NORTH CAROLINA DEPARTMENT OF LABOR
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

Chapter 7	CFR Revision 136
Subchapter 7F	CFR II

Field Information System

Logging
Subpart R, 29 CFR 1910.266, 1910.269(r)(5) General Industry
Subpart B, 29 CFR 1928, Agriculture
Final Rule

DISCUSSION:

On October 12, 1994, Federal OSHA issued a new rule addressing the logging industry. The federal effective date for the standard and accompanying amendments was February 9, 1995. On February 8, 1995, Federal OSHA issued a notice of stay of enforcement of certain sections of 1910.266. The sections delayed for six months are as follows:

- (d)(1)(v) insofar as it relates to requiring foot protection to be chainsaw resistant
- (d)(1)(vii) insofar as it requires face protection
- (d)(2)(iii) for first-aid kits that contain all the items listed in Appendix A
- (f)(2)(iv)
- (f)(2)(xi)
- (f)(3)(ii)
- (f)(3)(vii)
- (f)(3)(vii);
- (f)(7)(ii) as it requires that parking brakes be able to stop the machine;
- (g)(1) and (g)(2) as they require inspection and maintenance of employee-owned vehicles;
- and(h)(2)(vii) insofar as it precludes backcuts at the level of the horizontal cut of the undercut when the Humboldt cutting method is used.

This delay is stated in the Federal Register as necessary to allow time for Federal OSHA "to clarify language in the regulatory text so that it most adequately expresses its intent with respect to some of these provisions, and to provide additional information on other provisions."

ACTION:

This final rule at 29 CFR 19 10 and 29 CFR 1928 was adopted verbatim in North Carolina by the Commissioner of Labor with an effective date of April 1, 1995. However, until further notice OSHNC will not enforce any of the above enumerated subsections until August 9, 1995. OSHNC and the NC Forestry Association are meeting to discuss possible amendments to the Logging standard to make it meet the needs of North Carolina.

Copies of the regulatory text from the original Federal Register announcement (Vol. 59, No. 196) and the federal OSHA Notice of Stay (Vol. 60, No. 26) are attached. A copy of the regulatory text from the NC Administrative Code is also attached.

Please file this NC CFR Revision in CFR II of your Field Information System.

Date: 3/17/1995

Charles N. Jeffress, Director
Division Of Occupational Safety and Health
(Signed on Original)

Filing Date: February 23, 1995
NC Effective Date: April 1, 1995
Numbers: 13 NCAC 7F.0101 and 13 NCAC 7F.0301

- **Information Date:** 10/12/1994
- **Federal Register #:** 59:51672-51748
- **Standard Number:** 1910;1928
- **Type:** Final
- **Agency:** OSHA
- **Subject:** Logging Operations
- **CFR Title:** 29
- **Abstract:** The Occupational Safety and Health Administration (OSHA) is issuing a final standard specifying safety requirements covering all logging operations, regardless of the end use of the forest products (saw logs, veneer bolts, pulpwood, chips, etc.). This standard replaces the existing standard at 29 CFR 1910.266, that had applied only to pulpwood logging, and thereby expands coverage to provide protection for all employees engaged in logging operations. The final standard addresses the unique hazards found in logging operations, and supplements other general industry standards in 29 CFR part 1910. The final standard strengthens and further clarifies some provisions of the existing standard, and eliminates unnecessary provisions. The revised standard also requires training for all employees in this high risk industry. OSHA believes this standard will significantly decrease the number of employees killed or injured in this industry.

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910 and 1928

[Docket No. S-048]

Logging Operations

AGENCY: Occupational Safety and Health Administration, Labor.

ACTION: Final rule.

SUMMARY: The Occupational Safety and Health Administration (OSHA) is issuing a final standard specifying safety requirements covering all logging operations, regardless of the end use of the forest products (saw logs, veneer bolts, pulpwood, chips, etc.). This standard

replaces the existing standard at 29 CFR 1910.266, that had applied only to pulpwood logging, and thereby expands coverage to provide protection for all employees engaged in logging operations. The final standard addresses the unique hazards found in logging operations, and supplements other general industry standards in 29 CFR part 1910. The final standard strengthens and further clarifies some provisions of the existing standard, and eliminates unnecessary provisions. The revised standard also requires training for all employees in this high risk industry. OSHA believes this standard will significantly decrease the number of employees killed or injured in this industry.

DATES: This final standard is effective on February 9, 1995. Employers must be in compliance with all requirements of the final standard by the effective date. The incorporation by reference of certain publications listed in the standard is approved by the Director of the **Federal Register** as of February 9, 1995.

ADDRESSES: Send petitions for review of the standard to the Associate Solicitor for Occupational Safety and Health, Office of the Solicitor, Room S-4004, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210.

For additional copies of this standard contact U.S. Department of Labor, Occupational Safety and Health Administration, Office of Publications, Room N-3101, 200 Constitution Avenue, NW., Washington, DC 20210, (202) 219-9667.

FOR FURTHER INFORMATION CONTACT: Anne Cyr, Office of Information and Consumer Affairs, Occupational Safety and Health Administration, Room N-3637, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210, (202) 219-8148.

SUPPLEMENTARY INFORMATION:

Table of Contents

References to the rulemaking record are provided in the text of the preamble. References are identified as "Ex." followed by a number to designate the reference in the rulemaking docket. For example, "Ex. 1" means exhibit one in the Docket S-048. Exhibit 1 is a copy of the Notice of Proposed Rulemaking for Logging Operations that was published in the **Federal Register** on May 2, 1989 (54 FR 18798).

References to the transcripts of the public hearings are given as "Tr." followed by the location and page. The July 24, 1990, Washington, D.C., hearing transcript is identified as "W1." The

July 25, 1990, Washington, D.C., hearing transcript is identified as "W2." The Oregon hearing transcript is designated as "OR."

A list of exhibits, copies of the exhibits and copies of the transcripts are available in the OSHA Docket Office, Room N-2625, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210, (202)-219-7894.

I. Introduction

The Occupational Safety and Health Administration (OSHA) is issuing a final standard detailing safety requirements for logging operations, regardless of the end use of the forest products (saw logs, veneer bolts, pulpwood, chips, etc.). Logging consists of felling trees (usually by chain saws), removing the limbs and branches (limbing), and cutting or splitting the trees into manageable logs (bucking). Trees and logs are then moved (yarding) to central locations (landings) by one of several methods (e.g., skidding or forwarding). In relatively flat terrain, logs are hooked to a tractor and dragged to the landing. When terrain is very steep or rough, logs may be transported by steel cables attached to a winching apparatus (cable yarder) via a system of cables, blocks, pulleys, and carriages (cable yarding). Then logs are partially suspended and dragged over the ground (high-lead yarding) or hoisted into the air and conveyed on overhead cables (sky-line yarding) to the landing. At the landing, logs are mechanically loaded onto trucks, railroad cars or barges for transport to sawmills. In some cases logs are formed into log rafts for transport by water to sawmills. Logging operations require employees to work in all types of weather, on all types of terrain and in isolated, remote locations. (Logging operations and regional characteristics are discussed in greater detail in the profile of the logging industry in the Regulatory Impact Analysis.)

II. Regulatory History

OSHA's existing pulpwood standard was adopted pursuant to Section 6(a) of the Occupational Safety and Health Act of 1970 (the OSH Act) (29 U.S.C. 655(a)). Section 6(a) permitted OSHA, within two years of the enactment of the OSH Act, to promulgate as OSHA standards any existing national consensus standard or established Federal standard. At that time, the only national consensus standard covering logging operations was the American National Standards Institute standard that was limited to pulpwood logging (ANSI O3.1-1971, Pulpwood Logging Safety Standard) (Ex 2-13). OSHA's pulpwood standard has remained virtually unchanged since it was first adopted.

After OSHA adopted the ANSI pulpwood logging standard, trade associations with interests in the logging of other forest products, such as sawlogs and veneer bolts, joined with ANSI to revise the pulpwood logging standard to include all logging operations within the United States. The expanded ANSI standard was approved May 19, 1977 (ANSI 03.1-1978, Safety Requirements for Logging) (hereafter "1978 ANSI logging standard") (Ex. 2-14). That standard adopted most of the safety practices contained in the earlier standard, applying them to all logging operations throughout the nation.

The 1978 ANSI logging standard, however, was withdrawn by ANSI in 1984 because no final action was taken to revise or reaffirm it. Since ANSI procedures require that action be taken to reaffirm, revise, or withdraw a standard no later than five years after the date of its publication, the 1978 ANSI logging standard was withdrawn by default. Currently there is no national consensus standard covering logging operations.

In July 1976, the National Institute for Occupational Safety and Health (NIOSH), published a criteria document, Recommendations For An Occupational Standard For Logging From Felling To First Haul that was applicable to all logging operations (Ex. 4-3). The NIOSH document addressed the hazards and safe work practices involved in felling, bucking, limbing, yarding and loading operations.

The NIOSH criteria document differed from OSHA's pulpwood logging standard in several ways:

(a) The criteria document included all logging operations such as those relating to sawlogs, veneer bolts, poles and pilings rather than being limited only to pulpwood operations;

(b) It included training requirements for employees;

(c) It did not include provisions dealing with equipment protective devices, personnel transport, off-highway truck transport, chipping operations, or the construction and maintenance of roads, trails, and bridges; and

(d) It recommended pre-placement and periodic medical examinations. This final standard for logging operations, as did OSHA's proposed rule, adopts many of the recommendations of the NIOSH criteria document, including expansion of coverage to all logging operations, emphasis on safe work practices and training, and elimination of provisions not unique to logging operations, such as that involving construction of roads and bridges.

Six states have promulgated standards covering logging operations under the OSH Act State plan procedure set forth in section 18 of the OSH Act (29 U.S.C. Sec. 667) and in OSHA regulations (29 CFR Part 1902), which requires State plan States to adopt standards which are at least as effective as those promulgated under section 6 of the OSH Act. 29 CFR 1902.03(c). These States, Alaska (Ex. 2-17), California (Ex. 2-18), Hawaii (Ex. 2-19), Michigan (Ex. 2-20), Oregon (Ex. 2-21) and Washington (Ex. 2-22), have adopted standards which provide more protection than OSHA's pulpwood logging standard by covering all logging operations within their States. The standards of the five western states also contain a much higher level of detail and specification than either the 1978 ANSI logging standard or OSHA's pulpwood logging standard. OSHA used these standards as source documents during development of this final standard.

On May 2, 1989, OSHA published a notice of proposed rulemaking (NPRM) to amend OSHA's pulpwood logging standard, 29 CFR 1910.266, to include requirements for all logging operations (54 FR 18798). Thereafter, on May 11, 1990, OSHA published a notice of

hearing in which 10 issues were raised for additional comment (55 FR 19745). There were 92 comments submitted in response to the proposed rule and hearing notice.

Informal public hearings were held on July 24-25, 1990, in Washington, D.C., and on August 21-23, 1990, in Portland, OR, to allow interested persons who had objections to the proposed rule to have an opportunity to state those objections. There were 23 companies, organizations, associations and individuals who participated in the hearings.

At the close of the hearing Administrative Law Judge John M. Vittone established a 60-day post hearing comment period, until October 22, 1990, for the submission of additional information and data supplementing the testimony provided at the hearing. The post-hearing comment period was followed by another 30 days, until November 21, 1990, for hearing participants to submit final briefs, analyses and summations. OSHA received 12 comments during the post-hearing comment period.

OSHA has considered all evidence, comments and testimony entered into the rulemaking record and presented at the public hearing in developing this final standard.

II. Basis for Agency Action

A. Hazards

The safety hazards present in the logging industry are well-known,(1) and there is no dispute among participants in this rulemaking that logging is a high hazard industry (Ex. 2-1 through 2-10, 2-30, 5-18, 38B, 38C). The tools and equipment which logging employees use or operate, such as chain saws, axes and tractors, pose hazards wherever they are utilized in industry. As logging employees use their tools and equipment, they are dealing with massive weights and irresistible momentum of falling, rolling, and sliding trees and logs. The hazards are even more acute when dangerous environmental conditions are factored in, such as uneven, unstable or rough terrain; inclement weather including rain, snow, lightning, winds, and extreme cold; remote and isolated work sites where health care facilities are not immediately accessible. The combination of these hazards present a significant risk to employees working in logging operations throughout the country, regardless of the type of timber being logged, where it is logged or the end use of the wood.

Footnote(1) The National Institute for Occupational Safety and Health has identified a number of health hazards that are also present in the logging industry (Ex. 5-42). According to NIOSH, 20 to 50 percent of employees in felling operations may be affected by hand-arm vibration syndrome. Logging employees are also exposed to chain-saw exhaust, wood dust, tree fungi and bacteria. However, NIOSH has said that at this time there is insufficient data to project the magnitude of risk for some of these potential health hazards. The final rule on logging addresses health hazards, but only in certain specific ways (e.g., safety and health meetings). However, for those health hazards not specifically addressed in the logging final rule, other sections of Part 1910 apply. For example, occupational noise exposure is addressed

by 29 CFR 1910.95. A permissible exposure limit for occupational exposure to wood dust is contained in 29 CFR 1910.1000. OSHA notes that hand-arm vibration, manual lifting and other risk factors associated with musculoskeletal disorders are being addressed in OSHA's rulemaking on ergonomic safety and health management.

There is also no dispute that these hazards and the resulting injuries and fatalities are severe and are not limited to the pulpwood sector of the industry (Ex. 2-1, 5-6, 5-10, 5-17, 5-18, 5-21, 5-36, 5-42, 5-46, 5-48, 5-49, 5-54, 5-61, 5-65). The 1992 Census of Fatal Occupational Injuries, a public report compiled by the Bureau of Labor Statistics (BLS), indicated there were 158 fatalities in the logging industry, which amounts to a 2 in 1,000 risk of death each year. The National Institute for Occupational Safety and Health (NIOSH) estimates that there are 16,500 compensable injuries each year in the logging industry (Ex. 37). This amounts to an incidence rate of 1 in every 5 loggers. According to the U.S. Department of Agriculture (USDA), the accident rate in the logging industry has pushed workers' compensation insurance to 40 percent of payroll costs (Ex. 5-18). The USDA estimates that this now amounts to $90 million annually in the Pacific Northwest Region alone. According to a study conducted by the Bureau of Labor Statistics (BLS), as least 47 percent of all injuries reported occurred in non-pulpwood logging operations (Ex. 2-1).

The following discussion of the accident and injury data shows that injury incidence rate for the logging industry is among the highest industry incidence rates in the country.

B. Accident, Injury, and Other Data

OSHA looked at several data sources to identify and characterize the degree of risk faced by employees in the logging industry. The data show that the logging industry has one of the highest injury incidence rates. For example, the most recent injury incidence rate for the logging industry (15.6) compiled by the BLS is almost double the incidence rate for the combined private sector (7.9). The logging incidence rate was also well above the incidence rate for the manufacturing sector (11.2).

To assess the level of risk in logging operations, OSHA relied primarily on the following data sources. These data sources are described and discussed below.

1. Bureau of Labor Statistics. The Bureau of Labor Statistics (BLS) publishes annual reports that list the estimates of injuries in the private sector during the year under consideration, Occupational Injuries and Illnesses in the United States by Industry (Ex. 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-30, 38B and 38C). The data and information are broken down industry by industry according to Standard Industrial Classification (SIC) codes. The BLS injury reports and data are generated from inquiries to selected employers about the OSHA Form 200 (Log and Summary of Occupational Injuries and Illnesses).

Table 1 shows BLS occupational injury incidence data for the logging industry for 1972 through 1991. The data in Table 1 were derived from the BLS data using SIC code 241 (Logging Camps and Logging Contractors). While this classification covers the majority of the employees engaging in logging operations, it does not cover loggers employed by mills

(SIC 242-Sawmills and Planing Mills) and other loggers working for other miscellaneous employers (SIC 24-Lumber and Wood Products, Except Furniture). Although the incidence rates for SIC 242 and 24 are very close to the rates for SIC 241, OSHA did not include incidence rates for those SIC codes in its determination of incidence rates for logging because BLS does not provide incidence rates for occupational categories within a SIC code. As such, OSHA was not able to identify and segregate out the percentage of accidents which occurred while employees were performing logging as opposed to other operations in those related industries. OSHA is aware that there has been a move on the part of some mill owners to increasingly use private contractors rather than mill employees to harvest the trees that the mills process. OSHA believes, however, that SIC 241 does capture the vast majority of employees performing logging operations. To the extent that some logging operations may still be performed by employees in other than SIC 241, OSHA does not believe that their accident data significantly alter the level of risk present in logging operations.

Table 1. -- Occupational Injuries Logging Camps and Logging Contractors, SIC 241

Year	Total cases	Lost workday cases	Nonfatal without lost workdays	Average lost workdays	Lost workdays
1972	32.2	16.0	16.0	16.0	266.3
1973	31.2	16.1	15.0	20.5	307.8
1974	28.8	15.6	13.0	18.8	296.2
1975	25.5	13.9	11.5	20.3	282.5
1976	24.6	13.8	10.7	20.6	284.5
1977	25.8	15.4	10.3	21.2	327.0
1978	25.6	15.5	9.9	20.4	315.5
1979	24.0	14.7	9.1	21.1	310.4
1980	22.4	13.8	8.5	24.4	338.1
1981	19.1	12.2	6.8	23.6	288.1
1982	20.1	12.9	7.1	23.5	302.8
1983	21.2	13.6	7.5	23.5	319.4
1984	21.4	13.8	7.5	23.1	318.7
1985	19.8	12.2	7.5	25.9	316.1
1986	18.9	12.5	6.3	23.3	291.7
1987	19.1	12.3	6.7	26.9	330.4
1988	19.6	12.7	6.8	27.2	345.4
1989	19.2	11.6	7.5	26.2	306.0
1990	17.2	10.7	6.3	26.2	280.3
1991	15.6	9.9	5.7	27.8	274.8

Notes:1. Total cases, lost workday cases and nonfatal without lost workday cases are expressed as incidence rates are per 100 full-time employees (200,000 person hours).

2. Average lost workdays are the average number of lost workdays per lost workday case.

Sources: Bureau of Labor Statistics, Bulletin Nos. 1830 (1972), 1932 (1974), 1981 (1975), 2047 (1977), 2097 (1979), 2130 (1980), 2196 (1982), 2236 (1983), 2259 (1984), 2278 (1985), 2399 (1990), 2424 (1991) Occupational Injuries and Illnesses in the United States by Industry.

While the injury incidence rate remains high in the logging industry, the BLS data show a steady decrease in the incidence rate for the industry since the pulpwood logging standard was adopted in 1971.(2) The decrease in incidence rates occurs in both lost-workday and non-lost-workday cases. In contrast, the data also show a steady increase in the average number of lost workdays per case, that indicates that the severity of injuries has increased over time.

Footnote(2) The decrease in injuries since 1971 is also due in part to adoption of comprehensive logging standards by six states. For example, the state of California, which has a comprehensive standard, reported 457 logging fatalities in the 1950s, prior to adoption of the standard. In 1981, after the logging standard had been promulgated, California's logging fatalities hit a record low (6 fatalities) (Ex. 2-11).

The 1991 logging industry incidence rates still remain far above the total incidence rates and lost-workday incidence rates for other industries, as Table 2 indicates. For example, the most recent logging industry incidence rate (15.6) is almost double the incidence rate for the private sector combined (7.9). It is also 40 percent higher than the manufacturing sector incidence rate (11.2). The logging injury incidence rates also are well above the incidence rates for the construction industry (12.8) and mining (7.1), industries generally considered as high hazard.

Table 2.-- Comparison of Incidence Rates Logging vs. Major Industry Divisions 1991

Industry	Total cases	Lost workday cases	Nonfatal cases w/o lost workdays	Lost workdays
Logging.....	15.6	9.9	5.7	274.8
Private sector.....	7.9	3.7	4.2	79.8
Agriculture, forestry, fishing.....	10.2	5.2	4.9	104.6
Mining.....	7.1	4.4	2.7	127.8
Construction.....	12.8	6.0	6.8	146.2
Manufacturing.....	11.2	5.0	6.2	101.1
Transportation and utilities.....	9.1	5.3	3.7	136.8
Wholesale and retail trade	7.5	3.4	4.1	69.7
Finance, insurance and real estate.....	2.3	1.0	1.2	21.5
Services.....	5.9	2.8	3.2	57.7

Notes: 1. Total cases, lost workday cases and nonfatal without lost workday cases are expressed as incidence rates are per 100 full-time employees (200,000 person hours).

Source: Bureau of Labor Statistics, Bulletin 2424, Occupational Injuries and Illnesses in the United States by Industry, 1991.

The most recent lost-workday incidence rate for logging was 9.9, which is almost double the 5.0 incidence rate in the manufacturing sector and almost three times the 3.7 incidence rate for the private sector combined. The lost-workday rate, that is an indicator of the severity of cases, is extremely high in the logging industry (274.8 lost workdays per 100 full-time workers). It is more than three times the private sector lost-workday rate (79.8) and more than double the manufacturing lost-workday rate (101.1).

2. Census of Fatal Occupational Injuries. The Bureau of Labor Statistics also publishes an annual Census of Fatal Occupational Injuries (CFOI). The CFOI is a systematic and verifiable count of fatally injured public and private sector workers. This census uses administrative records, such as death certificates, workers' compensation fatality claims, medical examiners' records, and other reports to Federal and State agencies, to identify the workplace fatalities and complete descriptive data on the workers and circumstances of their deaths. According to the 1992 CFOI, the most recent data available, 158 logging employees were killed while performing logging operations. Table 3 shows that more than 60 percent were using power tools and performing cutting activities at the time of their death. Almost 20 percent were killed while operating logging machines or vehicles.

Table 3. -- Fatal Injuries in SIC 241 by Activity of Employee, 1992

Activity at time of accident	Number of fatalities	Percent
Using or Operating Tools, Machines.....	08	68
Operating Heavy Equipment.....	4	.....
Using Power tools.....	14	
Logging, trimming, pruning.....	86	.....
Other.....	4	.....
Vehicular and Transportation Operations.....	24	15
Driving, operating.....	15	.....
Riding in, on.....	3	.....
Vehicular and Transportation Operations, n.e.c.....	3	.....
Other.....	3	.....
Material Handling Operations*.....	6	4
Physical activity, n.e.c.....	4	3
All other activities.....	16	10
Total.....	158	100

Notes:
* Loading, unloading materials.
n.e.c. Not elsewhere classified.

Source: Bureau of Labor Statistics, 1992 Census of Fatal Occupational

Injuries, April, 1994.

Applying the CFOI fatality estimate to the most recent logging employment estimate of 72,100 developed for the Regulatory Impact Analysis (see Section VI of this preamble), the fatality incidence rate is .22. The logging industry fatality incidence rate is 8.1 times higher than the fatality incidence rate the mining sector (.027), the next closest industrial division. In addition, the logging fatality rate is 53.6 times higher than the fatality rate for the manufacturing sector (.0041).

3. BLS Work Injury Report (WIR). The most detailed data source available to the Agency on logging injuries and their causes is a June 1984 BLS Work Injury Report survey of 1,086 injured logging employees, hereafter referred to as the WIR survey (Ex. 2-1). It is significant to note that all 1,086 injuries occurred within just a three-month period.(3)

Footnote(3) Not all questions were answered by all survey participants, therefore, total responses vary in each table of data presented.

Included in the report are employees who were injured while performing logging activities at the logging site or while moving or transporting logs across terrain. Motor vehicle accidents were included when the accident occurred at the work site, while hauling logs to the mill, returning from the mill, or transporting tools, equipment, or workers to or from the logging site in company-owned vehicles.

Almost one half (47%) of those responding indicated they were performing non-pulpwood logging operations, therefore they were not covered by OSHA's existing pulpwood logging standard. Another 17 percent did not know what type of timber they were logging.(4) OSHA believes it is reasonable to assume that some percentage of those employees were not covered by OSHA's existing logging standard and therefore, more than one half of the injured employees were not covered by the OSHA standard. Approximately 35 percent of the injured employees were engaged in pulpwood logging operations.

Footnote 4 Of those who responded, 62 percent were engaged in clear cutting, 27 percent in selective cutting, and 8 percent in salvage logging. Approximately 4 percent did not know the type of logging being conducted.

The survey also contained the following information: (1) the work site where the injury occurred (Table 4); (2) work activity being performed at the time of the accident (Table 5); (3) causes of the accidents (Table 6); (4) sources of the accidents (Tables 7-10); (5) protective equipment in use at the time of the accident (Table 11); (6) safety features of vehicles or equipments operated at the time of the accident (Table 12); (7) safety training given prior to the accident (Table 13); (8) factors contributing to the injury (Table 14); (9) severity of the injury (Table 15-16).

a. Work site where injury occurred. Table 4 shows that more than one-half of employees injured were at cutting sites in the woods, while only 20 percent were injured at landings. In addition, more than one-half of those injured were working on sloping terrain at the time and more than 60 percent reported that the work site contained moderate or heavy brush.

Table 4. -- Description of Work Site Where Injury Occurred

Description of work site	No.	Percent
Location of Accident		
Cutting site	570	53
Landing	219	20
Between cutting site and landing	188	18
Employer built road	34	3
Highway	17	2
Other	45	4
Total	1,073	100
Terrain Where Accident Occurred		
Flat ground	476	44
Medium slope	388	36
Steep slope	206	19
Total	1,070	(1)
Ground Cover at Accident Site		
Little or no brush	369	35
Moderate brush	386	37
Heavy brush	273	26
Swampy, marshy, boggy	29	3
Total	1,057	(1)

Notes:
1. Due to rounding, percentages may not add to 100.
2. Because incomplete questionnaires were used, the total number of responses may vary by question.

Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR), Injuries in the Logging Industry, Bulletin 2203, dated June 1984 (Ex. 2-1).

b. Work activity at time of accident. Table 5 shows that almost one-half of all injured employees were engaged in cutting activities (felling, limbing, bucking) at the time of their accidents, and almost one-fourth of all injured employees were felling trees. Twenty-eight percent of the employees were injured during yarding operations (choker setting or hooking up, tractor or cable skidding, chasing). The remainder of the accidents occurred when the logs

were being prepared to move from the landing (loading/unloading and rigging) or were being transported to the mill or other final destination. Other unspecified logging activities accounted for eight percent of the accidents. Finally, servicing and maintaining of equipment accounted for four percent of the accidents, a figure that is consistent with the information found for servicing or maintenance accidents throughout general industry. (See Docket S-012A.) Table 3 outlines the activity being performed at the time of the accidents and the percentage each activity represents.

Table 5. -- Activity Being Performed at Time of Accident

Activity	Number	Percent
Felling trees	253	23
Limbing	165	15
Choker setting or hooking up	156	14
Bucking	134	12
Tractor or cable skidding	92	9
Chasing	49	5
Loading/unloading	51	5
Rigging	39	4
Servicing or maintaining equipment	43	4
Hauling logs to mill	15	1
Other logging activity	84	8
Total	1,084	100

Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR), Injuries in the Logging Industry, Bulletin 2203, dated June 1984 (Ex. 2-1).

c. Causes of accidents. Table 6 indicates that almost one-fourth of the employees were injured when hit by trees, limbs or logs. Another quarter of the accidents were due to slips and falls. It is important to note that 20 percent of all injuries were chain saw related.

Table 6. -- Cause of Accident

Cause of injury/accident	Number	Percent
Injured by limb, tree or log (hit by) (See Table 7)..	259	24
Slip, trip or fall (see Table 8).....	258	24
Injured by chain saw (see Table 9).....	222	20
Muscular strain.....	85	8
Hit by cable, hook, chain, etc.....	60	6
Chip or other object in eye.....	55	5
Mobile equipment accident (see Table 10).....	33	3
Other.....	114	10
Total.....	1086	100

Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984 (Ex. 2-1).

d. Sources of injury. The WIR survey broke down the sources of injuries into employees hit by trees; injured in slips or falls; while using chain saws; and while operating equipment or motor vehicles (Tables 7-10). As Table 7 indicates, almost one-half of those employees injured by trees were hit by falling wood.

Table 7. -- Sources of Injury When Employee Struck by Limb, Tree or Log

Source of injury	Number	Percent
Falling wood	127	49
Rolling logs	37	14
Logs rigged for yarding	30	12
Other (springpoles, etc.)	65	25
Total	259	100

Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

Approximately one-fourth of employees were injured in slips or falls, as shown in Table 8. Of these employees, 47 percent were injured when they fell from elevations. Approximately 28 percent fell from some type of mobile equipment or motor vehicle.

Table 8. -- Slips, Trips and Falls

Falls from, to	Number	Percent
Falls from elevation (surface fell from)	105	47
Ground surface	9	9
Felled trees, rolling or moving	16	15
Felled trees, stationary	46	45
Standing timber	2	2
Skidder	8	8
Truck	14	13
Yarder	3	3
Mobile equipment, n.e.c	4	4
Other	2	2
Unknown	1	1
Falls to same level (Fell to)	117	53
Ground surface or tools	48	41
Ground wood, stationary	29	25
Skidder	2	2
Truck	1	1
Yarder	2	2
Other	8	7
Unknown	27	23
Total	222	100

Notes:
1. The percentages of the major categories are of the total. The percentages of the subcategories are of the major categories.
2. Due to rounding, the percentages will not necessarily equal 100.
Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984 (Ex. 2-1).

It should be noted that in a majority of cases where an employee slipped or fell, the fall was due to an uneven surface. Many of these employees lost their balance on those uneven surfaces, such as standing on felled trees. Other employees slipped and fell from slippery or loose bark, sudden shifting of trees or logs, protruding roots, deadwood, leaves, vines, other wood litter and rocks.

As stated above, one-fifth of all employees were injured while operating chain saws, as shown in Table 9. Of these employees, about two-thirds were hurt when the chain saw kicked back.

Table 9. -- Causes of the Chain Saw Injuries

Cause	Number	Percent
Chain saw kicked back	140	64
Fell on saw	28	13
Didn't have tight grip on saw	15	7
Hand slipped into chain	14	6
Wrong cutting method	7	3
Chain on saw broke	7	3
Using wrong size saw	3	1
Saw ran after shutoff	2	1
Saw not properly maintained	1	*
Other	39	18
Total	222	(1)

Notes:
(1) Because more than one response is possible, the sum of the responses and percentages may not equal the total. Percentages are calculated by dividing each response by the total number of persons who answered the question.
* Less than 1 percent.
Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

Table 10 shows the type of machine or vehicle the employee was operating at the time of injury. Over one-half of those injuries involved logging trucks, on which logs are loaded for transport to mills, etc.

Table 10. -- Sources of Injury in Mobile Equipment Accidents

Source of injury	Number	Percent
Skidder	9	27
Log truck	17	52
Mobile equipment, n.e.c	2	6
Ground surface	1	3
Other or non-classifiable	4	12
Total	33	100

Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

e. Protective equipment. Also included in the WIR survey was information about the type of protective equipment being worn or used at the time of the accident. Table 11 shows that the majority of employees were wearing logging boots, gloves and head protection when they were injured. However, less than one-third of those injured were wearing leg protection, even though almost 60 percent of the injuries investigated occurred when employees were performing activities that required the use of a chain saw (brushing, felling trees, limbing, and bucking). In addition, only six of the 33 employees injured while operating equipment or vehicles were using seat belts. Since more than one-half of all injured employees said they were working on sloping terrain at the time, OSHA believes it is reasonable to assume that some of the machine accidents were rollovers or tipovers and that seat belts could have prevented some of those injuries.

Table 11. -- Protective Equipment Worn or Used

Type protective equipment used	Number	Percent
Calk- or cork-soled boots	659	62
Dust masks	16	2
Earplugs or other hearing protector	264	25
Glasses or goggles	179	17
Gloves	788	75
Hard hat	916	87
Leg protection	303	29
Seat belts	6	1
Steel-toed boots	295	28
Other	19	2
Not using protective equipment	38	4
Total	1057	(1)

Note:(1) Because more than one response is possible, the sum of the responses and percentages may not equal the total. Percentages are calculated by dividing each response by the total number of persons who answered the question.

Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

f. Equipment and vehicle safety features. Table 12 clearly shows that a significant number of machines and vehicles involved in the logging accidents were not equipped with fall protection, rollover protection or seat belts.

Table 12. -- Safety Equipment on Vehicles or Equipment

Mobile equipment safety equipment	Number	Percent
Falling object protective structure	30	59
Rollover protective structure	27	53
Seat belt	32	63
Other	4	8
Not aware of safety devices	5	10
Total	51	(1)

Note: (1) Because more than one response is possible, the sum of the responses and percentages may not equal the total. Percentages are calculated by dividing each response by the total number of persons who answered the question.

Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

g. Safety training. The WIR survey also contained information on whether employees had received safety training prior to their accidents. Table 13 indicates that over one-third of the injured employees had never received training on safe work practices or in the operation of machines and vehicles used in logging operations. Only 40 percent of employees injured said they had received training from the employer. In fact, 19 percent of those injured said that whatever training they had received had come from a relative.

Table 13. -- Safety Training of WIR Participants

Source of safety training	Number	Percent
Never received training	392	37
Supervisor or employer	419	40
Co-worker	300	29
Relative	200	19
Other	72	7
Total	1046	(1)

Note: (1) Because more than one response is possible, the sum of the responses and percentages are calculated by dividing each response by the total number of persons who answered the question.

Source: Bureau of Labor Statistics (BLS) Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

h. Factors contributing to the accident. Table 14 shows the conditions or factors that the injured worker felt contributed to his/ her accident. With regard to natural conditions, more than 30 percent said the sloping terrain and heavy brush had been a factor. In addition, 15 percent of the injured employees said that a danger tree had contributed to the accident.

Human factors also contributed to accidents, according to the injured employees. More than 20 percent said that the fast speed at which they had been working contributed to their accident. OSHA notes that 10 percent of those injured were unaware of the hazards when they were injured.

Table 14. -- Conditions or Factors Contributing to Accident

Conditions or factors employee felt contributed to accident	Number	Percent
Natural conditions:		
Defects in tree	63	7
Snag or deadwood in tree	75	8
Spring pole or wood under tension	105	11
Hidden wood on ground	61	7
Weather conditions	56	6
Slippery conditions	80	9
Heavy brush or ground cover	173	19
Steep terrain	109	12
Other natural conditions	71	8
No natural conditions contributed	335	36
Total	934	(1)
Other factors:		
Co-worker's activity	54	6
Working too fast	186	22
Too noisy	13	2
Working when tired or fatigued	64	8
Handling too heavy an object	45	5
Misjudged time or distance	118	14
Not paying full attention	65	8
Unaware of hazards	83	10
Wrong cutting method	35	4
Other:	53	6
No other factors contributed	282	34
Total	839	(1)

Notes:(1) Because more than one response is possible, the sum of the responses and percentages are calculated by dividing each response by the total number of persons who answered the question.

(2) Due to rounding, the percentages may not add to 100.

Source: Bureau of Labor Statistics, Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

i. Severity of injury. The WIR survey also indicates that when employees were injured in logging operations, their injuries were more severe than injuries occurring in other industry

sectors. Table 15 shows that almost three-fourths of those injured missed more than 1 day of work due to their injuries. Over 30 percent missed more than 10 days of work. The average lost-time case resulted in 23 days away from work. In addition, Table 16 shows that more than one-fifth of those injured were hospitalized an average of six nights.

Table 15. -- Estimated Days Away From Work

Days away from work	Number	Percent
No days	270	26
1 to 5 days	234	22
6 to 10 days	103	10
11 to 15 days	57	5
16 to 20 days	58	6
21 to 25 days	27	3
26 to 30 days	47	4
31 to 40 days	45	4
41 to 60 days	43	4
More than 60 days	50	5
Lost-time cases for which days not estimated	116	11
Total	1,050	100
Mean days away from work:	23	
Median days away from work:	10	

Notes:
(1) Total excludes 5 employees for whom data were not available.
(2) Due to rounding, percentages may not add to 100.
Source: Bureau of Labor Statistics, Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

Table 16. -- Length of Hospitalization

Length of hospitalization	Number	Percent
No hospitalization	849	80
1 night	29	3
2 nights	26	2
3 nights	27	3
4 nights	16	2
5 nights	26	2
6 nights	11	1
7 nights	13	1
8 nights	15	1
9 nights	3	(1)
10 nights	6	1
11 to 20 nights	9	1
21 to 30 nights	8	1
More than 30 nights	4	(1)
Total	1,059	100

Mean length of stay in hospital: 6 days
Median length of stay in hospital: 4 days

Note:
(1) Due to rounding, percentages may not add to 100.
Source: Bureau of Labor Statistics, Work Injury Report (WIR) Injuries in the Logging Industry, Bulletin 2203, June 1984.

4. OSHA First Reports of Serious Injury (FRSI). OSHA also utilizes a telephone reporting system for the field staff to inform the national office of the occurrence of serious or significant accidents. This telephone call system is part of the OSHA emergency communications system. Regional Administrators are required to file first reports of fatalities, catastrophes and other important events (such as those that receive significant publicity) to the National Office. The information is recorded on a form entitled First Report of Serious Accident (FRSI). Approximately 1,200 reports are received by the National Office yearly.

None of the reports are screened prior to OSHA receiving them to eliminate those from a certain industry, occupation or because of other factors. None of these reports may be considered statistically significant by themselves in attempting to determine the number of accidents that have occurred. However, they do give an indication of where many serious accidents have occurred and the types of work being performed at the time of the accidents.

OSHA has examined the FRSI reports and identified 105 (Ex. 4-65) that occurred while employees were performing logging operations. These accidents occurred between October 1985 and December 1989. Table 17 lists the logging accident reports as a percentage of all accident reports received.

Table 17. -- First Reports of Serious Injury Accidents in Logging Industry

Period	Total reports	Logging	Percentage
Oct-Dec 85	228	12	5.26
Jan-Dec 86	1147	30	2.62
Jan-Dec 87	1236	29	2.35
Jan-Dec 88	1330	23	1.73
Jan-Dec 89	1150	11	.96
Totals	5091	105	2.06

Source: Office of Electronic/Electrical and Mechanical Engineering Safety Standards, Directorate of Safety Standards Programs, OSHA.

The percentages attributable to logging injuries are particularly large in relation to the total employment in the industries represented. Using employment rates for 1985-1989 for the private sector and for the logging industry, OSHA observes that the percentage of accidents recorded on the FRSI for logging for each year far exceeded the percentage of employees in logging compared with the private sector. Whereas, logging employment constituted one tenth of one percent of total private sector employment,

the reports of serious accidents in logging averaged about two percent of the total accidents. Table 18 lists these employment rates as they appear in the BLS annual reports entitled, Occupational Injuries and Illnesses in the United States by Industry, (followed by the year of the data). (See section A above.)

Table 18. -- Private Sector and Logging Industry Employment Rates
(1985-1989)
[All numbers are in thousands]

Year	Private sector	Logging industry
1985	81,601.3	82.7
1986	83,291.2	82.9
1987	85,686.0	85.0
1988	88.698.8	90.3
1989	91,111.0	87.4

Sources: Bureau of Labor Statistics, Bulletin Nos. 2278 (1985) (Ex. 2-30), (1986), (1987) (Ex. 38B), (1988) (Ex. 38C), and (1989).

OSHA was also able to identify from the FRSI reports the activity that was being conducted at the time of the accident and the causes of the accidents. For example, more than one-half were involved in cutting activities when they were seriously injured. OSHA also notes that almost nine percent were seriously injured in machine rollover or tipover accidents while only 1 employee was injured by a jillpoke. Table 19 lists the activity being conducted or the causes of the accidents.

Table 19. -- First Reports of Serious Injuries
-- Logging Operations October 1985-December 1989
Activity Being Conducted/Cause of the Accident

Activity/Cause	Number	Percent
Felling Tree	30	28.6
Lodged Tree	17	16.2
Working Around Danger Tree	13	12.3
Struck by Falling Load	10	9.5
Vehicle Tipover	9	8.6
Struck by Vehicle	8	7.6
Electrocutions	3	2.9
Fall from Vehicle	2	1.9
Skidding	2	1.9
Delimbing	1	1.0
Jillpokes	1	1.0
Other	9	8.6
Total	105	100

Note: 1. The percentages may not be equal 100 due to rounding.
Source: Office of Electronic/Electrical and Mechanical Engineering Safety Standards, Directorate of Safety Standards Programs, OSHA.

5. OSHA Fatality/Catastrophe Investigations Report (FCI). OSHA regulations require that all workplace fatalities be reported to the nearest OSHA Area Office. Employers are required to complete a Fatality/Catastrophe Event Report Form (OSHA 36), which is reviewed by the OSHA Area Director to determine whether an investigation of the fatality is warranted. In 1989, OSHA published a study of 141 logging fatalities that occurred during the period of 1978-84 (Ex. 4-61). These fatalities do not represent all logging industry fatalities during that time period.

According to the study, 71 percent of those logging employees killed were out in the cutting area. Only one percent each were killed on skid trails or at landings.

The study also indicated that 43 percent of those killed were felling trees at the time. Employees performing yarding and bucking and limbing operations each accounted for 13 percent of the fatalities. The overwhelming majority of employees (72%) were killed when they were struck or crushed by a tree, log or limb, while 17 percent were killed in machine accidents. One percent were killed in chain-saw accidents.

Unsafe work practices, misjudgments and lack of training or supervision accounted for 42 percent of the fatalities while less than one percent were due to equipment failure.

6. Maine Bureau of Labor Statistics. The State of Maine Bureau of Labor Statistics (Maine BLS) has compiled various statistics on injuries and fatalities in the logging industry (Ex. 4-174, 4-175, 4-176).

Maine BLS conducted a detailed survey of 189 logging employee injuries that occurred between May and July of 1982 (Ex. 4-175). This number does not represent all logging employees who were injured during that period. According to this survey, 35 percent of employees reporting injuries were struck by trees, logs or limbs. Chain-saw accidents accounted for 26 percent of the reported injuries while 13 percent of the logging employees were injured in slips or falls.

According to Maine BLS, the category that showed a significantly higher than average percentage of disabling injuries was chain-saw accidents. Over one-half of all chain-saw accidents involved kickback. In over 70 percent of the kickback accidents, the chain saws were equipped with chain brakes. Maine BLS said that chain brakes had played a significant role in lessening the effects of the injury. Less than 13 percent of chain-saw accidents where chain brakes were present resulted in hospitalization, while nearly 50 percent of the accidents involving other than chain saws resulted in hospitalization.

This survey also indicates that two-thirds of all logging accidents resulted in lost workdays and 13 percent of all injuries required at least one overnight in the hospital. The average hospitalization was for five days.

Maine BLS has also compiled statistics from 1980-87 of chain-saw injuries that resulted in a first report of serious injury (Ex. 4-176). According to this report, average chain-saw injuries for each year was 362. Of those, an average of 237 (65%) were disabling injuries, that is, injuries which result in lost workdays.

Maine BLS has also examined disabling logging injuries reported from 1985-87 that had resulted in lacerations (Ex. 4-174). During those three years, there were an average of 183 disabling lacerations each year.

7. Washington State Logging Fatalities. A detailed study has been compiled on logging fatalities in the State of Washington from 1977-83 (Ex. 4-129). Of the 135 fatalities that occurred during those years, the study analyzed 92 percent of them. Death certificates and reports of investigations by Washington OSHA were used in the analysis.

According to this study, the overall annual fatality rate for logging during this period was approximately 2 per 1,000 full-time employees. Those employees who were killed had a mean length of experience in the logging industry of 11.6 years. Less than 10 percent had less than one year's experience.

More than 40 percent of all loggers killed were engaged in felling activities, while 23 percent were killed performing yarding operations. Almost 20 percent of the loggers were operating logging machines at the time of their accident. Table 20 shows the jobs employees were performing at the time of their accident.

Table 20. -- State of Washington Logging Fatalities, 1977-83

Job title	Number	Percent
Feller/bucker	53	42
Choker-setter	23	18
Mobile equipment operator	16	13
Hook tender	8	6
Chaser	7	6
Yarder operator	6	5
Loader	6	5
Rigging slinger	5	4
Pondworker	1	1
Total	125	100

More than 65 percent of all employees killed were hit or crushed by a log or tree. While most of these employees who were hit or crushed by a tree were the result of their own activity, more than eight percent were

hit by trees being felled by another employee. Approximately nine percent were killed in machine rollover accidents, while 10 percent of those employees killed were struck by a machine or vehicle. Table 21 shows the causes of the accidents in which loggers were killed.

Table 21. -- State of Washington Logging Fatalities by Type, 1977-83

Type of accident	Number	Percent
Struck by tree brought down by the deceased.....	34	26
Struck by tree felled by another person.....	11	8
Struck by rolling log.....	20	15
Struck by log being dragged.....	18	14
Struck by mobile equipment.....	13	10
Equipment rollover.....	12	9
Struck by boom or rigger.....	7	5
Struck by log falling from truck during loading.....	3	2
Electrocution.....	2	2
Other.....	9	7
Unknown.....	3	2
Total.....	132	100

According to the study, accident investigation reports indicated that many of the deaths would not have occurred if the employees had been following safe work practives an dhad remained out of hazardous areas (e.g., other occupied work areas).

C. Need for agency action.

OSHA believes that current logging methods and the inherent dangers posed by work in the woods, such as those caused by inclement weather, uneven terrain and isolation from health care facilities, present significant hazards to employees engaged in logging operations across the nation, regardless of the type logging being conducted or the end use of the wood. The presentation of data in the preceding section further demonstrate the level of risk to which all loggers are exposed. Nevertheless, the existing OSHA safety standard for pulpwood logging (29 CFR 1910.266) specifically addresses only one segment of the logging industry--logging operations whose forest product ends up as pulp. Although OSHA does not know precisely the breakdown of employment and occupational injuries between pulpwood and other logging operations, the data and other information available to OSHA indicate that similar hazards exist in both sectors of the industry.

The preceding section has shown that the logging industry remains a high risk industry, regardless of the end use of the forest product. In particular, the data show:

1. Employees engaged in logging operations have a substantially higher risk of injury and death than workers in many other industries, including other high hazard industries.

2. If they are injured, loggers are more likely to be hospitalized and lose workdays compared to employees in most other industries, as evidenced by the very high lost-workday incidence rate.

3. When loggers are injured, their injuries are much more severe and result in longer hospitalizations and more lost time per employee than do the injuries of employees in most other industries.

4. Loggers also have a much higher incidence of fatalities than employees in other industries.

In addition, the Regulatory Impact Analysis for the final logging standard estimates, based on the various data in the record, that there are an average of 158 fatalities, 6,798 lost workday injuries and 3,770 non-lost workday injuries that occur each year in the logging industry. (For further discussion see section VI of this preamble.)

