OSHA Small Business Advocacy Review Panel

Tree Care Operations

Preliminary Initial Regulatory Flexibility Analysis

March 2020

Tree Care Operations Preliminary Initial Regulatory Flexibility Analysis
(PIRFA)

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I. INTRODUCTION

OSHA is considering promulgating a new standard covering tree care operations with the goal of ensuring that workers of covered employers work safely when performing tree care. This potential standard would cover certain workers who prune, repair, maintain, or remove trees, as well as workers who provide any on-site support for such work.

OSHA's potential standard is based in part on, and is largely consistent with, the Virginia Occupational Safety and Health Program (VOSH) Tree Trimming Operations regulation, 16 Va. Admin. Code ch. 73 (the VOSH Tree Trimming Operations regulation, available at http://law.lis.virginia.gov/admincode/title16/agency25/chapter73/). OSHA found the Virginia regulation to be an especially useful source because it is written in a style that translates readily to federal regulation. The potential standard is also largely consistent with tree care regulations promulgated by Oregon,[1] California,[2] Maryland,[3] and Michigan,[4] as well as the American National Standards Institute (ANSI) Standard for Arboricultural Operations – Safety Requirements (ANSI Z133-2017).

OSHA's potential tree care operations standard would apply to employers engaged in tree care, including pruning, maintaining, repairing, or removing trees. This would include tree trimmers and pruners who engage in tree care operations work daily, as well as companies, municipalities, and organizations that occasionally perform tree care. For example, if a general contractor or landscape company performing general lawn maintenance removes a tree as part of

[1] Available at *https://osha.oregon.gove/OSHARules/div2/div2R.pdf*.

[2] Available at *https://Califo*rnia *Code of Regulations, Title 8, Section 3427, Safe Work Procedures*.

[3] Available at *https://mdrules.elaws.us/comar/09.12.28*.

[4] Available at *https:www.michigangov/documents/CIS_WSH_part53_34782_7.pdf*.

the scope of work, that employer would be covered by this potential standard. The work performed to remove that tree, as well as training and equipment use, would be regulated by this potential standard.

Workers engaged in on-site support of tree care would also be covered under this potential standard. Employees performing on-site groundwork, vehicle control, or operating equipment in connection with tree care would therefore fall under the scope of this standard.

In accordance with the Regulatory Flexibility Act (RFA) (Sections 601 through 612 of Title 5 of the United States Code), OSHA is convening a Small Business Advocacy Review Panel ("SBAR Panel"). This Panel consists of members from OSHA, the U.S. Small Business Administration's Office of Advocacy (SBA Office of Advocacy), and the Office of Information and Regulatory Affairs (OIRA) within the Office of Management and Budget (OMB).

The SBAR Panel identifies individuals who are representatives of affected small entities, termed "Small Entity Representatives" (SERs). Small entities under the RFA include small businesses, small not-for-profit organizations, and small governmental jurisdictions with a population less than 50,000. For purposes of defining small businesses, OSHA uses the industry-specific size standard published by the Small Business Administration (SBA) (for more information, please see https://www.sba.gov/content/summary-size-standards-industry-sector).

The SBAR Panel has several purposes. First, the Panel provides an opportunity for affected small employers to provide comments to OSHA. Second, by reviewing OSHA's potential provisions that may be included in a tree care operations standard and estimates of the potential impacts of that rule, SERs and the Panel can offer recommendations to OSHA on ways to tailor the rule to make it more cost effective and less burdensome for affected small entities. Third, early comments permit identification of different regulatory alternatives the agency might consider. Finally, the SBAR Panel report can provide specific recommendations for OSHA to consider on issues such as reporting requirements, timetables of compliance, and whether some groups, including small entities, should be exempt from all or part of any proposed rule.

Following the SBAR Panel, if the agency were to move forward with rulemaking, OSHA's next step would be to publicly propose the new rule in the *Federal Register*. The Preamble to the proposed rule would include an Initial Regulatory Flexibility Analysis (IRFA) that focuses attention on the potential impacts on small entities. The IRFA would include a description of the Panel's recommendations and OSHA's responses to those recommendations. Sections 603(b) and (c) of the RFA set out the requirements for the IRFA:

> (b)(1) a description of the reasons why action by the agency is being considered;
> (b)(2) a succinct statement of the objectives of, and legal basis for, the proposed rule;
> (b)(3) a description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
> (b)(4) a description of the proposed reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirements and the type of professional skills necessary for preparation of the report or record;

(b)(5) an identification to the extent practicable, of all relevant federal rules that may duplicate, overlap, or conflict with the proposed rule; and
(c) a description of any significant alternatives to the proposed rule that accomplish the stated objectives of applicable statutes that minimize any significant economic impact of the proposed rule on small entities.

An alternative under Section 603(c) need not be unique to small entities. Rather, an alternative that meets OSHA's goals and reduces impacts for all affected entities can and should be considered as part of the Panel and regulatory flexibility analysis process.

Under Section 609(b) of the RFA, the SBAR Panel must be provided any information that OSHA has available on issues related to paragraphs (3), (4), and (5) of Section 603(b), as well as Section 603(c), of the RFA. The SBAR Panel collects comments on these issues.

This Preliminary Initial Regulatory Flexibility Analysis (PIRFA) provides such information to the members of the SBAR Panel and to individual SERs who have agreed to participate in this SBAR Panel. The PIRFA also satisfies the RFA's legal requirement that OSHA provide certain information to the Chief Counsel for Advocacy. OSHA has placed all references in this document in the public docket at regulations.gov, OSHA-2008-0012, and can help SERs obtain any references they would like to see. All non-copyrighted references will be available online at regulations.gov in the public docket for this potential rulemaking. Copyrighted materials are available for inspection through OSHA's docket office: OSHA Docket Office, Room N-2625, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210; telephone number (202) 693-2350 (OSHA TTY (887) 889-5627).

II. LEGAL BASIS FOR AN OSHA STANDARD ADDRESSING TREE CARE OPERATIONS

The legal basis for a potential draft safety proposal is the responsibility delegated to the Secretary of Labor by the Occupational Safety and Health (OSH) Act of 1970 (29 U.S.C. § 651 et seq.). The OSH Act was enacted "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources." 29 U.S.C. § 651(b). The legal authority for issuing safety and health standards is found in Section 6(b) of the OSH Act (29 U.S.C. § 655).

The OSH Act imposes a number of requirements OSHA must satisfy before adopting a safety standard. Among other things, the standard must be highly protective, materially reduce a significant risk to workers, be technologically feasible, be economically feasible, and employ the most cost-effective protective means for meeting the agency's regulatory goals. *See* 58 FR 16612, 16614-16 (Mar. 30, 1993); *Int'l Union, United Auto., Aerospace & Agric. Implement Workers of Am. v. OSHA*, 37 F.3d 665, 668-69 (D.C. Cir 1994). A standard is technologically feasible if the protective measures it requires can be developed and installed by a typical firm most of the time, which can be demonstrated by showing, for instance, that the technology "is already in use or has been conceived and is reasonably capable of experimental refinement and distribution within the standard's deadlines." *United Steelworkers of Am. v. Marshall*, 647 F.2d

1189, 1272 (D.C. Cir. 1980). In determining economic feasibility, OSHA must consider the cost of compliance on an industry basis rather than the cost on individual employers. In its proposed and final economic analyses, OSHA follows the standards of the U.S. Court of Appeals for the D.C. Circuit to "construct a reasonable estimate of compliance costs and demonstrate a reasonable likelihood that these costs will not threaten the existence or competitive structure of an industry." *Id.*

III. WHY REGULATION IS BEING CONSIDERED

A. Reasons the Rule is Being Considered

Congress created OSHA to assure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education and assistance. Based on the preliminary research described below, OSHA believes that there are currently unsafe or hazardous conditions for working men and women in the treecare industry that could be improved through federal regulation.

Workers engaged in tree care operations are exposed to a number of serious hazards including being hit by falling trees or branches, falling from trees, ladders, or bucket trucks, coming into contact with high speed cutting equipment including chainsaws, chippers, and stump grinders, and contact with electric power lines. As shown below, tree care workers account for only 0.03 percent of all workers in the U.S. but represent nearly one percent of all fatalities. The Bureau of Labor Statistics (BLS) reported 521 fatalities to tree trimmers and pruners between 2011-2017 – a rate of 1.1 per 1,000 workers. This rate is about 30 times higher than the fatality rate faced by private sector workers overall (3.5 per 100,000 or 0.035 per 1,000 workers) (BLS, 2018b). Tree care workers also have a high rate of injuries. As described below, about 1,100 workers are injured annually – a rate of 238.7 per 10,000 workers compared to a rate of 89.4 per 10,000 full-time workers for all occupations (BLS, 2018c).

In this section, OSHA summarizes some of the data that demonstrate the hazards facing workers performing tree care operations. To identify the occupational safety hazards tree care workers experience on the job, OSHA examined fatalities and injuries data from the U.S. Bureau of Labor Statistics – Injuries, Illnesses, and Fatalities program (IIF)[5] and OSHA's Integrated

[5] The BLS IIF program fatality data are compiled through the IIF's Census of Fatal Occupational Injuries (CFOI), a "Federal-State cooperative program that has been implemented in all 50 States and the District of Columbia since 1992. To compile counts that are as complete as possible, the census uses multiple sources to identify, verify, and profile fatal worker injuries. Information about each workplace fatal injury—occupation and other worker characteristics, equipment involved, and circumstances of the event—is obtained by cross-referencing the source records, such as death certificates, workers' compensation reports, and Federal and State agency administrative reports. To ensure that fatal injuries are work-related, cases are substantiated with two or more independent source documents, or a source document and a follow-up questionnaire" (BLS, 2012). Given the multifactor authentication, CFOI is considered the authoritative count for work-related deaths in the United States. However, the data are aggregated and presented in a way that makes it difficult to ascertain the activities workers are engaging in when they are fatally injured. This presents a drawback in assessing the need for or effectiveness of a rule where many workers with many job titles in many industries could potentially be performing the regulated tasks. As a result,

Management Information System (IMIS) and the OSHA Information System (OIS). The discussion of the OSHA IMIS/OIS data provides preliminary indications of which provisions of the standard are most likely to affect specific types of fatalities. These data sources provide information with varying levels of detail, and the data from each helps to build a more complete picture of the risks faced by workers in the tree care industry. This section is not intended to determine precisely which fatalities and injuries might be prevented by a tree care operations standard but is rather intended to provide an overview of the types of hazards a standard would seek to address. If OSHA moves forward with a proposed rule, OSHA intends to provide more definitive and quantitative information in its Preliminary Economic Analysis supporting a formal Notice of Proposed Rulemaking (NPRM).[6]

B. Fatal Occupational Injuries among Tree Trimmers and Pruners (BLS, IIF Data)

OSHA requested the assistance of the U.S. Bureau of Labor Statistics, IIF program to provide estimates of the number of fatal and nonfatal occupational injuries to tree trimmers and pruners. For this purpose, OSHA asked BLS to provide data for the Standard Occupational Code of 37-3013 – Tree Trimmers and Pruners. To the extent that workers other than tree trimmers and pruners who are also part of a tree trimming crew are fatally injured during tree care operations, these BLS data underestimate the total number of fatalities among the population covered by the standard. (OSHA will return to this issue of fatalities to persons other than tree trimmers in the OSHA IMIS/OIS data.) BLS estimated a total of 521 occupational fatalities to tree trimmers and pruners from 2011 through 2017 (see Table III-1); an average of 74 fatalities per year over that period. However, OSHA's statutory authority does not extend to protection of self-employed workers, who represent 38 percent of all fatalities recorded by BLS. Any potential standard that OSHA promulgates would not apply to self-employed workers and would not be expected to directly reduce the number of injuries they suffer, but the hazards and injuries they experience are likely to also be experienced by workers protected by OSHA. From 2011 through 2017, there were 324 fatalities to workers at establishments that are subject to OSHA's authority (wage and salary workers), for an average of 46 fatalities to those tree trimmers and pruners per year.

OSHA uses its own data on serious incidents, namely OIS and IMIS, to provide more detailed data on the relation of possible provisions of the rule to the serious incidents.

[6] The Tree Care Industry Association (TCIA) collects and reports tree care related fatality and injury data gathered from media reports. These data show considerably more fatalities than either BLS or OSHA IMIS/OIS sources but include all types of tree care-related fatalities and injuries including fatalities and injuries to homeowners working on their own property, self-employed workers, and others outside of OSHA's jurisdiction. Removing fatalities and injuries to individuals outside OSHA's jurisdiction to the extent possible gives results that are broadly consistent with other sources. The TCIA data reinforce OSHA's preliminary determination that tree care work can be dangerous regardless of where and by whom it is performed. It should also be noted that BLS, OSHA, and TCIA data show falls, struck by trees or tree limbs, and electrocutions as leading hazards related to tree care work.

Table III-1. Fatal Occupational Injuries to Tree Trimmers and Pruners in the U.S., 2011-2017

Year	Number of Fatalities	Fatalities for Wage and Salary Workers	Fatalities for Self-Employed Workers
2011	83	51	32
2012	71	46	25
2013	71	49	22
2014	68	43	25
2015	66	41	25
2016	84	49	35
2017	78	45	33
Total	**521**	**324**	**197**
Average	**74**	**46**	**28**

Source: OSHA, based on U.S. Bureau of Labor Statistics, Injuries, Illnesses, and Fatalities Program.
Note: These numbers are unpublished counts or estimates from the Bureau of Labor Statistics, Occupational Safety and Health Statistics.

In 2017, there were approximately 41,000 tree trimmers employed as wage and salary employees (see Section V, Potentially Affected Entities).[7] Given 45 fatalities in 2017, this implies a fatality rate of 1.1 per 1,000 employees for that year, an occupational fatality rate that is much higher than the rate in most industries. The fatality rate for all U.S. workers was 3.5 per 100,000 full-time equivalent workers in 2017 (BLS, 2018b). The 41,000 wage and salary tree trimmers account for 0.87 percent or almost one percent of the 5,100 total reported occupational fatalities in the U.S. (BLS, 2018b) even though the number of workers in this industry represents 0.03 percent of all workers in the overall workforce (41,000 tree trimmers and pruners and 142.6 million total workers in all occupations (BLS, 2018c)).

Through further review of the BLS IIF data, OSHA was able to gain information about the most frequent characteristics in the work environment that led to the 521 occupational fatalities during the selected period. (Some of these individuals may have been self-employed, and therefore not subject to OSHA's jurisdiction. OSHA does not yet have this data for wage and salary workers alone.) OSHA was interested in the industries that employed tree trimmers and pruners who were fatally injured in a tree care incident. As shown in Table III-2 below, over 94 percent of work-related fatalities to tree trimmers and pruners occurred among workers employed in the North American Industry Classification System (NAICS) 561730 Landscaping Services. Among tree trimmers and pruners employed by companies in other NAICS codes (often businesses who require tree services as part of the maintenance of their own grounds), there was an average of eight fatalities a year.

The combination of the standard's requirements for job hazard analysis, job briefings and training contained in the potential rule are intended to have some effect on almost all kinds of fatalities. Further examination of Table III-2 shows that most of these fatalities are of kinds addressed by this standard.

[7] The number of tree trimmers is the total reported number of tree trimmers and pruners (SOC 37-3013) in the BLS Occupational Employment Survey data. Total here is employment for 2017 to align with the data analysis of accidents, injuries, and fatalities. 2018 data are used in the cost section.

Table III-2. Number of Fatal Occupational Injuries to Tree Trimmers and Pruners by Selected Characteristics

	Year								
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**	**Average**
Tree Trimmers and Pruners Fatalities	83	71	71	68	66	84	78	**521**	**74**
Selected Characteristics									
Industry									
Landscaping Services	79	66	63	65	61	82	76	**492**	**70**
Event or Exposure									
Transportation incidents	4	2	4	5	4	4	3	**26**	**4**
Fall to lower level	36	30	28	30	26	41	41	**232**	**33**
Exposure to electricity	13	10	9	9	5	15	7	**68**	**10**
Struck by object or equipment	25	24	26	21	23	18	19	**156**	**22**
Source									
Trees	37	34	25	24	29	36	36	**221**	**32**
Limbs, branches unattached	8	10	17	17	10	10	8	**80**	**11**
Tools, instruments, and equipment	15	11	8	6	6	15	10	**71**	**10**
Boom truck, bucket or basket hoist truck	8	6	9	8	6	11	8	**56**	**8**
Worker Activity									
Vehicular and transportation operations	4	2	5	4	5	5	3	**28**	**4**
Logging, trimming, pruning	56	52	49	58	55	70	66	**406**	**58**
Climbing, descending (ladders or trees)	6	3	3	1	-	6	3	**22**	**3**

Source: U.S. Bureau of Labor Statistics, Injuries, Illnesses, and Fatalities Program.
Note(s): Number of fatalities for selected characteristics may not equal total because OSHA selected those work-related characteristics that had the highest number of fatalities. These numbers are unpublished counts or estimates from the Bureau of Labor Statistics, Occupational Safety and Health Statistics.

Event or Exposure

An event or exposure indicates the manner in which a work-related injury happened. From 2011 to 2017, BLS data show falls as the leading cause of all fatalities to tree trimmers and pruners; 232 of the 521 fatalities were the result of falls to lower levels. These falls included falls from collapsing structures and equipment at a height of 26 feet or more; and falls from 30 feet or more to lower levels.

Contact with objects and equipment was the second leading cause of fatal injuries to tree trimmers and pruners. There were 156 fatalities resulting from workers being struck by falling objects or equipment.

These two leading causes of fatalities account for 74 percent of all fatalities, and would be directly addressed by a potential regulation.

Transportation incidents made up nearly 5 percent of the fatal occupational injuries to tree trimmers and pruners. These incidents involved workers being struck by vehicles while in

their work zone as well as roadway collisions with other motorized vehicles. The potential regulation contains traffic control provisions addressing work in or around roadways. Should OSHA proceed to issue a proposed rule, OSHA would examine the transportation vehicle incidents in more detail to determine which fatalities could have been prevented by compliance with existing OSHA standards or requirements by federal, state, or local governments, and which might be reduced through the potential rule's requirements for job hazard analysis, job briefings, traffic control, and training.

The other most frequent cause of fatalities for tree trimers and pruners was direct or indirect exposure to electricity. While the potential rule's job hazard analysis, job briefing, and training requirements affect all possible types of fatalities, and the potential rule would include traffic control requirements for tree care work near traffic, the potential rule would not directly change requirements involving electrical work or transportation of equipment from a worksite (e.g., driving on a highway to reach bring equipment to a job location). There are existing OSHA standards that address work near electric power lines and the U.S. Department of Transportation and state and local governments regulate transportation on highways and other public roads.

Source

Data on the source of a fatal occupation injury identifies the "object, substance, person, bodily motion, or exposure which most directly led to, produced, or inflicted the injury or illness" (BLS, 2018b). For example, trees would be considered a source if the word "tree" occurred in the accident description as a major factor leading to the fatality. A tree could be a source if the fatality occurred while climbing a tree, as result of a tree falling. Trees were the primary source in 42 percent of the fatalities to tree trimmers and pruners, followed by unattached tree branches or limbs which accounted for 15 percent of fatalities. Tools, instruments, and equipment were involved in 71 work-related fatalities from 2011 through 2017 and included the use of non-powered cutting hand tools such as saws; powered cutting hand tools such as chain saws; ladders; and personal protective equipment such as lifelines, lanyards, safety belts, and harnesses. Aerial lifts of various kinds were the source of 15 percent of the fatal injuries to tree trimmers and pruners with boom trucks and bucket or basket hoists being the primary source in 56 of the reported fatalities. In total, 82 percent of the fatalities were from these four sources, all of which would be at least partially addressed by the potential rule.

Worker Activity

Data on worker activity describes the occupational task a worker was engaged in when the injury occurred. Of the 521 fatal injuries to tree trimmers and pruners, 85 percent of the workers were engaged in logging, trimming, or pruning activities. BLS includes in this activity category - trimming and pruning (330 fatalities) and using a power saw (28 fatalities). "Vehicular and transportation operations" was the activity for 28 of the tree trimmers and pruners fatalities from 2011 through 2017. This work activity includes driving or operating a truck, riding in or on a truck, boarding or alighting a truck, and walking in or near a roadway. Accidents resulting from workers being near roadways would be affected by this standard. These types of fatalities would also be affected by the job hazard analysis, job briefing, traffic control, and training requirements of the potential standard.

Physical activity accounted for 21 fatalities to tree trimmers and pruners. In these cases, workers were either climbing or descending a tree or ladder when they were injured.

C. Non-Fatal Occupational Injuries among Tree Trimmers and Pruners (BLS, IIF Data)

To develop an estimate of the number of non-fatal occupational injuries resulting from safety hazards associated with the duties of tree trimming and pruning, OSHA examined data from the Bureau of Labor Statistics – Survey of Occupational Injuries and Illnesses. From 2011 through 2017, there were a total of 7,770 non-fatal lost work time injuries to tree trimmers and pruners, or an average of about 1,110 non-fatal occupational injuries annually (see Table III-3).[8] The median days away from work for injuries among tree trimmers and pruners averaged about 10 days over this time period compared to an average median days away from work of 8 days for all occupations. As noted above, tree trimmers accounted for only 0.03 percent of the workforce, almost one percent of all fatal injuries, and 0.1 percent of non-fatal occupational injuries with days away from work. The rate of non-fatal occupational injuries with days away from work for tree trimmers and pruners was 238.7 per 10,000 workers, compared to a rate of 89.4 per 10,000 full-time workers for all occupations (BLS 2018c).

Table III-3. Number of Non-Fatal Occupational Injuries with Days Away from Work to Tree Trimmers and Pruners in the U.S., 2011-2017

Year	Number of Tree Trimmers and Pruners	Injuries to Tree Trimmers and Pruners	Median Days Away from Work	Number of Workers (All Occupations)	Injuries (All Occupations)	Median Days Away from Work
2011	38,530	1,110	13	128,278,550	918,140	8
2012	39,750	1,230	10	130,287,700	918,720	8
2013	40,720	1,200	13	132,588,810	917,090	8
2014	39,640	1,560	11	135,128,260	916,440	9
2015	40,160	790	10	137,896,660	902,160	8
2016	40,680	990	5	140,400,040	892,270	8
2017	41,140	890	10	142,549,250	882,730	8

Source: OSHA, based on U.S. Bureau of Labor Statistics, Injuries, Illnesses, and Fatalities Program.
Note: These numbers are unpublished counts or estimates from the Bureau of Labor Statistics, Occupational Safety and Health Statistics.

[8] There were about 900,000 lost work time injuries to all private sector workers in 2017. This means that tree trimmers and pruners account for about 0.1 percent of all lost work time injuries while only comprising 0.03 percent of the total private sector workforce.

Table III-4. Number of Nonfatal Occupational Injuries and Illnesses Involving Days Away from Work by Occupation and Selected Events or Exposures Leading to Injury or Illness, Private Industry, 2010-2017

Occupational Code 37-3013 - Tree Trimmers and Pruners

	Year							
Event or exposure leading to injury or illness[1]	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Contact with objects	430	380	290	510	740	300	460	400
Falls, slips, trips	130	250	160	120	180	130	170	240
Overexertion and bodily reaction	70	130	410	220	250	100	170	110
Transportation incidents	–	–	–	30	–	30	50	–
Exposure to harmful substances or environment	20	–	50	20	20	80		
Violence and other injuries by persons or animals - *animal and insect related	40	40	20	–	–	–	–	–
All other events[2]	20	–	–	30	–	–	–	–
Total injuries and illnesses	**680**	**820**	**1,000**	**960**	**1,210**	**650**	**860**	**760**

Source: US Department of Labor - Bureau of Labor Statistics - Survey of Occupational Injuries and Illnesses Table R12 - Number of nonfatal occupational injuries and illnesses involving days away from work by occupation and selected events or exposures leading to injury or illness

Footnotes:

[1] Data correspond to Event codes based on the Occupational Injury and Illness Classification System 2.01 developed by the Bureau of Labor Statistics.

[2] Includes nonclassifiable responses.

Days-away-from-work cases include those that resulted in days away from work, some of which also included job transfer or restriction.

Note: Dash indicates data do not meet publication guidelines, data may be too small to be displayed.

Because of rounding and data exclusion of nonclassifiable responses, data may not sum to the totals.

D. Fatal Occupational Injuries among Tree Care Workers in the Landscaping Services Industry (OSHA, IMIS/OIS Data)

To get a better understanding of the types of safety hazards tree care workers experience on the job, OSHA conducted a search of its IMIS and OIS databases.[9] OSHA used the NAICS code of 56173 – Landscaping Services to list all Fatality and Catastrophe Investigation Summaries that may involve fatalities to workers as a result of performing tree care activities. Unlike the BLS data, the incidents in the IMIS/OIS databases include narrative summaries explaining the circumstances of each fatality. This allows for an analysis of the factors that lead to accidents in a way that the BLS summary data do not. Unlike the BLS data, OSHA's IMIS/OIS data are not necessarily restricted by occupation or NAICS industry. This means that

[9] Because IMIS/OIS data are self-reported, they likely do not capture one hundred percent of occupational fatalities. For this part of the analysis, OSHA is using the IMIS/OIS data to categorize the types and causes of fatalities that occur during tree care operations with the assumption that the types and causes of fatalities in this limited search are similar to the types of fatalities experienced across all workers involved in tree care operations regardless of the worker's occupational title or in which NAICS industry they are employed.

accidents that involved tree care operations can be identified for any NAICS industry and are not limited to workers with the occupation of tree trimmer and pruner. The search of OSHA's IMIS/OIS database identified 247 accident reports from 2016 through 2018. After manually reviewing each investigation report, and eliminating accidents that did not involve tree care activities (i.e., workers killed by a tree that fell during a storm, worker killed when lawn mower overturned), OSHA found 135 accident reports, all involving fatalities, resulting in 135 fatalities to tree care workers (see Table III-5 below), at an average rate of 45 fatalities per year. Unlike the BLS data on the occupation of tree trimmers and pruners, these data include fatalities to other members of the crew. OSHA found that over the three-year period examined, there were 16 fatalities to persons other than tree trimmers. These were largely the result of either being struck by a tree or tree limb or of operating a wood chipper. However, unlike the BLS IIF data above (specific to the tree trimming profession), this search method does not account for fatalities as a result of tree care work in NAICS industries other than landscaping services.

Table III-5. Number of Fatal Occupational Injuries by Safety Hazard

NAICS 56173 – Landscaping Services				
	Year			
Occupational Safety Hazard or Type	**2016**	**2017**	**2018**	**Total**
Struck by tree, tree limb or tree trunk	14	24	13	51
Fall from tree or tree limb	11	16	7	34
Fall from aerial lift or boom truck	6	0	1	7
Fall from elevation—ladder	2	2	1	5
Electrocution	11	9	7	27
Wood chipper or stump grinder	2	4	2	8
Chain Saw	0	1	2	3
Subtotal	**46**	**56**	**33**	**135**
Fatality to crew member and not a tree trimmer	6	4	6	16
Lack of timely rescue	0	1	2	3

Source: U.S. Department of Labor, OSHA Integrated Management Information System/OSHA Information System, Fatality and Catastrophe Investigation Summaries. Does not include all types of hazards and some categories such as "fatalities to crew member" or "rescue might have prevented fatality" overlap with other headings.

The following describes the types and causes of fatal accidents in the OSHA IMIS/OIS data. This is intended to be descriptive of the kind and causes of accidents among workers performing tree care operations and to broadly suggest what provisions in the regulatory framework may help prevent future incidents of those kinds and with those causes.

Struck by Tree, Tree Limb, Tree Trunk

Nearly 34 percent, or 51 total during the three years analyzed, of the fatal accidents to tree care workers in the Landscaping Services industry were the result of workers being struck by trees, tree limbs, and tree trunks. OSHA's IMIS/OIS reports showed workers were often in the drop zone of a cut tree limb or tree when the fatal injury occurred.[10]

[10] The drop zone, also referred to as a work zone or fall zone, is a restricted zone around a tree being cut.

In some of these cases, trees fell in unanticipated directions outside the intended drop zone due to collisions of nearby falling trees. Job hazard analyses that, for example, more thoroughly assesses the condition of the tree, the position of surrounding trees that may get in the way, and where the potential drop zone would be and job briefings aimed at ground crew workers informing them, for example, of drop zones and reinforcing requirements that workers stay clear of drop zones are the principle ways of trying to prevent these accidents, though some of the tree removal provisions may also help. In other cases, a tree was not structurally stable and fell long before it had been fully cut through – before workers had cleared the area in anticipation of the tree falling. Job hazard analyses, and especially the establishment of drop zones can help prevent these kinds of fatalities. In cases involving the use of cranes or other support systems during the removal of tree trunks (or sections of trees), the data show that workers were fatally injured when trunks rolled or snapped after the tree had been cut down. Again, job hazard analyses and job briefings are most important to preventing these types of fatalities.

Fall from Tree, Tree Limb

Falls from trees or tree limbs were the second most frequent hazard found from OSHA's IMIS/OIS reports. According to these reports, tree care workers were fatally injured in falls from heights as low as 15-feet and as high as 150-feet. Even when workers use fall protection, those systems can fail, resulting in a fatal fall. The IMIS/OIS data included reports where workers were wearing fall arrest systems that failed; for example, harness saddle ropes either broke or came untied during climbing or descending trees. The regulatory framework's requirement for inspection of fall protection systems can help to prevent these kinds of incidents. In other incidents, workers accidentally cut their safety ropes during tree care activities; cut limbs their safety harness was attached to; or lost their balance when removing safety ropes to readjust their position. Full compliance with the fall protection provisions of the standard, as well as job hazard analysis, job briefings, and training can help prevents these fatalities.

Fall from Aerial Lift, Boom Truck

Another fall hazard was falls from the bucket or basket of aerial lifts, boom trucks, or crane hoists which resulted in seven fatalities over the three year period analyzed. Workers were catapulted or ejected from baskets when baskets were struck by falling tree limbs. Falls from baskets occurred when workers were operating chainsaws to cut tree limbs or maneuvering to cut branches causing tip-overs. In other cases, falls were the result of malfunctions of the lifts, such as broken connecting ropes or hydraulic cylinders. The potential regulation has provisions addressing falls from aerial lifts.

Fall from Ladder

Falls from ladders accounted for five fatalities (two percent) in this data set. The regulatory framework has provisions addressing ladder safety that may prevent or reduce the likelihood of ladder related accidents.

Electrocution

The third highest hazard found in OSHA's search was electrocutions accounting for 27 fatalities over the three years analyzed. In addition to direct contact with wires, the most common sources of electrocutions were pole tools contacting power lines; limbs falling across power lines; and aerial lift buckets coming into contact with wires. Job hazard analyses, job briefings and training address these hazards, which are primarily addressed by other existing OSHA standards. This regulatory framework also includes a new requirement that Food and Drug Administration (FDA)-approved automated external defibrillators (AEDs) be available at each worksite where workers are exposed to electrical hazards. Rapid deployment of AED assistance may reduce the number of fatalities due to electrocutions.

Wood Chippers

There were seven fatalities caused by wood chippers or stump grinders. Most were associated with wood chippers and were frequently the result of a worker trying to unjam a wood chipper that was still running. Portions of the regulatory framework address wood chipper hazards and adherence with these provisions may prevent or reduce the likelihood of this type of accident.

Lack of Timely Rescue

The incident reports included three fatalities where a worker working aloft was severely injured and could not be lowered to the ground in time to prevent a fatality. Adequate rescue equipment might have prevented these fatalities. The regulatory framework has provisions addressing possible rescues that may prevent fatalities in cases where workers working aloft were injured and cannot self-rescue. Note that in examining the IMIS/OIS data, this category overlaps with other types of accidents.

Chain Saws

In spite of the ubiquity of chain saws in tree care work, there were only three fatalities that were the direct result of contact with chain saws. Chain saw fatalities would be addressed by the powered hand tool provisions in the potential tree care operations standard.

Other Fatalities

None of the 135 fatalities in the IMIS/OIS system attributed to tree care, as listed in Table III-4, involved transportation incidents. There were no fatalities in this data set that clearly involved tree care and involved employees not working in a roadway.

There was one fatality due to heat stress and one due to a heart attack attributed to tree care work.

E. Fatal Occupational Injuries among Tree Care Workers in Industries other than the Landscaping Services Industry (OSHA, IMIS/OIS Data)

OSHA's IMIS/OIS data search identified 20 fatalities related to tree care operations in industries other than Landscaping Services. Like in Landscaping Services (where the bulk of tree trimmers and pruners are employed), struck-by trees and limbs, electrocutions, and falls were the most common causes of fatalities representing 11, 5, and 4 fatalities, respectively. NAICS 541320 Landscape Architectural Services was the most common industry outside the Landscaping Services industry where workers were killed performing tree care operations, accounting for five fatalities over the three years reviewed. Three fatalities were recorded in construction industries other than site preparation contractors.[11] Some of the fatalities occurred in industries where tree care operations may be an expected, albeit rare, part of a worker's duties like in NAICS 712190 Nature Parks and Other Similar Institutions, NAICS 115310 Support Activities for Forestry, or NAICS 561210 Facilities Support Services. However, there were a few fatalities in industries where tree care operations are likely exceedingly rare, including a fatality in NAICS 453920 Art Dealers, where a worker was struck and killed by the limb they were trimming, and in NAICS 441310 Automotive Parts and Accessories Stores, where a worker was knocked from a scaffold from which they were working by the tree limb they were trimming.

While OSHA has no data on how frequently tree care operations are performed in the above-mentioned industries or other industries, it is clear that tree care work can be dangerous and potentially fatal regardless of where and by whom it is performed, and OSHA believes preliminarily that it is imperative that these tasks be undertaken by workers who are properly trained and equipped.

F. Summary

BLS data show that professional tree trimmers and pruners under OSHA's jurisdiction collectively average 46 fatalities per year. Some of these, particularly the electrical related fatalities and possibly the transportation related fatalities (of which there are an average of seven and four per year, respectively, among tree trimmers and pruners) may be little affected by this potential standard. This still leaves at least 35 fatalities per year directly addressed by this potential standard. The OSHA IMIS/OIS data show an average of 50 fatalities per year. Removing electrical-related fatalities and transportation-related fatalities leaves an average of 41 fatalities per year due to hazards addressed by this potential standard. Thus, these data suggest that a potential standard might directly address the causes of between 35 and 41 fatalities a year among an affected population of about 41,000 workers. And, while OSHA has not closely examined the relation between the causes of nonfatal occupational injuries among tree care workers and the potential provisions of a tree care operations standard, the potential standard would likely reduce those as well. However, as mentioned previously, OSHA's estimate does not take into account the accidents, fatalities, and injuries suffered by workers engaged in tree care operations who are employed in occupations other than tree trimming and pruning.

[11] These include one fatality recorded in each of the following industries: NAICS 236210 Industrial Building Construction, NAICS 237130 Power and Communication Line and Related Structures Construction, and NAICS 236115 New Single-Family Housing Construction (except Operative Builders).

IV. SUMMARY OF DRAFT REGULATION

This section provides an overview of the potential requirements OSHA is considering to address the hazards of tree care operations. OSHA's potential standard is based in part on, and is largely consistent with, the Virginia Occupational Safety and Health Program (VOSH) Tree Trimming Operations regulation, 16 Va. Admin. Code ch. 73 (the VOSH Tree Trimming Operations regulation, available at http://law.lis.virginia.gov/admincode/title16/agency25/chapter73/). The potential standard is also largely consistent with tree care regulations promulgated by Oregon, California, Maryland, and Michigan, as well as the American National Standards Institute (ANSI) Standard for Arboricultural Operations – Safety Requirements, (ANSI Z133-2017). In addition, OSHA reviewed comments received in response to an Advance Notice of Proposed Rulemaking (ANPRM) and an OSHA stakeholder meeting, which are discussed below, as well as lessons learned from tree care accidents involving falls, struck-by hazards, and electrocutions that occurred during the conduct of tree care operations.

Tree care is a high-hazard industry. The tree care industry's fatality rate for tree care operations makes it among the most hazardous occupations in the country. Tree care operations and equipment used during those operations expose workers to a number of workplace hazards. Some of these hazards include falling from trees or aerial devices; being hit by falling trees/branches, flying objects and vehicular traffic; being cut, mutilated, or killed by chainsaws and chippers; and coming into contact with energized power lines.

Recognizing a critical need to address the root causes of the high fatality rate in the tree care industry, OSHA developed an ANPRM on tree care operations to solicit information about the hazards to which tree care employees are exposed, as well as safe work practices implemented to address those hazards (73 FR 54118 (9/18/2008), available on www.regulations.gov under Docket No. OSHA-2008-0012)). The ANPRM was published on September 18, 2008, and the comment period closed on December 17, 2008. OSHA received 69 comments in response to the ANPRM (also available on www.regulations.gov under Docket No. OSHA-2008-0012). We appreciate this public input.

An informal stakeholder meeting was subsequently held on July 13, 2016 to gather more information on best practices for preventing work-related injuries and fatalities in tree care operations. (https://www.osha.gov/SLTC/treecare/mtg_minutes_07132016.html). Eighteen stakeholders participated in this meeting, and members of the general public were allowed to observe. OSHA obtained valuable information about tree care operations hazards and abatement of those hazards from the ANPRM responses and stakeholder meeting. These inputs have been extremely useful to OSHA while crafting this PIRFA.

Below, OSHA summarizes provisions that the agency, based on its research, currently believes would be appropriate in a tree care operations standard. These potential provisions are discussed in terms of what an employer "would" be required to do. However, OSHA emphasizes that its thoughts about what might be included in a potential standard are preliminary, and the PIRFA has been developed to generate discussion and receive feedback at this early stage. OSHA seeks comments on both these potential provisions and about new and different

abatement methods to address the hazards associated with tree care operations. The agency will carefully consider all input received during this SBAR Panel process and throughout the rulemaking process if the agency proceeds with a proposed rule that culminates in a final rule.

A. Scope and Application

Scope of Tree Care Operations

OSHA is considering a standard that would cover employers that engage in tree care operations. OSHA would define tree care operations to include:

- the pruning, repairing, maintaining, or removing of trees (tree care); and
- any on-site activities done in support of tree care.

Tree care operations would not include the use of earth-moving equipment to mechanically remove trees. Workers that would be covered by this potential standard (i.e. tree trimmers and pruners) generally are not exposed to the hazards associated with using earth moving equipment to mechanically remove trees. That type of work is generally done during activities such as site clearance (see 29 CFR 1926.604) or logging (see 29 CFR 1910.266). Under this potential standard, OSHA would define earth-moving equipment as machinery and vehicles used to dig, remove, or haul trees, dirt, or brush. Earth-moving equipment would include front-end loaders, backhoes, excavators, or dump trucks, for example. Thus, using a bulldozer to fell trees in their entirety at a work site would not be considered a tree care operation. Earth-moving equipment would not include tools and equipment specifically regulated by a potential tree care operations rule, such as chainsaws, stump grinders, chippers, sprayers, and cranes. OSHA notes that the manual felling of trees and other tree care operations would continue to be covered by a potential tree care operations rule even though earth-moving machinery may also be used at a site to remove trees. For example, if, after using an excavator to fell a tree, workers engage in limbing or bucking that tree, the limbing or bucking would be considered a tree care operation. As another example, a potential rule would apply to the manual felling of a tree to clear a site for the building of a home.

Tree care operations would also not include the pruning, repairing, maintaining, or removing of shrubs, hedges, and similar bushes, or the mowing of lawns. This work is typically done on residential or commercial properties by landscaping firms, not by tree care firms. (OSHA notes that a potential rule *would* apply to work done by landscaping firms to the extent those firms engage in tree care operations as defined by the rule. For example if a landscaping firm pruned trees, it would be covered under a potential standard).

Notwithstanding the potential exclusion, OSHA also believes the hazards associated with these activities may be similar to those involved in tree care operations when the shrub, hedge, or similar bush on which work is being done is of a certain height or diameter, or when the work occurs above a certain height on the shrub, hedge, or similar bush. For example, trimming a 20 foot high hedge involves fall hazards. OSHA, therefore, seeks input on whether the potential exclusion is appropriate.

OSHA seeks input on the potential definition of tree care operations. For example:

- Should a potential standard apply only to the pruning, repairing, maintaining, or removing of trees of a certain height or diameter, or when tree care occurs above a certain height on a tree? Many of the processes or equipment used in tree care operations (for example, tree climbing) would not be used when removing or trimming a sapling. Should the scope of a potential standard be limited to account for the size of the tree or where on the tree the work occurs? If so, how? For example, should the standard apply only if a tree has at least a 6 inch diameter at breast height ("DBH," the tree diameter measured at 4.5 feet above the ground), or if the tree is at least 4 feet tall, or if the tree care occurs on a part of a tree that is at least 4 feet off the ground?
- Should OSHA add definitions of "tree," "shrub," "bush," and "hedge"? If so, how should OSHA define such terms? Such definitions would need to be clear and concise such that workers, employers and regulatory agencies would understand and be easily able to apply the definitions to the worksite.
- OSHA's draft regulatory framework would exclude the use of "earth-moving equipment" to mechanically remove trees from the scope of a potential tree care operations standard. OSHA believes preliminarily that the hazards associated with that activity are different than the hazards typically associated with tree care operations. For example, if a bulldozer is used to remove trees, employees would not be engaged in tree care operations as defined by this draft regulatory framework. Should OSHA exclude "earth-moving equipment" from the scope of a potential tree care operations standard? Why or why not?
- OSHA is considering whether its potential exclusion on the use of "earth moving equipment" should include the use of earth moving and other mechanical equipment to pull down trees in the direction of a fall (with a chain affixed to a tree, for example). It is OSHA's preliminary understanding that the use of such equipment in this manner is not condoned in the tree care industry because such use could cause the tree to break apart (i.e. barberchair), or the pull line to break, or result in other unintended consequences. OSHA seeks input on how it should address this issue in a rulemaking. Should the use of earth moving and other mechanical equipment to pull down trees in the direction of a fall be excluded from the scope of a potential tree care operations standard? Should OSHA incorporate into a potential tree care operations standard requirements prohibiting the use of earth moving and other mechanical equipment in this manner? [12]
- In order to clearly define what might be excluded from the scope of a potential tree care standard, OSHA seeks input on how to define "earth-moving equipment." What

[12] It is also OSHA's preliminary understanding that the tree care industry permits the use of winches, in the hands of experienced operators, to deliver a measured amount of force, and, in such circumstances, all that is needed is a pull line, tightened by hand with perhaps a small amount of mechanical advantage, with the goal of getting the tree moving in the intended direction and then letting gravity do the rest. OSHA addresses the use of winches elsewhere in this summary of draft regulation. It notes here only that it will further explore this issue both in this SBREFA proceeding and in the rulemaking context (if OSHA moves forward with rulemaking).

equipment should OSHA consider as "earth-moving equipment" under the scope of this potential standard?

- OSHA seeks input on the potential exclusion of the pruning, repairing, maintaining, or removing of shrubs, hedges, and similar bushes, and the mowing of lawns, from the scope of a potential rule.
- Although OSHA is considering incorporating the exclusion for work on shrubs, hedges or similar bushes into a potential tree care operations rule, OSHA is continuing to examine whether the hazards associated with these activities are different than the hazards typically associated with tree care operations. Are the hazards different? Why or why not?
    - Should the scope of a potential standard be expanded to account for the size of the shrub, hedge, or similar bush on which work occurs, or where on the shrub, hedge, or similar bush the work occurs? If so, how? For example, should the standard apply if a shrub, hedge, or similar bush is at least 6 feet tall, or if a shrub, hedge, or similar bush is at least 4 feet tall, or if the work on a shrub, hedge, or similar bush occurs on a part of the shrub, hedge, or similar bush that is at least 4 feet off the ground?

Application of General Standards

OSHA notes that, in general, generally applicable standards (such as the Noise Standard, 29 CFR 1910.95, or the PPE standard, 29 CFR Part 1910 Subpart I) would continue to apply to tree care operations if OSHA moves forward with a potential tree care rule. The potential rule would note specifically when generally applicable provisions do not apply. For example, OSHA might determine that a particular requirement in the PPE standard is not appropriate for tree care work. If OSHA makes that determination, it would note that in the potential rule.

Multi-Employer Protections

OSHA is considering requiring that employers with employees who perform tree care operations ensure that workers at the site who are not engaged in tree care operations are protected from the hazards associated with tree care operations. OSHA believes preliminarily that employers performing tree care operations are often in the best position to protect all on-site workers from the hazards associated with tree care operations. These employers, unlike many other employers whose workers may be on-site, have the expertise to engage in tree care work and can best determine how to address tree care hazards. For example, the employer of a worker delivering packages to a home would likely not fully understand the implications of the worker entering a drop zone during tree removal activities, or even what area out of which the worker needs to stay. On the other hand, the employer removing the tree is the employer that engages in the activity that necessitates the establishment of a drop zone, needs to be qualified to establish an appropriate drop zone, is familiar with the controls that need to be implemented to keep workers out of the drop zone, and is therefore in the best position to ensure that all ground workers avoid many of the struck-by hazards to which they would be exposed if they entered the drop zone. Thus, under a potential standard, employers who perform tree care operations would be required to ensure that all workers on the ground not enter the drop zone during tree care

operations, whether the workers are engaged in tree care operations such as limbing and bucking, or work for other employers and are engaged in non-tree care activities such as trimming shrubs or delivering packages. OSHA seeks input on how, or whether, it should incorporate multi-employer protections into a potential standard.

B. General Requirements

Safety and Health Program

OSHA is considering requiring that employers whose workers perform tree care operations develop, implement, and maintain a written tree care safety and health program that adequately addresses the tree care operations hazards to which employees might be exposed. This written program would need to include the employer's safety and health policies and procedures for addressing tree care operations hazards. For example, depending on the hazards to which employees might be exposed, the program might need to cover the employer's policies and procedures for fall protection, personal protective equipment (PPE), protection from electrical hazards, protection from environmental hazards, traffic control, and the safe use of equipment (e.g., chipper, chainsaws). The program would need to be consistent with, and incorporate policies and procedures addressing, the OSHA requirements in a tree care operation standard, as well as any other applicable OSHA standards that address hazards encountered in tree care operations.

OSHA would require that this written safety and health program be reviewed and updated at least annually, and whenever necessary to reflect changes in occupational hazards or work procedures, changes in technology, or updates to applicable regulations. Employers would be required to provide this program to employees upon initial employment and make the program available to employees at any time.

Job Hazard Analysis (JHA)

OSHA is considering requiring employers to prepare a daily written JHA, prior to each tree care operation, and for each worksite. The JHA is a tool that identifies hazards that are or might be present at the worksite and is related to the specific nature of the tasks to be performed, the nature of the worksite itself, and the specific conditions present at the worksite at the time the task is to be performed. A JHA not only identifies potential hazards, but also includes specific means of abatement or avoidance of each of the hazards. A JHA can be completed on a form or checklist specific to the company.

Workers may have to spend several days at the same jobsite during which time work conditions change. In such circumstances, a new or revised JHA would need to be done to capture changes in conditions, such as weather, necessary equipment changes, changes in the method of communication required, or any changes to how work will be completed. OSHA would require that employees have input into the JHA as it is developed, so that hazards not accounted for will be incorporated.

Each JHA would need to include, but would not be limited to, the following:

- General jobsite information that would impact the method of work, as well as the hazards that are or might be present on the worksite. This would include, for example, the type, weight, and health of all trees that would be pruned, repaired, maintained, or removed;
- Location of overhead and underground utility or service lines;
- Weather and environmental conditions/hazards;
- Identification of all drop and work zones, and when workers can or cannot enter those zones;
- Methods of communication that are needed for the scope of work (including hands-free, wireless communication, hand signals, two-way radio, blue-tooth headsets);
- Specific job tasks to be completed, along with the hazards associated with each task;
- The type of tools that will be used to complete each task;
- The number of employees needed to perform the job;
- The rescue plan, including if an employee is trained in aerial rescue, or the contact information of the closest emergency medical service;
- Identification of all other hazards present at the jobsite, such as the potential presence of vehicular or pedestrian traffic, or of employees from other companies on-site; and
- The specific means of eliminating, or providing effective protection against, each of the hazards identified in the JHA, including but not limited to, administrative, engineering, or work practice controls that would be used.

The potential tree care operations standard would also require that the JHA contain procedures for the inspection of the tree prior to climbing, entering, or performing any work on the tree. This inspection would cover, for example, any trees being removed, any trees workers would be climbing in order to install cabling or rigging, and any trees to which cables would be attached for the purpose of hauling logs (i.e., spar trees). Inspection would be required to address the following hazards, at a minimum:

- Trunk and root hazards including, but not limited to, cracks, cavities, wood decay/rot, cut roots, and mushrooms;
- Lower stem hazards including, but not limited to, loose bark, open cavities, cracks, mushrooms, conks, and depressions or swelling in the stem;
- Limb hazards including, but not limited to, watersprouts, hangers, cankers, dead branches, lightning damage, and weak crotches; and
- 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.