Of the 72,100 employees engaged in logging operations as defined by the final rule, only 38 percent (27,170) are covered by State Plan State logging standards,(5) which currently provide protection regardless of kind of logging operation in which the loggers are employed. Of the estimated 62 percent (44,930) of logging employees who are not covered by State plan State standards, OSHA estimates that at only one-third (16,478) are covered by the existing pulpwood logging standard. That means that almost two-thirds (28,452) are not covered by any Federal or State logging standard. (This estimate is consistent with the WIR survey, which indicated that only 35 percent of those surveyed were engaged in pulpwood logging operations.)

Footnote(5) In 1977, the leading states in logging employment (with 48 percent of the total) were Washington (15, 400), Oregon (14,000), California (6,100) and Maine (4,300). By 1982, the employment pattern had shifted and the leading states (with 42 percent of the total) were Washington (11,900, down 3,500); Oregon (11,300, down 2,700); Georgia (5,400, up 1,600); and Alabama (5,000, up 1,200). California (3,900, down 2,200), was no longer one of the leaders. Overall logging employment in the Pacific Coast states decreased 22% during this period. The South was the only region in the country to show an increase in logging employment (21%). This employment trend, resulting in the change from harvesting the Pacific Coast's old-growth timber to increased harvesting of third and forth-growth pine forests in the south, means that an increasing proportion of logging employment is in states not covered by state logging standards. (As noted earlier, only Alaska (16th in 1982), California (7th), Hawaii (very small), Michigan (19th), Oregon (2nd) and Washington (1st) have OSHA approved state logging standards covering all loggers.) This means that as the centers of activity (and employment) shift from the old growth forests of the pacific coast to the pine forests of the south, fewer employees conducting general logging (non-pulpwood logging) will be covered by these State plan State logging standards.

The preceding section shows there has been a steady decrease in injury and lost-workday incidence rates since the adoption of OSHA's existing pulpwood logging standard and the

State plan State standards. In addition to a further reduction in accidents for those employers currently covered by OSHA and State logging standards, OSHA believes that a substantial reduction in incidence rates can be achieved by promulgating a uniform national logging standard that provides protection for all employees engaged in logging operations.

In developing the proposed rule, OSHA used the l978 ANSI standard as its model for a uniform national logging standard, since many of its requirements were stated in performance language. This is in keeping with the Agency's determination that properly drafted performance standards can adequately address safety and health hazards without unnecessarily impeding technological advancement and employer innovation. The final rule provides a base level of safety for employees in all logging operations. At the same time, it still allows those State plan States with more complicated or specialized local conditions to develop their own detailed standards, as several States have already done.

Many participants in this rulemaking have said that a comprehensive performance-based logging standard is necessary to reduce the risk of injury and death (Ex. 5-6, 5-10, 5-17, 5-18, 5-21, 5-22, 5-42, 5-46, 5-74 through 5-92; Tr. W1 21, 73, 202). OSHA agrees with these commenters. The Agency believes that the integrated program of personal protective equipment; equipment, machine and vehicle protective devices, inspection and maintenance; work practices; and training contained in the final rule is reasonably necessary and appropriate to reduce the high injury and fatality incidence rates in this industry.

V. Major Issues

A. Introduction

As a result of issues raised by those commenting on the proposed logging standard, OSHA solicited information on 10 major issues in the notice of public hearing (55 FR 19745, May 11, 1990). OSHA requested detailed information on a variety of issues including training, personal protective equipment, first aid, chain-saw protective devices, and seat belts. These issues were discussed by the participants during the public hearings and in post-hearing comments. The evidence submitted to the record is summarized and evaluated in the following discussion of each issue and in the summary and explanation of the final rule.

1. Training. Comments on the proposed rule generally supported the need for training. Several commenters, however, raised specific questions about particular training issues. As a result, OSHA requested in the hearing notice further comment on the following training issues: Effective date of training, sufficiency of training, and portability of training.

a. Effective date for training. In the proposed rule, OSHA would have required employers to be in compliance with all provisions of the final logging standard within 60 days of publication of the rule in the Federal Register. The proposed rule did not provide extended compliance time for employers to familiarize themselves with the standard and to develop and conduct training. Some commenters said additional time to meet the training requirements of the rule was unnecessary (Ex. 9-3, 9-13; Tr. OR 343). These commenters said that in many logging establishments training is already being provided and that employers would not

require significant time to incorporate the proposed training requirements into their ongoing programs. However, other commenters argued that the effective date for training should be delayed because additional time was necessary to develop the required training program and to train employees (Ex. 5-2, 5-27, 9-1, 9-2; Tr. W2 243-44). Commenters proposed various effective dates for training. For example, the Northeastern Loggers Association, Inc., recommended a 2-year phase-in of the training requirements (Ex. 5-2). The American Pulpwood Association, Inc. (APA), however, supported a shorter six-month phase-in period:

Safety training programs for loggers are largely specific to a function (for example, proper felling technique). A fully comprehensive training package will have to be developed to meet the training requirements. APA is attempting to develop training programs and have them available by the end of 1989. * * * APA will seek OSHA staff review of its training program as it is developed. We'd like a brief delay in enforcement, just long enough for us to have something available for employers (Ex. 5-27).

At the hearing there was little testimony about delaying the effective date for training. Mr. Doug Domenech, testifying on behalf of APA, repeated APA's position that employers should be given some additional time to comply with training requirements:

The training is a very needed thing and, unfortunately, we just don't have the infrastructure to provide that training. That's why * * * we * * * hope that OSHA will give some kind of variance on time before citations are delivered because it's just not out there. If loggers had to comply with a training requirement today, they'd all be cited (Tr. W2 243-44).

At the same time, however, Mr. Alex Hansen, of Associated Oregon Loggers, Inc. (AOL), testified that Oregon loggers already were in compliance with the training provisions contained in the proposed rule:

As far as we're concerned in Oregon, you could implement the training tomorrow. We already have it in place. We don't have a problem with it. We're advocates of safety training in the woods. I know some other states have some problems. They haven't been doing it or maybe not as strenuous as the Oregon rules, and I understand their problems, but as far as our association is concerned, if you pass it tomorrow, we're in compliance (Tr. OR 343).

The record indicates that training materials and courses for logging safety are widely available and that many logging establishments have implemented training programs (Ex. 4-122, 4-123, 4-181, 5-20, 5-33, 9-1, 9-2, 9-5, 9-6, 36; Tr. W1 163-64, W2 113, 115, 125, 199-201, OR 87, 259-60, 393, 546-47, 566). Trade associations such as AOL, APA and the Montana Logging Association have been providing training materials on an on-going basis (Ex. 5-27). APA expected to have completed a comprehensive training package for its members companies by 1989. In addition, state agricultural extension services are a source of training information (Ex. 4-122, 4-123). Several hearing participants submitted descriptions of their training programs and the actual training materials (Ex. 21, 22, 23, 24, 26, 28, 29).

OSHA is aware that many of the existing training programs are based on the training requirements of OSHA's pulpwood logging standard. Because the training requirements have

been revised in this final rule, current training programs will have to be reviewed and upgraded, when necessary, to meet the revised requirements. In addition, the training provisions of the final rule vary to some degree from the proposed rule. As such, employers who made changes in their programs in response to the proposed rule will have to review their training materials to assure compliance with the final rule.

OSHA is aware that employers, trade associations and other organizations that provide training will need time to prepare and/or update training programs to meet the requirements of the final rule and will need time to provide training to employees. However, the record also shows that many companies and organizations already have developed training programs that meet most of the requirements of the final rule (Ex. 5-20, 5-27, 5-52, 5-69, 9-2; Tr. OR 343). Many establishments, especially those in States that have logging standards, already are providing training (Ex. 21, 22, 23, 24, 26, 28, 29). Therefore, OSHA does not believe that a lengthy delay is necessary to meet the training requirements of the final rule. The Agency believes that extending the effective date of the standard for 120 days after publication of the final rule in the **Federal Register** will be sufficient to allow employers and others to familiarize themselves with the final rule, to update training programs to meet the provisions of the final rule, and to conduct initial training. This phase-in period also will give employers time to determine whether current and new employees have received the training in all of the elements specified in this section or whether they will need additional training.

b. Sufficiency of training. The second issue raised in the hearing notice concerned what training OSHA would consider sufficient to meet the training requirements in the final rule. Some commenters supported OSHA's preference for performance based training (Ex. 9-3, 9-15). Other commenters argued for detailed specifications to be included in the training requirements, including a minimum number of hours of training (Ex. 9-13, 9-19).

In general, the final rule contains training requirements in performance language to allow employer flexibility in tailoring training programs to the individual circumstances under which they operate. The final rule sets forth the basic elements that must be covered in the employer's training program, such as safe performance of assigned work tasks; safe use of tools; recognition and control of workplace hazards; prevention and control of general logging hazards; and the requirements of the final standard. The training provisions also require that employees initially work under supervision and that they demonstrate the ability to perform their work tasks safely before being released from supervision.

As discussed elsewhere in this preamble, each logging establishment has unique conditions or hazards associated with its logging operations, that result in unique methods of operation. OSHA believes that the general elements of the training provisions allow employers to take into account those differences while still requiring the employer to assure through training that each employee is able to perform the job safely.

On the basis of information submitted to the record and the testimony presented during the hearings, OSHA has determined that employers will not have difficulty in complying with the training requirements of the final rule. OSHA believes that the performance-based elements

adopted in the final rule will enhance employee safety and will provide employees with the tools to permit them to actively participate in providing their own protection.

The Industrial Truck Association (ITA) recommended that OSHA specify in greater detail the training required for industrial truck operators (Ex. W1 5-47, Tr. 221-27). ITA urged OSHA to adopt the training provisions from the ASME B56.6 standard on rough-terrain forklift trucks. Mr. William Montweiler, testifying for ITA, stated:

Part Two of the B56.6 standard addresses general safety and operating practices that are highly relevant to the proposed rule's training provisions. Although ITA is pleased that the proposed rule's training provisions provide greater detail than OSHA's industrial truck rule, these provisions can be made still more effective by additional particularity.

The proposed rule merely requires that employees be trained to recognize safety hazards and trained "in the safe use or maintenance of any machinery, equipment, or tools that they may be required to operate or maintain." This directive, we feel, is inadequate because it fails to state the elements that comprise an effective training program.

By contrast, paragraph 5.17.4 of the B56.6 voluntary standard lists numerous elements of a proper training program specific to rough-terrain forklift truck operation, including explanation of the safety-related aspects of truck and component design; location and function of controls; supervised practice; oral, written, and operational performance testing; and refresher courses. ITA requests, therefore, that the final logging operations rule incorporate the training provisions contained in the B56.6 standard.

OSHA believes that the performance-based and competency-based training provisions contained in the final standard adequately address ITA's concerns, and that more specific requirements in this standard for forklift truck operator training are not warranted for several reasons.

First, the record indicates there is not a significant number of rough-terrain industrial trucks used in logging operations. Mr. Richard Lewis, testifying on behalf of APA, confirmed the limited use of rough- terrain industrial trucks in the logging industry:

The American Pulpwood Association currently employs seven technically trained foresters, two in Washington and five in division offices throughout the U.S. And collectively we've worked in the field for approximately 103 man years, and we get out on logging operations every month and sometimes once a week, and we have never, never observed the use of a rough terrain fork lift in a logging operation (Tr. OR 478-79 OR).

Second, the ASME standard to which ITA refers, B56.6, does not focus on any unique problems with the use of industrial trucks in logging operations. Conversely, the logging standard is intended primarily to deal with workplace hazards that are unique to logging operations.

Third, in any event, the final standard achieves the same training outcome as the B56.6 standard: demonstrated ability to safely operate a rough-terrain industrial truck.

OSHA is in agreement with ITA that safety in industrial truck operation is important in the logging industry as well as all other industries. OSHA believes that the issue of training of industrial truck operators is more appropriately addressed in more detail in OSHA's forthcoming proposed standard on industrial truck operator training. OSHA believes the major safety issues involving industrial truck operation can be fully and specifically examined and addressed in that rulemaking.

c. Portability of training. The third issue raised regarding training involves the portability of training; that is, whether current and new employees who are experienced and previously trained must receive additional or supplemental training. The proposed rule would have required that each new employee be trained, regardless of whether he/she had been trained previously.

Some commenters supported the proposed requirement (Ex. 9-2, 9-3, 9-9, 9-13). Several commenters disagreed with the scope of employees that need training, stating that trained and experienced loggers should not require the same training as an inexperienced new employee (Ex. 5-21, 5-33, 5-39, 9-2; Tr. W1 63, OR 85).

OSHA believes that training is important for all loggers regardless of whether they have no logging experience or have many years of experience. The need to provide training for even experienced loggers is buttressed by the WIR survey of injured loggers, which indicated that over one third of those injured had never received training (Ex. 2-1). In addition, more than 60 percent of those injured had worked 5 years or more in the logging industry. In fact, only 22 percent of those injured had worked in the logging industry for one year or less.

At the same time, OSHA does not want to penalize those employers who already have instituted training programs that meet the requirements of the final rule or can easily be brought into compliance with the final rule. In addition, OSHA does not want to impose an unnecessary burden on an employer who hires loggers who have received the training required by this section on a prior job.

In order to eliminate unnecessary duplication of training in the final rule, OSHA is not requiring employers to retrain employees who have received training in the specific requirements of this section. The final rule only requires the employer to train employees in those elements in which the current or new employee has not been trained. For example, an employee may need to be trained to recognize hazards that are specific to the terrain in which the work is being done, and to utilize safe work practices to avoid or control these hazards. In addition, a new employee, even if experienced in logging operations, may not be familiar with various work site procedures of the new employer, such as signals to be used. It is important for new employees to be brought up to speed with the current logging practices so other members of the logging crew are not placed at risk by the actions or inactions of the new employee.

OSHA has included in the final rule a provision that each new employee and each employee who must be trained work under the supervision of a designated person until they can demonstrate the ability to perform their new duties safely. OSHA's position on the supervision requirement was supported by various hearing participants. For example, various witnesses at the hearing noted that close supervision of new employees, regardless of their experience, is a widely accepted practice in the logging industry and a means of determining whether the employee's previous training was adequate (Tr. W1 91-92, OR 95-97, 204-05, 275-76, 374, 456-57, 635-36). As such, OSHA believes that the inclusion of the supervision requirement in the final rule will provide the necessary safety to both the new and current employee, and will not impose a significant burden on the employer.

2. Personal protective equipment. In the hearing notice OSHA raised the issue about who should pay for personal protective equipment (PPE) that employees are required to use or wear. The Agency proposed that employers provide PPE and assure it is used by employees when required. OSHA's intent in the proposed rule was that the employer provide personal equipment at no cost to the employee. PPE items included in the proposed rule were gloves, leg protection, logging boots, safety helmets (hard hats), eye or face protection, and respiratory protection.

Many commenters agreed that the personal protective equipment specified in the proposed rule should be used. (Ex. 5-32, 5-42, 5-64, 9-2, 9-15, 9-16, 9-20). Some commenters urged OSHA to require that the employer be responsible for providing all PPE (Ex. 9-3, 9-13). They said that only if the employer provided the PPE could he assure its quality, design and maintenance. However, many other commenters opposed requiring logging employers to provide certain types of PPE, and their opposition focused primarily on logging boots (Ex. 5-11, 5-21, 5-32, 5-39, 5-45, 5-51, 5-55, 5-74 through 5-92, 9-2, 9-5, 9-15, 9-17, 9-18; Tr. W1 74-75, 110, 177, OR 22, 79, 205, 262, 441, 533, 632, 701). Many commenters did not give any reason why the employer should not be required to pay for PPE. Other commenters contended primarily that employers would be financially burdened if they had to pay for certain high cost PPE, such as individually-fitted and non-reusable logging boots, in an industry that has such a high turnover rate. Other reasons for not requiring the employer to provide certain types of PPE were the use of certain PPE by employees outside the workplace, and industry custom.

Commenters noted that employee turnover in the logging industry is very high (Ex. 5-11, 5-21, 5-39, 5-49, 5-51, 5-55, 5-56, 5-63, 5-65, 5-74 through 5-92; Tr. W1 74-75, 110, 177, OR 22, 79, 205, 262, 441, 533, 632, 701). Some commenters also indicated that employees sometimes work only one or two weeks before leaving, often taking jobs at another logging establishment (Ex. 5-55, 5-74 through 5-92; Tr. OR 78). These commenters argued that it would be unfair to require employers to pay for expensive logging boots given the high turnover rate of the logging industry. One commenter said:

[I]t frightens us to think that we might be providing a $300 pair of boots for a man that's there a week (Tr. W1 74).

These commenters also contend that for some PPE, particularly logging boots, employers might have to buy new PPE every time they hire a new employee. First, this would be

necessary because terminated employees do not return PPE they are issued (Ex. 5-45). Second, these commenters argue that, unlike PPE such as ear muffs and head and leg protection, logging boots are an item of PPE that cannot be reused by other employees because of size and hygienic concerns (Ex. 5-29, 5-43, 5-44, 5-62, 5-74 through 5-92, 9-1, 9-15, 9-21; Tr. OR 78). Because logging boots cannot be worn by other employees, these commenters said employers view logging boots as "personal clothing." In addition, these commenters said that even if employees did return their logging boots, new employees would be unwilling to wear used logging boots. One commenter said:

Suppose a new employee comes to work in the spring and finds he can't or doesn't want to be a logger so he hands in his $200 boots with two weeks wear and tear and leaves. Is the next guy going to accept "used" boots someone else wore? (Ex. 5-78)

The commenters said that requiring employers to pay for new PPE, primarily logging boots, for each new employee would place a considerable financial burden on employers (Ex. 5-32, 5-39, 5-45, 9-15; Tr. W1 74, OR 78, 350). They said the cost would be particularly burdensome for small establishments that comprise the vast majority of the logging industry. Their basis for this conclusion is that logging boots are very costly, ranging from $60 to $400 a pair (Ex. 5-45, 9-15; Tr. W1 74, OR 78, 350). In addition, they said employees need two to three pairs of logging boots a year. The commenters, however, did not present any financial or economic evidence as to the burden (e.g., effect on profits, sales, etc.) on the industry as a whole, and particularly small employers as a group, of providing logging boots.

One commenter said employers should not be required to pay for logging boots that are used by employees away from workplace (Ex. 5-39). This commenter said employees take their logging boots with them when they seek new employment (Ex. 5-39). He also said employees use their logging boots for hunting and cutting their own wood (Ex. 5-39). In contrast, the record shows that other types of PPE (e.g., leg protection, safety glasses and hearing protection) remain with the employer, therefore, they are not used away from the workplace (e.g., Ex. 5-32). In addition, one commenter said that these types of PPE are already being provided by many establishments as standard industry practice (Ex. 5-32).

Finally, several commenters said that employers should not be required to pay for certain PPE because the custom in the logging industry is that employees, especially piece-rate workers, provide their own PPE, particularly logging boots (Ex. 5-11, 5-24, 5-45, 5-67, 5-74 through 5-92). These commenters said that piece-rate workers provide all "tools of the trade," that includes some types of PPE. However, the record also shows that some logging establishments do provide logging boots (Ex. 5-32; Tr. W1 177). For example, one commenter said:

[T]he way we set it up is that when you're with us for one year we will buy you three pair of boots and we will supply all safety equipment.

After you are with us for one month, we will supply safety chaps, the helmet, the whole works. The first day you come on the job we will supply the helmet, a helmet with the eye protection and the ear protection (Tr. W1 177).

Another commenter said:In most instances items such as ear plugs, safety glasses, bucking chaps or any other safety item required to work in a safe environment are provided (Ex. 5-32).

OSHA has carefully reviewed the evidence in the record and, for several reasons, has decided in the final rule to delete the general requirement that the employer be required to provide logging boots. However, the final rule does require that such boots be worn by logging employees, and holds the employer responsible for assuring that the employee has logging boots and wears them. As to the other PPE requirements specified in paragraph (d), OSHA has retained the language of the pulpwood logging and proposed standards that the employer provide such PPE at no cost to the employee.

The OSH Act imposes on employers the responsibility for compliance with standards and for providing safe working conditions for employees. This responsibility has been recognized in OSHA's personal protective equipment standards at 29 CFR 1910.132 through 29 CFR 1910.138. Section 1910.132(a) establishes the employer's obligation to provide and maintain personal protective equipment whenever such equipment is necessary by reason of the hazards in the workplace.

Section 1910.132(b) does recognize that in some limited circumstances that employees may provide their own PPE. However, OSHA emphasizes that this practice is not the norm, but rather an exception based on unusual or specific circumstances. In addition, section 1910.132(b) underscores the employer's continuing obligation to assure the adequacy and maintenance of the PPE.

The record shows that special circumstances exist in the logging industry which may make it appropriate for employees to provide their own logging boots. First, the record shows that the logging industry is highly transient, and that logging boots, unlike other PPE required by the final rule, are not the kind of PPE that can be reused. Logging boots purchased to fit one employee may not fit the next employee. It is important that logging boots fit properly or the boot may not provide the necessary protection. Therefore, based on current turnover rates in the industry, employers would have to purchase non-reusable logging boots costing $200 to $400 many times a year for newly-hired employees, even though there is a significant likelihood that these employees will remain in the job for only a short time.

Second, the record shows that logging employees tend to move from one logging establishment to another, taking their "tools of the trade" with them, particularly their logging boots. OSHA believes it may be appropriate in this situation to allow employees to take their logging boots to the next place of employment, rather than requiring the new employer to provide logging boots. Logging boots are both portable (i.e., not limited in use to or maintained at a particular workplace, like respirators for instance) and in most cases they fit only that particular employee therefore they cannot be reused by other employees. The other items of PPE required by the final rule, such as leg and head protection, tend to be both less personal to the employee and more connected to the workplace itself, and can be readily used by other employees.

Third, there is evidence in the record that employees do use their logging boots away from work. Employees come to and leave work wearing their logging boots, suggesting that the boots are used away from the workplace. In addition, commenters cited specific activities where logging boots are used away from the logging work site. The commenters did not provide any comparable evidence that other items of PPE required by the final rule are also used by employees away from the workplace.

Based on the above, OSHA has decided in the final rule not to require the employer to provide logging boots. The Agency emphasizes that it is the totality of the special circumstances in the logging industry that justify this determination. Of the reasons discussed above, none of them standing alone would provide sufficient justification for departing from the general requirement that employers provide PPE. Rather, it is the combination of these reasons and special circumstances in the logging industry that make it appropriate to allow employees to provide their own logging boots.

OSHA also emphasizes that regardless of who provides the logging boots, the final rule makes the employer responsible for assuring that logging boots are used by the employee and are maintained in a serviceable condition. In addition, in the final rule the employer is responsible for assuring that logging boots are inspected before initial use during a workshift. Attendant to this requirement, the employer is also responsible for assuring that damaged and defective equipment is either repaired or replaced before work is commenced.

With regard to the other items of PPE required by the final rule, OSHA does not believe there is sufficient evidence in the record to justify a departure from OSHA's long-established policy. Neither industry practice nor turnover rates compel the Agency to relieve employers of the obligation to pay for the other items of PPE for loggers. Indeed, evidence in the record shows that many employers are currently providing these other items of PPE (Ex. 5-32, 9-15; Tr. W1 177). The record shows that, unlike logging boots, these items of PPE tend to remain at the workplace and are amenable for use by other employees. Further, there is no evidence in the record of an established practice of employees using such PPE away from the workplace. Also, there is no evidence of established and uniform industry practice of transporting such PPE from job to job. Therefore, in the final rule, OSHA is requiring, except for logging boots, that the employer provide PPE at no cost to the employee.

3. Leg protection. In the hearing notice OSHA raised three issues concerning leg protection for chain-saw operators: specifications for leg protection, the area to be protected, and potential disadvantages of leg protection.

a. Specifications. The proposed rule would have required that chain-saw operators wear leg protection made of ballistic nylon or other material that provides at least equivalent protection. Many commenters supported the leg protection requirement for chain-saw operators (Ex. 5-5, 5-7, 5-17, 5-30, 5-33, 5-42, 5-45, 5-51, 5-60, 5-68, 5-73, 9-9-11; Tr. W2 126-28). Several commenters and hearing participants also supported OSHA's position that leg protection meet certain criteria (Ex. 5-30, 5-60, 5-68, 5-73; Tr. W2 126-28). Two commenters suggested that OSHA require leg protection made with KEVLAR because they believe KEVLAR provides more protection than ballistic nylon (Ex. 5-5, 5-30). One of these commenters said KEVLAR

leg protection provides 50 percent more protection than ballistic nylon with a fraction of the weight and bulk, thus allowing easier movement and reducing fatigue (Ex. 5-30). This commenter also said that the U.S. Forest Service specifications call for KEVLAR leg protection. Other commenters stated that a testing protocol for leg protection should be adopted rather than specifying that leg protection be comprised of any certain type of material (Ex. 5-60, 5-68, 5-72). One commenter said OSHA should adopt the ISO or Canadian testing standards for leg protection (Ex. 9-16). However, other commenters said there was no consensus in this country regarding an appropriate testing standard (Ex. 5-60, 5-68, 5-72). One commenter proposed that the following testing standard be adopted:

[T]he protective garment must have a minimum "Threshold Chain Speed"of 2500 feet per minute for operators using chain saws with an engine displacement of under 65 cc and 3000 feet per minute for operators using chain saws with an engine displacement of over 65 cc. Further the test procedure developed and currently used by the US Forest Service [should] be adopted and defined as the test method used to measure the "Threshold Chain Speed" of safety material (Ex. 5-68).

Another commenter proposed that a different testing standard be adopted in OSHA's final rule:

I propose to replace "ballistic nylon or equivalent protection covering each leg from the upper thigh to boot top or shoe top" by "leg protective device in conformity with the standard NQ 1923-450 "Protective pad for chain saw operators' trousers and leggings.(6)

_____

Footnote(6) NQ 1923-450 is a test standard developed in Quebec Province, Canada.

This performance standard covers all the requirements for safety leggings such as the minimum coverage and a minimum performance level. This performance level is measured in conformity with the standard NQ 1923-450 "Protective pads for chain saw operators' trousers and leggings--Determination of stopping speed and cut-through time." These two standards have been adopted by a consensus of employers, workers, manufacturers of fabrics and PPE, government and workers' compensation boards.

Other participants opposed specific criteria for leg protection performance for several reasons (Tr. W2 206-07, OR 472-75, 496-98, 513- 14). First, some argued that there were no national consensus or State standard to provide guidance on specification standards. Second, others commented that a specification standard limited to "ballistic nylon" was too restrictive (Ex. 5-30; Tr. W2 189-90). Third, others stated that there are no standards establishing specific performance criteria of the material for leg protection. For example, APA testified:

APA does not know of any state leg protection apparel standard in existence or under development. I can report to you that our association has a special committee working on the development of a safety apparel standard, and this committee has generally accepted the Quebec Research Institute testing method, and now it's kind of rewriting this testing method to

meet the American Society of Testing Materials guidelines. So the committee is close to completing its work on endorsing an approved test procedure.

The next step in the committee's charge is to develop a voluntary performance testing standard that would apply for leg protection, safety boots and other apparel. That's going to be a little way down the road. It's own opinion that the work of this committee is not yet mature and that OSHA should probably not attempt to include any specific performance testing standard for leg protection or other safety items at this time. They're recommending that you defer the inclusion of a specific leg protection performance testing standard until the next revision of the OSHA logging regulations, whenever that might be. It may be ten years from now or fifteen years from now. At this point in time, we feel it's much more important to get any safety equipment worn, rather than to worry about whether or not it meets specific performance standard (Tr. OR 472-75).

APA also testified that regional differences in chain-saw operations also precludes a specification standard for leg protection:

I would also say in general our feeling is that logging is so different obviously in every part of the country that often we've got to have lead-way for the types of leg protection that might be appropriate for a person working in the swamps of Louisiana as opposed to the mountains of Montana. Not that we know what those differences might be, but that in general we feel like the loggers in those areas should be able to have the opportunity to design or approve a leg protection that would be appropriate for their situation (Tr. OR 207-08).

The record shows that leg protection for chain-saw operators is essential to prevent injuries. According to the WIR survey, 64 percent of injuries to chain-saw operators were due to kickback, an accident that usually results in injury to the leg (Ex. 2-1). The WIR survey also indicates that 22 percent of all injuries reported were to the leg.

OSHA believes that leg protection made of ballistic nylon or equivalent material is effective in preventing injuries to the leg. A study by the French Farmers' Mutuality indicates that ballistic leg protection was effective in preventing 12 leg injuries in 91 loggers studies over an eight-month period (Ex. 37). Testimony and comments show, however, that there is no accepted testing measurements standard in this country on leg protection performance. In addition, the foreign standards that do exist have not been generally accepted or used in this country. Nonetheless, OSHA believes that a performance-based requirement for leg protection to provide protection against contact with a moving saw chain will provide flexibility for employers while encouraging technological innovation, such as the work by APA.

For these reasons, in the final rule OSHA has adopted the proposed provision requiring that leg protection be worn on each leg by all chain-saw operators. However, OSHA has revised the final rule to require that where the employer provides leg protection made of material other than ballistic nylon, the employer is responsible for demonstrating that it provides protection which is at least equivalent to ballistic nylon, such as KEVLAR. This requirement ensures that

employees are protected against moving saw chains, while at the same time providing flexibility for the employer.

b. Area to be protected and disadvantages of leg protection. The other issues raised regarding leg protection concerned the parts of the chain-saw operator's body that should be covered and its effect on mobility and other potential safety disadvantages of wearing leg protection.

The proposed rule specified that leg protection extend from the upper thigh to the boot or shoe top. Many commenters supported the proposed rule (Ex. 9-2, 9-3, 9-4, 9-5, 9-11, 9-13, 9-15, 9-16, 9-20). One commenter said that the proposed rule followed the requirements of the European draft standard (Ex. 9-11B). Some commenters said the proposed rule was not protective enough and said the equipment for protecting chain-saw operators should be expanded (Ex. 5-14, 5-68). One of these commenters said:

[W]e would recommend that a standard be developed defining the minimum coverage these garments should have, for example from crotch to ankle bone with a minimum width measured at the knee of 9.5 (Ex. 5-68).

The other commenter recommended leg protection be extended to also provide foot protection that is cut resistance to a chain saw (Ex. 5-14). This commenter said that the additional foot covering protection would also assure that the entire leg and ankle were covered if the chaps were not long enough to cover the boot top.

Several commenters, however, said leg protection should be limited in the final rule (Ex. 5-17, 5-45, 5-56, 5-65, 9-1; Tr. OR 227, 633-34). Most of these commenters said that OSHA should not require leg protection to extend from the upper thigh to the boot or shoe top. First, these commenters said that extending leg protection from the thigh to the boot or shoe top was not necessary because most of the injuries occur to the area around the knee. For example, one commenter stated:

A person using a chain saw would have to do some pretty spectacular gymnastics to receive a chain saw cut more than 4" below the knee. Once again, we have no recordable injuries for the last 7 years involving chain saw cuts more than 4" below the knee (Ex. 5-45).

Another commenter stated that leg protection was not necessary for climbers and bucket truck operators:

The major hazards for these individuals are cuts to the upper body from saw kick-backs and falling material. Leg protection should not be required, however the use of some of the new lighter and more pliable pads sewn into pants should be encouraged whenever feasible (Ex. 5-19).

Second, commenters stated that the small risk of injury to the lower leg was outweighed by the risks due to lack of mobility caused by full-length leg protection. For example, one said:

We have received numerous comments from our membership throughout the country who use leg protection (or chaps) suggesting that chaps only extend to just below the knee. Chaps that extend to the boot top, or shoe top, as required in proposed Section (e)(1)(ii), impede mobility and cause a greater safety hazard than the standard works to protect against. Our members believe that the highest risk for chain saw cuts occurs from the knee to the thigh. Thus, chaps that cover the leg from the upper thigh to just below the knee are sufficient (Ex. 5-56).

Third, one commenter testified that leg protection to the boot or shoe top would pose an unreasonable financial burden on employers (Tr. OR 633-34). According to the participant, different loggers use the employer-provided leg protection each day. Because all loggers are not the same height, the leg protection provided may not reach to the boot or shoe top or may be too long for other loggers to wear safely. This participant suggested that the only way an employer could guarantee compliance with the required fit of the leg protection would be to provide fitted leg protection to each individual logger. The participant recommended the following:

We suggest [leg protection extend] to below the knee because these come in various lengths. And certainly in those times you can't always stretch a pair of chaps that somebody maybe having to put on to operate a chain saw all of a sudden to get it down to the boot top (Tr. OR 633-34).

Fourth, some commenters stated that leg protection that extends to the boot or shoe top might cause mobility problems, and would therefore be hazardous for chain-saw operators (Ex. 5-19, 5-20, 5-55). For example, one commenter stated:

Rigging crews will occasionally use a power saw. If they are required to wear leggings, it could be more dangerous than not having anything. This is one of the reasons rigging crews prefer suspenders rather than a belt because you don't get "hung up" so often. Anything that is going to hinder mobility is a problem (Ex. 5-20).

Another commenter recommended that OSHA limit leg protection to just one leg for cutters (i.e., the leg in front that is used to maintain balance during cutting) (Ex. 5-65). However, this commenter also admitted that any chain-saw operator who is clearing brush needs to wear protection on both legs because the saw is continuously and perilously close to either leg at all times.

Other commenters said leg protection should be limited because heat and humidity could increase worker fatigue or cause problems that might exceed the benefits of leg protection (Ex. 5-25, 5-26, 5-59, Tr. W2 206-07). For example, one commenter stated:

OSHA proposes that employees are assigned duties that require an operator of a chain saw to wear ballistic nylon or equivalent protection that must cover each leg from the upper thigh to the boot top. This does not take into consideration the various temperature factors which could increase fatigue. Fatigue is a major cause of injuries. As stated, on Page 11802 [of the preamble to the proposed standard], Alabama and Georgia are states that are among the leaders in logging activities. Due to the high heat and humidity of these states, the requirement

to wear ballistic nylon chaps could possibly increase injuries as a result of the fatigue caused by hot, humid summer weather (Tr. W2 206-07).

Another comment added:Clause (e)(1)(ii) should allow exceptions to the wearing of leg protectors for all circumstances (not just climbers) in which there is a greater hazard than working without them (for instance, fatigue from heat and humidity or loss of mobility in heavy undergrowth etc.). It would be even more appropriate if the wearing of "leg protectors" were made optional, depending on the individual work circumstances. One study, (The Role of Personal Protection in the Prevention of Accidental Injuries in Logging Work, T. Klen and S. Vayrynen, Journal of Occupational Accidents, 1984) concluded that personal protectors have not been very effective and that this was a result of a phenomena known as "risk compensation", the tendency of workers to be more careless when they believe that personal protectors will prevent injury (Ex. 5-59).

OSHA has carefully reviewed the record on this issue and, for several reasons, has decided in the final rule to retain the requirement that leg protection cover the upper thigh to the boot top. The record clearly shows that chain-saw operators face a significant risk of injury due to kickback. The WIR survey indicates that 64 percent of all chain-saw injuries reported were the result of kickback (Ex. 2-1). Further, the WIR survey shows that almost 30 percent of all injured employees were not wearing leg protection at the time. Also, almost one-fourth of all injuries reported were to the leg.

According to the Maine BLS survey, chain-saw accidents accounted for 26 percent of all reported injuries and more than half of those accidents involved chain-saw kickback.

OSHA does not believe the record supports the commenters' claims that chain-saw injuries only occur to the area around the knee. Injuries to the lower leg as well as the knee are significant. The WIR survey indicated that nine percent of all employees reporting injuries were hurt in the lower leg or ankle, while 11 percent were injured in the knee.

The available accident and injury data also do not support the commenters' argument that lack of mobility is a greater hazard to chain-saw operators than lack of leg protection. To the contrary, the data clearly show that the risk of chain-saw kickback is far more serious than any of the potential dangers that have been suggested with regard to leg protection (Ex. 2-1). For example, according to the WIR survey, none of the chain-saw operators said they had been injured because they did not have enough time to retreat from the falling tree. On the other hand, almost two-thirds of the chain-saw operators were injured because the chain saw kicked back. In any event, OSHA believes that other provisions in the proposed and final rule will adequately address concerns about mobility. For example, the requirement to plan and clear retreat paths before commencing cutting will protect employees who would be at risk from decreased mobility.

Finally, OSHA believes the new innovations in leg protection technology address the commenters' concerns about costs, mobility, fatigue and heat stress. First, the record shows that full-leg protection now being manufactured is light-weight and relatively cool (Ex. 5-68, 9-4). The record also shows that light-weight leg protection that is inserted or sewn into

logging pants is now available. According to one commenter, these new innovations make leg protection tolerable even in the hot and humid southern logging regions. OSHA believes these innovations will reduce fatigue and heat stress and will prevent mobility from being impeded. Second, the record shows that foot coverings are available that can supplement protection in those instances where leg protection may not fully cover the logger's lower leg. These devices will provide adequate protection in those isolated instances where leg protection may not be long enough without requiring the employer to purchase leg protection in many different sizes.
4. First aid. The hearing notice raised two issues about first aid:

the number of employees who must have first-aid training, and the elements required as part of that training, such as cardiopulmonary resuscitation (CPR).

a. Number of employees trained. The proposed standard specified that all supervisors and all fellers be adequately trained in first aid methods as prescribed by the American Red Cross, the Mine Safety and Health Administration or an equivalent training program. In addition, the proposed rule included a provision that at least one person in the "operating area" have first-aid training.

OSHA received many comments regarding the number of employees who should be trained in first aid in order to provide adequate protection. There was no consensus among those commenters on the appropriate number of employees who must be trained. Their recommendations about the number of employees who should be required to receive first-aid training covered a wide range of options, including the following:

1. All employees (Ex. 5-7, 5-17, 9-15, 9-20; Tr. W1 175, W2 209, OR 100, 375, 393, 681);

2. All supervisors and fellers (Ex. 9-3, 9-13);

3. All supervisors and enough additional personnel so each work site would have a trained employee (Tr. OR 21);

4. All supervisors and fellers, plus two additional employees on a logging job (Ex. 5-54; Tr. OR 647);

5. All supervisors, fellers, and one-fifth of remaining crew members (Ex. 9-19, Tr. OR 282);

6. All supervisors, fellers and one-fourth of remaining crew members (Tr. OR 206); and

7. All supervisors and some fellers (Ex. 5-36, 5-53, 5-55, 5-63). Commenters who recommended first aid training for a limited number of employees, said that training all fellers or all other employees was excessive since the proposed rule would also require employees to work within visual or audible contact of another employee (Ex. 5-36, 5-55). Another commenter said that requiring all fellers to be trained would be duplicative since more than one feller may work at a work site (Ex. 5-63).

Other commenters said they already provide first-aid training for each employee:

Everyone--all the people on our crew are trained [in first aid] on a rotating basis. Now, the fellow that's been with us six months, he has not been to the first-aid class yet. Also, one of the--I believe it's in with the Nortim Corporation, the Nortim self insured, it is one of the regulations that we do have people on the job that are versed in first aid (Tr. OR 174).

Another hearing participant stated:Along with overall safety training, I feel that required first aid training for all employees is simply common sense (Tr. OR 393).

Other commenters indicated that they are providing first aid training to a substantial portion of employees, in part because the company's logging operations are in isolated locations in Alaska:

Mr. Lesser: Does your training program include first aid training?Mr. Bell: We provide first aid training to just about whoever wants it.Mr. Lesser: Who do you require to have first aid training? Mr. Bell: We require all supervisors, leadmen, hook tenders, leaders of crews.Mr. Lesser: Using the voluntary nature offering the first aid, do you get a lot of volunteers? What percentage of the work force is trained in first aid? Mr. Bell: I'd say 35 percent (Tr. OR 375).

As discussed above, there is no dispute that logging is a hazardous industry. All data sources in the record show that a significant number of accidents occur in the logging industry and that the severity of injuries sustained by loggers is greater than that suffered by employees in other industries. Loggers often work in isolated locations that are far from hospitals or health care providers that sometimes are accessible only by helicopters or vehicles designed to operate on the most rugged terrain (Ex. 9-20; Tr. OR 21). Accordingly, loggers need to be trained and equipped to handle the significant number of severe injuries that might arise. In many instances these trained employees will be the only persons available to render assistance at a critical time.

OSHA believes that first aid training for only a select few individuals, such as supervisors and fellers, is not adequate to ensure that injured loggers receive first aid that is timely and appropriate. First, when only a few selected employees are trained, they may not be close enough to the site of the accident to render assistance in time. The WIR survey indicates that more than one-half of all injuries reported occurred at cutting sites, that in most cases are remote from landings and from medical facilities (Ex. 2-1). The WIR survey is consistent with the OSHA FCI study, that indicated that more than 70 percent of logging employees killed were working at cutting sites (Ex. 4-61). One hearing participant reinforced this problem:

The rigging crew is often 1,000 feet and sometimes 5,000 feet from the landing. The work site is usually on rough, steep ground, and these workers often use hazardous cutting implements such as axes and chain saws. If the first aid trained person and the first aid kit are in the yarder, that can be 15 minutes or more from where the worst exposure is (Tr. OR 21).

In addition, since the final rule allows employees to maintain contact with another employee by visual or audible contact, an employee may be miles from the contact person when radio

communication is used. In such cases, the contact person may not be able to provide immediate first aid assistance.

Second, limiting first aid training to all supervisors and some additional personnel may not be adequate when supervisors are not at the work site when an accident occurs. According to the State of Washington, logging supervisors usually have two or more logging crews working directly for them (Ex. 5-34). These logging crews are often dispersed over five square miles or more. In addition, in larger operations, foremen usually see each crew only once a day and rarely for more than one hour of the workshift. Another commenters said in his experience it was not uncommon to find a group of employees working in a location without a supervisor and no other employee in the group has a current first aid certificate (Ex. 91-5).

Third, a logger's injuries may be of such severity that several persons trained in first aid may be needed to stabilize the injured employee and treat the injury. If only one employee is trained, the first aid assistance may not be sufficient.

Fourth, when only one employee in a work site is trained, as the proposed rule contemplates, first aid will obviously be inadequate if the trained person is the one who is injured. (Although first-aid training does include instruction in self-aid, the injuries may be severe enough to incapacitate the trained employee.) For example, in a small working crew that has no supervisor, the feller may be the only employee who is trained in first-aid. If the feller is injured, there may be no other logger in that work crew who is trained to provide first aid. The WIR survey indicates that one-half of all loggers who were injured were performing felling tasks (i.e., felling, limbing, bucking) at the time.

Fifth, when only a few employees receive first-aid training, there is a greater likelihood that there could be crucial gaps in coverage due to sickness, vacations, other leave, or employee turnover of those few who have received training. In addition, an employer may not know from day to day if an employee will be present that is holding a current first aid certificate (Ex. 5-7).

OSHA notes that some commenters opposed requiring every employee to have first-aid training because of the transient nature of the logging industry. OSHA finds that the commenters' argument does not support the position that fewer employees should be trained. If there is high employee turnover, it may be the trained employee who is not employed any longer. If work continues without a fully-trained person while a first-aid replacement is being trained, employees may be at great risk. By contrast, if work has to be stopped until a replacement can be trained, the employer could incur costs which could be prevented by having adequate first aid coverage in advance. If all employees working in the logging industry are required to have first-aid training, a pool of trained employees will always be available to employers for hiring.

Fifth, requiring that each employee be trained eliminates confusion and may be less administratively burdensome than making a daily check and rescheduling of work assignments

to assure that supervisors, fellers and some additional number of employees in each operating area hold current first aid training certificates.

To ease the training burden for employers, the final rule does not require that the first-aid training be provided by the employer. Rather, the final rule requires that the employer assure that each employee performing logging operations receives or has received first-aid training and that the first-aid training/certificate is current. For example, as one means of complying with the final rule, the employer could make first-aid training a condition of hiring or continued employment. The employer would be free to hire only those persons who had previously obtained first-aid training and kept their certificate current. In addition, when there is employee turnover, trained employees will be able to bring their first-aid skills from one workplace to another and thus relieve the training burden for the new employer.

OSHA is aware that some employers currently provide first-aid training and most likely will continue to provide such training. OSHA is also aware that a number of organizations and schools provide first-aid training that would meet the requirements of Appendix B. For example, the American Red Cross, the Mine Safety and Health Administration, State extension services, community colleges, and adult education programs all provide first-aid training that includes CPR. As such, OSHA does not believe that the requirement of assuring that all employees have received first-aid training that remains current will pose an unreasonable burden on any employer or employee.

b. Elements of first-aid training. In the hearing notice, OSHA requested comment on the specific elements, such as CPR, that should be included in first-aid training. In the proposed rule OSHA did not specify the basic elements in which supervisors and fellers must be trained. Rather, OSHA proposed that first-aid training meet the requirements of courses provided by the American Red Cross, MSHA or an equivalent training program.

Several commenters recommended that OSHA require CPR training as part of required first-aid training (Ex. 5-42, 5-49, 5-50, 9-2, 9-19). Both NIOSH and the U.S. Dept. of Interior supported the CPR training requirement. Because loggers, especially those deep in the woods are not close to medical facilities during the "golden hour" where resuscitation may save a person's life, OSHA agrees with the commenters that it is essential that all loggers be able to perform CPR. Therefore, in the final rule OSHA has included a requirement for annual CPR training.

In addition, OSHA has specified other basic skills and knowledge in Appendix B (mandatory) that are important for providing aid to injured loggers in isolated settings. OSHA is aware that there are many well- recognized first-aid programs that have broad-based curricula which already satisfy OSHA requirements.

5. Visual and audible contact. In the hearing notice OSHA requested comment on the maximum time and/or distance separation between employees. In the proposed rule, OSHA included a requirement that employees work within visual or audible contact of another employee, so that someone would be able to respond quickly in case of an accident or other emergency. The proposed rule prohibited the use of engine noise, such as from chain saws, as

a means of contact. Various State logging standards also prohibit the use of chain-saw noise as a means of signaling (Ex. 2-17, 2-18, 2-19, 2-21, 2-22, 38J, 38K).

OSHA received many comments on the contact and signaling provisions. Many commenters testified that the proposed contact requirement is necessary (Ex. 5-14, 5-17, 5-27, 5-74 through 5-92, 9-2, 9-3, 9-5, 9-13; Tr. W2 197-98). One commenter said:

We think that visual or audible contact is important and will save lives. There are also electronic devices, some sophisticated and some like citizen band radios, that can be used by forest workers to maintain audible contact by electronic means. We recommend that the existing proposed language be retained but modified perhaps to allow audible contact by electronic means (Tr. W2 197-98).

Certain commenters urged OSHA to make the contact requirement stricter than that proposed. One commenter said employees in solitary jobs also need to remain in contact and, therefore, should be provided with two-way radios (Ex. 9-15). Another commenter said OSHA should require employees to remain within visual contact of another crew members (Ex. 9-20). Finally, two commenters recommended that OSHA require employees to work within normal hearing or calling distance of another employee (Ex. 9-19; Tr. OR 679-81).

However, several commenters expressed various concerns about the contact provision, and particularly the prohibition against chain-saw noise as a means of contact. First, some participants said the requirements would have an adverse impact on small employers, especially employers with work crews consisting of three or fewer loggers (Ex. 5-21, 5-28, 5-35, 5-49, 5-53, 5-54, 5-70). For example, one commenter said:

This requirement may adversely affect the livelihood of many small-scale loggers in the South who may work alone in the woods, or operate a single mobile ground skidder or felling machine and are frequently out of contact with other phases of the logging operation (Ex. 5-28).

Another commenter stated:This requirement would not be practical for several reasons:(1) there are a number of logging contractors that work alone,

(2) log crews with two or three members are often out of contact because the great distance between the faller and log header,

(3) even at close range, visual and audible signals are attenuated by thick brush and loud machinery.

My experience has been loggers will keep track of their fellow workers the best they can but, due to the nature of the job, individuals will be separated for certain lengths of time. To require loggers to be within signaling distance of one another will preclude the existence of one and two man log crews, working in thick brush, working in hilly topography, skidding long distances, the use of ear plugs or working with loud machines (Ex. 5-70).

Second, some commenters believed the contact requirement conflicted with the proposed requirement to maintain a distance of two tree lengths between work areas (Ex. 5-12, 5-29, 5-4, 5-67, 5-70). These commenters said that a separation of two tree lengths between work areas might make it impossible to maintain contact due to saw noise and obstructions such as hills or vegetation. One commenter explained:

If this code goes through and is enacted, it would change the timber falling industry in Alaska. Southeast Alaska is a relatively new geological area. We work on steep ground that is broken up by draws, gullies, cliffs. We have our timber fallers work together as partners. One works in one strip or one area of the hillside and the other one works in another area of the hillside. For safety reasons, our company requires that they work at least three tree lengths apart. And often with the broken up terrain, that precludes visual contact (Tr. OR 353).

Third, comments were received on the prohibition of chain-saw noise as a signaling device. Some participants supported the prohibition (Ex. 5-27, 5-34, 5-42). Other commenters argued that chain-saw noise is currently being used as a means of contact in the logging industry and should be allowed in the final rule (Tr. W1 65; OR 86, 353-55, 356-58, 384-85, 694-96). For example, one commenter said the sound of chain saws is an indicator that someone is working at a specific location (Tr. W1 65). Another commenter stated:

[W]e have been counting on chain saw noise for years. Chain saw noise is possible, and by the way, that's my most dangerous part of my job is to do a safety inspection or to go up and check on cutters in a strip, to approach cutters. And I listen to the saw. And I can tell when they are putting a cut into a standing tree or bucking a log with the chain saw noise. If we are not allowed to use chain saw noise as audible contact, that means we may have to go back to double jacking which is a faller and a bucker working in tandem (Tr. OR 353-55).

This participant also said that chain-saw noise should also be permitted because 103-decibel chain-saw engines render 92-decibel personal alarm systems inadequate as means of audible contact (Tr. OR 355).

Fourth, several commenters urged OSHA to adopt various alternatives and modifications to the proposed contact requirement (Ex. 5-54, 5-55; Tr. OR 670-81). For example, commenters suggested that OSHA replace the contact provision with a "check-in" requirement:

In West Virginia, a cutting crew often consists of a worker who fells and limbs the trees and a worker who operates a skidder. Consequently, it is often necessary that the feller be left alone in the woods, without audible or visual contact with another worker, for short periods of time while the skidder operator is making the trip to the log landing. Also, it is common practice for workers to be constantly checking on one another. Upon his return from the landing, the skidder operator immediately checks on the feller; and, the feller, if the skidder operator does not return in the normal time span, will check on the skidder operator.

Considering the common small cutting crew size, the practice of constantly checking on one another, and the difficulties involved in using an audible signal capable of being heard over distances, over machine noise, and through hearing protection devices, it is our

recommendation that this aspect of the Standard be changed to allow a worker to be out of "visual or audible signal contact with another person" for short periods of time. Due to the normal time involved for transporting a skidder load to the landing, unhooking, and returning, we recommend that this short time period be established at 20 minutes (Ex. 5-54).

Other commenters also suggested that OSHA allow employees to be out of contact from other employees for short periods of time (e.g., 15 to 20 minutes, the time to take a load to the landing and return) (Ex. 5-54; Tr. OR 670-81).

OSHA has decided in the final rule to retain the requirement that employees work within visual or audible contact of another employee. As discussed above, most commenters indicated that remaining in contact is important to the safety of loggers. Several commenters said that supervisors use chain-saw noise to identify where and whether an employee is working. However, they did not provide evidence that chain-saw noise provides an effective means of communicating information from the employee or from the supervisor. For example, data and information available to OSHA indicates that even though chain-saw noise is currently used as a means of maintaining contact, there are still reports from OSHA case file investigations of loggers being injured and not being discovered until after the shift has ended (Ex. 1). In addition, chain-saw noise does not provide the cutter with an adequate means of communicating with others in the event they have become injured or are in other trouble. Since all chain-saw noise indicates is whether an employee is working, the cutter must wait until another employee recognizes that the lack of noise means the cutter needs assistance. This may delay rendering that assistance. OSHA believes the cutter, not just the supervisor, needs to have a method for communicating when necessary. Radios and telephones are modern communication methods that are increasingly used in this logging industry. These methods, unlike chain-saw noise, provide immediate two-way communication.

Although OSHA has decided to retain in the final rule the prohibition against use of chain-saw noise alone as a means of contact, the final rule does provide employers with a great deal of flexibility in maintaining contact with employees. First, permitting radio communication to be used as a means of contact allows contact to be maintained while at the same time maintaining a two tree-length distance between adjacent occupied work areas. Second, permitting contact to be maintained by radio or whistles allows employees to work alone rather than limiting employees to working in teams that are within visual distance of each other. Allowing radio contact will also provide flexibility for small radio crew operations when visual or voice contact may not be possible. Third, OSHA also believes that permitting radio contact will not be unduly burdensome for the industry since many companies already are utilizing electronic communications (Ex. 5-27; Tr. W2 227).

With regard to the issue of equipment noise preventing radio communication, OSHA notes that radios are available with ear phones that fit inside hearing protection muffs. Where such ear phones and hearing protectors are provided, equipment noise will neither interfere with communication nor should result in occupational hearing loss.

Because contact may be maintained by radio, OSHA has removed the exception to the contact requirement for "single employee assignments." OSHA believes that radio communication

already is necessary in order for many of those single employee jobs to be performed (e.g., watchman). As such, OSHA does not believe that extending the radio contact requirement to all logging operations will unduly burden employers, while at the same time it will provide important protection for all loggers.

6. Chain-saw protective devices. In the proposed standard, OSHA did not include a provision requiring chain saws to be equipped with chain brakes or other devices that prevent kickback. The proposed standard also did not require chain saws to meet any performance criteria of any standards-setting organizations. Rather, OSHA proposed only to require employers to inspect and maintain chain-saw safety devices when chain saws were so equipped. The hearing notice requested further comment on the adequacy of various chain-saw safety devices and what regulatory action OSHA should take in the final standard regarding chain saws.

There was no dispute among commenters that chain-saw protective devices are necessary to prevent operators from being injured. The record shows that the chain-saw bar can kick back in less than 0.3 seconds (Ex. 4-172). The record also shows that average human reaction time, however, is only 0.75 seconds (Ex. 4-172). That means in many cases the operator cannot take action quickly enough to avoid being struck by the chain saw. The record also shows that many injuries in the logging industry are the result of chain-saw kickback. According to the WIR survey, 20 percent of all logging injuries reported involved chain saws and almost two-thirds of those injuries were the result of chain-saw kickback (Ex. 2-1). The Maine BLS survey also shows that chain-saw injuries account for a significant number of logging injuries (26%) in that State (Ex. 4-175). Similar to the WIR survey, the Maine BLS survey indicated that over half of all chain-saw accidents resulted from kickback.

a. Devices to prevent chain-saw kickback. Information submitted to the docket indicates that there are four devices that exist to reduce or minimize the risk of injury due to chain-saw kickback. These devices are chain brakes, bar tip guards, reduced-kickback guide bars, and low- or reduced-kickback saw chains. Information about these devices was taken from a 1983 report prepared for the Consumer Product Safety Commission (CPSC) (Ex. 5-13) as well as comments to the proposed rule. The discussion that follows explains the different devices and their advantages and disadvantages.

The chain brake is a device for stopping the saw chain when kickback occurs before the chain can contact the operator. The most common type of chain brake is actuated when the operator's hand or arm hits the brake lever that is located immediately ahead of the front handle. When kickback occurs, the chain brake may either be actuated by the operator's hand pivoting forward on the handle, or by the hand being dislodged from the handle, striking the brake lever. According to the CPSC report, chain brakes, unlike new technology chains and safety guide bars, do not have any adverse effect on the cutting effectiveness of chain saws. The record also indicates that one of the advantages of chain brakes is that, unlike other protective devices that can be removed, the chain brake is an integral part of the saw and is difficult to remove (Ex. 4-174). As such, chain brakes deter the disabling of the kickback prevention system by the operator (Ex. 5-19).

The bar tip guard (or nose tip guard) is a device that is bolted or screwed onto the tip of the bar. Its primary function is to prevent contact with the tip of the bar from which kickback is generated. Commenters identified three problems with bar tip guards. First, one commenter said bar tip guards are not usable in felling and bucking of some trees (Ex. 9-16). This commenter said forward leaning trees usually require the bar tip to fell the tree safely.

Second, two commenters said the hazards associated with bar tip guards outweigh their protective value (Ex. 5-42, 9-20). According to NIOSH bar tip guards reduce kickback danger only under certain conditions, that is, when the log or limb is elevated and does not have any off-angle to cause pinching of the bar (Ex. 5-42). NIOSH concluded that the bar tip guard may pose greater hazards than saws without tips because they require the bucker to maintain working stances that are less stable. The other commenter said that the bar tip can get caught on limbs. Third, the major problem with bar tip guards is that they are removable (Ex. 5-13, 5-13H). According to the CPSC report, the bar tip guard is removed by operators because it reduces the utility of the saw by preventing boring and the cutting of any logs that are wider than the guide bar. Evidence in the record indicates that bar tip guards are being removed by a significant number of operators:

Only about half of the operators of saws so equipped always use such guards. About 36 percent never use them, and about 12 percent sometimes take them off the guide bar. Thus, while nose tip guards are effective anti-kickback devices, many operators remove them from their saws (Ex. 5-13).

The Portable Power Equipment Manufacturers Association (PPEMA) submitted testimony from CPSC's own proceedings, which also acknowledged the extent to which bar tip guards are removed from chain saws:

[T]he Commission received the benefit of a survey that was done on the part of the NESDA, National Equipment Servicing Dealers Association. They on their own surveyed hundreds of their dealers. * * * [T]heir survey corroborated my own personal observations, namely, that in real life practice users of chain saws in the droves are simply not using that nose tip, and while if it were used or if it were permanently established on the saw, it would be a complete barrier to kickback, the fact of the matter is because it's temporary and because it is removed, because in my view it affects in the case of the dealers, as you'll see from their comments, it affects the efficacy of the saw, it is taken off, and as a result provides no protection, zero.

Just to cite from the survey, 73.5 percent of the responding dealers to the NESDA survey reported that only zero to five percent of the chain saws brought into their shops for repair, of the ones that were originally equipped with the nose guards, that 73.5 percent of the dealers responded that only zero to five percent had nose guards in place. Another 9.3 percent reported that six to ten percent of such saws had nose guards in place, leaving only 17.1 percent of the dealers who put the figure of nose guards in place at something more than ten percent.

The unmistakable conclusion is that the overwhelming majority of consumers are removing the nose guards from their saws and not putting them on in the first place.

The survey also revealed that almost no consumers are interested in replacing nose guards that are not in place. Eighty-eight percent of the dealers, 88 percent, stated that zero percent of their customers wanted replacements, and an additional 8.9 percent put the replacement request at a mere one to five percent (Ex. 5-13H).

There are two different types of reduced-kickback guide bars. One is designed and manufactured with a taper from the back of the bar and has a correspondingly small radius of curvature at the tip of the bar. This type of bar is commonly referred to as a narrow nose bar. The other type of reduced kickback guide bar has a reduced radius nose but achieves its taper from the fact that the top and bottom edges of the bar a asymmetrical (the top and bottom edges are curved and have a different radius of curvature). This type bar is commonly called a banana bar because of its peculiar shape. According to the CPSC report, both the narrow nose bar and the banana bar have significant drawbacks, primarily in the useful life of the bar and chain and the efficiency of the chain saw. The narrow nose bar, because of its reduced radius of curvature at the tip, receives more stress at the tip, thereby requiring more frequent replacement. Because of its asymmetrical design, the banana bar cannot be merely turned over when the bottom edge of the bar becomes worn, but must be replaced. This type of bar also reduces the ability of the operator to use the saw for boring. This disadvantage is compounded if the saw also is equipped with a low- or reduced-kickback chain.

[T]he use of low-kickback guide bars results in a tradeoff of some reduction in utility for an improvement in safety. Industry sources have suggested that this may be an acceptable tradeoff for the less powerful saws which are probably purchased by consumers. Since the tradeoff involves a marginal improvement in safety, however, manufacturers are probably less willing to equip the more powerful, more performance oriented saws with the low-kickback guide bars (Ex. 5-13).

Finally, the potential for kickback can be reduced by the low- or reduced-kickback chain. This chain is commonly referred to as new generation chain. Low kickback chain can be identified by an idler or spacer link between each of the cutting links. In other words, the chain has a left hand cutter link on the right side of the chain, followed by a spacer link, followed by a right hand cutter link on the left side of the chain followed by another spacer link before the sequence begins again.

Although the low-kickback chain can reduce kickback energy by 40 to 90 percent, there are drawbacks to its use, according to the CPSC report. These drawbacks include: (1) New technology chains generally exhibit some loss in cutting efficiency (speed and ease of cutting), (2) these chains make cutting more tiring for the operator thereby causing more operator fatigue, and (3) the loss of cutting efficiency may adversely affect the life of the chain. The loss of cutting efficiency has been estimated to be anywhere from a 10 to 25 percent. OSHA has no estimates of the increase in operator fatigue and the degradation in the service life of the chain.

Of the four protective devices, most commenters said OSHA should require chain saws to be equipped with a chain brake because it is the most used and most effective for professional logging operations (Ex. 4-175, 5-17, 5-19, 5-21, 5-27, 5-34, 5-42, 5-46, 9-3, 9-4, 9-13, 9-15, 9-18, 9-20; Tr. OR 536-37). Several of these commenters said that all chain saws used at their establishments are equipped with chain brakes. These commenters also said that almost all manufacturers now produce chain saws with some kind of chain brake and that almost all chain saws manufactured for commercial logging operations now have chain brakes (Ex. 5-19; Tr. OR 185-87, 536). In addition, one commenter said that manufacturers have improved earlier mechanical problems with chain brakes so that they are reliable in preventing kickback (Ex. 9-4). With regard to the effectiveness of chain brakes, one commenter said:

The chain brake is, I'd say, one of the most important chain saw protective devices developed in modern history. In Montana all of our current professional saws are equipped with chain brakes. Most of our saws are in the four to six cubic inch range, primarily, Stihl and Husqvarna with a few other minor brands and seldom on job visitations do I find anyone who has disconnected the chain brake. It's so uncommon that it's startling when I find that any more.

The other protective device that I see that's had substantial improvement is the throttle lock mechanism where it has to be held down with your palm in order for the trigger to operate. For years it was common that the first thing a logger did was he got a roll of black tape and he would tape that down so you didn't have to operate that. Through our progressive Montana Sawyer Safety Program and other efforts I brag to people that we now have developed a genetically superior timber faller in Montana that can now squeeze with his palm and pull with his trigger finger at the same time.

These two chain saw protective devices combined with leg protection have had a significant impact on the reduction of accidents in Montana relative to timber falling. In fact, it's been so significant that I don't even consider the other options of even any application to logging when we talk about the low kickback bar, the low kick-back chains and even the bar tipped guards. They may have individual special application but I'm thoroughly convinced with the chain brake, the throttle lock and the leg protection we've so significantly reduced chain saw injuries that any further attention is maybe some wasted effort and just further develops additional conflict (Tr. OR 536).

Mr. David Kludt, Logging Safety Program Supervisor for the State of Idaho, testified that 10 percent of all logging accidents each month are the result of chain-saw kickback and that these accidents could be drastically reduced by the use of chain brakes (Ex. 9-4).

In addition, Maine BLS says that chain brakes have played a significant role in lessening the effects of chain-saw injuries in that State (Ex. 5-174). They reported that only 13 percent of chain-saw accidents where chain brakes were present resulted in hospitalization, while nearly half of all other accidents required hospitalization.

Some commenters, however, disputed the effectiveness of chain brakes for preventing kickback (Ex. 5-39, 5-59, 5-66). One of these commenters said chain brakes were not reliable

and required frequent maintenance, however, no evidence or data were presented to support the contention (ex. 5-59). Another commenter said that a study showed that while chain brakes reduced kickback by 80 percent, non-kickback accidents showed a 400 percent increase (Ex. 5-66). However, the commenter also admitted that the study was from 1972 and that chain brakes had undergone significant improvement since that time. Another commenter said chain brakes, depending on their design, could become entangled in the brush the saw is clearing and create a safety hazard (Ex. 5-39). The WIR survey, however, does not support the commenter's argument. None of the chain-saw operators reporting injuries said their chain brake had become caught (Ex. 2-1).

b. OSHA regulatory action. Many commenters said that the final rule should include requirements for chain-saw protective devices (Ex. 5-17, 5-19, 5-21, 5-27, 5-34, 5-42, 5-46, 9-3, 9-4, 9-13, 9-15, 9-18, 9-20; Tr. OR 536-37). However, some commenters, including chain-saw and chain-saw accessory manufacturers, said OSHA should include performance requirements for chain saws in the final standard rather than specification requirements (Ex. 5-4, 5-8, 5-13, 5-15, 5-26, 5-37, 5-59). Many of these commenters supported incorporating by reference the American National Standards Institute (ANSI) B175.1-1985 standard on "Safety Requirements for Gasoline Powered Chain Saws" (Ex. 5-4, 5-8, 5-13, 5-15, 5-26, 5-37, 5-59). The ANSI standard specifies a performance criteria for manufacture and testing of chain saw safety features, such as protection from chain-saw kickback. One commenter summed up their rationale:

[T]he Status Report on Chain Saw Related Hazards since the 1985 Revision to The Voluntary Standard ANSI B175.1, which was prepared for the Consumer Product Safety Commission in March of this year, is a testimonial to the fact that the reduction in chain saw injuries is the result of adherence by manufacturers to the voluntary standard. There truly is little to be said in defense of OSHA when it chooses to knowingly ignore the demonstrated success of the chain saw voluntary standard, which equates compliance with the use of a combination of devices, in favor of an arbitrary and inexpert agency decision to the effect that one specific device, in and of itself, is superior to any other device or combination of devices permitted by the standard (Ex. 5-4).

These commenters stated that OSHA would create "confusion in the marketplace" if OSHA adopted requirements that were significantly different from the ANSI chain-saw standard that all manufacturers have been voluntarily following (Ex. 5-4).

Other commenters, however, opposed incorporating the ANSI standard in the final rule (Ex. 5-27, 5-48; Tr. OR 118). These commenters said the ANSI standard was developed to protect consumer chain-saw users, not professional loggers:

The ANSI B175.1 Standard was developed from an injury data base that was consumer based and therefore its direct application to pro-logging may not be justified (Ex. 5-27).

Two commenters said that ANSI standards were not known to most loggers, were not readily available, and were not written in language that the average logger would comprehend (Ex. 5-27; Tr. OR 118). One of these commenters said OSHA, therefore, should put its requirements

in the standard rather than requiring logging employers to obtain and read another document (Tr. OR 118). He added that placing the requirements in the regulatory text would increase compliance.

As discussed above, many commenters supported a requirement that all chain saws be equipped with chain brakes rather than just referencing the ANSI standard. In general, these commenters said chain brakes were the most effective device to protect operators from kickback and to provide extra protection when the saws are carried between cutting jobs. In addition, one commenter supported a chain brake requirement for the following reason:

The U.S. should follow the lead of other countries (European) and require that all saws have an operating chain brake if purchased after the adoption of these regulations. The cost would be minimal since the majority of saws now come equipped with these devices. This would also help deter the disabling of the brake system by operating personnel (Ex. 5-19).

OSHA agrees with commenters that the final standard should include requirements on chain-saw protective devices. The final rule does incorporate by reference the ANSI B175.1 consensus standard, but the Agency believes that the ANSI standard alone does not provide the necessary degree of safety for logging employees. Accordingly, for several reasons, the final rule also requires that chain saws placed into initial service after the effective date of the standard be equipped with chain brakes. First, there is considerable evidence in the record that chain brakes are effective and the most used device to prevent kickback. Second, they have strong acceptance by logging professionals, and as a result, already are standard equipment on almost all chain saws currently manufactured. Third, chain brakes do not have the disadvantages of the other protective devices. For example, unlike bar tip guards, chain brakes are not removed by operators. Unlike reduced-kickback guide bars and low- or reduced-kickback chains, chain brakes do not affect production efficiency. Fourth, other countries also have adopted provisions requiring chain saws to be equipped with chain brakes (Ex. 5-19).

Fifth, OSHA agrees with commenters who are concerned that, in order to maximize compliance, the standard be comprehensible to the average loggers. This is especially important for chain-saw safety, since many employees provide their own chain saws. These employees and their employers need plain and simple direction about what protection must be provided for each chain-saw operator. OSHA does not believe that the ANSI standard contains the type of information needed by those operating the chain saw. It requires the use of sophisticated equipment and exacting procedures that are beyond the expertise of the average logging employer. Much of the ANSI standard deals with a computer program for simulating chain-saw kickbacks and tests to determine the accuracy of the computer program. As such, the ANSI standard is primarily directed to manufacturers of chain saws, rather than employers and employees in the logging industry. For example, the standard states:

The purpose of this standard is to establish minimum safety requirements with respect to the manufacture of portable, hand-held, gasoline-powered chain saws (Ex. 4-66).

The requirements of the ANSI standard are primarily within the unique purview of manufacturers, such as requirements for the throttle control system, handles, pull-type starters,

fuel tanks and oil tanks, exhaust systems, sound levels, and vibration. Only the following requirements are directed at the employer:

It shall be the responsibility of the owner to maintain the chain saw in accordance with the instructions in the owner's manual.

Chain saws shall be used in accordance with the operating instructions and safety precautions listed in the owner's manual. It shall be the responsibility of the owner to see that such instructions and precautions are given to every operator who uses the saw (Ex. 4-66).

In addition, the ANSI standard does not require the employer to ensure that each chain saw used in their workplace is equipped with kickback protection. That is, the ANSI standard does not require the employer to ensure that kickback prevention devices are not removed or disabled by operators. By specifying that chain saws used by logging employees be equipped with chain brakes, OSHA emphasizes that responsibility for compliance with OSHA standards rests with the employer, not the manufacturer or the employee.

In order to retain flexibility in the final rule, OSHA is requiring chain saws placed in service after the effective date of this standard to be equipped with chain brakes or other protective device that prevents or minimizes kickback. OSHA notes that whatever kickback device is present, the final rule requires that it not be removed or otherwise disabled.

7. Operator manuals or instructions. In the hearing notice OSHA raised two issues regarding operator manuals or instructions (referred to collectively as instructions) for machines: the location of instructions, and the experience of employers in obtaining manuals from manufacturers.

a. Location of operator manuals or instructions. Both the existing pulpwood standard and the proposed standard contained provisions requiring either an operator's manual or set of instructions be kept with each machine. In addition, both stated that the instructions, at a minimum, must describe the operation, maintenance and safe practices for the machine. The proposed standard added a provision requiring each operator and maintenance employee to comply with the manual.

All commenters generally agreed with the need to have instructions available to operators and maintenance personnel. Several hearing participants supported OSHA's proposal to require instructions to be kept with machines (Tr. W1 201, OR 168, 194). For example, one participant stated:

We urge OSHA to require that operator manuals be kept on the machine. Operator manuals contain important personal safety and machine operational information which must be utilized during training and must be available for reference to assure safety for all different operating conditions.

Efficient and productive logging operations go hand in hand with safe work practices and proper machine maintenance and operation. Ready and immediate access to safety and operational information is essential to minimize downtime caused by accidents (Tr. OR 168).

Another commenter added that once instructions are placed back at the office, they are not used:

Ms. Schuster: I just have one question. Do you have any idea of the percentage of equipment out there in the woods that does not currently have operator's manuals available? Mr. Carr: I'm afraid I'd have to agree, most of them probably do not.

This is our concern as manufacturers that most of them do not. Most of the time they have taken them and put them in the office and that's the last they see of them.

Mr. Schuster: You say most of them would have put them in the office. Would you say that many of them do have them available though somewhere, if not on the equipment? Mr. Carr: If somebody can find it (Tr. OR 194).

Many commenters, however, stated that for several reasons instructions should not be kept with machines or instead should be distributed as part of the training program (Ex. 5-12, 5-34, 5-35, 5-67, 9-2, 9-3, 9-4, 9-5, 9-19, 9-22; Tr. W1 66, 134, 185, 235, W2 225, OR 31, 59, 263, 378, 629). First, these commenters said instructions kept with machines would be damaged or destroyed. They stated that instructions would be subject to vandalism or would disappear if kept with machines or vehicles. They also said instructions would become dirty or be destroyed due to adverse weather in which machines and vehicles are operated. As a result, these commenters stated that they store operator instructions at the company office, in the crew transport vehicles or at the work site.

Second, several commenters said that it was not necessary to keep instructions with machines because they have limited utility (Ex. 9-4; Tr. W1 134, 186, OR 80, 117, 378, 430, 629). Some of these commenters said instructions pertain primarily to maintenance of machines and scheduling of maintenance and, therefore, should be kept where the maintenance will be conducted. Other commenters said that instructions contain such general information about machine operation that their only utility is for someone who is unfamiliar with the operation of the machine. Instead, these and other participants said the manuals should be used in operator training sessions.

Third, some participants said that instructions are currently given to new employees to read as part of their orientation sessions (Tr. W1 66; OR 31, 263, 629). These participants also said that if operators need to refer routinely to instructions at the work site, they should not be allowed to operate the machine and should receive additional training rather than being allowed to rely on the instructions.

After reviewing the comments and testimony received, OSHA has decided in the final rule to require that operating and maintenance instructions be available on the machine or in the area where the machine is being operated, such as at the landing or in a crew transport vehicle

located in the area where the machine is being operated. OSHA believes ready access to instructions is important for several reasons. As OSHA explained in the preamble to the proposed rule, instructions are necessary not only for maintenance personnel but also for operators who are unsure or unaware of safe operating procedures pose hazards to themselves and co-workers. Maintaining these materials in the immediate work area of the machine assures their availability and increases the likelihood of their use when needed by the operator.

OSHA also believes that instructions have utility for operators in specific circumstances. Instructions give the operator a ready reference source when a new or unique situation is encountered (e.g., operations on terrain where a combination of hazards are present, such as swampy, rocky or loose ground). If unusual problems or emergencies requiring prompt correction arise during operation, the instructions provide the operator with correct information to resolve the problem rather than guessing about a solution. In addition, some machine operators perform their own maintenance. By keeping instructions on the machine or in the immediate work area, these operators can quickly deal with maintenance issues as they arise. Therefore, OSHA believes that instructions are useful for the operator only when they can be immediately accessed rather than being housed at an office that may be miles from the work area or maintenance area.

OSHA also agrees with commenters who said that if instructions are not kept in the work area of the machine they will not be used. OSHA is concerned that if instructions are not in the area where the machine is being operated, operators will be discouraged from stopping production to go get the instructions. Instead, employees will decide to "take their chances" in dealing with unusual problems or emergencies, which could result in serious injury.

With regard to the issue of weather damage to instructions which are kept on the machine or in the machine work area, OSHA notes that a hearing participant pointed out that in recent years, manufacturers have been providing weather-resistant instructions which may be kept with machines (Tr. OR 205). Moreover, it should not be overly difficult for an employer to place the instructions in a weather-proof bag to keep them with the machine.

OSHA does agree with commenters' position that if an operator must routinely refer to instructions in order to operate a machine or vehicle, additional training or supervision is necessary. The final rule does provide such additional training for that operator. However, there may well be instances in which the employee may need to consult the manual in order to deal with a problem that arises during the use of the equipment. For that reason, the instructions should be immediately available to employees. Therefore, OSHA is requiring in this final rule that instructions be maintained in the immediate work area of the machine so they will be available both to the machine operator and to maintenance personnel.

b. Obtaining operator manuals or instructions. In the hearing notice OSHA also requested employers to discuss their experience with trying to obtain operating instructions or replacement instructions from dealers and manufacturers. OSHA wanted to gather information

on the number of machines that come with instructions and on the degree of ease in obtaining replacement instructions. Very few participants commented in this issue.

One hearing participant said that manufacturers do provide instructions with new equipment, but used machines that are sold may have no instructions (Tr. OR 31). However, two hearing participants said that replacement instructions are available either from the manufacturer or the dealer, and therefore, they have had no more difficulty in obtaining instructions than in acquiring any machine replacement part (Tr. W1 201, OR 197).

OSHA therefore believes that the requirement that instructions for machine be maintained will not be burdensome for employers, even where employers must obtain replacement copies from the manufacturer.

8. Riders. In the hearing notice OSHA requested comment on whether trainers should be permitted to ride on machines to observe operator performance. The pulpwood logging standard prohibited riders or observers from riding on machines unless seating and other protection were provided. The proposed standard continued that prohibition.

Many commenters supported the current and proposed prohibition of riders on machines (Ex. 5-7, 5-22, 5-42, 9-3, 9-13, 9-18; Tr. W1 202, 205, 235, W2 227, OR 155, 169). These commenters said riders should be prohibited, unless protection is provided since they are exposed to the same hazards as machine operators, for whom seating, seat belts and other protection is required. NIOSH, for example, supported the prohibition for the following reasons:

Many logging operations occur on rough terrain which would expose any rider to a high risk of injury or death. Serious errors made by a trainer or trainee under these conditions endangers both people; it must be recognized that logging equipment is not designed for training purposes (i.e., the trainer cannot take control of the equipment from the trainee in a safe, orderly fashion) (Ex. 5-42).

NIOSH therefore recommended that training be conducted and completed in pre-worksite training where the environment can be "controlled" instead of the employer conducting "on-the-job" training with machines that are not designed to carry passengers safely. Another commenter agreed that the necessary operator training should be given, and the operator should be afforded the opportunity to practice on level ground, before the operator moves into work areas. This training and practice would allow operators to become proficient without requiring trainers to ride on the machines (Tr. OR 155).

Two commenters, including one who supported the exemption for trainers, stated that it was not absolutely necessary to have the trainer riding on the machine in order to maintain communication with the machine operator (Ex. 5-27; Tr. W2 227). They said communication could be accomplished through radio contact (one-way or two-way radios), thus allowing the trainer to remain in a safe location on the ground. One of the commenters pointed out that this method is currently used in logging operations in Scandinavian countries (Tr. W2 227).

Many commenters supported an exception permitting trainers to ride on machines (Ex. 5-12, 5-22, 5-28, 5-36, 5-45, 5-49, 5-53, 5-54, 5-55, 5-63, 5-74 through 5-92, 9-2, 9-5, 9-10, 9-13, 9-19; Tr. OR 32, 201, 206, 337). These commenters said that an exemption be allowed because trainers were not as great since they ride for only short periods and, therefore, they are not exposed to hazards to the same extent as machine operators. However, several commenters said that if instructors were permitted to ride on machines that at least seat belts should be required and training should be conducted on level terrain (Ex. 5-27, 9-3, 9-13; Tr. OR 169). Another commenter said that trainers should not be permitted to ride on machines during actual production because "such conditions may not be conducive to rider safety" (Ex. 5-54).

Other commenters said the exemption should include other employees in addition to training (Ex. 5-27, 9-2; Tr. OR 206). One commenter supported expanding the exception to allow mechanics to ride on machines (Tr. OR 206). Another commenter said that the exception should be permitted for large multi-purpose logging equipment where there is sufficient room in the enclosed operator cab to permit another person to ride safely, even though there is not a second seat (Ex. 5-27). One commenter said fellers should be permitted to ride back to the landing at the end of the workshift (Ex. 9-2). However, none of these commenters provided any evidence that these riders were not exposed to the same hazards as the machine operator.

OSHA has carefully considered all comments and data in the record. OSHA agrees with the commenters that riders face the same hazards as machine operators on moving equipment and that they need protection equivalent to that of the operator. According to logging fatalities reported to OSHA between 1985-90, there were reports of riders killed when machines roll over (Ex. 4-65). The OSHA FCI report also indicated that loggers have been killed riding on unauthorized parts of machines (Ex. 4-61). Even those who opposed the prohibition on riders recognized that such an activity is hazardous due to conditions of the work environment, such as unlevel terrain. In addition, the record indicates that an exemption for trainers is unnecessary because other methods of communication between the trainee and trainer are available and in use in the logging industry. As such, OSHA has retained the requirement in the final standard that machines must have passenger protection equivalent to operator protection if the employer allows riders on machines.

9. Equipment protective devices. In the hearing notice OSHA raised two issues regarding protective devices for machines: the need and cost of retrofitting machines with rollover protective structures (ROPS) and falling object protective structures (FOPS), and the appropriateness of incorporating various consensus standards covering ROPS and FOPS into the logging standard by reference.

a. Retrofitting. In the hearing notice OSHA requested comment on whether the final standard should require machines without ROPS and FOPS to be retrofitted with those devices. The proposed standard would not have required retrofitting. In the proposed standard, OSHA specified that certain machines placed in service after the effective date of the final standard to be equipped with ROPS and/or FOPS meeting Society of Automotive Engineers (SAE) minimum performance criteria.

There was no opposition from commenters on the general requirement that certain machines used in logging operations be equipped with ROPS and/or FOPS. NIOSH stated that 80 deaths occurred due to logging machine rollovers from 1980-85 (Ex. 5-42). This is approximately 13 deaths each year due to rollover accidents. Another commenter cited a study where 12 loggers were killed in rollover accidents in the State of Washington from 1977-83 (Tr. W1 27).

Several commenters said that machines without ROPS and FOPS should be retrofitted (Ex. 5-42, 5-54, 9-3, 9-13; Tr. W1 22). The West Virginia Forestry Association safety committee said that retrofitting was necessary because operators were exposed to "extreme danger" if machines were used in the woods without such protective devices (Ex. 5-54). In addition to the safety necessity of retrofitting, the committee said that retrofitting was economically feasible for the industry as whole.

Many commenters, on the other hand, while supporting ROPS and FOPS requirements for new machines, opposed retrofitting older machinery (Ex. 5-19, 5-22, 5-25, 5-27, 5-33, 5-53, 5-57, 5-74 through 5-92, 9-5, 9-17; Tr. W1 203, OR 170). Their opposition was based on several reasons.

First, commenters said that machines should not be required to be retrofitted to meet current standards when the installed ROPS and/or FOPS met industry standards in effect at the time of manufacture (Ex. 5-22; Tr. W1 203, OR 170). One commenter said that older machines in the logging industry were equipped with rollover protection, but those machine structures still in service do not meet the revised industry standards (Ex. 5-22).

Second, some commenters said that retrofitting machines would be very burdensome and costly, especially given the limited useful life of such machines (Ex. 5-74 through 5-92, 9-5). They said retrofitting would be expensive because it would require complete rebuilding and testing of the frame structure. These commenters also said that employers would have to hire outside contractors to test the retrofitted equipment since most employers did not have the personnel, expertise or equipment to install and test protective structures (Ex. 5-35). In addition, other commenters said that the retrofitting requirement would be too burdensome for small employers, both in terms of absorbing the cost in small operations and in finding persons who could do the retrofitting (Tr. OR 119, 263, 307).

Third, commenters indicated that the retrofitting requirement was not essential since most of the machines specified in the proposed standard already are manufactured with ROPS and FOPS as standard equipment (Tr. W1 184, 203, OR 170). For example, most log-skidders manufactured after 1974 have ROPS and FOPS meeting the performance criteria specified by the Society of Automotive Engineers (SAE). Most mobile equipment used in the Southeastern United States already has ROPS or FOPS (Ex. 5-19). Other commenters said that skidders now come with fully enclosed cabs (Tr. W1 184).

After consideration of all the comments and information received in the rulemaking record, OSHA has decided for several reasons not to require machines placed into service before the effective date of this standard to be retrofit with ROPS and FOPS, provided that ROPS and FOPS have not been removed from machines so equipped at the time of manufacture. First,

OSHA has determined that many of the machines currently in use already have protective structures meeting various performance criteria. The final standard requires that these protective structures continue to be maintained throughout the useful life of the machine, and that they be replaced where they have been removed (e.g., removed after machine accident).

Second, many machines currently in use and virtually all machines recently manufactured meet the performance criteria specified in the proposed standard (Ex. 9-2; Tr. OR 185-87). OSHA believes that older machines, that either do not have protective structures or have ROPS and FOPS meeting earlier standards, are few in number and are rapidly nearing the end of their useful life. As such, OSHA believes that most employers are substantially in compliance with the requirement for machine protective structures and will reach full compliance in short period of time. Therefore, OSHA determines that compliance with the protective structure requirement can be achieved without requiring retrofitting.

b. Incorporation of standards by reference. In the hearing notice, OSHA requested comment on the appropriateness of incorporating by reference updated consensus standards governing machine protective devices. In the proposed standard OSHA required ROPS and FOPS to be installed, tested and maintained in accordance with the following SAE national consensus standards: SAE 1040c June 1979 "Performance Criteria or Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forestry, and Mining Machines" and J231 Jan 1981 "Minimum Performance Criteria for Falling Object Protective Structures (FOPS)." The SAE ROPS standard was updated in 1988 as was the SAE standard on "Deflection Limiting Volume-ROPS/FOPS Laboratory Evaluation."

Several commenters discussed incorporation of updated standards (Ex. 5-10, 5-22, 5-57, 9-3, 9-13; Tr. W1 203). Most emphasized the need to reference the most up-to-date standards in the final rule. In addition, two commenters said OSHA should allow the use of standards from other standards producing bodies, such as the International Organization for Standardization (ISO) (Ex. 5-22, 5-57). Two commenters also recommended that OSHA harmonize its regulatory language with ISO and Mine Safety and Health Administration protective structure standards (Ex. 5-10, 5-22). However, two commenters opposed incorporation by reference because they contend that other standards may not have followed the same notice and public comment rules as do OSHA standards (Ex. 9-3, 9-13).

OSHA has considered the comments and in the final standard the Agency has decided to incorporate by reference the current SAE standards on ROPS and FOPS. While there was some comment about whether technical publications should be referenced in standards, OSHA believes it is better in this case to reference technical documents rather than spell out all of the many specifications the documents contain. Since the final standard is not requiring employers to retrofit machines, it is more important for employers to know that new machines they purchase meet the SAE standards. It is the manufacturer and not the employer who will have the expertise, personnel and equipment to do the necessary installation and testing of the protective structures as part of the manufacturing process, and it is the label of conformance placed on the equipment by the manufacturer that will be the method that the employer will

usually use to demonstrate compliance with the protective structures requirement of the final standard.

10. Manual felling. The hearing notice raised two issues regarding manual felling: should exceptions to the undercut requirement be allowed, and where should the backcut be required to be made? a. Undercut requirement. The proposed standard included a provision requiring each manually felled tree to be undercut. This provision also required that undercuts be of a size to guide the tree fall in the intended direction and to minimize the possibility of splitting. The purpose of this provision was to prevent trees from splitting, kicking back, or falling in an unintended direction, thereby injuring an employee.

Some commenters supported the proposed requirement (Ex. 5-42, 9-15;Tr. OR 485-88). One commenter said:

[Undercutting] helps protect the feller from the butt of the tree riding back up the sawn notch and springing backwards over the stump towards him if the tree is felled uphill, or strikes something during its fall that pushes [the tree] backwards (Ex. 9-15)

However, other commenters said OSHA should revise the undercut requirement in the final rule (Ex. 5-21, 5-39, 5-46, 5-52, 5-63, 5-74 through 5-92, 9-1, 9-5; Tr. OR 265, 284-88, 324-26). One commenter said OSHA should make undercutting a recommended practice in the final rule to allow for innovations in cutting techniques and to allow for consideration of various production requirements for cutting certain types of wood (e.g., veneer).

Other commenters stated that OSHA should permit an exception to the undercut requirement for manual felling of saplings or unmerchantable trees, that is, of trees with a small diameter at breast height (DBH) (Ex. 5-21, 5-39, 5-46, 5-63, 5-74 through 5-92, 9-1, 9-5; Tr. OR 265, 284-88, 324-26). These commenters said that the hazards OSHA was attempting to protect against do not exist for saplings, therefore, undercuts are not necessary. For example, Mr. Alex Hanson, of AOL, stated:

On the smaller, nonmerchantable timber that's two, three, four, five, six inches, generally not very tall, 20 foot or less or maybe taller, and when you slash it, you push it over. It doesn't need a face to control the direction of fall.

* * * * *

[W]hen trees start getting to be merchantable size, then you have safety problems. You get a seven inch or over tree, you want to know where it's going. You don't want to have it just fall anywhere.

* * * * *

[Y]ou have to buck those merchantable trees. You have to cut the top out so you just don't want them going everywhere. You want things in line. And if they're everywhere, then it increases the risk for the buckers. Generally it's the same guy who is falling it, but you want to

have things in an orderly fashion so that he's not having to go everywhere to buck the top. If they're just slashing it, it doesn't really matter where it goes because you're not having to go out there and limb and cut the tops out and create another hazard for yourself (Tr. OR 265, 284-88).

However, other commenters disagreed with AOL about what size tree requires an undercut. One commenter said that undercuts are necessary for any tree that has more than a three-inch base (Ex. 9-16), while another commenter said undercuts were not necessary for trees with a seven-inch DBH (Tr. OR 421-22).

The APA, however, said that even trees with a small DBH should be undercut:

You heard from one of the associations who is recommending that with regard to what I call undercuts, they're also called face cuts, that they not be required on very small trees, and there was a discussion and possibly a recommendation of an 8-inch or 7-inch size limit. Unfortunately, I don't have any data. But we do know and I will watch to see if I can find any and submit it post hearing. I went through our files and could not find anything. But it is our perception, after studying these operations, that a tree that's 8 inches in diameter at breast height is probably about 12 inches in diameter at the stump, and whether it's an oak tree or a Douglas fir tree that's 60 feet tall and 8 inches and 12, it's a significant mass of wood that is difficult to control to get on the ground and could cause and probably has caused injuries and maybe even deaths. There's enough mass there with a 60-foot tree ripping down, uncontrolled in its fall, to cause a death. And you heard from the Montana folks, that they have a little bit of a problem with that too (Tr. OR 485-88).

Moreover, some commenters opposing the undercut requirement also admitted that undercuts were necessary for any merchantable tree, regardless of its size. They said that whenever a tree has a merchantable stem for a sawlog product, it must be undercut to protect the fiber recovery (Tr. OR 422, 487-88). They said undercutting was essential both for production reasons and safety considerations for employees bucking the felled tree.

After considering the evidence in the record, OSHA believes a provision requiring that each tree manually felled be undercut is necessary to protect employees from injury. According to the WIR survey, four percent of employees injured said they had been using the wrong cutting method at the time of their accident (Ex. 2-1). The OSHA FCI report indicated that 10 fellers were injured because of misjudgments in cutting the tree (Ex. 4-61).

As discussed above, undercutting helps protect the feller from injury by reducing the potential for the tree splitting and falling in an unintended direction or kicking back towards the feller. In the final rule, OSHA is also allowing an exception to the undercutting requirement when the employer demonstrates that felling the particular tree without an undercut will not create a hazard for an employee. OSHA believes that when the hazards of splitting trees, tree kickback and misdirected falls are not present, it may be appropriate to manually fell a tree without undercutting. OSHA notes that the employer bears the burden of demonstrating that the hazards discussed in this section are not present. OSHA also notes that the employers cannot make a blanket determination that trees of a particular size never pose the hazards discussed

above if manually felled without an undercut. The condition of the tree and the surrounding area may make manually felling even a small a tree hazardous if it is not first undercut. The tree and those conditions must be assessed on a case by case basis to determine whether felling the tree without making an undercut would create a hazard for an employee.

For two reasons, however, OSHA has decided against specifying an undercut exception for trees of a certain size. First, there is no agreement among the commenters on what size tree could be safely exempted from the undercutting requirement. There is evidence in the record, that manually felling trees of the size that some commenters say should be exempted from the requirement can pose a serious hazard to fellers (Tr. OR 265-69, 485-88). Also, while commenters agreed that unmerchantable trees did not require undercutting, none agreed on what size tree constituted an unmerchantable tree. The estimates of what sizes were considered to be merchantable trees varied greatly, from 3 to 10 inches DBH, depending on the type of wood being harvested (Ex. 5-46; Tr. OR 265, 485-88). And, as some commenters have pointed out, trees included in this range of sizes can pose hazards to fellers.

Second, some commenters said that any tree that is considered merchantable is undercut, even if it is within the range of sizes that commenters say should be exempted. According to commenters the undercut is also made in merchantable trees to prevent splitting of the product (Tr. OR 284-88). As such, undercutting may be done on small trees in any event.

OSHA does note that in many cases when trees are determined to be unmerchantable they are not manually felled but rather slashed by mechanical means (Tr. OR 265, 268-69, 285-87, 421-22). This provision on undercutting does not apply to trees felled by mechanical means.

b. Backcut requirement. The second issue regarding manual felling on which OSHA requested comment was where backcuts should be required to be made. In the proposed standard, OSHA required that backcuts be made above the horizontal cut of the undercut. The 1978 ANSI logging and various State logging standards contain similar requirements (e.g., Ex. 38K).