OSHA is also considering requiring that, as part of a JHA, the employer determine the weight of the limbs and other tree parts that will be lowered to the ground during tree care operations. This potential requirement is important so that equipment used to lower limbs and other tree parts to the ground is not overloaded. Knowing the weight of tree sections will enable workers to set up the appropriate equipment, ensure cranes are set up correctly, and use

equipment such as ropes and port-a-wraps in the correct manner so that tree sections are lowered in controlled fashion. To aid employers in complying with this potential requirement, OSHA is also considering incorporating into a potential standard, as Non-Mandatory Appendix 1, a table delineating the weight of green logs. OSHA based this potential appendix on the Virginia Tree Trimming regulation, and the appendix is also consistent with the ANSI Z133 standard. Tables of this nature are also available in phone applications, which can be easily used at worksites.[13]

OSHA emphasizes that the JHA would need to be completed by a knowledgeable and experienced employee. Therefore, OSHA would require someone performing a JHA in a potential standard to be trained and competent in the following areas:

- Knowledgeable of the provisions of the potential standard and any other OSHA standards that might apply to the work at hand;
- Hazard recognition of the risks of climbing, and using tools and equipment;
- Worksite safety, including, for example, traffic control and drop and work zones;
- Electrical hazards, including, for example, working near or around above or underground utilities;
- Tool and equipment safety, including, for example, machine guarding, refueling techniques and inspection and usage for portable hand tools;
- Chainsaw usage;
- Pruning and trimming procedures;
- Tree removal procedures;
- Limbing and bucking procedures;
- Vehicle and mobile equipment safety, including, for example, how to safely operate chippers, stump grinders, equipment mounted winches and other equipment;
- Aerial device operation;
- PPE, including which PPE is required, as well as climbing gear;
- Climbing procedures, including how to ascend, descend, and work in trees;
- Cabling and rigging;
- Rescue procedures, including, for example, what emergency response is most applicable, rescue plan development, calling 911, or performing aerial rescues, as well as training and competency in CPR, first aid, and AED usage;
- Communication methods, including radio and hand signals;
- Identification of environmental hazards, such as poisonous or irritant plants, animals or weather conditions;
- Sprayer operations;
- Tree inspection to include the health and stability of the tree, root collar, and surrounding area to determining if the tree can withstand the forces to be applied during the work; and
- How to communicate effectively.

Employees may not be exposed to a number of hazards typical to tree care operations in the limited situation when the only tree care operations taking place at a worksite are sprayer

[13] OSHA does not approve or endorse products such as phone applications.

operations and no employee engaged in sprayer operations climbs, changes work location or works on trees during the course of these sprayer operations. For example, employees performing sprayer operations are not exposed to hazards associated with working inside a drop zone or climbing trees during this limited situation. Should the JHA and job briefing in such a limited sprayer operations situation be performed by an employee who is knowledgeable and experienced in all aspects of tree care operations or would such a requirement be overly burdensome given the limited nature of the sprayer operations? OSHA seeks input on whether it should include, in a potential rule, modified requirements for the JHA and job briefing that are specific to this limited sprayer operations situation. OSHA is still weighing whether and how to modify these potential requirements. Therefore, if you believe OSHA should modify the JHA and job briefing potential requirements in this limited situation, how should OSHA do so?

OSHA notes that it believes preliminarily that the JHA and job briefing in this potential standard are integral to reducing tree care operations fatalities and injuries. OSHA seeks input on a potential JHA requirement. For example:

- Do you complete JHAs? If so, how often do you complete JHAs? Are your JHAs jobsite-specific or job activity-specific?
- Should a JHA be conducted for all jobs? Are there some jobs or jobsites where a job hazard analysis is more or less appropriate? What factors would be helpful to consider in determining whether a JHA should be required for a particular jobsite?
- What portion of a JHA, if any, can be completed prior to a crew arriving at the jobsite?
- Should tree inspections be included in JHAs? Why or why not?
- Should the JHA include the requirement that the employer determine the weight of the limbs and other tree portions that will be lowered to the ground during tree care operations? Why or why not?
- When are electrical hazards, or underground service lines identified?
- Are there any tools or equipment needed to assist in conducting JHAs?
- Is there a shorter version of a JHA that would offer the same protection as a detailed checklist?
- Are individuals outside of the tree care company included in the JHA process? If so, who, is included and do they have input into the JHA?
- How are JHA results shared or communicated on multi-employer worksites?
- Are pre-climb assessments included in the JHA process?
- What other areas of training would be required or helpful for someone performing a JHA?

Job Briefing

A potential tree care operations standard would require that employers hold a job briefing with all worksite employees prior to beginning any tree care operations. OSHA has considered, and has based some of the provisions in this potential rule, in part, on existing job briefing requirements in OSHA's Electric Power Generation, Transmission and Distribution standard (29 CFR 1910.269(c)(1) through (c)(4)). A potential rule would require the following:

- If the work or operations to be performed during the work day or shift are repetitive and similar, the employer would be required to perform at least one job briefing before the start of the first job of each day or shift.
- Additional job briefings would need to be held if significant changes occur during the course of a tree care job that might affect the safety of the employees.
- The job briefing at a worksite would need to be relevant to the operations occurring specifically at that worksite, as identified in the JHA. The job briefing would need to be conducted by the experienced and knowledgeable employee who completed the JHA or another employer with the minimum level of experience and competence to have completed the JHA had he been tasked to do so, so that the hazards associated with the job, and the contents of the JHA, could be fully and adequately explained to the employees performing the work.
- The job briefing would need to address hazards associated with the job, work procedures involved, special precautions, energy-source controls, and PPE requirements. A brief discussion would be satisfactory if the work involved is routine and if the employees, by virtue of training and experience, could reasonably be expected to recognize and avoid the hazards involved on the job. However, more extensive discussion would be needed if the work were complicated or particularly hazardous or if the employee could not be expected to recognize and avoid the hazards involved in the job.
- A job briefing would also need to highlight any unique hazards presented by the scheduled work activities at that particular worksite, and methods for avoiding those hazards. OSHA recognizes that this briefing will vary in length and topics covered based on the complexity of the job and the hazards that are present. For example, a job briefing could remind employees to drink additional water and take more frequent breaks if they are exposed to a heat hazard,[14] or to avoid any poisonous plants that were identified at the jobsite, remind workers of the location of the drop or work zones for the site, and reiterate the importance of PPE.

Working Alone

A tree care operations standard would include provisions that address the conduct of job briefing for employees who work alone. OSHA understands that there are employees who are deployed to work alone, such as in pesticide application or plant health care services. There are also situations where one employee may be left behind to finish work, such as chipping or clean up.

OSHA's Electric Power Generation, Transmission and Distribution standard (29 CFR 1910.269(c)(5)) provides that "[a]n employee working alone need not conduct a job briefing," but that "the employer shall ensure that the tasks to be performed are planned as if a briefing were required." Under a potential tree care operations rule, however, job briefings would need to be conducted for employees working alone so that the experienced and knowledgeable employee who completed the JHA, or another employer with the minimum level of experience and

[14] For OSHA guidance on how employers can minimize the risk of heat-related illness, please see https://www.osha.gov/SLTC/heatillness/heat_index/index.html.

competence described above, could fully and adequately explain to the employee the hazards associated with the job, and the contents of the JHA. Employees working alone are still exposed to hazards and would benefit from both a job hazard analysis and a job briefing.

In addition, a potential tree care operations standard would require an employer to account for each employee working alone throughout a workshift at regular intervals appropriate to the job, and at the end of the job assignment or end of the workshift, whichever comes first. The agency believes this is important because some tree trimming operations take place in isolated locations, and, if employees working alone are injured, without regular communication, those employees may not receive help in a timely manner and could potentially succumb to their injuries prior to being discovered.

OSHA seeks input into these potential requirements:

- Are there situations or tree care operations where employees work alone?
- How often does this occur? Please provide examples of job tasks or circumstances.
- Are there work sites that would not necessitate a JHA or a job briefing? Please provide examples.
- How do employers ensure the safety of employees working alone? Are job briefings being conducted?
- Has an employee, who was working alone, been involved in an incident where he/she was found injured, incapacitated or deceased? Please explain in detail the circumstances surrounding any such incidents. What caused the worker's incapacitation, injury, or death?
- OSHA also seeks feedback about the methods employers use to account for employees working alone, how often employees work alone, and how often during an assignment or shift employers account for employees working alone.

Traffic Control

OSHA understands that tree care work is often performed near streets where there is vehicular and pedestrian traffic. Under a potential rule, employers would need to take those working conditions under consideration as part of the JHA prior to the start of tree care work. Moreover, under a potential tree care operations standard:

- Employers would need to protect employees from hazards associated with working on or near roadways;
- Employers would need to ensure that employees exposed to the hazards associated with working on or near roadways wear high-visibility clothing;
- Employers would be required to provide annual training for workers on traffic control procedures, including proper traffic control device usage and placement; and
- Employers would be required to ensure that employees are not working in a traffic area, or in a work zone that would push them into traffic. For example, where a chipper is placed on the side of roadway, the work zone around that chipper would

need to be sufficiently identified and protected so that employees are not pushed into traffic by the work, or do not inadvertently walk into traffic.

These additional provisions are consistent with the Virginia Tree Trimming Operations regulation and with the ANSI Z133 standard. OSHA believes its potential requirements are also consistent with Federal Highway Administration (FHWA)[15] regulations contained in 23 CFR Part 655 Subpart F. These regulations "prescribe policies and procedures . . . to obtain basic uniformity of traffic control devices on all streets and highways" in accordance with FHWA's Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD, available at https://mutcd.fhwa.dot.gov/, accessed January 30, 2019), 2009 Edition, including Revisions No. 1 and No. 2, dated May 2012 (23 CFR 655.601). The regulations provide that the MUTCD is the "national standard for all traffic control devices on any street, highway, or bicycle trail open to public travel." (23 CFR 655.603). To meet the goal of uniformity, the regulation provides that, "[w]here State or [] Federal agency MUTCDs or supplements are required, they [must] be in substantial conformance with the National MUTCD" and "States and [] Federal Agencies are encouraged to adopt the National MUTCD in its entirety as their official Manual on Uniform Traffic Control Devices." (*Id.*). Moreover, any traffic control devices installed in construction areas using Federal-aid funds must conform to the MUTCD, and "[t]raffic control plans" that are consistent with the MUTCD must be implemented in such areas "for handling traffic and pedestrians in construction zones and for protection of workers" (*Id.*; 23 CFR Part 630 Subpart J).

OSHA seeks input on these potential provisions:

- Do you currently train employees on the MUTCD requirements?
- How often is this training conducted?
- How many employees do you have working solely on traffic control?
- Do you own the equipment needed for work zone safety, or do you outsource this work and/or equipment?
- Do you contract out traffic control work to companies that specialize in traffic control? If so, what circumstances lead you to contract this work? How often do you contract out this work?
- Do you provide employees working in or near traffic with high visibility vests?
- Are traffic protections included in your JHA or job briefing?
- Does your state, town, or company require that you have a police presence when working in or near roadways?

Emergency Procedures and Rescue

OSHA is considering requiring employers to train workers in the correct procedures for emergency response, including 911 calls and other applicable emergency response procedures. These additional provisions are consistent with the Virginia Tree Trimming Operations regulation and the ANSI Z133 standard.

[15] The FHWA is an agency within the United States Department of Transportation.

The Virginia Tree Trimming Operations regulation (16VAC25-73-40.C.4) and the ANSI Z133 standard require that employees who may be faced with a rescue decision receive training in emergency response and rescue procedures. OSHA is considering a similar provision for a potential tree care standard.

Aerial rescue is a highly specialized activity, and OSHA recognizes that training all employees on this could be burdensome. However, OSHA believes that at least one employee trained in aerial rescue should be on the ground at each job site while climbing or working aloft is taking place. In addition, OSHA is considering including the Aerial Rescue Flowchart (Appendix 2) from the Virginia Tree Trimming Operations regulation as a non-mandatory appendix to a potential tree care rule.

OSHA seeks information on this potential provision:

- How are employees trained in rescue training and what is included in this training?
- What rescue equipment systems and components do you use?
- How often should rescue training be conducted?
- How many members of each work crew are trained in emergency rescue?
- How often should rescue equipment be replaced?
- Should local first responders be aware or alerted that tree care operations are being conducted prior to the onset of those operations?

First Aid, CPR, and Automated External Defibrillators (AEDs):

OSHA's Medical Services and First Aid standard, which currently applies to tree care operations, requires that, "[i]n the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid," and that "[a]dequate first aid supplies shall be readily available" (29 CFR 1910.151(b)). OSHA's potential tree care operations standard would include additional requirements on first aid. These requirements would be consistent with the Virginia Tree Trimming Operations regulation.

Under the potential standard, the employer would need to provide first aid kits at each work site, and on each motor vehicle. OSHA based this requirement in part on requirements in the Logging Operations standard (29 CFR 1910.266(d)(2)(i)). First aid kits would need to include items that are adequate for the hazards to which employees are exposed. Therefore, employers would need to complete an analysis of the hazards to which their employees are exposed. Moreover, also consistent with the Logging Operations standard (29 CFR 1910.266(d)(2)(ii)), first aid kits would need to contain at least the following items:

- Gauze pads (at least 4 x 4 inches);
- Two large gauze pads (at least 8 x 10 inches);
- Box adhesive bandages;
- One package gauze roller bandage at least 2 inches wide;
- Two triangular bandages;

- Wound cleaning agent such as sealed moistened towelettes;
- Scissors;
- At least one blanket;
- Tweezers;
- Adhesive tape;
- Latex gloves;
- Resuscitation equipment such as resuscitation bag, airway, or pocket mask;
- Two elastic wraps;
- Splint; and
- Directions for requesting emergency assistance.

OSHA is also considering requiring that employers ensure that all employees are trained in both first aid and CPR, at worksites where an infirmary, clinic, hospital, or physician is not reasonably accessible in terms of distance and/or time.

OSHA is also considering requiring that employers protect employees from hazards associated with poisonous plants, biting and stinging insects, and other wildlife to which tree care workers might be exposed. In addition, employers would be required to train employees on the identification of, preventive measures for, and first-aid treatment of common poisonous plants, stinging and biting insects and other pests to which they might be exposed.

OSHA's potential tree care operations standard would require that employers ensure that each worksite where employees would be exposed to an electrical hazard, either from overhead power lines or underground utilities, have at least one FDA-approved AED available. Employers would also need to ensure that the AEDs they provide are maintained according to manufacturer's specifications, and that all employees receive training on the proper use of AEDs. Portable AEDs are an important lifesaving technology and may have a role in treating workplace cardiac arrest. In addition, they are now widely available, safe, effective, portable, and easy to use. AEDs are often included in workplaces adjacent to first aid kits. Training on AED-use is often offered as part of First Aid or CPR courses, often times at no extra charge.

OSHA notes that it previously sought comment on whether the Electric Power Generation, Transmission and Distribution standard (29 CFR 1910.269), which OSHA revised in 2014, should require the employer to provide AEDs on worksites subject to that standard. OSHA ultimately decided not to include such a requirement in the revised standard because the agency believed at the time, that there was "insufficient evidence in the record that AEDs exposed to the environmental extremes typical of work covered by [29 CFR 1910.269] would function properly when an incident occurs." OSHA noted, however, that "defibrillation is a necessary part of the response to electric shock incident that occur during work covered by" 29 CFR 1910.269, and "encourage[d] employers to purchase and deploy AEDs in areas where they could be useful and efficacious." As OSHA stated, deploying AEDs "likely will save lives and provide the Agency with useful information on the use of AEDs under a wide range of conditions."

In addition, John D. Graham, former Administrator for the Office of Information and Regulatory Affairs, submitted a letter to former Assistant Secretary of Labor for OSHA John

Henshaw in 2001 to raise the importance and efficacy of AEDs (OIRA, 2011). OSHA believes preliminarily that the improved technology in FDA-approved AEDs in recent years has resulted in increased durability, enhanced usability even by untrained persons, and lowered costs. Thus, OSHA is considering including in a tree care operations standard a provision requiring FDA-approved AEDs under the circumstances described above. OSHA seeks comment as to whether AEDs are, or would be, effective in the conditions in which they are, or would be, used in the tree care industry.

OSHA seeks input on these additional provisions:

- What measures do you take for protecting employees against poisonous plants, biting or stinging insects, or other pests found at tree care worksites?
- Do you currently provide AEDs? If so, how many AEDs do you have? How do you decide which worksites have AEDS if an AED is not supplied at every worksite?
- How many employees are trained in first aid, CPR, and/or the proper use of AEDs per worksite?
- Should OSHA develop a list of mandatory items for first aid kits, such as in 29 CFR 1910.266(d)(2)(ii)?
- Are there additional items that OSHA should include in first aid kits that are not addressed above?

Fire Prevention

Flammable liquids must be stored, handled, transported, and used in accordance with the requirements of the Flammable Liquids standard, 29 CFR 1910.106. This standard contains specific requirements for, among other things, the storage of flammable liquids in portable containers (29 CFR 1910.106(d)(2)). The potential tree care operations standard would include additional requirements, consistent with the Virginia Tree Trimming Operations regulation and the ANSI Z133 standard, to extend additional protections to tree care employees from fire hazards at the worksite.

In a potential tree care operations standard, OSHA would require the employer to provide and maintain portable fire extinguishers on equipment, such as chippers and compact lifts, and vehicles, such as chipper trucks or aerial lift trucks, in accordance with the requirements in 29 CFR Part 1910 Subpart L (similar to the requirements in OSHA's Logging Operations standard (29 CFR 1910.266(d)(4)). OSHA would also require employers to train workers on the use and location of those fire extinguishers. OSHA seeks input on these potential provisions:

- Do you currently have portable fire extinguishers on vehicles or mobile equipment?
- Do you provide a portable fire extinguisher at each worksite?
- Do you provide training to employees on how to use portable fire extinguishers, and if so, how often?
- How do your conduct inspections of your portable fire extinguishers?

OSHA is considering additional provisions requiring employers to ensure that:

- A vehicle or equipment is refueled only after the engine of the vehicle or equipment has stopped;
- Spilled fuel is removed from a vehicle or equipment before restarting the vehicle or equipment;
- Refueling operations not be conducted within 10 feet (3.05 m) from all operating equipment;
- Spark arresters are provided for all internal or external combustion engines in small equipment, such as chain saws (not large equipment such as cranes), and that those spark arresters meet specifications set forth by SAE Recommended Practice J335, Multiposition Small Engine Exhaust System Fire Ignition Suppression, or U.S. Forest Service Specification 5100-1 (see also 36 CFR 261.52 (U.S. Forest Service regulation)); and
- Workers do not smoke while working in proximity to dry combustible materials.

OSHA seeks information on these potential provisions:

- What type of equipment used in tree care operations requires fueling on a daily basis at the worksite?
- Do tree care organizations or businesses, or employers engaged in tree care operations, provide training or instructions to employees on how to refuel equipment?
- What type of dispense mechanisms are used to conduct refueling operations?
- How is spill cleanup performed at a mobile tree care worksite
- What type of equipment used in tree care operations requires spark arresters?
- Is employee-owned equipment allowed, and if so, what type of equipment?
- Is there any other equipment or technology that could be used in lieu of a spark arrester?
- How often should a spark arrester be inspected, cleaned or replaced?

OSHA is considering requiring employers to train and ensure employees remove clothing contaminated by flammable liquids, oils, and petroleum-based products at the worksite. In addition, OSHA is considering requiring that contaminated clothes are stored properly at the worksite until properly disposed of or washed. OSHA seeks information on these potential provisions:

- What procedures are used for removing clothes at temporary or mobile worksite?
- What decontamination or wash procedures are used for a temporary or mobile worksite?

Personal Protective Equipment (PPE)

OSHA's existing standards require the use of PPE as protection for the eyes, head, face, foot, arms, and legs, as well as for respiratory and hearing protection (see, e.g., 29 CFR 1910.132 through 29 CFR 1910.138, 1910.95). For example, 29 CFR 1910.135(a)(1) requires the employer to "ensure that each affected employee wears a protective helmet when working in areas where

there is a potential for injury to the head from falling objects." OSHA does not intend, at this preliminary stage, to propose additional PPE requirements in connection with protection for the eyes, head, face, foot, arms, and legs, as well as for respiratory and hearing protection. OSHA notes that under the potential JHA requirement (discussed above), employers would be required to determine which hazards are present, or likely to be present, at the worksite, whether PPE is required, and if so, what kind. Employers would also be required to train employees on what PPE is required, how to properly wear PPE, the limitations of PPE, and the proper care, maintenance, useful life, and disposal of the PPE.

OSHA seeks information on the use and care of PPE in tree care operations:

- What type(s) of PPE is specifically used at a worksite where tree care operations take place?

Environmental Hazards

OSHA is considering provisions for employers to address weather-related, and insect and animal hazards. OSHA believes the addition of these provisions would ensure the safety of workers engaged in tree care operations because they are exposed to environmental hazards while they work outdoors, year round, in all parts of the country. Therefore, OSHA is considering adding provisions to protect employees exposed to weather conditions, such as lightning or sleet or snow, to venomous animals, and/or to poisonous plants.

OSHA is considering requiring employers to check weather reports before commencing tree care operations and to monitor weather conditions periodically during the work. Hazardous weather conditions include, for example, lightning, thunderstorms and snowstorms, high winds and extreme temperatures, both hot and cold. Changes in weather, such as wind speed, low visibility, rain-, ice- or snow-covered branches, or cold temperatures that affect dexterity, can make climbing more hazardous. Therefore, under a potential rule, employers would be required to monitor conditions periodically during the work.

OSHA seeks input on these provisions:

- How do you ensure that employees are not working in adverse weather conditions?
- How often do you check weather reports?
- How do you determine when it is safe to return to work after a weather event?
- What are your procedures for protecting workers during adverse weather conditions?

OSHA is also considering requirements for employers to protect employees from wildlife, stinging insects or biting animals, and flora hazards, such as poison ivy. Employers would need to identify wildlife hazards (such as venomous snakes, stinging insects, birds, etc.) and poisonous plants (such as poison oak, poison sumac, and poison ivy) in the JHA, and discuss these identified hazards with all employees prior to beginning work during the job briefing that would be required under a potential standard. Employees would also need to be trained to identify these hazards. Employers would be required to provide effective treatments for wildlife and poisonous plant hazards in first aid kits, as well as training on those treatments. These

potential requirements are consistent with the Virginia Tree Trimming Operations regulation (16VAC25-73-40.C.3) and the ANSI Z133 standard.

OSHA seeks input on these potential provisions:

- What additional items are included in your first aid kits to address wildlife and poison plant hazards?
- How often are these items replaced in your first aid kits?
- Do you currently train employees on how to avoid poisonous or stinging animals or insects or poisonous plants?
- Are employees currently trained on treating injuries from hazardous plants and animals?
- What percentage of workplace injuries and incidents involve environmental hazards such as those listed above (weather, wildlife, poisonous plants)?

C. Training

OSHA's potential tree care operations standard would include minimum training requirements for all employees who perform tree care operations. Training would be required to be provided upon initial assignment for each new employee; whenever an employee is assigned new work tasks, tools, equipment, machines, or motor vehicles; or when necessary to maintain proficiency. Employers would train employees based on their work tasks and roles. However, there are topics that each employee would need to be trained in regardless of their work assignments.

Employers would need to train employees on the organization's written safety and health program, discussed earlier, as well as training required by other OSHA standards (for example, training on PPE (e.g., 29 CFR 1910.30), electrical hazards (e.g., 29 CFR 1910.332), Hazard Communication (e.g., 29 CFR 1910.1200), as applicable).

OSHA is considering requiring the following topics be included in employee training:

- First aid, CPR, AED, and emergency response procedures, such as calling 911;
- The safe use, operation, and maintenance of tools, mobile equipment, and motor vehicles the employee uses or operates, including an emphasis on understanding and following the manufacturer's operating and maintenance instructions for inspections, warnings, and precautions;
- Recognition of safety and health hazards associated with the employee's specific work tasks, including the use of measures and work practices to prevent or control those hazards;
- Recognition, prevention, and control of safety and health hazards to which the employee might foreseeably be exposed;
- Remaining outside the work and drop zones until it is communicated that the zone is safe to enter;
- The identification of, and preventive measures and first-aid treatment for, common poisonous plants (poison ivy, poison oak, and poison sumac), stinging and biting

insects, and other pests present, or likely to be present in the area in which work is to be performed;
- Communication methods being used, including, for example, hand signals or use of two-way radios;
- When to use hand signals or audible contact, such as but not limited to, training employees that whistles, horns, or radios, shall be utilized whenever noise, distance, restricted visibility, or other factors prevent clear understanding of normal voice communications between employees;
- Fire prevention, including training on how to recognize, prevent and abate fire hazards on tree care operations worksites, on the use, storage and dispensing of flammable liquids, and on the refueling of gasoline-powered equipment, such as chainsaws, stump grinders, and wood chippers; and
- The use and locations of equipment- and vehicle-mounted fire extinguishers.

OSHA is also considering requiring additional training for each employee that pertain to his or her job assignments. Because each employee has varying responsibilities and work tasks, employers would need to provide training for each employee based on that employee's job assignments (similar to the Electric Power Generation, Transmission and Distribution standard, 29 CFR 1910.269(a)(2)(i)(A)). For example, depending on an employee's job assignments, an employer may not need to provide rigging or fall protection training to an employee who performs work on the ground only (e.g., operating equipment such as a chipper or stump grinder). In addition to the general requirement that employers provide training for each employee based on that employee's job assignments, OSHA is considering the following specific training provisions, also based on job assignment:

- Employees whose job assignments require climbing trees would need to be trained in the safe use, operation, inspection, maintenance, and storage of climbing systems and components;
- Employees whose job assignments require the use of personal fall arrest systems, would need to be trained in the safe use, operation, inspection, maintenance, and storage of fall protection equipment;
- Employees who may be faced with a rescue decision would need to 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 the rescue efforts;
- Employees whose job assignments require the performance of rigging operations would need to be trained to estimate and understand the potential forces at any point in the rigging system being used;
- Employees whose job assignments require the operation of motor vehicles or mobile equipment would need to be trained in inspection procedures in accordance with manufacturers' and owners' instructions and applicable requirements, as well as the safe use, operation, and maintenance of each motor vehicle or mobile equipment operated. The operator would also need to be trained on the location of the manufacturers' and owners' instructions and the controls, safety devices, and operating characteristics of motor vehicles or mobile equipment being operated;

- Employees whose job assignments require the operation of winches would need to be trained on the inherent dangers associated with winch operations. Winch operators would also need to be trained that loads must 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; and
- Employees whose job assignments require the operation of chippers would need to be trained on the safe use, operation, maintenance, and inspection of chippers. Training would need to include, but not be limited to, starting, stopping, feeding, shutdown, and emergency procedures. Training would need to be provided for each type of chipper the operator might use.

OSHA is considering requiring that employers maintain written training records. This recordkeeping requirement is similar to recordkeeping requirements in many OSHA standards (see, e.g., 29 CFR 1910.268(c)). Records would need to include the type of training, the name of the company or individual providing the training, and copies of any relevant training documentation/certificate. In addition, OSHA would require employers to retain training records for three years.

D. Electrical Hazards

Workers engaged in tree care operations may be exposed to electrical hazards from both overhead power lines and underground utilities. Employers of these workers are subject to various OSHA requirements to protect their employees from electrical hazards, including OSHA's Electrical Standard for General Industry (29 CFR Part 1910 Subpart S), OSHA's Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269), and OSHA's Telecommunications standard (29 CFR 1910.268), as applicable.

OSHA is considering requiring, in a potential tree care operations rule, that employers follow OSHA's existing requirements to protect workers from the electrical hazards they face. Those requirements are consistent with the recommendations for Electrical Hazards in ANSI Z133-2017, which appear to be based on the OSHA requirements.

OSHA seeks input on its potential plan for protecting workers engaged in tree care operations from electrical hazards:

- Are workers sufficiently protected by the existing regulatory requirements from electrical hazards they face during tree care operations?
- Should OSHA bolster its existing requirements by, for example, requiring the use of insulated tools wherever there is exposure to electrical hazards or whenever employers engage in line-clearance tree trimming?
- Under the existing regulatory requirements, line-clearance tree trimming may be covered by one of three standards, 29 CFR Part 1910 Subpart S, 29 CFR 1910.269, or 29 CFR 1910.268, which all have different requirements. Should OSHA apply one set of requirements to all line-clearance tree trimming? For example, should OSHA require that all employers follow the line-clearance tree trimming requirements in 29 CFR 1910.269 when line-clearance tree trimming is performed by workers who,

through related training or on-the-job experience or both, are familiar with the special techniques and hazards involved in line-clearance tree trimming?

E. Motor Vehicles and Mobile Equipment

This section will address the care, design, and use of motor vehicles and mobile equipment, such as sprayers, and specialized equipment. As will be discussed, OSHA is considering incorporating requirements in a potential tree care operations standard based on requirements in several OSHA standards. In developing these potential requirements, OSHA has also considered the Virginia Tree Trimming Operations regulation (16VAC 25-73-60) and the ANSI Z133 standard.

General Requirements

OSHA is considering provisions in a potential tree care standard that would apply generally to all motor vehicles, aerial devices, and mobile equipment covered in this section. It should be noted that these general requirements would apply in addition to mobile equipment-specific requirements (e.g., requirements specific to chippers) that are described later in this section of the PIRFA.

OSHA is considering the following requirements for employers based on its review of the Virginia Tree Trimming Operations standard and ANSI Z133. Employers would be required to:

- Ensure that each motor vehicle and piece of mobile equipment used is maintained in serviceable condition;
- Ensure that each motor vehicle and piece of mobile equipment used is inspected before initial use during each work shift;
- Do not use defective, damaged, or unserviceable motor vehicles and mobile equipment;
- Ensure that operating and maintenance instructions are available for each motor vehicle and piece of mobile equipment;
- Train employees operating motor vehicles and mobile equipment to comply with the operating and maintenance instructions;
- Maintain and use mobile equipment and motor vehicle manufacturers' safety devices, instructions, decals, and safeguards;
- Utilize the manufacturers' instructions to detect hydraulic leaks;
- Ensure that no part of the body is used to stop motor vehicle and mobile equipment hydraulic leaks;
- Ensure that motor vehicles and mobile equipment are serviced and/or operated only by personnel whom the employer authorizes to service and/or operate them;
- Ensure that materials and equipment transported on mobile equipment and motor vehicles are properly stored and secured in compliance with the design of the mobile equipment or motor vehicle and manufacturer's instructions;
- Maintain manufacturer-provided motor vehicle and mobile equipment slip/skid surfaces, and replace slip/skid surfaces when they no longer prevent slips or skids;

- Ensure that keys are removed from the ignition, wheels chocked, and, if applicable, parking brakes applied when mobile equipment and motor vehicles are left unattended;
- Prohibit the use of motor vehicles and mobile equipment with an obstructed view to the rear unless the motor vehicle has a reverse signal alarm audible above the surrounding noise level or the motor vehicle is backed up only when a spotter signals it is safe to do so;
- Ensure that when towing, safety chains are crossed under the tongue of the unit being towed and connected to the towing motor vehicle;
- Ensure that towed mobile equipment is chocked or secured in place before being detached;
- Ensure each motor vehicle's exhaust system does not present a fire hazard; and
- Ensure that off-road motor vehicles and mobile equipment are operated in the proper gear and at the proper speed relative to the operating environment and the manufacturers' instructions and guideline.

OSHA is also considering the following requirements for employers, which are based on the Logging Operations standard (29 CFR 1910.266). Employers would be required to:

- Provide mounting steps and handholds for each motor vehicle wherever it is necessary to prevent an employee from being injured when entering or leaving the motor vehicle;
- Ensure that seat belts are provided for each motor vehicle operator or passenger;
- Ensure that each operator and passenger uses his or her seat belt while a motor vehicle is being operated, and that each operator and passenger securely and tightly fastens his or her seat belt to restrain them within the motor vehicle;
- Ensure that seat belts are not removed from any motor vehicle;
- Replace each seat belt which has been removed from any motor vehicle that was equipped with seat belts at the time of manufacture;
- Ensure that the maximum load a motor vehicle or piece of mobile equipment was designed by the manufacturer to handle (i.e., the rated capacity) is not exceeded;
- Ensure that, before starting or moving any motor vehicle or piece of mobile equipment, the operator determines that no employee is in the path of a motor vehicle or piece of mobile equipment; and
- Ensure that, before the operator leaves a motor vehicle or operating station of mobile equipment, the parking brake or brake locks are applied, the transmission is placed in the manufacturer's specified park position, and each moving element is lowered to the ground or otherwise secured.

OSHA is also considering the following requirements for employers, which are based on the Motor Vehicles in Construction standard (29 CFR 1926.601). Employers would be required to:

- Train employees to, and ensure that they, inspect motor vehicles and mobile equipment before use to identify anything that could cause failure while in use, are in

safe operating condition, and are free of damaged parts (such as brakes, tires, horn, steering, seat belts, and safety devices);
- Ensure that haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, have a cab shield and/or canopy to protect the operator from shifting or falling materials; and
- Ensure that seat belts and anchorages meeting the requirements of 49 CFR Part 571 (Department of Transportation, Federal Motor Vehicle Safety Standards) are installed in all motor vehicles.

OSHA seeks input on these provisions:

- Do you transport employees to worksites in company motor vehicles?
- Do you have inspection procedures for motor vehicles and mobile equipment?
- Are there provisions in 29 CFR 1910.266, 1926.601 or 1926.602 (Material Handling Equipment in Construction standard) that should be considered as potential provisions?
- Are there provisions in 29 CFR 1910.266, 2916.601 or 1926.602 that should not be included in this potential standard? Why not? How would these provisions negatively impact tree care operations?
- What equipment do you use that is mobile equipment? Does any of this mobile equipment have seat belts?

Aerial Devices and Compact Lifts

Employers engaged in tree care operations use aerial devices to perform certain tree care operations. OSHA believes that the hazards of using aerial devices during tree care operations are similar to the hazards of using aerial devices during other types of work. Therefore, OSHA would require employers to continue to follow the requirements in OSHA's Vehicle-Mounted Elevating and Rotating Work Platforms standard, 29 CFR 1910.67, to protect workers from hazards associated with using aerial devices. For example, per 29 CFR 1910.67(c)(2)(v), a personal fall arrest or travel restraint system that meets the requirements in 29 CFR Part 1910 Subpart I of this part must be worn and attached to the boom or basket when working from an aerial lift.

It is OSHA's understanding that compact lifts are used regularly by those performing tree care operations because they can be maneuvered into tight places (e.g., into clients' fenced-in back yards) and then used to position employees at the point of elevated work. OSHA welcomes comment on whether there are additional hazards associated with compact lifts that should be addressed in a potential tree care standard.

OSHA is also considering including in a potential tree care operations standard the following additional requirements, which are based in part on the Virginia Tree Trimming Operations regulation (16VAC 25-73-60B). Employers would be required to:

- Prohibit aerial devices, aerial ladders, and compact lifts from being used as cranes or hoists to lift or lower materials or tree parts, unless the device or ladder was specifically designed by the manufacturer to do so;
- Ensure that aerial devices and compact lifts are equipped with outriggers or a stabilizing system and that outriggers and stabilizing systems are operated in a manner consistent with manufacturers' requirements;
- Ensure that adequate clearance exists and warning is given to all employees in the work area prior to lowering outriggers;
- Ensure that, when operating aerial devices and compact lifts, the operator looks in the direction the bucket is traveling and is aware of the location of the booms in relation to all other objects and hazards;
- Ensure that, when booms or buckets are operated over roads, an adequate distance from passing motor vehicles and pedestrians is maintained or traffic control procedures are implemented;
- Establish that only one person is allowed in the bucket during tree care operations;
- Release pressure from hydraulic/pneumatic hoses before connections are broken, except where quick-acting connectors are used;
- Instruct employees to never kink hydraulic/pneumatic hoses
- Ensure that hoses affecting dielectric characteristics of equipment meet manufacturers' requirements and the flash point of hydraulic fluid meets the minimum set by the manufacturer;
- Ensure that combined loads not exceed rated lift capacities. Load ratings would need to be conspicuously and permanently posted on aerial devices and compact lifts;
- Ensure aerial devices and compact lifts are not moved when an employee is on a platform (for example, a bucket) except when aerial devices or compact lifts are specifically designed for such operation;
- Instruct employees to not, and ensure employees do not, drill holes in the buckets or liners of aerial devices or compact lifts;
- Instruct employees 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;
- Ensure that all underground hazards are located prior to operating aerial devices and compact lifts. These hazards might include, for example, natural gas tanks, underground oil tanks, and septic systems; and
- Ensure that employees do not wear climbing spurs (gaffs) while working from aerial devices.

OSHA seeks input on its potential requirements for the use of aerial devices and compact lifts during tree care operations. OSHA is especially interested in information about the ANSI Z133 standard provision that recommends allowing workers to transfer from the platform (aerial bucket) of an aerial device to a tree. The Vehicle-Mounted and Rotating Work Platforms standard (29 CFR 1910.67(c)(2)(iv)) requires that employees working from extensible and articulating boom platforms always stand firmly on the floor of the basket, and not sit or climb on the edge of the basket. That standard (29 CFR 1910.67(b)(2)) also permits aerial lifts to be "field modified" for uses other than those intended by the manufacturer, but only if the modification has been certified in writing by the manufacturer or by any other equivalent entity,

such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2—1969 and 29 CFR 1910.67, and to be at least as safe as the equipment was before modification. OSHA is concerned that aerial devices and compact lifts used by workers performing tree care operations are not designed to allow transfer from the bucket to the tree and that permitting the transfer of personnel from the bucket to the tree is not safe.

Chippers

Chipper machines cut tree limbs into small chips. Hazards arise when employees operating chippers get too close to, or make contact with, the chipper. OSHA's Machinery and Machine Guarding standard requires employers to provide one or more methods of machine guarding for hazards such as those created by point of operation, in going nip points, rotating points, flying chips and sparks (29 CFR 1910.212(a)). Employers are required to ensure that guards are installed and maintained on equipment such as chippers and stump grinders to prevent employee injuries. OSHA would continue to require employers to follow the Machine Guarding requirements in a potential tree care operations standard.

OSHA is also considering the following requirements to address chipper operations, which are based on the Virginia Tree Trimming Operations regulation (16VAC25-73), OSHA's Logging Operations standard (29 CFR 1910.266), and consistent with the ANSI Z133 standard. Employers would be required to:

- Ensure chippers are equipped with a locking device in the ignition system;
- Prohibit opening access covers or doors on chippers before the drum or disk is at a complete stop;
- Ensure that the access panels for maintenance and adjustment of the chipper blades and associated drive train remain in place and secure during operation of the equipment;
- Ensure that chippers not equipped with a mechanical infeed system are equipped with an infeed hopper of a length sufficient to prevent employees from contacting the blades or knives of the machine during operation;
- Ensure that chippers equipped with a mechanical infeed system have a quick-stop and reversing device on the infeed system located across the top, along each side, and close to the feed end of the infeed hopper within easy reach of the worker;
- Ensure that rotary drum or disc chippers not equipped with a mechanical infeed system are equipped with an infeed hopper not less than 85 inches (2.15 m), as measured from the blades or knives to ground level over the center line of the hopper, and that side members of the infeed hopper have sufficient height to prevent workers from contacting the blades or knives during operations;
- Ensure that rotary drum or disc chippers not equipped with a mechanical infeed system have a flexible anti-kickback device installed in the infeed hopper to reduce the risk of injury from flying chips and debris;
- Ensure that employees do not reach beyond the plane of the infeed hopper when the cutter disc, rotary drum, or feed rollers are moving;

- Prohibit chipper operators from wearing loose clothing, climbing equipment or components, gauntlet-type gloves, or other items that can cause an entanglement hazard, such as jewelry, when operating a chipper;
- Ensure that employees feed brush and logs into the chipper butt or cut end first and from the side of the feed table center line;
- Instruct operators to turn and step away when the brush is taken into the rotor or feed rollers;
- Ensure that employees do not feed foreign materials, such as stone, nails, sweepings, or rakings into chippers;
- Ensure that small branches are fed into chippers using longer branches or a push stick; and
- Ensure that chipping operations are located such that an adequate distance from passing motor vehicles and pedestrians is maintained.

OSHA seeks input on these potential requirements.

Sprayers and Related Equipment

Spraying equipment is used to apply fertilizer, pesticides, and other liquids during tree care operations. OSHA is considering including requirements in a potential tree care operations standard to address safety hazards associated with the use of sprayers and related equipment. OSHA is considering the following provisions based on the Virginia Tree Trimming Operations regulation (16VAC25-73) and consistent with ANSI Z133-2017. These provisions would require that employers:

- Ensure that a visual inspection of hoses, fittings, exposed plumbing, tanks, covers, and related equipment is conducted prior to use each workday;
- Ensure that damaged sprayers and related equipment are tagged and removed from service until repaired;
- Ensure that all walking and working surfaces of all sprayers and related equipment are covered with skid-resistant material;
- Ensure that vehicle-mounted equipment is equipped with guardrails around the working area if the applicator/operator stands on the equipment while the vehicle is in motion;
- Ensure that hoses or other parts of the equipment do not create a tripping hazard; and
- Ensure that the employee operating the applicator maintains a firm grip on the spray gun/excavation tool when pulling the trigger.

OSHA seeks input on these potential requirements.

In addition, OSHA notes that both ANSI Z133-2017 and the Virginia Tree Trimming Operations regulation include requirements about equipment that is related to spraying activities, such as injection systems for injecting trees and systems for injecting fertilizer into the soil, including requirements to prevent hazards associated with underground utilities when drilling holes in the ground for fertilizer or pesticide injection. OSHA seeks comment on whether it

should also include requirements for this related equipment in a potential tree care operations standard.

Stump Grinders

A stump grinder is a power tool that removes tree stumps with a rotating cutting disk that chips away the wood. As noted above, employers are required to properly guard stump grinders under OSHA's Machinery and Machine Guarding standard (29 CFR 1910.212(a)). OSHA would continue to require employers to follow the Machine Guarding requirements in a potential tree care operations standard.

OSHA is also considering including in a potential tree care operations standard the following provisions addressing stump grinder operations. These provisions are similar to those in the Virginia Tree Trimming Operations regulation as well as the ANSI Z133 standard. Employers would be required to:

- Ensure that underground utilities are identified prior to performing work;
- Ensure that all persons in the area are clear of the stump grinder when it is in use;
- Prohibit secondary activities, such as using the backfill blade;
- Ensure that employees stay at the controls until the grinding wheel has stopped where equipment has no remote control capabilities;
- Ensure that the operator remain a safe distance away from the grinding wheel while the grinder is in use where equipment has a remote control;
- Ensure that the operator and tether remain clear of the cutting wheel where equipment has a tether control;
- Ensure that all moving parts are stopped and the key is removed and pocketed when the equipment is not in use, before the machine is left unattended, or, where there is no key, develop and implement procedures for securing the machine; and
- Ensure that the only personnel who are permitted to perform maintenance are employer-authorized personnel.

Knucklebooms, cranes, and related hoists

Employers engaged in tree care operations use cranes to perform certain operations. OSHA believes that the hazards of using cranes during tree care operations are similar to the hazards of using cranes during other types of work. OSHA also believes that the types of cranes used during tree care operations (i.e., mobile cranes) are similar to the types of cranes used during construction work, and that the hazards associated with using cranes during tree care operations are similar to the hazards associated with using cranes during construction work because tree care operations involve temporarily (as opposed to permanently) locating a crane at a site to perform operations. OSHA has recently revised its Cranes and Derricks in Construction Standard, (29 CFR Part 1926 Subpart CC), and the standard represents the agency's most recent view of how to address the hazards associated with crane use. Therefore, a potential standard on tree care operations would require employers to comply with OSHA's Cranes and Derricks in Construction Standard when using cranes and other equipment covered under that standard in

tree care operations (regardless of whether the tree care operation in question is construction work). OSHA believes this approach will provide employees with the best protection.

OSHA seeks input on its potential requirements for the use of cranes during tree care operations. OSHA also seeks input on whether there are other requirements beyond OSHA's Cranes and Derricks in Construction Standard, that employers should comply with when using cranes, knuckleebooms, and related hoists in tree care operations.

OSHA is especially interested in information about the ANSI Z133 standard provision that allows the hoisting of personnel into position with a crane under certain conditions during tree care operations (ANSI Z133-2017 § 5.7.11). This consensus standard provision is not consistent with the Cranes and Derricks in Construction Standard, which provides that "[t]he use of equipment to hoist employees is prohibited except where the employer demonstrates that the erection, use, and dismantling of conventional means of reaching the work area, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform, or scaffold, would be more hazardous, or is not possible because of the project's structural design or worksite conditions" (29 CFR 1926.1431(a)). The ANSI Z133 standard is also not consistent with the existing general industry rule, the Crawler Locomotive and Truck Cranes Standard, 29 CFR 1910.180. That standard prohibits hoisting, lowering, swinging, or traveling to be done while anyone is on the load or hook (29 CFR 1910.180(h)(3)(v)), although OSHA's existing policy on enforcing that standard during tree care operations (OSHA Instruction CPL 02-01-045, Citation Guidance Related to Tree Care and Tree Removal Operations (August 21, 2008)) clarifies that the greater hazard or impossibility defense would apply if established by the employer:

> This requirement applies even though the American National Standard for Arboricultural Operations, ANSI Z133.1-2006, §5.7.9, allows the hoisting of personnel into position with a crane. An employer's reliance on the ANSI is therefore not a defense to a violation of §1910.180(h)(3)(v). An employer may, however, assert that compliance with the OSHA standard is either impossible/infeasible or presents a greater hazard to the employee. As with other affirmative defenses, the employer bears the burden of proving these affirmative defenses.
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> * * *
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> If there is reason to believe that either defense may be asserted by an employer using a crane to position an employee, CSHOs shall consider whether the following (non-exclusive) alternative methods could have been used:
>
> > a. Can an aerial lift position employees? Aerial lifts (e.g., bucket trucks or cherrypickers) are available in many configurations, some with booms of up to 46 meters. Aerial lifts with material handlers are also available, though generally not with the longest booms. Cranes may be used in addition to aerial lifts if heavy limbs must be handled. Aerial devices used in compliance with 29 CFR 1910.67 Vehicle-mounted elevating and rotating work platforms are considered a safe method of positioning employees.

b. Is the tree safe to climb? Climbing decayed or damaged trees could be hazardous. For instance, damage to tree bark from insect infestation, or missing tree bark caused by fire, may make climbing infeasible or more hazardous than using a crane. If the tree is not damaged or decayed to the extent that climbing would be unsafe, then climbing is normally considered safe using the appropriate climbing equipment and practices.

c. If it is impossible to use an aerial device and if climbing is unsafe, can a personnel platform be suspended from a crane? Personnel platforms meeting 29 CFR 1926.550(g)(2) are available in several designs and, when used, will be treated as de minimis violations of 29 CFR 1910.180(h)(3)(v). These platforms are required to be designed to minimize tipping caused by personnel movement through the use of an appropriate suspension system.

OSHA also has concerns that hoisting of personnel into position with a crane during tree care operations is not in compliance with 29 CFR 1926.1417(a), which requires the employer to comply with all manufacturer procedures applicable to the operational functions of equipment, including its use with attachments.

OSHA is considering including a provision in a potential tree care operations standard that would create a limited tree care operations exception to the Subpart CC personnel hoisting prohibition when the employer is able to establish that it is either impossible or infeasible to perform the work otherwise, or that not using the crane presents a greater hazard. Before hoisting personnel, OSHA would also require employers in tree care operations to conduct a written assessment demonstrating the infeasibility or greater hazard. This might include documenting the hazards and/or drawing a diagram of the site. OSHA seeks input on these potential requirements, and on whether, and under what circumstances, OSHA should permit employers to hoist personnel on a crane during tree care operations. Are the cranes used in tree care operations designed to hoist personnel? What criteria is used when determining that a crane is the safest route? Is this considered during the JHA? What methods, procedures and equipment are used to during personnel hoisting?

Deadman controls

OSHA is considering requiring provisions in a potential tree care operations standard that would address deadman controls on equipment used in tree care operations. Some equipment is equipped with a deadman control, such as chippers, compact lifts, stump grinders and chainsaws. A deadman control is an electrical or mechanical safety switch that deactivates the equipment's function when released by the operator. OSHA is considering the following provisions based on the Virginia Tree Trimming Operations regulation (16VAC25-73) and consistent with ANSI Z133-2017. These provisions would require that the employer:

- Ensure that deadman controls on equipment are used and maintained in good working condition;
- Remove equipment from service if the deadman control is malfunctioning or not operational, until the deadman control has been repaired or discarded; and

- Ensure that, for equipment without deadman controls, employees disengage the power source to the rotary or cutter head before dismounting the vehicle or mobile equipment.

OSHA seeks input on these potential requirements.

Equipment-mounted winches

OSHA is considering requirements in a potential tree care operations standard that would address the use of equipment-mounted winches in tree care operations. OSHA is considering provisions similar to those in the Virginia Tree Trimming Operations regulation (16VAC25-73) and the ANSI Z133 standard. These provisions would require that the employer:

- Train employees on the safe operation of winches, including on the dangers of load or cable breakage;
- Ensure the performance of daily pre- and post-work inspections;
- Ensure that employees identify damage to winches;
- Ensure that damaged winches are tagged and removed from service until repaired;
- Ensure that the winch cable/synthetic line is inspected daily for broken or worn strands, bird caging, major kinks, and other defects, and that damaged cables are tagged and removed from service until repaired;
- Ensure that cable hooks and attachment points are inspected daily for damage or deformities, and that any damaged or deformed hooks or attachment points are tagged and removed from service until repaired;
- Ensure that mounting bolts and hardware are inspected daily for loose or missing components, and that, if components are loose or missing, the winch is not used until repaired;
- Ensure employees remain clear of the operation, including winch line extension and recoil areas, in case of winch line breakage;
- Ensure that winch systems and cables are used only as intended and instructed by the manufacturer;
- Ensure that all loads are 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;
- Ensure that the vehicle supporting the winch is secured to avoid unintended movement; and
- Ensure that loads are pulled in line with the winch unless the winch is properly equipped with a fair lead and the winch operator is trained to pull loads at an angle.