Several commenters supported the proposed requirement (Ex. 5-42, 9-15). These commenters said a backcut above the horizontal cut is necessary to assure that the tree does not fall in an unintended direction.

However, other commenters said OSHA should permit backcuts to be at the same level or below the level of the undercut (Ex. 5-28, 5-29, 5-42, 5-52, 9-1; Tr. W2 229-31, OR 395-96, 421-24, 499-500). Some said that a same level backcut was more effective:

Backcuts should be made on the same level as the point of the notch of the undercut. The hinge is what keeps the tree from kicking back, not the fact that the backcut is higher than the undercut. High backcuts run the risk of cutting off the hinge, actually increasing the danger of kickback (Ex. 5-52).

Other commenters said that backcuts above the horizontal cut were not as critical when using the Humboldt undercutting method (Ex. 5-42, 9-15). They said that when the slanting cut of the undercut is angled downward, the tree is more likely to fall in the intended direction

without kicking back. However, one of these commenters admitted that placing the backcut at the same level as the horizontal cut when using the Humboldt undercut method sacrificed safety for quality control:

Quality control concerns with several companies dictate that only Humboldt undercuts are permissible with sawlog grade timber, so that wood loss is minimized by taking the notch wood out of the stump. Quality control often dictates that there must be a flush surface on the end of the log. To avoid having to make another cut to square up a log butt, fallers will attempt to make their backcuts meet the horizontal face cut as closely as possible. By doing this, they sacrifice the safety of the step that would have been left on the stump to catch a possible backwards-moving tree butt, and depend only on the downward-slanting face on the stump to hold the tree (Ex. 9-15).

Two commenters said the backcut requirement should be limited to those situations when tree kickback is a problem, which they contended was only on steep terrain, when felling uphill or through trees (Ex. 9-1, 9-4). Other commenters said that believed that the standard should provide more flexibility because variations frequently found on logging sites, such as lean of the tree and type of terrain, would make strict adherence to the regulation difficult (Ex. 5-19, 9-9, 9-22; Tr. OR 206-7, 395-96). These commenters said that the cutting decisions should be left to the judgment of the experienced feller.

After reviewing the evidence in the record, OSHA has decided that the proposed backcut provisions are necessary to protect fellers from being hit or crushed by the tree they are felling. As discussed above, the record shows that injuries and fatalities have occurred because of improper cutting methods. The purpose of undercutting and backcutting trees is to prevent the tree from splitting, felling an unintended direction or kicking back into the feller. OSHA agrees with ANSI and the various State plan States that the proposed backcut provisions are necessary to protect employees against these hazards.

OSHA does not agree that backcutting should be limited only to those situations when tree kickback can occur. The record shows that hazards other than tree kickback necessitate the backcut requirement. Without appropriately-placed backcuts, trees are more likely to split and/or fall in an unintended direction. While OSHA agrees that it is more likely that this could happen when trees are felled uphill, OSHA also believes the record shows that the possibility exists regardless of the terrain. According to the WIR survey, the single largest cause of injuries reported was being hit by a falling tree (Ex. 2-1). Almost one-half of all injuries reported were due to employees being hit or crushed by a falling tree.

In the final rule OSHA has provided an exception to the backcut requirement. The final rule allows the backcut to be placed at or below the horizontal cut in tree pulling operations. Various State logging standards also provide this exception to the backcut requirement (e.g., Ex. 38K). OSHA believes this exception covers those situations in which a special cutting technique may be required, such as by Federal agencies.

V. Summary and Explanation of the Final Standard

The revision of the pulpwood logging standard was undertaken in response to the concern on the part of OSHA to the number of fatalities and injuries that occur each year in the logging industry. The industry itself admits that logging is a high hazard industry. As discussed above, the injury and fatality incidence rates in the logging industry are among the highest industry incidence rates in the country.

The OSHA pulpwood logging standard, 1910.266, addressed only the hazards that exist in the pulpwood logging industry. However, examination of the descriptions of accidents and other information available to the Agency indicates that the same hazards exist for employees performing logging operations regardless of the end use of the harvested trees.

Many commenters supported the need for a comprehensive logging standard (Ex. 5-6, 5-10, 5-17, 5-18, 5-21, 5-22, 5-36, 5-41, 5-42, 5-46, 5-49, 5-59, 5-61, 5-65, 5-69; Tr. W1 pg 21, 73, 202). For example, one commenter said that in Maine it has generally been acknowledged that both products (pulpwood logs and logs used for other purposes) come off the same job (Ex. 5-46).

This final rule provides protection for all loggers involved in timber harvesting, including loggers employed as part of a mill operation, regardless of the end use of the forest products (saw logs, veneer bolts, pulpwood, chips, etc.). This standard fills the current gap in coverage by providing a basic level of protection for all loggers. OSHA has changed the title of 1910.266 from "Pulpwood Logging" to "Logging Operations" in order to reflect the wider coverage of this revised standard. In addition, OSHA has added and/or modified various provisions of the pulpwood logging standard to address more adequately the hazards faced in different aspects of logging operations. OSHA also has updated equipment specification requirements in the revised standard.

Throughout the development of the revised standard, the Agency strove to promulgate a final rule that is effective, and that is simple, concise, enforceable, and sustainable.

Paragraph (a) Table of Contents

OSHA has added a table of contents to aid employers and other persons in using the revised standard. The table of contents identifies the provisions that are included in the final standard and where specific requirements can be found. The table of contents also is included because the final standard represents a significant reorganization of the elements of the pulpwood logging standard.

The identification of the major paragraphs will, hopefully, aid persons in reading and understanding the requirements of this final rule. In order to add the table of contents, each of the subsequent paragraphs had to be renumbered. The paragraph references in the following discussion of the individual provisions of the standard are to the paragraphs of the final rule, unless otherwise noted.

Paragraph (b) Scope and Application

This paragraph defines the scope and application of this standard. The existing standard applied only to pulpwood logging operations. That standard adopted, pursuant to section 6(a) of the Occupational Safety and Health Act, the American National Standards Institute, ANSI 03.1-1971 Safety Standard for Pulpwood Logging (hereafter 1971 ANSI standard) (Ex 2-13). Included in the 1971 ANSI standard were requirements for important safety practices along with provisions pertaining to personal protective equipment, first aid and stationary and mobile equipment.

When ANSI revised the 1971 consensus standard in 1978, they expanded the scope of the standard to include all logging operations. The revised ANSI standard adopted, virtually unchanged, many of the requirements of the 1971 pulpwood logging standard, and applied those provisions to all logging operations throughout the nation. OSHA has taken a similar approach in this rulemaking. In paragraph (b)(1), the Agency has expanded the scope of the pulpwood logging standard, 1910.266, and to cover all logging operations regardless of the end use of the timber products.

In paragraphs (b)(1) and (b)(2) of the final rule, OSHA makes clear that the standard applies to all types of logging operations, regardless of the end use of the wood. Logging operations, as defined in paragraph (c) of the final rule, include, but are not limited to, marking, felling, bucking, limbing, debarking, chipping, yarding, loading, unloading, storing, transporting machines and equipment from one site to another, and other operations associated with felling and moving trees and logs from the stump to the point of delivery. Many commenters supported the application of the standard to all types of logging and all logging operations (Ex. 5-6, 5-10, 5-17, 5-18, 5-21, 5-36, 5-42, 5-46, 5-48, 5-49, 5-54, 5-61, 5-65).

One commenter said OSHA should exclude felling operations from the logging standard and cover only the movement of felled trees from the stump to the mill (Ex. 17). This commenter said that felling activity is not the most hazardous part of logging operations. OSHA believes the record does not support the commenters' recommendation. The record clearly shows that felling activities are the most hazardous activities of the logging operation. According to the WIR survey, more than one-half of all reported injuries involved various felling activities (Ex. 2-1). OSHA believes that if the standard did not include hazards associated with felling the trees, that the majority of employees in the logging industry would still be exposed to significant risk of injury and death. Therefore, in the final OSHA has retained coverage of tree felling operations.

Another commenter raised the issue about whether establishments that hire independent contractors to perform various logging activities are considered employers covered by this standard (Ex. 5-23). The courts have held in various OSHA cases that when the contractor exercises control over the means and methods by which the independent contractor performs the work, that the contractor is regarded as an employer for purposes of this rule. Loomis Cabinet Co. v. Martin, 15 F.3d 1086 (9th Cir. 1994). See also Castillo v. Gibbons, 704 F.2d 181, 188-93 (5th Cir. 1993). For example, establishments that provide independent contractors with machines, such as yarders or forklift trucks, to perform the job are exercising control over the means by which the job is performed.

At paragraph (b)(1) of the final rule, the Agency has excluded from coverage the construction or use of cable yarding systems. Cable yarding, as defined in the final standard, is the movement of felled trees or logs from the area where they are felled to the landing on a system composed of a cable suspended from spars and/or towers. The definition further states that the trees or logs may be either dragged across the ground by the cable or carried while suspended from the cable. One of the end towers is located in the area where the trees or logs are attached to the cable yarding system and the other end is at the landing. Cable yarding systems are used primarily when the terrain is extremely rugged and the felled trees and logs are otherwise inaccessible. Important elements of the safe use of a cable yarding system include the selection and use of climbing devices to install the system, preparation of head and tail spars and intermediate trees or towers, component sizing, system rigging and system usage. There are generally three types of cable yarding systems, namely, high lead, skyline and slackline. In a high lead system, the mainline is threaded through the mainline block (pulley) that is attached near the top of the spar to obtain a lift of the logs being yarded. A skyline system is one in which the line (cable) is hung between two or more supports on which a carriage or block travels. A slackline system is a form of skyline system where the skyline is spooled on a drum so that the line can be raised or lowered. In all three systems, the spars are usually held in part and restrained against movement by the use of guylines that are anchored to the ground or another tree. Trees and logs may be moved by a cable yarding system by dragging them along the ground or while they are suspended from the system.

In the preamble of the proposed rule, OSHA explained that this exemption was included due to the regional nature of the use of cable logging systems. State plan States in the far west that have the most significant cable logging activity have developed very detailed cable logging standards. Many commenters testified that the hazards of cable yarding in those states have been adequately covered by the specific state standards (Ex. 2-18, 2-19, 2-20, 2-21, 2-23, 5-17, 5-27, 5-39, 5-45, 5-74 through 5-92, 38J, 38K). However, some commenters discussed the need for increased regulation of cable yarding operations on the national level because they assert there is increasing use of cable yarding in non-western regions of the country where no State standards exist (Ex 5-19, 5-20, 5-36).

After careful consideration of the comments, OSHA has decided to retain the exclusion for cable yarding operations in this final rule for several reasons. First, the State logging standards that address cable yarding are detailed specification standards that adequately address the unique hazards associated with the construction and use of cable yarding in those particular States, that are all western States. For example, those standards deal with construction of cable yarding systems on steep slopes that are predominently in those western States. Those State cable yarding standards will not be affected by the Federal logging standard. Second, there is no evidence in this rulemaking record that those standards are not addressing particular hazards associated with cable yarding in those States. Third, OSHA agrees with the APA that the prevalent use of cable yarding is in those States that have their own standards that include requirements for cable yarding. None of the commenters representing non-western logging establishments indicated that cable yarding is being performed in their area or by their member companies. Fourth, OSHA believes there is not sufficient information and data in the record regarding cable yarding activities in non-western States to determine at this point whether the various cable yarding regulations of the western States would be appropriate to apply

nationwide. For example, logging in western States is usually clear cut logging while selective cutting is more prominent in non-western states (Ex. 2-1). Other logging conditions vary across regions, such as tree size and type, weather, and terrain. For example, logging operations in western States are three times more likely to be on steep slopes, where skidding may be impossible (Ex. 2-1). OSHA believes that these differences might affect what would constitute appropriate cable yarding rules for non-western States. Therefore, OSHA believes this issue requires further study before the Agency promulgates a national cable yarding standard.

However, OSHA emphasizes that the exclusion of cable yarding is only for the construction and use of the cable yarding system itself. Other parts of the logging operation taking place where cable yarding systems are present will be covered by this standard. Just as this standard extends the pulpwood logging standard to cover the same hazards experienced elsewhere in the logging industry, OSHA believes that these same hazards need to be covered by this standard when cable yarding operations are being performed. For example, the hazards for loggers felling trees exist regardless of how the trees or logs are moved about the work site. To this end, the Agency has included in the final standard the felling of the trees and the other operations that are conducted in conjunction with the use of a cable yarding system.

It should also be noted that the use of yarding machines with winches for playing out and retrieving cable is not considered cable yarding for the purposes of this standard. Therefore, this operation is covered by this final logging standard. In this type of log retrieval, a yarding machine plays out cable, to which is attached a choker sling that is secured to a tree or log. Once the sling is attached to the log, the cable is wound onto the drum and the tree or log is then yarded by skidding while attached to and supported by the cable on the winch. This system of yarding is oftentimes used when logging is being conducted along a roadway or other area where access to the area where the tree is felled is not practical and the area where the yarder (skidder) is operating is on the roadway or in an accessible area.

At paragraph (b)(3) of the final rule OSHA emphasizes that this standard is not a totally "vertical" standard for logging operations. That is, the requirements of this final rule are to be supplemented by other applicable requirements found elsewhere in part 1910. When there is a corresponding provision elsewhere in part 1910 that addresses the same hazard or condition of work as a provision of the logging standard, the more specific logging provision takes precedence for logging operations. By contrast, when hazardous working conditions are not addressed or covered by the logging standard, the other requirements of part 1910 apply. For example, employers in the logging industry must provide employees protection against occupational noise exposure by meeting the requirements of 29 CFR 1910.95. Employers in this industry must also comply with the permissible exposure limit for wood dust specified in 29 CFR 1910.1000 and meet the field sanitation requirements of 29 CFR 1910.28.

Several commenters raised the issue about what standards apply to the construction of roads and trails (Ex. 5-16, 5-44, and 5-63). These commenters said there was confusion about whether the entire part 1926 would be applied to logging operations. Construction activities such as the building of roads and trails are not logging operations, therefore they are covered by applicable construction standards and not the logging standard. As such, the use and

maintenance of the equipment to perform the construction of those roads and trails, such as graders, scrapers, front-end loaders, and bulldozers, are covered by the construction standards. In addition, the building of roads and trails to reach logging sites is not a logging operation, but is a construction activity that is carried out preparatory to the logging activity. Therefore, in this final standard OSHA has removed references to road building construction activities. Road building in conjunction with the establishment of a logging activity is no different than road building to gain access to any other operation and is covered in the general construction standards.

However, the felling of trees in preparation for the construction activities, such as the building of roads, is considered to be a logging operation. To the extent that any employee is performing a logging operation in preparation for construction activities, the employee is performing general industry work, and the requirements of this standard as well as other applicable sections of part 1910, apply in order to safely fell those trees. For example, if trees are felled to prepare for road construction, the requirements in this final rule and other sections of part 1910 apply. This reasoning also applies to felling of trees in preparation for agricultural activities (e.g., felling trees to prepare land for crops). Felling of those trees is general industry work and the requirements of this standard as well as other applicable sections of part 1910 apply. To this end, OSHA has specifically referenced the applicability of the final logging standard in 29 CFR Part 1928 to felling of trees in preparation of agricultural activities.

Paragraph (c) Definitions

In paragraph (c), OSHA is adopting a number of definitions to clarify the meaning, intent and purpose of certain terms contained in this standard. Several definitions contained in the pulpwood logging rule were deleted from the proposed rule because the terms were no longer used in the regulatory text. In addition, 17 new definitions were added to the proposal. In the final rule OSHA has added and changed several definitions to better reflect the intent of the Agency and to aid interested persons in understanding the requirements of this standard. In addition, in the final rule OSHA has deleted several proposed definitions. Many of these terms involved cable yarding and road construction activities, that are not covered by this final rule.

"Cable yarding" is defined in this final rule as the movement of felled trees or logs from the area where they are felled to a landing by attaching them to a suspended cable system. The supports for the cable that carries or supports the trees or logs are called head and tail spars. Spars may be fashioned from standing trees or from metal towers (commonly called metal spars). There may be additional intermediate spars if the cable run is of sufficient length to require intermediate support. OSHA has specifically defined "cable yarding" in the final rule to aid persons in understanding the scope of the exclusion from the standard for this particular type of logging operation.

"Danger tree" is defined in the final rule as any standing tree that presents a hazard to an employee due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree. The tree may be dead or alive. This term was not contained in the proposed standard. Instead, the related term "snag" was included and defined as any dead tree or portion thereof remaining standing. Also, the

term "widow maker" was included in the proposed rule and defined as an overhanging limb or section of tree that could become dislodged and drop to the ground. Several commenters said this term should replace the use of "snag" in the proposed rule because the definition of snag implies that all dead trees are dangerous (Ex. 5-17, 5-50, 5-64, 17). Rep. Jolene Unsoeld, from the State of Washington, said that not all snags were dangerous to employees and many were essential to the health of the wildlife community (Ex. 17). In this final rule, OSHA has decided to use the term "danger tree," a term that is used in the State of Washington logging standard that is more inclusive of the various conditions that could cause a tree to be dangerous (Ex. 2-22).

"Designated person" is defined in the final rule as an employee who has the requisite knowledge, training and experience to perform specific duties. This definition is a close parallel to the definition of the term used in consensus standards dealing with material handling equipment, such as the American Society of Mechanical Engineers, ASME B30.5-1989 with Addenda, "Safety Standard for Mobile Cranes" (Ex. 38DD and EE). In the ASME standard, a designated person is defined as an employee who is selected or assigned by the employer as being competent to perform specific duties. In this final rule, the Agency has amended that definition to indicate that the employee needs to have the knowledge, training and experience to perform that job or duty for which he/she is designated. The possession of those attributes is not a discretionary decision on the part of the employer but a mandatory prerequisite that the employee must possess. Knowledge and competency are normally achieved through training or experience or a combination of those activities.

In this final rule a signal person, an explosive handler and user, a machine operator, a trainer, and a supervisor of new and newly-trained employees must be designated persons. In these cases, the Agency recognizes that each of those individuals must have knowledge, experience, and training to competently perform those tasks. For example, a signal person needs to know the various signals to use when indicating that a particular operation or movement is to be made. The signal person also must know and understand how the task is to be performed and the role of his signals in completing the task safely.

"Domino felling" is defined in the final rule as the partial cutting of several trees that are left standing and then pushed over with a pusher tree. Domino felling is a dangerous practice that is prohibited by the final standard. When one tree falls into or against another tree, the direction of fall of each tree may be altered to the point that either tree may fall in an unexpected, and oftentimes, dangerous location. Whenever one tree is being felled and it strikes another tree, the base of the tree being felled can kick back, striking the feller who has not moved away sufficiently from the tree being felled. Additionally, one tree falling into another tree can result in the initial tree becoming lodged in the second tree, thereby making it necessary for an employee to remove the lodged tree.

"Health care provider" is defined in this final rule as a health care practitioner operating within the scope of his/her license, certificate, registration or legally authorized practice. As used in this standard, health care providers are practitioners whose authorization qualifies them to approve first-aid kits that are to be used in the logging industry.

"Log" has been defined in the final rule as a segment sawed or split from a felled tree. This term replaces the terms section, log, bolt and tree length, that were all used in the pulpwood logging standard and the proposed standard. The usual practice in the harvesting of large and/or tall trees is to cut them into shorter, more manageable lengths before they are yarded so that they may be more easily handled and transported. In some cases, extremely large diameter trees may be split lengthwise so that they can be handled and transported to the mill for further processing. Although the practice of splitting a very large tree is not as common, the Agency has included a log as any section of tree, whether that section has been cut or split from a tree.

"Logging operations" is defined in the final standard as operations associated with felling and moving trees and logs from the stump to the point of delivery, such as, but not limited to, marking, felling, bucking, limbing, debarking, chipping, yarding, loading, unloading, storing, and transporting machines, equipment and personnel from one site to another. The proposed rule did not define logging operations. OSHA has included this definition in the final rule to emphasize that this standard covers those operations involving the felling and moving of felled trees, as opposed to other operations, such as road building that are preparatory to rather than part of logging operations.

"Machine" is defined in the final standard as a piece of equipment having a self contained powerplant that is operated off-road and is used for the movement of materials. Machines include tractors, skidders, front-end loaders, scrapers, graders, bulldozers, swing yarders, log stackers and mechanical felling devices, such as tree shears and feller-bunchers. In the pulpwood logging and proposed standards, terms such as "machine" and "equipment" were used interchangeably to describe a piece of equipment that is intended to be operated off-road and is used primarily for the movement of material. Some commenters said they were confused about whether "vehicles" were included within the term "mobile equipment," that had been broadly defined as the kind of equipment which includes mobility as part of its work function. Because of the potential for confusion regarding the intention of the Agency in proposing requirements for off-road versus on-road equipment, the Agency has defined both the terms "machine" and "vehicle." The intent of the Agency in including these terms is to distinguish between machines, whose primary area of operation is off-road and are primarily material movers, and vehicles that include personnel and material conveyances operated on highways as well as off-road.

The operators of many vehicles (primarily trucks, tractor/trailers and buses) require special licenses or endorsements to qualify as an operator of that type vehicle. In contrast, machine operators usually do not have to possess a special license. Therefore, OSHA is defining and imposing different logging-related requirements for the operation of machines and vehicles. The use of the term "machine" as used in this standard should not be confused with the use of that term elsewhere in these general industry standards.

"Rated capacity" is defined in the final rule as the maximum load that a piece of material handling equipment can safely lift and move. This is a term that is commonly used when describing the capability of a piece of material handling equipment. The rated capacity of a

piece of material handling equipment is initially determined by the manufacturer and documented in the operators manual and on the equipment.

"Serviceable condition" is defined in this final rule as that quality of a tool, machine, vehicle, or other device to operate as it was intended by the manufacturer to operate. OSHA believes that there are many conditions that can exist with a piece of equipment that would make it unserviceable, as well as other conditions that would not similarly qualify. For example, seat covering material on a tractor that has become cracked, although uncomfortable, would not normally qualify as a condition that would make the machine unserviceable. On the other hand, worn brakes or a leak in the brake system would definitely make a machine or vehicle unserviceable. Additionally, cracked or broken gauges and defective or leaking fuel systems are other conditions that would render a machine or vehicle unserviceable.

In the case of personal protective equipment, head protection that has a crack that would compromise the ability of the hard hat to absorb further impact without injuring the employee is an example of an unserviceable condition. On the other hand, a small dent in a hard hat would not necessarily render the head protection unserviceable.

"Tie down" is defined in the final rule as an assemblage of binder and strapping (either chain, cable, steel strips or fiber webbing) that is used to secure a load to the bed of a transport vehicle. In the proposed rule, OSHA used the term "binder" to indicate the assembly that is used to secure a load to a vehicle during transport of that load. As pointed out by two commenters (Ex. 5-7; Tr. OR 20), a binder is a component of a tie down and is the ratchet assembly that is used to secure and tighten the strapping of the tie down. In this final rule, the Agency has corrected the definition.

"Vehicle" is defined as a personnel conveyance and/or material handling equipment. Included are cars, buses, trucks, trailers and semi-trailers. Although vehicles normally operate on public roads, their use is not limited to that environment. Any of these pieces of equipment may operate not only on public roads, but may also be used to transport personnel or materials off-road. For example, when a logging truck or tractor/trailer is moving a load of trees or logs, the vehicle may have to traverse not only the logging trails or roads, but may have to operate on the public thoroughfares to deliver its load to the mill or other off-loading point. This final rule covers the logging operation from the site of the felling of the trees to the point of delivery of the trees or logs.

Paragraph (d) General Requirements

Included in the general requirements paragraph of the final rule are requirements for personal protective equipment, seat belts, first aid, fire extinguishers, environmental conditions, work areas, signaling and signal equipment, overhead electric lines, flammable and combustible liquids and explosives and blasting agents.

Personal Protective Equipment

Paragraph (d)(1) contain requirements for personal protective equipment (PPE), including its use and maintenance, and the inspection of PPE before its use during a workshift. Paragraph (d)(1) also specifies when employees must use gloves, leg protection, logging boots, head protection, and eye and face protection. This final rule, however, does not contain requirements for other types of personal protective equipment that are covered by other general industry requirements contained elsewhere in part 1910 (i.e., hearing protection and respiratory protection). Paragraph (b)(3) already makes clear that other requirements contained in part 1910 automatically apply when the logging standard has not addressed a particular hazard or working condition. Therefore, since part 1910 already require the use and maintenance of PPE, OSHA has included in paragraph (d)(1) only those items of personal protective equipment that are not contained elsewhere in that part or that are in some way different from the requirements contained in elsewhere in part 1910. As such, references to respiratory protection in subpart I of part 1910 and hearing protection at Sec. 1910.95 have been deleted from this final rule.

Paragraph (d)(1)(i) of the final rule requires that the employer assure that all PPE is maintained in a serviceable condition. This employer responsibility applies whether the PPE is provided by the employer or provided by the employee. One commenter recommended that OSHA include this provision in the final rule (Tr. W2 195). This provision parallels the maintenance requirements of the general industry PPE standards. Specifically, 1910.132(b) also requires that when employees are allowed to provide their own PPE, the employer is still responsible for assuring its proper maintenance. OSHA has recognized that whether or not the employer pays for particular types of PPE that must be worn in the workplace, the employer is responsible for assuring that required PPE is adequately protecting employees from workplace hazards. The only way for the employer to assure that PPE adequately protects employees from workplace hazards is to inspect the PPE and maintain it in the condition that it was intended by the manufacturer. The final rule, in paragraphs (d)(1)(i) (PPE maintenance) and (ii) (PPE inspection), imposes such responsibilities directly on the employer.

In order to assure that all PPE is maintained in a serviceable condition, paragraph (d)(1)(ii) requires that the employer assure that all PPE be inspected before initial use during each workshift. This inspection will assist employers in identifying whether any PPE is not functioning properly so that unserviceable equipment can be repaired or replaced. This paragraph also requires that before work is commenced, the employer must repair defects or damage, or replace the PPE. The Agency considers defects and damage to be conditions that detract from the ability of the product to perform its intended function. For example, worn cuffs on leg protection that do not compromise the ability of the leg protection to resist chain-saw cuts, is not a defect or damage within the meaning of this standard. However, a cut of the leg protection and loss of the fibrous material that is used to resist the chain saw would definitely be a defect or damage. When there is a defect or damage, the PPE must be repaired so that the condition no longer affects the serviceability of the item or the item must be replaced before work commences.

Discussed below are the specific PPE requirements of the final rule. OSHA notes that each of the requirements of paragraphs (d)(1)(iv) through (vii) require that the employer assures that the employee wears PPE meeting the requirement of the final rule. It is the responsibility of

the employer to assure that serviceable PPE is available and worn by employees when required by the final rule. As discussed above in the Major Issues section, with the exception of logging boots, these specific PPE requirements impose on the employer the obligation to provide such PPE at no cost to the employee.

Gloves

Paragraph (d)(1)(iii) of this final rule requires that the employer provide, at no cost to the employee, and assure that each employee handling wire rope wears cotton gloves or other equivalent hand protection. In the proposed rule, OSHA specified that the employer provide hand protection consisting of suitable heavy-duty puncture-resistant gloves when employees were working with wire rope. Several State logging standards also require the use of gloves for employees working with wire rope (Ex. 2-18, 2-19, 2-20, 2-22, 2-23, 38K).

OSHA received many comments regarding the proposed requirement (Ex. 5-7, 5-17, 5-20, 5-27, 5-29, 5-30, 5-32, 5-35, 5-39, 5-43, 5-44, 5-45, 5-51, 5-54, 5-55, 5-62, 5-74 through 5-92; Tr. OR 104). Many commenters objected to the requiring the use of puncture resistant gloves, such as leather gloves, for logging operations. First, commenters argued that there are no gloves that are puncture resistant in all circumstances (Ex. 5-54; Tr. OR 104). They argued that wire rope can puncture even leather gloves. Second, several commenters indicated that cotton gloves have become the industry standard and that their experience had shown that medium weight cotton gloves are considered safer than leather gloves in logging operations when punctures can occur. According to these commenters, cotton gloves give the logger a better feel of jaggers (broken wires in a wire rope) when they penetrate so the logger is able to quickly let go of the wire rope (Ex. 5-17, 5-74 through 5-92). They added that break-away gloves are imperative when the wire rope travels at high speed and reaction time is critical (Ex. 5-74 through 5-92). They said that cotton gloves, but not leather gloves, will tear away from the hand when caught by a jagger rather than forcibly pulling the hand along with the jagger, causing the employee to fall and possibly into the path of the log (Ex. 5-7, 5-74 through 5-92). These commenters argued that pulling of the hand and glove could make a minor hand injury more serious such as making a small puncture wound a tear or laceration of the skin (Ex. 5-29). Third, one commenter indicated that cotton gloves provide adequate protection because a review of their recordable accidents since 1982 indicated that no employee wearing cotton gloves while handling wire rope had suffered an injury requiring medical attention (Ex. 5-45). Fourth, these commenters said leather gloves are generally considered hazardous for logging operations because they do not have good gripping ability on cable when wet (Ex. 5-7, 5-20, 5-43, 5-46). These commenters asserted that cotton gloves provided better gripping ability in the same circumstances.

Fifth, commenters argued that the required gloves must be applicable and efficient for a wide range of logging activities. One commenter pointed out that employees who use saws also work with wire rope, and very few will take the time to change gloves between each operation (Ex. 5-35). For these reasons, OSHA has, in this final rule, changed the requirement for the use of hand protection to specify that cotton gloves or other equivalent hand protection must be worn when handling wire rope.

Leg protection. At paragraph (d)(1)(iv) of the final rule, OSHA is requiring that the employer provide, at no cost to the employee, and assure that each employee who operates a chain saw wears leg protection. This paragraph requires that the leg protection be comprised of ballistic nylon or other material that the employer demonstrates provides equivalent protection. In addition, this paragraph requires that the leg protection cover the full length of the thigh to the top of the boot on each leg.

The pulpwood logging standard did not have a requirement for the use of chaps or other leg protection. The proposed rule would have required that chain-saw operators wear ballistic nylon or equivalent protection covering each leg from upper thigh to boot top or shoe top. Both the State of Washington and the State of Oregon logging standards require the use of leg protection by chain-saw operators (Ex. 2-22, 38K).

The need for and the use of leg protection was one of the issues raised in the hearing notice and has been discussed above in the Major Issues section. The evidence in the record, as discussed above, strongly supports the need for a requirement for leg protection for each chain saw operator in order to protect that operator against being injured by contact with a moving saw chain. OSHA points out that the requirement for using leg protection applies to each employee who operates any chain saw at any time on the job. This requirement includes the employee who is a regular chain saw operator as well as the employee who occasionally uses a chain saw. Some commenters emphasized the need for any employee who uses a chain saw, even occasionally, to wear leg protection (Tr. W1 193, W2 61, 115). Other commenters said OSHA should provide an exception for employees who operate chains saws only occasionally (Ex. 5-20, 5-59). The Agency believes that an employee who operates a chain saw for any duration needs leg protection. OSHA also notes that there were no comments received saying leg protection was too burdensome for infrequent operators or for short duration use.

In this paragraph, OSHA also has included an exception to the leg protection requirement for employees working from bucket trucks and, in some instances, for climbers. OSHA has allowed the exception for those working in bucket trucks, because the bucket work platform provides the necessary protection for these chain saw operators.

With regard to climbers, OSHA has retained an exception in the final rule for certain situations. Climbers are not required to wear leg protection when the employer demonstrates that a greater hazard is posed by wearing leg protection in the particular situation. As the final rule makes clear, this is not a blanket exception for climbers. The employer must evaluate the particular situation to determine whether there is a greater risk to the climber by wearing leg protection. OSHA points out that the employer will bear the burden of demonstrating that leg protection poses a greater hazard for the climber. OSHA received one comment that said leg protection should not be required because it was a hindrance during tree climbing (Ex. 5-7). The fact that leg protection may be a "hindrance" is not in itself a showing that leg protection poses a greater danger. When the hindrance is just that climbing goes more slowly when leg protection is worn, the employer has not made the requisite showing that leg protection poses greater safety hazards. However, when the employer shows that in wet conditions leg protection would substantially increase the likelihood of falling, it may be appropriate in that case for the climber to refrain from using leg protection. In such cases, OSHA believes that

alternative methods for protecting the legs, such as light and pliable pads sewn into work pants, should be used whenever feasible.

Foot protection. At paragraph (d)(1)(v) of the final rule, OSHA is requiring that the employer assure that each employee wear foot protection, such as heavy duty logging boots. This provision requires that the foot protection be waterproof or water repellant, cover and provide support for the ankle, and protect the employee against chain-saw penetration. This paragraph allows employees to wear sharp, calk-soled boots, or other slip-resistant boots, when the employer demonstrates that they are necessary for the job, terrain, timber type, or weather conditions. However, this alternative foot protection must otherwise meet the requirements of this paragraph.

OSHA notes that when the logging boot itself does not provide protection from penetration by a chain saw, the employee must use some additional foot protection, such as a foot cover, to provide that necessary protection. Information in the record indicates such devices are commercially available in the logging industry, therefore, this provision should not prove burdensome (Ex. 5-14).

Both the proposed and pulpwood logging standards contained provisions requiring that safety boots or shoes (excluding low cut shoes) meet ANSI Safety Standards for Men's Safety-Toe Footwear. The proposal also would have allowed heavy duty logging style boots with lug or calk soles to be worn when they are appropriate for the job, the terrain, the timber type and weather conditions. Several State logging standards also require that employees wear logging boots (Ex. 2-17, 2-19, 2-20, 2-22, 2-23, 38K).

While there was considerable comment on the proposed safety boot requirement, commenters generally supported the need for a safety boot provision (Ex. 5-11, 5-17, 5-19, 5-24, 5-27, 5-28, 5-29, 5-33, 5-43, 5- 50, 5-51, 5-54, 5-55, 5-63, 5-67, Tr. W1 63, 110, W2 115, 139). OSHA received the most comment on the issue of who must provide and pay for the safety boots. That issue has been discussed at length above in the Major Issues section.

OSHA also received considerable comment opposing the incorporation of the ANSI Z41.1 standard on safety shoes (Tr. W1 147-148). Commenters from cold climate areas, such as Alaska, northern Washington, Idaho and Montana, opposed the proposed requirement because they contended that the steel toes transmit the warmth produced by their feet, thereby encouraging the onset of frostbite.

For several reasons, OSHA has used performance criteria rather than incorporating by reference any foot protection standard. First, the ANSI standard permits low-cut shoes that do not cover the ankle or provide ankle support. Second, the ANSI foot protection standard is a testing rule for steel toes of safety shoes. While falling objects may pose a hazard for logging employees, the greater hazard is penetration of the boot by a chain saw. The ANSI standard does not address this hazard and it does not provide adequate protection to the entire foot, which is necessary. In addition, as discussed above, steel-toed boots may cause problems for loggers working in extreme cold. OSHA received comment about efforts to develop, manufacture and market protective footwear with fiberglass rather than steel toes, but there is

no accepted standard yet. Third, the ANSI standard does not address hazards that are unique to the logging industry, such as wet conditions and penetration of the boot by a chain saw. Fourth, there is no evidence in the record of any other consensus standard regarding logging boots. OSHA is aware of efforts by various organizations and associations, in conjunction with the American Society of Testing and Materials (ASTM), to develop test standards for personal protective equipment that is intended to apply directly to loggers and the logging industry. These standards would be similar to the various Canadian PPE standards developed by the Safety and Engineering Program Laboratory Services (IRRST) (Ex. 5-72).

Instead, the Agency has specified that logging boots that meet certain performance criteria must be worn by each employee. OSHA has reviewed the rulemaking record and determined some of the most important performance characteristics that are needed in order to deal with particular hazards that are present in logging operations (e.g., steep and uneven terrain, wet and cold weather, chain-saw kickback). For example, two hearing participants testified that logging boots must provide ankle support for the employee (Tr. W1 147, OR 222). Coverage and support of the ankle is necessary to protect against lacerations and to prevent ankle injury when navigating the rugged terrain that characterizes much of the logging environment. One commenter also said that logging boots must be waterproof or water repellent so that the logger would not be exposed to getting trench foot or immersion foot (Tr. W1 147). Finally, commenters said logging boots must provide protection against penetration by a chain saw if contact is made with the boot (Tr. W1 148, 195, W2 139).

Several commenters also supported the proposed provision allowing lug or calk-soled boots to be used (Ex. 5-19, 5-28, 5-29). These commenters said that working conditions varied too greatly to require the use of one type of boot sole for all logging regions. For example, one commenter said that calk boots are considered essential for safe and secure walking on steep western forest terrain (Ex. 5-28). Another commenter stated that there are situations in the south where smooth soled boots are adequate (Ex. 5-29). In addition, this commenter said that there are conditions when calk boots might pose a greater danger, such as a machine operator who is continuously mounting and dismounting a machine via steel platform steps where the calk boots could result in slipping or falling. As a result, this commenter said that calk and sharp-soled boots should be limited to those situations when the type of logging operation, terrain, timber size or weather conditions make their use appropriate. The U.S. Department of the Interior also commented that calk-soled boots may contribute to certain types of logging injuries, such as knee injuries (Ex. 5-50). Based on these comments, OSHA specifically allows sharp, calk-soled boots or other slip-resistant type boots to be worn, provided the employer can demonstrate such boots are needed for the employee's job, the terrain, the timber type or the weather conditions.

In order for the employer to demonstrate that such footwear is necessary, the employer must prove that three conditions are met: (1) that the footwear is appropriate for use in the work environment; (2) the employee's duties require him/her to work where the footwear is needed; and (3) that the use of the alternative footwear does not make the work less safe. For example, if the area where the logging is being done is moist to wet and has a dense leaf cover, the use of calk-soled boots (boots with spiked soles) would provide the logger with additional traction when walking and working on that ground cover. On the other hand, such footwear is not

appropriate when a machine operator spends little time working on the ground (even if the same conditions as described above prevail) since spikes make frequent mounting and demounting of the machine more hazardous. OSHA recognizes that slips, trips and falls are a major source of injury in the logging industry, accounting for one third of the injuries to loggers (Ex. 2-1).

OSHA is also requiring that when an employee wears calk-soled logging boots, the other foot protection requirements of this paragraph must also be met. OSHA is aware that most calk-soled boots do not have steel-toes or other devices that prevent penetration by a chain saw. However, OSHA is also aware that calk-soled boots are worn primarily by fellers and buckers operating chain saws on steep terrain. Evidence in the record indicates that a vast majority of loggers in western States, where the terrain is steep, wear calk-soled boots (Ex. 2-1). However, even in those States, almost 20 percent of all injuries reported in the WIR survey involved chain saws. The vast majority of these injuries happened when the logger was struck by the chain saw. Therefore, OSHA believes that it is necessary that even when an employee wears calk-soled boots, he must also have foot protection providing protection against chain-saw penetration. As stated above, when the boot itself does not provide that protection, the employee must wear some other device that will provide the needed protection. The record shows there are such devices currently available on the market, therefore, OSHA does not believe this additional requirement will be unduly burdensome (Ex. 5-14).

Head protection. At paragraph (d)(1)(vi) of the final rule, OSHA is requiring each employee who is at risk of injury from falling or flying objects to wear head protection. The head protection must meet the requirements of newly-revised subpart I of part 1910. Both the pulpwood logging standard and the proposed standard contained head protection requirements. The pulpwood logging standard had identified the performance criteria that head protection was required to meet, but did not specifically require employees to wear it. The proposed standard added that requirement and updated the performance criteria for the required head protection. Several State logging standards also require that employees wear head protection (Ex. 2-18, 2-19, 2-20, 2-22, 2-23, 38K).

OSHA did not receive any comments opposing the required use of head protection and has retained the proposed provision in the final standard. OSHA believes it is important to stress that in the logging industry head protection is necessary to protect employees not only from falling objects, but also from flying objects. According to the WIR survey, 14 percent of all injuries reported were to the head (Ex. 2-1). OSHA believes this hazard is present especially for fellers, chain saw operators and persons performing chipping operations, however, there are other logging operations where the potential for head injury also exists.

Eye and face protection. Paragraph (d)(1)(vii) of the final rule requires that each employee who works in an area where there is a potential for injury due to falling or flying object shall wear eye and face protection meeting the requirements of subpart I of part 1910. This provision permits logger-type mesh screen to be worn when the employer demonstrates it provides equivalent protection. The proposed rule also contained these provisions. The 1978

ANSI standard contained a similar requirement. Eye and face protection is also required by several State logging standards (Ex. 2-18, 2-19, 2-22, 2-23, 38K).

Two commenters said OSHA should require eye protection to be worn only in certain situations (Ex. 5-43 and 5-64). One commenter stated:

This is a good rule for some logging activities, such as felling, bucking, splicing, etc.; however, we do not feel that this is necessary for choker setting and many machine operators, such as yarder, loader, feller-bunchers (Ex. 5-64).

After reviewing the evidence in the record, OSHA believes that a requirement mandating eye and face protection is necessary. According to the WIR survey, 13 percent of all injuries reported involved the eyes and face (Ex. 2-1). In the final rule, OSHA is requiring only that such protection be worn whenever there is the potential for head injury due to falling or flying objects. OSHA agrees with the commenters that the potential for eye and face injury is present especially for fellers, buckers and chippers, however, there are other logging operations in which the potential for this type of injury also exists. In any logging operations when there is no danger of being struck by falling or flying objects, eye protection is not required.

Employers, under the PPE standard, will have to conduct a hazard assessment to determine when and where those hazards may exist in the logging workplace. In some cases, the presence of the hazard will be obvious (e.g., fellers and buckers). In other cases, working conditions may be such that there is no potential for injury (e.g., yarder operator working inside an enclosed cab).

As with the head protection provision, OSHA has retained the eye and face protection provision to alert the industry that falling objects, in addition to flying objects, are a hazard for employees in the logging industry.

First-Aid Kits

At paragraph (d)(2) of the final rule, OSHA is requiring that employers provide first-aid kits. The proposed standard contained this provision. First aid kits are also required by every State Plan State logging standard. OSHA did not receive any comments opposing this requirement in general.

Paragraph (d)(2)(i) of the final rule requires that first-aid kits be at each work site when felling is being conducted, at each landing and on each employee transport vehicle. The proposed rule stated that first-aid kits be provided "at the work site." Several commenters said that OSHA should define the term "work site" (Ex. 5-39, 5-53, 5-55, 5-63) in the final rule. They also said that having kits available at the landing should provide adequate protection. However, another commenter said chain-saw operators working away from the landing need first-aid kits and should each be required to carry a small first-aid kit that contains supplies to stop bleeding (Ex. 5-28).

In the final rule, OSHA has clarified its intention regarding having first-aid kits at each work site. First, the records shows that first-aid kits are necessary at each work site when felling is being conducted and not just at landings. According to the WIR survey, more than one-half of all injuries occurred at the cutting site, while only one-fifth of the injuries were at landings (Ex. 2-1). OSHA believes that immediate assistance must be provided for injured cutters. As discussed above in the Major Issues section, many logging establishments have central offices, but their crews are performing operations miles from that central location. OSHA has received testimony that cutting crews are often spread out and in remote locations (Ex. 5-34; Tr. OR 21). These commenters said crews are often located more than one-half hour away from a central office or spread across five square miles. First-aid kits that require that much time to access are of limited value to an injured employee. When an injury is severe, the lack of immediately accessible first-aid materials and trained personnel could result in permanent disability or death. Therefore, OSHA is requiring that first-aid kits be provided at each work site where trees are being felled.

Second, OSHA is also requiring first-aid kits to be provided at each landing. As discussed above, one-fifth of all injuries reported in the WIR survey occurred at landings (Ex. 2-1). First-aid kits at landings are also necessary to provide assistance to other injured employees, such as those on skid trails. According to the WIR survey, nearly one-fifth of employees injured were on skid trails.

Third, OSHA is retaining the requirement from the proposed rule that first-aid kits be provided on each crew vehicle. The WIR survey indicates that employees are injured on employer-built roads while enroute to and from work sites (Ex. 2-1). One commenter stated that requiring first-aid kits on each employee transport vehicle could result in several kits being at each work site (Ex. 5-35). Nothing in the standard prohibits an employer from using the employee transport vehicle kits by a felling crew during the workshift, provided they are returned to the crew vehicle when it is moved at the end of the workshift.

Paragraph (d)(2)(i) of the final rule also requires that the employer, in determining the appropriate number and contents of first-aid kits, to consider the degree of isolation of the work site, the number of employees at the work site and the hazards reasonably anticipated at that work site. The further a crew is from a central landing, the more crucial a first-aid kit is for that remote crew. For example, large and well-supplied first-aid kits are needed where crews are so remotely located that rescue units (either vehicles or helicopters) cannot get to the injured person or not get there quickly. When crews are very small and located close to central landings smaller kits may be adequate, when supplemented by kits at central landing areas that contain a more comprehensive supply of first-aid materials.

Paragraphs (d)(2)(ii), (iii) and (iv) all deal with the adequacy of the contents of first-aid kits. At paragraph (d)(2)(ii) of the final rule, OSHA has specified that each first-aid kit must meet certain minimum content requirements. Those minimum content requirements are delineated in mandatory Appendix A. OSHA received comments urging OSHA to specify the contents needed for an "adequately supplied" first-aid kit (Ex. 5-21, 5-28, 5-50, 30). These commenters also pointed out that several State logging standards specify minimum first-aid content requirements (Ex. 2-18, 2-21, 2-22, 2-23, 38J, 38K). In addition, one commenter also provided

a list of minimum contents needed for logging first-aid kits. Based on these comments and OSHA's expert judgment, the items listed in Appendix A are the type necessary for dealing with injured persons in remote areas of varying climatic conditions. OSHA points out that the specified contents are minimally adequate for a small logging crew of two to three employees. Where crews are larger, additional kits or kits with more supplies may be needed. In formulating this final rule, OSHA included Appendix A (First-aid supplies) and Appendix B (First-aid training) to provide the employer with a definitive means of determining the adequacy of the first-aid kits and the training that employees must receive.

OSHA has deleted from the final paragraph the proposed requirement that first-aid kits include snake bite kits. OSHA received several comments about this provision (Ex. 5-7, 5-17, 5-29, 5-35, 5-42, 5-50, 5-51, 5-55, 5-67). One commenter said this requirement should be deleted since there were no poisonous snakes in his area (Ex. 5-7). Other commenters said that some snake bite kits were not effective in treating bites or that they are outmoded and can do more damage than good (Ex. 5-17, 5-29, 5-35, 5-42, 5-50, 5-51, 5-55, 5-67). For example, NIOSH said that it is possible more serious injury will occur to a person by improper use of a snake bite kit (Ex. 5-42). According to the Regional Snake Bite Control Center at the University Medical Center in Cincinnati, OH, snake bite kits should not be used when medical treatment is available within one hour of the bite (Ex. 5-42). OSHA has determined that, given the regional differences in the logging industry, employers should be allowed to work with their health care provider to determine whether a snake bite kit is necessary and what kind of kit would be of most assistance for loggers working in that area. One of the factors the health care provider should consider is how far particular loggers are from medical facilities and trained medical personnel.

Paragraph (d)(2)(iii) requires a health care provider to review and approve annually the first-aid kits the employer provides, both as to the adequacy of the kit's contents and the number of kits provided. OSHA has added this requirement in the final rule for several reasons. First, 1910.151(b) already requires that first-aid kits be approved by consulting physicians. OSHA is aware that health care providers in addition to physicians are qualified to approve first-aid kits and OSHA wants to provide flexibility for employers in meeting this requirement. Second, 1910.151(b) only requires initial approval of first-aid kits rather than periodic approval. However, OSHA believes that a periodic review of first-aid kits is necessary and appropriate in the logging industry. This industry is one in which the workplace is often not near medical personnel, infirmaries, clinics, or hospitals that are best able to treat logging injuries. Therefore, it is important for a health care provider to assess the contents of first-aid kits to see that they contain those supplies that will provide effective assistance for an injured worker.

Once the kits are reviewed and approved, paragraph (d)(2)(iv) requires the employer to maintain the first-aid kits in accordance with the approval conditions. Employers have the duty to ensure that first-aid kits are adequately supplied and replenished as necessary. In addition, the employer is responsible for assuring that kit contents are usable, that is, there is no spoilage or damage due to weather conditions. For example, employers need to periodically check first-aid supplies to ensure that materials are still in clean and sterile condition.

Seat Belts

At paragraph (d)(3) of the final standard, OSHA is requiring the provision of seat belts for the operator of any vehicle or any machine equipped with ROPS or FOPS and the use of seat belts by the vehicle and machine operator and passengers. The pulpwood logging standard required the provision of seat belts on mobile equipment, but did not require the use of seat belts by operators and passengers. The proposed rule required both the provision and use of seat belts by tractor, equipment and personnel transport operators. In addition, the proposed rule allowed an exception to using seat belts when the employer had "reasonable cause to believe that safety of the operator is jeopardized by wearing a seat belt." The 1978 ANSI logging standard required logging machines to be equipped with seat belts. All State logging standards also require the use of seat belts by operators and passengers of machines and vehicles.

OSHA received many comments on the use of seat belts (Ex. 5-17, 5-19, 5-22, 5-35, 5-39, 5-45, 5-51, 5-54, Tr. W1 79, 113, 183, 213). The West Virginia Forestry Association recommended expanding the seat belt requirement to require seat belts be installed and used in all personnel transport vehicles because West Virginia did not have a state seat belt law (Ex. 5-4). Other commenters also recommended that OSHA not permit any exceptions to the use of seat belts (Ex. 5-17, 5-22, 5-27, Tr. W1 183, 213). One commenter reasoned that any exception would invite widespread abuse and seriously weaken OSHA's field enforcement capability (Ex. 5-22). However, other commenters said that seat belts should not be required because they would unduly restrict operators, would result in greater injury if an object entered the operator area (i.e., "jillpoke"), and would be hazardous for employees operating machines on steep terrain (Ex. 5-35, 5-45; Tr. W1 79, 113, OR 31-2, 83, 120, 181).

After reviewing the comments in the record and the available accident data, OSHA has decided in the final rule to eliminate the seat belt exception for several reasons. First, the record shows that use of seat belts would save lives in the logging industry (Ex. 4-129). A State of Washington study also reported 12 loggers killed in rollover accidents from 1977-83 (Ex. 4-129). All 12 of those employees were crushed by the machine when they were thrown from the cab. This study concluded that all of those deaths might have been prevented if the employees involved had been wearing seat belts because the ROPS and FOPS were still intact when the machine came to a rest. This study also concluded that eliminating exemptions on seat belt use would save lives in the logging industry.

Second, the record does not support the view that the operator's risk of being injured by a jillpoke entering the cab is greater than the risk of injury from not wearing seat belts. Of the 105 logging fatalities reported to OSHA between 1985 and 1990, only one was caused by a jillpoke (Ex. 4-65). On the other hand, 7 fatalities occurred during machine rollover accidents when either the machine operator or a rider was thrown from the machine and crushed because he was not wearing a seat belt. NIOSH said that 80 deaths occurred due to logging machine rollovers from 1980-85 (Ex. 5-42). The State of Washington study indicated that 12 loggers were killed in machine rollover accidents and no machine operators were killed during that period because of jillpokes (Ex. 4-129). California OSHA also testified that their experience has been that the jillpoke hazard is far outweighed by the hazard of rollovers (Ex. 9-12). They

provided examples of logging accidents in which the employee would not have died or been injured if he had been wearing a seat belt.

Third, OSHA has dealt directly with the hazard of jillpokes in the final rule. The final rule requires that all operator cabs be equipped with screening or other material that will prevent objects from penetrating the cab. This requirement is expected to prevent jillpoke injuries, therefore the seat belt exception is not necessary.

Fourth, OSHA agrees with commenters that there should be no exception to the seat belt requirement for mobile machine operators, especially those who operate on steep terrain. Mobile logging machines are operated on unlevel ground and steep terrain where it is well-recognized that machine rollover and tipover is a primary danger. Seat belts will restrain the operator in the cab and its protective structure rather than allowing the operator to try to jump free. In most instances, when the operator tries to jump free he is pinned, crushed or hit by the machine, ROPS/FOPS or overhead guard. Finally, OSHA notes that seat belts have been designed that keep operators restrained within the cab in the event of a rollover or tipover, while at the same time providing them with maximum movement within the cab. One commenter said these seat belts, which resemble carnival harnesses, have been designed by the Forest Engineering Research Institute of Canada (Ex. 32). These seat belts would meet the requirements of this section while addressing the concerns raised by the commenters.

Paragraph (d)(3)(iii) of the final rule requires that each employee fasten the seat belt securely and tightly so that the employee is restrained in the vehicle or machine cab in the event of an accident. Evidence in this record (Ex. 5-35; Tr. W2 190) indicates that employees frequently keep their seat belts loose in order to move in the cab more easily. However, if the machine rolls over, the loose seat belt may not be effective in keeping the operator in the cab. In such cases, the operator may be thrown from the cab and pinned or crushed by the machine because the seat belt was too loose to keep the operator fully contained in the cab.

Paragraph (d)(3)(iv) of the final rule requires that machine seat belts meet the requirements of the Society of Automotive Engineers standard (SAE J386 June 1985) for seat belts for construction machines. This incorporation by reference of SAE J386 June 1985, has been approved by the Office of the **Federal Register**, in accordance with the requirements of 5 U.S.C. 552(a) and 1 CFR Part 51. The final rule has been revised to reflect this approval and provides the requisite information regarding access to the text of SAE J386, June 1985. This provision updates the proposed standard to incorporate the latest SAE seat belt standard. There were no comments opposing this provision.

Paragraph (d)(3)(v) of the final rule requires employers to assure that seat belts are not removed from any vehicle or machine. This paragraph also requires the employer to replace the missing seat belts if seat belts were installed in the vehicle or machine at the time of manufacture and have subsequently been removed. OSHA is aware that seat belts are removed from machines because operators do not like to wear them. OSHA is requiring the replacement of seat belts because the Agency believes they are essential in protecting machine and vehicle operators from being killed or seriously injured in accidents.

Paragraph (d)(3)(vi) of the final standard requires employers to assure that seat belts are maintained in a serviceable condition. Employers have the duty to ensure that seat belts are functioning properly and are not damaged. The standard also requires inspection of seat belts as part of the general machine and vehicle inspection required at the start of each workshift. (See discussion of maintenance in paragraphs (f) and (g)).

Fire Extinguishers

At paragraph (d)(4) of the final rule, OSHA is requiring employers to provide and maintain a portable fire extinguisher on each machine and vehicle. The extinguisher must meet the requirements of subpart L of part 1910. The pulpwood logging and proposed standards required a fire extinguisher at locations where machines and vehicles are being operated.

Several commenters urged OSHA to limit this requirement (Ex. 5-21, 5-36, 5-39). Two of these commenters said that fire extinguishers should only be required on heavy equipment and at refueling stations (Ex. 5-21, 5-36). The other commenter said fire extinguishers should only be required during forest fire seasons.

OSHA has decided in the final rule to require extinguishers on each machine and vehicle for several reasons. First, repeatedly in this rulemaking commenters have requested that OSHA more clearly define what constitutes a "work site," an "operating area," or a "work area." OSHA's intention in the proposed rule was that a fire extinguisher be located where each machine and vehicle is operated, including areas where they are refueled. OSHA believes that requiring the fire extinguisher be located on each machine most clearly conveys the Agency's intention that the fire extinguisher move with the machine or vehicle as it is operated and refueled.

Second, the potential for fire is a major concern in this industry (Ex. 5-20). It is important that extinguishers be immediately available so that a fire can be extinguished before it goes out of control and endangers employees and the forest. A fire extinguisher that is located at a landing where the machine begins its operation, may be of no use when the machine is miles away from the landing picking up a load.

Third, one of the areas where the potential for fire is great is during refueling of the machine. However, the proposed standard only required the extinguisher to be located where machines and vehicles were being operated and did not address refueling directly. If the extinguisher remains with the machine or vehicle, it will be there to protect against fire hazards during refueling.

Fourth, OSHA is aware that in many industrial settings, the extinguisher is already mounted on the machine or vehicle so that it is immediately accessible when a fire occurs. Therefore, OSHA does not believe complying with this requirement will pose a significant burden on the employer.

Environmental Conditions

At paragraph (d)(5) of the final rule, OSHA is requiring that all work be stopped and that each employee move to a place of safety when environmental conditions may endanger an employee in the performance of their job. This provision also specifies that hazardous environmental conditions include, but are not limited to, electrical storms, high winds, heavy rain or snow, extreme cold, dense fog, fires, mudslides, and darkness. The pulpwood logging and proposed rules contained a similar provision, however, it only specifically identified electrical storms and high winds. The 1978 ANSI logging standard also contained a similar requirement and, in addition, required logging operations to cease when visibility is inadequate, unless artificial lighting is provided. All State logging standards, except the State of Alaska, have provisions requiring work to cease when environmental conditions are hazardous to employees.

OSHA received several comments on this provision (Ex. 5-50, 5-51, 5-55, 5-66; Tr. W1 139). Some of these commenters recommended expanding the conditions listed in this provision. These commenters also said logging should be stopped when darkness impairs visual ability, unless artificial light is provided. One commenter said they do not allow their employees to work in blowing snow, extreme cold or winds (Ex. 5-51). Another commenter said OSHA should specify that the work stoppage requirement should be limited to only that work that is affected by the environmental conditions (Ex. 5-55; Tr. W1 139).

OSHA does not believe it is possible to delineate each and every environmental condition that would necessitate termination of work and moving employees to a place of safety. OSHA is aware that the employer's judgment will be essential in carrying out this provision in the various environmental conditions that affect different regions of this industry. However, the criteria that must form the basis of the employer's assessment is uniform--when a reasonable employer would believe that environmental conditions may endanger employees performing a specific job or operating a specific piece of equipment, work must stop and the employees must move to a place of safety. For example, darkness may prevent a feller from accurately assessing the distance between occupied work areas or the condition of the tree to be cut (e.g., loose bark, damaged trunk or limbs). If the feller is not able to properly assess these conditions, he may endanger himself and others in the area. Therefore, work would have to stop unless artificial light were available to alleviate the danger.

Another element of the determination as to whether an environmental condition may endanger an employee is the particular job being performed and the tools of that job. For example, dense fog may endanger a feller because they may not be able to see the top of the tree and accurately judge its lean. If such conditions exist, felling must be stopped. However, fog may not necessarily endanger employees who are loading transport vehicles at a landing. In that case, the employees might still be able to perform their job under such conditions.

Work Areas

At paragraph (d)(6) of the final rule, OSHA is requiring that work areas be so organized and spaced that the actions of one employee will not create a hazard for any other employee. This paragraph also requires that each employee work in a position or location that is within visual or audible contact with another employee. These provisions were adopted from the proposed

standard. The pulpwood logging and 1978 ANSI logging standards also recommended a two tree-length distance between work areas. Requirements similar to the final rule exist in various State logging standards (Ex. 2-17, 2-18, 2-19, 2-20, 2-21, 2-22, 2-23, 38J, 38K).

At paragraph (d)(6)(ii) of the final rule, OSHA is requiring that work areas be assigned so that trees cannot fall into adjacent occupied work areas. This provision also requires that the distance between adjacent occupied work areas be at least two tree lengths of the trees being felled. The proposed rule and the 1978 ANSI logging standard contained similar requirements.

OSHA received comments supporting this provision (Ex. 5-29, 5-41, 5-67, 5-70; Tr. W2 163). These commenters said that two tree lengths is already used in the industry to ensure safe spacing of work areas. Some commenters, however, said that the provision should be limited (Ex. 5-28, 5-36, 5-39, 5-44, 5-49, 5-53, 5-54, 5-63, 5-74 through 5-92). One commenter said OSHA should require minimum spacing requirements only when physical control of the timber was unpredictable, such as felling and skidding (Ex. 5-28). Other commenters recommended that the requirement be limited to slopes that are greater than 25 or 35 percent (Ex. 5-21, 5-36, 5-39, 5-63).

The purpose of these requirements is to protect employees in adjacent occupied work areas from being hit by misdirected trees. One of the major causes of injury in the logging industry is being hit by a tree. According to the WIR survey, almost one-quarter of all those injured were hit by a tree (Ex. 2-1). The State of Washington study showed that more than 65 percent of all employees were killed when they were hit by a tree or log (Ex. 4-129). In addition, the study showed that almost nine percent of that reported fatalities resulted from an employee being hit by a tree being felled by another employee (Ex. 4-129).

Employees can be hit by a tree that falls in the wrong direction or by one that rolls or slides down sloping terrain. There is no dispute that there is increased difficulty in directional felling on unlevel terrain. OSHA believes that these work spacing requirements in the final rule will help to prevent these types of accidents. Moreover, adopting any of the limitations that the commenters proposed would still leave employees exposed to other foreseeable hazards. Since the two tree-length distance has become accepted practice in the industry, it appears that industry itself recognizes the need for a minimum work spacing requirement and that the provision should not prove overly burdensome for any establishments in the industry.

In paragraph (d)(6)(ii) of the final rule OSHA is also requiring that employers assess conditions to determine whether additional spacing between adjacent occupied work areas is necessary. Some of the conditions that employers must examine include the degree of slope, the density of the growth, the height of trees, the soil structure, and other hazards reasonably anticipated at that work site. This paragraph also requires that additional distance be maintained between adjacent occupied work areas on any slope where rolling or sliding of logs is reasonably foreseeable. These provisions were also contained in the proposed rule and in various State logging standards (Ex. 2-17, 2-18, 2-19, 2-20, 2-22, 38J, 38K). The 1978 ANSI logging standard also contained a similar requirement.

Some commenters said greater distance should only be required when the slope is greater than 25 or 35 percent (Ex. 5-21, 5-36, 5-39, 5-63). These commenters, however, did not provide any information on why such a limitation would provide adequate protection for employees. OSHA does not agree that greater distance may only be necessary on such steep slopes. OSHA believes there is a potential for trees and logs to roll and slide on lesser slopes when conditions such as snow and ice accumulation or wet soil are present. Therefore, OSHA does not believe that adequate protection would be provided if the commenters' recommendation were adopted.

Other commenters said that a greater distance on slopes should not be required when employees are working to the side of each other, pointing out that the Alaska logging standard allows this (Ex. 5-74 through 5-92). OSHA believes that the final standard is consistent with the Alaska logging standard. The final rule only requires that a greater distance is required on any slope where rolling or sliding of trees or logs is reasonably foreseeable. Nothing in the final rule requires a greater distance on slopes when there is no danger that an employee could be hit by a rolling or sliding log. For example, when employees work side by side on a slope, rather than uphill and downhill from each other, there is no danger that the employee will be injured by a rolling log.

At paragraph (d)(6)(iii), OSHA is requiring that each employee, without exception, be located within visual or audible contact of another worker. This provision must be read in conjunction with the requirements in paragraph (d)(7) specifying what methods of audible contact may be used (i.e., not chain-saw engine noise). This requirement parallels the proposed standard, however the proposed rule did not apply this requirement to motor vehicle operators, watchmen and other single employee assignment jobs. The pulpwood logging standard required that employees work within the vocal range of other loggers but also allowed employers to use an alternative procedure that provided for periodic checks of employee welfare.

Much of the comment on this requirement has already been discussed in the Major Issues section above. Some commenters opposed various aspects of this provision (Ex. 5-29, 5-36, 5-39, 5-49, 5-53, 5-54, 5-67, 5-70, 5-74 through 5-92; Tr. W1 65). One commenter recommended allowing manual fellers to be out of contact with other employees, such as skidder operators, for up to 20 minutes (Ex. 5-54). This commenter said that was the amount of time necessary to transport a load to the landing and return to the cutting area. However, the commenter has not provided any information or data to support why such an exception would still allow for adequate protection for fellers. OSHA does not believe that permitting periods of time in which contact is not maintained will provide adequate protection for employees. A chain-saw operator who severely cuts himself could bleed to death within 20 minutes.

Other commenters opposed this provision because it would be difficult to comply with this requirement and maintain the required two tree-length separation between adjacent work areas (Ex. 5-29, Tr. W1 pg 65). For several reasons, OSHA believes employers will be able to comply with both requirements. First, this paragraph requires each employee to be within visual or audible contact with "another" employee. It does not require that the person with whom contact is maintained be in an adjacent work area. Second, the provision requiring at

least two tree-length spacing between adjacent occupied work areas is intended to prevent trees from falling from one work area into another. The purposes of a visual or audible contact is to provide a method for employees to remain in contact in case of an emergency (e.g., a chain-saw operator requesting first aid after being cut by the saw, an employee alerting others of severe weather approaching). Therefore, if employees are provided with radio communication, it would be possible for employees whose work areas are spaced far apart to maintain contact with each other.

Third, as discussed above in the issues section, the final rule does not require that visual contact be maintained. Instead, audible contact may be maintained by the use of horns, whistles or radio communication. As such, employees can be great distances from each other and still remain in contact satisfying the requirements of this provision. Fourth, OSHA is also aware that many logging establishments are currently using radio communication to maintain contact, that is the best evidence of its effectiveness.

As stated above, in this paragraph OSHA has eliminated all proposed exceptions to the requirement of maintaining contact with another employee. As discussed above in the Major Issues section, OSHA has eliminated the proposed exceptions for several reasons. First, various State standards do not include an exception to the contact requirement (Ex. 2-17, 2-18, 2-19, 2-20, 2-21, 2-22, 38J, 38K). Second, several commenters supported the proposal that all employees remain in contact and indicated that they do maintain contact with all employees, including employees in single employee assignments, via radio and telephone (Ex. 5-74 through 5-92). As a result, these commenters suggested the exceptions may no longer be necessary (See also, Ex. 5-33). These commenters also reasoned that all employees, including mobile machine operators performing single employee assignments, need a method of summoning help in an emergency. OSHA agrees with these commenters. The Agency believes that the contact requirement will help to provide prompt assistance to all employees who are injured or are otherwise in emergency situations. As discussed above in the Major Issues section, with the advent of radio communication, it is feasible to maintain contact with workers performing single employee assignments.

OSHA notes that it is implied in this provision that not only will means for contact be provided, but also that contact will be maintained with each employee. All but one State logging standard require check-in systems to assure that contact is maintained (Ex. 2-17, 2-18, 2-19, 2-20, 2-21, 38J, 38K). In addition, several commenters say they have initiated check-in systems to assure that employees working in remote locations are all right.

At paragraph (d)(6)(iv) of the final rule, OSHA is requiring the employer to account for each employee at the end of the workshift. OSHA has adopted this provision from the pulpwood logging and the proposed standards. The 1978 ANSI logging standard also contained a similar requirement. Several State logging standards also require check-in systems at the end of the workshift to ensure no employees are left in the woods (Ex. 2-17, 2-18, 2-19, 2-20, 38K). Several commenters said that it was not necessary for small felling and bucking crews to be accounted for by anyone other than the crew members (Ex. 5-21, 5-36, 5-39, 5-53, 5-63). In response, OSHA points out that nothing in the final rule would prevent the employer from allowing a crew supervisor, for example, to account for the rest of the crew at the end of the

workshift. In such cases, the employer is responsible for establishing and enforcing a regular system whereby there is a check on each employee at the end of the workshift. The most important thing is that no employee is unaccounted for at the close of the shift. As with the contact requirement, OSHA believes that this provision will help to assure timely assistance to employees in emergencies.

In addition, end of shift accounting offers several other benefits to the employer and employee. First, the employer can remain appraised of the progress made on the job during the last workshift. Second, any hazardous conditions that were not contemplated during pre-shift meetings with employees can be relayed to the employer for dissemination to other employees. Third, unserviceable tools and machines can be reported to the employer so that replacements can be obtained or repairs can made before the next workshift. Therefore, OSHA has retained this provision in the final standard.

Several commenters said this provision would interfere with contracting situations when the logger is an independent contractor (Ex. 5-21, 5-23, 5-36, 5-53, 5-55, 5-63). However, they did not provide any evidence as to how this provision might conflict with contracting agreements.

Signaling and Signal Equipment

At paragraph (d)(7)(i) of this final rule, OSHA is requiring that hand or audible signals such as whistles, horns, or radios, be utilized whenever noise, distance or other factors prevent clear understanding of normal voice communications between employees. Paragraph (d)(7)(ii) prohibits the use of engine noise, such as from chains saws, as a means of maintaining contact. These provisions supplement and support the requirement for the maintenance of audible or visual contact contained in paragraph (d)(6)(iii). The proposed rule also contained a contact requirement. However, it would not have prohibited the use of chain-saw noise as a means of signaling. The 1978 ANSI logging standard also contained a requirement similar to the proposed rule. Several State logging standards also prohibit the use of chain-saw noise as a signaling device (Ex. 2-22, 2-23, 38K). The Washington State logging standard requires fellers to carry whistles, which are to be used for no other purpose than to summon help (Ex. 2-22, 5-7).

OSHA received many comments on this provision opposing the prohibition of chain-saw noise as a signaling device, that have been discussed above in the Major Issues section. Other commenters supported the provision, focusing their comments on allowing communication devices such as telephones and radios in the final rule (Ex. 5-54, 5-70, 7-74; Tr. W2 197). One of these commenters supported the provision because the use of electronic communication, such as citizen band radios, makes controlling trainees easier (Tr. W2 197). Another commenter supported the use of whistles for signalling because they produce a very unusual sound in the woods that can be heard for a great distance (Ex. 5-7).

In general, there are two principal safety-related needs for a signalling system in logging operations. The first is for the maintenance of communication between employees working in adjacent occupied work areas, both to warn other employees of potential hazardous situations

and to summon help in an emergency. The second need for a signaling system is to provide guidance to the operators of machines and vehicles, such as cranes and other material handling machines, when work site conditions prevent operators from seeing and controlling the operation. For example, if a crane is used to move a load from below an overhang such as a cliff, a signal person might be needed to observe the load and to signal the crane operator when and how to move the load.

As discussed above in the Major Issues section, paragraph (d)(7)(ii) of the final rule prohibits the use of engine noise as a signaling device. This paragraph does permit other locally and regionally recognized signals to be used. This provision has been adopted from the proposed rule and the 1978 ANSI logging standard. OSHA did not receive any comments opposing the use of locally or regionally recognized signals, therefore, the Agency has retained this provision in the final rule.

At paragraph (d)(7)(iii) of the final rule, OSHA has added a provision requiring that only designated persons give signals except in an emergency. The proposed rule and the 1978 ANSI logging standard also contained this requirement. Several State standards also require that only designated persons give signals (Ex. 2-18, 2-21, 2-22, 38K). As defined in this standard, a designated person is one who has the necessary knowledge, training and experience to perform specific job tasks. OSHA did not receive any comments opposing this provision.

OSHA has included this provision in the final rule for several reasons. First, OSHA believes that the signaling system should be included in the employer's training-program so that employees who are called upon to act as signal persons will know how to signal appropriately. This is especially important when an employee performs signaling to assist with the safe operation or movement of a machine or load. It is also important that employees know the appropriate signals in the event that help must be summoned. The employee requiring help needs to know what means are to be used to communicate the necessary information and how to use those means of communication properly. In addition, other employees must be trained in what they should listen for so they can avoid potential hazards or provide assistance. Second, OSHA believes that employees without the necessary training should not be permitted to act as a signal person for assisting with the operation and movement of machines and loads. When the signal person has not been adequately trained, the risk of harm to the signal person, the machine operator and other employees in the vicinity is great. Third, the use of trained signal persons should reduce the potential for conflicting signals that could create a hazard.

Overhead Electric Lines

At paragraph (d)(8)(i) of the final rule, OSHA is requiring that logging operations near overhead electric lines be done in accordance with the requirements of 1910.333(c)(3). The proposed rule repeated some of the requirements of 1910.333(c)(3). The pulpwood logging standard did not contain any provision regarding overhead electric wires. All State logging standards contain restrictions regarding felling near power lines.

One comment was received addressing minimum clearance from overhead lines (Ex. 5-34). This commenter suggested that when the line voltage is unknown and other information indicates that the line is obviously high voltage, a minimum clearance of 20 feet must be maintained from the line until the line voltage is established by the electrical system operator. The separation distance recommended by the commenter would provide clearance that would only be warranted by a 350 KV line. OSHA believes that maintenance of that great a separation distance is unnecessary in this rule. High voltage lines of this order of magnitude are usually on tall transmission towers, therefore it is highly unlikely any employee would come in contact with the line or have any means of getting near the line.

OSHA believes that 1910.333(c)(3) adequately spells out the precautions and clearances that must be taken when working near overhead lines. OSHA finds nothing indicating that logging is different from the rest of general industry, therefore, the Agency does not believe a special provision is necessary to address the logging industry.

At paragraph (d)(8)(ii) OSHA is requiring the employer to immediately notify the power company when any felled tree comes into contact with a power line. This provision also requires each employee to remain clear of the area until the power company advises there are no electrical hazards. OSHA has adopted this provision from the proposed standard. OSHA did not receive any comments on this provision.

Flammable and Combustible Liquids

At paragraph (d)(9) of the final rule, OSHA is including requirements for the safe handling and use of flammable and combustible liquids. As was proposed, the final rule requires such liquids to be stored, handled, transported and used in accordance with subpart H of Part 1910.

Two commenters opposed this provision (Ex. 5-7, 5-34). One commenter stated:

After carrying a 40 pound saw, lunch, water, wedges and wrenches, the last thing the timber faller wants to add is more weight. So when he goes to carry fuel and oil it's normally carried in labeled plastic containers, generally in sizes not exceeding two quarts. To carry fuel in approved containers would do nothing more than add back injuries to the statistics (Ex. 5-7).

In response, OSHA points out that there are approved plastic storage containers available in small sizes, such as two quart containers. Nothing in the final rule or subpart H of part 1910 prohibits employers from using small plastic storage containers, provided they meet the requirements of 29 CFR 1910.106. Further under 29 CFR 1910.106, the maximum allowable size of approved plastic fuel container is one gallon. OSHA does not believe that carrying one gallon or less of fuel in a plastic container will substantially increase back injuries.

At paragraph (d)(9)(ii) of the final rule, OSHA is requiring that flammable and combustible liquids not be transported in the driver's compartment or in any passenger-occupied area of a machine or vehicle. OSHA is aware that pick-up trucks are often used to transport employees to a logging work site. Transportation of flammable and combustible liquids in the passenger

compartment of these vehicles exposes the driver and passenger to fire and explosion hazards and is not a safe practice.

At paragraph (d)(9)(iii) of the final rule, OSHA is requiring that each machine, vehicle and portable powered tool, such as chain saw, be shut off during refueling. OSHA has added this requirement because it believes that when handling flammable and combustible liquids, it is essential to eliminate sources of ignition. The requirement to shut off the engines of motor vehicles when they are refueled is mandatory in most states and is clearly posted in service stations. Because OSHA believes that it is essential to minimize the sources of ignition when refueling vehicles, the Agency has retained the requirement as proposed.

At paragraph (d)(9)(iv) of the final rule, OSHA is requiring that flammable or combustible liquids not be used to start fires. The proposed rule contained a requirement that chain saw fuel not be used to start fires. While several commenters supported this requirement (Ex. 5-21, 5-36, 5-74 through 5-92), other commenters, including the State of Washington, opposed the provision (Ex. 5-34, 5-66). They said that loggers would use whatever material they have to start a fire rather than losing production time to return to a vehicle to obtain materials. In addition, the State of Washington said they were not aware of any injuries occurring as a result of this practice.

OSHA has carefully considered these comments. OSHA understands that in cold weather employees must be able to warm their hands and feet to prevent frostbite and to maintain proper grip of tools. However, OSHA believes that the use of a flammable liquid, such as gasoline, to start a fire can quickly result in an uncontrolled fire that endangers the loggers and others in the vicinity. Other commenters have told OSHA about the dangers of fires, especially during the dry season (Ex. 5-7, 5-21, 5-39). In particular, when an area is cold and wet, gasoline will not volatilize or burn rapidly. However, as the fire gains intensity, the gasoline will evaporate more rapidly, causing the fire to suddenly flame up and can rapidly get out of control. Instead of using gasoline or a gasoline mixture, there are products available that are not combustible to start fires, such as fire starters comprised of sawdust and wax. These products are small, light weight and will not suddenly accelerate their combustion.

OSHA has deleted from the final rule the proposed requirement that chain-saw fuel not be used as a solvent. Two commenters said that chain-saw fuel is recommended by manufacturer's as a cleaning solvent for chain-saws (Ex. 5-7, 5-34). For example, manufacturers' specifications indicate that chain-saw fuel is the most effective solvent for cleaning chain-saw air filters. OSHA agrees with the commenters and has eliminated the prohibition from the final rule.

Explosives and Blasting Agents

At paragraph (d)(10) of the final standard, OSHA is including requirements on the safe use of explosives and blasting agents. Paragraph (d)(10)(i) of the final requires that explosives and blasting agents be stored, handled, transported and used in accordance with the requirements of subpart H of this part. This provision has been adopted from the proposed rule. The 1978 ANSI logging standard contained a similar requirement. All State logging standards contain

requirements on the use of explosives and blasting agents. There were no comments opposing this provision.

Paragraph (d)(10)(ii) of the final rule requires that only designated persons handle or use such materials. As discussed above, a designated person is one who possesses the requisite training, knowledge and experience to perform the specific duties. The proposed rule and the 1978 ANSI logging standard also required that explosives only be handled by trained and experienced personnel. All State logging standards also require that only trained employees handle explosives. OSHA did not receive any comments on these provisions.

At paragraph (d)(10)(iii) of the final standard, OSHA is requiring that explosives and blasting agents not be transported in the driver compartment or any passenger-occupied area of a machine or vehicle. The proposed rule did not contain a similar requirement. OSHA has added this provision in the final rule for the same reason that it included a similar provision regarding flammable and combustible liquids. OSHA believes that employees may be gravely endangered by riding over rough terrain and trails in close proximity to explosives.

Paragraph (e) Hand and Portable Powered Tools

Paragraph (e) of this final rule contains requirements for the safe use of hand and portable powered tools, including chain saws. For the most part, these requirements were derived from corresponding provisions in the pulpwood logging standard.

In the final rule OSHA has combined provisions regarding both hand tools and chain saws. This was done to provide uniformity in how tools are addressed in the logging standard. In addition, OSHA has combined these provisions to reduce duplicative provisions, such as those dealing with maintenance and inspection of tools.

General Requirements

Paragraph (e)(1) deals with general requirements for all hand and portable powered tools. At paragraph (e)(1)(i) of the final rule, OSHA is requiring employers to assure that each hand and portable powered tool is maintained in serviceable condition. This employer responsibility applies whether the tool is provided by the employer or employee. This paragraph adopts the proposed provision. All State logging standards contain similar requirements about the maintenance of logging tools.

OSHA received several comments on this provision (Ex. 5-35, 5-39, 5-53, 5-54, 5-62, 5-63, 5-66). These commenters supported the need for tools to be properly maintained. One commenter said that lack of proper maintenance of chain saws contributes to a number of accidents (Ex. 5- 35). However, most of the commenters stated that the maintenance of tools that are supplied by employees should be the employees' responsibility (Ex. 5-35, 5-53, 5-54, 5-62, 5-63, 5-66).

One commenter stated:We feel that it is not reasonable and it is burdensome to logging companies to have to be responsible for the condition and safety of an employee's own tools.

We feel very strongly that there should be a recognition of one's individual responsibility in this area. A more general statement might be appropriate in this item simply stating that "tools shall be properly maintained so as to assure safe operation and shall be used only for their intended purpose and design" (Ex. 5-39).

OSHA does not agree with these commenters. OSHA believes that the Agency's reasoning in including a maintenance provision in the PPE section applies here as well (See summary and explanation of paragraph (d)(1)(i)). The requirement for employers to assure that tools are maintained in a serviceable condition does not prohibit the employer from allowing an employee to inspect, maintain and repair tools he provides. The employer's responsibilities for compliance with standards and for safe working conditions that the OSH Act imposes, applies even if the employee provides the tools.

This paragraph is meant to be viewed in conjunction with paragraph (e)(1)(ii), that requires inspection of tools before they are used in each workshift. As discussed above, "serviceable condition" is the state or ability of a tool to operate as it was intended by the manufacturer.

At paragraph (e)(1)(ii), OSHA is requiring that the employer assure that each tool is inspected before initial use during each work shift. This paragraph also specifies the minimum elements to be inspected, such as chain brakes, handles, guards, and controls, to assure that the tools are functioning properly. In the proposed standard, OSHA specified that hand tools be checked during use to ensure continued serviceability. The proposed rule also required chain saws to be "frequently" inspected. The proposed rule also contained elements that must be included in hand tool inspections. The 1978 ANSI logging standard also required periodic inspection of tools.

OSHA received comments on these provisions. Some commenters recommended that OSHA establish the frequency that tools, such as chain saws, should be inspected (Ex. 5-21, 5-36, 5-39, 5-53). One commenter objected to inspection of chain saws:

The need for chain saws to be "frequently inspected" should be clarified further. How often is frequently and who would be responsible for the inspections? (Ex. 5-39).

OSHA believes that the final rule adequately addresses the commenter's concerns. First, OSHA explicitly identifies the required frequency for inspection of tools. Second, nothing in the final rule prohibits the employer from allowing the tool user or operator to conduct the workshift inspection, provided that such inspection and the required content of the inspection are accomplished in the manner and time frame specified by OSHA. Finally, the standard specifies the minimum elements that must be covered by the inspection.

At paragraph (e)(1)(iii) of the final rule, OSHA is requiring that the employer assure that each tool is used only for purposes for which it has been designed. OSHA has adopted the provision from the proposed rule. The 1978 ANSI logging standard also contained this requirement. OSHA received only one comment on this provision that supported its inclusion (Ex. 5-39).

At paragraph (e)(1)(iv) of the final rule, OSHA is requiring that when the head of any shock, impact-driven or driving tool begins to chip, it shall be repaired or removed from service. The proposed rule would have required that tools be repaired when "any mushrooming" occurs. A similar requirement was contained in the 1978 ANSI logging standard.

The State of Washington opposed the proposed provision, stating that the language was too restrictive (Ex. 5-34, 9-10). The State said that as soon as a plastic wedge if firmly struck there will be some small amount of mushrooming. In the final rule, OSHA has clarified this provision by requiring that the tool be repaired or removed from service when it begins to chip. OSHA believes that this language more accurately describes the hazard that arises over time with these tools. Over time there is a tendency for the steel in these tools to become brittle and chip. When a tool has reached that point, continued use of the tool can cause metal fragments to chip off the tool and fly into the air, thereby endangering employees. The metal fragments could be small enough to strike the eye or large enough to cause a sizeable laceration.

At paragraph (e)(1)(v) of the final rule, OSHA is requiring that the cutting edges of each tool be sharpened in accordance with manufacturer's specifications whenever they become dull during a workshift. OSHA received little comment on this provision. One commenter stated:

With regard to the sharpness of cutting tools, we have had some interpretive problem in California where fire suppression agencies who have been requiring various tools to be razor sharp rather than sharp enough to do the task for which they are intended. The result has been unnecessary cuts to employees who have inadvertently had incidental contact with such tools. We would suggest that the word "adequately" be inserted between the words "kept" and "sharp" to provide a more "moderate" meaning to this requirement. (Ex. 5-55).

The need for tools to be inspected and sharpened as necessary is well-recognized and has been a part of OSHA's and ANSI's logging standards from the start. OSHA believes that the final rule adequately addresses the commenter's concerns. OSHA has added to the final rule the requirement that tools be sharpened according to the manufacturer's specifications. This addition has also been supported by other commenters (Ex. 5-51, 5-53, 5-55).

At paragraphs (e)(1)(vi) and (vii) OSHA is requiring that each tool be stored and transported so it is not damaged and will not create a hazard for an employee. These provisions require that racks, boxes, holsters or other means shall be provided and used for transporting tools. These provisions parallel requirements contained in the proposed and pulpwood logging standards. The proposed rule specified that tools be secured during transport but did not require that storage containers be provided. In addition, these provisions as proposed were included in the 1978 ANSI logging standard. OSHA received only limited comments on these provisions. Two commenters stated that the storage provision was unnecessary and, at most, should be limited to cutting tools (Ex. 3-53 and 5-55). The other commenter said that the proposed transportation provision was not protective enough (Ex. 5-7). This commenter stated that outside boxes or storage units should be utilized especially for crew vehicles, because tools can bounce around when transported in such a vehicle, particularly when the vehicle is

operated on off highway roads or trails, and could injure employees who are riding with the tools.

OSHA believes that provisions for proper tool storage and transportation are necessary to protect employees from injuries. Such provisions have been in OSHA and ANSI standards for many years. In this regard, however, OSHA also believes that it is not necessary to require that tools be stored outside of passenger areas during transport if there are appropriate containers or other means to adequately secure the tools. Therefore, in the final rule OSHA has clarified that employers must provide and use some means, such as racks, boxes or holsters, of securing tools during transport.

Chain Saws

At paragraph (e)(2) of this final rule, OSHA specifies various requirements for the proper use of chain saws in the logging industry. OSHA believes these requirements are necessary to protect loggers from injury when using chain saws. Several commenters also supported the proposed chain saw requirements as reasonable practices (Ex. 5-21, 5-36, 5-74 through 5-92). As discussed earlier, the WIR survey indicates that chain saw accidents accounted for 20 percent of the reported accidents (Ex. 2-1). According to a Maine BLS, from 1980-87 there were an average of 362 disabling chain-saw injuries each year (Ex. 4-176).

In recent years there have been many improvements in chain saw safety due to the introduction of devices such as chain brakes, bar tip guards, and reduced kickback bars and chains. Also, the availability of protective chaps and pads of ballistic nylon or other lightweight protective materials have provided further protection for chain-saw operators. OSHA believes that proper use of improved chain saws and personal protective equipment, and compliance with the work practices will greatly improve the safety record of chain saw operations. OSHA also believes that proper training in these requirements will result in better understanding of how these safety devices and work practices can work to reduce chain-saw related injuries.

At paragraph (e)(2)(i), OSHA is requiring each chain saw placed into initial service after the effective date of this section be equipped with a chain brake. In addition, this paragraph requires that chain saws meet all other requirements of the ANSI standard B175.1-1991 "Safety Requirements on Gasoline-Powered Chain Saws." This incorporation by reference of ANSI B175.1-1991, has been approved by the Office of the **Federal Register**, in accordance with the requirements of 5 U.S.C. 552(a) and 1 CFR part 51. The final rule has been revised to reflect this approval and provides the requisite information regarding access to the text of ANSI B175.1-1991.

Paragraph (e)(2)(i) also requires that each chain saw placed into service before the effective date of this section be equipped with a protective device that minimizes chain-saw kickback. Finally, this provision also requires that chain-saw kickback devices not be removed or otherwise disabled.

The proposed rule did not require installation of chain brakes or other devices. The proposed rule did, however, require that when such devices were present they should be inspected frequently and maintained. The need for devices to prevent kickback was specifically raised as an issue in the notice of hearing.

OSHA received many comments on whether chain-saw protective devices should be required in the final rule. These comments have been discussed above in the Major Issues section. One commenter suggested that loggers be allowed to remove chain brakes when, in the judgment of the operator the presence of the chain brake creates a hazard greater than the hazard the brake was designed to avoid (Ex. 5-55). This commenter suggested that it is more hazardous to have a chain brake when the saw is operated on its side and at other unspecified times. However, the commenter did not provide any data or other evidence to support his contention. There is no other data or evidence in the record that chain brakes may create additional hazards at any time during the cutting process. Additionally, OSHA believes that once the chain brake is removed it is likely the operator will leave it off and remain exposed to injury from chain saw kickback. As noted in the earlier discussion, commenters stated that removal of devices is occurring, thereby exposing the operator to the risk of injury due to kickback. Therefore, OSHA is requiring that chain-saw kickback devices not be removed or otherwise disabled.

At paragraph (e)(2)(ii) of the final rule, OSHA is requiring that each gasoline-powered chain saw be equipped with a continuous throttle system which stops the running chain when pressure on the throttle is released. This provision has been adopted from the proposed rule. OSHA received one comment that stated that if the safety equipment that came with the chain saw were in place, the accidents listed in the preamble would not have occurred (Tr. W1 66). Therefore, this requirement has been retained in the final rule.

NIOSH recommended that OSHA require chain saws be equipped or retrofitted with mufflers meeting the chain-saw manufacturer's specifications (Ex. 5-42). NIOSH said mufflers would be effective for noise reduction. OSHA has not adopted NIOSH's recommendation. First, retrofit mufflers may cause operational difficulties. Second, retrofit mufflers may also contribute to an increase in back pressure for the operator.

Paragraphs (e)(2)(iii) through (e)(2)(xiv) specify various requirements for safe operation of chain saws. OSHA believes these work practices are essential in reducing the number of injuries that occur to chain-saw operators. According to the WIR survey, the vast majority of chain-saw injuries reported indicates that unsafe work practices were involved (Ex. 2-1). In contrast, only four percent of chain-saw injuries were the result of equipment failure.

At paragraph (e)(2)(iii) of the final rule, OSHA is requiring that the chain saw be operated and adjusted in accordance with the manufacturer's instructions. This provision adopts the requirement contained in the proposed rule. OSHA did not receive any comments opposing this requirement.

At paragraph (e)(2)(iv) of the final rule, OSHA is requiring that the chain saw be refueled at least 20 feet from any open flame or other source of ignition. This provision adopts the

requirements contained in the proposed rule. This requirement was also contained in the 1978 ANSI logging standard. The OSHA pulpwood logging standard required only that chain saw operators be instructed to refuel the saw only in safe areas and not in areas conducive to fire.

OSHA believes that a separation between a fueling area and any source of ignition, such as a cigarette, is necessary to prevent ignition of vapors from spills or from overfilled chain-saw tanks. The final rule clarifies what constitutes at least a minimal safe fueling area. OSHA did not receive any comments opposing this requirement.

At paragraph (e)(2)(v) of the final rule, OSHA is requiring that the chain saw be started at least 10 feet from any fueling area. This provision also adopts the requirement contained in the proposed rule.

Only one commenter opposed this provision, saying that in some instances it would be impossible to move 10 feet from a fueling area to start the chain saw (Ex. 5-7). However, no substantive evidence was presented.

OSHA believes that when a chain saw is started, there is a potential that spilled fuel in the area could also become ignited. For example, a faulty spark plug wire can cause an arc between the wire and metal casing, resulting in the igniting of spilled fuel. In addition, the record shows that the danger of fire is a major concern in the logging industry (Ex. 5-20). OSHA believes that this provision will help to reduce the potential for fires.

At paragraph (e)(2)(vi) of the final rule, OSHA is requiring that the chain saw be started on the ground or where otherwise firmly supported. The provision is the same as the requirement contained in the proposal and the pulpwood logging standard. Two commenters opposed the requirement (Ex. 5-34, 5-35). One commenter stated:

In many instances, there is not any way to comply, i.e., when a cutter is felling while standing on springboard jacks, it would be a greater hazard for him to climb up carrying a running saw. This means that the chain saw must be started on the springboard with no place left to rest the saw. The same situation occurs when limbing and bucking large trees after they are on the ground. The cutter/ bucker would have to climb up on the trunk while carrying a running saw. The proposed standard should be amended to read "whenever possible" chain saws should be started [on the ground] (Ex. 5-34).

The other commenter said starting the chain saw on the ground was not necessarily the safest way to start it, and, in any event, saws equipped with chain brakes could be drop started when the chain brake is engaged (5-35). Another commenter said that they had had no injuries resulting from starting chains saws when standing in an upright position (Ex. 5-45).

For several reasons, OSHA believes that this provision is necessary to protect chain saw operators. First, the record supports the need for chain saws to be firmly supported when they are started. The WIR survey indicates that a significant portion of chain saw injuries were related to the operator not having firm control or grip of the saw (e.g., didn't have tight grip on saw, hand slipped into chain, operator fell on saw). While the survey does not indicate whether

these injuries occurred while the operator was starting the saw, the presence of these injuries does reinforce the need for appropriate work practices that require proper support for equipment so the operator is able to maintain a firm grip and control of the saw.

Second, OSHA believes that there is a potential for injury when operators attempt to drop-start chain saws. There is a potential for the operator to lose his grip when starting the saw. In addition, especially when the saw is not properly adjusted, the engine can flood. This can cause the saw to fly upward and hit the operator. When the chain saw starts there is potential for sudden movement of the chain because of the increase in rpm. Third, while OSHA believes that starting the chain saw on the ground will provide the best control and support, OSHA is aware that there may be some circumstances in which a chain saw cannot be started in this manner. Nonetheless, even in those circumstances, OSHA believes that it is necessary for operator safety that the saw be firmly supported. Fourth, even when the chain brake is on, the saw needs to be firmly supported when it is started. When the chain saw is started, the chain will move until the engine returns to idle. If the chain saw is not firmly supported when the operator starts the engine, he could lose control of the saw and the moving chain could strike and injure him.