OSHA seeks input on these potential requirements. OSHA also seeks input on whether OSHA should prohibit side-pulling with winches. How should side-pulling be defined?

High-Pressure Air-Excavation Equipment

Employers use high-pressure air-excavation equipment (e.g., air spades) to remove soil around the base of trees and expose their root systems so they may conduct root inspections or

diagnose tree concerns or diseases. When this equipment is used, workers can be struck by the compressed air generated by the equipment and suffer serious injury or death.

OSHA is considering the following potential requirements to address high-pressure air-excavation equipment operations. The employer would be required to ensure that:

- The operator of the compressor is trained on the proper operation of the compressor;
- No employee places any body parts in front of the equipment's air jets;
- Employees are not exposed to the compressed air hazard unless their presence is needed to conduct work on or related to the use of the equipment;
- Before the compressor is started, the air hose is secured to the compressor and properly attached; and
- The air line is depressurized before disconnecting the air hose from the equipment.

These potential provisions are consistent with ANSI Z133-2017. The ANSI standard also contains recommendations on identifying the hazards at the worksite, and on the use of PPE and other clothing to protect against the struck-by hazard. OSHA would require hazard identification to be done during the conduct of the JHA, previously discussed. As also previously discussed, OSHA does not intend, at this preliminary stage, to propose additional PPE requirements in connection with protection for the eyes, head, face, foot, arms, and legs, as well as for respiratory and hearing protection.

OSHA seeks input on these potential requirements. In addition, ANSI Z133-2017 contains requirements for the use of PPE and other clothing to protect against the compressed air hazard (a hard hat with attached face shield, hearing protection, eye protection, gloves, long pants, a long-sleeved shirt, and/or coveralls). What PPE and other clothing are workers currently wearing/using for protection against this hazard? What PPE and other clothing do you believe is needed to protect against this hazard?

F. Portable Power Hand Tools and Equipment

OSHA's Hand and Portable Powered Tools and Other Hand-Held Equipment standard (29 CFR Part 1910 Subpart P, §§ 1910.241 thru 1910.244) contains requirements on the use and condition of hand and portable powered tools and other hand-held equipment used during tree care operations. For example, the standard provides that "each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees" (29 CFR 1910.242(a)). This standard applies, and, if OSHA promulgates a potential tree care operations standard, would continue to apply, to tree care operations.

A potential tree care operations standard would include additional requirements applicable to hand and portable power tools and other hand-held equipment to provide more specificity, and to require employers to ensure the proper use, inspection, and maintenance of both powered and non-powered hand and portable tools and equipment, and to ensure that employees follow manufacturers' operating and safety instructions regarding their use.

Portable Electric Powered Tools

As discussed earlier in this PIRFA, workers engaged in tree care operations may be exposed to electrical hazards from both overhead power lines and underground utilities. Employers of these workers are subject to various OSHA requirements to protect their employees from electrical hazards, including OSHA's Electrical Standard for General Industry (29 CFR Part 1910 Subpart S), OSHA's Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269), and OSHA's Telecommunications standard (29 CFR 1910.268), as applicable. OSHA is considering requiring, in a potential tree care operations rule, that employers continue to follow OSHA's existing requirements to protect workers from the electrical hazards they face. Under a potential tree care operations rule, therefore, employers would need to consult those standards to determine requirements applicable to the use of portable electric powered tools near overhead power lines and underground utilities. For example, 29 CFR 1910.333(c) sets distances that must be maintained between overhead lines and conductive objects, such as portable electric powered tools and extension cords, that employees may contact.

Employers are also subject to electrical hazards from the use of portable electric powered tools themselves. For example, if a tool is not properly grounded, and there is a fault, this could cause the employee using the tool to be electrocuted. Paragraph (a)(5) of 1910.243, which again applies to the use and condition of hand and portable powered tools and other hand-held equipment used during tree care operations, provides "Grounding. Portable electric powered tools shall meet the electrical requirements of subpart S of this part." See also 29 CFR 1910.302, 1910.331. Thus, OSHA's requirement that "[t]he path to ground from circuits, equipment, and enclosures [] be permanent, continuous, and effective," 29 CFR 1910.304(g)(5), applies to portable electric powered tools. In addition to the requirements in Subpart S, a potential standard would also require that employers ensure that all electrical portable power tools and supply cords are attached to a lanyard or in a separate line when the employee is aloft.

OSHA seeks input on these potential requirements.

Chain saws

As discussed, OSHA's Guarding of Portable Powered Tools standard (29 CFR 1910.243), applies, and, if OSHA promulgates a potential tree care operations standard, would continue to apply, to tree care operations. That standard contains requirements to protect workers from the hazards of using chain saws. For example, the standard requires that all hand-held powered circular saws having a blade diameter greater than 2 inches, electric, hydraulic or pneumatic chain saws, and percussion tools without positive accessory holding means be equipped with a constant pressure switch or control that will shut off the power when the pressure is released, and that all hand-held gasoline powered chain saws be equipped with a constant pressure throttle control that will shut off the power to the saw chain when the pressure is released (29 CFR 1910.243(a)(2)(i)).

In addition, OSHA is considering requiring that all gasoline-engine power saw operations meet the requirements in paragraph (e) of the Logging Operations standard, 29 CFR 1910.266.

Thus, employers under a potential rule would be subject to the following requirements (and other requirements also contained in 29 CFR 1910.266(e)):

- A chain saw would need to be started with the chain brake engaged;
- A chain saw would need to be started on the ground or where otherwise firmly supported.
- Drop starting a chain saw would be prohibited;
- A chain saw would need to be held with the thumbs and fingers of both hands encircling the handles during operation unless the employer demonstrates that a greater hazard is posed by keeping both hands on the chain saw in that particular situation; and
- A chain saw would need to be operated and adjusted in accordance with the manufacturer's instructions.

OSHA is also considering requiring that all gasoline-engine power saw operations meet the requirements in paragraph (r)(5)(vi) of the Electric Power Generation, Transmission and Distribution standard, 29 CFR 1910.269. That provision prohibits the running of a power saw when the saw is being carried up into a tree by an employee.

In addition, a potential tree care operations standard would require that employers ensure that:

- The operator maintains a stable position and secure footing when starting a chain saw;
- The operator uses a second point of attachment, such as a lanyard or a climbing line, when operating a chain saw in a tree, unless the employer can demonstrate a greater hazard is posed by using a second point of attachment; and
- A chain saw's chain brake is engaged and the engine shut down when a chain saw is set down.

OSHA seeks input on these potential requirements.

Powered Pole Tools

A potential tree care operations standard would require that employers ensure that powered pole tools, such as pole saws and pole pruners, are not hung on electrical conductors or left unattended in trees; that, when hung, powered pole tools are securely positioned to prevent dislodgment and hung so that sharp edges are away from the tree care worker; and that powered pole tools are removed when the tree care worker leaves the tree. In addition, OSHA would require employers to only use fiberglass pole tools.

OSHA seeks input on these potential requirements.

Backpack Power Unit

OSHA is considering requiring that backpack power units meet the requirements in paragraph (r)(6) of the Electric Power Generation, Transmission and Distribution standard, 29 CFR 1910.269. Thus, a potential tree care operations standard would contain the following requirements:

- While a backpack power unit is running, no one other than the operator could be within 3.05 meters (10 feet) of the cutting head of a brush saw;
- Each backpack power unit would need to be equipped with a quick shutoff switch readily available to the operator;
- Backpack power unit engines would need to be stopped for all cleaning, refueling, adjustments, and repairs to the saw or motor, except as the manufacturer's servicing procedures require otherwise.

These requirements would be consistent with the Virginia Tree Trimming Operations regulation. OSHA seeks input on these potential requirements.

G. Hand Tools and Equipment

As discussed earlier, OSHA's Hand and Portable Powered Tools and Other Hand-Held Equipment standard (29 CFR Part 1910 Subpart P, §§ 1910.241 thru 1910.244) contains requirements on the use and condition of hand and portable powered tools and other hand-held equipment used during tree care operations. For example, the standard provides that "each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees" (29 CFR 1910.242(a)). This standard applies, and, if OSHA promulgates a potential tree care operations standard, would continue to apply, to tree care operations.

Hand tools and equipment used in tree care operations include cant hooks, cant dogs, peaveys, tongs, wedges, chisels, gouges (mauls, sledges, and hammers), chopping tools such as grub hoes, mattocks, axes, and cabling tools. OSHA's potential tree care operations standard would add more specific language regarding the safe condition of the equipment, as well as its use. This would include provisions addressing the equipment used in tree care operations to ensure that employees are protected from injuries due to flying tool parts (the hand tool hitting the user or striking another employee), cuts from splintered tool handles, or fragments flying or shattering on impact.

A potential tree care operations standard would include the following general requirements addressing safe work practices for all hand tools and equipment used in tree care operations. Employers would be required to ensure that:

- The correct hand tool or equipment is selected for the job;
- Any damaged or defective hand tools and equipment, including, for example, tools with loose or cracked heads or cracked, splintered, or weakened handles, are removed from service;
- Workers maintain a safe working distance from other workers when using hand tools and equipment;

- Workers do not carry hand tools and equipment in their hands when climbing, unless they are used to assist them in climbing.
- Tools used aloft may only be carried in a bag, on a belt designed to hold such tools, or attached to a tool lanyard;
- Tools other than ropes or throwlines are not thrown into a tree, or between workers aloft;
- Scabbards or sheaths are used when handsaws are carried;
- Folding saws are closed and secured when not in use;
- Hand tools or equipment being raised or lowered with climbing lines or handlines be raised or lowered in a manner that prevents the cutting edge from contacting the climbing lines or handline; and
- All hand tools and equipment are stored properly or placed out of the immediate work area when not being used.

OSHA seeks input on these potential requirements.

Cant Hooks, Cant Dogs, Peaveys, and Tongs

A potential tree care operations standard would include provisions specific to the equipment used to grab and move limbs, logs, or other debris, such as cant hooks, cant dogs, peaveys, and tongs. These provisions would require that the employer ensure that cant hooks, cant dogs, peaveys, and tongs be firmly set before force is applied, that the points of the hooks on this equipment be at least two inches long and maintained in a sharp condition, and that all workers stand uphill from rolling logs and be warned prior to logs being moved.

OSHA seeks input on the differences in cant hooks, cant dogs, peaveys and, tongs. Specifically:

- What factors determine which type of equipment is used?
- Are they interchangeable?
- Is there a weight factor for logs that determines which is the best tool for the task?
- The Virginia Tree Trimming Operations regulation defines cant hooks, but not cant dogs, peaveys, and tongs. A "cant hook" is defined in the Virginia regulation as "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." Should OSHA develop definitions for cant hooks, cant dogs, peaveys, and tongs? What should those definitions be?

Wedges, Chisels, and Gouges

A potential tree care operations standard would include the following requirements specific to the use of wedges, chisels, and gouges in tree care operations. Employers would need to ensure that:

- All chisels and wedges used by workers are properly pointed and tempered;
- Only wood, plastic, or soft-metal wedges are used while operating chains saws; and

- Chisels with wood handles are protected with a ferrule on the striking end, and only wood, rubber, or high-impact plastic mauls, sledges, or hammers are used with these chisels.

OSHA seeks input into the use of wedges, chisels, and gouges. Specifically:

- What factors determine which type of wedge, chisel, or gouge is used?
- Are wedges, chisels, and gouges interchangeable?
- What activities in tree care requires the use of wedges, chisels, or gouges?

Chopping Tools

A potential tree care operations standard would include provisions for chopping tools used in tree care operations to protect workers from cuts, eye injuries, flying fragments, foot injuries, and struck-by hazards. OSHA would include a number of work practice controls for the use of chopping tools. A potential tree care operations standard would require that the employer ensure that:

- Workers do not use chopping tools while working aloft;
- Chopping tools are not used as wedges or to drive metal wedges; and
- Chopping tools are swung in a safe manner (i.e., away from the feet, legs, and body, using the minimum force practical for function and control, held with a secure grip, clear of other workers and overhead hazards).

OSHA seeks input on the types of chopping tools employers use and the potential provisions OSHA is considering.

H. Ladders

OSHA's Walking-Working Surface standard (29 CFR Part 1910 Subpart D) contains requirements for ladders (29 CFR 1910.23). These requirements apply, and, if OSHA promulgates a potential tree care operations standard, would continue to apply, to tree care operations. Examples of existing requirements include the following:

- Ladders must only be used for the purposes for which they were designed;
- Ladders must be inspected before initial use in each work shift, and more frequently as necessary, to identify any visible defects that could cause employee injury;
- Any ladder with structural or other defects must be immediately tagged "Dangerous: Do Not Use" or with similar language in accordance with 29 CFR 1910.145 and removed from service until repaired in accordance with 29 CFR 1910.22(d), or replaced; and
- No employee may carry any object or load that could cause the employee to lose balance and fall while climbing up or down the ladder.

In addition, a potential tree care operations standard would contain the following requirements:

- Ladders would need to be supported while in storage to prevent sagging. Except when on mobile equipment, each ladder would need to be stored under suitable cover that protects the ladder from weather and in a dry location away from excessive temperatures;
- To prevent falls and the moving of the ladder when working from a tripod/orchard ladder, the third, or hinged leg of a tripod/orchard ladder would need to be braced or fastened when on hard or slick surfaces;
- Employers would need to ensure that each ladder is used in accordance with the manufacturer's specifications, adhere to limitations prescribed by the manufacturer, and ensure that each ladder is not altered in any way that circumvents the manufacturer's specifications; and
- Employers would need to ensure that, when a climber uses a ladder to gain access to a tree, he or she does not leave the ladder until he or she is tied in or secured.

OSHA welcomes comments on whether additional protections are needed or whether any existing provisions should not be applied to tree care operations. Should all of the provisions on ladders located in 29 CFR 1910.23 continue to apply to tree care operations?

Under a potential tree care operations standard, employers would need to ensure that, when a climber uses a ladder to gain access to a tree, he or she does not leave the ladder until he or she is tied in or secured. This potential requirement differs from the Virginia Tree Trimming regulation, which requires that, "while ascending a ladder to gain access to a tree, the arborist not work from or leave the ladder until he is tied in or otherwise secured." The ANSI Z133 standard contains a requirement that is identical to the Virginia Tree Trimming regulation. OSHA believes that the Virginia requirement to be tied in or otherwise secured "while ascending a ladder" is confusing because, when the entire provision is read, it seems to require the employee to be tied in or otherwise secured only when the employee is working on the ladder and located at his or her work position or when the employee is transferring from the ladder to the tree. OSHA believes its potential requirement is clearer than the Virginia regulation. Moreover, OSHA's potential requirement does not include a provision for the employee to be tied in or otherwise secured when he or she is working on the ladder and located at his or her work position. As stated, OSHA's Walking-Working Surface standard (29 CFR Part 1910 Subpart D) applies, and, if OSHA promulgates a potential tree care operations standard, would continue to apply, to the use of ladders during tree care operations. Under Subpart D, employers are not generally required to provide or ensure the use of fall protection to employees working on portable ladders, such as those that are used by employees engaged in tree care operations (29 CFR 1910.28). OSHA seeks input on whether it should require fall protection for employees working on portable ladders during tree care operations. What are the benefits of providing fall protection in this situation? Are there any impediments to providing fall protection here? Should OSHA require fall protection for employees while they ascend and descend portable ladders during tree care operations as well?

I. Work Procedures

General Questions on Climbing, Changing Location, and Working on Trees

A potential tree care operations standard would contain requirements, specific to climbing, changing location, and working on trees, for the provision, use, and care of personal fall protection systems. Personal fall protection systems are systems (including all components) an employer uses to provide protection from falling or to safely arrest an employee's fall if one occurs. Examples of personal fall protection systems include personal fall arrest systems, positioning systems, and travel restraint systems. OSHA is still developing personal fall protection system requirements that are specific to climbing, changing location, and working on trees. OSHA seeks input on what those requirements should be:

- For example, OSHA seeks information on potential requirements for anchorages and anchor points for workers engaged in climbing, changing location, and working on trees. Should OSHA require that anchorages be capable of supporting a certain weight (e.g., at least 5,000 pounds (22.2 kilonewtons (kN)) for each employee attached)? Should factors other than, or in addition to, a weight requirement determine whether an anchorage is of sufficient strength? How do employers determine whether a tree or limb is safe or unsafe to climb or use as an anchorage point for fall protection equipment?
- OSHA also seeks information on whether the use of personal fall protection systems while climbing, changing location, and working on trees should only be required above a certain height? Should personal fall protection be required whenever a worker is climbing, changing location, or working on trees? Or should personal fall protection systems be required only when an employee is at a certain height above the ground? If so, what should the height be? 4 feet (1.2 m) above the ground? Higher? Lower?
- Also, are personal fall protection systems used during tree climbing and changing location typically integral to the climbing or changing location activities (i.e., is the personal fall protection system used to climb or change location in addition to providing protection from falls)? If so, does it make sense to have a requirement that personal fall protection systems be required only when an employee is at a certain height above the ground?
- Are there systems that can fulfil the functions of both a personal fall arrest system and a positioning system? If so, please explain.

OSHA notes that it is considering requiring that employers provide, pay for, and perform daily inspections on, all personal fall protection systems, including all components. OSHA seeks input on these potential provisions. Should inspections occur more than once daily? Should they be performed whenever a worker is going to use personal fall protection in connection with climbing, changing location, or working on a tree?

Employers would also be required to provide training to employees who use personal fall protection systems. This training would need to be understandable to all employees. In addition to training required by other OSHA standards, employers would need to provide training on:

- Fall hazards and how to recognize them;

- How to minimize those hazards;
- The correct procedures for installing, inspecting, operating, maintaining, and disassembling personal fall protection systems; and
- The correct use of personal fall protection systems including, but not limited to, proper hook-up, anchoring, and tie-off techniques, and the methods of equipment inspection and storage, as specified by the manufacturer.

OSHA would also require the retraining of employees who use personal fall protection systems when the employer has reason to believe the employee does not have the understanding and skill required. Retraining would be needed when changes in the workplace render previous training obsolete or inadequate, when there are changes in personal fall protection systems or related equipment, or when an employee's knowledge or use of fall protection systems or related equipment indicate that the employee no longer has the understanding or skill necessary to use fall protection systems or related equipment safely.

OSHA also understands that employers engaged in tree care operations sometimes require workers to move between the platform (e.g. bucket) of aerial devices or compact lifts, or the load or hook of a crane, and a tree (to make a cut, for example). OSHA discussed aerial devices, compact lifts, and cranes earlier in this PIRFA. However, OSHA seeks information on the types of personal fall protection systems that employers use when moving between aerial devices or compact lifts, or the load or hook of a crane, and trees. How do employers protect their employees from falls during movement to and from the tree? Can one personal fall protection system be used to protect the employee throughout the time he or she is aloft? Or do workers need to use different personal fall protection systems to protect their employees depending on where the employee is located? Do employees use both a personal fall arrest system(s) and positioning equipment, for example? Please also provide information related to the time, effort and costs involved.

Ropes and Equipment

A potential tree care operations rule would contain requirements on the climbing components used during tree care operations. The following potential requirements are consistent with the Virginia Tree Trimming Operations regulation and the ANSI Z133 standard. The employer would need to ensure that:

- All climbing lines used in a split-tail system and split-tails are terminated with an eye splice, or a knot that interfaces appropriately with the connecting link to which it is attached. The termination knot selected would need to remain secure under normal loading and unloading. When using a carabiner without a captive eye, the knot or eye splice would need to cinch in place to prevent accidental opening and/or side-loading of the carabiner;
- Tree saddles and lanyards used for work positioning are not altered in a manner that would compromise the integrity of the equipment;
- Hardware used in the manufacture of tree saddles meets the hardware material, strength, and testing requirements outlined in the American National Standard for Personal Fall Protection (ANSI 359.1), which OSHA would incorporate by reference;

- Climbing lines have a minimum diameter of 7/16 inch (11 mm) and are constructed from a synthetic fiber, with a minimum breaking strength of 5,400 pounds (24.02 kN) when new. Maximum working elongation could not exceed 7.0% at a load of 540 pounds (2.402 kN). Climbing lines would need to be identified by the manufacturer as suitable for tree climbing;
- Prusik loops, split-tails, and work-positioning lanyards used in a climbing system meet the minimum strength standards for climbing lines;
- Splicing is done in accordance with cordage manufacturers' specifications;
- Equipment used to secure a worker in a tree or on a platform in an aerial device or compact lift is not to be used for anything other than its intended purpose. The worker climbing line cannot be used to raise and lower tools;
- Rope ends are finished in a manner to prevent raveling;
- Ropes and climbing equipment are stored and transported in such a manner to prevent damage through contact with sharp tools, cutting edges, gas, oil, or chemicals;
- Climbing lines are never left in trees unattended;
- Each component of each climbing system used is approved by the manufacturer for its intended use as well as its compatibility with other components of the climbing system; and
- Tree saddles and lanyards used for work positioning are identified by the manufacturer as suitable for tree climbing.

OSHA seeks input on these potential requirements.

Climbing Procedures

A potential tree care operations rule would contain requirements on climbing procedures. The potential requirements OSHA is considering are consistent with the ANSI Z133 standard and the Virginia Tree Trimming Operations regulation. OSHA notes that many potential requirements on climbing procedures, such as potential requirements on inspections of equipment, communication, and emergency response, are addressed in other sections in this PIRFA.

OSHA is considering a provision that would require the employer to ensure that an employee trained in emergency response is within visual or voice communication during all tree climbing operations where a worker is aloft. This potential requirement would ensure that should a climber be injured while aloft, an employee is prepared, trained in emergency procedures, and is within visual or voice communication to render aid as quickly as possible. OSHA is also considering including in a potential tree care operations standard an Aerial Rescue Flowchart as a non-mandatory appendix (see Potential Appendix 2). This chart is based on the Virginia Tree Trimming Operations regulation:

- ANSI Z133, section 8.1.2, has a recommendation similar to the potential requirement OSHA is considering, with the exception that the ANSI Z133 recommendation would apply only where a climber is at least 12 feet above the ground. OSHA seeks information on ANSI's recommendation and why the potential requirement should only apply where a climber is at least 12 feet above the ground. OSHA believes a

worker in a tree may need rescue when he is at a height that is far less than 12 feet above the ground. Please provide any information you may have on this 12 foot limitation.

OSHA is considering a provision that would require the employer to ensure that all climbing equipment, such as climbing lines, work lines, body harnesses, and lanyards, is inspected before being put into service. OSHA would also require that all personal fall protection systems be inspected before initial use during each workshift for mildew, wear, damage, and other deterioration, and that defective components be removed from service.

OSHA is considering a provision that would require the employer to ensure that when a climber is working aloft, he or she has a climbing line and at least one other means of being secured on his/her person at all times (e.g., a climbing line and a work positioning lanyard). This potential requirement is consistent with the Virginia Tree Trimming Operations regulation:

- ANSI recommends that two means of being secured be used when the climber decides it is advantageous (ANSI Z133, section 8.1.4). OSHA seeks information on this recommendation. On what factors does, or should, the climber base his or her decision? Also, when is the decision made? Prior to climbing? Please provide examples of when a second line would not be advantageous.

OSHA is also considering provisions regarding climbing lines used in tree care operations. When a climber is working at heights greater than one-half the length of the climbing line, a figure-8 knot would need to be tied in the end of the climbing line to prevent pulling the rope through the climbing system. The tie-in position would need to be such that the worker will not be subjected to an uncontrolled pendulum swing in the event of a slip.

OSHA is considering a provision that would require all climbers to be protected from falls whenever the climber is off the ground, including, but not limited to, when the climber ascends and descends the tree (including when using climbing spurs/gaffs), when the climber is at the work position, when the climber repositions his/her climbing line, and when the climber changes location in the tree (but see General Questions on Climbing, Changing Location, and Working on Trees at the beginning of the Work Procedures Section). Once at the work position, the climber would need to be tied in, and remain tied in, until the work is completed and he/she has returned to the ground. When changing location, the climber would need to continue using, and could not release, the current means of being secured until the climber tests the new tie-in point with, and ensures the tie-in point will bear, that climber's full weight. When repositioning, the climber would need to preload the new tie-in point with his/her full weight before releasing the current means of being secured. This is consistent with ANSI Z133, section 8.1.6 and the Virginia Tree Trimming regulation, 16VAC 73-90.A.20.

OSHA is considering requiring that the employer ensure that, when employees climb, change location, or are at the work position in tress, their hands and feet are placed on separate limbs, and they maintain three points of contact with the tree. These potential provisions are consistent with ANSI Z133, sections 8.1.7 and 8.1.8.

OSHA is also considering requiring the following provisions for work procedures prior to and during climbing activities:

- A false crotch and/or false-crotch redirect could be used in lieu of a natural crotch if the employer establishes it is safe to do so;
- A potential tie-in-point/primary suspension point could not be selected by a climber if it allows for lateral movement of the climbing line;
- A climbing line or false crotch that is installed from the ground would need to be located at a position along the main stem/leader/lateral limb that prevents or minimizes the risk of a fall. Before climbing commences, the climber would need to: subject the anchor point to a load that is twice the climber's weight; and visually inspect the tree to ensure that the anchor point is not structurally weakened by visible factors such as disease, cracks, burns, etc.
- If a stem or spar from which work will be performed does not contain a natural crotch that can be used to safely support a climber, the climber would need to select and use tie-in points and tie-in methods that prevent the climbing line from moving up, down, along, or off the stem during climbing operations. Any tie-in point selected would need to be capable of withstanding the forces being applied during the entire pruning/removal operation. Furthermore, employers would need to ensure that climbing lines are not placed around a stem in an area without a lateral limb unless the climbing line is secured by one of two methods:
  - Cinching or choking the line around the stem itself; or
  - Running the line through a double wrapped or adjustable false crotch, which is secured/cinched around the stem.
- The employer would need to ensure that the climbing line is kept free of damage, debris and obstructions by the ground crew, and that, if the line becomes damaged, the ground crew informs the climber of that damage immediately.
- During the climber's descent, he/she would need to ensure that the climbing line has not sustained damage, and can support him/her during the descent. During the entirety of the climber's descent, he/she would need to examine the climbing line beneath the climbing hitch to make sure it is not damaged.

OSHA seeks information on work practices in tree care operations. What are your climbing procedures? Are there additional procedures that should be considered? Would you provide to OSHA the work practices or checklists that you use prior to and during climbing?

OSHA understands that lowering devices, such as Port-A-Wraps, are commonly used in tree care operation activities. OSHA is considering including requirements for port-a-wraps used for lowing or lifting tree components. OSHA is seeking additional input about port-a-wrap usage in the tree care industry:

- What are the factors that prompt the use of a lowering device in tree care operations activities?
- What are the training requirements for using port-a-wrap?
- What are the advantages of using a port-a-wrap?
- Is specialized training or instruction required for workers that use this equipment?

- What are the precautionary measures needed to protect workers?

Other procedures to protect on-site employees

OSHA is considering other requirements that would require employers to ensure that:

- Employees employ wireless, hands-free communication methods (e.g., two-way radios), and use hand signals where wireless communication is ineffective. To aid employers in complying with this potential requirement, OSHA is considering incorporating into a potential standard Potential Appendix 3 – Hand Signal Chart for Crane Operations. This potential appendix would be a non-mandatory appendix. OSHA based this potential appendix on the Virginia Tree Trimming regulation.
- Workers do not enter the drop or work zone until it is communicated the zone is safe to enter;
- Ensure that electric power lines are identified prior to performing all work, and that underground utilities are identified if work might involve exposure to underground utilities;
- Employees protect themselves from the dangers of working in hot weather. As part of this duty, employers would be required to periodically monitor workers for signs of heat stress and heat-related illness;
- Designate job work assignments prior to starting work; and
- Employees manage traffic work zones to maintain worker safety by, for example, minimizing traffic delays.

OSHA seeks input on these potential requirements. Are there any procedures not listed in this document that would protect workers from the hazards associated with tree care operations?

Pruning and Trimming

Most potential provisions associated with pruning and trimming are addressed elsewhere in the PIRFA. Those potential provisions include potential provisions on communication, the use of pole tools, fire prevention, and rigging.

OSHA's potential tree care operations standard would also include provisions for pruning and trimming palm fronds. Employers would be required to ensure that:

- Palm frond skirts that have three years or more of growth are removed from the top down;
- Workers performing this work are supported by a climbing line or work from an aerial lift;
- Workers do not remove tree skirts from below, or in between, the skirt and the trunk of the tree; and
- Cut branches are not left in trees upon completion of work.

These potential provisions are consistent with the Virginia Tree Trimming Operations regulation (16VAC 73-90.B.7 and 8) and the ANSI Z133 standard.

OSHA seeks input on these potential requirements.

Cabling

Most potential provisions associated with cabling are addressed elsewhere in the PIRFA. However, there are additional provisions not addressed elsewhere that would be included in a potential tree care operations standard. These additional provisions would require the employer to:

- Prohibit workers not involved in the installation of cabling systems from entering the work zone while cabling systems are being installed; (OSHA is aware that ANSI Z133 recommends that all cabling and pruning be conducted in accordance with ANSI A300 (Part 3). OSHA seeks input on this recommended practice.)
- Ensure that workers installing cabling systems are positioned off to one side to protect them from injury should the cable system fail (for example, if a block and tackle or hand winch is released);
- Ensure that, when removing a cable from a tree, a block and tackle or come-along system is installed before removing the existing cable; and
- Ensure that a replacement cable is fully installed prior to removing the outdated cable.

These potential provisions are consistent with the Virginia Tree Trimming Operations regulation (16VAC 73-90.C) and the ANSI Z133 standard.

OSHA seeks input on these potential requirements.

Rigging

Employers are, and, under a potential rule, would continue to be, required to follow OSHA's Slings standard (29 CFR 1910.184), which requires, among other things, safe operating practices, inspections, and design specifications applicable to different types of slings. Moreover, to ensure the integrity of the tree and eliminate the risk of failure during a lift, the employer would need to inspect the tree to ensure its health prior to lifting, as required in the JHA. The following requirements would also be included in a potential tree care standard. Employers would need to:

- Limit the number of connecting links (including shackles, screw links, and other connecting links) for rigging systems to the extent possible;
- Ensure that components are in compliance with manufacturer's recommendations;
- Ensure that rigging equipment and climbing equipment are clearly marked to indicate their different purposes and to eliminate any confusion between the two systems;
- Ensure that running rigging lines do not come into contact with any part of the climbing system;
- Ensure that workers select tie-in points that allow for separation of climbing and rigging systems;

- Ensure all rigging points are inspected, and that both the tree and the forces being applied to the tree are considered as part of the JHA (before the commencement of the job and therefore prior to rigging);
- Ensure that workers working aloft position themselves above or to the side of the section of tree being rigged and out of the path of movement of the section of tree when it has been cut;
- Ensure that climbers and their climbing systems are positioned outside of the rigging system itself when a cut is being made or a load is being moved or lowered;
- Develop an escape plan for climbers and communicate that plan to them as part of the job briefing;
- Ensure that steps are taken to prevent spars from splitting or tearing during rigging operations; and
- Train climbers in how to avoid becoming trapped, pinned, or entangled in the rigging system should a tree split or the rigging fail.

OSHA seeks input on these potential requirements.

Tree Removal

OSHA's tree care operations standard would address the hazards associated with removing standing trees and trunks. As discussed earlier in this PIRFA, employers would be required to complete a JHA and a job briefing to ensure that employees are aware of the hazards of each work site including identifying any planned escape routes. Employers would need to ensure that the escape route is free of all obstructions.

A potential tree care operations standard would include a provision specifying that the employer would need to ensure that the gaffs being used are the appropriate type and length for the tree being climbed and that, where pull lines are used, workers involved in pulling are clear by at least one tree length.

OSHA is considering requiring the use of notches on all trees and trunks greater than five inches in DBH. In addition, notches and back cuts would need to be made at a height that allows the chainsaw operator to safely begin the cut, control the tree or trunk, and have freedom of movement for escape. The employer would be required to ensure the following regarding notches:

- That the notch cut:
  - Is a conventional notch, open-face notch, or Humboldt notch;
  - Is 45 degrees or greater and large enough to guide the fall of the tree or trunk to prevent splitting; and
- Does not exceed one-third the diameter of the tree; and
- That the back does not penetrate into the predetermined hinge area.
- That the back cut is one to two 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 when using a Humboldt or conventional notch;
- That the back cut is at the same level as the apex of the notch when using an open-

face notch (greater than 70 degrees);
- That the two cuts that form the notch do not cross at the point where they meet;
- That, before making the back cut, there is a command (such as "stand clear") from the chain saw operator and a response (such as "all clear") from other workers on site;
- That all workers in the vicinity are out of range when the tree or trunk falls and that workers maintain visual contact with the tree or trunk until it is on the ground; and
- That, when the back cut has been completed, the chain-saw operator immediately moves a safe distance away from the tree or trunk using the planned escape route.

OSHA seeks input on these potential requirements.

Limbing and Bucking

OSHA's potential tree care standard would include requirements addressing the hazards associated with limbing and bucking. Limbing is the process of removing limbs from standing or felled trees, and bucking is cutting a felled tree into smaller pieces or logs.

As mentioned previously, limbing and bucking work plans would need to be included in the JHA and communicated to workers during the job briefing. The previously discussed potential chain saw requirements would require the employer to ensure that chain saws are operated in a safe manner (i.e., away from the legs and feet of the operator) and that workers maintain firm footing before, during, and after limbing and bucking.

OSHA is also considering including in a potential tree care operations standard a requirement protecting employees performing limbing and bucking on slopes and hills. Employers would need to ensure that limbing and bucking is performed on the uphill side of each tree or log. In addition, employers would need to ensure that logs are chocked with a suitable material to keep them from rolling, and that natural barriers between the saw and the body, such as limbs, are used where possible.

OSHA is considering the following training requirements for employees performing limbing or bucking. Employers would be required to train workers:

- Not to stand on loose chunks or logs that could roll after being sawed off;
- That trees, limbs, or saplings under tension are to be considered hazardous and on the appropriate cutting techniques and precautions that must be followed;
- That wedges can be used to prevent binding the chainsaw bar or chain; and
- That cant hooks, cant dogs, or peaveys can be used to roll large or irregular logs.

As stated previously in this PIRFA, OSHA would require a communication method to be identified in the JHA for limbing and bucking activities done on a job, communicated during the job briefing, and used during the work. In addition, work zones would be required to be established, and all workers not authorized to be in a work zone would need to remain outside the work zone until informed that it is safe to enter.

OSHA seeks input on these potential requirements.

Potential Non-Mandatory Appendices (based on Virginia Tree Trimming Regulation).

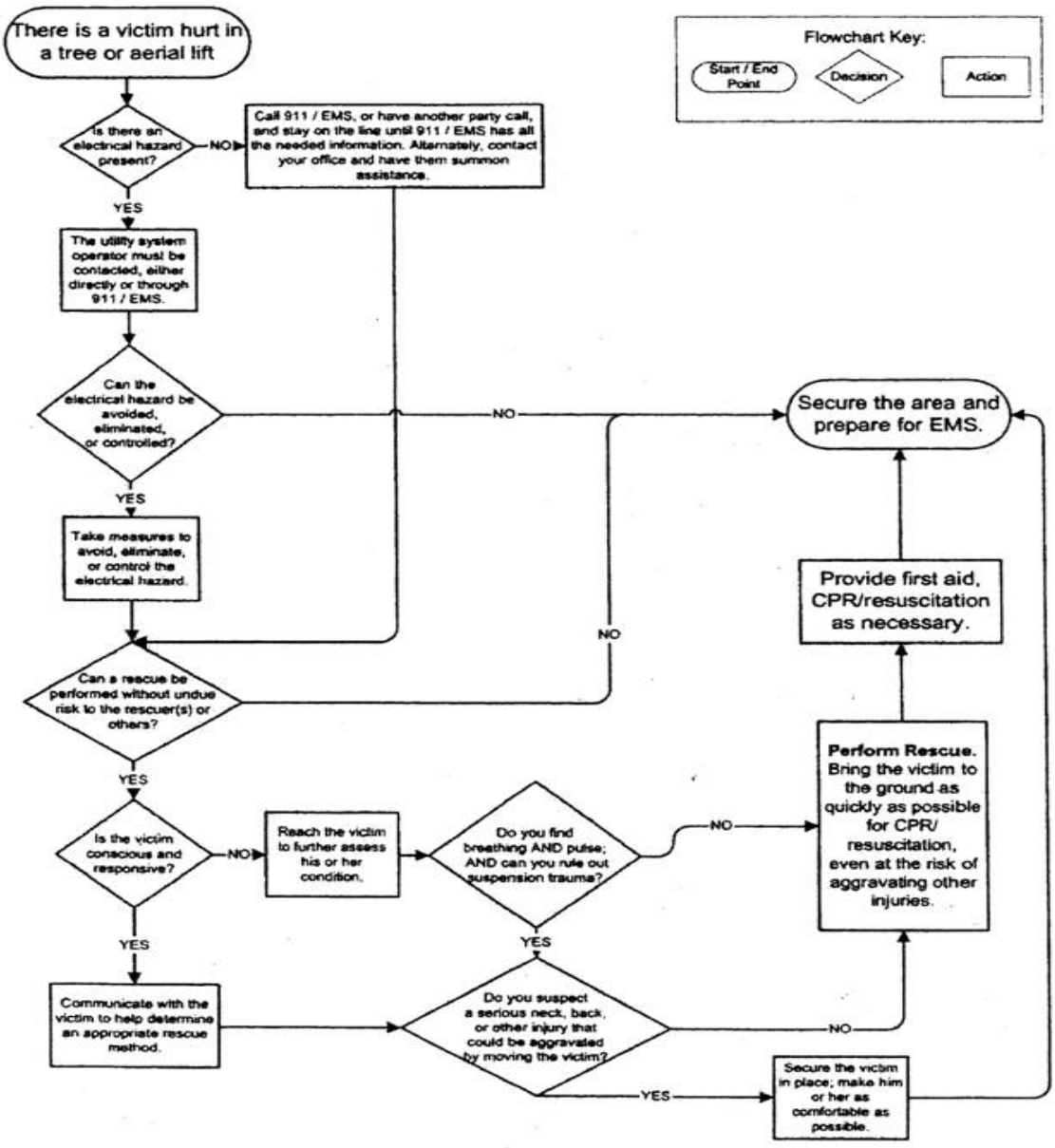
Potential Non-Mandatory Appendix 1 – Weight of Green Logs

Species	Weight, lb per ft	Weight of 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 (Eucalyptus)	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

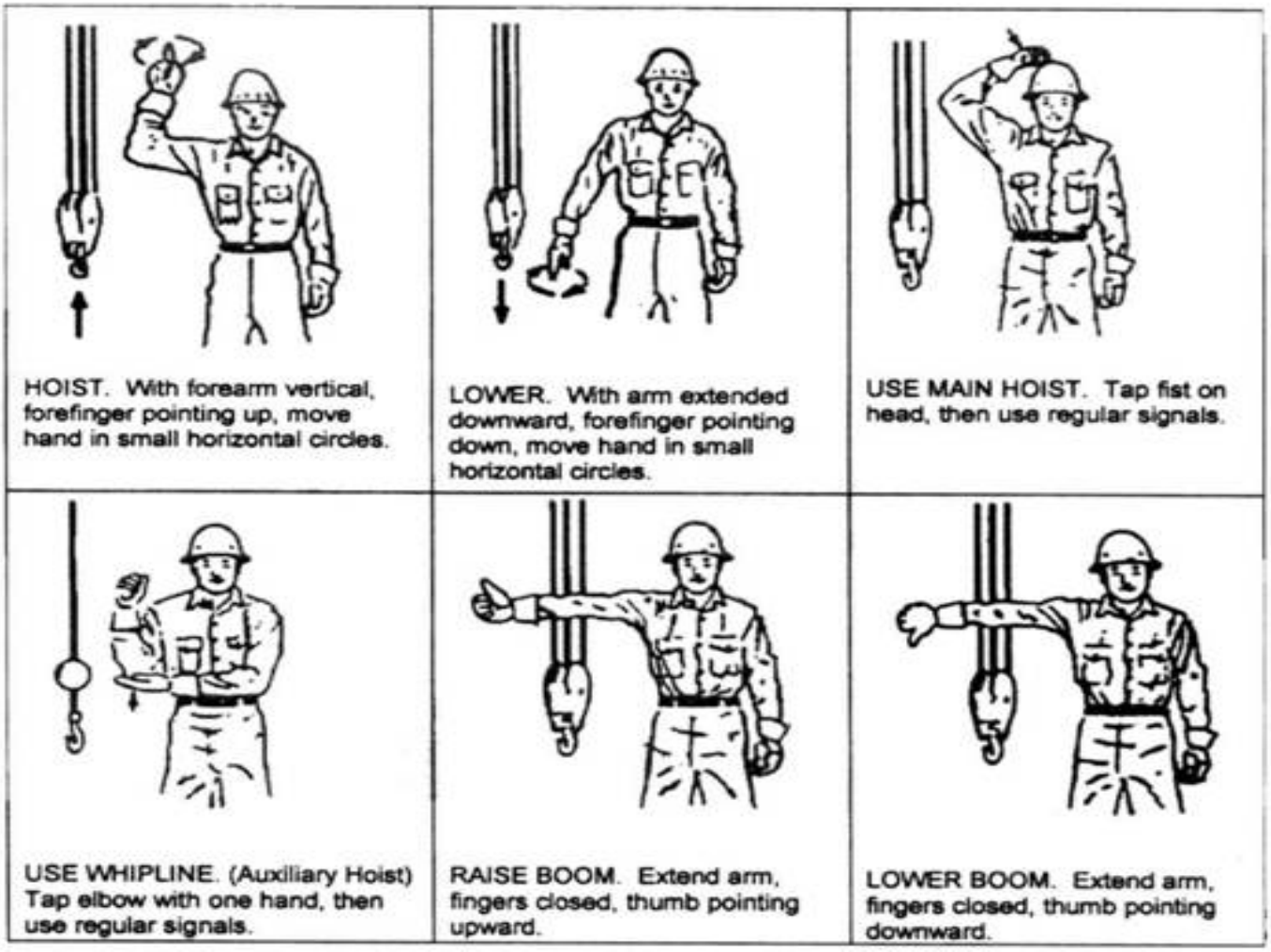
Hickory, shagbark	64	35	50	68	89	113	140	169	201
Horsechestnut	41	22	32	43	57	72	89	108	129
Larch	51	28	40	54	71	90	111	135	160
Locust, black	58	32	45	62	81	102	126	153	182
Locust, honey	61	33	48	65	85	108	133	161	192
Maple, red	50	27	39	53	70	88	109	132	157
Maple, silver	45	25	35	48	63	79	98	119	141
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
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

Potential Non-Mandatory Appendix 2 – Aerial Rescue Flowchart



Potential Non-Mandatory Appendix 3 – Hand Signal Chart for Crane Operations



HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.

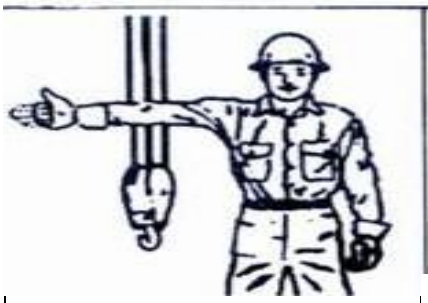
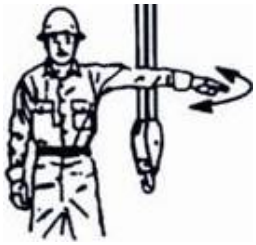
LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.

USE MAIN HOIST. Tap fist on head, then use regular signals.

USE WHIPLINE. (Auxiliary Hoist) Tap elbow with one hand, then use regular signals.

RAISE BOOM. Extend arm, fingers closed, thumb pointing upward.

LOWER BOOM. Extend arm, fingers closed, thumb pointing downward.

 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 an example.)	 RAISE THE BOOM AND LOWER THE BOOM. With arm extended, thumb pointing up, flex fingers in and out 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 arm 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 circlular 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.

V. POTENTIALLY AFFECTED ENTITIES

This section provides an estimate of the industries that potentially fall within the scope of a tree care rule based on the draft regulatory framework. OSHA believes these are the primary industries performing tree care operations.

As discussed under the draft regulatory framework in Section IV, this potential standard would cover tree care operations even if such work is not a routine part of the worker's job or the main activity performed by a given NAICS industry. The agency has preliminarily determined that this rule would cover workers who prune, repair, maintain, or remove trees, and provide on-site support for tree care operations. If the type of work performed meets the definition of tree care operations, the employer's performance of such work would fall under the scope of this draft regulatory framework. OSHA has preliminary determined that the main occupations affected by a potential tree care operations rule would include landscaping and groundskeeping workers (landscapers); pesticide handlers, sprayers, and applicators, vegetation (spray technicians); tree trimmers and pruners (tree trimmers); and crane operators.

A. Employment by NAICS and Occupation

The primary source of data in this analysis is the Bureau of Labor Statistics' Occupational Employment Statistics (OES) for May 2018 (BLS, 2019), which contains data on the number of employees of a given occupation (by Standard Occupational Classification, or SOC code) employed in a given industry (by North American Industry Classification System, or NAICS code).

Data for most of the occupations of interest for the draft regulatory framework (that is, occupations that engage in tree care operations, as defined by the draft regulatory framework) are drawn from the BLS OES data:

- SOC 37-3011 Landscaping and Groundskeeping Workers;
- SOC 37-3012 Pesticide Handlers, Sprayers, and Applicators, Vegetation;
- SOC 37-3013 Tree Trimmers and Pruners;
- SOC 53-7021 Crane and Tower Operators.

BLS OES data are available at the 3-digit, 4-digit, and 5-digit NAICS level, although not every NAICS/SOC combination is available at each level. Because this analysis is performed at the 6-digit NAICS level, OSHA mapped the more aggregated BLS OES data onto 6-digit NAICS codes. Additional detail on how this allocation was made is presented in Appendix A.

Tree Trimmers and Pruners

OSHA estimates that all workers with the job title Tree Trimmer and Pruner (SOC 37-3013) will be affected by this potential rule regardless of the industry in which they are employed. Data from the BLS report that there were 40,274 workers with this job title in 2018. (BLS, 2019)

Landscaping and Groundskeeping Workers Scope Adjustments

After mapping the OES data supplied by BLS, OSHA made several scope adjustments concerning SOC 37-3011 Landscaping and Groundskeeping Workers (landscapers).

First, OSHA preliminarily determined that not all workers with the job title of landscaper currently perform tree care operations as defined under the scope of this potential standard. Therefore, the agency made an adjustment for establishments in NAICS industries employing landscapers to account for this determination. The U.S. Census Bureau (2016) Economic Census estimates that 32,756 establishments out of a total of 93,058 in NAICS 561730 Landscaping Services reported products and services code 33536 "Commercial - Exterior landscaping services - Tree, ornamental plant, and shrub services," meaning those firms report receipts from that service. Based on these figures, OSHA estimated that 35.2 percent (32,756/93,058 x 100) of landscapers in SOC 37-3011 and 35.2 percent of the firms and establishments that employ landscapers currently perform some tree-trimming operations and are thus affected by this potential standard.

Second, for the purposes of this PIRFA, OSHA assumed that landscapers working at establishments where no tree trimmer is employed would not continue to perform tree care operations if the draft standard were enacted. In effect, for the purposes of this PIRFA, OSHA has assumed that landscapers (SOC 37-3011) performing tree care operations under a potential standard will be working in crews *with* tree trimmers, because the landscapers would likely not independently have the qualifications necessary to comply with certain provisions OSHA is considering, such as the job hazard analysis or job briefing requirements.[16] For the landscapers at establishments without tree trimmers, and for the establishments that employ them, the only costs incurred by a potential tree care rule would be for rule familiarization and the incremental cost of hiring a tree care contractor in place of doing the work using an unqualified in-house landscaper.[17]

Third, NAICS 561730 Landscaping Services employs over 90 percent of tree trimmers and about 65 percent of landscapers and spray technicians. Eight percent of the establishments in NAICS 561730 Landscaping Services employ tree trimmers (BLS, 2019). OSHA has estimated that approximately 5 percent of these establishments (0.4 percent overall) also employ landscapers. OSHA expects that those landscapers would continue performing tree care

[16] Additionally, although OSHA recognizes there may be landscaping crews performing tree care operations that are unrelated to pruning or tree removal, OSHA assumes for the purposes of this PIRFA that landscapers engaged in tree care operations are primarily performing or assisting in the performance of work that involves cutting trees, such as pruning or tree removal, or they are part of a crew that performs such work.