At paragraph (e)(2)(vii) of the final rule, OSHA is requiring that chain brakes be engaged when the saw is started. Although this requirement was not contained in the proposed rule, OSHA believes it is necessary for chain brakes to be engaged when the engine is started. As discussed above, when chain saws are started, the chain will run momentarily. When a chain brake is present, it will hold the chain when the engine returns to idle. However, when the chain brake is not engaged, the chain may continue to run at idle, further exposing the operator to the hazard. OSHA believes that the many comments recommending that the final rule require chain saws to be equipped with chain brakes, also imply that the chain brakes should be properly engaged during use of the chain saw. In addition, none of those commenters supporting a chain brake provision indicated that there were situations in which it would be safe to allow the chain brake not to be engaged during operation of the saw.

At paragraph (e)(2)(viii) of the final standard, OSHA is requiring that the operator hold the chain saw with both hands during operation. This requirement does not apply when the employer can demonstrate that a greater hazard is posed by keeping both hands on the saw in that particular situation. This provision is the same as the provision contained in the proposed rule. The 1978 ANSI logging standard also recognized the occasional need for momentary release of one hand from the saw in some situations.

Some commenters urged OSHA to require that a chain saw must never be operated with only one hand (Ex. 5-34, 5-50, 5-66). One commenter said:

Regardless of what organization recognizes and sanctions momentary one-handed chain saw use, it is extremely dangerous. I do not agree it is necessary to operate a saw with one hand and place a wedge with the other. By so doing, the right hand is on the pistol grip controlling the throttle, the left handling the wedge. If, during this one-handed process a kick back should occur, the left hand which has the primary responsibility for maintaining a distance between the operator and the saw chain is absent. Sufficient time exists between the initiation of the

backcut and its completion for the cutter to momentarily halt his sawing to insert a wedge (Ex. 5-66).

The U.S. Dept. of Interior also said that chains saws should be held with both hands unless the motor is at idle (Ex. 5-50). It is not difficult for chain-saw operators to put the saw in idle before removing one hand from the saw. Before placing a wedge the feller can stop the chain by simply removing his finger from the throttle, that will idle the chain saw, thereby reducing the possibility of injury resulting from operating the saw with only one hand. OSHA agrees that in this situation as well as most other operating situations, the greater hazard is posed by removing the hand from the chain saw. According to the WIR survey, 13 percent of chain-saw operators injured reported that their hand slipped into the chain or they did not have a tight grip on the saw. However, OSHA believes there are other situations in which the hazard may be greater if the operator attempts to hold the saw with two hands. For example, when an operator has climbed a tree to top the tree, the operator may not be able to keep his balance if he tries to operate the saw with both hands. In that case, the safest method may be to use one hand to control the saw and the other hand to steady himself.

OSHA notes that the employer bears the burden of demonstrating that a greater hazard exists by keeping both hands on the saw in a particular situation. OSHA also notes that the limited exception involves a case-by-case determination by the employer.

At paragraph (e)(2)(ix) of the final rule, OSHA is requiring that the chain saw operator be certain of his footing before starting to cut. This provision also requires that the chain saw not be operated in a position or at a distance that could cause the operator to become off-balance, to have insecure footing, or to relinquish a firm grip on the saw. This provision adopts requirements contained in the proposed rule. Commenters supported this provision (Ex. 5-7, 5-21, 5-34, 5-36, 5-55), and there were no comments opposing this requirement.

OSHA believes this work practice will help to reduce the number of slip and fall injuries occurring in the logging industry. According to the WIR survey, slips and falls account for 24 percent of all injuries and 13 percent of all chain saw injuries reported resulting from operators falling on the saw.

At paragraph (e)(2)(x) of the final rule, OSHA is requiring that prior to felling a tree the chain saw operator clear away brush or other potential obstacles that might interfere with cutting or using the retreat path. This provision adopts the requirement contained in the proposed rule. There were no comments opposing this requirement. OSHA believes this provision will help to reduce the number of injuries that result from loggers being hit by trees. According to the WIR survey, 24 percent of all injured loggers were hit by trees (Ex. 2-1). In addition, of employees reporting injuries, over one-fourth said that heavy brush, ground cover and hidden wood on the ground had contributed to their accident.

At paragraph (e)(2)(xi) of the final rule, OSHA is prohibiting cutting directly overhead with a chain saw. This provision was contained in the proposed rule. Several commenters supported the proposed provision (Ex. 5-34, 5-42, 9-10) and no comments were received opposing it.

At paragraph (e)(2)(xii) of the final rule, OSHA is requiring that the chain saw be carried in a manner that will prevent operator contact with the chain and muffler. The proposed rule contained the same requirement. Evidence in the record suggests that this work practice already is being used extensively in the logging industry (Ex. 5-66). Some commenters said that for many years chain saw operators have carried the saw on their shoulder and used a felt and/or leather pad to protect their neck and shoulder from being cut by the chain or burned by the hot engine (Ex. 5-21, 5-36, 5-63). OSHA notes that any other method of carrying the chain saw that prevents these hazards would also meet this requirement.

In paragraphs (e)(2)(xiii) and (xiv) of the final rule, OSHA is specifying requirements for carrying a chain saw. In paragraph (e)(2)(xiii), OSHA is requiring that the chain saw be shut off or at idle before the operator starts a retreat after cutting a tree. This provision also clarifies OSHA's intent that these work practices apply not only to carrying the saw between cuts but also to retreating after a cut has been made. This provision has been adopted from the proposed rule.

NIOSH supported this provision, and further recommended that OSHA should require the chain brake to be engaged when an operator is moving from one location to another, except while working on the same tree or log, regardless of distance traveled (Ex. 5-42). Another commenter also supported the NIOSH recommendation (Ex. 5-52). However, three other commenters opposed requiring saws to be at idle or shut off before starting a retreat (Ex. 5-7, 5-50, 5-66). One commenter said:

The cutter may lose precious seconds worrying about compliance with the proposed standard, meanwhile a life could be in danger. Better to immediately remove the cutter from the base of the tree than worry about the saw (Ex. 5-50).

OSHA believes that the requirement that chain saws be shut off or at idle before starting a retreat is necessary and can be accomplished without creating additional hazards for the operator. First, OSHA believes that carrying a chain saw with the chain moving may present a great hazard for the operator. The WIR survey indicates that a significant portion of chain saw injuries result from the operator falling on the saw, the saw chain contacting the employee, or the operator's hand slipping into the chain (Ex. 2-1).

Second, as OSHA explained in the preamble to the proposed rule, the saw can be at idle rather than shut off, provided that the chain brake is engaged. OSHA is allowing operators to comply by either method because it recognizes that idling the saw with the chain brake engaged is as effective as shutting off the engine in terms of preventing serious lacerations due to coming into contact with the moving chain.

Third, OSHA does not think that idling the saw will add a significant amount of time to the operator's retreat. All the operator must do to idle the chain saw and safely carry it is to release pressure on the throttle and grasp the front handle. Fourth, in any event, chain saws are designed to be carried by the front handle rather than by the rear throttle. Carrying the saw by the front handle is easier and there is no risk of the bar tip contacting the operator's leg or toe. Carrying the saw by the rear throttle guard can cause the bar tip to swing downward and

possibly strike the operator. Therefore, OSHA believes that the operator should grasp the front handle thereby idling the saw. That way the operator will both protect himself from a falling tree and from saw lacerations without undue difficulty.

Paragraph (e)(2)(xiv) of the final rule requires that when the operator must carry the chain saw further than 50 feet that the chain brake be engaged or, if there is no chain brake, that the saw be shut off. This provision also requires that the chain brake be engaged or the saw shut off when carrying a saw for a lesser distance if conditions, such as but not limited to, the terrain, underbrush and slippery surfaces, may create a hazard for an employee.

The proposed rule also contained these provisions. The 1978 ANSI logging standard required that chain saws be shut off when carried for a distance greater than from tree to tree. In addition the ANSI standard also required that when the terrain and other physical factors, such as underbrush and slippery surfaces, make the carrying of a running saw for such short distances, the saw shall be shut off for carrying. Some State logging standards also require the chain saw to be shut off or at idle when moving from tree to tree (Ex. 2-18, 2-22). For example, the State of Washington logging standard requires that after the chain-saw operator has felled the tree, the saw must be shut off or at idle while moving to another tree (Ex. 2-22). This standard also requires the chain saw to be shut off when moving to the next tree when hazardous conditions are present.

Some commenters supported this provision (Ex. 5-27, 5-42, 5-66). One of these commenter said that their experience had been that a chain-saw operator could carry a chain saw any distance without being injured, provided the chain brake was engaged (Ex. 5-27). Another commenter supported the provision because carrying a running chain saw any distance promotes additional fatigue that can also contribute to accidents and errors (Ex. 5-66). The reasoning and explanation for shutting off chain saws before beginning retreat also applies to carrying chain saws for longer distances. According to the WIR survey, 13 percent of all chain-saw operators were injured when they fell on their saws (Ex. 2-1). OSHA believes this provision is necessary to reduce exposure to the hazard of a running chain-saw chain.

Paragraph (f) Machines

At paragraph (f) of this final rule, OSHA is promulgating requirements for stationary and mobile machines. These provisions include requirements for machine operation, protective structures, overhead guards, machine access, stability and reliability, exhaust systems and brakes. As previously defined, a machine is a piece of equipment having a self-contained powerplant that is operated off-road and used for the movement of material.

OSHA believes these machine requirements are necessary to protect operators and other employees who are in the area where machines are being operated. According to the FRSI, 20 percent of all serious logging injuries involved machines (Ex. 4-65). Of all serious injuries reported, almost eight percent of employees injured were struck by a logging machine or vehicle.

The record also shows that a significant number of logging employees are killed in machine accidents. The OSHA FCI report indicates that 17 percent of all employees were killed in machine accidents. The State of Washington fatality study in consistent with the FCI report. According to that study, almost 20 percent of the employee deaths resulted from machine rollover or being struck by a machine (Ex. 4-129).

General Requirements

At paragraphs (f)(1)(i) and (ii) of the final rule, OSHA is requiring the employer to assure that each machine used by an employee is maintained and inspected so that the machine remains in serviceable condition. The employer must assure that any machine is inspected before initial use during a workshift, and that defects or damage be repaired or the unserviceable machine be replaced before work is commenced. Maintenance and inspection requirements were also contained in the proposed standard.

Some commenters supported the general maintenance and inspection requirement for each machine (Ex. 5-10, 5-16). For example, one commenter said that daily cleaning and inspection of machines was a necessary element of fire prevention as well as other workplace protection (Ex. 5-10).

OSHA believes that the reasoning and explanation for the maintenance and inspection requirements for PPE and hand and portable powered tools also applies to machines. (See discussion above of paragraphs (d)(1)(i), d(1)(ii), (e)(1)(i), and (e)(1)(ii).) As with tools and PPE, OSHA is imposing on the employer the obligation of assuring that machines are in serviceable condition. This obligation applies regardless of whether the employer or employee provides the machine.

OSHA notes that because a general machine maintenance and inspection requirement has been included in the final rule, the Agency has deleted from the final rule proposed maintenance and/or inspection requirements for any particular machine safety feature.

At paragraph (f)(1)(iii) of the final rule, OSHA is requiring that the employer assure that operating and maintenance instructions are available on the machine or in the area where the machine is being operated. This paragraph also requires that each machine operator and maintenance employee comply with the instructions. The pulpwood logging standard and the proposal both specified that instructions be kept with each machine. The proposed rule also contained a provision requiring operators and maintenance personnel to comply with the instructions.

Some commenters supported the proposed provision, however, other commenters opposed requiring that instructions be kept on machines. These comments have been discussed above in the Major Issues section.

Machine Operation

At (f)(2)(i) of this final rule, OSHA is requiring that machines be operated only by designated persons. As explained above, a designated person is an employee who has the requisite knowledge, training and experience to perform specific duties.

OSHA has included this provision in the final rule for two reasons. First, this provision must be read in conjunction with the training requirements in the final rule. The training provisions require that each machine operator be trained and demonstrate the ability to safely operate a machine before he/she is allowed to work independently. This provision reinforces the requirement that the employer not allow untrained personnel to operate machines. Second, training and skill are particularly necessary in an industry when machines are being operated in adverse weather conditions and on steep or unlevel terrain. Employees who have not been trained to safely operate a logging machine under such conditions could injure themselves or others. As noted earlier, over one-third of all employees reporting injuries in the WIR survey had never received any kind of training (Ex. 2-1).

In paragraphs (f)(2)(ii), (iii) and (iv) of the final rule, OSHA is specifying various requirements regarding stability limitations for machines. Stability limitations of machines used in logging are determined by three factors: (1) load size; (2) what is done with the load when it is being handled; and (3) the physical environment in which the machine is being operated. These requirements address each of those factors.

In paragraph (f)(2)(ii), OSHA is requiring that stationary logging machines and their components be anchored or otherwise stabilized to prevent movement during operation. The proposed standard contained a provision requiring that stability limitations of machines not be exceeded. The proposed standard also contained a provision specifying that truck and crawler mounted rigid boom cranes and other yarders meet the stability requirements of the ANSI B30.2-1983 "Safety Code for Cranes, Derricks and Hoists--Overhead and Gantry Cranes" or the ANSI B30.5-1982 "Safety Code for Cranes, Derricks and Hoists--Crawler, Locomotive and Truck Cranes." The pulpwood logging standard required only that the operator be advised as to the stability limitations of the machine. Several commenters pointed out that machines referenced in those standards were not used for logging operations (Ex. 5-17, 5-25, 5-29, 5-34, 5-51, 5-67).

In the final rule OSHA has deleted reference to the ANSI standards because those machines are covered elsewhere in part 1910. Overhead cranes are covered in 29 CFR 1910.179 and mobile cranes are covered in 29 CFR 1910.180. OSHA believes that these standards adequately spell out the requirements for safe operation when operating cranes. OSHA finds nothing indicating that the use of cranes is different from the rest of general industry, therefore, the Agency does not believe a special provision is necessary to address the logging industry. In addition, most of the machines referenced in the ANSI standards, overhead and gantry cranes, crawlers locomotive cranes and truck cranes; either are not used or are infrequently used in logging operations covered by this standard. OSHA also has deleted the proposed provisions on reliability and stability of cranes for the same reasons.

At paragraph (f)(2)(iii) of the final rule, OSHA is requiring that the rated capacity of any machine not be exceeded. As discussed above, OSHA has defined rated capacity as the

maximum load a system, vehicle, machine or piece of equipment was designed to handle. This provision was not explicitly contained in the proposed standard. Rather, it was implied as part of the requirement that machine operators comply with the operating manuals or instructions. The pulpwood logging standard, however, did require that operators at least be advised about the load capacity of machines.

OSHA believes that it is necessary to explicitly state this requirement in the final standard. When the rated capacity of the machine is exceeded, rollover and tipover accidents occur. As discussed above, many logging injuries and deaths are the result of machine rollover accidents. The State of Washington study showed that nine percent of the reported logging fatalities resulted from machine rollover accidents (Ex. 4-129). The OSHA FCI report also showed that 10 percent of fatalities were due to machine rollover accidents (Ex. 4-61). The Agency believes that it is not sufficient to merely inform operators of the machine's capacity, rather operators must be instructed that load capacities shall not be exceeded. As part of the training of machine operators, the operator also needs to be instructed on how to keep the load within the rated capacity and what foreseeable conditions or actions can affect the machine's rated capacity.

At paragraph (f)(2)(iv) of the final rule, OSHA is requiring that no machine be operated on any slope that is greater than the maximum slope recommended by the manufacturer. In the proposed standard, this requirement was implied in the provision that operators comply with operating manuals or instructions. The pulpwood logging standard had specified that operators be advised of the stability limitations of the machine. As with the requirement on rated capacity, OSHA believes this provision is necessary to reduce the potential for machine rollover and tipover accidents. Therefore, the Agency has explicitly stated this requirement in the final standard.

At paragraph (f)(2)(v) of the final rule, OSHA is requiring the operator to determine that no employee is in the path of the machine before starting or moving the machine. This provision parallels the proposed rule. In the pulpwood logging standard, the operator was required to walk completely around the machine before start up to ensure no employee was in the area. There were no comments on the proposed requirement. OSHA believes this provision is necessary to reduce the number of accidents when employees are struck by machines. According to the State of Washington study, 10 percent of all logging fatalities occurred when employees were struck by machines (Ex. 4-129). The OSHA FCI report indicated similar results. Eight percent of the employees killed were struck by a logging machine (Ex. 4-61). Therefore, this requirement has been retained in the final rule.

At paragraph (f)(2)(vi) of the final rule, OSHA is requiring that the machine be started and operated only from the operator's station or as otherwise recommended by the manufacturer. This requirement adopts the provision contained in the proposed rule. Again, there were no comments opposing this provision. Under normal conditions, the only safe place for an operator to be during the use of a machine is at the operator's station. However, some types of material handling equipment have more than one operator's station. In those situations, the operator may choose which available operator's station to use when operating the machine.

At paragraph (f)(2)(vii) of the final rule, OSHA is requiring that the machine be operated at such a distance from other employees and machines that a hazard is not created for any employee. This requirement parallels provisions contained in both the proposed standard and the pulpwood logging standard. OSHA did not receive any comment on the proposed requirement. The reasoning and explanation for checking the area before starting or moving a machine applies to this provision as well. The record shows that many employees are injured and killed when they are hit by logging machines (Ex. 2-1, 4-61, 4-129). Therefore, OSHA has adopted the provision as proposed.

At paragraphs (f)(2)(viii) and (ix) of the final rule, OSHA is prohibiting riders on machines and loads. At paragraph (f)(2)(viii), OSHA is specifying that no employee, other than the operator, be allowed to ride on the machine unless seating, seat belts and other protection equivalent to that provided for the operator is available for the rider. There were no comments opposing this provision. In paragraph (f)(2)(ix), OSHA is prohibiting riding on any load. These requirements parallel the provisions contained in the proposed rule. Several comments were received on these provisions and have been discussed above in the Major Issues section.

Paragraph (f)(2)(x) of the final rule requires that before any machine is shut down, the machine brake locks or parking brakes shall be applied. This provision also requires that each moving element, such as but not limited to, blades, buckets and shears, shall be grounded. As defined in the final rule, grounded means the placement of a component of a machine on the ground or on a device where it is firmly supported. This requirement was also contained in the pulpwood logging and the 1978 ANSI logging standards. The proposed rule would have required that the moving elements of any machine be lowered to the ground.

Several commenters said employers should be viewed in compliance with this provision if the moving element is placed in on a device on the equipment designed to hold moving elements in a stationary, secure position (Ex. 5-74 through 5-92). This is the method used to ground moving elements on certain machines, such as knuckleboom loaders. OSHA agrees with these commenters that it may be appropriate for the moving elements of a machine to be grounded if the moving elements can be placed on a device that can hold it in a stationary and secure position. However, in those situations when the machine does not have a device to place the moving element, the moving element must be lowered to the ground. OSHA believes this provision is necessary because the record shows that logging employees are injured and killed when they are crushed between equipment and equipment parts or struck by falling and swinging equipment components (Ex. 4-61).

Paragraph (f)(2)(xi) of the final rule requires that after each machine is shut down, pressure or stored energy from hydraulic and pneumatic storage devices shall be discharged. This provision has been adopted from the proposed rule. The 1978 ANSI logging standard also contained a similar requirement. OSHA believes this provision is necessary because if pressure or stored energy is not discharged water will accumulate in the storage device thereby decreasing the amount of fluid to carry out the function of the system. For example, many machines use air brake systems. If the compressed air reservoir fills up with water and displaces the air, there may not be enough air to stop the machine.

At paragraphs (f)(2)(xii) and (xiii) of this final rule, OSHA is adopting provisions for transporting machines. Paragraph (f)(2)(xii) requires that the rated capacity of any vehicle transporting a machine not be exceeded. Paragraph (f)(2)(xiii) requires that the machine be loaded, secured and unloaded so that it will not create a hazard for any employee. These provisions parallel requirements contained in the proposed rule. OSHA did not receive any comments opposing these requirements.

OSHA believes that the reasoning and explanation on machine rated capacity (paragraph (f)(2)(iii)) applies as well to transporting machines on trailers. Machines, as defined in this standard, are material handling equipment that are not operated on the public highways. Therefore, they must be transported on trailers across public roads from work site to work site. The loading and unloading of a machine on a trailer can be a hazardous event. The principal hazards occur due to rollover of the machine as it is driven up or down the trailer ramp or the ramp failing under the weight of the machine. Rollover can occur when a machine is not properly aligned when being driven onto or off a trailer or when the machine operator unsuccessfully attempts to make minor corrections in the direction of travel of the machine on the ramp. The latter case is particularly likely when the machine runs on tracks rather than wheels, and directional corrections are much more difficult to achieve. OSHA believes these machine transport provisions are necessary to prevent injury to machine operators and other employees in the area.

Protective Structures

At paragraph (f)(3) of this final rule, OSHA is adopting various requirements for protective structures on machines.

At paragraph (f)(3)(i) of the final rule, OSHA is requiring that the specified logging machines that are placed into initial service after the effective date of the final standard be equipped with falling object protective structures (FOPS) and/or rollover protective structures (ROPS). This provision applies to each tractor, skidder, swing yarder, log stacker, and mechanical felling device, such as a tree shear or feller-buncher. This provision combines the FOPS and ROPS requirements contained in the proposed standard. ROPS requirements are also contained in several State logging standards (Ex. 2-18, 2-19, 2-20, 2-21, 2-22, 2-23, 38J, 38K). In addition, FOPS and ROPS requirements are contained in OSHA Construction Safety Standards, 29 CFR Part 1926, and Agriculture Safety Standards, 29 CFR Part 1928.

OSHA received many comments supporting the FOPS and ROPS requirement (Ex. 5-6, 5-7, 5-10, 5-19, 5-21, 5-22, 5-35, 5-36, 5-54, 5-74 through 5-92) and did not receive any comments opposing this provision in general. Many of the commenters addressed the issues of retrofitting machines with ROPS and FOPS and incorporation by reference of SAE standards have been discussed above in the Major Issues section.

One commenter said that the ROPS requirement should also apply to loaders on self-loading logging trucks (Ex. 5-7). However, three other commenters said this machine should be excluded from the requirement because the machine would not meet most state highway height restrictions if FOPS and/or ROPS were added to the operator station (Ex. 5-21, 5-36, 5-

49). OSHA agrees with these three commenters and has not expanded the FOPS and ROPS requirements to cover loaders on self-loading logging trucks.

The necessity of ROPS and FOPS on logging machines is not disputed. Steep terrain, slippery or uneven ground, large loads, top-heavy equipment with loads, and other environmental conditions and unsafe work practices increase the potential for logging machine rollover. ROPS reduce the likelihood that operators will be crushed in the event their machine rolls over. FOPS prevent falling objects such as trees, limbs and winch lines from penetrating the cab and injuring the operator. As OSHA noted in the preamble to the proposed rule, ROPS and FOPS are standard features on all currently manufactured logging machines.

Based on other comments in the record, OSHA has made the following changes to the ROPS and FOPS provision in the final rule:

1. The ROPS and FOPS requirements have been incorporated in one provision because the SAE FOPS standard (J231, January 1981) specifies that only machines equipped with ROPS can also be equipped with FOPS. The ROPS-FOPS requirement of the SAE standard was pointed out by three commenters (Ex. 5-16, 5-22, 5-57).

2. Machines only used in construction activities, such as road building, rather than logging operations have been deleted from this provision (e.g., graders, scrapers, bulldozers, front-end loaders). Construction machines and activities continue to be covered under 29 CFR Part 1926.

3. Forklift trucks have been deleted from this provision and included in a separate provision in the final standard (see paragraph (f)(4)). One commenter pointed out that forklift trucks were manufactured with overhead guards rather than ROPS and FOPS and, therefore, were not included in the SAE standards (Ex. 5-16, 5-47; Tr. W1 224)).

4. An exception to the ROPS and FOPS requirement has been added for machines capable of 360-degree rotation. Two commenters pointed out that the mast assembly of these machines, usually converted excavators, protects against machine rollover (Ex. 5-16, 5-22, 5-27, 5-39, 5-40, 5- 49, 5-53, 5-63). In addition, the boom structure provides crush protection during rollover or tipover (Ex. 5-16).

At paragraphs (f)(3)(ii) and (iii) of the final rule, OSHA is requiring that ROPS and FOPS be tested, installed and maintained in accordance with the following Society of Automotive Engineers standards: "Performance Criteria for Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forestry, and Mining Machines" SAE J1040, April 1988; "Minimum Performance Criteria for Falling Object Protective Structures (FOPS)" SAE J231, Jan 1981; and "Deflection Limiting Volume-ROPS/FOPS Laboratory Evaluation" SAE J397, April 1988. This incorporation by reference of SAE J1040; April 1988, SAE J231, Jan 1981, and SAE J397; April 1988, have been approved by the Office of the Federal Register, in accordance with the requirements of 5 U.S.C. 552(a) and 1 CFR Part 51. The final rule has

been revised to reflect this approval and provides the requisite information regarding access to the text of SAE J1040, April 1988, SAE J231, 1981, and SAE J397, April 1988.

These provisions update the requirements contained in the proposed rule. OSHA received various comments on incorporating consensus standards by reference, and this issue has been discussed above in the Major Issues section.

In paragraph (f)(3)(v) of the final rule, OSHA is requiring that the protective structure on each machine be of a size that does not impede the operator's normal movements in the cab. This provision parallels the provision contained in the proposed rule and the 1978 ANSI logging standard. OSHA did not receive any comments opposing this provision.

In paragraphs (f)(3)(vi) through (xii) specify requirements for enclosing the operator's cab. OSHA did not receive any comments opposing these provisions in general. One commenter did recommend that OSHA replace these provisions with a reference to the Society of Automotive Engineers J1084, April 1980, standard on force requirements for tractors and skidders (Ex. 5-16). However, since the SAE standard does not cover all of the machines referenced in paragraph (f)(3), OSHA has specified in the final rule the cab force requirements which are applicable to machines used in logging operations.

Paragraph (f)(3)(vi) of the final rule requires that the overhead covering of each cab be of solid material extending over the entire canopy. This provision parallels the requirement contained in the proposed rule.

Paragraph (f)(3)(vii) requires that the lower portion of the cab (up to the top of the instrument panel or 24 inches (60.9 cm) if there is no instrument panel) be completely enclosed, except at entrances, with solid material to prevent objects from entering the cab. The proposed rule stated generally that the lower portion of the cab be fully enclosed. One commenter said that what constitutes the "lower portion" of the cab should be specifically defined (Ex. 5-16). OSHA has incorporated the commenter's recommendation that the lower portion be defined as below the top of the instrument panel or at 24 inches.

Paragraph (f)(3)(viii) of the final rule requires that the upper portion of the cab be fully enclosed. The enclosure must be made of mesh material with openings no greater than 2 inches (5.08 cm) at its least dimension or other material that the employer demonstrates provides equivalent protection and visibility. This provision combines two requirements contained in the proposed rule: full enclosure of the upper rear portion of the cab and enclosure extending forward as far as possible from the rear corners of the cab sides. The proposed rule also required that the mesh material openings be no greater than 1 3/4 inches. The 1978 ANSI logging standard also required metal mesh when glass alone is not sufficient to provide operator protection. In the final rule, OSHA has combined these provisions because one commenter said that "upper rear portion" and "as far as possible" were not adequately defined (Ex. 5-16). In addition, OSHA has changed the final rule to allow mesh material with openings no greater than two inches, that one commenter pointed out is the accepted standard in the western States (See Ex. 2-22, 5-71, 38K).

Some commenters said that OSHA should limit the types of vehicles requiring mesh material (Ex. 5-74 through 5-92). They said mesh should not be required on front-end loaders, log stackers, forklifts, scrapers and graders. They contend some of these machines are used in log stacking areas where there is no danger of branches entering the cab. In the final rule, OSHA has deleted front-end loaders, trucks, graders, and scrapers from paragraph (f)(3) because they are used in performing construction activities rather than logging operations. With regard to log-stackers, OSHA believes it is necessary for these machines to be equipped with mesh material or equivalent protection. Log-stackers are used to raise and move trees as well as logs. In some cases trees are not topped until they are taken to the landing. When trees still contain branches, they could enter the cab and injure the operator if no cab protection is provided.

Paragraph (f)(3)(viii) of the final rule also specifies that the cab may be enclosed with a material other than mesh, provided the employer demonstrate that it provides equivalent protection and visibility. The proposed rule implied that transparent material could be used but did not specify what level of protection it must provide. The 1978 ANSI logging standard specified that when glass enclosures were used, they must be safety glass or its equivalent.

OSHA did not receive any comments opposing this provision. One commenter stated that many machines are already enclosed with other material, such as safety glass, that offers equivalent protection and visibility (Ex. 5-16). In addition, the Society of Automotive Engineers SAE J1084, April 1980, "Operator Protective Structure Performance Criteria for Certain Forestry Equipment, Recommended Practice" allows cabs to be enclosed with safety glass.

OSHA notes that the employer bears the burden of demonstrating that when transparent material, other than safety glass is used, that it provides both equivalent protection and visibility. Paragraph (f)(3)(ix) of the final rule requires that the upper cab enclosure allow maximum visibility. The proposed rule required that the upper cab enclosure allow maximum visibility to the rear. OSHA believes that it is necessary that the enclosure allow maximum visibility in all directions so that the operator and other employees in the area are not injured.

Paragraph (f)(3)(x) of the final rule requires that if transparent material, rather than mesh, is used to enclose the upper cab, it shall be of safety glass or other material that the employer demonstrates provides equivalent protection and visibility. This provision parallels the provision contained in the proposed rule. The proposed standard also specified that a metal screen must also be used where transparent material alone does not provide adequate protection. In the final rule, OSHA specifies the preferred transparent material (i.e. safety glass). OSHA agrees with various commenters that when safety glass is used, additional metal mesh screens are not necessary. The final rule does allow alternative material to be used, and makes clear OSHA's intent that it is the employer who bears the burden of proving that the alternative material provides protection and visibility that is equivalent to safety glass.

Paragraphs (f)(3)(xi) and (xii) of the final rule require that transparent material be kept clean and be replaced when it is cracked, broken, scratched or damaged in any other way that may

create a hazard for the operator. These requirements parallel the provisions contained in the proposed rule and the 1978 ANSI logging standard.

Paragraph (f)(3)(xiii) of the final rule requires that deflectors be installed in front of each cab to deflect whipping saplings and branches. This provision also requires that deflectors be located so they do not impede visibility or access to the cab. This provision adopts the requirement contained in the proposed rule. OSHA did not receive any comments opposing the provision.

Paragraph (f)(3)(xiv) of the final rule requires that the height of each cab entrance be at least 52 inches, or 1.3 meters, from the floor of the cab. This provision has been adopted from the proposed rule. No commenters opposed this requirement.

Paragraph (f)(3)(xv) of the final rule requires that each machine operated near yarding systems (high lead and skyline) shall be equipped with sheds or roofs of sufficient strength to provide protection from breaking lines. This provision has been adopted from the proposed rule. There were no comments opposing this provision.

Overhead Guards

At paragraph (f)(4) of the final rule, OSHA is specifying that each forklift truck used in logging operations be equipped with an overhead guard. The overhead guard must meet the requirements of the American Society of Mechanical Engineers (ASME) B56.6-1987 (with addenda), "Safety Standard for Rough Terrain Forklift Trucks." This incorporation by reference of ASME B56.6-1987, has been approved by the Office of the **Federal Register**, in accordance with the requirements of 5 U.S.C. 552(a) and 1 CFR Part 51. The final rule has been revised to reflect this approval and provides the requisite information regarding access to the text of ASME B56.6-1987.

In the proposed rule, OSHA had included forklift trucks in the provisions requiring installation of ROPS and FOPS. However, commenters informed OSHA that the manufacture of forklift trucks used in rough terrain conditions such as the logging industry are covered by the ASME standard (Ex. 5-22, 5-47, Tr. W1 224), and that forklift trucks are manufactured with overhead protection, rather than ROPS and FOPS (Ex. 5-47).

OSHA believes that this overhead protection requirement is necessary and will adequately protect logging forklift operators from falling objects. Since the mast assembly of the forklift truck prevents it from rolling onto its top, ROPS protection is not necessary. When accidents do occur, forklift trucks are more likely to tip over on their sides. OSHA believes that, in the event of a tipover, the seat belt requirement contained in this standard will prevent operators from being pinned or crushed by the truck or overhead guard by safely restraining them within the cab.

In paragraph (f)(4) OSHA has not included a provision excepting fork lift trucks placed into service before the final rule from being equipped with overhead guards. The manufacturing requirements for rough terrain forklift trucks have been in place since 1978. Since the useful

life of these machines is approximately 10 years, OSHA is confident that almost all forklift trucks currently used in the logging industry do contain overhead guards meeting the ASME standard.

Machine Access

Paragraph (f)(5) of the final rule specifies various requirements regarding machine access. Paragraph (f)(5)(i) of the final rule requires that machine access be provided for each machine when the operator or another employee must climb onto the machine to enter the cab or an operating element to perform maintenance. This provision also requires that the machine access system meet the requirement of the SAE J185 June 1988, standard on "Recommended Practice for Access systems for Off-Road Machines." This incorporation by reference of SAE J185, June 1988, has been approved by the Office of the **Federal Register**, in accordance with the requirements of 5 U.S.C. 552(a) and 1 CFR Part 51. The final rule has been revised to reflect this approval and provides the requisite information regarding access to the text of SAE J185, June 1988.

The proposed rule and the 1978 ANSI logging standard also contained machine access provisions. The proposed rule specified that steps, ladders, handhold, catwalks, or railings installed after the effective date of this standard comply with the SAE J185, June 1981, or be in accordance with a design by a professional engineer which offers equivalent employee protection. There were no comments opposing the proposed provision.

OSHA believes this provision is necessary to prevent logging injuries due to slips and falls. The WIR survey indicated that these types of injuries accounted for almost one-fourth of all logging injuries reported, and that 28 percent of all injuries resulting from falls involved machines and vehicles (Ex. 2-1). OSHA believes that compliance with the SAE standard, in conjunction with work practices and training, will prevent these types of accidents. OSHA notes that in the final rule, the reference to the SAE standard has been updated from the 1981 to the 1988 edition.

Paragraph (f)(5)(ii) of the final rule requires that each machine cab have a second means of egress. This provision has been adopted from the proposed rule. The 1978 ANSI logging standard also contained this requirement. According to one commenter, nearly all logging machines currently in use have a second means of egress (Ex. 5-29). Therefore, OSHA does not believe compliance with this provision will be burdensome.

Paragraphs (f)(5)(iii) and (iv) of the final rule require that walking and working surfaces of each machine have slip resistant surfaces and be kept free of waste, debris and other material which might result in slipping, falling or fire. These requirements parallel provisions contained in the proposed rule.

OSHA received three comments opposing these provisions (Ex. 5-7, 5-22, 5-55). These commenters stated that the debris must be hazardous (Ex. 5-7) and that the requirement should be changed to indicate that the walkways of machines should be "substantially free" of debris (Ex. 5-55). As discussed above, slips, trips and falls account for a significant number of

injuries in the logging industry. The Agency's primary intent in this provision is to minimize the potential for employees to slip, trip or fall when mounting or dismounting a machine. OSHA believes these provisions will reduce the hazards that result in those types of injuries. OSHA does not agree with the characterization implied by the commenters that this provision requires employers to keep every machine walking and working surface "spotless" at all times. OSHA is aware that in outdoors environments material may accumulate on machine surfaces. OSHA is only requiring that when such accumulated material might result in a fire or in an employee slipping or falling that it must be removed.

Exhaust Systems

Paragraph (f)(6) of the final rule contains various requirements regarding exhaust pipes and mufflers. Paragraphs (f)(6) (i) and (ii) of the final rule require that exhaust pipes on each machine be so located that exhaust is directed away from the operator, and be mounted or guarded to protect the employee from accidental contact. These provisions have been adopted from the proposed rule. The 1978 ANSI logging standard also contained a similar requirement. OSHA did not receive any comments opposing these provisions.

Paragraph (f)(6) (iii) of the final rule requires that exhaust pipes be equipped with spark arresters. This provision also provides that when an engine is equipped with a turbocharger, spark arresters are not required. The proposed rule also required a spark arrester for each machine, but did not make an exception for machines equipped with turbochargers.

Several commenters said that spark arresters were not needed when engines are turbocharged (Ex. 5-10, 5-16, 5-17, 5-22, 5-25, 5-27, 5-55, 5-74 through 5-92). These commenters said that the flow of exhaust gases through the turbocharger requires sufficient time for any sparks to be extinguished and unburned fuel and particulate matter to be burned. One commenter said that functional turbocharged engines do not produce exhaust sparks like normally aspirated engines (Ex. 5-27). For this reason, these commenters said turbochargers were an acceptable substitute for spark arresters (Ex. 5-16). In addition, the U.S. Forest Service allows turbochargers in lieu of spark arresters (Ex. 5-16). Based on this evidence, OSHA has incorporated an exception to the use of spark arresters when the machine engine is turbocharged.

Paragraph (f)(6)(iv) of the final rule requires that the muffler provided by the manufacturer, or the equivalent, be in place at all times the machine is in operation. This provision is the same as the corresponding provisions of the proposal and the pulpwood logging standard. OSHA did not receive any comments opposing this requirement.

Brakes

Paragraph (f)(7) of the final rule specifies provisions regarding machine brakes. Paragraph (f)(7)(i) of the final rule requires that the brakes must be sufficient to hold each machine and its maximum load on the slopes on which the machine is being operated. As discussed above, rated capacity is the maximum load a machine was designed by the manufacturer to handle. This provision was adopted from the proposed rule. Machine brake provisions are also

included in various State logging standards (Ex. 2-17, 2-18, 2-19, 2-22, 38J, 38K), and in the 1978 ANSI logging standard.

Several commenters supported this provision (Ex. 5-10, 5-16, 5-22). These commenters also said that OSHA should include provisions requiring brakes to meet certain criteria in respective SAE and ANSI standards.

The variety of terrain encountered in logging operations makes the adequacy of brakes a critical safety issue. For example, information presented in the preamble to the proposed rule indicated that an operator was unable to stop the machine he was operating on a slope and the machine rolled over (54 FR 18799-80). The injured operator was trapped in a cab for 45 minutes until he could be rescued. This provision requires that the braking system, that consists of the service and emergency brakes, must be adequate to hold the machine and its maximum allowable load on the slope. For certain machines (tractors and rubber tired skidders), employers can look to national consensus standards for guidance on brake system performance (See SAE J1041, October 1991, "Breaking System Test Procedure and Braking Performance Criteria for Agricultural Tractors" and SAE J1178, June 1987, "Braking Performance--Rubber Tired Skidders"). However, these standards do not cover all machines used in logging operations. Therefore, OSHA is specifying certain minimum brake system requirements for all machines used in logging operations.

Paragraph (f)(7)(ii) requires that each machine be equipped with a secondary braking system, such as an emergency brake or parking brake. This provision also requires that the secondary system be effective in stopping the machine and maintaining parking performance, regardless of the direction of travel or of whether the engine is running. These requirements parallel the provisions contained in the proposed rule. These provisions are also contained in the 1978 ANSI logging standard. There were no comments opposing these provisions.

Guarding

Paragraphs (f)(8)(i) and (ii) of the final standard requires that each machine be equipped with guarding to protect employees from exposed moving elements and flying objects. These provisions also require that guarding must meet the requirements specified in subpart O of part 1910. These provisions clarify that guarding requirement also applies to each machine used in debarking, limbing and chipping. The proposed standard also contained a provision requiring machine guarding. The 1978 ANSI logging standard contained a similar requirement.

Three commenters stated that the provision should be applied only to stationary equipment to prevent misapplication to mobile equipment (Ex. 5-10, 5-22, 5-57). OSHA believes the record does not support the commenters' recommendation. The Agency believes that both mobile and stationary machines pose a risk of injury due to exposure to moving parts. According to the WIR survey, a significant number of employee injuries involved mobile equipment (Ex. 2-1). OSHA believes that employees working with or near both types of machine need to be protected. Additionally, requiring all machines to be guarded eliminates the ambiguity as to

whether a machine is stationary or mobile (e.g. mobile machines that are used in place, such as a trailer mounted chipper).

OSHA notes that guarding satisfies the requirements of subpart O when it is in the form of a specially constructed and installed barrier or when the structure of the machine itself prevents employee contact with the moving element of the machine. Each machine shall be equipped with guarding to protect employees from exposure to moving elements, such as but not limited to, shafts, pulleys, belts on conveyors, and gears, in accordance with the requirements of subpart O of part 1910.

Paragraph (f)(8)(iii) of the final rule requires that the guarding on each machine be in place at all times the machine is in operation. This provision was contained in the 1978 ANSI logging standard. This provision makes explicit OSHA's intent in the proposed rule that machines be equipped with guarding and that such guarding not be removed or otherwise disabled while the machine is in operation. If machine guarding is removed or disabled, employees still remain exposed to the danger of moving elements and flying objects when they are near or using the machine. OSHA believes the reasoning and explanation for requiring that chain-saw chain brakes be engaged when starting the machine and not be removed is also applicable to this provision.

Paragraph (g) Vehicles

At paragraph (g) of the final rule, OSHA has included various requirements regarding vehicles when used off public roads in logging operations. OSHA has decided to include a separate paragraph on vehicles in this final rule because of the confusion commenters said existed in the definition and requirements regarding "mobile equipment" verses "motor vehicles" in the proposed rule (Ex. 5-16, 5-18, 5-19, 5-22). Certain of the proposed provisions on vehicles were limited to personnel transport vehicles. In the final rule, OSHA has defined vehicles to include trucks and trailers used to transport logs and machines, as well as personnel transport vehicles. Therefore, the provisions covering vehicles apply to all vehicles used in any logging operation. OSHA believes that the reasoning and explanation supporting the need for protection for those in personnel transport vehicles also apply to operators and passengers of other vehicles.

OSHA received some comment that employee-provided vehicles should be excepted from the standard's vehicle requirements (Ex. 5-21, 5-36, 5-39). OSHA has not distinguished between employer-provided and employee-provided equipment anywhere in this standard. OSHA believes that when any equipment is used in logging operations, the employer is responsible for assuring that it is in proper working condition. However, this final standard does not address the personal vehicle an employee drives on public roads. By contrast, when the employer allows employees to use their own vehicles to transport themselves and other employees off public roads to and from logging work sites rather than providing such transportation, those vehicles are exposed to the unique hazards of logging operations. Such vehicles must be adequately equipped and properly running, just as employer provided vehicles must be, in order to cross what may be difficult terrain and other hazardous conditions encountered enroute to and from the logging site. The OSH Act imposes on the

employer the responsibility for compliance with standards and for assuring safe conditions in the workplace, even if the employee provides the vehicle for the logging operation.

OSHA believes it is necessary in the final rule to specify requirements for vehicles used to transport employees off public roads and vehicles used to perform logging operations. The record shows that a number of injuries and fatalities have occurred in the logging industry that involve vehicles (Ex. 2-1, 4-61, 4-129).

At paragraphs (g)(1) and (g)(2), OSHA is requiring the employer to assure that each vehicle used to transport employees off public roads or to perform any logging operation, including vehicles provided by employees, is maintained, and is inspected before initial use during a workshift. These provisions also require that defects or damage be repaired or the vehicle be replaced before work is started. These are the same general maintenance and inspection as required for machine and tools. OSHA believes that the explanation and reasoning for including these provisions in the paragraphs covering PPE, tools and machine apply here as well. (See discussion above of paragraphs (d)(1)(i), (d)(1)(ii), (e)(1)(i), (e)(1)(ii), (f)(1)(i), and (f)(1)(ii).) OSHA has included paragraphs (g)(1) and (g)(2) in the final rule in an effort to clarify its proposed intention. As stated above, commenters said it was not clear in the proposed rule whether the definition of "mobile equipment" included both machines and vehicles, and therefore, whether the general maintenance and inspection requirements applied to both types of equipment. "Mobile equipment" was defined in the proposal as that kind of equipment that includes mobility as a part of its work function. In the final rule, OSHA is defining machines and vehicles separately, and placing the requirements governing each in different paragraphs. In making these clarifications, however, the Agency emphasizes that all mobile equipment used in logging operations, whether vehicles or machines, must operate properly, and that maintenance and inspections are needed to assure that only properly functioning mobile equipment is used.

Paragraph (g)(3) of the final rule requires that the employer assure that operating and maintenance instructions are available in each vehicle. This provision also requires that each vehicle operator and maintenance employee comply with the instructions. These are the same provisions as required for machines. OSHA believes that the explanation and reasoning for including these provisions in the paragraph covering machines applies to vehicles as well. (See discussion above of paragraph (f)(1)(iii).) Paragraph (g)(4) of the final rule requires that the employer assure that each vehicle operator has a valid operator's license for the class of vehicle being operated. This provision applies to all vehicle operators, not just employees who operate personnel transport vehicles. The proposal applied the licensing requirement only to personnel transport vehicle operators and no comments opposing the requirement were received.

OSHA believes that it is also essential that an employee operating any type of vehicle possess a current license for that vehicle. Any employee operating a vehicle for logging operations needs to have met the necessary qualifications and shown that they have operated the vehicle in a manner responsible enough to maintain a current license. This provision ensures that the

employee has the proper kind of license for the type of vehicle being operated and the load being carried.

Paragraph (g)(5) of the final rule requires that mounting steps and handholds be provided on each vehicle whenever it is necessary to prevent an employee from being injured while entering or leaving the vehicle. The proposed rule specified that mounting steps and handholds be provided for every personnel transport vehicle. The 1978 ANSI logging standard also contained a similar provision.

One commenter opposed applying this provision to pickup trucks (Ex. 5-51). This commenter said steps would rip off of high center pickup trucks during the ride. In addition this commenter said that steps would prevent access of fire fighting vehicles to roads that have water barriers or speed bumps. OSHA does not believe the record supports the exceptions recommended by the commenter. First, according to the WIR survey, 13 percent of all injuries resulted from falls from vehicles (Ex. 2-1). Second, there are mounting steps for vehicles used in logging operations that can be retractable or high enough to prevent contact with the ground while the vehicle is moving. In addition, the record does not indicate that there are many speed bumps on logging roads. OSHA is aware that mounting steps and handholds may not be necessary for every vehicle. OSHA is only requiring mounting steps when there is a danger that an employee could be injured while entering or leaving the vehicle without being provided with such assistance.

Paragraph (g)(6) of the final rule requires that each seat be securely fastened to the vehicle. The final rule adopts the proposed requirement and applies it to all vehicles used in logging operations. The 1978 ANSI logging standard also contained this requirement. OSHA did not receive any comments opposing this provision.

Paragraph (g)(7) of the final rule requires applies the requirements of paragraphs (f)(2)(iii), (f)(2)(v), (f)(2)(vii), (f)(2)(x), (f)(2)(xiii) and paragraph (f)(7) to each vehicle used to transport any employee off public roads or to perform any logging operation, including any vehicle provided by an employee. OSHA believes these general work practices and brake requirements are necessary to prevent accidents involving vehicles as well as machines. OSHA believes the reasoning and explanation for including these general provisions in the paragraph covering machines applies here as well.

Paragraph (h) Tree Harvesting

At paragraph (h) of the final rule, OSHA establishes various general and specific work practice requirements regarding tree harvesting. OSHA believes these work practice requirements are necessary, especially given the high injury rate in the logging industry. According to the WIR survey, in more than two-thirds of all reported injuries unsafe working practices contributed to the accident (Ex. 2-1). The work practices specified in this paragraph address those work practices that when not used contributed to accidents such as those reported in the WIR survey (e.g., co-worker activity, working too fast, misjudging time or distance to avoid injury, using wrong cutting method).

OSHA notes that those provisions in the proposed rule that specified requirements other than work practices (e.g., equipment specifications) have been moved to the applicable equipment specification paragraphs of the final rule.

General Requirements

Paragraph (h)(1)(i) requires that trees not be felled in a manner that may create a hazard for an employee, such as, but not limited to, falling on an employee, or striking a rope, cable, power line or machine. The proposed rule and the 1978 ANSI logging standard contained similar provisions. The proposed rule required that trees not be felled in a manner that could endanger an employee.

Three commenters said that the proposed provision was too broad to be useful since they believed all felling activities are dangerous (Ex. 5-21, 5-36, 5-63). While OSHA agrees that it may not be possible to eliminate all hazards in a workplace, the employer does have the responsibility to prevent or minimize hazards the employer can reasonably anticipate. To comply with this provision, it is incumbent on the employer to train employees in proper felling work practices and to point out when employee actions or workplace conditions could create hazards for employees.

Paragraph (h)(1)(ii) requires that the immediate supervisor be consulted before felling is commenced, whenever unfamiliar or unusually hazardous conditions necessitate the supervisor's approval. The final rule adopts the provision contained in the proposed rule. One commenter supported the proposed requirement (Tr. W1 85). He said that consulting supervisors when heavy accumulations of snow are present would prevent injuries. OSHA believes that unusual, hazardous situations may arise during felling operations and the supervisor should be involved in making decisions about the safest way to fell a tree. These situations may include, but are not limited to, felling very large or tall trees; cutting trees whose lean, location or structure make it difficult to fell in the desired or a safe direction. Adding the supervisor's knowledge, training and experience to the decision-making process should help to minimize the hazards to loggers. In addition, this consultation process is especially important when logging crews are relatively new and may not have dealt with such situations before.

Paragraph (h)(1)(iii) of the final rule requires that no yarding machine be operated within two tree lengths of any tree being manually felled. This provision has been adopted from the proposed rule. The 1978 ANSI logging standard also contained a similar requirement.

Several commenters raised questions about or discussed this provision (Ex. 5-12, 5-43, 5-67; Tr. W1 104, W2 197). None of the commenters denied that yarding machine operators may be endangered when they operate too close to manual felling activities. However, two commenters stated that the provision should be revised because, in some circumstances, the assistance of a yarding machine is necessary to assure that the tree is felled in the desired direction or to keep the area clear (Ex. 5-12, 5-67). For example, one commenter said that

failure of yarders to clear an area of a build up of felled trees or logs can result in timber breakage or can pose problems for fellers working on slopes (Ex. 5-67).

In general, OSHA believes that allowing yarding machines within two tree lengths of trees being manually felled would pose a risk of harm to both the machine operator and the feller. First, a manual feller who is cutting a tree is concentrating on that work activity and not on other logging activities in the area. If that tree were to fall on a yarding machine that is too close to a manual felling operation, the machine operator could be injured by the tree. Second, it also is important for their own safety that manual fellers work at a safe distance from yarding activities. Yarder operators and chasers and choker setters concentrating on slinging and moving logs could cause injury to the feller if a tree or log were to shift, roll or slide suddenly.

Third, yarding machine operators are often working downhill from manual fellers. It may be dangerous for the operator to approach the feller because the falling tree could roll or slide into the machine. Fourth, the requirements of this paragraph can still be met even where the feller and yarder work as a team. After the feller has cut a tree and is moving on to size up another tree for cutting, the yarder can remove the felled tree before the feller begins cutting the next tree. The feller should check to make sure the yarder has removed the tree out of the work area before he starts cutting. Therefore, OSHA believes that its general rule that each work area be separated by at least two tree lengths should also apply to yarding and manual felling operations.

One commenter, who said that "cat skidding crews" in the northwest work in close proximity of tree fellers, suggested that this provision should allow skidding directly away from a timber feller as long as the feller is not actively trying to fell a tree (Ex. 5-43). OSHA notes that the final rule does not prohibit what the commenter suggests. The final rule only says that yarding machines shall not be within a two-tree length distance while manual felling is in progress. The final rule does not prohibit the yarding operator from clearing logs when the feller is not engaged in cutting trees. While the feller is moving onto the next tree and assessing its condition, this provision allows yarder operators to remove the trees that have been felled, provided that the other requirements or this paragraph have been met (e.g., the feller acknowledging that it is safe for the yarder to enter the work area).

Paragraph (h)(1)(iv) of the final standard requires that no employee approach a felling operation closer than two tree lengths of the tree being felled until the feller acknowledges it is safe to do so. This provision includes an exception to the two-tree length requirement when the employer demonstrates that a team of employees is necessary to manually fell a particular tree. The proposed rule and the 1978 ANSI logging standard also contained provisions specifying that employees remain two tree lengths from the feller. The proposed rule did not contain the felling team exception.

Several commenters urged OSHA to permit exceptions to the two tree-length requirement (Tr. W1 152, 183-86, W2 163, OR 126). These commenters discussed, for example, the need for shovelers to work in conjunction with fellers.

OSHA believes the two tree-length distance requirement is necessary for several reasons. First, a feller may not be aware of approaching employees due to noise or the feller's concentration on the work. It is therefore possible that employees may inadvertently enter an area where a tree is falling. This could result in injury to the approaching employee, and even to the feller if he attempts to take corrective action. According to the WIR survey, six percent of employees injured reported that co-worker activity had contributed to the accident (Ex. 2-1). The State of Washington study indicated that eight percent of employees who were killed were hit by a tree being felled by another employee (Ex. 4-129). According to the OSHA FCI report, nine logging employees were killed when they were struck by a tree that was being cut by another logger (Ex. 4-61). Second, an approaching employee could be injured if he is unaware of or misjudges the falling direction of a tree. The feller is the best judge of the direction that a tree is likely to fall and, therefore, should be the one to signal when a work area is safe. Third, approaching employees could be injured if a tree were to inadvertently fall in the wrong direction. The best way for employees to prevent such injury is to remain clear of the work area while the felling operation is being conducted. Once the felling of the tree is completed, the feller can signal that it is safe for other employees to approach. Therefore, OSHA believes the safer approach for both the feller and other employees is to wait until the feller has acknowledged it is safe to enter the felling area.

OSHA has included an exception to this rule for particular situations when more than one employee is needed to manually fell a particular tree. However, OSHA notes that this exception covers only manual fellers and those whom the employer demonstrates are needed to assist in manually felling a tree (e.g., shovelers). It does not include mechanical felling operations and it does permit machines to enter the manual felling area. In those situations, paragraphs (h)(1)(iii) and (h)(1)(v) apply. If a machine is necessary to push or pull over a tree, the manual feller must move at least two tree lengths away and must not enter the area until the machine operator acknowledges that it is safe. OSHA notes that this is not a blanket exception for all team felling activities. The general rule is that no person is to approach a feller until the feller has indicated it is safe to do so. The exception is meant to be applied on a case-by-case basis. That is, the employer bears the burden of demonstrating that a particular tree or a particular felling situation requires a team. Only then is more than one person allowed within the immediate work area. In addition, the employer bears the burden of showing that a team is necessary to manually fell the tree in that particular situation.

Paragraph (h)(1)(v) of the final rule requires that no employee approach a mechanical felling operation closer than two tree lengths of the tree being felled until the machine operator has acknowledged that it is safe to do so. The proposed rule required that employees remain clear of any mechanical felling operation.

OSHA received many comments recommending that OSHA apply the two tree-length minimum work distance to mechanical felling operations as well (Ex. 5-18, 5-21, 5-34, 5-36, 5-39, 5-63, 5-74 through 5-92; Tr. W2 163, 197). These commenters said that such distance was needed, for example, to protect other employees from flying metal fragments from broken mechanical disc saw blades. In addition, the reasoning and explanation supporting the distance requirement for approaching fellers also applies to this provision. For example, a feller-

buncher operator who is not expecting an employee to enter the work area may move in reverse and not see the employee in time to prevent an accident. OSHA has therefore added the two tree-length distance requirement to this provision of the final rule.

Paragraph (h)(1)(vi) of the final rule requires that each danger tree, including lodged trees and snags, be felled, removed or avoided. When the danger tree is felled or removed, it must be felled or removed using mechanical or other techniques that minimize employee exposure before felling is commenced in the area of the danger tree. When the danger tree is avoided, it must be marked and no work be conducted within two tree lengths of the danger tree, unless the employer demonstrates that a shorter distance will not create a hazard for an employee. As defined in the final rule, a danger tree includes any standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or damage to the tree, and direction or lean of the tree.

The proposed rule required that lodged trees be marked and lowered to the ground using mechanical or other safe techniques before any work is continued within two tree lengths of the lodged tree. The proposed rule did not allow any exceptions to the two tree-length distance. Many State logging standards include requirements to fell danger trees or not to commence work within a two tree-length distance of the danger tree (Ex. 2-19, 2-20, 2-22, 38J, 38K).

The record shows that danger trees pose many hazards for employees. According to the WIR survey, 15 percent of those injured said that the dangerous conditions of the tree had contributed to their accident (Ex. 2-1). The OSHA FCI report indicated that 23 logging employees were killed by danger trees (Ex. 4-61).

OSHA received several comments on this proposed provision (Ex. 5-7, 5-21, 5-34, 5-39, 5-43, 5-74 through 5-92, 17; Tr. W1 187, W2 6-7). Some commenters supported the provision (Ex. 5-39, 5-34). Some commenters suggested that this provision conflicts with other federal regulations requiring retention of some "snags" to preserve wildlife habitats in the area (Ex. 5-7, 5-27, 5-39, Tr. W2 6) and Rep. Jolene Unsoeld commented that OSHA should attempt to harmonize the final rule with various environmental regulations (Ex. 17, 31). Other commenters said that OSHA's provision was excessive in those situations when a tree is securely lodged a few feet above the ground (Ex. 5-21, 5-74 through 5-92; Tr. W1 187, W2 6-7). Another commenter said that prohibiting any felling within two tree-lengths of a danger tree would take a large volume of timber out of production, especially strips of trees on steep slopes (Ex. 5-43).

OSHA has addressed the commenters' concerns in the final rule. First, OSHA is more explicitly stating in the final rule that dangers trees may be avoided, when necessary, rather than being felled or removed. OSHA believes that this requirement harmonizes with and does not conflict with the rules and regulations of other Federal agencies. The U.S. Department of the Interior participated in this rulemaking and did not indicate that this provision was in conflict with their regulations (Ex. 5-50). The change to the final rule further clarifies OSHA's proposed intent that danger trees do not have to be felled or removed. This provision of the final rule only requires two actions of the employer. One, when the employer wishes to fell a

danger tree, it must be removed or felled before other trees in the area are felled. Two, when the employer elects not to fell or remove a danger tree, the employer must not conduct any other felling in that area. Therefore, when other regulations require the preservation of a particular snag, this final standard requires only that fellers be protected from potential injury from the snag. This is accomplished by keeping all other felling activity out of the immediate area of that snag.

Second, in the final rule OSHA has addressed the concerns of other commenters by allowing work to commence within two tree lengths of a marked danger tree, provided that the employer demonstrates that a shorter distance will not create a hazard for an employee. This change will assure the safety of logging employees without removing significant timber from production. OSHA notes that the employer bears the burden of demonstrating that a distance of less than two tree lengths will not create a hazard for an employee. Supervisors should actively participate in identifying and training employees about providing safe distances. Whether a shorter distance does create a hazard is a case-by-case determination. What constitutes a safe distance for other work to be conducted will require an evaluation of various factors such as, but not limited to, the size of the danger tree, how secure it is, its condition, the slope of the work area, and the presence of other employees in the area. For example, excessive root deterioration or damage might indicate that the danger tree is unstable and that there is a possibility it could fall. In such case, a two tree-length distance would be required.

Some commenters recommended that OSHA designate dislodging a tree by felling another one into it as a safe technique "in certain situations" (Ex. 5-74 through 5-92). However, these commenters did not identify any situations in which it would be safe to dislodge a tree in this manner. There is no information in the record that identifies any situation in which it is safe to use domino felling to fell a danger tree. In fact, other commenters have indicated they know of no situation when felling another tree into a danger tree is considered safe practice (Ex. 5-42, 5-46). OSHA also believes that it is not safe to dislodge a tree in this manner. First, there are already hazards associated with domino felling trees that are not danger trees. Trying to domino fell danger trees such as lodged trees can only increase the seriousness of the hazard. One of the factors that makes a tree a danger tree is that the physical damage to the tree may cause it to fall in an unintended direction. Felling another tree into the danger tree increases the potential for a misdirected fall. Second, the possibility exists that danger trees being domino felled also will become lodged, thereby increasing the number of trees to be avoided or removed and, consequently, increasing the risk to employees when those lodged trees are removed. The safest way to remove a lodged tree, first is remove all unnecessary employees from the area and then to hook the tree to a skidder, and pull the tree down (Ex. 5-43). Therefore, OSHA is not permitting removal of any tree, including a danger tree, by domino felling (See discussion of paragraph (h)(1)(ix).

Paragraph (h)(1)(vii) of the final rule requires that each danger tree be carefully checked for signs of loose bark, broken branches and limbs or other damage before it is felled or removed. This provision also requires that loose bark and other damage that may create a hazard be removed before felling or removing the tree. This requirement has been adopted from the proposed rule. In the proposed rule, OSHA specified that snags be carefully checked for

dangerous bark before they are felled and that accessible loose bark be removed before felling.

One commenter opposed this provision (Ex. 5-65). This commenter said that removing loose bark increases dangers from above since upper bark will slough off if lower bark is no longer supporting it. As such, this commenter recommended that OSHA require loose bark to be pinned to the tree. OSHA has changed the final rule to include removing loose bark or holding it in place.

Paragraph (h)(1)(viii) of the final rule requires that felling activity on any slope when rolling or sliding of trees or logs is reasonably foreseeable be kept uphill from, or on the same level as, previously felled trees. This provision has been adopted from the proposed standard and the pulpwood logging rules. Various State standards contain similar requirements (Ex. 2-19, 2-22, 38K).

OSHA received various comments on this provision (Ex. 5-7, 5-12, 5-16, 5-17, 5-53, 5-74 through 5-92). Several commenters said that OSHA should more clearly define what constitutes sloping terrain (Ex. 5-16, 5-21, 5-53, 5-74 through 5-92). These commenters suggested that the provision be limited to slopes exceeding 25 or 35 percent. They also indicated that mechanical felling in southern states should be excluded because slopes are gentler and shorter than in other regions.

The record shows that this provision is necessary to protect employees from being injured by rolling or sliding trees. The WIR survey supports the need for this work practice requirement. According to the WIR survey, nearly three-fifths of the workers who reported injuries said that their accidents occurred on moderately or steeply sloped terrain, and 10 percent of all injured workers blamed the steep terrain for their accident (Ex. 2-1). The OSHA FCI report indicated that 20 employees were killed when they were struck by rolling trees or logs (Ex. 4-61).

OSHA has not adopted a precise minimum slope that would trigger this requirement or excempt any region from the requirement, however, the final rule does address the commenters' concerns by limiting this provision to those sloping terrains where rolling or sliding of felled trees is reasonably foreseeable. OSHA is aware that logging work sites are often not completely level, and that many logging sites could be considered to be sloping terrain. Elements other than the mere slope of the terrain also must be considered in determining whether there is a reasonable possibility that the trees could roll or slide. When a given slope does not present the reasonable possibility that felled trees will slide or roll, OSHA agrees that this requirement should not apply. However, when the terrain slopes to the degree that a reasonable employer would believe that sliding or rolling is foreseeable, then this work practice requirement is necessary to protect loggers from being injured.

Whether a particular terrain slope poses a possibility that trees or logs may slide or roll requires an assessment of the condition of the terrain. All conditions that might contribute to a hazard must be considered (e.g., tree size, weather conditions). For example, when the terrain is either wet or covered with snow or ice, the possibility of trees sliding and rolling is greater and these conditions must be considered in determining whether uphill felling is required. As

long as the hazard of sliding or rolling trees exists, felling must be done on the uphill side even if industry practice has been downhill felling, or even if roads have generally been located on the tops of ridges.

One commenter said that this provision of the final rule may be counter to some environmental considerations in timber harvest plans which require opposite felling schemes (Ex. 5-7). However, the commenter has not provided substantive information to support his assertion. OSHA has previously discussed the danger of manual felling operations being conducted in adjacent work areas due to the potential for a felled tree falling into another work area. In light of that the fact that most trees fall down hill when felled, the hazard to employees working below another felling activity exposes those employees to an unacceptable risk of injury or death.

Finally, one commenter said downhill felling should be permitted because it can reduce the feller's fatigue (Ex. 5-12). While NIOSH suggests that worker fatigue may be a factor in logging accidents, NIOSH did not recommend downhill felling as being a method to reduce worker fatigue (Ex. 5-42). Rather, NIOSH said that the employer should reduce worker fatigue and the potential for accidents that results from such fatigue by planning appropriate work schedules. NIOSH suggested that the employer's planning of work schedules should include an evaluation of the amount of heat stress, physical exertion and other factors contributing to fatigue in planning those work schedules. OSHA agrees with NIOSH that planning appropriate work schedules rather than downhill felling would be the appropriate way to reduce worker fatigue without exposing the employee to further hazards and to assure that jobs fit the capabilities of the person. (OSHA is addressing these factors in its rulemaking on ergonomic safety and health management.) Paragraph (h)(1)(ix) of the final rule prohibits the practice of domino felling. As previously discussed, domino felling involves cutting wedges and making partial backcuts in a series of trees that form a continuous line. The last tree is then felled into the line thus pushing the line of trees to the ground in a chain reaction fashion.

This requirement was not included in the proposed rule, however, several commenters urged OSHA to prohibit domino felling in the final rule (Ex. 5-42, 5-46; Tr. W2 231, OR 659). NIOSH said that domino felling was a hazardous practice because there was a loss of stability in the standing tree when it had been backcut (Ex. 5-42). Therefore, NIOSH recommended that OSHA include a requirement in the final rule allowing only one tree to be felled at a time. There are also other hazards associated with domino felling. First, when trees are used to knock down other trees, the likelihood that the trees will not fall in the expected direction is greatly increased. A small miscalculation in the falling direction can be significantly magnified down the line and result in serious injury to the feller or other employees in the area. In addition, a falling tree could hit another object and either fall in another direction or become lodged. This would require an employee to fell the lodged tree, which is a hazardous operation.

Second, the hazards can be magnified when domino felling is not successful in knocking down the entire line of trees. The feller may be placed in an extremely hazardous situation if he must try to fell any of the line of trees that may remain standing. For example, part of the line of trees may have fallen over and lodged against the standing tree. A feller who attempts to fell

the final standing tree(s) could be injured when the lodged line of trees and the final tree finally do fall. The risk of injury is greater because it is more likely that the lodged trees may fall in an unexpected direction, and the combined weight of the lodged trees further increases the risk. In this sense, the prohibition against domino felling is similar to the requirement in the final rule that trees be felled in a manner that prevents them from striking things such as ropes, cables, or power lines. For these reasons, OSHA is requiring that trees be felled one at a time rather than allowing trees to be used to knock down other trees.

Manual Felling

Paragraph (h)(2) of the final rule specifies various work practices for manual felling. OSHA believes these provisions are essential to reduce the number of injuries that occur during felling activities. According to the WIR survey, tree felling is the most dangerous activity in the logging industry. Of those who reported injuries in the WIR survey, 23 percent were engaged in felling trees at the time.

OSHA's FCI report also indicates that felling operations are the most hazardous operation in the logging industry (Ex. 4-61). The report indicated that 43 percent of all employees who died did so when they were felling trees.

The State of Washington study indicated that more than 40 percent of employees killed from 1977-83 were performing felling operations (Ex. 4-129). This study concluded that many of the deaths would have been prevented had logging employees been following safe work practices and had remained out of hazardous areas (e.g., adjacent occupied work areas).

One commenter said that certain of the work practices proposed by OSHA should not be required of each feller (Ex. 5-54). This commenter said the work practices did not take into account the variation in feller experience, production requirements, and the trees themselves. This commenter also said the work practice requirements did not allow for innovations in felling technology and for recognition of other safe ways to perform felling tasks. OSHA points out that these work practice requirements have been widely recognized and accepted in the logging industry. Most of the State logging standards contain most of these work practices (Ex. 2-17, 2-18, 2-19, 2-20, 2-23, 38J, 38K). These requirements were included in OSHA's pulpwood logging standard, that adopted the 1971 ANSI logging standard. In addition, these requirements were contained in the 1978 ANSI logging standard. The ANSI standards are national consensus standards which were developed, approved and followed by the logging industry itself. Presumably, they represent what the industry has viewed to be necessary and reasonable to prevent injuries and deaths in this high hazard industry.

In paragraph (h)(2)(i) of the final rule, OSHA requires that before a feller even begins felling a tree, a retreat path must be planned and cleared. This provision also requires that the retreat path extend diagonally away from the expected felling line. This provision also includes an exception to the diagonal retreat path when the employer demonstrates that in the particular situation such a retreat path is not feasible or poses a greater hazard than an alternative retreat path. The proposed rule contained a requirement for planning and clearing a retreat path before commencing cutting. However, the proposed rule required that the retreat path "extend

back and diagonally to the rear" of the expected felling line. This language also was contained in the 1978 ANSI logging standard.

One commenter contended that a diagonal retreat path may not lead to the safest location in the felling area, therefore, it would be inappropriate for OSHA to designate a required retreat direction in the standard (Ex. 5-35). The record shows that the clearance of a retreat path so the feller is able to move rapidly and safely away from a falling tree is essential to prevent injuries. According to the WIR survey, 24 percent of all reported injuries resulted from being hit by a tree and half of these injuries involved falling trees. OSHA believes there are many kinds of hazards that necessitate a quick and clear retreat path. For example, the tree being felled can split and part of the tree may then fall in an unexpected direction. In heavily wooded areas, the tree being felled can strike another tree that can cause the first tree or parts of either tree to fall or fly in an unexpected direction. In addition, planning and clearing a path prior to cutting a tree is especially important when the terrain is covered with obstructions such as snow, water or heavy undergrowth. These obstructions could cause the feller to be injured if they impede the feller's ability to rapidly retreat or cause him to trip or fall. For these reasons, OSHA has retained the requirement to plan and clear a retreat path before felling the tree.

OSHA has addressed in the final rule the concerns raised by the commenter. As a general rule, OSHA believes that a diagonal retreat path is the safest location in the felling area. The ANSI standard, developed by persons experienced in the logging industry, recognized that same general safe work practice. OSHA recognizes that when the retreat path is planned prior to cutting, the employer may find that a diagonal retreat path poses greater hazards than an alternative path. For example, excessive slopes, rocks or other trees in the path of a diagonal retreat may create hazards that are not present in an alternative retreat path. In such cases, the final rule permits the employee to use an alternate retreat path.

OSHA notes that the employer bears the burden of demonstrating that the diagonal retreat path poses a greater hazard. OSHA also notes that the exception is a case-by-case determination. That is, the general rule requiring a diagonal retreat path is to be applied in all manual felling activities. The exception only applies when the feller, in planning a particular retreat path, determines that a diagonal retreat poses a greater hazard.

Paragraph (h)(2)(ii) of the final rule requires that before each tree is felled, conditions shall be evaluated in the work area and precautions taken so a hazard is not created for an employee. Conditions that must be evaluated include, but are not limited to, snow and ice accumulation, wind, lean of the tree, dead limbs and location of other trees. This provision parallels the requirement contained in the proposed rule and the 1978 ANSI logging standard.

OSHA did not receive any comments opposing this provision. Many commenters discussed the hazardous nature of working conditions in the logging industry, and noted that these conditions are constantly changing (Ex. 5-12, Tr. W1 76, 88). Because conditions can change with each tree that is being felled, it is important that the feller assess in advance the conditions and hazards that may be present. In order for fellers to understand what conditions

and hazards may be present and must be appraised, it is important that the employer should include this discussion in training sessions and monthly safety and health meetings.

Paragraph (h)(2)(iii) of the final rule requires that each tree be checked for accumulations of snow or ice. This provision also requires that accumulations of snow and ice that may create a hazard for an employee must be removed before felling is started in the area or the area must be avoided. This provision parallels the requirement contained in the proposed rule.

One commenter said that this provision would require logging establishments to cease felling operations during winter months (Ex. 5- 51). OSHA does not agree with the characterization that the commenters draw about the proposed rule. OSHA is aware that logging operations are carried out in many types of weather conditions. OSHA does not believe that this provision requires logging operations to close down during the winter. However, when accumulations of snow and ice may create a hazard for an employee, that hazard must be removed or avoided. The record shows that removing or avoiding hazardous accumulations of snow and ice is necessary to protect logging employees from injury. According to the WIR survey, six percent of employees injured said that weather conditions such as snow and ice had contributed to their accident (Ex. 2-1).

Paragraph (h)(2)(iv) of the final rule requires that when a spring pole or other tree is under stress, no employee other than the feller may be closer than two tree lengths when the stress is released. This provision was included in the proposed rule, however, the proposed rule did not require that employees be at least two tree lengths away. Rather, it required that employees be in the clear when the stress is released.

Various commenters recommended that OSHA establish a uniform minimum safe distance for all work areas (Ex. 5-18, 5-21, 5-34, 5-36, 5-39, 5-63, 5-74 through 5-92; Tr. W2 163, 197). OSHA agrees with these commenters and has included a minimum two tree-length distance in this provision. The record shows that this distance is necessary to protect employees from being injured or killed by trees under stress. According to the WIR survey, 11 percent of employees who reported injuries said that wood being under tension had contributed to their accident (Ex. 2-1). The OSHA FCI report indicated that four employees were killed when they were struck by propelled or whiplashing tree limbs (Ex. 4-61).

Paragraphs (h)(2)(v), (vi) and (vii) require undercutting and backcutting of each tree being felled.

In paragraph (h)(2)(v) of the final rule, OSHA is requiring that each tree being felled be undercut unless the employer demonstrates that felling the particular tree without an undercut will not create a hazard for an employee. This paragraph also requires that the undercut be of a size so the tree will not split and will fall in the intended direction. The proposed rule contained a provision requiring undercutting of each tree being felled, however, the proposed provision did not provide for any exceptions. OSHA received many comments on this provision, which have been discussed above in the Major Issues section.

At paragraphs (h)(2)(vi) and (vii) of the final rule, OSHA is requiring that each tree be backcut. OSHA is also requiring that the backcut allow for sufficient hinge wood to guide the tree and prevent it from prematurely slipping or twisting off the trunk. OSHA is requiring that the backcut be above the horizontal cut of the undercut. In the final rule, OSHA is allowing one exception to the backcut requirements. In tree pulling operations, the backcut may be at or below the horizontal cut of the undercut. The proposed rule also contained provision requiring backcutting of each tree being felled. The proposed rule did not allow any exceptions to the backcut requirement. OSHA received many comments on these provisions, which have been discussed above in the Major Issues section.

Bucking and Limbing

Paragraph (h)(3) of the final rule establishes various necessary work practices for bucking and limbing activities. According to the WIR survey, 12 percent of the reported logging injuries occurred when the employee was bucking or limbing (Ex. 2-1). The OSHA FCI report showed that 16 employees were killed during bucking and limbing operations (Ex. 4-61). The work practice requirements contained in this paragraph address the hazards presented by log movement on slopes, by wind-thrown timber and by trees that are yarded for bucking.

Paragraph (h)(3)(i) of the final rule requires that bucking and limbing that are done on any slope where rolling or sliding of trees or logs is reasonably foreseeable must be done on the uphill side of the tree, unless the employer demonstrates that it is not feasible for bucking or limbing to be done on the uphill side. This paragraph also requires that whenever bucking or limbing is done on the downhill side, the tree must be secured against movement to prevent rolling or sliding. The proposed rule also contained a provision requiring bucking and limbing to be done from the uphill side.

This provision was supported by one commenter (Ex. 5-17). The record shows that bucking and limbing from the uphill side is necessary to protect employees from being hit or crushed by rolling or sliding trees or logs. As discussed above, according to the WIR survey, nearly three-fifths of workers who reported injuries were working on moderate to steep terrain at the time of their accident, and 10 percent of all injured workers said steep terrain had been a factor in their accident (Ex. 2-1). Bucking or limbing can cause loss of support for the tree and cause it to shift, roll or slide unexpectedly. Blocking or chocking a tree on a slope can never provide as much protection as avoiding the hazard in the first place. The record shows that the only work method in which it can be assured that an employee will not be hurt by a rolling or sliding tree is by performing bucking and limbing on the uphill side. As such, bucking and limbing from the downhill side is permitted only in those cases when the employer is able to demonstrate that it is not feasible to work from the uphill side. In those particular cases, the tree must be restrained to reduce as much as possible the possibility of the tree rolling or sliding. OSHA notes that the burden of demonstrating infeasibility is on the employer. In addition, the issue of the infeasibility of bucking and limbing from the uphill side must be determined on a case-by-case basis when the tree and the conditions in the area are carefully assessed.

Paragraph (h)(3)(ii) requires that when bucking or limbing wind-thrown trees, precautions must be taken to prevent the root wad, tree butt, or logs from striking an employee. These precautions include, but are not limited to, chocking or moving the tree to a stable position before bucking or limbing. The proposed rule also contained a requirement for bucking or limbing wind-thrown trees. However, the proposed rule did not specify what precautions should be taken.

Several commenters said that the proposed provision was too general to be useful (Ex. 5-21, 5-36, 5-74 through 5-92). These commenters said that this was one of a series of proposed work practice requirements which should be deleted from the final rule and included in topics that must be covered in training sessions. OSHA believes that this work practice requirement is necessary to address the significant risk of injury during these activities. According to the WIR survey, 12 percent of reported injuries occurred during bucking and limbing. OSHA does agree with the commenters that these work practice requirements should also be addressed in training sessions.

Chipping

At paragraph (h)(4) of the final rule, OSHA has specified various work practices regarding chipping that is performed at in-woods locations. Paragraph (h)(4)(i) of the final rule requires that access covers or doors not be opened until the drum and disc is at a complete stop. The access covers and doors are the means by which employees are safeguarded from the risk of contacting these parts while they are moving. This provision is adopted from the proposed rule. The 1978 ANSI logging standard also contains a similar provision. OSHA did not receive any comment opposing this provision.

OSHA believes that this requirement is necessary to keep employees away from the dangerous moving drums, discs, knives and blower blades of a chipper. OSHA's FCI reported indicated that two employees have been killed while operating a chipper or trying to free jammed logs (Ex. 4-61). The moving chipper mechanism presents significant hazards, and employees need protection from contact with those mechanisms when they are moving.

Paragraph (h)(4)(ii) of the final rule requires that infeed and discharge ports be guarded to prevent contact with the disc, knives, or blower blades. This provision has been adopted from the proposed rule. There were no comments opposing this provision.

Paragraph (h)(4)(iii) of the final rule requires that the chipper be shut down and locked out in accordance with 29 CFR 1910.147 when an employee performs any servicing of maintenance on the chipper. The proposed rule required that the chipper be shut down and locked out before an employee works in the infeed.

OSHA did not receive any comments opposing lockout of the chipper while working on the infeed. OSHA received one comment stating that lockout should be expanded to apply when an employee is working on the drive mechanism or chipping disc (Ex. 5-28). The lockout/tagout standard, 29 CFR 1910.147, applies to servicing and maintenance of all machines and equipment in which the unexpected energization or start up of the machine or

equipment, or release of stored energy could cause injury to employees. This includes machines and equipment used in logging operations.

The lockout-tagout standard permits employers to either place a lock or tag on any machine before beginning servicing. However, OSHA believes that the environmental conditions involved in logging operations necessitates the use of locks rather than tags when servicing chippers. As OSHA stated in the preamble of the lockout/ tagout standard, it is intended to interact with any new or revised standard to address the use of specific control measures on an individual basis (54 FR 36644, 36665, Sept. 1, 1989). Selection of the specific method of control, at that time, will reflect a thorough evaluation of the extent of exposure to the hazard, the risk of injury involving the particular machine or industry, and the feasibility of applying a particular method of control. OSHA also pointed in the preamble of the lockout/tagout standard that damage to or loss of tagout devices is a serious drawback to the use of tagout. Logging operations are carried out in all kinds of weather, including rain, snow, ice and wind, and there is a significant possibility that tags could be damaged or lost. In such circumstances, OSHA believes only locking machinery will provide adequate protection for employees who are servicing it. Therefore, OSHA is requiring chippers to be shut down and lockout out before an employee performs any servicing or maintenance activities.

Paragraph (h)(4)(iv) of the final rule requires that detached chippers be chocked during usage on any slope when movement of the chipper is reasonably foreseeable. As with other mobile equipment that is intended to be operated from a stationary position, the unexpected movement of the equipment can endanger employees who are either operating the equipment or in the path of the equipment when it moves. The vibration caused by the operation of the equipment can enhance the potential for unintended equipment movement. Chocking of mobile equipment to prevent movement is recognized throughout industry as a necessary and appropriate means to prevent unintended movement. For example, OSHA requires in 29 CFR 1910.178(k)(1) that trailers be chocked before being boarded by powered industrial trucks.

Yarding

Paragraph (h)(5) specifies various work practice requirements covering yarding activities. Paragraph (h)(5)(i) of the final rule requires that logs not be moved until each employee is in the clear. This provision has been adopted from the proposed rule. Movement of logs when employees are in the immediate area can result in an injury to those employees.

According to the WIR survey, almost 20 percent of employees injured were involved in yarding operations at the time of their accident (Ex. 2-1). When a log is moved on uneven, unimproved terrain, the exact path that the log will follow is impossible to predict. When they are being moved, logs may roll over, or the loose end of a log may flip back and forth (fishtail). Movement in an unanticipated direction can cause the log to strike an employee, causing serious injury. OSHA has included this requirement in the final rule to ensure that when logs are moved, all personnel must be safely positioned and not exposed to a hazard. OSHA did not receive any comments opposing this provision.

Paragraph (h)(5)(ii) of the final rule requires that each choker be hooked and unhooked from the uphill side or end of the tree or log when rolling or sliding is reasonably foreseeable, unless the employer demonstrates that it is not feasible in the particular situation to hook or unhook the choker from the uphill side. This provision also requires that when the choker is hooked or unhooked from the downhill side, the log shall be securely blocked or chocked to prevent rolling or swinging. The proposed rule also specified that chokers be hooked and unhooked from the uphill side when feasible unless the log is securely blocked to prevent rolling or swinging. The 1978 ANSI logging standard also contained a similar requirement. There were no comments opposing this provision.

Employees who hook and unhook chokers on sloping terrains face the same hazard of rolling or sliding logs as do fellers, buckers, limbers and other employees. According to the WIR survey, 19 percent of the injuries reported occurred during choker setting, hooking and unhooking (Ex. 2-1). In addition, the WIR survey indicates that nearly three-fifths of all workers injured were working on moderate to steep terrain at the time of their accidents. The final rule makes clear OSHA's intention that all hooking and unhooking of chokers must be from the uphill side or end when rolling or sliding is reasonably foreseeable. This is the only work location in which it can be assured that an employee will not be hurt by a rolling or sliding tree. For this reason, hooking or unhooking chokers from the downhill side is not permitted simply because the tree has been secured with a chock. Rather, the employer must evaluate on a case-by-case basis whether it is possible to hook or unhook from the uphill side. Only when the employer has demonstrated that hooking or unhooking the choker from the uphill side or end is not feasible in the particular situation is hooking or unhooking the choker from the down hill side permitted.

Paragraph (h)(5)(iii) of the final rule requires that each choker be positioned near the end of the log or tree length. This provision was adopted from the proposed rule. There were no comments opposing this provision.

Positioning a choker at the end of the log ensures that the log is moved along its longitudinal axis. Hooking up and skidding a tree or log requires much less energy than trying to move the tree or log sideways. If an employee were to try to move a tree or log by dragging it sideways (perpendicular to its longitudinal axis) the tree or log could become wedged behind another tree, a rock, or a stump, causing the premature failure of the haulage equipment and the possibility of employee injury if the restraint were to suddenly break or release the tree or log. Because of these hazards, the usual practice in non-cable yarding is to skid or drag a tree or log when moving it. When trees or logs are skidded, the choker is hooked to the end of the tree or log and it is pulled along the ground.

Paragraph (h)(5)(iv) of the final rule requires that each machine be positioned during winching so the machine and winch are operated within their design limits. The proposed rule required that the machine be positioned so that the winch line is as near in alignment as possible with the long axis of the machine, unless the machine is designed to be used under different conditions of alignment.

One commenter opposed the proposed provision for several reasons (Ex. 5-34). First, the commenter said that some machines, such as cats and skidders, are designed to sustain winching strain from a much broader angle than straight behind the machine, therefore, the proposed provision was needlessly restrictive if the machine is being operated within its rated capacity. Second, the commenter said it was not possible to comply with the provision in many situations. For example, the commenter said arches are normally equipped with fairleads and grapples that swing sideways out of alignment with the long axis of the machine. Third, the commenter said the provision would create a greater hazard when winching is conducted on very steep terrain. In such cases, the commenter said, it is more important that the machine be positioned to assure maximum stability rather than positioning the machine relative to the log being winched.

OSHA recognizes that exact alignment is not always possible in the woods. OSHA also recognizes that a machine may have a winch mounted on it that may work off the side or front of the machine, and that aligning the winch line with the long axis of the machine may not be the safest manner to operate the winch.

OSHA agrees with this commenter that what is most important is that the design limits of the machine and winch not be exceeded. Therefore, OSHA has revised the wording of this provision to ensure that winching operations conducted with machines are performed within the design limitations of the machines.

Paragraph (h)(5)(v) of the final rule requires that no line be moved unless the yarder operator has clearly received and understood the signal to do so. This provision also requires that when the yarder operator is in doubt, the operator must repeat the signal and wait for a confirming signal before moving any line. This provision has been adopted from the proposed rule. A similar provision also was contained in the 1978 ANSI logging standard and in various State logging standards (Ex. 2-14, 2-18, 2-20, 38J). OSHA did not receive any comments opposing this provision.

OSHA believes that adequate communication is necessary for the safe movement of trees and logs. If the yarder operator begins moving the tree or log before the choker setter or chaser has moved to a safe location, the choker setter or chaser could be injured if struck or caught by a yarding line, carriage, or choker, or by the tree or log.

Paragraph (h)(5)(vi) of the final rule requires that the load shall not exceed the rated capacity of the pallet or other carrier. This provision has been adopted from the proposed rule. OSHA did not receive any comments opposing this provision. This provision is an outgrowth of the requirement that the rated capacity of machines shall not be exceeded. In order to prevent machines from rollovers and tipovers, it is also essential that loads on trailers not exceed the maximum capacity the trailer was designed to carry and the machine was designed to transport. If loads exceed the maximum capacity, the machine operator will be at greater risk of rollover or tipover. As discussed above, a significant number of fatalities have occurred in the logging industry due to rollover accidents. NIOSH reported that 80 logging employees were killed in machine rollover accidents from 1980-85 (Ex. 5-42). The State of Washington

reported that 12 logging employees were killed in rollover accidents from 1977-83 (Ex. 4-129).

Paragraph (h)(5)(vii) of the final rule requires that towed equipment must be attached to the machine or vehicle in such a manner as to allow a 90 degree turn, to prevent overrunning of the towing machine or vehicle and to assure that the operator is always in control of the towed equipment. Towed equipment includes but is not limited to skid pans, pallets, arches and trailers. This provision parallels the proposed requirement. There were no comments opposing this provision.

OSHA's intention in this provision is two-fold. First, OSHA believes this provision is necessary to help reduce the potential for rollover of vehicles or machines that are moving equipment to various work sites. For example, a trailer carrying a maximum load could tip over or roll over and cause the towing machine or vehicle to roll over if the loaded trailer cannot make a full 90 degree turn. Second, this provision is necessary to help assure that material handling equipment is not overloaded. This provision must be viewed in conjunction with the requirement that loads must not exceed the rated capacity of the trailer or other carrier on which it is being towed. For example, when towed equipment exceeds the rated capacity of the towing trailer, it may overrun the towing machine or vehicle. When the rate capacity of the trailer is exceeded there is an increased likelihood that the operator may lose control over the towed equipment and an accident could result.

Paragraph (h)(5)(viii) of the final rule requires that each yarding machine or vehicle, including its load, must be operated with safe clearance from all obstructions. This provision has been adopted from the proposed rule. There were no comments opposing this requirement.

Paragraph (h)(5)(ix) of the final rule requires that each yarded tree must be placed in a location that does not create a hazard for an employee and be placed in an orderly manner so that the trees are stable before other work, such as bucking or limbing, is commenced. The proposed rule required that trees yarded for bucking shall be safely located and stable before bucking is commenced. There were no comments opposing this provision.

In the final rule, OSHA has expanded this provision to provide that no work is commenced until yarded trees are stabilized and safely located. OSHA believes it is necessary to apply this provision to all work done in the area of yarded trees. The WIR survey indicates that the single greatest cause of accidents in the logging industry is being injured by a tree, log or limb and a significant number of employees were injured performing bucking and limbing (Ex. 2-1). If operations, such as bucking or limbing, are located too close to other work operations, unsuspecting loggers could be injured by a rolling log. Moreover, if yarded trees or stacks of trees are not stabilized, loggers performing work activities involving these trees could be at substantial risk of injury if the unstabilized trees move, shift or roll.

In the final rule, OSHA has not retained two proposed requirements from this paragraph. The first would have required the examination of spar trees for defects before they are rigged. This

provision has been deleted because it relates to the construction of cable yarding systems that is not covered by the final rule.

The second provision would have required unstable trees and spars to be guyed to ensure stability. Some commenters said that requiring employees to climb on and rig unstable trees presents a greater hazard than does felling an unguyed tree (Ex. 5-17, 5-21). The weight of the climber and his rigging gear could cause the tree to break off and fall over, resulting in serious injury or death to the climber. OSHA has addressed in other ways the hazards associated with danger trees through other practice requirements. For example, the final rule requires danger trees to be felled or removed before any work can be commenced in the area.

Loading and Unloading

Paragraph (h)(6) of the final rule specifies various work practice requirements regarding loading and unloading trees onto transport machines or vehicles. These requirements were based on those in the 1978 logging standard and various State logging standards (Ex. 2-17, 2-18, 2-19, 2-20, 2-22, 38J, 38K). OSHA believes these work practices are necessary to protect employees from being hit by machines, vehicles, trees and logs during loading and unloading. The WIR survey indicates that five percent of the injuries reported occurred during loading or unloading (Ex. 2-1). The State of Washington study indicated that five percent of all deaths occurred during loading and unloading operations (Ex. 4-129).

Paragraph (h)(6)(i) of the final rule requires that the transport machine or vehicle be positioned to provide working clearance between the vehicle and deck of trees or logs. This provision parallels the requirement contained in the proposed rule. The 1978 ANSI logging standard contained a similar provision.

Several commenters supported the need for adequate room between transport equipment and trees or logs (Ex. 5-21, 5-74 through 5-92). These commenters pointed out that room needs to be provided on the landing for the transport machine or vehicle and its counterweights, especially when landings are on sloped terrain. The record supports these commenters' position. According to the State of Washington study, almost 10 percent of all deaths reported occurred when an employee was struck by mobile equipment and five percent of all deaths involved employees performing loading operations (Ex. 4-129). OSHA believes that the employer must consider several factors in determining an adequate work clearance for loading and unloading. These factors include, but are not limited to, the type of loading machine and transport vehicle being used, the physical characteristics of the load being moved, and the layout of the area where the operation is being conducted. For example, if the vehicle is a self-loading log truck, it will have to be positioned close to the deck of logs to allow the truck to be loaded. On the other hand, if a crane or other material handling machine is used to load and unload the transport vehicle, the machine must be positioned so that it can reach both the deck of logs and the vehicle without exceeding the rated capacity of the machine.

Paragraph (h)(6)(ii) of the final rule requires that only the loading or unloading machine operator and other personnel that the employer demonstrates are essential shall be allowed in the work area during loading and unloading. This provision parallels the provision contained

in the proposed rule and in the 1978 ANSI logging standard. There were no comments opposing this provision. OSHA believes this provision is necessary because, as discussed above, many injuries and fatalities in the logging industry involve loading operations. For example, the State of Washington study reported that three employees were killed when they were struck by logs falling from the transport vehicle during loading (Ex. 4-129).

In the final rule, OSHA is clarifying its intention that the employer bears the burden of proving that personnel other than the machine operator who are in the loading or unloading area are essential to that activity. OSHA notes that this is a case-by-case determination that requires the employer to evaluate the needs and conditions present at the time.

Paragraph (h)(6)(iii) of the final rule requires that no transport vehicle operator remain in the cab during loading and unloading if logs are carried or moved over the cab, unless the employer demonstrates that it is essential for the operator to be in the cab. This provision also requires that when the transport vehicle operator remains in the cab during loading or unloading operations, the employer must provide operator protection such as, but not limited to, reinforcement of the cab. The proposed rule specifies that no transport vehicle operator remain in the cab during loading and unloading unless the employer demonstrates that it was necessary for the operator to be in the cab. The 1978 ANSI logging standard contained a similar requirement.