[17] For establishments under NAICS 561730 Landscaping Services that OSHA assumes to perform some tree-trimming operations, and that currently employ landscapers but not tree trimmers, OSHA estimates that the only cost incurred by a potential tree care rule would be for rule familiarization, because OSHA assumes that these establishments would no longer do any tree care as part of their landscaping services, and these jobs would, instead, be performed by tree care companies. See Section VI – Unit Compliance Costs and Section VII—Total Costs for further discussion.

operations under the potential new standard, whereas the remaining landscapers in NAICS 561730 would not.[18]

Fourth, OSHA expects that the remainder of the landscapers that currently perform tree care are employed in small numbers across a wide range of industries in every sector. In NAICS industries other than NAICS 561730 that employ both landscapers and tree trimmers, OSHA estimated the number of landscapers that currently perform tree trimming and also work with a tree trimmer by dividing the number of landscapers in each industry by the estimated crew size (four workers, see discussion on crew size in section V.E), and then comparing the resulting number of possible landscaper crews to the estimated total number of tree trimmers in the industry. In industries where there are fewer tree trimmers than landscaper crews, OSHA assumed there would be no tree trimmer available for crews in excess of the total number of tree trimmers. OSHA assumed that crews with at least one tree trimmer would continue to engage in tree care operations and thus be subject to the remainder of the potential standard. For crews without a tree trimmer available, OSHA assumed the landscapers' employer would incur familiarization costs and the cost of hiring a tree care contractor, but there would be no costs for the remainder of the potential draft standard provisions.[19] Depending on the pattern of tree trimmer and landscaper employment in each 6-digit NAICS industry, OSHA has estimated that this will affect anywhere from 0 to 100 percent of landscapers in a given NAICS code, with about 104,000 landscapers no longer sufficiently qualified to perform tree care operations (see Table V-1).

Pesticide Handlers, Sprayers, and Applicators, Vegetation Scope Adjustments

Spray technicians[20] are licensed pesticide applicators, regardless of whether they apply insecticides, fungicides, herbicides, or plant (tree) growth regulators. This is a license typically regulated by the State's Department of Agriculture or Department of Natural Resources.

Licensed spray technicians may apply pesticides by foliar spray, soil drench, dormant season sprays to the tree bark, granular soil application, injection or implantation, or by any combination of those delivery methods. Because of the overlap in skills sets as well as some of the equipment used, spray technicians often handle fertilizer application, which may be delivered in the same variety of ways. Spray technicians often use sprayers carried by large, mobile equipment for foliar sprays and dormant season sprays to a tree's bark.

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[18] This estimate is based on the percent of establishments in NAICS 561730 that are reported in the SUSB data to have more than 20 employees based on an assumption that larger companies would have multiple lines of business while smaller companies would focus their entire business on tree trimming or landscaping only.

[19] For example, if an industry employed 100 landscapers, OSHA would divide that by the estimated number of landscapers per crew (four) to arrive at an estimated 25 landscaping crews in that industry. If that industry was reported to only employ 15 tree trimmers, this analysis assumes that 15 of the 25 landscaping crews would work at a firm that employed a tree trimmer and would, therefore, continue to do tree care operations. The remaining 10 landscaping crews would no longer have the expertise necessary to comply with a tree care standard and would opt to not perform tree care operations rather than incur the expenses to comply with the standard.

[20] The term sprayer can mean a piece of equipment and, somewhat confusingly, spray technicians are referred to as "sprayers" in the BLS occupation code. This analysis will use the term "spray technician" to refer to employees engaged in spraying operations.

Spray technicians do not climb or trim trees, and spray technicians generally do not conduct their activities while other tree care operations, such as tree trimming, are ongoing at the same location. For the purposes of the potential rule, OSHA assumes that anyone engaged in tree climbing for the purposes of tree care operations will not be a spray technician. Spray technicians typically work alone or with an assistant, who is also a spray technician.

Because spray technicians are engaged in work that is separate from other tree care work and work exclusively on the ground such that they are not exposed to many of the hazards addressed by a potential standard (climbing, cutting, etc.), OSHA's potential standard would not require spray technicians to comply with several of the requirements that are not relevant to their duties. For example, spray technicians would not be subject to the same job hazard analysis or job briefing requirements as others covered by the potential standard. For purposes of the economic analysis, OSHA assumes that spray technicians would not use powered tools or hand tools other than sprayers and sprayer-related equipment.

Further, while several NAICS industries employ SOC 53-3012 Pesticide Handlers, Sprayers, and Applicators, Vegetation, OSHA has preliminarily estimated that only those employed in NAICS 561730 Landscaping Services are likely to fall within the scope of a potential tree care operations standard. Thus, OSHA did not include spray technicians that are employed in other NAICS industries for the purposes of this PIRFA.

Crane and Tower Operators Scope Adjustments

While several NAICS industries employ SOC 53-7021 Crane and Tower Operators, OSHA has preliminarily estimated that only those employed in NAICS 561730 Landscaping Services are likely to fall within the scope of a potential tree care operations standard. Thus, OSHA did not include crane operators that are employed in other NAICS industries for the purposes of this PIRFA.

B. Firms and Establishments Employing the Relevant Occupations

After estimating the number of employees from each relevant occupation employed by each affected 6-digit NAICS industry, OSHA then estimated the number of firms and establishments that would employ these workers (i.e., the number of affected firms and establishments). OSHA began with the total number of firms and establishments in the U.S. Census Bureau's (2015) Statistics of U.S. Businesses (SUSB) data for 2012.[21] However, not all the firms and establishments listed in SUSB employ the relevant occupations. Therefore, to estimate the percentage of establishments in a given NAICS industry that employ the relevant occupations, OSHA generally used BLS's May 2018 OES data (BLS, 2019), which include an estimate of the percentage of establishments in a NAICS industry employing a given occupation.

[21] The data from 2012 were used because these data contain the most recent revenue data that are available. (Although revenue data are included in datasets for years ending in 2012 and 2017, the 2017 data are not scheduled to be released until 2020.) Using a source with revenue data allows OSHA to identify the number of firms that are small by SBA definitions, which are often revenue-based. As discussed further in the section on impacts, the revenue data were inflated to 2018 dollars using the BEA (2019) GDP deflator.

In cases where BLS did not include an exact estimate of the percent of establishments that employ workers in a given occupation, but instead reported that the percentage was less than 0.5 percent of establishments, OSHA assumed that 0.5 percent of establishments employed those workers.

To estimate the number of affected establishments in a given 6-digit NAICS industry, OSHA multiplied the Census (2015) estimate of total establishments in the NAICS industry by the estimated percentage that employ each of the affected occupations in that industry.

If this approach would result in more establishments than employees in a 6-digit NAICS industry (as is sometimes the case for NAICS industries in which BLS reported less than 0.5 percent of establishments employ an occupation), OSHA instead estimated the number of establishments by dividing the number of employees in that occupation by the estimated crew size for that occupation.[22] Thus, OSHA assumed that each establishment would typically employ enough employees to make up a crew.

To estimate the number of affected firms, OSHA calculated the ratio of total firms to establishments in a given NAICS code and multiplied that ratio by the estimated number of affected establishments. This estimate was rounded to the nearest integer (or, if it would result in an estimate of zero firms but greater than zero establishments, set equal to the number of establishments).

Table V-2 summarizes the total number of firms, establishments, and employees of different occupations estimated to be affected by a rule based on this draft regulatory framework. In total, over 350,000 employees, 50,000 firms, and 53,000 establishments may be within the scope of a standard based on the draft regulatory framework. About 40,000 of the 350,000 employees are tree trimmers, and the remainder of the affected employees are in adjacent occupations that may occasionally perform tree care operations or support activities for tree care operations. Appendix B displays OSHA's estimates of this employment data by 6-digit NAICS code.

The approximately 193,000 landscapers in NAICS 561730 Landscaping Services and the 104,000 landscapers in other NAICS industries that OSHA estimates would not continue performing tree care operations under a potential standard (and the firms/establishments that employ them) are summarized in Table V-1 (see discussion of landscaper scope adjustments above). Note that these firms, establishments, and employees are included, along with all other firms, establishments, and employees that OSHA estimates fall within the standard's scope, in Table V-2 through Table V-4 and Appendix B, as OSHA estimates that these landscapers will incur costs associated with the potential draft standard (namely rule familiarization and the incremental cost of hiring a qualified contractor in place of an unqualified landscaper).

[22] OSHA has estimated that landscapers and tree trimmers work in crew sizes of four, whereas sprayers work in crew sizes of two. See Section V.E for a discussion of crew size.

Table V-1. Estimated Landscapers that will no Longer Perform Tree Care Operations under Potential Tree Care Operations Standard due to Lack of Employee Qualifications

	Total	Currently Performing Tree Care (Pre-Standard)	Performing Tree Care Post-Standard (working in crew w/ tree trimmer)	Reduction (would not perform Tree Care Post-Standard)	% Affected
NAICS 561730					
Firms	91,251	39,082	3,126	35,956	92.0%
Establishments	92,976	39,820	3,186	36,634	92.0%
Landscapers	549,760	193,513	774	192,739	99.6%
Other NAICS					
Firms	5,803,621	11,044	40	11,004	99.6%
Establishments	7,378,843	13,316	51	13,265	99.6%
Landscapers	309,427	108,444	4,093	104,351	96.2%
Total					
Firms	5,894,872	50,126	2,554	47,572	94.9%
Establishments	7,471,819	53,136	3,237	49,899	93.9%
Landscapers	859,187	301,957	4,867	297,090	98.4%

Sources: BLS, 2019; U.S. Census, 2015; OSHA estimate.

Note: Figures may not add to totals due to rounding.

Table V-2. Total Estimated Firms, Establishments, and Employees in Scope of a Potential Tree Care Operations Standard, Sector Level

NAICS	Industry	Firms	Establishments	Employees				
				Tree Trimmers	Landscapers	Spray Technicians	Crane Operators	Total Employees
11	Agriculture, Forestry, Fishing and Hunting	0	0	0	0	0	0	0
21	Mining, Quarrying, and Oil and Gas Extraction	8	9	0	25	0	0	25
22	Utilities	53	272	890	162	0	0	1,052
23	Construction	1,062	1,072	1,010	5,908	0	0	6,918
31-33	Manufacturing	296	298	0	834	0	0	834
42	Wholesale Trade	202	232	0	950	0	0	950
44-45	Retail Trade	317	390	0	3,473	0	0	3,473
48-49	Transportation and Warehousing	104	114	0	374	0	0	374
51	Information	25	28	0	79	0	0	79
52	Finance and Insurance	44	64	0	149	0	0	149
53	Real Estate and Rental and Leasing	1,249	1,497	0	9,666	0	0	9,666
54	Professional, Scientific, and Technical Services	195	211	0	3,639	0	0	3,639
55	Management of Companies and Enterprises	189	394	49	457	0	0	506
56	Administrative and Support Services	40,136	41,401	36,760	202,368	9,720	280	249,128
61	Educational Services	323	479	40	2,804	0	0	2,844
62	Health Care and Social Assistance	289	426	0	3,481	0	0	3,481
71	Arts, Entertainment, and Recreation	2,851	3,105	60	33,523	0	0	33,583
72	Accommodation and Food Services	730	906	0	6,363	0	0	6,363
81	Other Services (except Public Administration)	1,076	1,261	80	8,714	0	0	8,794
99	State and Local Government	977	977	1,385	18,988	0	0	20,373
Total		**50,126**	**53,136**	**40,274**	**301,957**	**9,720**	**280**	**352,231**

Sources: OSHA, based on BLS (2019), U.S. Census (2015), and USDA (2014).

Note: Figures may not add to totals due to rounding.

C. Small Entities

The vast majority of firms in the affected industries are small. OSHA's analysis assessed impacts on private entities that are small by two separate measures: entities that are small by SBA's definitions and entities that employ fewer than 10 employees. Over 90 percent of affected firms are small by SBA definitions and over 90 percent of workers in the relevant occupations are employed by these firms. Over 80 percent of firms employ fewer than 10 employees and between 70 and 90 percent of workers in the relevant occupations are employed by these firms.

Private entities are defined as small pursuant to the SBA's regulations in 13 CFR 121.201, which include different thresholds for each 6-digit NAICS industry. The SBA definitions are generally revenue-based or employee-based. Because the U.S. Census Bureau's (2015) Statistics of U.S. Business data that are used to estimate total firms and establishments are grouped by employment size class, OSHA converted SBA revenue-based definitions to employee-based definitions. To do so, OSHA first calculated average revenues per firm for each employment size class in the Statistics of U.S. Business data, and then found the largest employment size class with revenue per firm under the SBA's revenue-based definition. Firms in that size class or smaller were estimated to be small by SBA's definitions.

For the second measure, entities that employ fewer than 10 employees, OSHA relied on the U.S. Census Bureau's (2015) SUSB, which include data by employment size class, including firms that employ fewer than 10 employees.

To estimate the number of affected small firms, as defined by SBA, employing each of the relevant occupations, OSHA divided the number of firms in a given NAICS industry that were small by SBA definition by the number of total firms in that NAICS industry. OSHA then multiplied that percentage by the estimated number of affected firms in that NAICS industry. The same process was used to estimate the number of affected firms with fewer than 10 employees. Estimates were rounded to the nearest integer.

To estimate the number of affected small establishments in a NAICS industry, the ratio of small establishments to small firms was multiplied by the number of affected small firms. The same process was used to estimate affected establishments with fewer than 10 employees. Estimates were rounded to the nearest integer.

To estimate the number of affected employees in each relevant occupation in a NAICS industry, the estimated number of employees of that occupation per establishment in the overall profile was multiplied by the number of affected establishments that are SBA-defined small entities or that have fewer than 10 employees. OSHA then rounded to the nearest integer.

Table V-3 summarizes the profile for entities that are small by SBA's definitions, and Table V-4 summarizes the profile for entities the employ fewer than 10 employees.

Table V-3. Estimated Firms, Establishments, and Employees in Scope of a Potential Tree Care Operations Standard, Sector Level - Firms Small by SBA/RFA Definitions

NAICS	Industry	Firms	Establishments	Employees				
				Tree Trimmers	Landscapers	Spray Technicians	Crane Operators	Total Employees
11	Agriculture, Forestry, Fishing and Hunting	0	0	0	0	0	0	0
21	Mining, Quarrying, and Oil and Gas Extraction	8	8	0	22	0	0	22
22	Utilities	50	86	263	98	0	0	361
23	Construction	1,051	1,053	982	5,806	0	0	6,788
31-33	Manufacturing	296	297	0	829	0	0	829
42	Wholesale Trade	201	210	0	860	0	0	860
44-45	Retail Trade	314	335	0	2,996	0	0	2,996
48-49	Transportation and Warehousing	104	108	0	340	0	0	340
51	Information	25	26	0	72	0	0	72
52	Finance and Insurance	44	49	0	115	0	0	115
53	Real Estate and Rental and Leasing	1,230	1,301	0	8,276	0	0	8,276
54	Professional, Scientific, and Technical Services	193	197	0	3,482	0	0	3,482
55	Management of Companies and Enterprises	4	4	1	12	0	0	13
56	Administrative and Support Services	39,906	40,083	35,893	195,164	9,522	274	240,853
61	Educational Services	255	267	15	1,450	0	0	1,465
62	Health Care and Social Assistance	258	305	0	2,396	0	0	2,396
71	Arts, Entertainment, and Recreation	2,833	2,949	55	31,244	0	0	31,299
72	Accommodation and Food Services	719	775	0	5,173	0	0	5,173
81	Other Services (except Public Administration)	1,064	1,143	72	7,826	0	0	7,898
99	State and Local Government	914	914	1,188	15,355	0	0	16,543
Total		**49,469**	**50,110**	**38,469**	**281,516**	**9,522**	**274**	**329,781**
% SBA Small		**99%**	**94%**	**96%**	**93%**	**98%**	**98%**	**94%**

Sources: OSHA, based on BLS (2019), U.S. Census (2015), and USDA (2014).

Note: Figures may not add to totals due to rounding.

Table V-4. Estimated Firms, Establishments, and Employees in Scope of a Potential Tree Care Operations Standard, Sector Level - Entities with Fewer than 10 Employees

NAICS	Industry	Firms	Establishments	Employees				
				Tree Trimmers	Landscapers	Spray Technicians	Crane Operators	Total Employees
11	Agriculture, Forestry, Fishing and Hunting	0	0	0	0	0	0	0
21	Mining, Quarrying, and Oil and Gas Extraction	5	5	0	14	0	0	14
22	Utilities	16	16	28	71	0	0	99
23	Construction	884	884	807	4,745	0	0	5,552
31-33	Manufacturing	114	114	0	391	0	0	391
42	Wholesale Trade	151	151	0	598	0	0	598
44-45	Retail Trade	240	241	0	2,162	0	0	2,162
48-49	Transportation and Warehousing	82	82	0	244	0	0	244
51	Information	21	21	0	55	0	0	55
52	Finance and Insurance	37	37	0	84	0	0	84
53	Real Estate and Rental and Leasing	1,131	1,137	0	7,033	0	0	7,033
54	Professional, Scientific, and Technical Services	154	154	0	2,901	0	0	2,901
55	Management of Companies and Enterprises	6	6	1	12	0	0	13
56	Administrative and Support Services	35,270	35,276	31,749	171,284	8,445	243	211,721
61	Educational Services	105	105	5	531	0	0	536
62	Health Care and Social Assistance	130	130	0	757	0	0	757
71	Arts, Entertainment, and Recreation	1,912	1,916	31	17,013	0	0	17,044
72	Accommodation and Food Services	465	467	0	3,010	0	0	3,010
81	Other Services (except Public Administration)	861	872	56	5,872	0	0	5,928
99	State and Local Government	103	103	134	1,730	0	0	1,864
Total		**41,687**	**41,717**	**32,811**	**218,507**	**8,445**	**243**	**260,006**
% < 10 Employees		**83%**	**79%**	**81%**	**72%**	**87%**	**87%**	**74%**

Sources: OSHA, based on BLS (2019), U.S. Census (2015), and USDA (2014).

Note: Figures may not add to totals due to rounding.

D. Government Entities

BLS's (2019) OES includes data on employment of the four occupations detailed above (SOC 37-3011 Landscaping and Groundskeeping Workers, SOC 37-3012 Pesticide Handlers, Sprayers, and Applicators, Vegetation, SOC 37-3013 Tree Trimmers and Pruners, and SOC 53-7021 Crane and Tower Operators) by ownership. This allowed OSHA to identify how many state and local government employees in these occupations might be affected by this potential standard.

OSHA limited the estimated number of state and local government workers to those working in state plan states (as state and local government workers in non-state plan states would not be covered by a rule based on the draft regulatory framework).[23] Table V-5 shows the states and territories with state plans.

Table V-5. States and Territories with State Plans

States with State Plans		
Alaska	Maine	Oregon
Arizona	Maryland	South Carolina
California	Michigan	Tennessee
Connecticut	Minnesota	Utah
Hawaii	Nevada	Vermont
Illinois	New Jersey	Virginia
Indiana	New Mexico	Washington
Iowa	New York	Wyoming
Kentucky	North Carolina	
Territories with State Plans		
U.S. Virgin Islands	Puerto Rico	

To estimate the percentage of state and local government workers in state plan states, OSHA used BLS's (2019) OES data on total tree trimmers by state. These data suggested that 49.6 percent of tree trimmers are in state plan states. (BLS included similar data for the other two occupations, but OSHA used a single percentage for all occupations as a simplifying assumption.)

BLS also estimated the percentage of state and local government establishments in state plan states that employ each of the relevant occupations. Unlike private entities, however, the U.S. Census Bureau's (2015) SUSB does not include data on the total number of firms and establishments for governmental jurisdictions.

[23] State plans are OSHA-approved workplace safety and health programs operated by individual states or U.S. territories. There are currently 22 state plans covering both private sector and state and local government workers, and there are six state plans covering only state and local government workers. State plans are monitored by OSHA and must be at least as effective as OSHA in protecting workers and in preventing work-related injuries, illnesses and deaths.

Local government data were drawn from the U.S. Census Bureau's (2011) Governments Integrated Directory (GID) for 2007.[24] The data include the 2006 populations of each city, county, and town served by the listed local governments. These populations were important for OSHA's analysis because, under the RFA, a small governmental jurisdiction (sometimes referred to as a "small government" in this analysis) is defined, in relevant part, as "governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand" (5 U.S.C. § 601(5)). Using the GID data, OSHA found that, of the 39,045 local governments listed, 14,681 are in state plan states and 13,774 have a population of less than 50,000 and are, thus, considered small. No state governments are considered small under the RFA definition.

OSHA used the same number for local government firms and local government establishments. While an individual local government may have many establishments (e.g., a library, a city hall, a police station), OSHA estimated that only one of these establishments would employ tree trimmers. This approach means that any individual local government would only incur an establishment-based costs once.

After determining the total number of state and local governments in state plan states, OSHA estimated affected small governments by multiplying the total by the percentage estimated to employ each of the relevant occupations in the May 2018 OES data (BLS, 2019).

E. Jobs per Year and Crew Size

One driver of some potential costs of a tree care operations standard may be the number of tree care operations a given entity performs in a year. OSHA estimated the number of jobs by entity per year based on the average number of jobs per worker and average crew size.

For tree trimmers, one tree care company that OSHA's contractor ERG spoke with, Tree Care Company A (2019), estimated that the average tree trimming company might have 275 to 300 jobs per year, with larger companies having more jobs. For this analysis, OSHA used the higher end of the range to be conservative, and assumed that all tree trimming crews would perform 300 jobs per year. For landscapers and spray technicians, where no specific estimate is available, OSHA assumed the same number of jobs per year as for tree trimmers (although these jobs are not necessarily tree care related work that would be under the scope of this potential standard).

OSHA estimated that all jobs for tree trimmers would be covered by a potential tree care standard, but that only 5 percent of jobs for landscapers and spray technicians would include covered tree care operations.

Next, OSHA estimated the typical crew size. For tree trimmers, Tree Care Company A (2019) estimated a typical crew size of three to four workers, whereas tree care operations being performed with a crane are typically done by crews of six workers including the operator.

[24] Census of Governments data are released every five years. 2007 is the most recent year that reports microdata listing each individual city and town and its population, allowing the estimate of how many governments would be small according to the Regulatory Flexibility Act definition (see the discussion in the text).

According to Tree Care Company A (2019), crew size would not vary with firm size, but larger companies would have more crews. To account for the workers involved in crane crews, OSHA used an estimate of four workers per crew for all tree trimming crews, regardless of company size. For landscapers, OSHA assumed the same number as tree trimmers, four workers per crew. For spray technicians, OSHA estimated an average crew size of two workers.

For crane operators, crane jobs were assumed to be a subset of tree trimmer jobs. The number of jobs was thus calculated by multiplying the number of tree trimmer jobs by the percentage of jobs estimated to involve cranes, knucklebooms, or related hoists, 15.4 percent, drawn from Julius (2012; 2014).[25]

To calculate total tree care operations jobs per year, OSHA multiplied the total number of affected employees in each occupation (as shown in Table B-1) by the number of tree care operations jobs per worker per year, and then divided that number by the crew size. This yielded an estimate of approximately 4.2 million jobs per year for all relevant occupations (see Table V-6. In this table, OSHA has included all landscaper employees that OSHA estimates currently perform tree care operations. As discussed in Section V.B, OSHA expects many of these landscapers may not be able to comply with a potential tree care rule. OSHA expects many of these jobs would likely shift to a different occupation (tree trimmer) if this standard were enacted. That shift is captured in the right-most column of the table.

Table V-6. Estimated Tree Care Operations Jobs per Year by Occupation

Occupation	Affected Employees	Total Jobs per Worker per Year	% Tree Care Operations	Tree Care Operations Jobs per Worker per Year	Crew Size	Total Tree Care Operations Jobs per Year	
						Pre-Standard	Post-Standard
	a	*b*	*c*	*d = b × c*	*e*	*f = (d × a) ÷ e*	
Tree Trimmer	40,274	300	100%	300	4	3,020,550	3,411,974
Landscaper	301,957	300	5%	15	4	1,132,448	741,024
Spray Technician	9,720	300	5%	15	2	72,900	72,900
Crane Operator	280	—	—	—	1	420,767	420,767
Total	—	—	—	—	—	**4,225,898**	**4,225,898**

Sources: OSHA, based on BLS (2019); Tree Care Company A, 2019; TCIA, 2014; Julius (2012; 2014).
Note: Figures may not add to totals due to rounding.

Tasks on some jobs would require a higher degree of expertise (e.g., the job hazard analysis, conducting a job briefing, meeting with the crane operator to review procedures, etc.). These higher-expertise jobs would involve an employee in charge, who would be one of the crew members characterized in Table V-6. In order to estimate the number of affected tasks that would involve an employee in charge, OSHA totaled the estimated number of tree trimmer, landscaper, or spray technician jobs with tasks that require this greater level of expertise. For example, for the job hazard analysis requirements that OSHA is considering, which would apply to all tree care operations performed by all types of workers, all of the jobs for tree trimmers, landscapers,

[25] Note that crane operator jobs are excluded from the total job calculation, as they are a subset of tree trimmer jobs.

and spray technicians were included in the total affected tasks that would require an employee in charge. By contrast (as shown in Table V-7 below), only about 60 percent of tree trimmer jobs would use aerial devices, so tasks involving aerial devices that would be done by the employee in charge only occur on 60 percent of tree trimmer jobs.

Not all jobs would include every type of activity covered by the draft regulatory framework. Table V-7 shows the estimated percentage of tree care jobs that OSHA expects would likely be covered by specific provisions or categories of provisions that OSHA is considering including in a potential tree care standard. Several estimates are drawn from Julius (2012; 2014). OSHA based the remainder of these preliminary estimates on best professional judgement.

Table V-7. Estimated Percentage of Tree Trimming Jobs Covered by Potential Tree Care Provisions

Provision	% Jobs
Rule Familiarization [b]	100.0%
Employee Qualifications [b]	100.0%
Written Tree Care Safety and Health Program [b]	100.0%
Training [b]	100.0%
Emergency Procedures [b]	100.0%
Electric Hazard Exposure	
NAICS 2211 Electric Power Generation, Transmission and Distribution [c]	100.0%
All Other NAICS industries [c]	7.5%
Job Hazard Analysis, Job Briefing, and Worksite Setup [b]	100.0%
Vehicle Inspection & Safety [b]	100.0%
Aerial Devices [a]	60.3%
Chippers [a]	98.5%
Sprayers and Related Equipment [b]	100.0%
Stump Grinders [b]	25.0%
Cranes and Knucklebooms [a]	15.4%
Equipment-Mounted Winches [b]	25.0%
Maintain equipment [b]	100.0%
Portable Power Hand Tools [b]	100.0%
Hand Tools [b]	100.0%
Ladders [b]	100.0%
Pruning and Trimming [a]	56.4%
Tree Climbing and Removal [a]	38.0%
Weather Hazards [b]	100.0%
Electric Power [c]	7.5%
Traffic Control [a]	74.8%

Sources:

[a] Julius, 2012; Julius et al., 2014

[b] OSHA estimate

[c] Gerstenberger, 2019

VI. SUMMARY OF REPORTING, RECORDKEEPING, AND OTHER COMPLIANCE REQUIREMENTS

This section presents OSHA's estimates of the costs resulting from the regulatory framework for a potential tree care operations standard. The estimated costs are based on employers achieving full compliance with the new requirements of the potential standard.

A. Workers Affected by Each Provision

While the potential standard would apply to employers and workers in occupations performing tree care operations as defined by the scope in this PIRFA, not all types of occupations perform all activities covered under the potential standard. Table VI-1 shows whether costs are incurred for each provision based on the type of worker. In some cases (rule familiarization and the written program), the cost is estimated to be borne one time per establishment, as indicated in the table.

To estimate the percentage of employers whose workers have potential electric hazard exposure and thus would be required to provide at least one portable AED at each worksite, OSHA used data from TCIA's (2006) member survey. There, 15 percent of survey respondents reported that they perform line clearance tree trimming and an additional 57 percent of respondents reported that they did not perform line clearance tree trimming but their crews had at least some electrical hazard exposure, for a total of 72 percent of respondents with electric hazard exposure (57 percent + 15 percent = 72 percent). OSHA further differentiates between workers employed in different NAICS industries. OSHA estimates that all workers employed directly by electric utilities (NAICS 2211) would have electrical hazard exposure, 72 percent of workers in NAICS 561730, Landscaping Services, would have electrical hazard exposure (because these workers may be contracted to perform line clearance tree trimming as well as having other electrical hazard exposure), and 57 percent of workers in other NAICS engaged in tree care operations would have electrical hazard exposure (because they have at least some electrical hazard exposure that is not associated with line-clearance tree trimming).

Table VI-1. Occupations/Establishments Affected by Each Provision

Provision	Tree Trimmers	Landscapers	Spray Technicians	Crane Operators	Establishment
Rule Familiarization	—	—	—	—	100%
Employee Qualifications	0%	100%	0%	0%	—
Written Tree Care Safety and Health Program	—	—	—	—	100%
Training	100%	100%	100%	100%	—
Emergency Procedures					
Emergency Procedure Instruction	100%	100%	100%	100%	—
Aerial Rescue Training	—	—	—	—	100%
First Aid/CPR/AED Training	100%	100%	100%	100%	—
First Aid Kit	—	—	—	—	100%
AEDs - NAICS 221121 Electric Bulk Power Transmission and Control	100%	100%	100%	100%	0%
AEDs - NAICS 221122 Electric Power Distribution	100%	100%	100%	100%	0%
AEDs - NAICS 561730 Landscaping Services	72%	72%	72%	72%	0%
AEDs - Other NAICS	57%	57%	57%	57%	0%
Job Hazard Analysis, Job Briefing, and Worksite Setup	100%	100%	0%	100%	—
Fire Prevention	100%	100%	100%	0%	—
Hands-Free Wireless Radio	100%	100%	100%	100%	—
Vehicles and Mobile Equipment					
Vehicle Inspection & Safety	100%	100%	100%	0%	—
Aerial Devices	100%	0%	0%	0%	—
Chippers	100%	100%	0%	0%	—
Stump Grinders	100%	0%	0%	0%	—
Cranes and Knucklebooms	100%	0%	0%	100%	—
Equipment-Mounted Winches	100%	0%	0%	0%	—
Maintain equipment	100%	100%	100%	0%	—
Portable Power Hand Tools	100%	100%	100%	0%	—
Hand Tools	100%	100%	100%	0%	—
Ladders	100%	100%	100%	0%	—
Pruning and Trimming	100%	100%	0%	0%	—
Tree Climbing and Removal	100%	0%	0%	0%	—
Weather Hazards	100%	0%	0%	0%	—
Traffic Control	100%	100%	100%	0%	—

Sources: OSHA estimate; TCIA, 2006.

B. Baseline Non-Compliance Rates

Many companies whose workers perform tree care operations may already be working in a manner that, if OSHA promulgated a rule as outlined in the draft regulatory framework, would be in compliance with some or all elements of the potential standard, for instance, because work is performed in accordance with prior OSHA guidance, other applicable OSHA standards, the ANSI Z133 standard or state regulations in such a manner that it would also satisfy OSHA's standard, or because employers and employees themselves wish to perform their work in accordance with best practices. OSHA takes this level of baseline practices into account when

estimating the costs of a potential rule. The baseline non-compliance rates account for employers whose current practices mean they would not be in compliance with a potential rule based on the regulatory framework. These employers would incur costs to adjust their current practices to meet the practices required by a potential OSHA rule. (Conversely, a baseline compliance rate or baseline rate, represents employers whose current practices mean they would be in compliance with a potential rule. These employers would incur no additional costs under a potential rule.) For the purposes of estimating the costs of a potential rule, OSHA estimates that all affected employers would fully comply with the rule.

Table VI-2 shows the baseline non-compliance rate estimated for each provision of the potential standard. The baseline non-compliance rate shows the percentage of affected firms that OSHA estimates are not currently following the provisions outlined in this PIRFA. Only those firms that are not currently in compliance would have costs related to each provision.

Because this would be a new standard, all in-scope establishments would need to familiarize themselves with the rule, so baseline non-compliance is estimated to be 100 percent.

For employee qualifications and the written tree care safety and health program, the potential requirements are judged to be sufficiently different from what is required now or what is recommended in the ANSI Z133 standard and state law that baseline non-compliance is also estimated to be 100 percent.

For training, Ball & Vosberg's (2010) 2007 survey of 506 companies in the commercial tree care industry in the U.S. found that 37.9 percent of companies do not provide any formal training, and an additional 6.7 percent provide training less often than once a year. OSHA sums these two percentages to estimate that 44.6 percent of employers would not be in compliance with the training requirements in the potential standard.

For two provisions – (1) vehicle inspection and safety and (2) sprayers and related-equipment – Ball & Vosberg (2010) do not provide a direct compliance estimate. OSHA therefore formed its estimates about compliance with these requirements based on Ball & Vosberg's findings about training on these topics. In each case, OSHA assumed that 75 percent of everyone receiving training would be implementing worker practices that would be in compliance with the potential requirements for vehicle inspections and sprayers, and that none of the untrained workers would be working in a manner that would be in compliance. For vehicle inspection and safety, Ball & Vosberg (2010) found that 24.2 percent of respondents provide training on this topic. Assuming the worker population covered by a potential tree care standard is trained at the same rates as those respondents and that 75 percent of workers who are trained (18 percent of all workers) would perform vehicle inspections in accordance with OSHA's requirements, then the remaining 82 percent of all workers are not in compliance.

A number of non-compliance estimates are drawn from Julius' (2012, 2014) direct observation of 63 tree care companies in southern New England and their compliance with the ANSI Z133 standard. Because many requirements of the ANSI Z133 standard are, to a large extent, similar to the requirements of the potential standard, these observations about the rates of compliance with the ANSI standards are judged to be a reasonable proxy for rates of compliance with OSHA's potential standard. OSHA's baseline non-compliance estimates for aerial devices,

chippers, portable power hand tools, hand tools, tree climbing and removal, and traffic control are all drawn from Julius (2012, 2014).

For AEDs, a representative of TCIA (Gerstenberger, 2020) estimates that AEDs are not currently used in the industry; so non-compliance is set to 100 percent.

For the remaining items, where no related compliance estimate was available in Ball & Vosberg (2010), Julius (2012, 2014), or other sources, OSHA estimates a baseline compliance rate of 25 percent based on compliance with state regulations and the ANSI Z133 standard. OSHA notes that in BLS' (2019) Occupational Employment Statistics (OES), approximately 25 percent of workers classed as SOC 37-3013 Tree Trimmers and Pruners are in states with tree care regulations[26] and are therefore more likely to be in compliance with OSHA's potential standard while tree trimmers and pruners in states without tree care regulations may or may not be in compliance with the ANSI Z133 standard or following other best practices.

[26] This estimate includes data for California, Maryland, Michigan, and Oregon. While Virginia has a tree care standard, no BLS (2019) data are available for employment of SOC 37-3013 Tree Trimmers and Pruners for that state. Note that these estimates are based data for May 2018 (released in 2019), and are used to approximate current employment levels as they are the most recent BLS data available.

Table VI-2. Estimated Non-Compliance Rate by Provision

Provision	Non-Compliance Rate
Rule Familiarization [a]	100%
Employee Qualifications [a]	100%
Written Tree Care Safety and Health Program [a]	100%
Training [b]	45%
Emergency Procedures [a]	25%
AEDs [c]	100%
Aerial Rescue Training [a]	25%
Job Hazard Analysis, Job Briefing, and Worksite Setup [a]	25%
Fire Prevention [a]	25%
Hands-Free Wireless Radios [a]	25%
Vehicle Inspection & Safety [d]	82%
Aerial Devices [e]	4%
Chippers [e]	30%
Stump Grinders [a]	25%
Cranes and Knucklebooms [a]	25%
Equipment-Mounted Winches [a]	25%
Maintain Equipment [a]	25%
Portable Power Hand Tools [e]	50%
Hand Tools [e]	13%
Ladders [a]	25%
Pruning and Trimming [a]	25%
Weather Hazards [a]	25%
Tree Climbing and Removal [e]	15%
Traffic Control [e]	44%

Sources:

[a] OSHA estimate

[b] Ball & Vosberg, 2010

[c] Gerstenberger, 2020

[d] OSHA estimate based on Ball & Vosberg, 2010

[e] Julius, 2012; Julius et al., 2014

C. Unit Costs

This section describes the unit cost of compliance with each provision of the potential standard (that is, the cost on a per-establishment, per-employee, or per-job basis). The unit costs for the potential rule largely reflect new work safety practices and the additional time required for compliance with the requirements set out in the potential standard. There are some unit costs to account for the purchase of additional equipment (e.g., high-visibility vests and hands-free, wireless communications equipment), but unless otherwise specified OSHA assumes that employers would be able to comply with the potential rule using existing equipment.

D. Wages used in the Analysis

The majority of the costs estimated in this analysis are labor costs (as opposed to costs incurred to purchase equipment), calculated as the number of hours required to perform an

activity multiplied by the fully loaded hourly wage for a worker in the relevant labor category. The fully loaded hourly wage rates used in this analysis are shown in Table VI-3.

OSHA draws base hourly wage rates for each labor category from BLS's Occupational Employment Statistics (2019), using the median cross-industry hourly rate. In addition, OSHA also estimates fringe benefits based on BLS's Employer Costs for Employee Compensation for March 2018, where fringe benefits accounted for 31.8 percent of total compensation and wages for 68.2 percent. The base hourly rate for each labor category is divided by 68.2 percent to yield the hourly rate with benefits applied.[27]

OSHA also applies an overhead rate. Overhead costs are indirect expenses that cannot be tied to producing a specific product or service. Common examples include rent, utilities, and office equipment; however, there is no general consensus on the cost elements that fit the definition of overhead in the context of occupational safety and health. The lack of a common definition has led to a wide range of overhead estimates. Consequently, the treatment of overhead costs needs to be case-specific. For this analysis, OSHA has adopted an overhead rate of 17 percent of base wages, which is consistent with the overhead rate and methodology used in a number of rulemakings, including for (1) sensitivity analyses in the final economic analysis (FEA) in support of the 2017 final rule delaying the deadline for submission of OSHA Form 300A data (82 FR 55761) and (2) the FEA in support of OSHA's 2016 final standard on Occupational Exposure to Respirable Crystalline Silica.[28] A rate of 17 percent of base wages is equivalent to 11.59 percent of the hourly wage rate with fringe applied.[29]

To calculate the total labor cost for an occupational category, OSHA added together three components: base wage + fringe benefits + applicable overhead costs. Using this methodology, OSHA calculated the fully loaded labor cost for four occupational categories, as shown in Table VI-3).

[27] For example, if an hourly rate of $20 accounts for 68.2 percent of total compensation, then *$20 = 68.2% × Total Compensation*, so $\frac{\$20}{68.2\,\%} = \text{Total Compensation}$.

[28] See the sensitivity analyses in the Improved Tracking FEA (https://www.gpo.gov/fdsys/pkg/FR-2017-11-24/pdf/2017-25392.pdf. , p. 55765) and the FEA in support of OSHA's 2016 final standard on Occupational Exposure to Respirable Crystalline Silica (81 FR 16285) (https://www.gpo.gov/fdsys/pkg/FR-2016-03-25/pdf/2016-04800.pdf, pp.16488-16492). The methodology was modeled after an approach used by the Environmental Protection Agency (EPA). More information on this approach can be found at: U.S. Environmental Protection Agency, "Wage Rates for Economic Analyses of the Toxics Release Inventory Program," June 10, 2002 (Ex. 2066). This analysis was based on a survey of several large chemical manufacturing plants: Heiden Associates, Final Report: A Study of Industry Compliance Costs Under the Final Comprehensive Assessment Information Rule, Prepared for the Chemical Manufacturers Association, December 14, 1989, Ex. 2065.

[29] This is calculated as 68.2 percent × 17 percent, i.e., the percent of wages that are the base hourly rate exclusive of fringe (68.2 percent) multiplied by the overhead rate as a percentage of base hourly wages (17 percent).

Table VI-3. Wages Used in the Analysis

Labor Category	SOC	Occupation	Median Hourly Wage [a]	Fringe % Total [b]	Overhead % (Wages + Fringe) [c]	Fully Loaded Hourly Wage [d]
Manager	11-1021	General and Operations Managers	$48.52	31.8%	11.59%	$79.39
Tree Trimmers	37-3013	Tree Trimmers and Pruners	$18.36	31.8%	11.59%	$30.04
Employee in Charge	37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	$23.18	31.8%	11.59%	$37.93
Landscapers	37-3011	Landscaping and Groundskeeping Workers	$13.94	31.8%	11.59%	$22.81
Spray Technicians	37-3012	Pesticide Handlers, Sprayers, and Applicators, Vegetation	$16.98	31.8%	11.59%	$27.78
Crane Operators	53-7020	Crane and Tower Operators	$26.03	31.8%	11.59%	$42.59

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

Notes:

[a] Median hourly wage rates are drawn from BLS' cross-industry OES for May 2017 (BLS, 2019).

[b] The fringe rate is drawn from BLS' Employer Costs for Employee Compensation for March 2017 (BLS, 2018).

[c] The overhead rate is drawn from EPA, 2002; Rice, 2002.

[d] The fully loaded hourly wage is derived by dividing the median hourly wage by (1 - the fringe rate) and then multiplying by the 11.59% overhead rate.

E. Rule Familiarization

Because of its similarity to the ANSI Z133 standard and other state regulations, many, but not all, portions of a potential tree care operations standard will be familiar to the affected firms, and affected employers will need to take some time to read and understand the implications of the potential standard. OSHA estimates that it would take a manager two hours to familiarize themselves with the requirements of a potential tree care operations standard. Multiplying two hours by the loaded hourly wage rate for a manager of $79.39 yields the unit cost of $158.78 per establishment (see Table VI-4).

In NAICS 561730 Landscaping Services, where most workers performing tree care operations are employed, the vast majority of firms are small single-establishment firms, with an average of 1.02 establishments per firm (U.S. Census, 2015). For the relatively rarer larger firms with more than one establishment per firm, this estimate would scale accordingly because it is a per-establishment estimate, capturing the increased complexity of understanding how the rule would affect a larger workforce operating out of multiple establishments.

Table VI-4. Unit Costs - Rule Familiarization

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Rule familiarization	2	Manager	$79.39	$158.78	Establishment	One-Time

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

F. Employee Qualifications

Certain tasks required by provisions of the potential standard detailed in this PIRFA would need to be completed by a worker with a higher degree of expertise (e.g., the job hazard analysis, conducting a job briefing, meeting with the crane operator to review procedures, etc.). OSHA has preliminarily estimated that most tree trimming crews would include at least one employee with the required level of qualification, but that crews of landscapers who sometimes perform tree care operations typically would not.

In instances where landscaping company crews do not include tree trimmers who would have the sufficient qualifications, those crews would no longer be able to perform tree care operations under the potential standard without additional training. OSHA believes that, in many cases, landscaping companies that only infrequently perform tree care operations would therefore opt to no longer provide those services. However, if these services comprise enough of a landscaping company's business, they may find it worthwhile to train a landscaper to the requirements of this potential standard in order to continue to offer tree care services.

For companies in NAICS 561730 Landscaping Services, this analysis assumes that landscaping companies where no tree trimmer is employed would no longer provide any tree care as part of their landscaping services. These tree care jobs would, instead, be performed by tree care companies with qualified tree trimmers. While this would entail some economic impact on the landscaping companies (and similarly an increase in income for tree care companies), this does not represent a cost for purposes of this economic analysis, so no unit cost is estimated.

As detailed in Section V – Potentially Affected Entities, landscapers are employed in a wide variety of industries where landscaping is not the primary business since some businesses have landscapers on staff to perform landscaping at their facilities. As in NAICS 561730 Landscaping Services, some of these establishments may also employ tree trimmers, in which case, this analysis assumes that those establishments will have an employee with sufficient qualifications to meet the requirements of a potential tree care operations standard and to continue to perform tree care operations. For the other employers with in-house landscaping that does not include tree trimmers, OSHA assumes the employer's in-house landscaping crew will no longer be able to perform tree care work but, instead, will need to hire a tree care contractor to perform any tree work.[30] This unit cost for employers in this situation is calculated as the difference in cost between using in-house landscapers and hiring a contractor to complete the work. As most tree care operations performed by landscapers in these industries are likely to be smaller, relatively simpler jobs (e.g., pruning and trimming from the ground), both the time for in-house landscapers to hire a tree care contractor, as well as the fee of the tree care contractor, would be relatively low. OSHA estimates that it would take 2 hours of in-house landscaper time per job, for a unit cost of $45.62, as compared to $100 to hire a tree care contractor (HomeGuide, 2019). This represents an incremental cost of $54.38 for each job (see Table VI-5).

Table VI-5. Unit Costs - Employee Qualifications

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
In-house landscaper labor cost	2	Landscapers	$22.81	$45.62	Job	Ongoing
Hiring tree care contractor	—	—	—	$100.00	Job	Ongoing
Incremental tree care contractor cost	—	—	—	$54.38	Job	Ongoing

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002; HomeGuide, 2019.

Based on these estimates, the cost to hire a tree care contractor to complete a 2 hour tree trimming job that would have previously been done by an in-house landscaper is about 2.2 times the cost of having that same job done by an in-house landscaper. Taking into account the cost of the in-house landscaper's time, the incremental costs are 1.2 times higher to hire a tree care company. It should be noted that OSHA estimated that all potentially affected entities would incur costs for a manager to spend two hours familiarizing themselves with a tree care rule before deciding that that establishment would no longer perform tree care work. It should also be noted that, at establishments without trained tree care professionals, a manager may well decide to hire all tree care work out post-rule without spending that time to familiarize themselves with the rule, thus reducing the cost of compliance for entities without qualified employees who would no longer perform tree care if a rule were promulgated.

[30] As with those landscaping industry employers, depending on the amount of tree trimming that in-house landscapers do, some employers may find it advantageous to train a landscape workers so that they can perform the tasks laid out in this PIRFA that would require an employee with a higher degree of expertise. For simplicity, OSHA has assumed, for this analysis, that all employers with in-house landscapers and no tree trimmers will cease tree trimming and contract that work to dedicated tree trimming companies.

G. Written Tree Care Safety and Health Program

OSHA estimates that it would take a manager at each establishment eight hours to develop a written tree care safety and health program in the first year after a potential standard is enacted, for a one-time, initial unit cost of $635.14. In subsequent years, OSHA estimates that it will take a manager one hour to review and update the program per establishment, for a unit cost of $79.39 annually. OSHA also estimates the cost for one employee to participate in the annual review and update of the plan. Because this employee could fall into several labor categories (tree trimmer, landscaper, etc.), OSHA calculates a weighted average wage based on the number of employees of each labor category that are in scope. This results in a weighted average wage of $23.79 per hour and unit cost of $23.79 per establishment annually (see Table VI-6).

Table VI-6. Unit Costs - Written Tree Care Safety and Health Program

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Develop program	8	Manager	$79.39	$635.14	Establishment	One-Time
Review and update - Manager	1	Manager	$79.39	$79.39	Establishment	Annual
Review and update - Employee	1	Various	$23.79	$23.79	Establishment	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

Note: Employee cost uses a weighted average wage based on the number of employees of each occupation that are in scope.

H. Training

The potential standard described in this PIRFA would require training that covers a number of topics, including the organization's written tree care safety and health program, safe use of tools and equipment, safe working practices, recognition and control of safety and health hazards, recognition and treatment for poisonous plants and stinging and biting insects, fire prevention, etc. The majority of this training time is aggregated here (where not specifically delineated as a unit cost for other provisions). While workers will have varying degrees of responsibilities and work tasks, all workers engaged in tree care operations will need training appropriate to the hazards they face.

OSHA estimates that it will take four hours for a manager at each establishment to create and provide the training in the first year, for a one-time, initial unit cost of $317.57. In subsequent years, OSHA estimates that it will take two hours for a manager at each establishment to update and provide the training, for a unit cost of $158.78 annually. OSHA estimates that each employee except for spray technicians will spend an hour each year receiving the appropriate training. Because spray technicians face fewer tree care operations-related hazards and because they are required by the U.S. Environmental Protection Agency (EPA) and state-level licensing boards to have training that addresses many of the sprayer-specific hazards they face, OSHA estimates that spray technicians will need 30 minutes of training. The unit cost will vary depending on the labor category of the worker, but ranges from $13.89 to $42.59 per worker, per year. While the potential rule outlined in this PIRFA does not require annual refresher training (only training initially and on an as-needed basis after that), due to the high turnover rate in this industry, for this analysis OSHA is assuming that employers will need to offer a full training session to train new workers every year. Finally, OSHA estimates that a

manager will spend five minutes (0.08 hours) per year to record training for each of their employees, for a unit cost of $6.35 per employee, per year (see Table VI-7).

Table VI-7. Unit Costs - Training

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Employer Create/Provide Training						
Create/provide training	4	Manager	$79.39	$317.57	Establishment	One-Time
Update/provide training	2	Manager	$79.39	$158.78	Establishment	Annual
Employee Receive Training						
Tree Trimmer	1	Tree Trimmers	$30.04	$30.04	Employee	Annual
Landscaper	1	Landscapers	$22.81	$22.81	Employee	Annual
Spray Technician	0.5	Spray Technicians	$27.78	$13.89	Employee	Annual
Crane Operator	1	Crane Operators	$42.59	$42.59	Employee	Annual
Training Recordkeeping						
Recordkeeping	0.08	Manager	$79.39	$6.35	Employee	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

I. Emergency Procedures and First Aid/CPR/AEDs

The potential tree care operations standard described in this PIRFA would require employers to train workers in the correct procedures for emergency response. OSHA estimates that it would take a manager one hour per establishment to develop the instructions on emergency procedures and then provide them to their employees, for a unit cost of $79.39 annually. Each employee would then spend 30 minutes (0.5 hours) receiving instruction. This unit cost would vary by labor category, ranging from $11.40 to $21.30 per employee, per year.

The potential standard would require employers of climbing crews to provide training in aerial rescue techniques. OSHA estimates that an aerial rescue training would take eight hours for one tree trimmer per establishment (TCIA, 2019a; TCIA, 2019b) and result in a unit labor cost of $240.34 per employee, and that the training materials (e.g., a training flashdrive, manual, and test) would cost $129.99 per employee (TCIA, 2019c).

The potential standard would also require workers to have current first aid, CPR, and AED certifications. This unit cost includes both the cost of the class itself, $95 per employee (American Red Cross, 2019a), and a total of seven hours of worker time, including five hours for the online course and hands-on course (AHA, 2019; American Red Cross, 2019a) and two hours of travel time. The unit cost would vary by labor category, ranging from $159.67 to $298.15 per worker. This is treated as an annual cost – while certification lasts for two years and refresher training takes less time than the standard introductory class (American Red Cross, 2019b), the high turnover rate in the industry (Arbor Age, 2008; TCIA, 2006; TCIA, 2014) would mean that employers would have a number of new employees who need to be trained each year.

OSHA would require employers to provide first aid kits that meet the requirements of 29 CFR 1910.266 Appendix A first aid specifications for logging. This would cost $56.75 per first aid kit (Forestry Suppliers, 2019). Dividing by the typical tree trimmer crew size of four employees (see Section V.E) yields an average cost per employee of $14.19 ($56.75 ÷ 4 = $14.19).

OSHA would also require at least one portable AED at each worksite where employees are exposed to electrical hazards from overhead power lines or underground utilities, at a cost of $1,658.70 per crew for affected crews (Grainger, 2019a). Using the typical tree trimmer crew size of four employees (see Section V.E), this results in an average cost per employee of $414.68 ($1,658.70 ÷ 4 = $414.68).

These emergency procedures unit costs are summarized in Table VI-8.

Table VI-8. Unit Costs - Emergency Procedures

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Emergency Procedure Instruction						
Instructor	1	Manager	$79.39	$79.39	Establishment	Annual
Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Landscaper	0.5	Landscapers	$22.81	$11.40	Employee	Annual
Spray Technician	0.5	Spray Technicians	$27.78	$13.89	Employee	Annual
Crane Operator	0.5	Crane Operators	$42.59	$21.30	Employee	Annual
Rescue Training						
Labor time	8	Tree Trimmers	$30.04	$240.34	Establishment	Annual
Materials	—	—	—	$129.99	Establishment	Annual
First Aid/CPR/AED Training						
Class	—	—	—	$95.00	Employee	Annual
Labor time - Tree Trimmer	7	Tree Trimmers	$30.04	$210.29	Employee	Annual
Labor time - Landscaper	7	Landscapers	$22.81	$159.67	Employee	Annual
Labor time - Spray Technician	7	Spray Technicians	$27.78	$194.49	Employee	Annual
Labor time - Crane Operator	7	Crane Operators	$42.59	$298.15	Employee	Annual
First Aid Kit						
First aid kit unit cost	—	—	—	$56.75	Employee	One-time
Employees per first aid kit	—	—	—	4	N/A	N/A
First aid kit unit cost (average per employee)	—	—	—	$14.19	Employee	One-time
AED						
AED unit cost	—	—	—	$1,658.70	Employee	One-time
Employees per AED	—	—	—	4	N/A	N/A
AED unit cost (average per employee)	—	—	—	$414.68	Employee	One-time

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002; American Red Cross, 2019a; AHA, 2019; American Red Cross, 2019a; Forestry Suppliers, 2019; Grainger, 2019a.

J. Job Hazard Analysis, Job Briefing, and Worksite Setup

The potential standard for tree care operations outlined in this PIRFA would require a written job hazard analysis (JHA) for each job (with the exception for jobs performed by spray technician crews working at sites where no tree trimming work is taking place) that assesses hazards specific to the job site and tree(s) and identifies ways to eliminate or mitigate those hazards. The JHA could include (as relevant) inspecting the area around the tree, creating a work plan for pruning and trimming, creating a work plan for limbing and bucking, assessing rigging points, an initial check of the weather conditions and forecast, assessing whether there are any

poisonous plants and biting or stinging insects, identifying traffic hazards, and any other hazards specific to the job. OSHA estimates that it will take 15 minutes (0.25 hours) for the employee in charge (an experienced and highly qualified member of the crew) to perform this analysis on each job, for a unit cost of $9.48. This estimate is meant to be an average and takes into account that a JHA may take less than 15 minutes where a job is simple, the crew is not using complex equipment, and there are no other hazards at the site (*i.e.*, roadways, electric lines, other trees), or the JHA may take longer than 15 minutes for a complex job removing a very large hazardous tree at a worksite with other hazard present.

The employee in charge would need to convey their findings to the rest of the crew in a job briefing. This is estimated to take 15 minutes (0.25 hours) for each member of the crew and is thus costed on an "employee-job" basis, i.e., 15 minutes per employee per job. The resulting unit cost would vary by labor category, ranging from $5.70 to $10.65 per employee per job, with the cost per job varying depending on how many crew members of each labor category are working on the job (e.g., there is only a job briefing cost for a crane operator on jobs where a crane is used). Like the JHA estimate, the job briefing estimate is intended to account for situations where the job briefing is simple and may take less than 15 minutes, as well as situations where the job briefing is highly complex and may take more than 15 minutes. On average, OSHA estimates that 15 minutes is a reasonable estimate of the average amount of time necessary to deliver and receive a job briefing.

OSHA also calculates a cost for the employee in charge to set up the worksite, which would involve developing a communication protocol, developing a safety plan, designating a drop zone, inspecting the worksite for electrical hazards, and visually inspecting the tree. OSHA estimates that most of these activities would take five minutes (0.08 hours) each for a unit cost of $3.03 each. For the visual inspection of the tree (which may include checking for trunk and root hazards, lower stem hazards, limb hazards, and storm damage hazards), OSHA allots 15 minutes (0.25 hours) per job, for a unit cost of $9.48. Taken together, the various worksite setup activities would take 0.57 hours and cost $21.62 per job (see Table VI-9).[31] Based on OSHA's draft regulatory framework, the costs for the JHA, job briefings, and worksite set up would be incurred at every new site and/or every day. If a crew performs three jobs at three different sites in one day, these costs would be incurred at each site. However, if the scope of the work is such that three jobs at three different sites can be completed in one day, it is likely that the JHA, job briefing, and worksite set up would take less time than the average estimated here. If a crew is

[31] OSHA notes that the unit cost estimates in Table VI-9 likely overestimate new costs attributable to the potential standard for some sectors, such as electric power generation firms who are also subject to OSHA's Electric Power Generation, Transmission and Distribution standard (29 CFR 1910.269) requirements for work near power lines. Employees of firms affected by that standard already perform a job hazard analysis, job briefing, and worksite set up that meet many of the requirements of a potential tree care operations standard because of overlaps with other standards or existing industry practices. For example, workers covered by the Electric Power Generation, Transmission and Distribution standard (29 CFR 1910.269) must already identify the hazards associated with the power lines, develop a work plan and brief employees, and ensure proper set up at the worksite. However, those employees may be required to spend additional time beyond their normal functions to account for different hazards not considered under the Electric Power Generation, Transmission and Distribution standard, such as falling tree limbs. OSHA currently lacks the data to how much additional time the job hazard analysis, job briefing, and set up time would take under the potential standard, so the agency is conservatively estimating the full cost of each of these provisions as the unit cost for all affected employers.

working on a multi-day job at the same site, these activities would have to be performed at least at the beginning of each day.

Table VI-9. Unit Costs - Job Hazard Analysis, Job Briefing, and Worksite Setup

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Job Hazard Analysis						
Job hazard analysis	0.25	Employee in Charge	$37.93	$9.48	Job	Ongoing
Job Briefing						
Conduct briefing	0.25	Employee in Charge	$37.93	$9.48	Employee-Job	Ongoing
Receive briefing - Tree Trimmer	0.25	Tree Trimmers	$30.04	$7.51	Employee-Job	Ongoing
Receive briefing - Landscaper	0.25	Landscapers	$22.81	$5.70	Employee-Job	Ongoing
Receive briefing - Crane Operator	0.25	Crane Operators	$42.59	$10.65	Employee-Job	Ongoing
Worksite Setup						
Communication protocol	0.08	Employee in Charge	$37.93	$3.03	Job	Ongoing
Safety plan	0.08	Employee in Charge	$37.93	$3.03	Job	Ongoing
Designate drop zone	0.08	Employee in Charge	$37.93	$3.03	Job	Ongoing
Electrical hazard inspection	0.08	Employee in Charge	$37.93	$3.03	Job	Ongoing
Visually inspect tree	0.25	Employee in Charge	$37.93	$9.48	Job	Ongoing
Worksite Setup Subtotal	***0.57***	***Employee in Charge***	***$37.93***	***$21.62***	***Job***	***Ongoing***

Sources: OSHA based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

K. Fire Prevention

Under the potential fire prevention provision, employees would need to be trained in the use of fire extinguishers. OSHA estimates that 5 minutes (0.08 hours) will be required for this training per year. The unit cost will vary by labor category, ranging from $1.82 to $2.40 per employee per year.

For the fire extinguishers themselves, OSHA estimates a cost of $52.90, which includes $43.60 for the extinguisher and $9.60 for the vehicle mounting bracket (Westech Rigging Supply, 2019a; Westech Rigging Supply 2009b). The potential tree care operations standard would require one fire extinguisher per vehicle. OSHA calculates this here as one per employee, so that it will scale with the number of employees – for instance, a single-crew operation with four employees would have four vehicles/pieces of equipment, etc.

The potential standard outlined in this PIRFA includes a number of provisions related to fire safety practices, for example, only fueling equipment when it's shut down and requiring that refueling operations not be conducted within 10 feet of operating equipment. OSHA estimates the cost of performing work in accordance with these safety practices as a "productivity impact," i.e., performing work in the safer manner takes more time than performing work in an unsafe manner. For fire safety practices, OSHA estimates this productivity impact as 15 minutes (0.25 hours) per person per year. The resulting unit cost varies by labor category, ranging from $5.70 to $7.51 per employee, per year.

The final element of fire prevention is the requirement to clean spark arrestors. OSHA estimates that it will take 5 minutes (0.08 hours) each, twice per year, for one member of each crew to clean an average of three spark arrestors (e.g., one on the brush chipper, chainsaw, and stump grinder). Dividing this labor time by the crew size results in an estimate of 0.125 hours for tree trimmers and landscapers (where the crew size is four) and 0.25 hours for Spray Technicians (where the crew size is two). The resulting unit cost varies by labor category, ranging from $2.85 to $6.95 per employee, per year.

OSHA does not take costs for crane operators related to fire prevention, as OSHA's existing crane standards already require the use of fire extinguishers in cranes and prevent refueling during operation.

The unit costs related to fire prevention are summarized in Table VI-10.

Table VI-10. Unit Costs - Fire Prevention

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Fire Extinguisher Training						
Tree Trimmer	0.08	Tree Trimmers	$30.04	$2.40	Employee	Annual
Landscaper	0.08	Landscapers	$22.81	$1.82	Employee	Annual
Spray Technician	0.08	Spray Technicians	$27.78	$2.22	Employee	Annual
Fire Extinguishers						
Vehicle-mounted fire extinguishers	—	—	—	$52.90	Employee	One-time
Employees per extinguisher	—	—	—	1	N/A	N/A
Extinguisher cost per employee	—	—	—	$52.90	Employee	One-time
Fire Safety Practices						
Tree Trimmer	0.25	Tree Trimmers	$30.04	$7.51	Employee	Annual
Landscaper	0.25	Landscapers	$22.81	$5.70	Employee	Annual
Spray Technician	0.25	Spray Technicians	$27.78	$6.95	Employee	Annual
Spark Arrestors						
Tree Trimmer	0.125	Tree Trimmers	$30.04	$3.76	Employee	Annual
Landscaper	0.125	Landscapers	$22.81	$2.85	Employee	Annual
Spray Technician	0.25	Spray Technicians	$27.78	$6.95	Employee	Annual

Sources: OSHA, based on Westech Rigging Supply, 2019a; Westech Rigging Supply 2019b.

L. Hands-Free Wireless Radios

The potential standard would require the use of hands-free radios for communications (unless that method of communication is ineffective). OSHA estimates the cost of this alternative as one hands-free wireless radio per employee, at a cost of $249 each (SENA, 2019) (see Table VI-11).

Table VI-11. Unit Costs - Hands-Free Wireless Radios

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Fire Extinguisher Training						
Tree Trimmer	—	Tree Trimmers	—	$249.00	Employee	One-time
Landscaper	—	Landscapers	—	$249.00	Employee	One-time
Spray Technician	—	Spray Technicians	—	$249.00	Employee	One-time
Crane Operator	—	Crane Operators	—	$249.00	Employee	One-time

Sources: OSHA, based on SENA, 2019.

M. Vehicles and Mobile Equipment

This section covers vehicles used to transport crew members, as well as a variety of equipment that is towed or driven to the worksite. Not every employee engaged in tree care operations will use every type of equipment on every job; the percentage of jobs estimated to involve each type of equipment is shown in Table V-7 above. The unit costs for each aspect of vehicles and mobile equipment, where they would apply, are discussed in turn below, and are shown in Table VI-12.

Vehicle and Mobile Equipment Inspection & Safety

OSHA estimates that it will take five minutes per job for one member of the crew to perform a pre- and post-trip equipment inspection to ensure equipment is in serviceable condition and any defects or damage are repaired. The unit cost for this inspection ranges from $1.82 to $2.40 per job, depending on labor category. OSHA also estimates that operating vehicles and equipment in a safe manner would result in a productivity impact of five minutes (0.08 hours) per employee per year. The vehicle safety provisions in the potential standard include a variety of tasks, such as properly storing the equipment, prohibiting workers from using parts of their body to stop hydraulic leaks, removing keys from the ignition, chocking unattended vehicles, using proper towing procedures, etc. The resulting unit cost for complying with the general vehicle safety provisions ranges from $1.82 to $2.40 per job, depending on labor category. This cost encompasses compliance with the safety requirements for "specialized equipment," such as ensuring that deadman controls on towing equipment are functional or that employees disconnect the rotary or cutter head before dismounting these vehicles or mobile equipment.

Aerial Devices

OSHA estimates that performing tree care operations using aerial devices in a manner consistent with the potential standard outlined in this PIRFA will result in a productivity impact of 15 minutes (0.25 hours) per employee per year, for a unit cost of $7.51 per employee per year. OSHA only applies this unit cost to tree trimmers, as this is the labor category likely to be utilizing aerial devices. This element includes the requirements that aerial devices or aerial ladders not be used as cranes or hoists, that adequate distances from passing vehicles be maintained, that combined loads not exceed rated lift capacities, that all underground hazards are located prior to operating aerial devices, and similar safe work practices.

Chippers

OSHA estimates that using chippers in a safe manner will result in a productivity impact of 30 minutes (0.5 hours) per employee per year for tree trimmers and 15 minutes (0.25 hours) per employee per year for landscapers, resulting in unit costs of $15.02 and $5.70 per employee per year, respectively. Safe practices include not reaching beyond the plane of the infeed hopper while the chipper is operating, removing any loose clothing before using the chipper, feeding brush and logs butt or cut end first and from the side of the feed table center line, and using a push stick to feed small branches into the chipper.

Sprayers and Related Equipment

OSHA has preliminarily determined that the potential requirements addressing sprayers and related equipment outlined in this PIRFA will not result in workers taking additional time to perform tasks using this equipment. Based on this, OSHA is not assessing costs related to these provisions in this analysis.

Stump Grinders

OSHA estimates that operating stump grinders in full compliance with the potential standard described in this PIRFA will result in a productivity impact of 30 minutes (0.5 hours) per year for tree trimmers, for a unit cost of $15.02 per employee per year. This includes staying clear of the stump grinder when in use, staying at the controls during grinding or maintaining a safe distance when using a remote control, stopping moving parts and removing the key when leaving the machine unattended, and similar safe work practices.

Cranes and Knucklebooms

Compliance with the potential standard would require a number of activities related to cranes, knucklebooms, and related hoists. First, a manager would spend 5 minutes (0.08 hours) to locate an existing crane checklist, for a one-time unit cost of $6.35 per establishment.

Second, the employee in charge and crane operator would spend an estimated five minutes (0.08 hours) for every crane job meeting to review procedures, for a unit cost of $3.03 per employee in charge and $3.41 per crane operator per job.

Third, OSHA estimates that performing crane work in a safe manner would result in a productivity impact of 15 minutes (0.25 hours) per employee per year for both tree trimmers and crane operators, resulting in a unit cost of $7.51 for tree trimmers and $10.65 for crane operators per employee per year. This would include work practices such as rigging tree sections to minimize load shifting, using controlled load lowering, estimating the weight of the tree section to be lifted prior to cutting the section, and similar practices.

Finally, when using a crane to hoist a climber (sometimes known as “riding the hook,”) OSHA would require a written assessment showing that it is either impossible or infeasible to perform the work otherwise, or that not using the crane presents a greater hazard. This might

include documenting the hazards, completing a pre-written checklist, or drawing a diagram of the site. OSHA estimates that this will take an employee in charge 30 minutes (0.5 hours) to perform this assessment, for a unit cost of $18.96 per job where this technique is used. This assessment would not be needed for all crane jobs, only to those where a climber is hoisted using a crane. Based on information provided by TCIA (Gerstenberger, 2019), OSHA estimates that for a given crew, approximately 16.7 percent of crane jobs will involve hoisting a climber using a crane (1 time per week ÷ (300 jobs per year divided by 50 workweeks)). Averaging the assessment cost across all crane jobs, then, results in a unit cost of $3.16 ($18.96 × 16.7 percent) per crane job.

Note that while the potential standard would require crane operation to comply with OSHA's Cranes and Derricks in Construction Standard at 29 CFR 1926, subpart CC, OSHA is not including additional costs for compliance with these existing crane requirements. It is OSHA's understanding that some companies engaged in tree care rent cranes from rental companies while others own the cranes but lease them out to other businesses along with the operator who is an employee of the crane-owning tree care company to use when the tree care companies are not using them. The cranes used in tree care are typically the types of cranes that are also used in construction, so OSHA assumes that all companies that rent cranes (crane rental companies and tree care companies who lease out their cranes) already ensure that their cranes meet the requirements of subpart CC in order to maximize their potential rental markets.[32] These cranes would typically be rented with operators, and OSHA assumes that the rental fee for the crane already encapsulates all of those costs, including operator time to inspect equipment and establish safe work areas for the crane.

Equipment-Mounted Winches

OSHA estimates that it will take an employee in charge five minutes (0.08 hours) per job to inspect winch and fastenings and attachments and ensure that winches are used in a safe manner (e.g., the winch system is being used only as intended, loads are being pulled in a manner to avoid tipping, etc.). This results in a unit cost of $3.03 per job to comply with this potential provision.

Equipment Maintenance

OSHA estimates that each employee would spend 30 minutes (0.5 hours) per year on vehicle and mobile equipment maintenance (including trucks, aerial devices, brush chippers, sprayers, stump grinders, and any other vehicles or mobile equipment used). The resulting unit cost varies by labor category, ranging from $11.40 to $15.02 per employee per year.

[32] The cranes at issue in the potential rulemaking would include cranes owned by tree-care employers in the NAICS code for landscaping. When OSHA conducted its economic analysis of subpart CC in 2010, OSHA had not discovered that cranes owned by employers in the NAICS code for landscaping were being rented for construction uses, or even focused on the NAICS for landscaping, because tree trimming and removal was exempt from the standard. Further study of the tree care industry, however, has made OSHA aware of the potential for use of these cranes in construction activities.

Table VI-12. Unit Costs - Vehicles & Mobile Equipment

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Pre-and Post-Trip Vehicle and Mobile Equipment Inspection						
Tree Trimmer	0.08	Tree Trimmers	$30.04	$2.40	Job	Ongoing
Landscaper	0.08	Landscapers	$22.81	$1.82	Job	Ongoing
Spray Technician	0.08	Spray Technicians	$27.78	$2.22	Job	Ongoing
Vehicle and Equipment Operation Safety						
Tree Trimmer	0.08	Tree Trimmers	$30.04	$2.40	Employee	Annual
Landscaper	0.08	Landscapers	$22.81	$1.82	Employee	Annual
Spray Technician	0.08	Spray Technicians	$27.78	$2.22	Employee	Annual
Aerial Devices						
Aerial device safety practices - Tree Trimmers	0.25	Tree Trimmers	$30.04	$7.51	Employee	Annual
Chipper Safety Practices						
Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Landscaper	0.25	Landscapers	$22.81	$5.70	Employee	Annual
Stump Grinders						
Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Cranes						
Checklist						
Locate checklist	0.08	Manager	$79.39	$6.35	Establishment	One-Time
Meet to Review Procedures						
Employee in Charge	0.08	Employee in Charge	$37.93	$3.03	Job	Ongoing
Crane Operator	0.08	Crane Operators	$42.59	$3.41	Job	Ongoing
Crane Safety Practices						
Tree Trimmers	0.25	Tree Trimmers	$30.04	$7.51	Employee-Job	Ongoing
Crane Operators	0.25	Crane Operators	$42.59	$10.65	Employee-Job	Ongoing
Riding the Hook - Written Assessment						
Written Assessment	0.5	Employee in Charge	$37.93	$18.96	Job	Ongoing
Written Assessment - Avg. per crane job	0.08	Employee in Charge	$37.93	$3.16	Job	Ongoing
Equipment-Mounted Winches						
Inspect winch and fastenings/attachment	0.08	Employee in Charge	$37.93	$3.03	Job	Ongoing
Maintain Equipment						
Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Landscaper	0.5	Landscapers	$22.81	$11.40	Employee	Annual
Spray Technician	0.5	Spray Technicians	$27.78	$13.89	Employee	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

N. Portable Power Hand Tools

For safe work practices relating to portable power hand tools (such as chainsaws), OSHA assesses a productivity impact of 30 minutes (0.5 hours) per employee per year, for a unit cost of between $11.40 and $15.02, depending on labor category (see Table VI-13). This would include work practices such as not drop-starting chainsaws, establishing a second point of attachment when operating a chain saw aloft, and shutting the chainsaw down before setting it down.

Table VI-13. Unit Costs - Safe Use of Portable Power Hand Tools

Labor Category	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Landscaper	0.5	Landscapers	$22.81	$11.40	Employee	Annual
Spray Technician	0.5	Spray Technicians	$27.78	$13.89	Employee	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

O. Hand Tools

OSHA estimates that workers covered by this potential standard will incur a productivity impact of 30 minutes (0.5 hours) per employee per year for safe work practices relating to hand tools. This results in a unit cost of $11.40 to $15.02 per employee per year, depending on the labor category (see Table VI-14). This productivity impact would include not carrying hand tools when climbing, not throwing hand tools, raising and lowering hand tools with a handline, and similar safe work practices.

Table VI-14. Unit Costs - Hand Tool Safety Practices

Labor Category	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Landscaper	0.5	Landscapers	$22.81	$11.40	Employee	Annual
Spray Technician	0.5	Spray Technicians	$27.78	$13.89	Employee	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

P. Ladders

OSHA estimates that workers covered by this potential standard will incur a productivity impact of 30 minutes (0.5 hours) per employee per year for safe work practices relating to ladders, resulting in a unit cost of $11.40 to $15.02 per employee per year, depending on labor category (see Table VI-15). This would include work practices such as not using metal ladders near electric lines, inspecting ladders before use, not using ladders as bridges, and supporting stored ladders to prevent sagging.

Table VI-15. Unit Costs - Ladder Safety Practices

Labor Category	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Landscaper	0.5	Landscapers	$22.81	$11.40	Employee	Annual
Spray Technician	0.5	Spray Technicians	$27.78	$13.89	Employee	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

Q. Pruning and Trimming

For pruning and trimming safety practices, OSHA assesses a productivity impact of 30 minutes (0.5 hours) for tree trimmers and landscapers working with tree trimmers, resulting in a unit cost of $15.02 and $11.40 per employee per year, respectively (see Table VI-16). This would include safe work practices such as storing pruners and pole saws safely, using rigging lines for limbs, and removing palm frond skirts from the top down.

Table VI-16. Unit Costs - Pruning and Trimming

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Pruning and Trimming Safety Practices						
Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Landscaper	0.5	Landscapers	$22.81	$11.40	Employee	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

R. Tree Climbing and Removal

The potential tree care operations standard would include a number of requirements addressing tree climbing and removal. OSHA estimates that it would take a tree trimmer seven minutes per job to inspect the climbing lines, climbing equipment, and fall protection systems to be used on the job, for a unit cost of $3.61 per tree trimmer per job. Climbing safety practices are estimated to result in a productivity impact of half an hour per tree trimmer per year, for a unit cost of $15.02 per tree trimmer per year. This would include practices such as having both a climbing line and a second means of being secured while aloft, being secured while ascending and repositioning, being tied in while working, safe rigging practices, using tie-in points, etc.

Second, OSHA estimates that safe use of ropes, arborist equipment, and fall protection systems will result in a productivity impact of half an hour per tree trimmer per year, for a unit cost of $15.02 per tree trimmer per year. This would include practices such as appropriate use of carabiners, saddles, and gaffs, preventing rope ends from fraying, safely storing and transporting ropes, not leaving ropes unattended, etc.

Third, because the inspection of climbing lines and climbing equipment may result in the need to repair or replace such equipment, OSHA estimates the average cost of this repair each year. TCIA's (2014) Operating Cost Benchmark Report estimated average repair costs of $1,500 per year. OSHA inflates this to 2018 dollars using the Bureau of Economic Analysis (BEA) (2019) GDP deflator, resulting in a cost of $1,627.28. To convert this cost to a per employee cost (so that it will scale appropriately for companies of different sizes), it is divided by the average number of tree care and other production employees reported per company in TCIA's (2014) report, 6.1. This results in a unit cost of $266.77 per employee per year. OSHA believes this amount overestimates the actual cost increase because it does not distinguish between the repairs that would have occurred absent new requirements and the repairs that will likely occur more frequently to comply with the new requirements. However, OSHA does not have sufficient data to focus only on the incremental cost increase.

Fourth, OSHA estimates that safe cabling practices will take an extra 30 minutes (0.5 hours) per year per tree trimmer, for a unit cost of $15.02 per tree trimmer per year. This includes work practices such as staying out of drop zone while cabling, transferring a load onto a new system in a way that avoids sudden or dynamic loading, and not removing the old cabling system until the new system is put in place.

Fifth, OSHA estimates that safe rigging practices will take an extra 30 minutes (0.5 hours) per year per tree trimmer, for a unit cost of $15.02 per tree trimmer per year. This includes ensuring that load ratings are observed, differentiating climbing and rigging equipment

using taglines, staying out of the path of the rigging while aloft, and not making contact with swinging parts of the rigging.

Sixth, in order to comply with the provisions addressing tree removal in the potential standard, OSHA estimates that following these practices will result in a productivity impact of 30 minutes (0.5 hours) per year per tree trimmer, for a unit cost of $15.02 per tree trimmer per year. This includes a number of work practices, such as using wedges to prevent binding of the guide bar, using notches on trees over five inches, considering the potential for a "barber chair" hazard, maintaining a safe working distance (non-involved workers remaining two times the tree height away, involved workers other than chain saw operator remaining 1.5 times the tree height away), etc.

Seventh, for limbing and bucking, OSHA estimates that it will take tree trimmers an additional 30 minutes (0.5 hours) per year per tree trimmer to use safe limbing and bucking work practices, for a unit cost of $15.02 per tree trimmer per year. The safe limbing and bucking work practices includes things such as positioning workers so they do not create a hazard for other workers, preventing the root ball or butt log from striking a worker, ensuring solid footing, etc.

Finally, OSHA estimates that it will take tree trimmers an extra 15 minutes (0.25 hours) per year for safe operation of high pressure air-excavation equipment, such as making sure the hose is properly attached and secured, not pointing the equipment at body parts, and depressurizing the equipment before uncoupling the hose. This results in a unit cost of $7.51 per tree trimmer per year.

Table VI-17 summarizes the unit costs related to tree climbing and removal.

Table VI-17. Unit Costs - Tree Climbing & Removal

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Climbing Procedures						
Inspect climbing lines, climbing equipment, and fall protection systems	0.12	Tree Trimmers	$30.04	$3.61	Job	Ongoing
Climbing safety practices	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Ropes, Arborist Equipment, and Fall Protection						
Safe use of ropes, arborist equipment, and fall protection systems	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Equipment Repair						
Equipment repair per employee	—	—	—	$266.77	Employee	Annual
Cabling						
Safe Cabling	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Rigging						
Rigging safety practices	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Tree Removal						
Tree removal safety practices - Tree Trimmer	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
Limbing and Bucking						
Safe limbing and bucking	0.5	Tree Trimmers	$30.04	$15.02	Employee	Annual
High Pressure Air-Excavation Equipment						
Safe compressor operation	0.25	Tree Trimmers	$30.04	$7.51	Employee	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002; TCIA, 2014

S. Weather Hazards

As changing weather conditions may represent a hazard for tree care operations, OSHA estimates a cost for the employee in charge to check the weather once during each job (in addition to an initial check that is included as part of the job hazard analysis. This is estimated to take 15 seconds per check (for example, using a smartphone app or listening to a National Oceanic and Atmospheric Administration (NOAA) weather radio). This results in a unit cost of $0.16 per job (see Table VI-18).

Table VI-18. Unit Costs - Weather Hazards

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Check weather on phone	0.0042	—	—	—	Job	Ongoing
Times checked per job	—	—	—	1.00	Job	Ongoing
Check weather per job	0.0042	Employee in Charge	$37.93	$0.16	Job	Ongoing

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

T. Electric Power

The potential tree care operations rule outlined in this PIRFA does not include any additional requirements for addressing electrical hazards beyond what is currently required by OSHA standards. Based on this, the agency has estimated there will be no additional costs attributed to this potential standard related to addressing hazards of working near electric power lines.

U. Traffic Control

For jobs that are conducted near streets where there is vehicular and pedestrian traffic, OSHA estimates that it will take one member of the crew an extra five minutes (0.08 hours) per job to conduct traffic control in full compliance with the potential standard. Dividing by the crew size of four yields an estimate of 0.02083 minutes per job and a unit cost of $0.63 and $0.48 per employee per job for tree trimmers and landscapers, respectively. For spray technicians, the estimated crew size of two yields an estimate of 0.04167 minutes per job and a unit cost of $1.16 per job. OSHA also estimates a cost for high visibility clothing (such as a vest) of $15.13 per employee per year (Grainger, 2019b) (see Table VI-19). Note that OSHA is not including new costs for traffic barriers, cones, or other related equipment because those items are already routinely used to comply with existing state and federal requirements.

Table VI-19. Unit Costs - Traffic Control

Item	Hours	Labor Category	Wage	Unit Cost	Basis	Frequency
Traffic Control Safety Practices						
Tree Trimmers	0.02083	Tree Trimmers	$30.04	$0.63	Job	Ongoing
Landscapers	0.02083	Landscapers	$22.81	$0.48	Job	Ongoing
Spray Technicians	0.04167	Spray Technicians	$27.78	$1.16	Job	Ongoing
Traffic Control Clothing/Equipment						
High visibility clothing	—	—	—	$15.13	Employee	Annual

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002; Grainger, 2019b.

VII. TOTAL COSTS OF COMPLIANCE[33]

This section summarizes the total costs of compliance with the potential standard. The total costs are generally derived by multiplying the basis for each cost (the number of establishments, employees, or jobs, from Section V, Potentially Affected Entities above) by the unit cost (derived in Section VI above). For job-based costs, if the covered activity would only take place on certain jobs, then this is also multiplied by the percentage of jobs that involve that activity (from Table V-7 above) to derive the number of affected jobs. This cost is then multiplied by the non-compliance rate for each provision (from Table VI-2, above) to yield the total compliance-adjusted undiscounted cost.

The costs in this analysis are either incurred one time, annually, or on an ongoing basis. In order to have compliance costs and cost savings presented on a consistent and comparable basis across various regulatory activities, they are expressed for this potential standard in annualized terms. Annualized costs represent the more appropriate measure for assessing the longer-term potential impacts of the rulemaking and for purposes of comparing net costs across diverse regulations with a consistent metric. In addition, annualized net costs are often used for accounting purposes to assess the cumulative net costs of regulations on the economy or specific parts of the economy across different regulatory programs or across years. As presented in this

[33] The estimated average cost per entity for entities of various sizes is show below in Tables VII-27, VII-28, and VII-29 for aggregated 2-digit NAICS industries and in Appendix Table C-2 at the 6-digit NAICS level. Costs are shown as a percent of revenue in Appendix Table D-4 and the costs as a percent of revenue overall are equal to the costs as a percent of revenue per job.

PIRFA, both 3 and 7 percent discount rates were applied to one-time costs, over a 10-year period, to calculate the annualized cost.[34] Annualized one-time and annual/ongoing costs are then summed to yield total annualized costs.

A. Rule Familiarization

Rule familiarization costs would be borne by all establishments where employees performing tree care operations are employed. To derive the total cost, the number of establishments (from Section V) is multiplied by the unit cost per establishment and non-compliance rate (from Section VI). This yields a total one-time cost of $8.4 million for all affected entities. This one-time cost is then annualized, resulting in a total annualized cost of $1.0 million to $1.2 million, using a 3 and a 7 percent discount rate, respectively (see Table VII-1).

Table VII-1. Total Costs - Rule Familiarization

Item	Affected Est.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Rule familiarization	53,136	$158.78	100%	$8,437,157	$0	**$989,092**	**$1,201,261**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

B. Employee Qualifications

Impacts associated with the potential standard's requirement that employees engaged in tree care operations meet a certain level of qualifications would primarily be felt by two groups: (1) establishments in NAICS 561730 Landscaping services employing landscapers but not tree trimmers and (2) establishments employing landscapers, but not tree trimmers, in other NAICS industries.

For companies in NAICS 561730 Landscaping services, as noted in Section VI.F, for this analysis, OSHA assumed that landscaping companies where no tree trimmer is also employed would no longer provide any tree care as part of their landscaping services. These tree care jobs would, instead, be performed by tree care companies (also within NAICS 561730). While this would entail some economic impact on the landscaping companies (and similarly an increase in income for tree care companies), this does not represent a cost for purposes of this economic analysis, so no cost is estimated.

The landscapers in other NAICS industries are employed by businesses where landscaping is not the main line of business but companies have landscapers on staff to perform landscaping at their own facilities. For example, a computer company may employ landscapers to maintain the grounds of its campus. OSHA has assumed for this analysis that at these other

[34] OSHA annualized costs for this potential standard over a 10-year period in accordance with Executive Order 13563, which directs agencies "to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible." In addition, OMB Circular A-4 states that analysis should include all future costs and benefits using a "rule of reason" to consider for how long it can reasonably predict the future and limit its analysis to this time period. The 10-year annualization period is the one OSHA has traditionally used.

establishments where no tree trimmer is employed, the employer would need to instead hire a tree trimmer or other tree care contractor with adequate expertise to perform tree care operations, including the required job hazard analysis. The total cost of hiring a tree care contractor for jobs previously performed by in-house landscaping staff is calculated by multiplying the number of landscaping jobs previously performed by these landscapers by the incremental cost of hiring a tree care contractor ($54.38) and by the non-compliance rate (from Section VI). This yields a total annual cost of $21.3 million (see Table VII-2)

Note that for both of these groups, none of the remaining costs of compliance with the potential standard shown here would apply, as these landscapers would no longer be engaged in tree care operations. Note also that the references to "landscaper" jobs in the tables throughout this section refer to landscapers who are not tree trimmers but are engaged in tree care work as part of a crew with a tree trimmer.

Table VII-2. Total Costs - Employee Qualifications

Item	Affected Jobs	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Incremental tree care contractor cost	391,424	$54.38	100.0%	$0	$21,285,910	**$21,285,910**	**$21,285,910**

Sources: OSHA based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002; HomeGuide, 2019.

C. Written Tree Care Safety and Health Program

Costs for developing and updating a written tree care safety and health program would be incurred by all establishments with sufficient employee qualifications to continue to perform tree care operations under the potential standard. To derive the total cost for this provision, the number of affected establishments is multiplied by the unit cost per establishment and non-compliance rate (from Section VI). This yields a total one-time cost of $2.1 million and total annual costs of $0.3 million. Summing annualized one-time and annual costs results in annualized costs of $0.6 million, using both a 3 and a 7 percent discount rate (see Table VII-3).

Table VII-3. Total Costs - Written Tree Care Safety and Health Program

Item	Affected Est.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Develop program	3,237	$635.14	100.0%	$2,055,836	$0	**$241,007**	**$292,705**
Review and update - Manager	3,237	$79.39	100.0%	$0	$256,980	**$256,980**	**$256,980**
Review and update - Employee	3,237	$23.79	100.0%	$0	$77,003	**$77,003**	**$77,003**
Total	—	—	—	**$2,055,836**	**$333,983**	**$574,989**	**$626,688**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

Note: Employee cost uses a weighted average wage based on the number of employees of each occupation that are in scope.

D. Training

Costs to create and provide training and maintain records of employee training would be incurred for all establishments and employees with sufficient employee qualifications to continue to perform tree care operations under the requirements of this potential standard. The costs to create, provide, and update training are based on the number of establishments, while the costs to receive training and keep a record of each employee's training are based on the number of employees. These are multiplied by the unit cost per establishment or employee and non-compliance rate (from Section VI). This yields a total one-time cost of $0.5 million and total annual costs of $1.0 million. Summing annualized one-time and annual costs results in annualized costs of $1.1 million, using both a 3 and a 7 percent discount rate (see Table VII-4).

Table VII-4. Total Costs - Training

Item	Affected Est./ Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Employer Create/Provide Training							
Create/provide training	3,237	$317.57	44.6%	$458,451	$0	$53,744	$65,273
Update/provide training	3,237	$158.78	44.6%	$0	$229,226	$229,226	$229,226
Subtotal	—	—	—	***$458,451***	***$229,226***	***$282,970***	***$294,499***
Employee Receive Training							
Tree Trimmer	40,274	$30.04	44.6%	$0	$539,621	$539,621	$539,621
Landscaper	4,867	$22.81	44.6%	$0	$49,514	$49,514	$49,514
Spray Technician	9,720	$13.89	44.6%	$0	$60,223	$60,223	$60,223
Crane Operator	280	$42.59	44.6%	$0	$5,319	$5,319	$5,319
Subtotal	—	—	—	***$0***	***$654,678***	***$654,678***	***$654,678***
Training Recordkeeping							
Recordkeeping	55,141	$6.35	44.6%	$0	$156,199	$156,199	$156,199
Total							
Total	**—**	**—**	**—**	**$458,451**	**$1,040,102**	**$1,093,847**	**$1,105,375**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

E. Emergency Procedures

Costs to train employees on emergency procedures, equip vehicles with first aid kits, and provide an AED are based on the number of establishments with sufficient employee qualifications to perform tree care operations. The remaining costs related to emergency procedures (receive emergency procedure training, receive rescue training, and receive first aid and CPR training) are based on the number of employees performing tree care operations. The number of establishments or employees are multiplied by the unit cost per establishment or employee and non-compliance rate (from Section VI). This yields a total one-time cost of $16.3 million and total annual costs of $4.7 million. Summing annualized one-time and annual costs results in annualized costs of $6.6 to $7.0 million, using a 3 and a 7 percent discount rate, respectively (see Table VII-5).

Table VII-5. Total Costs - Emergency Procedures

Item	Affected Est./ Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Emergency Procedure Instruction							
Instructor	3,237	$79.39	25.0%	$0	$64,245	$64,245	$64,245
Tree Trimmer	40,274	$15.02	25.0%	$0	$151,239	$151,239	$151,239
Landscaper	4,867	$11.40	25.0%	$0	$13,877	$13,877	$13,877
Spray Technician	9,720	$13.89	25.0%	$0	$33,758	$33,758	$33,758
Crane Operator	280	$21.30	25.0%	$0	$1,491	$1,491	$1,491
Subtotal	—	—	—	***$0***	***$264,610***	***$264,610***	***$264,610***
Rescue Training							
Labor time	3,237	$240.34	25.0%	$0	$194,482	$194,482	$194,482
Materials	3,237	$129.99	25.0%	$0	$105,189	$105,189	$105,189
Subtotal	—	—	—	***$0***	***$299,672***	***$299,672***	***$299,672***
First Aid/CPR/AED Training							
Class							
Class	55,141	$95.00	25.0%	$0	$1,309,603	$1,309,603	$1,309,603
Labor Time							
Tree Trimmer	40,274	$210.29	25.0%	$0	$2,117,347	$2,117,347	$2,117,347
Landscaper	4,867	$159.67	25.0%	$0	$194,283	$194,283	$194,283
Spray Technician	9,720	$194.49	25.0%	$0	$472,605	$472,605	$472,605
Crane Operator	280	$298.15	25.0%	$0	$20,870	$20,870	$20,870
Subtotal	—	—	—	***$0***	***$4,114,708***	***$4,114,708***	***$4,114,708***
First Aid Kit and AED							
First aid kit	55,141	$14.19	25.0%	$195,579	$0	$22,928	$27,846
AED	38,923	$414.68	100.0%	$16,140,224	$0	$1,892,127	$2,298,005
Subtotal	—	—	—	***$16,335,803***	***$0***	***$1,915,054***	***$2,325,851***
Total							
Total	—	—	—	**$16,335,803**	**$4,678,989**	**$6,594,043**	**$7,004,840**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002; American Red Cross, 2019a; AHA, 2019; American Red Cross, 2019a; Forestry Suppliers, 2019; Grainger, 2019a.

F. Job Hazard Analysis, Job Briefing, and Worksite Setup

Costs to perform a job hazard analysis, job briefing, and perform appropriate worksite setup are calculated on the basis of the number of tree care operations jobs performed. The job hazard analysis and worksite setup are based strictly on the number of jobs, whereas the job briefing costs are based on the number of jobs per employee (since each member of the crew would need to receive the job briefing). The number of jobs or jobs per person is multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $55.1 million (see Table VII-6).

Table VII-6. Total Costs - Job Hazard Analysis, Job Briefing, and Worksite Setup

Item	Affected Jobs/Jobs per Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Job Hazard Analysis							
Job hazard analysis	3,421,088	$9.48	25.0%	$0	$8,109,876	$8,109,876	$8,109,876
Job Briefing							
Conduct briefing - Employee in Charge	3,421,088	$9.48	25.0%	$0	$8,109,876	$8,109,876	$8,109,876
Receive briefing - Tree Trimmer	10,235,923	$7.51	25.0%	$0	$19,219,239	$19,219,239	$19,219,239
Receive briefing - Landscaper	27,342	$5.70	25.0%	$0	$38,978	$38,978	$38,978
Receive briefing - Crane Operator	420,767	$10.65	25.0%	$0	$1,120,088	$1,120,088	$1,120,088
Subtotal	—	—	—	***$0***	***$28,488,182***	***$28,488,182***	***$28,488,182***
Worksite Setup							
Communication protocol	3,421,088	$3.03	25.0%	$0	$2,595,160	$2,595,160	$2,595,160
Safety plan	3,421,088	$3.03	25.0%	$0	$2,595,160	$2,595,160	$2,595,160
Designate drop zone	3,421,088	$3.03	25.0%	$0	$2,595,160	$2,595,160	$2,595,160
Electrical hazard inspection	3,421,088	$3.03	25.0%	$0	$2,595,160	$2,595,160	$2,595,160
Visually inspect tree	3,421,088	$9.48	25.0%	$0	$8,109,876	$8,109,876	$8,109,876
Subtotal	—	—	—	***$0***	***$18,490,517***	***$18,490,517***	***$18,490,517***
Total							
Total	—	—	—	**$0**	**$55,088,574**	**$55,088,574**	**$55,088,574**

Sources: OSHA based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

G. Fire Prevention

Fire prevention-related costs, including fire extinguisher training, the costs of fire extinguishers themselves, fire safety practices, and cleaning and cleaning spark arrestors are all based on the number of employees performing tree care operations. The number of employees is multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total one-time cost of $0.7 million and total annual costs of $0.2 million. Summing annualized one-time and annual costs results in annualized costs of $0.3 million, using both a 3 and a 7 percent discount rate (see Table VII-7).

Table VII-7. Total Costs - Fire Prevention

Item	Affected Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Fire Extinguisher Training							
Tree Trimmer	40,274	$2.40	25.0%	$0	$24,198	$24,198	$24,198
Landscaper	4,867	$1.82	25.0%	$0	$2,220	$2,220	$2,220
Spray Technician	9,720	$2.22	25.0%	$0	$5,401	$5,401	$5,401
Subtotal	—	—	—	***$0***	***$31,820***	***$31,820***	***$31,820***
Fire Extinguishers							

Table VII-7. Total Costs - Fire Prevention

Item	Affected Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Vehicle-mounted fire extinguishers	54,861	$52.90	25.0%	$725,539	$0	$85,055	$103,300
Fire Safety Practices							
Tree Trimmer	40,274	$7.51	25.0%	$0	$75,620	$75,620	$75,620
Landscaper	4,867	$5.70	25.0%	$0	$6,939	$6,939	$6,939
Spray Technician	9,720	$6.95	25.0%	$0	$16,879	$16,879	$16,879
Subtotal	**—**	**—**	**—**	***$0***	***$99,437***	***$99,437***	***$99,437***
Spark Arrestors							
Tree Trimmer	40,274	$3.76	25.0%	$0	$37,810	$37,810	$37,810
Landscaper	4,867	$2.85	25.0%	$0	$3,469	$3,469	$3,469
Spray Technician	9,720	$6.95	25.0%	$0	$16,879	$16,879	$16,879
Subtotal	**—**	**—**	**—**	***$0***	***$58,158***	***$58,158***	***$58,158***
Total							
Total	—	—	—	**$725,539**	**$189,415**	**$274,470**	**$292,715**

Sources: OSHA, based on Westech Rigging Supply, 2019a; Westech Rigging Supply 2019b.

H. Hands-Free Wireless Radios

The costs for purchasing hands-free wireless radios is calculated by multiplying the number of employees by the unit cost of $249 (SENA, 2019) and non-compliance rate (from Section VI). This yields a total one-time cost of $3.4 million, and annualized costs of $0.4 million to $0.5 million, using a 3 and 7 percent discount rate, respectively (see Table VII-8).

Table VII-8. Total Costs - Hands-Free Wireless Radios

Item	Affected Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Fire Extinguisher Training							
Tree Trimmer	40,274	$249.00	25.0%	$2,507,057	$0	$293,904	$356,948
Landscaper	4,867	$249.00	25.0%	$302,982	$0	$35,519	$43,138
Spray Technician	9,720	$249.00	25.0%	$605,070	$0	$70,933	$86,148
Crane Operator	280	$249.00	25.0%	$17,430	$0	$2,043	$2,482
Total	—	—	—	**$3,432,538**	**$0**	**$402,398**	**$488,716**

Sources: OSHA, based on SENA, 2019.

I. Vehicles and Mobile Equipment

Vehicle and Mobile Equipment Inspection and Safety

The costs for pre- and post-trip vehicle and mobile equipment inspection are based on the number of tree care operations jobs for each labor category. The number of jobs is multiplied by

the unit cost and non-compliance rate (from Section VI) resulting in a total annual cost of $6.9 million. The costs for vehicle safety practices are based on the number of employees for each labor category, which are multiplied by the unit cost and non-compliance rate (from Section VI), resulting in a total annual cost of $0.1 million. The costs for vehicle inspection and safety are summed, for a total annual cost of $7.0 million (see Table VII-9).

Aerial Devices

The costs related to the safe use of aerial devices are based on the number of tree trimmer jobs, but limited to the approximately 60 percent of tree trimmer jobs where aerial devices are used (see Table V-7). The number of jobs utilizing aerial devices are multiplied by the unit cost and non-compliance rate (from Section VI) to yield a total annual cost of $13,595 (see Table VII-9).

Chippers

The costs related to the safe use of chippers are based on the number of tree trimmer and landscaper jobs, but limited to the approximately 98 percent of tree care operations jobs where chippers are used (see Table V-7). The number of chipper jobs is multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $0.2 million (see Table VII-9).

Sprayers and Related Equipment

OSHA has preliminarily determined that the potential requirements addressing sprayers and related equipment outlined in this PIRFA will not result in workers taking additional time to perform tasks using this equipment. Based on this, OSHA is not assessing costs related to these provisions in this analysis.

Stump Grinders

The costs for the safe use of stump grinders is based on the number of tree trimmer jobs, limited to the estimated 25 percent of jobs that would involve the use of stump grinders (see Table V-7). The number of jobs is multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $0.2 million (see Table VII-9).

Cranes and Knuckleebooms

The costs of compliance with the provisions of the potential standard related to cranes, knuckleebooms, and relate hoists are calculated either on the basis of establishments, employees, or jobs, all limited to the approximately 15 percent of tree care operations jobs that make use of a crane or related hoist (see Table V-7).

Costs for cranes and related hoists have a number of different cost bases. First, costs to locate a pre-existing crane checklist are based on the number of establishments. Second, the cost for the employee in charge and crane operator to meet and review procedures prior to starting the

job is based on the number of jobs. Third, costs for crane safety practices for tree trimmers and crane operators are based on the number of crane jobs per employee per year. Finally, costs to perform an assessment prior to using a crane to hoist a climber (i.e., "riding the hook") are based on the number of crane jobs where this practice is used, estimated to be approximately 17 percent of crane jobs. In all cases, the relevant number of establishments, employees, or jobs is multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total one-time cost of $5,140 and total annual costs of $6.2 million. Summing annualized one-time and annual costs results in annualized costs of $6.2 million, using both a 3 and a 7 percent discount rate (see Table VII-9).

Equipment-Mounted Winches

The costs related to the use of equipment-mounted winches are based either on the number of jobs, limited to the estimated 25 percent of tree care operations jobs using winches (see Table V-7). The number of jobs is multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $0.6 million (see Table VII-9).

Equipment Maintenance

Maintenance will be required for trucks, aerial devices, chippers, sprayers, stump grinders, and any other vehicles or mobile equipment used in tree care. The costs for equipment maintenance are based on the number of tree trimmers, landscapers, and spray technicians performing tree care operations. The number of employees in each labor category is multiplied by the unit cost (based on thirty minutes per employee per year) and non-compliance rate (from Section VI). This yields a total annual cost of $0.2 million (see Table VII-9).

Table VII-9. Total Costs - Vehicles and Mobile Equipment

Item	Affected Jobs/Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Vehicle and Mobile Equipment Inspection and Safety							
Pre-and Post-Trip Equipment Inspection							
Tree Trimmer	3,411,974	$2.40	81.9%	$0	$6,711,871	$6,711,871	$6,711,871
Landscaper	9,114	$1.82	81.9%	$0	$13,612	$13,612	$13,612
Spray Technician	72,900	$2.22	81.9%	$0	$132,627	$132,627	$132,627
Inspection Subtotal	—	—	—	***$0***	***$6,858,110***	***$6,858,110***	***$6,858,110***
Vehicle and Equipment Operation Safety							
Tree Trimmer	40,274	$2.40	81.9%	$0	$79,225	$79,225	$79,225
Landscaper	4,867	$1.82	81.9%	$0	$7,270	$7,270	$7,270
Spray Technician	9,720	$2.22	81.9%	$0	$17,684	$17,684	$17,684
Vehicle & Equipment Operation Safety Subtotal	***54,861***	—	—	***$0***	***$104,178***	***$104,178***	***$104,178***
Vehicle Inspection and Operation Safety Subtotal	—	—	—	***$0***	***$6,962,288***	***$6,962,288***	***$6,962,288***
Aerial Devices							
Tree Trimmer	40,274	$7.51	4.5%	$0	$13,595	$13,595	$13,595
Subtotal	—	—	—	***$0***	***$13,595***	***$13,595***	***$13,595***
Chipper Safety Practices							
Tree Trimmer	40,274	$15.02	29.9%	$0	$180,882	$180,882	$180,882
Landscaper	4,867	$5.70	29.9%	$0	$8,299	$8,299	$8,299
Subtotal	—	—	—	***$0***	***$189,181***	***$189,181***	***$189,181***
Stump Grinders							
Tree Trimmer	40,274	$15.02	25.0%	$0	$151,239	$151,239	$151,239
Subtotal	—	—	—	***$0***	***$151,239***	***$151,239***	***$151,239***
Cranes							
Checklist							
Locate checklist	3,237	$6.35	25.0%	$5,140	$0	$603	$732
Meet to Review Procedures							
Employee in Charge	525,444	$3.03	25.0%	$0	$398,590	$398,590	$398,590
Crane Operator	420,767	$3.41	25.0%	$0	$358,428	$358,428	$358,428
Meet to review Procedures Subtotal	—	—	—	***$0***	***$757,018***	***$757,018***	***$757,018***
Crane Safety Practices							

Table VII-9. Total Costs - Vehicles and Mobile Equipment

Item	Affected Jobs/Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Tree Trimmers	2,101,776	$7.51	25.0%	$0	$3,946,350	$3,946,350	$3,946,350
Crane Operators	420,767	$10.65	25.0%	$0	$1,120,088	$1,120,088	$1,120,088
Crane Safety Practices Subtotal	—	—	—	***$0***	***$5,066,439***	***$5,066,439***	***$5,066,439***
Riding the Hook - Written Assessment							
Riding the hook - written assessment - average per crane job	525,444	$3.16	25.0%	$0	$415,198	$415,198	$415,198
Crane Subtotal	—	—	—	***$5,140***	***$6,238,655***	***$6,239,258***	***$6,239,387***
Equipment-Mounted Winches							
Inspect winch and fastenings/attachment	852,994	$3.03	25.0%	$0	$647,062	$647,062	$647,062
Maintain Equipment							
Tree Trimmer	40,274	$15.02	25.0%	$0	$151,239	$151,239	$151,239
Landscaper	4,867	$11.40	25.0%	$0	$13,877	$13,877	$13,877
Spray Technician	9,720	$13.89	25.0%	$0	$33,758	$33,758	$33,758
Subtotal	—	—	—	***$0***	***$198,874***	***$198,874***	***$198,874***
Total							
Total	—	—	—	**$5,140**	**$14,400,892**	**$14,401,495**	**$14,401,624**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

J. Portable Power Hand Tools

The costs for the safe use of portable power hand tools are based on the number of tree trimmers multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $0.4 million (see Table VII-10).

Table VII-10. Total Costs - Safe Use of Portable Power Hand Tools

Labor Category	Affected Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Tree Trimmer	40,274	$15.02	50.4%	$0	$304,898	$304,898	$304,898
Landscaper	4,867	$11.40	50.4%	$0	$27,977	$27,977	$27,977
Spray Technician	9,720	$13.89	50.4%	$0	$68,055	$68,055	$68,055
Total	—	—	—	**$0**	**$400,930**	**$400,930**	**$400,930**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

K. Hand Tools

The costs for the safe use of hand tools are based on the number of tree trimmers and landscapers, which is then multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $0.1 million (see Table VII-11).

Table VII-11. Total Costs - Hand Tool Safety Practices

Labor Category	Affected Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Tree Trimmer	40,274	$15.02	13.3%	$0	$80,459	$80,459	$80,459
Landscaper	4,867	$11.40	13.3%	$0	$7,383	$7,383	$7,383
Spray Technician	9,720	$13.89	13.3%	$0	$17,959	$17,959	$17,959
Total	—	—	—	**$0**	**$105,801**	**$105,801**	**$105,801**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

L. Ladders

The costs for the safe use of ladders are based on the number of tree trimmers and landscapers, which is then multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $0.2 million (see Table VII-12).

Table VII-12. Total Costs - Ladder Safety Practices

Labor Category	Affected Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Tree Trimmer	40,274	$15.02	25.0%	$0	$151,239	$151,239	$151,239
Landscaper	4,867	$11.40	25.0%	$0	$13,877	$13,877	$13,877
Spray Technician	9,720	$13.89	25.0%	$0	$33,758	$33,758	$33,758
Total	—	—	—	**$0**	**$198,874**	**$198,874**	**$198,874**

Table VII-12. Total Costs - Ladder Safety Practices

Labor Category	Affected Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

M. Pruning and Trimming

The costs related to pruning and trimming are based on the number of jobs, but limited to the approximately 56 percent of jobs that involve pruning and trimming (see Table V-7). The costs for safe pruning and trimming work practices are multiplied by the number of tree trimmers and landscapers. Both of these are then multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $0.2 million (see Table VII-13).

Table VII-13. Total Costs - Pruning and Trimming

Item	Affected Jobs/Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Tree Trimmer	40,274	$15.02	25.0%	$0	$151,239	$151,239	$151,239
Landscaper	4,867	$11.40	25.0%	$0	$13,877	$13,877	$13,877
Total	—	—	—	**$0**	**$165,116**	**$165,116**	**$165,116**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

N. Tree Climbing and Removal

The costs related to tree climbing and removal are based either on the approximately 38 percent of jobs involving tree climbing and removal or the number of tree trimmers. Job-based costs include costs for tree trimmers to inspect climbing lines, arborist equipment, and fall protection systems. Employee-based costs include the incremental costs for equipment repair and safety practices related to climbing, use of ropes, arborist equipment, and fall protection systems, tree removal, limbing and bucking, and compressor operation. Both the number of tree climbing and removal jobs and the number of tree trimmers are then multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $2.9 million (see Table VII-14).

Table VII-14. Total Costs - Tree Climbing and Removal

Item	Affected Jobs/Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Climbing Procedures							
Inspect climbing lines, climbing equipment, and fall protection systems	1,296,550	$3.61	14.8%	$0	$691,770	$691,770	$691,770
Climbing safety practices	40,274	$15.02	14.8%	$0	$89,534	$89,534	$89,534
Subtotal	—	—	—	***$0***	***$781,303***	***$781,303***	***$781,303***
Ropes, Arborist Equipment, and Fall Protection							
Safe use of ropes, arborist equipment, and fall protection systems	40,274	$15.02	14.8%	$0	$89,534	$89,534	$89,534
Equipment Repair							
Equipment repair per employee	40,274	$266.77	14.8%	$0	$1,590,096	$1,590,096	$1,590,096
Cabling							
Safe Cabling	40,274	$15.02	14.8%	$0	$89,534	$89,534	$89,534
Rigging							
Rigging safety practices	40,274	$15.02	14.8%	$0	$89,534	$89,534	$89,534
Tree Removal							
Tree removal safety practices - Tree Trimmer	40,274	$15.02	14.8%	$0	$89,534	$89,534	$89,534
Limbing and Bucking							
Safe limbing and bucking	40,274	$15.02	14.8%	$0	$89,534	$89,534	$89,534
High Pressure Air-Excavation Equipment							
Safe compressor operation	40,274	$7.51	14.8%	$0	$44,767	$44,767	$44,767
Total							
Total	—	—	—	**$0**	**$2,863,834**	**$2,863,834**	**$2,863,834**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002; TCIA, 2014.

O. Weather Hazards

The cost for the employee in charge to check the weather over the course of the job is based on the number of tree trimmers jobs, multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $0.1 million (see Table VII-15).

Table VII-15. Total Costs - Weather Hazards

Item	Affected Jobs	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Check Weather	3,411,974	$0.16	25.0%	$0	$134,805	$134,805	$134,805

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002.

P. Electric Power

The potential tree care operations rule outlined in this PIRFA does not include any additional requirements for addressing electrical hazards beyond what is currently required by OSHA standards. Based on this, the agency has estimated there will be no additional costs related to addressing hazards of working near electric power lines attributed to this potential standard.

Q. Traffic Control

The costs for one member of the crew to direct traffic are based on the number of tree trimming jobs, limited to the approximately 75 percent of jobs that take place near a road. The costs also include the cost of high visibility clothing (such as vests). These clothing costs are based on the number of tree trimmers. Both are multiplied by the unit cost and non-compliance rate (from Section VI). This yields a total annual cost of $1.1 million (see Table VII-16).

Table VII-16. Total Costs - Traffic Control

Item	Affected Jobs/Emp.	Unit Cost	Non-Compliance Rate	Total Cost		Total Annualized Cost	
				One-Time	Annual/ Ongoing	3%	7%
Traffic Control Safety Practices							
Tree Trimmers	2,553,789	$0.63	44.0%	$0	$703,276	$703,276	$703,276
Landscapers	6,822	$0.48	44.0%	$0	$1,426	$1,426	$1,426
Spray Technicians	54,564	$1.16	44.0%	$0	$27,793	$27,793	$27,793
Subtotal	—	—	—	***$0***	***$732,495***	***$732,495***	***$732,495***
Traffic Control Clothing/Equipment							
High visibility clothing	54,861	$15.13	44.0%	$0	$365,222	$365,222	$365,222
Total							
Total	—	—	—	**$0**	**$1,097,717**	**$1,097,717**	**$1,097,717**

Sources: OSHA, based on BLS, 2018; BLS, 2019; EPA, 2002; Rice, 2002; Grainger, 2019b.

R. Summary of Costs

The following sections summarize the costs of the potential tree care operations standard, which would address the kinds of hazards facing tree trimmers and pruners on the job. It should be noted that these costs are preliminary and may change after OSHA receives and analyzes feedback from the SERs and comments from other members of the public, and conducts additional research. If the agency moves forward to a proposed rule, OSHA will provide more definitive costs in its Preliminary Economic Analysis (PEA) supporting a formal Notice of Proposed Rulemaking (NPRM).

OSHA preliminarily estimates that the total costs of a potential standard based on this regulatory framework would be $105.7 million per year for all entities (see Table VII-17).[35] OSHA also preliminarily estimates that the total cost to small entities would be $93.6 million per year, and $72.4 million per year for very small entities with fewer than 10 employees (see Tables VII-22, VII-24). OSHA also preliminarily estimates that the highest costs for all entities would be incurred in Administrative and Support Services sector (where the majority of tree trimmers and landscapers are employed), at $79.2 million, and the lowest costs would be incurred in the Mining, Quarrying, and Oil and Gas Extraction sector, at $5,280 (see Table VII-18).

For the small entities, the lowest per entity costs would be in the Finance and Insurance sector and are estimated to be $556, while the highest average per entity costs would be incurred in the Utilities sector, at $9,195 (see Table VII-27). In the Administrative and Support Services sector, where the majority of tree trimmers and landscapers are employed, the average cost per entity would be $1,799 (see Table VII-27). As for the very small entities with fewer than 10 employees, the lowest per entity costs would be incurred in the Finance and Insurance sector and are estimated to be about $485 average cost per entity, the State and the Local Government sector had the highest average per entity average costs of $5,432, and the Administrative and Support Services sector, which again include the majority of landscapers and tree trimmers, would incur $1,729 average cost per entity (see Table VII-28).

This draft standard has several provisions to reflect new work safety practices and the additional time that would be required to comply with the draft standard. The potential requirements on Job Hazard Analysis, Job Briefing, and Worksite Setup would incur the greatest compliance costs at $55.1 million for all entities, while the potential requirements on Aerial Devices would incur the least compliance costs of $13,600 for all entities (Table VII-17).

[35] This Summary of Costs discusses those preliminary estimates where OSHA annualized costs at a 3% discount rate over 10 years. OSHA also annualized costs at a 7% discount rate over 10 years (see Tables VII-17 thru VII-31).

Total Costs for All Entities[36]

The costs derived for each of the provisions above are summed to estimate the total cost of compliance with the potential standard for all entities.

Table VII-17 shows the total one-time, annual, and annual costs for each provision. Aggregate annualized costs range from $105.7 million to $106.5 million, using a 3 and a 7 percent discount rate, respectively.

Table VII-17. Summary of Total Costs of the Potential Standard by Provision - All Entities

Provision	One-Time Costs	Annual/ Ongoing Costs	Annualized Costs	
			3%	7%
Rule Familiarization	$8,437,157	$0	$989,092	$1,201,261
Employee Qualifications	$0	$21,285,910	$21,285,910	$21,285,910
Written Tree Care Safety and Health Program	$2,055,836	$333,983	$574,989	$626,688
Training	$458,451	$1,040,102	$1,093,847	$1,105,375
Emergency Procedures	$16,335,803	$4,678,989	$6,594,043	$7,004,840
Job Hazard Analysis, Job Briefing, and Worksite Setup	$0	$55,088,574	$55,088,574	$55,088,574
Fire Prevention	$725,539	$189,415	$274,470	$292,715
Hands-Free Wireless Radio	$3,432,538	$0	$402,398	$488,716
Vehicle and Mobile Equipment Inspection and Safety	$0	$6,962,288	$6,962,288	$6,962,288
Aerial Devices	$0	$13,595	$13,595	$13,595
Chippers	$0	$189,181	$189,181	$189,181
Stump Grinders	$0	$151,239	$151,239	$151,239
Cranes and Knucklebooms	$5,140	$6,238,655	$6,239,258	$6,239,387
Equipment-Mounted Winches	$0	$647,062	$647,062	$647,062
Maintain equipment	$0	$198,874	$198,874	$198,874
Portable Power Hand Tools	$0	$400,930	$400,930	$400,930
Hand Tools	$0	$105,801	$105,801	$105,801
Ladders	$0	$198,874	$198,874	$198,874
Pruning and Trimming	$0	$165,116	$165,116	$165,116
Tree Climbing and Removal	$0	$2,863,834	$2,863,834	$2,863,834
Weather Hazards	$0	$134,805	$134,805	$134,805
Traffic Control	$0	$1,097,717	$1,097,717	$1,097,717
Total	**$31,450,464**	**$101,984,942**	**$105,671,896**	**$106,462,780**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

[36] The estimated average cost per entity for entities of various sizes is show below in Tables VII-27, VII-28, and VII-29 for aggregated 2-digit NAICS industries and in Appendix Table C-2 at the 6-digit NAICS level. Costs are shown as a percent of revenue in Appendix Table D-4 and the costs as a percent of revenue overall are equal to the costs as a percent of revenue per job.

Table VII-18 shows the same total annualized costs for all entities as shown in Table VII-17, but by sector rather than provision.

Table VII-18. Summary of Total Annualized Costs of the Potential Standard by Sector - All Entities

NAICS	Industry	Annualized Costs	
		3%	7%
21	Mining, Quarrying, and Oil and Gas Extraction	$5,279	$5,315
22	Utilities	$1,584,897	$1,598,018
23	Construction	$2,956,554	$2,979,124
31-33	Manufacturing	$178,369	$179,559
42	Wholesale Trade	$198,675	$199,601
44-45	Retail Trade	$715,839	$717,397
48-49	Transportation and Warehousing	$78,581	$79,036
51	Information	$16,781	$16,893
52	Finance and Insurance	$31,753	$32,009
53	Real Estate and Rental and Leasing	$1,999,272	$2,005,250
54	Professional, Scientific, and Technical Services	$746,169	$747,011
55	Management of Companies and Enterprises	$181,777	$184,324
56	Administrative and Support Services	$79,205,414	$79,887,705
61	Educational Services	$647,124	$649,857
62	Health Care and Social Assistance	$718,195	$719,896
71	Arts, Entertainment, and Recreation	$6,997,437	$7,011,265
72	Accommodation and Food Services	$1,314,495	$1,318,113
81	Other Services (except Public Administration)	$1,932,978	$1,939,560
99	State and Local Government	$6,162,305	$6,192,847
Total		**$105,671,896**	**$106,462,780**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-19 shows the same total annualized costs for all entities as shown in Table VII-17 and Table VII-18, but by both sector and provision, using a 3 percent discount rate. Table VI-19 shows the same, but uses a 7 percent discount rate.

Table VII-19. Summary of Total Annualized Costs of the Potential Standard by Sector and Provision - All Entities, using a 3 Percent Discount Rate

NAICS	Industry	Rule Familiarization	Employee Qualifications	Written Tree Care Safety and Health Program	Training	Emergency Procedures	Job Hazard Analysis, Job Briefing, and Worksite Setup
11	Agriculture, Forestry, Fishing	$0	$0	$0	$0	$0	$0
21	Mining, Quarrying, and Oil and Gas	$168	$5,112	$0	$0	$0	$0
22	Utilities	$5,063	$19,360	$1,391	$16,002	$123,527	$1,056,858
23	Construction	$19,955	$941,981	$511	$33,410	$231,604	$1,264,968
31-33	Manufacturing	$5,547	$172,822	$0	$0	$0	$0
42	Wholesale Trade	$4,319	$194,356	$0	$0	$0	$0
44-45	Retail Trade	$7,260	$708,580	$0	$0	$0	$0
48-49	Transportation and Warehousing	$2,122	$76,459	$0	$0	$0	$0
51	Information	$521	$16,260	$0	$0	$0	$0
52	Finance and Insurance	$1,191	$30,562	$0	$0	$0	$0
53	Real Estate and Rental and Leasing	$27,866	$1,971,407	$0	$0	$0	$0
54	Professional, Scientific, Technical	$3,928	$742,241	$0	$0	$0	$0
55	Management of Companies	$7,334	$79,195	$349	$1,864	$12,048	$58,553
56	Administrative and Support	$770,653	$1,711,256	$567,736	$986,050	$5,845,819	$50,843,613
61	Educational Services	$8,916	$560,383	$512	$1,633	$9,981	$47,427
62	Health Care and Social Assistance	$7,930	$710,265	$0	$0	$0	$0
71	Arts, Entertainment, Recreation	$57,798	$6,819,128	$2,583	$3,344	$16,121	$71,064
72	Accommodation and Food Services	$16,865	$1,297,631	$0	$0	$0	$0
81	Other Services	$23,473	$1,754,407	$173	$2,848	$19,424	$95,982
99	State and Local Government	$18,186	$3,474,507	$1,736	$48,697	$335,519	$1,650,109
Total		**$989,092**	**$21,285,910**	**$574,989**	**$1,093,847**	**$6,594,043**	**$55,088,574**

Table VII-19. Summary of Total Annualized Costs of the Potential Standard by Sector and Provision - All Entities, using a 3 Percent Discount Rate (Continued)

NAICS	Industry	Fire Prevention	Hands-Free Wireless Radios	Vehicle and Mobile Equipment Inspection and Safety	Aerial Devices	Chippers	Stump Grinders
11	Agriculture, Forestry, Fishing	$0	$0	$0	$0	$0	$0
21	Mining, Quarrying, and Oil and Gas	$0	$0	$0	$0	$0	$0
22	Utilities	$4,699	$6,984	$133,533	$300	$4,111	$3,342
23	Construction	$10,360	$16,777	$160,144	$341	$6,734	$3,793
31-33	Manufacturing	$0	$0	$0	$0	$0	$0
42	Wholesale Trade	$0	$0	$0	$0	$0	$0
44-45	Retail Trade	$0	$0	$0	$0	$0	$0
48-49	Transportation and Warehousing	$0	$0	$0	$0	$0	$0
51	Information	$0	$0	$0	$0	$0	$0
52	Finance and Insurance	$0	$0	$0	$0	$0	$0
53	Real Estate and Rental and Leasing	$0	$0	$0	$0	$0	$0
54	Professional, Scientific, Technical	$0	$0	$0	$0	$0	$0
55	Management of Companies	$529	$861	$7,487	$17	$338	$184
56	Administrative and Support	$241,974	$350,276	$6,422,561	$12,408	$167,212	$138,043
61	Educational Services	$432	$703	$6,074	$14	$276	$150
62	Health Care and Social Assistance	$0	$0	$0	$0	$0	$0
71	Arts, Entertainment, Recreation	$648	$1,054	$9,103	$20	$413	$225
72	Accommodation and Food Services	$0	$0	$0	$0	$0	$0
81	Other Services	$864	$1,406	$12,264	$27	$551	$300
99	State and Local Government	$14,963	$24,338	$211,122	$468	$9,545	$5,201
Total		**$274,470**	**$402,398**	**$6,962,288**	**$13,595**	**$189,181**	**$151,239**

Table VII-19. Summary of Total Annualized Costs of the Potential Standard by Sector and Provision - All Entities, using a 3 Percent Discount Rate (Continued)

NAICS	Industry	Cranes and Knuckleebooms	Equipment-Mounted Winches	Maintain equipment	Portable Power Hand Tools	Hand Tools	Ladders
11	Agriculture, Forestry, Fishing	$0	$0	$0	$0	$0	$0
21	Mining, Quarrying, and Oil and Gas	$0	$0	$0	$0	$0	$0
22	Utilities	$93,126	$12,659	$3,533	$7,123	$1,880	$3,533
23	Construction	$105,681	$14,366	$7,468	$15,056	$3,973	$7,468
31-33	Manufacturing	$0	$0	$0	$0	$0	$0
42	Wholesale Trade	$0	$0	$0	$0	$0	$0
44-45	Retail Trade	$0	$0	$0	$0	$0	$0
48-49	Transportation and Warehousing	$0	$0	$0	$0	$0	$0
51	Information	$0	$0	$0	$0	$0	$0
52	Finance and Insurance	$0	$0	$0	$0	$0	$0
53	Real Estate and Rental and Leasing	$0	$0	$0	$0	$0	$0
54	Professional, Scientific, Technical	$0	$0	$0	$0	$0	$0
55	Management of Companies	$5,127	$697	$381	$767	$202	$381
56	Administrative and Support	$5,871,564	$597,081	$175,333	$353,471	$93,277	$175,333
61	Educational Services	$4,186	$569	$311	$627	$165	$311
62	Health Care and Social Assistance	$0	$0	$0	$0	$0	$0
71	Arts, Entertainment, Recreation	$6,281	$853	$466	$940	$248	$466
72	Accommodation and Food Services	$0	$0	$0	$0	$0	$0
81	Other Services	$8,371	$1,138	$621	$1,253	$331	$621
99	State and Local Government	$144,921	$19,699	$10,761	$21,694	$5,725	$10,761
Total		**$6,239,258**	**$647,062**	**$198,874**	**$400,930**	**$105,801**	**$198,874**

Table VII-19. Summary of Total Annualized Costs of the Potential Standard by Sector and Provision - All Entities, using a 3 Percent Discount Rate (Continued)

NAICS	Industry	Pruning and Trimming	Tree Climbing and Removal	Weather Hazards	Traffic Control	Total
11	Agriculture, Forestry, Fishing	$0	$0	$0	$0	**$0**
21	Mining, Quarrying, and Oil and Gas	$0	$0	$0	$0	**$5,279**
22	Utilities	$3,533	$61,533	$2,637	$20,169	**$1,584,897**
23	Construction	$7,468	$69,830	$2,993	$31,675	**$2,956,554**
31-33	Manufacturing	$0	$0	$0	$0	**$178,369**
42	Wholesale Trade	$0	$0	$0	$0	**$198,675**
44-45	Retail Trade	$0	$0	$0	$0	**$715,839**
48-49	Transportation and Warehousing	$0	$0	$0	$0	**$78,581**
51	Information	$0	$0	$0	$0	**$16,781**
52	Finance and Insurance	$0	$0	$0	$0	**$31,753**
53	Real Estate and Rental and Leasing	$0	$0	$0	$0	**$1,999,272**
54	Professional, Scientific, Technical	$0	$0	$0	$0	**$746,169**
55	Management of Companies	$381	$3,388	$145	$1,549	**$181,777**
56	Administrative and Support	$141,575	$2,620,882	$124,392	$994,908	**$79,205,414**
61	Educational Services	$311	$2,766	$119	$1,261	**$647,124**
62	Health Care and Social Assistance	$0	$0	$0	$0	**$718,195**
71	Arts, Entertainment, Recreation	$466	$4,148	$178	$1,890	**$6,997,437**
72	Accommodation and Food Services	$0	$0	$0	$0	**$1,314,495**
81	Other Services	$621	$5,531	$237	$2,533	**$1,932,978**
99	State and Local Government	$10,761	$95,756	$4,104	$43,733	**$6,162,305**
Total		**$165,116**	**$2,863,834**	**$134,805**	**$1,097,717**	**$105,671,896**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-20. Summary of Total Annualized Costs of the Potential Standard by Sector and Provision - All Entities, using a 7 Percent Discount Rate

NAICS	Industry	Rule Familiarization	Employee Qualifications	Written Tree Care Safety and Health Program	Training	Emergency Procedures	Job Hazard Analysis, Job Briefing, and Worksite Setup
11	Agriculture, Forestry, Fishing	$0	$0	$0	$0	$0	$0
21	Mining, Quarrying, and Oil and Gas	$203	$5,112	$0	$0	$0	$0
22	Utilities	$6,149	$19,360	$1,516	$16,030	$133,592	$1,056,858
23	Construction	$24,235	$941,981	$557	$33,420	$245,474	$1,264,968
31-33	Manufacturing	$6,737	$172,822	$0	$0	$0	$0
42	Wholesale Trade	$5,245	$194,356	$0	$0	$0	$0
44-45	Retail Trade	$8,817	$708,580	$0	$0	$0	$0
48-49	Transportation and Warehousing	$2,577	$76,459	$0	$0	$0	$0
51	Information	$633	$16,260	$0	$0	$0	$0
52	Finance and Insurance	$1,447	$30,562	$0	$0	$0	$0
53	Real Estate and Rental and Leasing	$33,843	$1,971,407	$0	$0	$0	$0
54	Professional, Scientific, Technical	$4,770	$742,241	$0	$0	$0	$0
55	Management of Companies	$8,907	$79,195	$380	$1,871	$12,760	$58,553
56	Administrative and Support	$935,965	$1,711,256	$618,781	$997,433	$6,209,234	$50,843,613
61	Educational Services	$10,829	$560,383	$558	$1,644	$10,563	$47,427
62	Health Care and Social Assistance	$9,631	$710,265	$0	$0	$0	$0
71	Arts, Entertainment, Recreation	$70,196	$6,819,128	$2,815	$3,395	$16,992	$71,064
72	Accommodation and Food Services	$20,482	$1,297,631	$0	$0	$0	$0
81	Other Services	$28,508	$1,754,407	$189	$2,852	$20,586	$95,982
99	State and Local Government	$22,087	$3,474,507	$1,892	$48,731	$355,639	$1,650,109
Total		**$1,201,261**	**$21,285,910**	**$626,688**	**$1,105,375**	**$7,004,840**	**$55,088,574**

Table VII-20. Summary of Total Annualized Costs of the Potential Standard by Sector and Provision - All Entities, using a 7 Percent Discount Rate (Continued)

NAICS	Industry	Fire Prevention	Hands-Free Wireless Radios	Vehicle and Mobile Equipment Inspection and Safety	Aerial Devices	Chippers	Stump Grinders
11	Agriculture, Forestry, Fishing	$0	$0	$0	$0	$0	$0
21	Mining, Quarrying, and Oil and Gas	$0	$0	$0	$0	$0	$0
22	Utilities	$5,017	$8,482	$133,533	$300	$4,111	$3,342
23	Construction	$11,125	$20,376	$160,144	$341	$6,734	$3,793
31-33	Manufacturing	$0	$0	$0	$0	$0	$0
42	Wholesale Trade	$0	$0	$0	$0	$0	$0
44-45	Retail Trade	$0	$0	$0	$0	$0	$0
48-49	Transportation and Warehousing	$0	$0	$0	$0	$0	$0
51	Information	$0	$0	$0	$0	$0	$0
52	Finance and Insurance	$0	$0	$0	$0	$0	$0
53	Real Estate and Rental and Leasing	$0	$0	$0	$0	$0	$0
54	Professional, Scientific, Technical	$0	$0	$0	$0	$0	$0
55	Management of Companies	$568	$1,045	$7,487	$17	$338	$184
56	Administrative and Support	$257,844	$425,413	$6,422,561	$12,408	$167,212	$138,043
61	Educational Services	$464	$854	$6,074	$14	$276	$150
62	Health Care and Social Assistance	$0	$0	$0	$0	$0	$0
71	Arts, Entertainment, Recreation	$696	$1,280	$9,103	$20	$413	$225
72	Accommodation and Food Services	$0	$0	$0	$0	$0	$0
81	Other Services	$928	$1,707	$12,264	$27	$551	$300
99	State and Local Government	$16,072	$29,558	$211,122	$468	$9,545	$5,201
Total		**$292,715**	**$488,716**	**$6,962,288**	**$13,595**	**$189,181**	**$151,239**

Table VII-20. Summary of Total Annualized Costs of the Potential Standard by Sector and Provision - All Entities, using a 7 Percent Discount Rate (Continued)

NAICS	Industry	Cranes and Knucklebooms	Equipment-Mounted Winches	Maintain equipment	Portable Power Hand Tools	Hand Tools	Ladders
11	Agriculture, Forestry, Fishing	$0	$0	$0	$0	$0	$0
21	Mining, Quarrying, and Oil and Gas	$0	$0	$0	$0	$0	$0
22	Utilities	$93,127	$12,659	$3,533	$7,123	$1,880	$3,533
23	Construction	$105,682	$14,366	$7,468	$15,056	$3,973	$7,468
31-33	Manufacturing	$0	$0	$0	$0	$0	$0
42	Wholesale Trade	$0	$0	$0	$0	$0	$0
44-45	Retail Trade	$0	$0	$0	$0	$0	$0
48-49	Transportation and Warehousing	$0	$0	$0	$0	$0	$0
51	Information	$0	$0	$0	$0	$0	$0
52	Finance and Insurance	$0	$0	$0	$0	$0	$0
53	Real Estate and Rental and Leasing	$0	$0	$0	$0	$0	$0
54	Professional, Scientific, Technical	$0	$0	$0	$0	$0	$0
55	Management of Companies	$5,128	$697	$381	$767	$202	$381
56	Administrative and Support	$5,871,692	$597,081	$175,333	$353,471	$93,277	$175,333
61	Educational Services	$4,186	$569	$311	$627	$165	$311
62	Health Care and Social Assistance	$0	$0	$0	$0	$0	$0
71	Arts, Entertainment, Recreation	$6,281	$853	$466	$940	$248	$466
72	Accommodation and Food Services	$0	$0	$0	$0	$0	$0
81	Other Services	$8,371	$1,138	$621	$1,253	$331	$621
99	State and Local Government	$144,921	$19,699	$10,761	$21,694	$5,725	$10,761
Total		**$6,239,387**	**$647,062**	**$198,874**	**$400,930**	**$105,801**	**$198,874**

Table VII-20. Summary of Total Annualized Costs of the Potential Standard by Sector and Provision - All Entities, using a 7 Percent Discount Rate (Continued)

NAICS	Industry	Pruning and Trimming	Tree Climbing and Removal	Weather Hazards	Traffic Control	Total
11	Agriculture, Forestry, Fishing	$0	$0	$0	$0	**$0**
21	Mining, Quarrying, and Oil and Gas	$0	$0	$0	$0	**$5,315**
22	Utilities	$3,533	$61,533	$2,637	$20,169	**$1,598,018**
23	Construction	$7,468	$69,830	$2,993	$31,675	**$2,979,124**
31-33	Manufacturing	$0	$0	$0	$0	**$179,559**
42	Wholesale Trade	$0	$0	$0	$0	**$199,601**
44-45	Retail Trade	$0	$0	$0	$0	**$717,397**
48-49	Transportation and Warehousing	$0	$0	$0	$0	**$79,036**
51	Information	$0	$0	$0	$0	**$16,893**
52	Finance and Insurance	$0	$0	$0	$0	**$32,009**
53	Real Estate and Rental and Leasing	$0	$0	$0	$0	**$2,005,250**
54	Professional, Scientific, Technical	$0	$0	$0	$0	**$747,011**
55	Management of Companies	$381	$3,388	$145	$1,549	**$184,324**
56	Administrative and Support	$141,575	$2,620,882	$124,392	$994,908	**$79,887,705**
61	Educational Services	$311	$2,766	$119	$1,261	**$649,857**
62	Health Care and Social Assistance	$0	$0	$0	$0	**$719,896**
71	Arts, Entertainment, Recreation	$466	$4,148	$178	$1,890	**$7,011,265**
72	Accommodation and Food Services	$0	$0	$0	$0	**$1,318,113**
81	Other Services	$621	$5,531	$237	$2,533	**$1,939,560**
99	State and Local Government	$10,761	$95,756	$4,104	$43,733	**$6,192,847**
Total		**$165,116**	**$2,863,834**	**$134,805**	**$1,097,717**	**$106,462,780**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

S. Undiscounted Costs by Year

Table VII-21 summarizes undiscounted costs by year. First year-only costs include rule familiarization, the cost to draft a written tree care safety and health program, create training, and create or locate a crane checklist. The majority of costs are annual, including updating the written plan, providing ongoing training, and productivity impacts for safe work practices relating to various provisions.

Table VII-21. Undiscounted Costs by Year (2018 Dollars)

Year	Total Costs
1	$132,871,763
2	$101,984,507
3	$101,984,507
4	$101,984,507
5	$101,984,507
6	$101,984,507
7	$101,984,507
8	$101,984,507
9	$101,984,507
10	$101,984,507

Note: Figures may not add to totals due to rounding.

Source: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

T. Total Costs for Small and Very Small Entities[37]

In addition to calculating costs for each affected industry as a whole, OSHA calculates cost for small entities, as defined by the Small Business Administration (SBA, 2019) and RFA, and for "very small" entities, defined by OSHA as those with fewer than 10 employees, in each affected industry (U.S. Census Bureau, 2015). The steps to derive these costs are the same as those detailed for all entities above, but the unit costs are instead multiplied by the number of establishments, employees, or jobs associated with small and very small entities from Section V (Potentially Affected Entities above).

Table VII-22 summarizes the total one-time, annual, and annualized costs for SBA/RFA-defined small entities by provision. Annualized costs range from $93.7 million to $94.4 million, using a 3 and a 7 percent discount rate, respectively

[37] The estimated average cost per entity for entities of various sizes is show below in Tables VII-27, VII-28, and VII-29 for aggregated 2-digit NAICS industries and in Appendix Table C-2 at the 6-digit NAICS level. Costs are shown as a percent of revenue in Appendix Table D-4 and the costs as a percent of revenue overall are equal to the costs as a percent of revenue per job.

Table VII-22. Summary of Total Costs of the Potential Standard by Provision – SBA/RFA-Defined Small Entities

Provision	One-Time Costs	Annual/ Ongoing Costs	Annualized Costs	
			3%	7%
Rule Familiarization	$7,956,676	$0	$932,765	$1,132,852
Employee Qualifications	$0	$18,053,958	$18,053,958	$18,053,958
Written Tree Care Safety and Health Program	$2,004,549	$325,651	$560,645	$611,053
Training	$447,014	$994,521	$1,046,925	$1,058,166
Emergency Procedures	$15,514,266	$3,219,409	$5,038,154	$5,428,291
Job Hazard Analysis, Job Briefing, and Worksite Setup	$0	$51,983,203	$51,983,203	$51,983,203
Fire Prevention	$690,258	$180,724	$261,643	$279,001
Hands-Free Wireless Radio	$4,248,429	$0	$498,045	$604,881
Vehicle and Mobile Equipment Inspection and Safety	$0	$6,570,687	$6,570,687	$6,570,687
Aerial Devices	$0	$12,985	$12,985	$12,985
Chippers	$0	$179,940	$179,940	$179,940
Stump Grinders	$0	$144,461	$144,461	$144,461
Cranes and Knucklebooms	$5,011	$4,711,170	$4,711,758	$4,711,884
Equipment-Mounted Winches	$0	$610,118	$610,118	$610,118
Maintain equipment	$0	$189,513	$189,513	$189,513
Portable Power Hand Tools	$0	$382,057	$382,057	$382,057
Hand Tools	$0	$100,821	$100,821	$100,821
Ladders	$0	$189,513	$189,513	$189,513
Pruning and Trimming	$0	$156,443	$156,443	$156,443
Tree Climbing and Removal	$0	$1,208,158	$1,208,158	$1,208,158
Weather Hazards	$0	$127,108	$127,108	$127,108
Traffic Control	$0	$691,694	$691,694	$691,694
Total	**$30,866,203**	**$90,032,133**	**$93,650,593**	**$94,426,785**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-23 shows the shows the same total annualized costs for SBA/RFA-defined small entities as shown in Table VII-22 but by sector rather than provision.

Table VII-23. Summary of Total Annualized Costs of the Potential Standard by Sector – SBA/RFA-Defined Small Entities

NAICS	Industry	Annualized Costs	
		3%	7%
21	Mining, Quarrying, and Oil and Gas Extraction	$4,663	$4,694
22	Utilities	$459,749	$463,670
23	Construction	$2,780,482	$2,802,569
31-33	Manufacturing	$177,317	$178,503
42	Wholesale Trade	$179,830	$180,669
44-45	Retail Trade	$617,583	$618,921
48-49	Transportation and Warehousing	$71,509	$71,940
51	Information	$15,330	$15,434
52	Finance and Insurance	$24,459	$24,655
53	Real Estate and Rental and Leasing	$1,712,083	$1,717,278
54	Professional, Scientific, and Technical Services	$713,824	$714,610
55	Management of Companies and Enterprises	$4,126	$4,160
56	Administrative and Support Services	$71,793,434	$72,482,041
61	Educational Services	$323,985	$325,366
62	Health Care and Social Assistance	$494,559	$495,777
71	Arts, Entertainment, and Recreation	$6,515,829	$6,529,017
72	Accommodation and Food Services	$1,069,302	$1,072,396
81	Other Services (except Public Administration)	$1,728,314	$1,734,284
99	State and Local Government	$4,964,215	$4,990,803
Total		**$93,650,593**	**$94,426,785**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-24 summarizes the total one-time, annual, and annualized costs for very small entities (those with fewer than 10 employees) by provision, which range from $72.4 million to $73.1 million, using a 3 and a 7 percent discount rate, respectively.[38]

Table VII-25 shows the shows the same total annualized costs for very small entities (those with fewer than 10 employees) entities as shown in Table VII-24, but by sector rather than provision.

[38] Note that while costs for very small entities are estimated in this analysis assuming that employees performing tree care operations are distributed among entities of different sizes proportionally to their total employment, many very small entities may not, in actuality, employ tree trimmers and the costs and impacts shown here may be an overestimate. For example, while landscapers are employed in the manufacturing NAICS, a manufacturer in NAICS 311111 Dog and Cat Food Manufacturing with fewer than 10 employees may be unlikely to have staff landscapers, or a local government with fewer than 10 employees may be unlikely to employ a tree trimmer.

Table VII-24. Summary of Total Costs of the Potential Standard by Provision - Very Small Entities (with Fewer than 10 Employees)

Provision	One-Time Costs	Annual/ Ongoing Costs	Annualized Costs	
			3%	7%
Rule Familiarization	$6,624,000	$0	$776,535	$943,109
Employee Qualifications	$0	$9,971,137	$9,971,137	$9,971,137
Written Tree Care Safety and Health Program	$1,768,303	$287,271	$494,570	$539,038
Training	$394,332	$839,629	$885,857	$895,773
Emergency Procedures	$13,035,176	$2,713,773	$4,241,894	$4,569,689
Job Hazard Analysis, Job Briefing, and Worksite Setup	$0	$42,790,803	$42,790,803	$42,790,803
Fire Prevention	$574,431	$151,801	$219,142	$233,587
Hands-Free Wireless Radios	$3,585,532	$0	$420,334	$510,499
Vehicle and Mobile Equipment Inspection and Safety	$0	$5,409,901	$5,409,901	$5,409,901
Aerial Devices	$0	$11,075	$11,075	$11,075
Chippers	$0	$151,079	$151,079	$151,079
Stump Grinders	$0	$123,214	$123,214	$123,214
Cranes and Knucklebooms	$4,421	$3,886,576	$3,887,094	$3,887,205
Equipment-Mounted Winches	$0	$501,454	$501,454	$501,454
Maintain equipment	$0	$158,757	$158,757	$158,757
Portable Power Hand Tools	$0	$320,053	$320,053	$320,053
Hand Tools	$0	$84,459	$84,459	$84,459
Ladders	$0	$158,757	$158,757	$158,757
Pruning and Trimming	$0	$129,427	$129,427	$129,427
Tree Climbing and Removal	$0	$1,010,228	$1,010,228	$1,010,228
Weather Hazards	$0	$104,470	$104,470	$104,470
Traffic Control	$0	$570,214	$570,214	$570,214
Total	**$25,986,196**	**$69,374,077**	**$72,420,452**	**$73,073,927**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-25. Summary of Total Annualized Costs of the Potential Standard by Sector - Very Small Entities (with Fewer than 10 Employees)

NAICS	Industry	Annualized Costs	
		3%	7%
21	Mining, Quarrying, and Oil and Gas Extraction	$2,975	$2,995
22	Utilities	$61,432	$61,875
23	Construction	$2,279,680	$2,297,977
31-33	Manufacturing	$82,769	$83,224
42	Wholesale Trade	$125,330	$125,933
44-45	Retail Trade	$445,567	$446,530
48-49	Transportation and Warehousing	$51,448	$51,775
51	Information	$11,702	$11,786
52	Finance and Insurance	$17,927	$18,075
53	Real Estate and Rental and Leasing	$1,455,508	$1,460,048
54	Professional, Scientific, and Technical Services	$594,637	$595,252
55	Management of Companies and Enterprises	$4,141	$4,185
56	Administrative and Support Services	$60,974,053	$61,582,033
61	Educational Services	$118,035	$118,558
62	Health Care and Social Assistance	$157,024	$157,543
71	Arts, Entertainment, and Recreation	$3,555,938	$3,564,420
72	Accommodation and Food Services	$622,650	$624,515
81	Other Services (except Public Administration)	$1,300,106	$1,304,675
99	State and Local Government	$559,529	$562,526
Total		**$72,420,452**	**$73,073,927**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Appendix A includes detailed costs for small and very small entities by six-digit NAICS code.

U. Economic Impacts

This section presents OSHA's analysis of the potential economic impacts of the potential standard and an assessment of economic feasibility. This includes an assessment of economic impacts on SBA-defined small and very small entities (those with fewer than 10 employees), conducted in accordance with the criteria laid out in the Regulatory Flexibility Act.

To provide an estimate of the economic significance of the impacts of the costs presented above, the average annualized costs per entity were compared to the average revenue and average profit of a given company. These comparisons were made based on NAICS code and size classification. Average revenue was estimated using total receipts and total entities from U.S. Census Bureau's (2015) Statistics of U.S. Businesses data on revenue and firm counts by employment size class. Revenue are inflated to 2018 dollars using the BEA's (2019) implicit price deflator for gross domestic product, and then divided by the number of firms in each size class to estimate average revenue per firm for all, small, and very small entities. Profit rates by NAICS are estimated using the Internal Revenue Services' (IRS, 2016) Statistics of Income

(SOI) Tax Stats - Corporation Source Book profit data for each of the 14 years 2000 – 2013.[39] (Appendix D for detailed revenue and profit rate data by six-digit NAICS code.) Profit rates were calculated by dividing the net income by total receipts for each industry sector, and averaged over the 2004 through 2011 time span to calculate an average profit rate to apply to the average revenue figures. Average revenue and profits are summarized in Table VII-26.

For purposes of determining the economic significance of the impacts, OSHA uses threshold values of costs exceeding 1 percent of revenues or 5 percent of profits. The estimated costs of compliance presented in Section T (for all entities and for small and very small entities) were compared with industry revenues and profits to provide a measure of potential economic impacts.

Table VII-26 through Table VII-31 present data on average revenue and profit per firm for each affected industry sector, along with the corresponding estimated annualized costs of compliance in each sector. Potential impacts in the table are represented by the ratios of compliance costs to revenues and compliance costs to profits. Costs are presented for all entities, SBA/RFA-defined small entities, and very small entities (those with fewer than 10 employees), first using a 3 percent discount rate, and then using a 7 percent discount rate.

On average, the costs of compliance with the potential standard for all entities do not exceed 0.2 percent of revenues or 12 percent of profits in any affected sector. For SBA/RFA-defined small entities, costs do not exceed 1 percent of revenues, but do exceed 10 percent of profits in NAICS 54 (Professional, Scientific, and Technical Services), where average costs per firm are under $4,000 but average profits per firm are under $25,000, and NAICS 81 Other Services (except Public Administration), where average costs per firm are just over $1,600 but average profits per firm are just over $11,000. For very small entities (those employing fewer than 10 employees), impacts do not exceed 1 percent of revenue but do exceed 15 percent of profits for some sectors.

In NAICS sector 56, which includes NAICS 561730 Landscaping Services (where the majority of tree trimmers and landscapers are employed) costs do not exceed 1 percent of revenue or 10 percent of profits when considering the average firm. This may not capture the range of impacts experienced by firms in this NAICS. Those who employ landscapers who no longer possess sufficient employee qualifications to perform tree care operations under the draft standard would only incur costs for rule familiarization, whereas those who employ tree trimmers and provide tree trimming as their primary service would incur costs for most or all rule provisions.

This analysis assumes that landscapers and tree trimmers employed in industries outside NAICS 561730 Landscaping Services are performing the same type of tree care operations that companies that specialize in tree care are performing. This means that, in this analysis, OSHA assumes that landscapers and tree trimmers employed by businesses outside of the Landscaping services industry are undertaking major tree care work like taking down a large, mature tree using mobile equipment, tree climbing techniques, rigging, etc. once a month or more. In reality,

[39] Profit rates are calculated as (Net Income (less Deficit) from IRS Table 1 [Returns with and without Net Income] ÷ Total Receipts from IRS Table 1 [Returns with and without Net Income]).

those sorts of jobs may be performed by dedicated tree care companies while landscapers and tree trimmers outside of the Landscaping Services industry may be performing much simpler tree care operations that do not require a JHA or job briefing that is as extensive as what is needed for complex, large-scale tree removal work. All significant impacts seen in the 6-digit NAICS level tables below disappear if the estimates for the JHA and job briefing time and the number of tree care jobs performed by landscapers as a percent of tree trimmer jobs are reduced. OSHA has chosen conservative estimates that err on the side of overestimating costs for this analysis and welcomes comment on whether these estimates are accurate or whether they are, in fact, overestimates. Appendix A also details economic impacts at the 6-digit NAICS level.

Table VII-26 estimates impacts for all entities using a 3 percent discount rate.

Table VII-26. Screening Analysis for Entities Affected by the Potential Standard with Costs Calculated Using a 3 percent Discount Rate

NAICS Code	Industry	Total Firms	Affected Firms	Avg. Total Annualized Cost per Firm	Avg. Revenue per Firm	Avg. Profits per Firm	Cost as a Percent of Revenue	Cost as a Percent of Profits
21	Mining, Quarrying, and Oil and Gas Extraction	17,700	8	$660	$28,016,430	$1,812,216	0.002%	0.036%
22	Utilities	6,245	53	$29,904	$94,157,598	$429,382	0.032%	6.964%
23	Construction	642,126	1,062	$2,784	$2,338,291	$66,777	0.119%	4.169%
31-33	Manufacturing	266,915	296	$603	$23,590,812	$1,111,047	0.003%	0.054%
42	Wholesale Trade	321,231	202	$984	$26,446,920	$700,153	0.004%	0.140%
44-45	Retail Trade	657,408	317	$2,258	$6,881,816	$144,116	0.033%	1.567%
48-49	Transportation and Warehousing	170,524	104	$756	$4,769,613	$63,347	0.016%	1.193%
51	Information	72,149	25	$671	$18,725,538	$594,797	0.004%	0.113%
52	Finance and Insurance	238,368	44	$722	$16,624,341	$772,189	0.004%	0.093%
53	Real Estate and Rental and Leasing	272,158	1,249	$1,601	$1,992,337	$155,777	0.080%	1.028%
54	Professional, Scientific, and Technical Services	776,373	195	$3,827	$2,166,880	$38,007	0.177%	10.068%
55	Management of Companies and Enterprises	27,653	189	$962	$9,915,241	$1,226,462	0.010%	0.078%
56	Administrative and Support Services	328,818	40,136	$1,973	$2,404,476	$64,060	0.082%	3.081%
61	Educational Services	84,829	323	$2,003	$4,778,824	$289,960	0.042%	0.691%
62	Health Care and Social Assistance	655,506	289	$2,485	$3,469,062	$166,157	0.072%	1.496%
71	Arts, Entertainment, and Recreation	115,423	2,851	$2,454	$1,945,080	$54,950	0.126%	4.467%
72	Accommodation and Food Services	497,387	730	$1,801	$1,580,700	$52,003	0.114%	3.463%
81	Other Services (except Public Administration)	668,128	1,076	$1,796	$961,983	$15,655	0.187%	11.475%
99	State and Local Government	14,708	977	$6,307	$211,007,818	N/A	0.003%	N/A
Total		**5,894,872**	**50,126**	–	–	–	–	–

Note: Figures may not add to totals due to rounding.

Sources: BLS (2018), BLS (2019), EPA (2002) and Rice (2002); U.S. Census (2015); IRS (2016); US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-27 estimates impacts for SBA/RFA-defined small entities using a 3 percent discount rate.

Table VII-27. Screening Analysis for SBA/RFA-Defined Small Entities Affected by the Potential Standard with Costs Calculated Using a 3 Percent Discount Rate

NAICS Code	Industry	Total Firms	Affected Firms	Avg. Total Annualized Cost per Firm	Avg. Revenue per Firm	Avg. Profits per Firm	Cost as a Percent of Revenue	Cost as a Percent of Profits
21	Mining, Quarrying, and Oil and Gas Extraction	17,157	8	$583	$8,542,903	$547,674	0.007%	0.106%
22	Utilities	5,817	50	$9,195	$21,888,182	$100,168	0.042%	9.180%
23	Construction	635,676	1,051	$2,646	$1,418,147	$41,580	0.187%	6.363%
31-33	Manufacturing	258,354	296	$599	$6,970,280	$297,537	0.009%	0.201%
42	Wholesale Trade	310,063	201	$895	$8,495,845	$253,089	0.011%	0.354%
44-45	Retail Trade	648,499	314	$1,967	$2,482,350	$39,764	0.079%	4.946%
48-49	Transportation and Warehousing	167,715	104	$688	$1,920,192	$26,924	0.036%	2.554%
51	Information	70,114	25	$613	$3,096,134	$109,443	0.020%	0.560%
52	Finance and Insurance	233,522	44	$556	$2,406,718	$134,118	0.023%	0.414%
53	Real Estate and Rental and Leasing	267,613	1,230	$1,392	$973,750	$85,056	0.143%	1.637%
54	Professional, Scientific, and Technical Services	765,705	193	$3,699	$983,754	$24,609	0.376%	15.030%
55	Management of Companies and Enterprises	5,108	4	$1,032	$4,916,879	$1,095,429	0.021%	0.094%
56	Administrative and Support Services	321,699	39,906	$1,799	$958,908	$26,562	0.188%	6.773%
61	Educational Services	80,848	255	$1,271	$1,154,437	$70,047	0.110%	1.814%
62	Health Care and Social Assistance	643,746	258	$1,917	$1,287,848	$66,202	0.149%	2.896%
71	Arts, Entertainment, and Recreation	114,284	2,833	$2,300	$1,079,183	$28,648	0.213%	8.028%
72	Accommodation and Food Services	494,820	719	$1,487	$870,316	$29,843	0.171%	4.983%
81	Other Services (except Public Administration)	662,299	1,064	$1,624	$677,235	$11,215	0.240%	14.484%
99	State and Local Government	13,774	914	$5,431	$32,040,226	N/A	0.017%	N/A
Total		**5,771,913**	**49,469**	–	–	–	–	–

Note: Figures may not add to totals due to rounding.

Sources: BLS (2018), BLS (2019), EPA (2002) and Rice (2002); U.S. Census (2015); IRS (2016); US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-28 estimates impacts for very small entities (those with fewer than 10 employees) using a 3 percent discount rate.

Table VII-28. Screening Analysis for Very Small Entities (with Fewer than 10 Employees) Affected by the Potential Standard with Costs Calculated Using a 3 Percent Discount Rate

NAICS Code	Industry	Total Firms	Affected Firms	Avg. Total Annualized Cost per Firm	Avg. Revenue per Firm	Avg. Profits per Firm	Cost as a Percent of Revenue	Cost as a Percent of Profits
21	Mining, Quarrying, and Oil and Gas Extraction	13,175	5	$595	$1,253,625	$81,491	0.047%	0.730%
22	Utilities	4,058	16	$3,840	$1,466,075	$7,326	0.262%	52.407%
23	Construction	539,834	884	$2,579	$581,824	$16,849	0.443%	15.306%
31-33	Manufacturing	154,570	114	$726	$660,035	$27,530	0.110%	2.637%
42	Wholesale Trade	233,969	151	$830	$2,750,017	$115,455	0.030%	0.719%
44-45	Retail Trade	526,128	240	$1,857	$919,770	$16,225	0.202%	11.442%
48-49	Transportation and Warehousing	131,941	82	$627	$527,541	$6,863	0.119%	9.142%
51	Information	53,020	21	$557	$591,999	$26,509	0.094%	2.102%
52	Finance and Insurance	202,566	37	$485	$495,851	$64,585	0.098%	0.750%
53	Real Estate and Rental and Leasing	242,797	1,131	$1,287	$532,624	$48,992	0.242%	2.627%
54	Professional, Scientific, and Technical Services	670,148	154	$3,861	$428,037	$17,444	0.902%	22.135%
55	Management of Companies and Enterprises	3,312	6	$690	$2,216,359	$514,350	0.031%	0.134%
56	Administrative and Support Services	259,098	35,270	$1,729	$353,979	$10,023	0.488%	17.248%
61	Educational Services	54,949	105	$1,124	$296,583	$17,995	0.379%	6.247%
62	Health Care and Social Assistance	474,251	130	$1,208	$463,144	$26,287	0.261%	4.595%
71	Arts, Entertainment, and Recreation	87,591	1,912	$1,860	$463,291	$17,136	0.401%	10.853%
72	Accommodation and Food Services	300,232	465	$1,339	$293,732	$10,141	0.456%	13.205%
81	Other Services (except Public Administration)	560,277	861	$1,510	$336,740	$6,007	0.448%	25.136%
99	State and Local Government	1,552	103	$5,432	$839,461	N/A	0.647%	N/A
Total		**4,531,788**	**41,687**	–	–	–	–	–

Note: Figures may not add to totals due to rounding.

Sources: BLS (2018), BLS (2019), EPA (2002) and Rice (2002); U.S. Census (2015); IRS (2016); US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-29 estimates impacts for all entities using a 7 percent discount rate.

Table VII-29. Screening Analysis for Entities Affected by the Potential Standard with Costs Calculated Using a 7 percent Discount Rate

NAICS Code	Industry	Total Firms	Affected Firms	Avg. Total Annualized Cost per Firm	Avg. Revenue per Firm	Avg. Profits per Firm	Cost as a Percent of Revenue	Cost as a Percent of Profits
21	Mining, Quarrying, and Oil and Gas Extraction	17,700	8	$664	$28,016,430	$1,812,216	0.002%	0.037%
22	Utilities	6,245	53	$30,151	$94,157,598	$429,382	0.032%	7.022%
23	Construction	642,126	1,062	$2,805	$2,338,291	$66,777	0.120%	4.201%
31-33	Manufacturing	266,915	296	$607	$23,590,812	$1,111,047	0.003%	0.055%
42	Wholesale Trade	321,231	202	$988	$26,446,920	$700,153	0.004%	0.141%
44-45	Retail Trade	657,408	317	$2,263	$6,881,816	$144,116	0.033%	1.570%
48-49	Transportation and Warehousing	170,524	104	$760	$4,769,613	$63,347	0.016%	1.200%
51	Information	72,149	25	$676	$18,725,538	$594,797	0.004%	0.114%
52	Finance and Insurance	238,368	44	$727	$16,624,341	$772,189	0.004%	0.094%
53	Real Estate and Rental and Leasing	272,158	1,249	$1,605	$1,992,337	$155,777	0.081%	1.031%
54	Professional, Scientific, and Technical Services	776,373	195	$3,831	$2,166,880	$38,007	0.177%	10.079%
55	Management of Companies and Enterprises	27,653	189	$975	$9,915,241	$1,226,462	0.010%	0.080%
56	Administrative and Support Services	328,818	40,136	$1,990	$2,404,476	$64,060	0.083%	3.107%
61	Educational Services	84,829	323	$2,012	$4,778,824	$289,960	0.042%	0.694%
62	Health Care and Social Assistance	655,506	289	$2,491	$3,469,062	$166,157	0.072%	1.499%
71	Arts, Entertainment, and Recreation	115,423	2,851	$2,459	$1,945,080	$54,950	0.126%	4.475%
72	Accommodation and Food Services	497,387	730	$1,806	$1,580,700	$52,003	0.114%	3.472%
81	Other Services (except Public Administration)	668,128	1,076	$1,803	$961,983	$15,655	0.187%	11.514%
99	State and Local Government	14,708	977	$6,339	$211,007,818	N/A	0.003%	N/A
Total		**5,894,872**	**50,126**	–	–	–	–	–

Note: Figures may not add to totals due to rounding.

Sources: BLS (2018), BLS (2019), EPA (2002) and Rice (2002); U.S. Census (2015); IRS (2016); US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-30 estimates impacts for SBA/RFA-defined small entities using a 7 percent discount rate.

Table VII-30. Screening Analysis for SBA/RFA-Defined Small Entities Affected by the Potential Standard with Costs Calculated Using a 7 Percent Discount Rate

NAICS Code	Industry	Total Firms	Affected Firms	Avg. Total Annualized Cost per Firm	Avg. Revenue per Firm	Avg. Profits per Firm	Cost as a Percent of Revenue	Cost as a Percent of Profits
21	Mining, Quarrying, and Oil and Gas Extraction	17,157	8	$587	$8,542,903	$547,674	0.007%	0.107%
22	Utilities	5,817	50	$9,273	$21,888,182	$100,168	0.042%	9.258%
23	Construction	635,676	1,051	$2,667	$1,418,147	$41,580	0.188%	6.413%
31-33	Manufacturing	258,354	296	$603	$6,970,280	$297,537	0.009%	0.203%
42	Wholesale Trade	310,063	201	$899	$8,495,845	$253,089	0.011%	0.355%
44-45	Retail Trade	648,499	314	$1,971	$2,482,350	$39,764	0.079%	4.957%
48-49	Transportation and Warehousing	167,715	104	$692	$1,920,192	$26,924	0.036%	2.569%
51	Information	70,114	25	$617	$3,096,134	$109,443	0.020%	0.564%
52	Finance and Insurance	233,522	44	$560	$2,406,718	$134,118	0.023%	0.418%
53	Real Estate and Rental and Leasing	267,613	1,230	$1,396	$973,750	$85,056	0.143%	1.641%
54	Professional, Scientific, and Technical Services	765,705	193	$3,703	$983,754	$24,609	0.376%	15.046%
55	Management of Companies and Enterprises	5,108	4	$1,040	$4,916,879	$1,095,429	0.021%	0.095%
56	Administrative and Support Services	321,699	39,906	$1,816	$958,908	$26,562	0.189%	6.838%
61	Educational Services	80,848	255	$1,276	$1,154,437	$70,047	0.111%	1.822%
62	Health Care and Social Assistance	643,746	258	$1,922	$1,287,848	$66,202	0.149%	2.903%
71	Arts, Entertainment, and Recreation	114,284	2,833	$2,305	$1,079,183	$28,648	0.214%	8.045%
72	Accommodation and Food Services	494,820	719	$1,492	$870,316	$29,843	0.171%	4.998%
81	Other Services (except Public Administration)	662,299	1,064	$1,630	$677,235	$11,215	0.241%	14.534%
99	State and Local Government	13,774	914	$5,460	$32,040,226	N/A	0.017%	N/A
Total		**5,771,913**	**49,469**	**–**	**–**	**–**	**–**	**–**

Note: Figures may not add to totals due to rounding.

Sources: BLS (2018), BLS (2019), EPA (2002) and Rice (2002); U.S. Census (2015); IRS (2016); US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-31 estimates impacts for very small entities (those with fewer than 10 employees) using a 7 percent discount rate.

Table VII-31. Screening Analysis for Very Small Entities (with Fewer than 10 Employees) Affected by the Potential Standard with Costs Calculated Using a 7 Percent Discount Rate

NAICS Code	Industry	Total Firms	Affected Firms	Avg. Total Annualized Cost per Firm	Avg. Revenue per Firm	Avg. Profits per Firm	Cost as a Percent of Revenue	Cost as a Percent of Profits
21	Mining, Quarrying, and Oil and Gas Extraction	13,175	5	$599	$1,253,625	$81,491	0.048%	0.735%
22	Utilities	4,058	16	$3,867	$1,466,075	$7,326	0.264%	52.785%
23	Construction	539,834	884	$2,600	$581,824	$16,849	0.447%	15.429%
31-33	Manufacturing	154,570	114	$730	$660,035	$27,530	0.111%	2.652%
42	Wholesale Trade	233,969	151	$834	$2,750,017	$115,455	0.030%	0.722%
44-45	Retail Trade	526,128	240	$1,861	$919,770	$16,225	0.202%	11.467%
48-49	Transportation and Warehousing	131,941	82	$631	$527,541	$6,863	0.120%	9.201%
51	Information	53,020	21	$561	$591,999	$26,509	0.095%	2.117%
52	Finance and Insurance	202,566	37	$489	$495,851	$64,585	0.099%	0.756%
53	Real Estate and Rental and Leasing	242,797	1,131	$1,291	$532,624	$48,992	0.242%	2.635%
54	Professional, Scientific, and Technical Services	670,148	154	$3,865	$428,037	$17,444	0.903%	22.158%
55	Management of Companies and Enterprises	3,312	6	$698	$2,216,359	$514,350	0.031%	0.136%
56	Administrative and Support Services	259,098	35,270	$1,746	$353,979	$10,023	0.493%	17.420%
61	Educational Services	54,949	105	$1,129	$296,583	$17,995	0.381%	6.274%
62	Health Care and Social Assistance	474,251	130	$1,212	$463,144	$26,287	0.262%	4.610%
71	Arts, Entertainment, and Recreation	87,591	1,912	$1,864	$463,291	$17,136	0.402%	10.879%
72	Accommodation and Food Services	300,232	465	$1,343	$293,732	$10,141	0.457%	13.244%
81	Other Services (except Public Administration)	560,277	861	$1,515	$336,740	$6,007	0.450%	25.225%
99	State and Local Government	1,552	103	$5,461	$839,461	N/A	0.651%	N/A
Total		**4,531,788**	**41,687**	–	–	–	–	–

Note: Figures may not add to totals due to rounding.

Sources: BLS (2018), BLS (2019), EPA (2002) and Rice (2002); U.S. Census (2015); IRS (2016); US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

While the economic impacts and feasibility summarized above represent average impacts across all affected entities or all affected small and very small entities, impacts on any given entity may vary widely depending on the number of workers performing tree care operations they employ and the number of tree care operations jobs they perform per year. Additionally, as discussed previously, NAICS 561730 Landscaping Services in particular may see disparate impacts because entities only employing landscapers who are no longer sufficiently qualified to perform tree care operations will only have costs for rule familiarization, whereas those employing tree trimmers and others who continue to perform tree care operations will have costs for most or all rule provisions.

The tables that follow estimate costs for "model" entities of various sizes. Costs are calculated as detailed above, but rather than using the total number of establishments and employees, use the number at one particular model entity specified in the text below. These model entities are not meant to represent an average firm in NAICS 561730 Landscaping Services. This industry has thousands of landscapers but only a handful of tree trimmers and pruners. Looking at an average firm in the landscaping industry dilutes the costs on the mostly highly impacted firms (those whose work is mostly tree trimming) by combining them with firms that would have little or no impact (those who do little or no tree trimming). These model entity tables instead focus on dedicated tree trimming firms that will incur more costs associated with complying with a tree care operations standard than the average landscaping firm. For comparison, OSHA included one model entity, Model Entity 5, that shows a landscaping firm that performed a limit number of tree trimming jobs each year that would opt to contract out those jobs under the potential tree care operations standard rather than incur costs to comply with the rule.

Estimated revenue is drawn on the U.S. Census Bureau's (2015) revenue data and firm counts for NAICS 561730 Landscaping Services by employment size class, with revenue inflated to 2018 dollars using the BEA (2019) implicit price deflator for gross domestic product. Total revenue for the employment size class the model entity would fall into is divided by the number of firms in that size class to obtain average revenue per entity. Profits are calculated by multiplying revenue by the average profit rate for this NAICS industry between 2000 and 2013 in the IRS' (2016) Corporation Source Book. Taking a conservative approach (i.e., one that results in the highest possible costs), costs for each model entity are calculated assuming that all landscapers engage in tree care operations at some point.

For several of these model entities, costs significantly exceed 1 percent of revenue and 10 percent of profits. In part, this is because profits for this NAICS industry are relatively low – for example, for the 0-4 employee size class, average profit per firm is only around $6,000 per year, so any costs over $600 per firm will exceed the 10 percent threshold.

Table VII-32 shows costs for a model entity with one establishment with four tree trimmers. This model entity is estimated to complete 300 jobs per year, including 46 where a crane is used and 114 that involve tree climbing (number of jobs where crane is used and that involve tree climbing derived using the percent of jobs estimated to include various types of

activities covered by the potential standard (see Table V-7)). The impacts are estimated using a profit rate of 2.8 percent.

Table VII-32. Costs and Impacts for a Model Entity - Model Entity 1

Provision	One-Time Costs	Annual/ Ongoing Costs	Annualized Costs	
			3%	7%
Rule Familiarization	$159	$0	$19	$23
Written Tree Care Safety and Health Program	$635	$103	$178	$194
Training	$142	$136	$152	$156
Emergency Procedures	$1,673	$433	$629	$671
Job Hazard Analysis, Job Briefing, and Worksite Setup	$0	$4,734	$4,734	$4,734
Fire Prevention	$53	$14	$20	$21
Hands-Free Wireless Radios	$249	$0	$29	$35
Vehicle and Mobile Equipment Inspection and Safety	$0	$598	$598	$598
Aerial Devices	$0	$1	$1	$1
Chippers	$0	$18	$18	$18
Stump Grinders	$0	$15	$15	$15
Cranes and Knucklebooms	$2	$419	$419	$419
Equipment-Mounted Winches	$0	$57	$57	$57
Maintain equipment	$0	$15	$15	$15
Portable Power Hand Tools	$0	$30	$30	$30
Hand Tools	$0	$8	$8	$8
Ladders	$0	$15	$15	$15
Pruning and Trimming	$0	$15	$15	$15
Tree Climbing and Removal	$0	$277	$277	$277
Weather Hazards	$0	$12	$12	$12
Traffic Control	$0	$88	$88	$88
Total Costs	**$2,912**	**$6,987**	**$7,328**	**$7,402**
Revenue	**$218,010**	**$218,010**	**$218,010**	**$218,010**
Profits	**$6,104**	**$6,104**	**$6,104**	**$6,104**
Costs as % of Revenue	**1.3%**	**3.2%**	**3.4%**	**3.4%**
Costs as % of Profits	**47.7%**	**114.5%**	**120.1%**	**121.3%**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-33 shows costs for a model entity with one establishment, eight tree trimmers, and four landscapers. This entity is estimated to complete 600 jobs per year, including 92 where a crane is used and 228 where workers are climbing trees (derived again using the percent of jobs

that involve activities covered by the potential standard (see Table V-7)). The impacts are estimated using a profit rate of 2.8 percent.

Table VII-33. Costs and Impacts for a Model Entity - Model Entity 2

Provision	One-Time Costs	Annual/ Ongoing Costs	Annualized Costs	
			3%	7%
Rule Familiarization	$159	$0	$19	$23
Written Tree Care Safety and Health Program	$635	$103	$178	$194
Training	$142	$253	$269	$273
Emergency Procedures	$5,019	$1,019	$1,607	$1,734
Job Hazard Analysis, Job Briefing, and Worksite Setup	$0	$9,684	$9,684	$9,684
Fire Prevention	$159	$38	$56	$60
Hands-Free Wireless Radios	$747	$0	$88	$106
Vehicle and Mobile Equipment Inspection and Safety	$0	$1,224	$1,224	$1,224
Aerial Devices	$0	$3	$3	$3
Chippers	$0	$43	$43	$43
Stump Grinders	$0	$30	$30	$30
Cranes and Knucklebooms	$2	$839	$839	$839
Equipment-Mounted Winches	$0	$117	$117	$117
Maintain equipment	$0	$41	$41	$41
Portable Power Hand Tools	$0	$84	$84	$84
Hand Tools	$0	$22	$22	$22
Ladders	$0	$41	$41	$41
Pruning and Trimming	$0	$41	$41	$41
Tree Climbing and Removal	$0	$711	$711	$711
Weather Hazards	$0	$24	$24	$24
Traffic Control	$0	$206	$206	$206
Total Costs	**$6,862**	**$14,523**	**$15,327**	**$15,500**
Revenue	**$1,245,826**	**$1,245,826**	**$1,245,826**	**$1,245,826**
Profits	**$34,882**	**$34,882**	**$34,882**	**$34,882**
Costs as % of Revenue	**0.6%**	**1.2%**	**1.2%**	**1.2%**
Costs as % of Profits	**19.7%**	**41.6%**	**43.9%**	**44.4%**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-34 shows costs for a model entity with one establishment, 16 tree trimmers, four landscapers, two spray technicians, and one crane operator. This entity is estimated to complete 1,200 jobs per year, including 185 using a crane and 456 where workers are climbing

trees (derived again using the percent of jobs that involve activities covered by the potential standard (see Table V-7). The impacts are estimated using a profit rate of 2.8 percent.

Table VII-34. Costs and Impacts for a Model Entity - Model Entity 3

Provision	One-Time Costs	Annual/ Ongoing Costs	Annualized Costs	
			3%	7%
Rule Familiarization	$159	$0	$19	$23
Written Tree Care Safety and Health Program	$635	$103	$178	$194
Training	$142	$422	$439	$443
Emergency Procedures	$9,619	$1,915	$3,043	$3,285
Job Hazard Analysis, Job Briefing, and Worksite Setup	$0	$19,796	$19,796	$19,796
Fire Prevention	$304	$73	$109	$116
Hands-Free Wireless Radios	$1,432	$0	$168	$204
Vehicle and Mobile Equipment Inspection and Safety	$0	$2,451	$2,451	$2,451
Aerial Devices	$0	$5	$5	$5
Chippers	$0	$79	$79	$79
Stump Grinders	$0	$60	$60	$60
Cranes and Knucklebooms	$2	$2,328	$2,328	$2,328
Equipment-Mounted Winches	$0	$233	$233	$233
Maintain equipment	$0	$78	$78	$78
Portable Power Hand Tools	$0	$158	$158	$158
Hand Tools	$0	$42	$42	$42
Ladders	$0	$78	$78	$78
Pruning and Trimming	$0	$71	$71	$71
Tree Climbing and Removal	$0	$1,383	$1,383	$1,383
Weather Hazards	$0	$49	$49	$49
Traffic Control	$0	$409	$409	$409
Total Costs	**$12,292**	**$29,734**	**$31,175**	**$31,484**
Revenue	**$3,456,446**	**$3,456,446**	**$3,456,446**	**$3,456,446**
Profits	**$96,778**	**$96,778**	**$96,778**	**$96,778**
Costs as % of Revenue	**0.4%**	**0.9%**	**0.9%**	**0.9%**
Costs as % of Profits	**12.7%**	**30.7%**	**32.2%**	**32.5%**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-35 shows costs for a model entity with two establishments, 100 tree trimmers, 20 landscapers, 10 spray technicians, and four crane operators. This entity is assumed to complete 7,500 jobs per year, including 1,155 using a crane and 2,850 jobs where tree climbing takes place (derived again using the estimated percent of jobs that involve activities covered by the potential standard (see Table V-7)). The impacts are estimated using a profit rate of 2.8 percent.

Table VII-35. Costs and Impacts for a Model Entity - Model Entity 4

Provision	One-Time Costs	Annual/ Ongoing Costs	Annualized Costs	
			3%	7%
Rule Familiarization	$318	$0	$37	$45
Written Tree Care Safety and Health Program	$1,270	$206	$355	$387
Training	$283	$2,202	$2,236	$2,243
Emergency Procedures	$56,042	$10,736	$17,306	$18,715
Job Hazard Analysis, Job Briefing, and Worksite Setup	$0	$123,259	$123,259	$123,259
Fire Prevention	$1,772	$434	$642	$686
Hands-Free Wireless Radios	$8,342	$0	$978	$1,188
Vehicle and Mobile Equipment Inspection and Safety	$0	$15,247	$15,247	$15,247
Aerial Devices	$0	$34	$34	$34
Chippers	$0	$483	$483	$483
Stump Grinders	$0	$376	$376	$376
Cranes and Knucklebooms	$3	$14,539	$14,540	$14,540
Equipment-Mounted Winches	$0	$1,451	$1,451	$1,451
Maintain equipment	$0	$467	$467	$467
Portable Power Hand Tools	$0	$942	$942	$942
Hand Tools	$0	$249	$249	$249
Ladders	$0	$467	$467	$467
Pruning and Trimming	$0	$433	$433	$433
Tree Climbing and Removal	$0	$8,256	$8,256	$8,256
Weather Hazards	$0	$302	$302	$302
Traffic Control	$0	$2,478	$2,478	$2,478
Total Costs	**$68,030**	**$182,562**	**$190,537**	**$192,247**
Revenue	**$13,472,170**	**$13,472,170**	**$13,472,170**	**$13,472,170**
Profits	**$377,210**	**$377,210**	**$377,210**	**$377,210**
Costs as % of Revenue	**0.5%**	**1.4%**	**1.4%**	**1.4%**
Costs as % of Profits	**18.0%**	**48.4%**	**50.5%**	**51.0%**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

Table VII-36 shows costs for a model entity with one establishment and four landscapers. This model entity would opt to cease tree care operations if the potential standard is enacted. The entity has costs for rule familiarization to account for time spent reviewing the standard and determining that they do not have any employee who meets the requirement for a knowledgeable

and experienced employee.[40] This hypothetical entity will opt to contract out any tree care operations work they would have done (estimated to be approximately 15 tree care jobs per year).

Table VII-36 Costs and Impacts for a Model Entity - Model Entity 5

Provision	One-Time Costs	Annual/ Ongoing Costs	Annualized Costs	
			3%	7%
Rule Familiarization	$159	$0	$19	$23
Employee Qualifications	$0	$816	$816	$816
Written Tree Care Safety and Health Program	$0	$0	$0	$0
Training	$0	$0	$0	$0
Emergency Procedures	$0	$0	$0	$0
Job Hazard Analysis, Job Briefing, and Worksite Setup	$0	$0	$0	$0
Fire Prevention	$0	$0	$0	$0
Hands-Free Wireless Radios	$0	$0	$0	$0
Vehicle and Mobile Equipment Inspection and Safety	$0	$0	$0	$0
Aerial Devices	$0	$0	$0	$0
Chippers	$0	$0	$0	$0
Sprayers and Related Equipment	$0	$0	$0	$0
Stump Grinders	$0	$0	$0	$0
Cranes and Knucklebooms	$0	$0	$0	$0
Equipment-Mounted Winches	$0	$0	$0	$0
Maintain equipment	$0	$0	$0	$0
Portable Power Hand Tools	$0	$0	$0	$0
Hand Tools	$0	$0	$0	$0
Ladders	$0	$0	$0	$0
Pruning and Trimming	$0	$0	$0	$0
Tree Climbing and Removal	$0	$0	$0	$0
Weather Hazards	$0	$0	$0	$0
Electric Power	$0	$0	$0	$0
Traffic Control	$0	$0	$0	$0
Total Costs	**$159**	**$816**	**$834**	**$838**
Revenue	**$218,010**	**$218,010**	**$218,010**	**$218,010**
Profits	**$6,104**	**$6,104**	**$6,104**	**$6,104**
Costs as % of Revenue	**0.07%**	**0.37%**	**0.38%**	**0.38%**
Costs as % of Profits	**2.6%**	**13.4%**	**13.7%**	**13.7%**

Note: Figures may not add to totals due to rounding.

Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

[40] OSHA's baseline compliance assumptions are for tree care, and not landscaping firms. Because OSHA is assuming that these firms are not currently meeting baseline requirements, OSHA does not anticipate cost savings related to these aspects of tree care operations if those operations are discontinued.

VIII. FEDERAL RULES THAT MAY DUPLICATE, OVERLAP OR CONFLICT WITH THE DRAFT STANDARD

The Regulatory Flexibility Act (RFA) requires that the agency's "initial regulatory flexibility analysis . . . identif[y], to the extent practicable, all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule." 5 U.S.C. 603(b)(5). OSHA has not yet developed a proposed rule addressing the hazards associated with tree care operations. However, as discussed in prior sections of the PIRFA, OSHA has developed a draft regulatory framework showing its preliminary thinking on what a proposed rule would encompass. OSHA has identified several federal rules that address tree care operations hazards.[41] Below, the Agency discusses whether these rules would duplicate, overlap, or conflict with a rule as outlined in the regulatory framework.

The first set of federal rules that OSHA identified are regulations promulgated by the Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. 136. Under that Act, the EPA oversees the registration of pesticides. FIFRA requires the registration of hazardous pesticides, sets out extensive labeling requirements, makes it unlawful to distribute misbranded pesticides, authorizes the EPA to inspect industries using or manufacturing hazardous pesticides and to investigate alleged violations of FIFRA, and generally bans the use of pesticides in any manner inconsistent with their labeling. (*Id.*) The EPA Worker Protection Standard includes requirements intended to "reduce the risks of illness or injury resulting from workers' and handlers' occupational exposures to pesticides used in the production of agricultural plants on farms or in nurseries, greenhouses, and forests and also from the accidental exposure of workers and other persons to such pesticides (40 CFR 170.1). Other EPA regulations regulate pesticide exposure of certified pesticide applicators and of those employees under the direct supervision of a certified applicator (40 CFR Pt. 171). The regulations provide that it is unlawful for "any person to make available for use or to use any pesticide classified for restricted use other than in accordance with the requirements" of the regulations (40 CFR 171.1(b)).

OSHA identified the EPA regulations under FIFRA as potentially duplicative, overlapping, or conflicting because workers engaged in tree care operations mix and apply pesticides during their work. See, e.g., ANSI Z133-2017, Sections 8.9, 8.10. OSHA concludes, however, that EPA's regulations under FIFRA would not be duplicative of, or overlap or conflict with, a rule as outlined in the regulatory framework. OSHA does not intend to regulate worker exposure to or use of pesticides (e.g., during mixing or application) in a rule as outlined in the regulatory framework.

The second set of federal rules that OSHA identified are Federal Highway Administration (FHWA)[42] regulations contained in 23 CFR Part 655 Subpart F. These regulations "prescribe

[41] The Federal rules discussed herein include only those rules that OSHA was able to identify that may duplicate, overlap, or conflict with a rule addressing tree care hazards. There may be other relevant Federal rules (including OSHA standards not identified and other Federal regulations) that OSHA did not identify. OSHA asks for input on whether there are any Federal rules that it did not identify in this analysis.

[42] The FHWA is an agency within the United States Department of Transportation.

policies and procedures . . . to obtain basic uniformity of traffic control devices on all streets and highways" in accordance with FHWA's Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD, available at https://mutcd.fhwa.dot.gov/, accessed January 30, 2019), 2009 Edition, including Revisions No. 1 and No. 2, dated May 2012 (23 CFR 655.601). The regulations provide that the MUTCD is the "national standard for all traffic control devices on any street, highway, or bicycle trail open to public travel." (23 CFR 655.603). To meet the goal of uniformity, the regulation provides that, "[w]here State or [] Federal agency MUTCDs or supplements are required, they [must] be in substantial conformance with the National MUTCD" and "States and [] Federal Agencies are encouraged to adopt the National MUTCD in its entirety as their official Manual on Uniform Traffic Control Devices." (*Id.*). Moreover, any traffic control devices installed in construction areas using Federal-aid funds must conform to the MUTCD, and "[t]raffic control plans" that are consistent with the MUTCD must be implemented in such areas "for handling traffic and pedestrians in construction zones and for protection of workers" (*Id.*; 23 CFR Part 630 Subpart J).

A rule as outlined in the regulatory framework would be entirely consistent with the FHWA requirement that Federal Agency requirements be in substantial conformance with the National MUTCD. While the draft regulatory framework contains potential traffic control requirements, OSHA believes those requirements are consistent with the MUTCD. Therefore, the FHWA regulations would not be duplicative of, or overlap or conflict with, a rule as outlined in the regulatory framework.

The third set of federal rules that OSHA identified are the Department of Transportation's (DOT's) Federal Motor Carrier Safety Regulations (FMCSR), 49 USC Ch. III, Subch. B. Those regulations contain requirements on the inspection, repair, and maintenance of motor vehicles and intermodal equipment (49 USC Part 396), as well as other requirements related to the operation of "commercial motor vehicles" (49 USC Parts 390 thru 399). The inspection, repair and maintenance regulations apply only to motor carriers and employees "directly concerned with the inspection or maintenance of commercial motor vehicles" (49 USC 396.1). The regulations define "commercial motor vehicles," in relevant part, as vehicles having "a gross vehicle weight rating or gross combination weight rating, or gross vehicle weight or gross combination weight, of 4,536 kg (10,001 pounds) or more, whichever is greater" (49 C.F.R. § 390.5).

OSHA identified the FMCSR as potentially duplicative, overlapping, or conflicting because a potential tree care operations rule might contain requirements on the inspection of vehicles and mobile equipment. Moreover, ANSI Z133-2017, Section 5.1.2, which OSHA considered in drafting the draft regulatory framework, recommends that "[i]nspections and operational checks [] be performed in accordance with applicable Federal Motor Carrier Safety Regulations," and ANSI Z133-2017, Section 5.6.2, recommends that "[r]egulated vehicles (those in excess of 10,000 pounds gross vehicle weight rating, or gross combined vehicle weight rating) [] be operated in compliance with the Federal Motor Carrier Safety Regulations." OSHA concludes, however, that the FMCSR would not be duplicative of, or overlap or conflict with, a rule as outlined in the regulatory framework. OSHA does not intend to include in a rule as outlined in the regulatory framework a requirement that inspections and operational checks be

performed in accordance with applicable Federal Motor Carrier Safety Regulations or a requirement that regulated vehicles be operated in compliance with the FMCSR.

The fourth set of federal rules that OSHA identified are United States Forest Service (USFS)[43] regulations authorizing the issuance of USFS orders restricting certain delineated activities in specific areas over which the USFS has jurisdiction (36 CFR Part 261 Subpart B). The delineated activities of relevance include activities that could cause a forest fire, such as smoking or operating or using an internal or external combustion engine without a spark arresting device that is properly installed, maintained, and in effective working order in accordance with U.S. Forest Service Standard 5100–1 (36 CFR 261.52).

The draft regulatory framework contains potential requirements for fire protection. The agency believes that the USFS regulations might be duplicative of, or overlap with, the rule, to the extent both the USFS regulations and the rule would apply (if at all). However, the USFS regulations would, in no cases, conflict with the rule. It is OSHA's intent that a potential rule be consistent with the USFS regulations.

The final set of federal rules that OSHA identified are existing OSHA standards, including both General Industry and Construction standards that apply only to specific industries or processes, and standards that apply generally to all employers.

Specific Standards

The existing standards that apply only to specific industries or processes that OSHA identified are relevant because they contain requirements addressing tree care hazards. The relevant standards include:

The Logging Operations Standard (29 CFR 1910.266).

> The Logging Operations Standard "establishes safety practices, means, methods and operations for all types of logging, regardless of the end use of the wood, and provides that "[t]hese types of logging include, but are not limited to, pulpwood and timber harvesting and the logging of sawlogs, veneer bolts, poles, pilings and other forest products" (§ 1910.266(b)(1)). The standard applies to all "logging operations," which the standard defines as "[o]perations associated with felling and moving trees and logs from the stump to the point of delivery, such as, but not limited to, marking danger trees and trees/logs to be cut to length, felling, limbing, bucking, debarking, chipping, yarding, loading, unloading, storing, and transporting machines, equipment and personnel to, from and between logging sites" (§ 1910.266(b)(2), (c)). The Occupational Safety and Health Review Commission held in a 2016 decision that "[t]he scope and application provisions of the logging standard make clear that the definition's description of 'logging operations' as 'felling and moving trees and logs from the stump to the point of delivery' means the process of logging, which requires both felling trees and moving the felled trees." *Davey Tree Expert Co.*, 2016 WL 845440, *6 (No. 11-2556, Feb. 26, 2016) (also

[43] The USFS is an agency within the United States Department of Agriculture.

available at https://www.oshrc.gov/assets/1/18/11-2556.pdf?7752). The Commission also held that the standard "unambiguously uses 'logging' to refer to a process—gathering timber from the forest for use in making" only "those forest products that are similar to the ones specifically listed" in the standard. *Id.* at *3.[44]

The agency believes that the Logging Operations Standard would not be duplicative of, or overlap or conflict with, a rule as outlined in the regulatory framework. If OSHA promulgates a rule as outlined in the regulatory framework, the Logging Operations Standard, and not a rule as outlined in the regulatory framework, would continue to apply to logging operations. Assuming OSHA decides not to address logging operations in a rule as outlined in the regulatory framework, OSHA would make clear that the rule does not apply to logging operations.

The Telecommunications Standard (29 CFR 1910.268).

The Telecommunications Standard "sets forth safety and health standards that apply to the work conditions, practices, means, methods, operations, installations and processes performed at telecommunications centers and at telecommunications field installations, which are located outdoors or in building spaces used for such field installations" (§ 1910.268(a)(1)). According to the standard, c*enter* work "includes the installation, operation, maintenance, rearrangement, and removal of communications equipment and other associated equipment in telecommunications switching centers," and field work "includes the installation, operation, maintenance, rearrangement, and removal of conductors and other equipment used for signal or communication service, and of their supporting or containing structures, overhead or underground, on public or private rights of way, including buildings or other structures" (*Id.*). The standard contains requirements for the use of rubber insulating equipment, personal climbing equipment, and PPE (§ 1910.268(e), (f), (g), (h)), and to protect against the electrical hazards associated with tree trimming (§ 1910.268(q)), among other relevant requirements.

The Telecommunications Standard applies to some work involving tree care. However, 29 CFR 1910.5(c) provides that "[i]f a particular standard is specifically applicable to a condition, practice, means, method, operation, or process, it shall prevail over any different general standard which might otherwise be applicable to the same condition, practice, means, method, operation, or process," but that "any standard shall apply according to its terms to any employment and place of employment in any industry, even though particular standards are also prescribed for the industry . . . to the extent that

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[44] The Commission elaborated:

The first two types of logging identified on the list—pulpwood and timber harvesting— involve cutting trees down and then taking them away, i.e. "gathering" the trees just like any other crop; the very definition of harvesting. . . . In other words, these two types of logging require felling the trees and then moving them to another location. The other items on the list—"the logging of sawlogs, veneer bolts, poles, pilings"—all reference manufactured goods made from trees.

Davey Tree Expert Co., 2016 WL 845440, at *4 (internal citations omitted).

none of such particular standards applies." Moreover, the Telecommunications Standard itself provides, in § 1910.268(a)(3), that "[o]perations or conditions not specifically covered by [the standard] are subject to all the applicable standards contained in [29 CFR] part 1910. See §1910.5(c)." Based on these provisions, the agency believes that the Telecommunications Standard would not be duplicative of, or overlap or conflict with, a rule as outlined in the regulatory framework.

The Electric Power Generation, Transmission, and Distribution Standard (29 CFR 1910.269).

The Electric Power Generation, Transmission, and Distribution Standard "covers the operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment," and applies to "[l]ine-clearance tree trimming[[45]] performed for the purpose of clearing space around electric power generation, transmission, or distribution lines or equipment and on behalf of an organization that operates, or that controls the operating procedures for, those lines or equipment" (§ 1910.269(a)(1)). The standard contains specific requirements for line-clearance tree trimming (§ 1910.269(a)(1)(i)(E)), including, for example, requirements on brush chippers (§ 1910.269(r)(2)), sprayers and related equipment (§ 1910.269(r)(3)), stump cutters (§ 1910.269(r)(4)), gasoline-engine power saws (§ 1910.269(r)(5)), backpack power units for use in pruning and cleaning (§ 1910.269(r)(6)), rope (§ 1910.269(r)(7)), and fall protection (§ 1910.269(r)(8)).[46]

Since the Electric Power Generation, Transmission, and Distribution Standard applies to some line-clearance tree trimming, the standard also applies to some work involving tree care. In this respect, OSHA notes that the Electric Power Generation, Transmission, and Distribution Standard provides that it "applies in addition to all other applicable standards contained in [29 CFR] part 1910," and that "[e]mployers covered under [29 CFR 1910.269] are not exempt from complying with other applicable

[45] The standard defines line-clearance tree trimming as "[t]he pruning, trimming, repairing, maintaining, removing, or clearing of trees, or the cutting of brush, that is within the following distance of electric supply lines and equipment:

(1) For voltages to ground of 50 kilovolts or less-3.05 meters (10 feet);

(2) For voltages to ground of more than 50 kilovolts-3.05 meters (10 feet) plus 0.10 meters (4 inches) for every 10 kilovolts over 50 kilovolts."

(§ 1910.269(x)).

[46] Entire §1910.269, except § 1910.269(r)(1), applies to line-clearance tree trimming when performed by § 1910.269 qualified employees (i.e., those who are knowledgeable in the construction and operation of the electric power generation, transmission, or distribution equipment involved, along with the associated hazards). (§ 1910.269(a)(1)(i)(E)(1)). Only paragraphs (a)(2), (a)(3), (b), (c), (g), (k), (p), and (r) of § 1910.269 apply to line-clearance tree trimming when performed by line-clearance tree trimmers who are not qualified employees.

provisions in part 1910 by the operation of §1910.5(c). When it revised the standard in 2014, OSHA discussed these provisions in the context of line clearance tree trimming:

> [T]he Agency does not believe that it is necessary to employee safety to address in § 1910.269 every hazard faced by line-clearance tree trimmers. Employers in every industry, including line-clearance tree trimming firms, must identify all OSHA standards applicable to their work, along with their general duty clause obligations, and then set, communicate, and enforce a set of work rules that meets all of the applicable requirements. For example, if a line-clearance tree trimming contractor performs work that falls under the logging or site-clearing standards (§§ 1910.266 and 1926.604, respectively), the contractor will have to ensure that its work rules meet those standards, in addition to § 1910.269.
>
> The provisions on brush chippers, sprayers and related equipment, stump cutters, gasoline-engine power saws, backpack units for use in pruning and clearing, rope, and fall protection (§ 1910.269(r)(2), (r)(3), (r)(4), (r)(5), (r)(6), (r)(7), and (r)(8), respectively) in existing § 1910.269 were taken, in part, from the EEI-IBEW draft on which § 1910.269 was based. Those provisions were "checked against the equivalent ANSI standard, ANSI Z133.1-1982[, American National Standard for Tree Care Operations—Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush—Safety Requirements] ([269-]Ex. 2-29), to be sure that OSHA's regulations would better effectuate safety than the national consensus standard" (59 FR 4322). However, OSHA did not incorporate a comprehensive tree-trimming standard in § 1910.269. Thus, many important safety provisions included in applicable consensus standards and in other OSHA standards were not included in § 1910.269, and that section does not address some important safety hazards faced by workers performing tree care operations. . . . [W]ith respect to the nonelectrical hazards that are regulated in the § 1910.269 tree-trimming provisions, the OSHA standards do not cover those hazards as comprehensively as the current version, or even the 1982 version, of ANSI Z133.1. For example, the new and old consensus standards include additional requirements for brush chippers and provisions on hand tools such as axes, pruners, and saws that are not contained in § 1910.269. . . .
>
> The Agency has published an advance notice of proposed rulemaking to gather information to use in developing a comprehensive standard on tree care operations (73 FR 54118-54123, Sept. 18, 2008). In that rulemaking, OSHA will consider whether, and to what extent, any new standard on tree care operations should cover line-clearance tree trimming. (79 FR 20316, 20342-20343 (April 11, 2014) (footnote omitted)).

As such, a rule as outlined in the regulatory framework would apply to line clearance tree trimming also covered by 29 CFR 1910.269. While a rule as outlined in the regulatory framework might be somewhat duplicative of, or overlap with, the Electric Power Generation, Transmission, and Distribution Standard, the agency believes, based on its statements during the 2014 rulemaking, that a rule as outlined in the regulatory framework would not conflict with the Electric Power Generation, Transmission, and Distribution Standard. If OSHA finds, through the

rulemaking process, that this is not the case, it may choose to modify the Electric Power Generation, Transmission, and Distribution Standard or to modify a proposed tree care standard. OSHA will seek comment during the SBAR process and throughout the rulemaking on provisions that may need to be modified.

General Standards

Employers that would be covered by a potential tree care operations rule must comply with a plethora of OSHA's general standards addressing a broad range of hazards to which workers are exposed while engaged in tree care operations. For example, employers that would be covered by a potential tree care rule must comply with OSHA's Occupational Noise Exposure Standard (29 CFR 1910.95), Permit-Required Confined Spaces Standard (29 CFR 1910.146), and General PPE Standard (29 CFR 1910.132). The agency believes that these and other general standards[47] might, in some cases, be duplicative of, or overlap with, a rule as outlined in the regulatory framework. However, OSHA believes that a rule addressing tree care hazards would help assure that all employers comply with these diverse requirements as part of a comprehensive duty to protect workers from the hazards associated with exposure to tree care hazards. If OSHA finds, through the rulemaking process, that a rule as outlined in the regulatory framework would conflict with an existing standard's requirements or is unclear, it will take action, through the rulemaking, to correct the conflict or clarify confusing provisions. OSHA will seek comment during the SBAR process and throughout the rulemaking on any potential conflicts or confusing provisions.

IX. REGULATORY ALTERNATIVES AND OPTIONS

This section describes the regulatory alternatives and options OSHA is considering.[48]

Table IX-1 summarizes the annualized costs for the potential standard, as calculated in Section VII above, using a three percent discount rate. Some of the regulatory alternatives and options discussed below would alter the scope, and thus the number of affected employers and employees, while others would expand, modify, or eliminate specific requirements that OSHA is considering.

[47] A full list of general standards that are applicable to employers that would be covered by a potential tree care operations rule would serve little purpose here since OSHA standards protect workers against such a broad range of hazards. For a full list of OSHA's standards, see https://www.osha.gov/laws-regs/regulations/standardnumber (accessed September 14, 2019).

[48] "Alternatives," as referenced under section 603(c) of the Regulatory Flexibility Act (RFA), "accomplish the stated objectives of applicable statutes that minimize any significant economic impact of the proposed rule on small entities." For the purposes of this PIRFA, the term "Option" is used to describe a potential scope change or substitute measure that does not meet the RFA definition for "alternative."

Table IX-1. Summary of Total Costs of the Potential Standard by Provision

Provision	Annualized Costs (3%)		
	All Entities	SBA-Defined Small Entities	Very Small Entities (< 10 Employees)
Rule Familiarization	$989,092	$932,765	$776,535
Employee Qualifications	$21,285,910	$18,053,958	$9,971,137
Written Tree Care Safety and Health Program	$574,989	$560,645	$494,570
Training	$1,093,847	$1,046,925	$885,857
Emergency Procedures	$6,594,043	$5,038,154	$4,241,894
Job Hazard Analysis, Job Briefing, and Worksite Setup	$55,088,574	$51,983,203	$42,790,803
Fire Prevention	$274,470	$261,643	$219,142
Hands-free, Wireless Radios	$402,398	$498,045	$420,334
Vehicle and Mobile Equipment Inspection and Safety	$6,962,288	$6,570,687	$5,409,901
Aerial Devices	$13,595	$12,985	$11,075
Chippers	$189,181	$179,940	$151,079
Stump Grinders	$151,239	$144,461	$123,214
Cranes and Knucklebooms	$6,239,258	$4,711,758	$3,887,094
Equipment-Mounted Winches	$647,062	$610,118	$501,454
Maintain equipment	$198,874	$189,513	$158,757
Portable Power Hand Tools	$400,930	$382,057	$320,053
Hand Tools	$105,801	$100,821	$84,459
Ladders	$198,874	$189,513	$158,757
Pruning and Trimming	$165,116	$156,443	$129,427
Tree Climbing and Removal	$2,863,834	$1,208,158	$1,010,228
Weather Hazards	$134,805	$127,108	$104,470
Traffic Control	$1,097,717	$691,694	$570,214
Total	**$105,671,896**	**$93,650,593**	**$72,420,452**

Note: Figures may not add to totals due to rounding.
Sources: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis and other sources given in preceding text.

OSHA presents a number of regulatory alternatives and options in this section. OSHA welcomes suggestions from the SERs regarding these regulatory alternatives and options, as well as additional alternatives or options the agency should consider. The total costs of the potential regulatory alternatives and options addressing the provisions, where quantified, are summarized in Table IX-3 and discussed in the text, with annualized costs calculated using a three percent discount rate.

A. Alternatives

This section includes alternatives that have the potential to meet the agency's statutory objectives, are feasible, and reduce the burden on small entities. The agency is presenting these alternatives consistent with the requirements of section 603(c) of the Regulatory Flexibility Act (RFA), and to solicit feedback to assist the agency in the decision-making process.

Scope

Alternative 1: Exclude Spray Technicians from tree care operations standard

Under this alternative, spray technicians would be removed from the scope of a tree care operations standard. Spray technicians must comply with existing OSHA standards. Potential hazards associated with pesticides are often addressed by EPA standards. Further, spray technicians are frequently licensed by state-level Departments of Agriculture or Natural Resources. OSHA has not identified any fatalities or injuries among spray technicians.

Moreover, when spray technicians perform work on trees, they work from the ground (e.g. spraying trees from the ground, inserting nutrients into the tree via the trunk, etc.). OSHA does not believe that spray technicians work at the same site as tree trimming crews while those crews are engaged in tree trimming, nor do they use the types of mobile equipment or electrical powered hand tools used by tree trimmers. OSHA estimates that this alternative would reduce annualized costs by approximately $1.8 million (see Table IX-3).

OSHA welcomes feedback on this regulatory alternative. OSHA also seeks input on whether it should include spray technicians in the scope of this potential standard for some or all provisions.

Alternative 2: Exclude Line-Clearance Tree Trimming Covered by the Electric Power Generation, Transmission and Distribution Standard, 29 CFR 1910.269, from tree care operations standard

Under this alternative, OSHA would exempt from the scope of a potential tree care operations standard any line-clearance tree trimming covered by the Electric Power Generation, Transmission and Distribution Standard, 29 CFR 1910.269. That standard "covers the operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment," and applies to "[l]ine-clearance tree trimming performed for the purpose of clearing space around electric power generation, transmission, or distribution lines or equipment and on behalf of an organization that operates, or that controls the operating procedures for, those lines or equipment" (§ 1910.269(a)(1)). Unless OSHA adopts this alternative, a rule as outlined in the regulatory framework would apply to line-clearance tree trimming also covered by the Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269).[49]

OSHA's Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269) already contains some protections against certain non-electrical hazards associated with line-clearance tree trimming (see, for example, requirements on brush chippers (§ 1910.269(r)(2)), sprayers and related equipment (§ 1910.269(r)(3)), stump cutters (§ 1910.269(r)(4)), gasoline-engine power saws (§ 1910.269(r)(5)), backpack power units for use in

[49] OSHA's Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269) "applies in addition to all other applicable standards contained in [29 CFR] part 1910," and "[e]mployers covered under [29 CFR 1910.269] are not exempt from complying with other applicable provisions in part 1910 by the operation of §1910.5(c).

pruning and cleaning (§ 1910.269(r)(6)), rope (§ 1910.269(r)(7)), and fall protection (§ 1910.269(r)(8)). However, as OSHA stated, when it revised the Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269) in 2014, "many important safety provisions included in applicable consensus standards [such as ANSI Z133] and in other OSHA standards were not included in § 1910.269" because "OSHA did not incorporate a comprehensive tree-trimming standard in § 1910.269" (79 FR 20316, 20342-20343 (April 11, 2014)). Moreover, OSHA stated, "with respect to the nonelectrical hazards that are regulated in the § 1910.269 tree-trimming provisions, the OSHA standards do not cover those hazards as comprehensively as the current version, or even the 1982 version, of ANSI Z133.1" (*Id.*). Unlike the Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269), a potential tree care operations standard would comprehensively protect employees engaged in line-clearance tree trimming covered by the Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269) against non-electrical hazards associated with tree care operations and would result in decreased injuries and deaths for those employees.

The costs of this alternative of removing employees covered by the Electric Power Generation, Transmission and Distribution Standard (29 CFR 1910.269) are not quantified, but OSHA expects this alternative would reduce costs because fewer employees and jobs would be affected by the requirements of the standard. However, OSHA also believes this alternative would be less protective and leave workers exposed to hazards they would be protected from if they were in the scope of a tree care operations standard.

Alternative 3: Limit the scope of tree care operations by defining "tree"

This alternative would add a definition of "tree" to the potential standard that would exclude some work based on the size of the tree. OSHA could limit trees in the scope of a potential tree care standard by tree height and/or diameter. Some pruning and trimming of small trees can be performed from the ground, which may limit some hazards. However, employees performing tree care operations on small trees may be exposed to hazards that a potential tree care standard could address, such as hazards from using tools and equipment (chainsaws and chippers, for example). The costs of this alternative are not quantified, but OSHA expects this alternative would reduce costs because fewer employees and jobs would be affected by the requirements of the standard.

OSHA welcomes feedback on this regulatory alternative, including whether and how the hazards from tree care operations concerning small trees differ from hazards associated with larger trees, and what minimum tree height and/or diameter might provide an appropriate scope limit under this alternative.

Alternative 4: Exempt the pruning, repairing, or maintaining of a tree when that work is performed entirely from the ground (except for manual felling of a whole tree)

This alternative would exempt the pruning, repairing, or maintaining of a tree when that work is performed entirely from the ground, but would not exempt the manual felling of a whole tree (i.e., the removal of a tree from the ground by the incorporation of a notch and back cut).

OSHA notes that this alternative would also not exempt on-site activities done in support of exempted pruning, repairing, or maintaining of trees (chipping, for example).

This alternative would remove many employees and activities from the scope of the standard—for instance, landscapers who only perform pruning and trimming from the ground, spray technicians who work from the ground to spray trees, and a portion of non-climbing tree care operations performed by tree trimmers (approximately 38 percent of tree jobs) (Julius, 2012; Julius et al., 2014). Although OSHA is including this alternative, OSHA is concerned that it could leave many employees exposed to hazards from falling limbs, electrical hazards, and other hazards that a potential tree care operations standard would likely address. OSHA does not estimate the cost of this alternative, but OSHA expects it would reduce burden and costs by reducing the number of affected employees and jobs that fall under the scope of the standard.

OSHA welcomes feedback on this regulatory alternative.

Alternative 5: Exempt the pruning, repairing, or maintaining of a tree when that work is performed entirely below a certain trigger height (except for manual felling of a whole tree)

This alternative would exempt the pruning, repairing, or maintaining of a tree when that work is performed entirely below a certain trigger height (e.g. four feet), except that, as with Alternative 4, the manual felling of a whole tree would not be exempted. Also as with Alternative 4, this alternative would not exempt on-site activities done in support of exempted pruning, repairing, or maintaining of trees (chipping, for example).

This alternative, like Alternative 4, would remove many employees and activities from the scope of the standard—for instance, landscapers who only perform pruning and trimming from the ground, spray technicians who work from the ground to spray trees, non-climbing tree care operations, and work that only requires climbing below the trigger height. OSHA does not estimate the cost of this alternative, but OSHA expects it would reduce burden and costs by reducing the number of affected employees and jobs that fall under the scope of the standard. As in the previous alternative, OSHA is concerned that this alternative could leave many employees exposed to hazards from falling limbs, electrical hazards, and other hazards that a potential tree care operations standard would likely address. OSHA welcomes feedback on this regulatory alternative.

Employee Qualifications

Alternative 6: Do not require employee qualifications

The potential standard detailed in this PIRFA would require certain tasks to be completed by a worker with a higher degree of expertise (e.g., the job hazard analysis (JHA), conducting a job briefing, meeting with the crane operator to review procedures, etc.). This alternative would remove that potential requirement.

In estimating the costs of a potential tree care operations standard, OSHA did not estimate that the number of tree care jobs would change because of the potential standard. OSHA rather estimated that, under a potential standard, tree care jobs would be both more expensive and performed by (or under the supervision of) tree care professionals with suitable qualifications. OSHA concluded preliminarily that those firms that employed landscapers, but did not employ tree care professionals with suitable qualifications, would not continue performing tree care operations under a potential tree care operations standard.

Eliminating the potential requirement that certain tasks would need to be completed by a worker with a higher degree of expertise would have two effects. First, it would eliminate the $21.3 million in costs associated with potentially requiring suitable qualifications. Second, and perhaps more importantly, it would allow landscapers to continue to do the kind of work they have done in the past, to the extent they found that the other costs of this standard did not make such work unprofitable. Eliminating the potential requirement for employee qualifications would thus save money and allow for greater flexibility.

OSHA emphasizes that, even under this alternative, any firm that chose to perform tree care operations using in-house employees would still have to comply with all the remaining provisions of a potential standard. If these firms only perform occasional tree care work, they might find it more cost-effective to contract the work to a company that regularly does tree care work. Having to comply with all of the remaining provisions of a potential tree care operations standard might induce some landscaping entities or establishments with landscapers who occasionally perform tree care operations to cease performing tree care operations because of the higher costs of compliance.

OSHA has concerns that employees that do not have suitable qualifications could not adequately complete the JHA and other potential requirements in the potential standard (such as the conduct of an adequate job briefing). OSHA therefore believes preliminarily that many of the benefits of a potential standard are contingent on a JHA performed by a suitably qualified person. OSHA welcomes feedback on this and all aspects of this regulatory alternative.

Tree Care Safety and Health Program

These alternatives would alter whether a safety and health program is required, how frequently it must be updated, or what elements the safety and health program must include.

OSHA's potential standard described in the Summary of the Draft Regulation section (see Section IV) would require employers to develop a tree care safety and health program that is specific to the tree care operations performed by the employer, and not a generic health and safety plan. The health and safety program would need to be reviewed annually.

OSHA welcomes feedback on all of these alternatives, including feedback on the importance of safety and health programs and the appropriate frequency for reviewing these programs.

Alternative 7: Do not require a written tree care safety and health program

OSHA believes preliminarily that a safety and health program is integral to reducing tree care operations fatalities and injuries. A clear, written policy helps communicate that safety and health is a primary organizational value. This alternative would completely remove the potential requirement to develop, review, and update a written worker safety and health program, and would thereby reduce the unit cost for a manager to develop the program by $635.14, the unit cost for a manager to review and update the program each year by $79.39, and the unit cost for an employee participant to review and update the program each year by $23.79. OSHA estimates that, under this alternative, annualized costs would be reduced by approximately $0.6 million for all employers engaged in tree care operations (see Table IX-3).

Alternative 8: Require employers to update the written tree care safety and health program every three years instead of annually

OSHA's potential standard would require that employers review and update their safety and health program annually. This alternative would reduce the frequency with which the safety and health program is updated. Instead of updating the safety and health program annually, employers would only be required to update the program every three years. The costs of this alternative are not quantified, but OSHA expects this would reduce costs. (Rather than reviewing the program beginning in Year 2 and continuing throughout the period of analysis, the costs to review and update the program would begin in Year 4 and only be incurred once every three years thereafter, thus reducing the annualized costs.)

Job Hazard Analysis (JHA) and Job Briefing

OSHA's potential standard would require an employee in charge to perform a JHA prior to each tree care operations job and then convey the findings to the rest of the crew working on the job through a job briefing. The alternatives that follow would remove or alter those potential requirements. OSHA welcomes feedback on all of these alternatives, including feedback on the usefulness of the JHA and job briefing.

Alternative 9: Do not require a JHA

This alternative would completely remove the potential requirement for conducting a JHA, which OSHA estimates would reduce the unit cost by $9.48 per job and total annualized costs by approximately $8.1 million (see Table IX-3).

Alternative 10: Do not require JHAs on job sites where there is only one employee

Under this alternative, a JHA would not be required for job sites with only one employee. OSHA believes that employees performing tree care operations rarely work alone, but to the extent this occurs, OSHA expects that costs for employers with employees working alone would be reduced.

Alternative 11: Do not require a job briefing for employees working alone

This alternative would completely remove the potential job briefing requirement for employees working alone. The cost savings under this alternative are not quantified, but to the extent this occurs, OSHA expects that costs for employers with employees working alone would be reduced.

Alternative 12: Do not require employers to account for employees working alone throughout the work shift

As part of the potential standard, OSHA is considering requiring an employer to account for each employee working alone throughout a work shift at regular intervals appropriate to the job, and at the end of the job assignment or end of the work shift, whichever comes first. This alternative would remove that potential requirement. Neither the costs of this potential requirement nor cost savings under this alternative are quantified, but OSHA expects this alternative would reduce costs for employers with employees working alone.

OSHA notes that it has reservations about this alternative, and asks SERs for information about any incidents of which they are aware where an employer found an incapacitated, injured, or deceased worker who was working alone. Please explain in detail the circumstances surrounding any such incidents. What caused the worker's incapacitation, injury, or death? OSHA also seeks feedback about the methods employers use to account for employees working alone, how often employees work alone, and how often during an assignment or shift employers account for employees working alone.

Training

Alternative 13: Do not require the employer to maintain training records

This alternative would remove the potential requirement for employers to maintain employee training records. OSHA has estimated this training record maintenance to take five minutes of manager time per employee, for a unit cost of $6.35 per employee (see Section VI.H). OSHA estimates that removing the training recordkeeping requirement would reduce annualized costs by approximately $0.2 million (see Table IX-3).

Emergency Procedures

The potential standard includes a number of potential requirements related to emergency procedures for workers injured while performing tree care operations, such as first aid, CPR, AED, and aerial rescue requirements. These alternatives would remove or modify the required activities and equipment. OSHA welcomes feedback on all of these alternatives.

Alternative 14: Do not require aerial rescue training

Under this alternative, employers would not need to provide aerial rescue training to any workers, but would still need to address all potential aerial rescue situations by training employees in the correct procedures for emergency response, including 911 calls and other applicable emergency procedures. OSHA has estimated that aerial rescue training would take eight hours (TCIA, 2019a; TCIA, 2019b), would result in a unit labor cost of $240.34 per employee, that the training materials (e.g., a training DVD, manual, and test) would cost $129.99 per employee (TCIA, 2019c), and that under the potential standard one tree trimmer would be trained per establishment. OSHA estimates that removing this requirement would reduce the cost of the potential tree care operations standard by approximately $0.3 million (see Table IX-3). OSHA welcomes feedback on this alternative, including how timely rescue could feasibly be accomplished without employees trained in aerial rescue on site, and whether there are circumstances under which this kind of alternative would be appropriate or inappropriate.

Alternative 15: Do not require aerial rescue training, but instead require that climbers use climbing equipment that allows for rescue from the ground

Under this alternative, OSHA would not require aerial rescue training, but would instead require that climbers working aloft use climbing gear that allows the climber to be lowered by someone on the ground. With this option, employers would be required to train employees on how to lower an incapacitated climber. However, OSHA is not taking additional costs in connection with this training, as these training costs would be incorporated into the training on emergency procedures that is already required by the potential standard. OSHA also preliminarily estimates this kind of climbing system is routinely used in the tree care industry and is similar to, or approximately the same price as climbing systems that can be used to perform rescues. Thus, OSHA estimates that there would not be any incremental equipment cost. OSHA estimates that the removal of the requirement to provide aerial rescue training would reduce annualized costs by the same amount as Alternative 14, approximately $0.3 million (see Table IX-3).

Alternative 16: Require only necessary first aid supplies

Under the potential standard, OSHA is considering requiring employers to provide first aid kits that meet the first aid specifications included in Appendix A of OSHA's Logging operations standard (29 CFR 1910.266). Under this alternative, OSHA would instead permit the employer discretion to stock first aid kits with necessary first aid supplies, and the employer would determine which first aid supplies are necessary based on the work to be performed at the worksite. To estimate this alternative's cost savings, OSHA lowered the estimated unit cost of a first aid kit from $56.75 (the estimated cost of a first aid kit with contents that meet 29 CFR 1910.266 Appendix A (Forestry Suppliers, 2019)) to $30.43 (the estimated cost of a general purpose first aid kit (Grainger, 2019c)). OSHA estimates that this alternative would reduce annualized costs by $10,634 (see Table IX-3).

Alternative 17: Do not require the provision of AEDs

Under the potential standard, OSHA is considering requiring employers to provide at least one portable AED at each worksite where employees are exposed to electrical hazards from overhead power lines or underground utilities. OSHA estimates a cost of $1,658.70 per AED (Grainger, 2019a). This alternative would remove this potential requirement, which OSHA estimates would reduce annualized costs by approximately $1.9 million (see Table IX-3).[50]

Alternative 18: Require one AED per establishment, rather than per crew, with electric hazard exposure

Under this alternative, OSHA would require employers to provide one AED per establishment, rather than per crew, where employees are exposed to electrical hazards. This would not affect the unit cost of $1,658.70 per AED (Grainger, 2019a), but would reduce the number purchased (since there are roughly three times as many crews as establishment). This would reduce annualized costs by approximately $1.4 million (see Table IX-3).

Alternative 19: Require one AED per crew only where workers are engaged in line-clearance tree trimming

Under this alternative, OSHA would require employers to provide one AED per crew, but only where employees are performing line-clearance tree trimming. OSHA estimates that this would affect 100 percent of tree trimmers in NAICS 221121 Electric Bulk Power Transmission and Control and NAICS 221122 Electric Power Distribution, 15 percent of tree trimmers in NAICS 561730 Landscaping Services (TCIA, 2006), and no workers in other NAICS industries. This alternative would reduce costs by approximately $1.6 million (see Table IX-3).

OSHA has concerns about implementing this alternative based on its preliminary estimate that 57 percent of employers have at least some electrical hazard exposure that is not associated with line-clearance tree trimming.

Alternative 20: Phase-in AEDs for each worksite where employees are exposed to electrical hazards from overhead power lines or underground utilities

Under this alternative, OSHA would phase in the potential AED requirement, that employers provide FDA-approved AEDs for each work crew where employees are exposed to electrical hazards from overhead power lines or underground utilities, over a period of time. While OSHA is not currently estimating the cost reduction associated with this alternative, a phase-in alternative would reduce the burden on regulated entities by allowing additional time to provide AEDs where required.

OSHA welcomes feedback on this alternative. If OSHA decides to require AEDs for some or all employers engaged in tree care operations, should the agency include a phase-in for

[50] Under this alternative, employees would also no longer need to be trained to use AED devices; however, OSHA is not reflecting a cost savings for the training in this alternative because the training costs for AEDs are combined with the training costs for first aid and CPR.

some or all employers? What do you think would be a reasonable length of time for a phase-in to best allow you to absorb the cost impact of providing AEDs?

Alternative 21: Phase-in AEDs for each worksite where employees are performing line-clearance tree trimming

Under this alternative, OSHA would phase in the potential AED alternative, that employers provide FDA-approved AEDs for each work crew where employees are performing line-clearance tree trimming. While the agency is not currently estimating the cost reduction associated with this alternative, a phase-in alternative would reduce the burden on regulated entities by allowing additional time to provide AEDs where required.

OSHA welcomes feedback on this alternative. If OSHA decides to require AEDs for some or all employers engaged in tree care operations, should the agency include a phase-in for some or all employers? What do you think would be a reasonable length of time for a phase-in to best allow you to absorb the cost impact of providing AEDs?

Alternative 22: Require fewer employees per job site to have first aid, CPR, and AED training

Under the potential standard, OSHA has estimated costs for all employees engaged in tree care operations to have first aid, CPR, and AED training. This alternative would instead require that fewer employees per worksite have this training. For example, under this alternative, OSHA might require only two employees per worksite to have this training. Alternatively, OSHA might require that two employees per worksite be trained, but only at worksites where an infirmary, clinic, hospital, or physician is not reasonably accessible in terms of distance and/or time; if OSHA promulgated such a requirement, there might be situations where no employees on a worksite had first aid, CPR, or AED training. The costs of this alternative are not quantified, but OSHA expects this would reduce costs because employers would likely be able to train fewer employees. Those cost savings might be somewhat offset, however, by increased time for coordinating job staffing to ensure that the requisite number of workers on every job site would have first aid/CPR/AED training.

Alternative 23: Require that only one member of each crew have first aid, CPR, and AED training, if all new employees are trained in first aid within three months of their hiring dates

This alternative would require that only one member of each crew have first aid, CPR, and AED training, if all new employees are trained in first aid within 3 months of their hiring dates. While the costs of this alternative are not quantified, this alternative would reduce costs to the extent there is a high turnover rate in this industry. OSHA would only include this or a similar requirement in a tree care operations standard if it determined through rulemaking that employers could not feasibly comply with either Alternative 20 or the potential requirements for first aid/CPR/AED training in the potential standard because of high turnover.

Fire Prevention

OSHA's regulatory alternatives for fire prevention would relax the requirements for fire extinguishers and fire extinguisher training. OSHA welcomes feedback on these alternatives.

Alternative 24: Require only one fire extinguisher per crew instead of one per vehicle/piece of mobile equipment

This alternative would require the employer to ensure the availability of one fire extinguisher per crew rather than the requirement in the potential standard of one fire extinguisher per motor vehicle or piece of mobile equipment. Under the potential standard, OSHA estimated the total number of fire extinguishers to be approximately one per employee, four per crew for tree trimmers and landscapers and two per crew for sprayers. By reducing the number of fire extinguishers to one per crew, OSHA estimates this alternative would reduce the unit cost by $158.70 and annualized costs by $63,791 (see Table IX-3).

Alternative 25: Require only two employees per worksite to be trained in the use of fire extinguishers

This alternative would reduce the number of employees required to receive fire extinguisher training. Under the potential standard, all employees would be required to receive this training (which OSHA estimates to take approximately five minutes). Under this alternative, OSHA would require that only two employees per worksite receive this training. The total costs of this alternative are not quantified, but OSHA expects this would reduce costs because employers would be permitted to train fewer employees. Depending on the number of employees trained, OSHA estimates the unit cost would be reduced by between $1.82 to $2.40 per employee, depending on labor category. Those cost savings might be somewhat offset, however, by increased time for coordinating job staffing to ensure that two of the workers on every job site are trained in the use of a fire extinguisher.

Cranes, Knucklebooms, and Related Hoists

Alternative 26: Do not require a written infeasibility/greater hazard assessment prior to hoisting workers using a crane

Under the potential standard discussed in this PIRFA, OSHA estimates that it will take an employee in charge 30 minutes per job to conduct a mandatory written assessment prior to using a crane to hoist a climber. Under this assessment, the employer would be required to show that it is either impossible or infeasible to perform the work otherwise, or that not using the crane presents a greater hazard. This alternative would modify the assessment requirement to no longer require the assessment to be in writing, with the intention of reducing the amount of time this assessment would take to complete. OSHA estimates that this change would potentially reduce the time required to complete the assessment from 30 minutes to 10 minutes, and that this would reduce the unit cost by $12.64 to a per-assessment cost of $6.32. OSHA estimated that for each crew approximately 16.7 percent of crane jobs will involve hoisting a climber using a crane (see Table VI-1). Averaging the assessment cost across all crane jobs, then, results in a unit cost of $1.06 ($6.32 × 16.7 percent) per crane job. This alternative would reduce the annualized costs by approximately $0.3 million (see Table IX-3). OSHA welcomes feedback on this alternative.

Communication Methods

OSHA is considering a provision in this PIRFA that would require employees to employ hands-free, wireless communication methods (e.g. two-way radios). These alternatives would remove or modify this requirement. OSHA welcomes feedback on all of these alternatives.

Alternative 27: Do not require hands-free, wireless communication methods

This alternative would entirely remove the requirement for hands-free, wireless communication methods (e.g. two-way radios). At a cost of $249 for each employee (SENA, 2019), OSHA estimates that removing this requirement would decrease the costs of a potential standard by approximately $0.4 million (see Table IX-3).

Alternative 28: Require hands-free, wireless communication methods only when workers are aloft or during crane operations

This alternative would remove the requirement for hands-free, wireless communication methods (e.g. two-way radios), except during crane operations or when workers are aloft. OSHA estimates a cost of $249 for each tree trimmer and crane operator under the hands-free, wireless communication methods requirement included in this PIRFA (SENA, 2019). The costs of this alternative are not quantified, but OSHA estimates that modifying this requirement would decrease the costs of a potential standard.

Alternative 29: Require hands-free, wireless communication methods only during crane operations

This alternative would require hands-free, wireless communication methods (e.g. two-way radios) only during crane operations. At a cost of $249 for each tree trimmer and crane operator (SENA, 2019), OSHA estimates that modifying this requirement would decrease the costs of a potential standard by approximately $0.1 million (see Table IX-3).

Weather Hazards

Alternative 30: Reduce weather checks from "periodic" to one per job

Under the potential standard described in this PIRFA, OSHA would require periodic weather checks. OSHA has estimated the costs of this requirement based on an assumption that the employee in charge would check the weather twice per job, once as part of the initial JHA, and then once more later in the job. (The actual number of checks would depend on the length of the job.) OSHA has estimated that the first weather check would be included in the 15 minutes for the JHA, and that the second weather check would take 15 seconds, resulting in a unit cost of $0.16 for the second, 15-second check. OSHA estimates that this alternative would reduce the number of weather checks at a worksite from two to one, and that the employer would conduct the one required weather check during the JHA. OSHA estimates this reduction in the number of

weather checks would reduce the annualized costs by approximately $0.1 million (see Table IX-3). OSHA welcomes feedback on this alternative.

Consensus Standards

Alternative 31: Adopt by reference the ANSI Z133 standard

This alternative would adopt by reference the ANSI Standard for Arboricultural Operations – Safety Requirements (ANSI Z133 standard), rather than an OSHA-specific standard. OSHA's potential standard discussed in the Summary of the Draft Regulation section (Section IV) is largely consistent with the ANSI Z133 standard but adds certain provisions, such as potential requirements for: a written tree care safety and health program; a first aid kit that is consistent with Appendix A of OSHA's Logging operations standard (29 CFR 1910.266); the provision of AEDs; using wireless hands-free communication; job briefings for all employees (even those working alone); accounting for employees working alone; and a written infeasibility/greater hazard assessment prior to hoisting employees with cranes. OSHA has not estimated the cost impact of this regulatory alternative, but adopting the ANSI Z133 standard by reference would reduce burden by removing potential requirements and might also reduce rule familiarization costs for employers and employees who are already familiar with the ANSI Z133 standard.

B. Regulatory Options

These options would bring additional industries or processes into the scope of the potential tree care operations standard, or supplement the requirements described in the Summary of Draft Regulation section (Section IV). OSHA is presenting these options to solicit feedback to assist the agency in the decision-making process.

Scope

Regulatory Option 1: Include Fruit and Tree Nut Farming

OSHA is considering whether to include tree care operations under NAICS 1113 Fruit and Tree Nut Farming in the scope of this potential standard. Tree care activities in Fruit and Tree Nut Farming would include pruning, repairing, maintaining or removing trees in fruit orchards (e.g., apple trees) or in nut tree farms (e.g., pecan trees). However, the option would not bring into the scope of a tree care standard fruit or nut farms where the fruit or nut harvested does not grow on a tree (e.g., strawberries or peanuts). OSHA identified few, if any, fatalities and injuries related to tree care operations in the Fruit and Tree Nut Farming industry. Most injuries and fatalities of which OSHA is aware instead result from harvesting fruit and tree nuts from these trees.

The U.S. Department of Agriculture (USDA, 2014) Census of Agriculture reports a total of 93,023 farms in NAICS 1113 Fruit and Tree Nut Farming, of which 39,841 have hired workers. OSHA has estimated that the number of firms and establishments in this NAICS code is

equal to the number of farms with hired workers in this NAICS code, per the 2014 USDA Census (i.e. OSHA has estimated that there are 39,841 firms and establishments in this NAICS code). According to the USDA (2014), these farms employ 657,977 hired workers.

However, since 1976, an appropriations rider has precluded OSHA from expending appropriated funds to "prescribe, issue, administer, or enforce any standard, rule, regulation or order under the Act which is applicable to any person who is engaged in a farming operation which does not maintain a temporary labor camp and employs 10 or fewer [nonfamily] employees." (See, for example, https://www.osha.gov/enforcement/directives/cpl-02-00-051; https://www.osha.gov/dep/enforcement/policy_clarification_small_farms.html). Thus, OSHA has adjusted the estimated number of firms, establishments, and employees affected by this alternative because farms employing 10 or fewer employees should be excluded under the appropriations rider. USDA (2014) includes a break down by revenue size class, but not by employment size class. OSHA, therefore, used the ratio of firms with less than 10 employees to total employees in NAICS code 115114 Postharvest Crop Activities (except Cotton Ginning), where 438 of the total 827 firms (approximately 53 percent) employ fewer than 10 employees, as a proxy measure to estimate that approximately 53 percent of farms (21,101) employ fewer than 10 employees. OSHA thus estimates that 18,740 firms and establishments in NAICS 1113 likely employ more than 10 employees. Similarly, using the ratio of employment at firms with less than 10 employees to employment at all firm in NAICS code 115114 (1,363 ÷ 39,759 = 3.4 percent), OSHA estimates that 22,556 hired workers work on fruit and tree nut farms with fewer than 10 employees (3.4 percent × 657,977), and 635,421 (657,977 - 22,556) hired workers work on fruit and tree nut farms with more than 10 employees.

To estimate tree care operations jobs per year for workers in this industry, OSHA again used data from USDA's (2014) Census of Agriculture, which does not directly estimate the number of "jobs" but does estimate the number of workers working more or less than 150 days per year. According to USDA (2014), 999,596 of 2,736,417 workers worked 150 days or more and 1,736,821 worked less than 150 days. To estimate how many days workers in each category work, OSHA used the midpoint of each range, 0 to 150 days and 150 to 260 days (one year of full-time work), respectively. This results in an estimate of approximately 122 days of work per year.[51] Assuming workers in Fruit and Tree Nut Farming perform jobs that involve tree care operations at rates similar to the rates that OSHA estimated for landscapers (i.e., five percent of the total jobs performed, see discussion in section V.5 of this PIRFA), OSHA has estimated that each worker in this industry would perform six tree care operations jobs per year.

After developing the industry profile described above, OSHA calculated estimated costs using the same methodology outlined in Sections VI and VII of this PIRFA. For labor costs, OSHA uses the fully loaded wage for a farmworker of $19.13 (BLS, 2018; BLS, 2019). Additionally, costs are only taken for provisions likely to affect workers in this industry. For example, OSHA took costs for pruning and trimming using aerial devices, stilts, or orchards

[51] This is calculated by finding the weighted average number of days worked by each group of workers, using the midpoint for each range of days worked, i.e., 99,596 people out of 2,736,417 worked between 150 and 160 days and 1,736,821 people out of 2,736,417 worked between 0 and 150 days. Mathematically, it is calculated as ((999,596 ÷ 2,736,417) × ((150 + 260) ÷ 2) + ((1,736,821 ÷ 2,736,417) × (0 + 150) ÷ 2))) = 122.

ladders for all workers in this industry. As another example, OSHA did not take costs for the use of cranes during tree care operations for any workers in this industry.

Costs are also not taken for safe tree removal practices, including safe tree climbing, for the majority of workers in this industry based on the belief that trees in orchards are generally kept at a low height and removed using mechanical means. Costs are only taken for safe tree removal practices on tree nut farms, based on the assumption that these farms may have some taller trees. Tree nut farms employ 134,903 of 644,789 total orchard workers[52] (20.9 percent, differences attributable to rounding) (USDA, 2015). OSHA estimates that one of the six tree care operations performed by a crew of in-scope workers on a tree nut farm (i.e., workers on a tree nut farm with more than 10 employees) would involve safe tree removal practices, including safe tree climbing, that there are 132,943 in-scope workers on tree nut farms ((134,903/644,789) x 635,421), and that each in-scope worker on tree nut farms would spend an extra five minutes per worker per year performing tree removals in a safe manner.

Based on the above assumptions, OSHA estimates that this regulatory option would increase annualized costs by approximately $109.8 million to a total of approximately $215.5 million (see Table IX-3).

OSHA welcomes input from the SERs on whether or not farmworkers in Fruit and Tree Nut Farming should be included in this potential standard.

Regulatory Option 2: Include work tasks using chippers, stump grinders, chainsaws, and backpack power units, regardless of whether the employer is pruning, repairing, maintaining, or removing trees (tree care) or performing on-site activities done in support of tree care

OSHA seeks input on the option of applying a tree care operations rule to the use of certain equipment and tools traditionally used in tree care operations, regardless of whether the equipment and tools are used in pruning, repairing, maintaining, or removing trees (tree care) or in on-site activities done in support of tree care. This option would extend coverage to any and all uses of chippers, stump grinders, chainsaws, and backpack power units. OSHA believes the hazards associated with using these types of equipment and tools still exist regardless of the purpose for which the tools and equipment are used.

OSHA has not estimated the cost impact of this regulatory option, but it would increase the number and type of entities potentially covered. The agency believes this option would bring additional landscapers, construction site preparation, brush clearance, and, in all probability, other industries and types of work under the scope of a tree care standard. If OSHA were to expand the scope to include this type of provision, all provisions in this potential tree care operations standard would also apply whenever chippers, stump grinders, chainsaws, or backpack power units are used. Therefore, for example, an employer who uses a chipper would also be required to perform a JHA, maintain a tree care operations safety and health program, provide job briefings, and follow all other potential provisions.

[52] The data by NAICS used to estimate affected farms and employment previously does not align exactly with the employment in orchards by type of orchard used to estimate the share of workers at tree nut farms.

OSHA welcomes feedback on this regulatory option. Should employers who are using these types of equipment and tools be subject to any or all provisions of this standard if they are using such equipment outside of a tree care operation? Should this type of provision include any other equipment? Should there be any limitations to the types of work that would be covered? For example, OSHA notes that, while chippers are typically only used to process wood or other organic materials, chainsaws are widely used. To account for the wide use of chainsaws (and perhaps other tools and equipment listed), OSHA could limit coverage under this scope provision to any and all uses of chippers, stump grinders, chainsaws, and backpack power units, but only where these types of tools and equipment are used on, with, or to process, trees, plants, plantings (e.g., shrubs, bushes), or tree, plant, or planting parts, in any form (e.g., living, rotting, dead), either still connected or no longer connected to the whole (e.g., limbs and branches (fallen or not), roots and stumps (uprooted or not), trunks and logs). Would such a scope provision limit coverage of the standard appropriately? OSHA requests comment on what limitations, if any, might be appropriate for work using each of these types of equipment and tools.

Regulatory Option 3: Include brush clearance in the scope of the potential standard

OSHA is considering an option that would expand the scope of coverage for a potential tree care rule by re-defining tree care operations to include:

- the pruning, repairing, maintaining, or removing of trees (tree care);
- brush clearance; and
- any on-site activities done in support of tree care or brush clearance.

OSHA believes that employees who perform brush clearance are exposed to many of the same hazards as employees performing tree care operations as currently defined in the Summary of Draft Regulation section. Expanding the scope of the potential standard to cover employees performing brush clearance would offer additional protections to workers clearing brush.

OSHA has not estimated the cost impact of this regulatory option, but it would increase the number and type of entities potentially covered. OSHA recognizes that many tree care employers also provide brush clearance services. This option would also likely affect the scope of construction site preparation covered by a potential standard and bring additional landscapers under the scope of a tree care operations rule.

Much of the equipment used to clear brush is also used in tree trimming or tree removal, such as chippers, stump grinders, portable power tools, hand tools, and PPE. If OSHA included brush clearance, these provisions would likely apply to brush clearance activities. Other generally-applicable provisions, such as the JHA, job briefing, and training requirements, would also apply. However, because brush clearance is performed on the ground, OSHA expects brush clearance workers would be unlikely to perform work falling under potential provisions addressing aerial device, crane, fall, and other above-the-ground hazards.

OSHA notes that if it included brush clearance in the scope, the agency would also likely consider including additional provisions for rotary mowers (i.e., brush hogs) and similar equipment commonly used in brush clearance.

OSHA seeks input on whether it should include brush clearance in the scope of this potential standard.

Emergency Procedures

Regulatory Option 4: Require aerial rescue training for all workers on crews where someone works aloft or while climbing is taking place

Under the potential standard, employers would need to train workers that could be faced with a rescue decision in emergency response and rescue procedures appropriate and applicable to the work to be performed. Thus, under a potential standard, at least one employee on the ground would need to be trained in aerial rescue procedures where someone works aloft or while climbing is taking place. This option would instead require employers engaged in tree care operations to train all on-site employees in aerial rescue procedures on jobsites where someone works aloft or while climbing is taking place. Under this option, OSHA calculates costs for all employees to be trained, to better ensure that there is always at least one trained employee on the ground at each job site where someone works aloft or while tree climbing is taking place. OSHA estimates that an aerial rescue training would cost $240.34 per employee plus $129.99 per employee for training materials ($370.33 in total) (TCIA, 2019c). In the aggregate, OSHA estimates that this option would increase annualized costs by approximately $0.9 million (see Table IX-3). OSHA welcomes feedback on this option.

Regulatory Option 5: Require rescue equipment

Under this option, employers would be required to purchase rescue equipment and have this equipment readily available at each worksite. The U.S. Forest Service National Tree Climbing Guide (2015) recommends the following items be included in a rescue pack:

- Flashlight and extra batteries;
- Roll of brightly colored flagging;
- Waterproof matches;
- Two blankets sealed in plastic for treating shock or for splinting;
- Long and short splints (in addition to those that may be in the first-aid kit);
- Eye wash or a bottle of sterile water to wash out the eyes (in addition to materials that may be in the first-aid kit);
- Two pulleys (minimum);
- Four approved carabiners (minimum);
- Several 10- to 12-foot lengths of webbing or rope, plus 50 feet of 1-inch tubular webbing or rope;
- Heavy-duty metal shears, bolt cutters, or a small hacksaw for cutting jammed carabiners or steel-core lanyards; and

- A rope suitable for rescue, if such a rope is not included with basic climbing equipment.

A number of these items may not be necessary for a rescue pack for climbers working in urban or suburban areas, as opposed to isolated areas. OSHA estimates a rescue kit for tree care operations could either be purchased pre-assembled or assembled by the employer for a unit cost of $2,522 per crew, based on available rope rescue kits sold for technical rescue (The Fire Store, 2019). OSHA estimates that this option would increase annualized costs by $0.7 million (see Table IX-3). OSHA welcomes feedback on this option.

Regulatory Option 6: Require AEDs at all worksites

OSHA is considering an option that would require an AED at each worksite, even when there is no worker exposure to electrical hazards from overhead power lines or underground utilities. OSHA believes preliminarily that 72 percent of all employers have performed tree care operations near electrical hazards from overhead power lines or underground utilities (TCIA, 2006). Under this alternative, all employers would be required to provide AEDs at each worksite. OSHA estimates that this option would increase costs by $0.7 million.

OSHA seeks input on the safety benefits of requiring AEDs at all worksites, even when there is no worker exposure to electrical hazards from overhead power lines or underground utilities.

Regulatory Option 7: Phase-in AEDs at all worksites

Under this option, OSHA would phase-in over a period of time the requirement that employers provide FDA-approved AEDs for each work crew regardless of employee exposure to electrical hazards. While this option would be an increased burden from the potential AED requirement presented in the regulatory framework, it would nonetheless reduce the burden of requiring AEDs under regulatory option 6.

At this time, OSHA has not estimated the additional costs associated with this regulatory option.OSHA welcomes feedback on this option. If OSHA decides to require AEDs for some or all employers engaged in tree care operations, should the agency include a phase-in for some or all employers? What do you think would be a reasonable length of time for a phase-in to best allow you to absorb the cost impact of providing AEDs?

Summary

Table IX-2 summarizes the unit costs of the regulatory alternatives quantified above.

Table IX-2. Change in Unit Costs under Alternatives and Regulatory Options [a]

Item	Rule	Alternative	Difference
A 7. Eliminate the written tree care safety and health program			
Develop Written Tree Care Safety and Health Program	$635.14	$0.00	-$635.14
Review & Update Program - Manager	$79.39	$0.00	-$79.39
Review & Update Program - Employee Participant	$23.79	$0.00	-$23.79

Table IX-2. Change in Unit Costs under Alternatives and Regulatory Options [a]

Item	Rule	Alternative	Difference
A 9. Do not require a JHA			
Job hazard analysis	$9.48	$0.00	-$9.48
A 13. Eliminate the requirement for the employer to maintain training records			
Training Recordkeeping	$6.35	$0.00	-$6.35
A 14. Eliminate the aerial rescue training requirement			
Rescue training course	$240.34	$0.00	-$240.34
Rescue training materials	$129.99	$0.00	-$129.99
A 15. Eliminate the aerial rescue training requirement, and instead require that climbers use climbing equipment that allows for rescue from the ground			
Rescue training course	$240.34	$0.00	-$240.34
Rescue training materials	$129.99	$0.00	-$129.99
A 16. Require "appropriate" first aid kit			
First aid kit	$56.75	$30.43	-$26.32
A 17. Eliminate the requirement to provide AEDs			
AED (per employee)	$414.68	$0.00	-$414.68
A 18. Require one AED per establishment, rather than per crew, with electric hazard exposure			
AED (per employee under rule, per establishment under alternative)	$414.68	$414.68	$0.00
A 19. Require one AED per crew only where workers are engaged in line-clearance tree trimming			
AED (per employee)	$414.68	$414.68	$0.00
A 24. Require one fire extinguisher per crew instead of one per vehicle/piece of mobile equipment			
Fire extinguisher cost per crew	$211.60	$52.90	-$158.70
A 26. Do not require the assessment prior to hoisting workers using a crane to be written			
Assessment time	$18.96	$6.32	-$12.64
A 27. Eliminate the requirement for hands-free wireless communication methods			
Hands-Free Wireless Radio - Tree Trimmers	$249.00	$0.00	-$249.00
Hands-Free Wireless Radio - Landscapers	$249.00	$0.00	-$249.00
Hands-Free Wireless Radio - Spray Technicians	$249.00	$0.00	-$249.00
Hands-Free Wireless Radio - Crane Operators	$249.00	$0.00	-$249.00
A 28. Only require hands-free wireless communication methods during crane operations			
Hands-Free Wireless Radio - Tree Trimmers	$249.00	$249.00	$0.00
Hands-Free Wireless Radio - Landscapers	$249.00	$0.00	-$249.00
Hands-Free Wireless Radio - Spray Technicians	$249.00	$0.00	-$249.00
Hands-Free Wireless Radio - Crane Operators	$249.00	$249.00	$0.00
A 30. Reduce weather checks from "periodic" to one per job			
Checks per day	$0.16	$0.00	-$0.16
RO 4. Require aerial rescue training for all workers on crews where someone works aloft			
Rescue training course & materials	$370.33	$370.33	$0.00
RO 5. Require rescue equipment			
Rescue equipment kit	$0.00	$2,522.00	$2,522.00
Rescue equipment kit (per employee)	$0.00	$630.50	$630.50
RO 6. Require AEDs for each crew, regardless of electric hazard exposure			
AEDs per crew	$414.68	$414.68	$0.00

Source: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

Note:

[a] Unit costs shown only where OSHA has estimated cost savings in non-scope Alternatives or burdens in non-scope Regulatory Options.

Table IX-3 summarizes the change in the industry profile and annualized costs under each regulatory option and alternative.

Table IX-3. Alternatives and Regulatory Options

Number	Description	Affected Firms	Affected Est.	Affected Employees	Annualized Cost (3%)	Difference from the Potential Standard			
						Affected Firms	Affected Est.	Affected Employees	Annualized Cost (3%)
Potential Standard									
Standard	Potential Standard as written	50,126	53,136	352,231	$105,671,896	0	0	0	$0
Alternatives (Burden-Reducing)									
A 1	Exclude Spray Technicians from tree care operations standard	47,388	50,347	342,511	$103,844,648	-2,738	-2,789	-9,720	-$1,827,248
A 2	Exclude Line-Clearance Tree Trimming Covered by the Electric Power Generation, Transmission, and Distribution Standard, 29 CFR 1910.269, from tree care operations standard	NE	NE	NE	NE	NE	NE	NE	NE
A 3	Limit the scope of tree care operations by defining “tree”	NE	NE	NE	NE	NE	NE	NE	NE
A 4	Exempt tree care operations performed from the ground (except for manual felling of a whole tree)	NE	NE	NE	NE	NE	NE	NE	NE
A 5	Exempt tree care operations performed below a certain height	NE	NE	NE	NE	NE	NE	NE	NE
A 6	Eliminate the employee qualifications requirement	NE	NE	NE	NE	NE	NE	NE	NE
A 7	Eliminate the written tree care safety and health program	50,126	53,136	352,231	$105,096,906	0	0	0	-$574,989
A 8	Require employers to update written tree care safety and health program every three years instead of annually	50,126	53,136	352,231	NE	0	0	0	NE
A 9	Do not require a JHA	50,126	53,136	352,231	$97,562,020	0	0	0	-$8,109,876
A 10	Do not require JHAs on job sites where there is one employee	50,126	53,136	352,231	NE	0	0	0	NE
A 11	Do not require a job briefing for employees working alone	50,126	53,136	352,231	NE	0	0	0	NE
A 12	Do not require employers to account for employees working alone throughout the work shift	50,126	53,136	352,231	NE	0	0	0	NE
A 13	Eliminate the requirement for the employer to maintain training records	50,126	53,136	352,231	$105,515,697	0	0	0	-$156,199
A 14	Do not require aerial rescue training	50,126	53,136	352,231	$105,372,224	0	0	0	-$299,672
A 15	Eliminate the aerial rescue training requirement, but instead require that climbers use climbing equipment that allows for rescue from the ground	50,126	53,136	352,231	$105,372,224	0	0	0	-$299,672
A 16	Require “appropriate” first aid kit	50,126	53,136	352,231	$105,661,262	0	0	0	-$10,634
A 17	Eliminate the requirement to provide AEDs	50,126	53,136	352,231	$103,779,769	0	0	0	-$1,892,127
A 18	Require one AED per establishment with electric hazard exposure, rather than per crew	50,126	53,136	352,231	$104,232,940	0	0	0	-$1,438,956
A 19	Require one AED per crew only where workers are engaged in line-clearance tree trimming	50,126	53,136	352,231	$104,090,719	0	0	0	-$1,619,048

Table IX-3. Alternatives and Regulatory Options

Number	Description	Affected Firms	Affected Est.	Affected Employees	Annualized Cost (3%)	Difference from the Potential Standard			
						Affected Firms	Affected Est.	Affected Employees	Annualized Cost (3%)
A 20	Phase-in AEDs for each worksite where employees are exposed to electrical hazards from overhead power lines or underground utilities	50,126	53,136	352,231	NE	0	0	0	NE
A 21	Phase-in AEDs for each worksite where employees are performing line-clearance tree trimming	50,126	53,136	352,231	NE	0	0	0	NE
A 22	Require fewer employees per job site to have first aid, CPR, and AED training	50,126	53,136	352,231	NE	0	0	0	NE
A 23	Require all employees to be trained in first aid, CPR, and AEDs within three months of hiring	50,126	53,136	352,231	NE	0	0	0	NE
A 24	Require one fire extinguisher per crew instead of one per vehicle/piece of mobile equipment	50,126	53,136	352,231	$105,608,104	0	0	0	-$63,791
A 25	Only require two employees per worksite to be trained in the use of fire extinguishers	50,126	53,136	352,231	NE	0	0	0	NE
A 26	Do not require the assessment prior to hoisting workers using a crane to be written	50,126	53,136	352,231	$105,395,097	0	0	0	-$276,799
A 27	Eliminate the requirement for hands-free wireless communication methods	50,126	53,136	352,231	$105,269,497	0	0	0	-$402,398
A 28	Only require hands-free wireless communication methods when workers are aloft or during crane operations	50,126	53,136	352,231	NE	0	0	0	NE
A 29	Only require hands-free wireless communication methods during crane operations	50,126	53,136	352,231	$105,565,444	0	0	0	-$106,451
A 30	Reduce weather checks from “periodic” to one per job	50,126	53,136	352,231	$105,537,091	0	0	0	-$134,805
A 31	Adopt by reference the ANSI Z133 standard	50,126	53,136	352,231	NE	0	0	0	NE
Regulatory Options (Burden-Increasing)									
RO 1	Include Fruit and Tree Nut Farming	68,866	71,876	987,652	$215,485,687	18,740	18,740	635,421	$109,813,791
RO 2	Include operations using chippers, stump grinders, chainsaws, and backpack power units, regardless of whether the employer is performing tree care operations	NE	NE	NE	NE	NE	NE	NE	NE
RO 3	Include brush clearance in the scope of the potential standard	NE	NE	NE	NE	NE	NE	NE	NE
RO 4	Require aerial rescue training for all workers on crews where someone works aloft	50,126	53,136	352,231	$106,570,911	0	0	0	$899,015
RO 5	Require rescue equipment	50,126	53,136	352,231	$106,416,097	0	0	0	$744,201
RO 6	Require AEDs for each crew, regardless of electric hazard exposure	50,126	53,136	352,231	$106,460,323	0	0	0	$788,427
RO 7	Phase-in AED requirements for all establishments	50,126	53,136	352,231	NE	0	0	0	NE

Note: "NE" indicates changes in profile and/or costs are not estimated.

Source: US DOL, OSHA, Directorate of Standards and Guidance, Office of Regulatory Analysis.

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