OSHA received many comments on this provision (Ex. 5-17, 5-21, 5-33, 5-34, 5-74 through 5-92). Several commenters stated that there were so many situations in which it is essential for transport vehicle operators to be in the cab or on the vehicle during loading and unloading that the exceptions would overwhelm the rule (Ex. 5-21, 5-34, 5-36, 5-74 through 5-92). For example, commenters said that self-loading logging trucks must be operated by the driver from an elevated seat above the cab (Ex. 5-21, 5-36). In other loading operations the operator is required to move the transport vehicle back and forth in the loading chute to position the log on the load (Ex. 5-34).

Several commenters said that the cab may be the safest place for the transport vehicle operator to be during loading and unloading (Ex. 5-17, 5-33, 5-34). One commenter said that greater hazards were posed for the operator when not in the cab (Ex. 5-34). For example, the operator outside the cab can be struck by logs that fall off the load or come out of the jaws of the loading machine, or by the loading machine itself. This commenter pointed out that in the State of Washington there have been numerous fatalities and serious injuries reported when the operator was outside the cab, but none reported when the operator was in the cab (Ex. 5-34). As such, this commenter said that many logging establishments will only permit logs to be unloaded if the transport vehicle operator is in the cab (Ex. 5-34).

OSHA believes the record shows that in some situations the safest place for the transport vehicle operator will be in the cab (e.g., Ex. 4-129). The WIR survey appears to support this position, in that only three percent of all injuries reported involved mobile equipment (Ex. 2-1). By contrast, almost one-fourth of all injuries reported resulted from being hit by a tree or falling in the work site. However, there are some hazards to operators who remain in cabs during loading and unloading. Any time logs are carried or moved over the cab, it is possible

due to equipment failure or operator error that the log could fall on the cab and seriously injure the operator.

In other standards OSHA has recognized the hazard of carrying loads over people. These standards include requirements that material handling equipment operators avoid this practice (See 29 CFR 1910.179, 29 CFR 1910.180, 29 CFR 1910.181). In many new self-loading trucks, the hoist mechanism is behind the cab, a location which prevents the movement of logs over the cab (Ex. 5-71). In other situations, however, logs are still moved or carried over the cab. It is not safe for the operator to be in the cab in those situations. Therefore, when logs are carried or moved over the cab, the final rule requires that the operator not remain in the cab if the employer has not demonstrated that it is essential for the operator to do so. If it is essential for the operator to be in the cab when logs are carried or moved over the cab, the employer must provide protection for the operator. The final rule states that this protection includes but is not limited to reinforcement of the cab.

Paragraph (h)(6)(iv) of the final rule requires that each log be placed on the transport vehicle in an orderly manner and tightly secured. This provision parallels the requirement contained in the proposed rule. There were no comments opposing this provision.

OSHA believes that this provision is necessary to protect employees from the hazards that result from haphazard loading and inadequately securing the load. For example, when the load is not properly stacked and/or tightly secured, logs can swing in the tie downs and hit an employee. In addition, the load can shift and cause both the trailer and transport machine or vehicle to rollover. Proper stowage of vehicle loads has the added advantage of providing, in most cases, a more compact load with a lower center of gravity, one that is safer to move.

Paragraph (h)(6)(v) of the final rule requires that the load be positioned to prevent slippage or loss during handling and transport. This requirement parallels the provision contained in the proposed rule. OSHA did not receive any comments opposing this provision. A load that is improperly positioned can roll or shift at any time, thereby potentially endangering any employee who might be close at hand.

Paragraph (h)(6)(vi) of the final rule requires that each stake and chock used to trip loads must be constructed so the tripping mechanism is activated on the side opposite the release of the load. OSHA has adopted this provision from the proposed rule. The 1978 ANSI logging standard also contained a similar provision. There were no comments opposing this provision. OSHA believes this provision is necessary to protect employees from sudden or unexpected shifts or movements of the logs when a load is released. Only by keeping employees out of the potential paths of the shifting or moving logs can there be assurance that the employee will not be struck by a log.

Paragraph (h)(6)(vii) of the final rule requires that each tie down be left in place over the peak log to secure the logs until the unloading lines or other equivalent protection have been put in place. This provision also specifies that a stake of sufficient strength to withstand forces of shifting logs shall be considered to provide protection equivalent to a tie down, provided that

the logs are not loaded higher than the stake. This provision parallels the requirement contained in the proposed rule.

The West Virginia Forestry Association supported this provision (Ex. 5-54). They said that several recent serious logging accidents had occurred in their state because logs loaded too high have fallen off the transport vehicle.

Due to the vibration of the load during transport, the load can shift or move so that when the restraints are removed, the load will roll or otherwise fall off the truck, thereby endangering the employee who must remove the restraints. For this reason, OSHA has specified the necessary and appropriate work practices that must be followed to ensure the safe unloading of transport vehicles.

Paragraph (h)(6)(viii) of the final rule requires that each tie down be released only from the side on which the unloading machine operates. This provision also permits two exceptions to this requirement in situations when the tie down is released by a remote control device and when the employee making the release is protected by racks, stanchions or other protection the employer demonstrates is capable of withstanding the force of moving and shifting logs. This requirement parallels the provision contained in the proposed rule and the 1978 ANSI logging standard.

Several commenters suggested that the exceptions to the release requirement be eliminated (Ex. 5-21, 5-36, 5-74 through 5-92). However, these commenters did not provide any discussion to support their position. OSHA believes that adequate protection is provided in the alternate releasing methods that are excepted from this provision to protect the machine or vehicle operator from being hit by moving or shifting trees or logs.

Transport

Paragraph (h)(7) of the final rule requires the transport vehicle operator to assure that each tie down is tight before transporting the load. In addition, this paragraph requires that while en route, the operator shall check and tighten tie downs whenever there is reason to believe that the tie downs have loosened or the load has shifted. The proposed rule also contained a provision requiring the transport operator to assure that tie downs have been tightened and to check and tighten the tie downs as necessary while en route. The 1978 ANSI logging standard contained a provision similar to the proposed rule.

One commenter opposed the provision, believing that the provision required transport vehicle operators to implement a regular schedule of stopping and checking on tie downs, regardless of whether there is reason to suspect they are loose (Ex. 5-35). OSHA has more clearly stated its original intention in the final that the operator must check tie downs whenever there is reason to believe they are loose or the load has shifted. For example, this would occur if an operator can feel the load shift, or knows that the transport vehicle has hit an object or pothole which jarred the load. OSHA believes this work practice is necessary to protect the transport vehicle operator from having an accident due to logs shifting or breaking the tie downs. In

addition, this provision is necessary to protect the transport vehicle operator from being hit by shifting or moving trees when he unloads the vehicle.

Storage

Paragraph (h)(8) of the final rule requires that each deck of logs be stacked and located so it is stable and provides each employee with enough room to safely move and work in the area. This provision has been adopted from the proposal. The 1978 ANSI logging standard contained a similar requirement. There were no comments opposing this provision.

This provision combines two different requirements. First, this paragraph requires that decks and piles of logs be constructed so they are stable. OSHA believes that decks must be carefully stacked so logs do not shift, roll or fall off the deck and strike an employee who may be working or passing through the storage area. Second, this paragraph requires that the work activities in the vicinity of the storage are well-planned so enough room is provided for those work activities so that an employee is not harmed if the stacked logs shift, roll or fall. OSHA believes these work practices are necessary to protect employees working in the landing area. According to the WIR survey, 20 percent of injuries reported involved accidents at landing areas.

Paragraph (i) Training

In paragraph (i) of the final rule OSHA has specified various training requirements. For several reasons OSHA believes training is a critical element in a integrated control program to reduce the number of accidents, and consequently, the number of fatalities and injuries in the logging industry. First, the logging industry is a high hazard industry. Employees need to be made aware of the various hazards so they can actively participate in making the workplace safe. According to the WIR survey, 10 percent of the workers who reported injuries said that being unaware of the hazard had contributed to their accident.

Second, training is also essential in achieving compliance with the substantive requirements of the standard, including the use of personal protective equipment and safe work practices. Without effective training, employees may not be aware of how to perform their job safely or how the integrated controls can reduce injuries and fatalities. Third, training is especially important in complying with the logging standard because the standard relies heavily on safe work practices to prevent accidents from occurring. Employees who are not trained in how to perform their job safely can put themselves and other employees at risk of injury. Various studies of accidents in the logging industry indicate that poor work practices are a major contributing factor (Ex. 2-1, 4-3, 4-14, 4-15, 4-61, 4-63, 4-121, 4-125, 4-129, 4-138, 4-172, 5-20). For example, according to an accident study conducted by one commenter, 40 percent of accidents were due to poor planning, 40 percent were due to poor technique, and 15 to 18 percent were due to carelessness (Ex. 5-20). Only 2 to 5 percent of the accidents were due to equipment failure. The WIR survey indicated that poor work practices of employees or a co-worker were a contributing factor in more than one-half of all accidents reported (Ex. 2-1).

OSHA's FCI report indicated that unsafe work practices and misjudgments accounted for 42 percent of logging employees who were killed (Ex. 4-61).

Fourth, training is necessary to correct unsafe behavior before it results in injury to the employee or others. In the WIR survey, injured loggers reported that among the factors that contributed to the accident were coworker's activity, misjudging time and distance needed to avoid injury, using wrong cutting methods and not paying full attention to work. In addition, a State of Washington study of fatalities in the logging industry from 1977-83 concluded that over 90 percent of the deaths had been preventable (Ex. 4-129). Therefore, when unsafe behavior is observed, it is important that proper work practices be reinforced through additional training. Fifth, according to the WIR survey, more than one third of all those injured had never received training. Moreover, more than one half of injured loggers working in non-western States (i.e., States without logging standards and training requirements) had never received training.

Sixth, the logging industry itself supports the value of training in reducing accidents (Ex. 4-181, 5-6, 5-17, 5-19, 5-20, 5-22, 5-29, 5-33, 5-42, 5-43, 5-44, 5-45, 5-47, 5-59, 9-5, 9-6; Tr. W2 125, OR 566). Many commenters said their accident rates decreased after they implemented a training program (Ex. 5-33, 9-5, 9-6; Tr. W2 125, OR 566). One company achieved a 63-percent reduction in lost workdays within a year of implementing training (Tr. W2 125). The Montana Logging Association reported that member companies had decreased accidents by 52 percent after implementing training (Tr. OR 566). A study for the International Woodworkers of America found a 71-percent reduction in accidents in establishments in the Pacific Northwest region who had implemented training programs (Ex. 4-181).

Paragraph (i)(1) requires that training be provided for each employee, including supervisors, at no cost to the employee. The proposed rule also required each employee to be trained. This provision clarifies OSHA's intent that supervisors also must receive training. OSHA believes that it is important that supervisors be trained since they are responsible for making work assignments, determining work areas, providing consultation when hazardous situations arise, determining when new employees can begin to work independently, and identifying and correcting unsafe job performance of employees they supervise.

Some commenters raised the issue of cost and availability of training programs, especially for small establishments (Ex. 5-19, 5-32, 5-51). However, other commenters said there are training resources that are readily available for logging establishments (Ex. 5-20, 5-27, 5-52, 5-69, 36, 9-1). These include logging associations and companies which currently offer logging training programs and traveling training seminars, and video tapes which are available to employers. For example, the Alaska Timber Insurance Exchange has established a video library for policyholders to use as training supplements (Ex. 9-15). The American Pulpwood Association said it was developing a logging training that was to be available by the end of 1989 (Ex. 5-27). The Associated Oregon Loggers has also developed logging training programs for member companies (Ex. 36). One training company indicated it was currently providing a variety of different logging training programs in six different States (Ex. 5-20).

OSHA also notes that several commenters have expressed their willingness to work with OSHA to train loggers (Ex. 5-18, 5-20, 5-27, 5-47, 5-52, 5-69).

Paragraph (i)(2) requires that training be provided as follows: as soon as possible but not later than the effective date of this section for initial training of each current employee who has not previously received training; prior to initial assignment for each new employee who has not previously received training; whenever an employee is assigned new work tasks, tools, equipment, machines or vehicles; and whenever an employee demonstrates unsafe job performance. When the proposed rule did not require initial training for each current employee, the proposed rule would have required training prior to initial assignment; annual retraining of each employee; and retraining whenever changes in job assignment would expose the employee to new or additional hazards. OSHA received many comments on the training provisions, some of which have already been discussed above in the Major Issues section.

Many commenters raised the issue of whether experienced and/or previously trained employees would be required to be retrained (Ex. 5-19, 5-21, 5-28, 5-29, 5-33, 5-35, 5-39, 5-43, 5-49, 5-74 through 5-92, 9-1; Tr. W1 63, OR 85). Some commenters favored training of all workers, regardless of their previous employment experience (Ex. 5-19, 5-28, 5-29, 5-35). Other commenters said that previously trained or experienced workers should be excepted from training requirements (Ex. 5-21, 5-36, 5-39, 5-43, 5-49, 5-52, 5-74 through 5-92).

As discussed above in the Major Issues section, OSHA believes that employees who have never received training must be trained, regardless of their level of experience. The need to provide training for experienced loggers who have not previously received such training is supported by the WIR survey, that indicates that over one third of those injured had never received training and 56 percent of those injured had worked in the logging industry for 5 years or more. By contrast, only 22 percent of those injured had worked in the logging industry for one year or less. In addition, the WIR survey indicates that the employees who were injured performed the activity in which they were injured on almost a daily basis. (OSHA is allowing an exception to initial training for previously trained employees. See discussion of paragraph (i)(5)).

OSHA also received several comments on annual retraining of employees. Some commenters said annual retraining is necessary (Ex. 5-34, 5-43, 9-3, 9-9, 9-13, 9-20). One commenter said that machine operators should be retrained at least annually (Ex. 5-34). However, other commenters questioned the need for annual retraining of loggers and suggested that retraining could be handled in regular safety and health meetings (Ex. 5-19, 5-29, 5-43). One commenter also said retraining should be limited to an "as needed basis" (Ex. 5-19).

OSHA has addressed these concerns in the final rule. Instead of an annual retraining provision, the final rule contains provisions requiring employers to hold safety and health meetings at least once a month (paragraph (i)(11)), and to retrain any employee who demonstrates unsafe job performance. OSHA agrees with the commenters that these new provisions are more responsive to addressing new hazards and unsafe job performance than is an annual retraining requirement. These provisions also require the employer to address unsafe job performance immediately. These provisions require the employer to address new hazards as they appear in

the workplace in monthly safety and health meetings. In addition to being more responsive to hazards as they appear in the workplace, OSHA believes these provisions will be less burdensome on employers, especially small employers with limited resources. OSHA anticipates that only a portion of employees will need to be retrained due to unsafe job performance. Also OSHA believes that for many employers ongoing monthly safety and health meetings will be incorporated into job planning meetings that are well-established in the logging industry. (Safety and health meetings are addressed further in discussion of paragraph (i)(11)).

OSHA received comments supporting the need for training of new inexperienced employees and training employees assigned to new job tasks, tools, equipment, machines or vehicles (Ex. 5-19, 5-21, 5-28). There were no comments opposing these provisions, therefore, OSHA has retained these requirements in the final rule.

OSHA has added the requirement of retraining of employees demonstrating unsafe job performance based on practice in the industry. OSHA received comment that some employers who are providing training do require retraining where unsafe job performance is identified (Ex. 29).

The proposed rule also contained minimum training elements that included recognition of safety hazards associated with the employee's particular work tasks and the protective and preventive measures to deal with those hazards; recognition and prevention of general safety hazards in the logging industry; and safe use and maintenance of any machine, equipment or tool used by an employee. One commenter agreed that training should list the hazards of each step of an employee's job and describe how these particular hazards could be controlled (Ex. 5-17). There were no comments opposing this provision.

In the final rule, OSHA has added the requirement that employees be trained in the procedures, practices and requirements of the employer's work site in recognition of the number of comments who describe the logging industry as highly transient (Ex. 5-21, 5-74 through 5-92). While new employees may be experienced and well-trained in the recognition of hazards of the job and in the safe use of equipment of the trade, they may be unaware of the operating protocol of a particular establishment, such as how work activities are organized, or what system of signals is being used. OSHA has also added a provision in the final rule requiring that each employee be trained in the requirements of this section. OSHA believes it is important that employees know the various provisions of this section so they can actively participate in contributing to their own protection. This provision is included in other OSHA standards (e.g., 29 CFR 1910.132, 29 CFR 1910.146, 29 CFR 1910.1047).

Paragraph (i)(4) of the final rule permits the employer to limit training of an employee due to unsafe job performance and for any employee assigned to new work tasks, tools, equipment, machines or vehicles to those content elements in paragraph (i)(3) that are relevant to the circumstances giving rise to the need for training. The proposed rule did not contain a similar provision. OSHA has added this provision to reduce the burden of the training requirement by allowing employers to focus the additional training on the elements necessary to prepare the employee to safely perform the job or operate a new piece of equipment. For example, OSHA

is aware that an employee who is assigned to operate a new machine, may not need retraining in recognition of general hazards in the logging industry or the requirements of the logging standard.

In paragraph (i)(5) of the final rule OSHA establishes certain exceptions to the training requirement. Current and new employees who have received training previously do not need to be retrained in those elements of paragraph (i)(3) for which they have received training. This paragraph also reinforces that each current and new employee must still receive training in those elements for which they have not previously been trained. Even though certain limited exceptions to the training requirements are allowed, this paragraph reinforces that the employer is responsible for ensuring that each current and new employee can properly and safely perform the work tasks and operate the tools, equipment, machines and vehicles used in their job. The proposed rule would have required new employees to be trained, regardless of whether they were experienced or had been trained previously, before initial assignment. The proposed standard also would have required each new and current employee to receive annual retraining.

Several commenters were confused about who was required to be trained under the proposed rule and many commenters opposed retraining of previously trained workers (Ex. 5-21, 5-33, 5-35, 5-39, 5-43, 5-53; Tr. W1 63, OR 85). According to these commenters, employees move from employer to employer and requiring retraining of each new employee would be both duplicative and costly. As discussed above in the Major Issues section, OSHA has addressed the commenters' concerns by allowing previous training to be acceptable in lieu of new initial training for both current and new employees. In order to determine whether the training exception is applicable to a particular employee, the employer must first ascertain whether previous training has satisfied the training content requirements of paragraph (i)(3). Determining whether previous training meets the requirements of this section should not be difficult with regard to current employees. Employers can examine their training materials to ensure that each of the training content requirements has already been covered in training sessions. OSHA notes that each current and new employee will at least have to be trained in the requirements of this new standard. OSHA believes that many employers will provide training on the new final rule in the monthly safety and health meetings.

It may, however, require additional effort for the employer to determine whether a new employee has received training that meets the requirements of the final rule. An employer cannot merely ask the new employee whether he has been trained. Rather, under the training certification requirements of this paragraph (see paragraph (i)(10)), the employer must make a determination of whether and when the past training was adequate to satisfy the requirements of this paragraph.

To determine whether past training was adequate, the employer will have to go through two steps. First, the employer must inquire whether the new employee had training in each of the elements specified in paragraph (i)(3). When the new employee indicates that he has not received training in a particular element, the employer will need to provide training in that element. Second, when the employee indicates that he had received training in each of the required elements, the employer must then determine whether the particular training was

adequate. Most likely, the employer will make that determination while the new employee is working under close supervision of a designated person, as required by this paragraph. When the new employee, who has been previously trained, can demonstrate the ability to safely perform the job independently, the employee can then determine and certify that previous training had been adequate.

At paragraph (i)(6) of the final rule, OSHA requires that each new employee and each employee who is required to be trained by this paragraph, to work under the close supervision of a designated person until the employee is able to demonstrate the ability to safely perform the new job independently. The proposed rule contained two provisions specifying initial close supervision. One provision specified initial close supervision for all power tool and machine operators and associated maintenance personnel. The second provided initial close supervision for each new employee, and each newly trained employee. In addition, the State of Oregon logging standard requires initial close supervision for new employees and requires experienced new employees to demonstrate their competence before being allowed to perform the job independently (Ex. 38K).

Several commenters supported this provision (Ex. 5-22, 5-42, 5-33, 5-39, 5-53, 5-55, 5-63, 9-9; Tr. W1 91-92, 172-73, OR 151-52, 216, 373, 377, 410). NIOSH said it was important in the logging industry to have an adequate balance of classroom and on-the-job training (Ex. 5-42). NIOSH said working with a designated person would be especially effective for pointing out poisonous plants to inexperienced workers (Ex. 5-42). Several commenters also supported limiting this provision to only inexperienced workers (Ex. 5-33, 5-39, 5-53, 5-62, 5-74 through 5-92).

OSHA has carefully considered the comments and has decided for several reasons that it is necessary in the final rule to retain the requirement that each new and each newly-trained employee work under the close supervision of a designated person initially. There are several reasons for this determination. First, this requirement acts as a final check on the competency of a newly-trained employee by allowing the employer to measure in practical terms how well the employee has absorbed the training. Second, this provision is also a measure of the general effectiveness and adequacy of the employer's training program. When employees are not able to demonstrate the ability to perform the job safely, the employer needs to review and correct the training program and retrain the workers.

Third, OSHA believes this provision is essential given the inclusion of an initial training exception in the final rule for previously trained workers. As discussed earlier, more than 60 percent of all loggers who reported injuries in the WIR survey had been previously trained (Ex. 2-1). This data supports the need for safeguards to integrating new employees into the workplace if initial training of each new employee is not required. Finally, this provision is also a safeguard for integrating newly-trained employees and employees whose unsafe job performance has necessitated retraining.

Paragraph (i)(7) of the final rule specifies various requirements regarding first-aid training for each employee, including supervisors. Paragraph (i)(7)(i) of the final rule requires that the employer assure that each employee receives or has received first-aid and CPR training. This

provision also requires that first-aid training meet at least the requirements of Appendix B. The proposed rule would have required only supervisors, fellers and at least one additional person in each operating area to have first-aid training. The proposed rule also would have required that the first-aid training content meet the training programs of the American Red Cross, the Mine Safety and Health Administration (MSHA) or other equivalent program.

As discussed above in the Major Issues section, OSHA is expanding the requirement on first-aid training to all employees. According to the WIR survey, more than one-half of all injuries occurred at cutting sites, that in most cases are remote from medical facilities and personnel (Ex. 2-1). Also as discussed above in the Major Issues section, OSHA is not requiring employers to provide the first-aid training. The employer can meet the requirements of the standard by assuring that employees he hires already have taken first-aid training. The employer can also meet this requirement by requiring any worker in his employ to take a first-aid training course from any organization in the community whose program meets the requirements of this standard. In addition, the standard does not require repeat first-aid training for workers who have received first-aid training previously, provided the training has met the content requirements of this standard and their first-aid certificate is current.

With regard to first-aid training content, Appendix B specifies the minimum content of required first-aid training. This content list includes training in emergency situations that are most likely to arise in the logging industry, such as control of bleeding and shock, immobilization of injured persons, treatment of sprains and fractures, and treatment of contact with poisonous plants or animals.

For several reasons, in the final rule, OSHA has specified the minimum first-aid training requirements rather than simply referring to programs provided by various organizations. First, the content list is in keeping with OSHA's goal of developing performance language standards. Second, the content list in Appendix B focuses on the types of situations that are most likely to occur in the logging industry and in remote work sites. General first-aid training programs may not thoroughly cover the kinds of situations found in the logging industry. Third, the content of training programs offered by various organizations may change and an element crucial to first aid in remote outdoor locations may be dropped. By specifying the minimum content, the standard places training organizations on notice as to what elements their program must include in order to meet the requirements of this standard.

Fourth, by expressing the first-aid training requirements in performance language, OSHA is providing employers with maximum flexibility. Employers will not have to research the Red Cross and MSHA training programs to see if a training program offered locally by another organization meets the requirements of this standard. In addition, by specifying the content, the standard leaves employers free to develop their own first-aid training program or rely on outside organizations to provide first aid training. Fifth, since the final standard permits employers to require their employees to take first-aid training rather than providing the training, it is important to provide employees with an understandable criteria for determining whether the training program they select meets the requirements of this standard.

Paragraph (i)(7)(ii) of the final rule requires that the employer assure that each employee receives first-aid training at least every three years and receives CPR training at least annually. The proposed rule did not contain a similar requirement. Most first-aid training organizations require retraining at the above frequency in order to maintain a current certificate (Ex. 5-42). OSHA agrees with these organizations that it is necessary to refresh one's first-aid skills on a regular basis. Since these skills are not usually used on a daily basis, trained persons may become less able to render these skills over time without periodic refresher training. In addition, what constitutes the best first-aid techniques and procedures changes over time. Employees need to be retrained so their skills include the best and most current practices.

Paragraph (i)(7)(iii) of the final rule requires that the employer assure that each employee's first aid and CPR training and/or certificate of training remain current. The proposed rule did not contain a similar requirement. OSHA believes this provision is essential given the inclusion of the exception in the final rule for previously trained workers. In addition, it is essential because employers can comply with the first-aid training provisions without actually providing the training themselves. In essence, this provision is similar to the provision in paragraph (i)(5) reinforcing that the employer is responsible for assuring that the employee can safely perform the job, even if the employer has not been required to actually provide the training. Regardless of whether the employer provides training or allows employees to take a first-aid program offered by another organization, the employer is still responsible for assuring that employees can render first aid properly if called upon.

At paragraph (i)(8) of the final rule, OSHA is requiring that training be conducted by a designated person. As discussed above, a designated person is an employee who has the requisite knowledge, training and experience to perform the specific duties. The proposed rule did not contain a similar requirement.

Some commenters said that it was important that training be conducted by a qualified or certified person (Ex. 9-3, 9-13, 9-16). OSHA has included this provision in the final rule because the Agency wants to assure that regardless of whether employers rely on their own personnel to conduct training or utilize outside experts, the person providing training must have the necessary qualifications and background in the subject matter being taught.

Paragraph (i)(9) of the final rule requires that training required by this section be presented in a manner that the employee is able to understand. This provision also requires that the employer assure that training materials are appropriate in content and vocabulary to the educational level, literacy and language skills of the employees being trained. A similar provision was not contained in the proposed rule. OSHA has added this provision in the final rule as a way of ensuring that all employees, regardless of their cultural or educational background, will receive adequate training on how to perform their job safely. OSHA notes that this requirement applies to both logging and first-aid training.

Paragraph (i)(10) requires the certification of training. While this provision was not contained in the proposed rule, several commenters stressed the need to document training (Ex. 9-16, 9-18; Tr. OR 137, 558-59, 643-44). OSHA agrees with these commenters that documenting training is necessary. First, in the final rule OSHA has allowed prior training to be acceptable

in lieu of initial training. In the proposed rule, OSHA had required that each new employee, regardless of experience and prior training, receive training prior to initial assignment. In order to accept prior training in lieu of new training, OSHA believes employers must establish a process for determining whether the prior training was adequate. The certification procedure provides that process without imposing a significant burden. Second, several commenters said that many establishments do not currently document training (Tr. W1 95, OR 92). As such, employers do not have any records to indicate whether appropriate training has been provided.

Third, some commenters testified that all training programs should be written programs (Ex. 5-17, 5-42). While many large logging establishments already have implemented impressive written training programs, OSHA is also aware that a written training and recordkeeping requirement would impose a paperwork burden and significant burden on small employers in this industry (Ex. 5-44). OSHA believes that training certification is a less burdensome way of documenting whether employees have been adequately trained. OSHA notes that the time and costs of training certification have been included in the final regulatory impact analysis.

Paragraph (i)(10)(i) of the final rule requires that the employer verify compliance with paragraph (i) of this section by preparing a written certification record. This provision also requires that the written certification record contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. In addition, this provision requires that if the employer relies on training conducted prior to the employee being hired or prior to the effective date of this section, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training. The proposed rule did not contain a certification requirement.

The Agency is adding this new provision to the final rule in large part because it is allowing prior training to be accepted in place of a new round of training. OSHA recognizes, given the transient nature of the workforce in this industry, that in many cases an employer will be unable to identify the date on which previous training was provided by another employer. In those cases, OSHA believes that knowing the date of the prior training is not as important as the employer's determination as to whether the prior training is adequate. As such, OSHA is requiring employers to certify on what date they determine the prior training to be adequate. In the final rule OSHA has included a measurable way to determine when and whether prior training had been adequate. The final rule requires that each new employee work under close supervision of a designated person until the employee demonstrates the ability to safely perform the job independently. In most cases, therefore, this demonstration date will constitute the certification date.

Paragraph (i)(10)(ii) of the final rule requires that the most recent training certification be maintained. This provision has been included to limit the number of records that the employer is required to maintain on training.

Paragraph (i)(11) of the final rule requires that the employer hold safety and health meetings as necessary and at least each month for each employee. This provision allows safety and

health meetings to be conducted individually, in crew meetings, in larger groups, or as part of other staff meetings. The proposed rule did not contain a safety and health meeting requirement. Many State logging standards also require regular safety and health meetings in the logging industry (Ex. 2-17, 2-22, 2-23, 36, 38K). For example, the State of Washington logging standard requires safety meetings to be held monthly and whenever work is started at a new work site.

Many commenters supported the need for regular and ongoing safety and health meetings for both inexperienced and experienced workers (Ex. 5-7, 5-19, 5-28; Tr. W1 93-95, 163, OR 92, 110, 137, 197, 204, 276, 335, 374, 643-44, 691-92). Several of these commenters indicated that many establishments in the industry already hold safety and health meetings on a regular basis. Several commenters said safety and health meetings were an effective way of informing employees about hazards and keeping their safety awareness high (Ex. 5-19, 5-28; Tr. W1 93-95, 163, 189-90, OR 92, 110, 137, 204, 276, 374, 643-44). One commenter said that documented monthly safety and health meetings were necessary on all logging operations "to instill the necessary safe work attitude in all logging employees" (Ex. 5-28). Commenters also said safety and health meetings were good for providing targeted information (Tr. W1 94, 164, 189, OR 110, 204-05, 373, 643). For example, they said safety and health meetings were a way of informing employees about recent accidents and about lapses in safe work practices, and to alert employees about conditions and hazards peculiar to the job to be performed or the site to be logged that day.

Commenters also said that safety and health meetings were necessary for both inexperienced and experienced loggers (Ex. 5-19, 5-28, 5-45; Tr. OR 335). One of these commenters said:

We don't feel that just new employees or green men ought to be sitting in safety and health meetings. Repetition increases retention, and everyone can benefit if they've heard it a hundred times. Maybe they forgot it 99 [times] and it might save their life or their buddy's life the next day (Tr. OR 335).

OSHA agrees with these commenters that safety and health meetings are necessary to reinforce proper work practices and to alert employees to particular hazards which are present in the workplace. OSHA believes that regular safety and health meetings will provide adequate retraining for employees in the logging industry, and that these meetings are necessary in lieu of requiring annual retraining of experienced workers.

Paragraph (j) Effective Date

As stated in paragraph (j), this final rule becomes effective 120 days after publication of the revised rule and preamble in the **Federal Register.** Employers must be in compliance with all requirements of this section by the effective date. One commenter recommended a three-year delay in the effective date of this final rule to allow for manufacturers' design and lead time and retrofitting of old equipment (Ex. 5-22). OSHA believes that 120 days is a reasonable compliance time for this standard for several reasons. First, the Agency is not requiring retrofitting ROPS and FOPS on old machines or chain brakes on chain saws. Those equipment requirements apply only to machines and chain saws placed into initial service after the

effective date. OSHA believes that replacement of safety devices that have been removed, such as seat belts, should not require additional compliance time. Second, in the final rule OSHA has not adopted any equipment requirements that are not already standard safety features of equipment currently manufactured and readily available. Therefore, additional compliance time is not warranted.

Finally, OSHA believes that allowing 120 days for employers to come into compliance will provide employers with adequate time to familiarize themselves with the final rule, to purchase needed equipment, and to develop and conduct required training.

OSHA notes that the requirements of the existing pulpwood logging standard remain in effect until the effective date.

Paragraph (k) Appendices

In paragraph (k) of the final rule, OSHA is specifying that Appendix A on contents of first-aid kits and Appendix B on content of first-aid training are mandatory. First-aid kits must contain at least the items listed in Appendix A to meet the requirements of paragraph (d)(2). First-aid training programs must cover the topics listed in Appendix B to meet the requirements of paragraph (i)(7). Appendix C contains a listing of comparable ISO standards to those Society of Automotive Engineer standards referenced in the final rule. These SAE standards cover ROPS, FOPS, seat belts and machine access. The information contained in Appendix C (Corresponding ISO Agreements) is purely informational and is not intended to create any additional obligations not otherwise imposed or to detract from existing obligations.

2. Summary and Explanation of Technical Amendments to 29 CFR 1910.269(r) and 29 CFR 1928.21(a)(3)

In this **Federal Register** document OSHA is also issuing technical amendments to the Electric Power Generation standard (29 CFR 1910.269) and to the standards for the agriculture industry (29 CFR 1928.21(a)(3)). Both standards have included a reference to the existing logging standard. OSHA intends that both standards now reference the revised logging standard in place of the pulpwood logging standard.

VI. Regulatory Impact Analysis, Regulatory Flexibility Analysis, and Environmental Assessment

A. Introduction

The purpose of the revision of the existing pulpwood logging standard, 29 CFR 1910.266, is to protect all loggers from the hazards encountered during timber harvesting regardless of the end use of the wood. Hazards are present, for example, due to falling, rolling or sliding trees and logs, the use of hazardous equipment such as chain saws, and improper work practices. According to BLS, these hazards resulted in an accident incidence rate of 15.6 injuries per 100 full- time workers in 1991, which is nearly twice the incidence rate of 7.9 injuries per 100 full-time workers for overall private sector. The number of lost workdays in logging in 1991 was

274.8 per 100 full-time workers, which is about three times that of manufacturing and four times that of the overall private sector.

The existing logging standard applies only to the logging of wood that is used to make pulp for paper and paperboard. Other logging operations are not covered by the existing standard. However, other general industry safety and health standards in Part 1910, such as but not limited to, Occupational Noise Exposure (29 CFR 1910.95), Lockout/ Tagout (29 CFR 1910.147), and Personal Protective Equipment (29 CFR Subpart I), apply to non-pulpwood logging operations, as well as the General Duty clause of the OSH Act (Section 5(a)(1)).

The final rule expands the coverage of the pulpwood logging standard to include all logging operations, regardless of the end use of the wood. Many of the provisions in the pulpwood logging standard have been retained in this standard. Some provisions have been modified, such as those requiring safety and first-aid training for all employees, and personal protective equipment. In certain cases, work practices have been made more specific.

It should be noted that six State Plan States (Alaska, California, Hawaii, Michigan, Oregon, and Washington) have developed logging standards that cover all logging operations and are not limited to just pulpwood logging.

This Regulatory Impact Assessment (RIA) has been prepared by OSHA in compliance with Executive Order 12866 and the Regulatory Flexibility Act of 1980 (5 U.S.C. 601 et seq.). The analysis was developed based on information and comments in the OSHA logging docket and informal public hearings.

B. Affected Industries and Workers

For purposes of analysis, logging operations in the United States were divided in four relevant geographical regions--the North, the South, the Rocky Mountains, and the Pacific Coast. The leading States in logging employment in 1987 were Oregon, Washington, Alabama and Georgia, which accounted for 40 percent of logging employment. The final rule will affect approximately 72,100 employees engaged in logging operations covered by the final rule and 11,936 logging establishments. Almost 94 percent of all logging establishments employ fewer than 20 employees and 60 percent of all logging employees work in small establishments. These estimates do not include independent contractors.

Affected workers include, but are not limited to, fellers and buckers, who cut the trees; skidder and yarder operators, choker setters, and chasers, who are responsible for delivering a felled tree to the landing; and loader operators and truck drivers, who load the trees onto trucks for transport to a mill. Although all stages of logging present hazards to workers, the loggers most at risk are manual felling crews rather than those who operate mechanical harvesting equipment and are protected by enclosed cabs.

C. Technological Feasibility Determination

The work practice and training provisions as well as the requirements regarding personal protective equipment and equipment protective devices in the final rule are technologically feasible. The fact that the requirements of the standard already are being achieved in the logging industry is the best evidence of feasibility. The record shows that many logging establishments are currently providing the training, equipment protection devices and personal protective equipment that would meet the requirements of the new standard. In addition, the record also shows they are operating under the same work practices as those required by the standard. Based on the record, OSHA has determined that numerous logging establishments of all sizes are already in compliance with most of the provisions of the final standard. In addition, equipment protective devices and personal protective equipment which are required by the final rule are all commercially available. Therefore, OSHA has determined that the final rule is technologically feasible.

D. Costs of Compliance

OSHA estimated compliance costs using data in the record on current practices and exposed population, including a report prepared by Centaur Associates, Inc. (Ex. 3). Based on all the data and evidence in the record, OSHA estimates that first-year costs associated with compliance will be $14.3 million. Total annualized cost of compliance with the standard is estimated to be $12.5 million. Table 22 shows the summary of costs of compliance with the final rule.

Table 22.--Summary of Costs to Comply With the Logging Standard

Provision	First year		Recurring cost	Annualized	
	Cost	(1)		Cost	(1)
Training provisions:					
Safety training....	$1,481,635	10.3	$120,695	$120,695	1.0
Safety meetings....	469,251	3.3	469,251	469,251	3.7
First aid training.	3,410,935	23.8	3,410,935	3,410,935	27.2
	5,361,820	37.4	4,000,881	4,000,881	31.9
Operators manuals....	189,293	1.3	189,293	189,293	1.5
Inspection and maintenance.....	5,396,789	37.6	5,396,789	5,396,789	43.0
Safety belt replacement.....	493,282	3.4	.....	80,279	0.6
First aid kits.....	267,593	1.9	232,028	232,028	1.8
Personal protective equipment.....	2,637,597	18.4	2,637,597	2,637,597	20.6
Total.....	14,346,375	....	12,456,588	12,809,333	.....

Note:(1) The number in these columns represent the percentage of the total cost that each provision represents and that are incurred in the first year and in each year thereafter.

Source: OSHA, Office of Regulatory Analysis.

Of the total annualized cost, 43 percent is attributable to inspection and maintenance of logging equipment. Training costs, which include safety and first-aid training as well as monthly safety and health meetings, account for 32 percent. Personal protective equipment accounts for about 21 percent of total annual costs. First-aid kits for 1.9 percent. Replacement of operator manuals or instructions accounts for 1.5 percent and replacement of seat belts removed from machines and vehicles accounts for about 0.6 percent of total costs.

D. Benefits of the Revised Standard

The record shows that injury rates in the logging industry are high. In 1991, there were 15.6 injuries per 100 workers in the logging industry as compared to an injury incidence rate of 7.9 and 11.2 per 100 workers in the private industry and manufacturing sectors, respectively. Lost workday rates are especially high in the logging industry, indicating that most logging accidents are serious. Based on the data in the record, OSHA estimates that there are approximately 158 fatalities, 6,798 lost workday injuries, and 3,770 nonlost workday injuries annually in the logging industry.

The revised standard mandates a variety of methods of control to reduce hazards in the logging industry. Included in the standard are provisions for personal protective equipment, machine protective devices, equipment inspection and maintenance, work practices, and training. The revised standard is expected to significantly reduce the number of accidents, and, consequently, fatalities and injuries that occur in the logging industry. The ability of the revised standard to reduce accidents, injuries and fatalities depends largely on this integrated program of controls to deal with the range of hazards that exist in logging operations. For this reason, the effects of the overall standard on workplace safety is expected to be greater than the effects of the elements of the standard when considered individually. OSHA estimates that compliance with the final standard will prevent 111 fatalities, 4,759 lost workday cases, and 2,639 nonlost workday cases annually (Table 23). These estimates were developed based on the comprehensiveness of the standard in dealing with the range of workplace hazards in logging.

Table 23. -- Reduction in Fatalities and Injuries From Compliance With the Logging Standard

	Fatalities	Total injuries	Lost workday injuries	Non-lost workday injuries
Baseline cases.....	158	10,568	6,798	3,770
Cases avoided by compliance with standard.....	111	7,398	4,759	2,639

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis, 1994.

F. Economic Feasibility Determination

The projected economic impact of the final standard on the logging industry is small. The cost of full compliance with the standard represents only 0.1 percent of the value of shipments for this industry as a whole. Although these annual costs of compliance represent a relatively insignificant amount of total shipments, some firms will bear more costs than others depending on their existing compliance with the various provisions of the standard.

The annual cost of compliance per logging establishment ranges from about $38 in California where firms are at a high level of compliance with their own State logging standard, to an average of $1,300 per establishment in the South where no comprehensive logging standards exists. These annual costs per establishment are insignificant when viewed in terms of other costs incurred by logging employers. It is expected that the costs of compliance with the final rule are too small to have a significant effect on price, employment, production, or profit rates.

The impact of compliance with the final rule is expected to fall primarily on small businesses, because the vast majority of logging establishments employ fewer than 20 workers. The record shows that most large logging establishments are already in compliance with many of the provisions of the final rule. However, many small firms are also located in States that have comprehensive logging standards. These firms are currently in compliance with these standards and are able to operate while incurring these costs. Even if it is assumed that small firms will bear all the costs of compliance with the final rule, the economic impact is still small. OSHA estimates that the average cost per small firm is substantially less than 0.5 percent of the average annual value of shipments per firm and will be more than offset by the probable decrease in workers' compensation costs resulting from fewer injuries. Even small establishments that operate on less than a full-time basis could incur the costs of compliance without experiencing an economic disruption that would threaten the competitive structure of the industry or cause any dislocation.

Based on these estimates developed from data and evidence in the record, OSHA has concluded that the economic impact of the standard would not threaten the stability or profitability of the logging industry. In addition, neither the Gross National Product (GNP), the level of international trade, the price of consumer goods, nor the level of employment would be significantly affected.

G. Regulatory Flexibility Certification

In accordance with the Regulatory Flexibility Act, the Assistant Secretary has made a preliminary assessment of the impact of the rule on small entities. As discussed above, the estimated compliance costs for small firms (i.e, those employing fewer than 20 workers) are estimated to be less than 0.5 percent of the average annual value of shipments per firm and will be more than offset by the probable decrease in workers' compensation costs resulting from reduction in logging accidents. As is the case for compliance costs for all firms covered under the standard, the costs of compliance for small firms would be very small compared

with net income. Therefore, OSHA does not anticipate the final rule will have a significant impact on small firms.

H. Environmental Impact Assessment

The revisions to the standard have been reviewed in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321, et seq.), the regulations of the Council on Environmental Quality (CEQ) (40 CFR 1500), and the Department of Labor (DOL) NEPA Procedures (29 CFR 11). As a result of this review, OSHA has determined that the rule will have no significant environmental impact.

The provisions focus on training, work practices, personal protective equipment, and protective devices on equipment in order to reduce worker fatalities and injuries. In general, these provisions do not impact on air, water, or soil quality, plant or animal life, the use of land, or other aspects of the environment. The revisions are considered excluded actions under Subpart B, Section 11.10 of the DOL NEPA regulations.

VII. References

In this preamble to the revised logging standard, OSHA has referred to the following public documents in addition to the materials contained in the docket for this rulemaking:

1. Bureau of the Census, 1987 Census of Manufacturers, Industry Series, Logging Camps, Sawmills and Planing Mills, U.S. Department of Commerce, February 1987.

2. Bureau of Labor Statistics, Employment and Earnings, U.S. Department of Labor, June 18, 1993.

3. Bureau of Labor Statistics, Employer Costs for Employee Compensation--March 1993, U.S. Department of Labor, June 18, 1993.

4. Bureau of Labor Statistics, Fatal Workplace Injuries in 1992: A Collection of Data and Analysis, U.S. Department of Labor, April 1994.

5. Bureau of Labor Statistics, Occupational Injuries and Illnesses in the United States by Industry, 1990, Bulletin 2399, U.S. Department of Labor, April 1992.

6. Bureau of Labor Statistics, Occupational Injuries and Illnesses in the United States by Industry, 1991, Bulletin 2424, U.S. Department of Labor, May 1993.

7. Burgess, Joe, et al., Timber Harvesting Equipment Costs 1994. 8. Eastern Research Group, Inc. An Economic Analysis for an OSHA Standard for Occupational Motor Vehicle Safety. October 1989.

9. Forestry Suppliers, Inc., Forestry, Engineering and Environmental Equipment Catalog, Jackson, Mississippi, 1994.

10. U.S. Department of Commerce, U.S. Industrial Outlook 1993, January 1993.

11. U.S. Forest Service, An Analysis of the Timber Situation in the United States: 1989-2040, U.S. Department of Agriculture, December 1990.

VIII. Statutory Considerations

A. Introduction

OSHA has described the hazards confronted by employees who work in the logging industry and the measures required to protect affected employees from those hazards in Section I, Background, and Section III, Summary and Explanation of the Standard, respectively, earlier in this preamble. The Agency is providing the following discussion of the statutory mandate for OSHA rulemaking activity to explain the legal basis for its determination that the logging operations standard, as promulgated, is reasonably necessary to protect affected employees from significant risks of injury and death.

Section 2(b)(3) of the Occupational Safety and Health Act authorizes "the Secretary of Labor to set mandatory occupational safety and health standards applicable to businesses affecting interstate commerce", and section 5(a)(2) provides that "[e]ach employer shall comply with occupational safety and health standards promulgated under this Act" (emphasis added). Section 3(8) of the OSH Act (29 U.S.C. 652(8)) provides that "the term `occupational safety and health standard' means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment."

In two recent cases, reviewing courts have expressed concern that OSHA's interpretation of these provisions of the OSH Act, particularly of section 3(8) as it pertains to safety rulemaking, could lead to overly costly or under-protective safety standards. In International Union, UAW v. OSHA, 938 F.2d 1310 (D.C. Cir. 1991), the District of Columbia Circuit rejected substantive challenges to OSHA's lockout/ tagout standard and denied a request that enforcement of that standard be stayed, but it also expressed concern that OSHA's interpretation of the OSH Act could lead to safety standards that are very costly and only minimally protective. In National Grain & Feed Ass'n v. OSHA, 866 F.2d 717 (5th Cir. 1989), the Fifth Circuit concluded that Congress gave OSHA considerable discretion in structuring the costs and benefits of safety standards but, concerned that the grain dust standard might be under-protective, directed OSHA to consider adding a provision that might further reduce significant risk of fire and explosion.

OSHA rulemakings involve a significant degree of agency expertise and policy-making discretion to which reviewing courts must defer. (See for example, Building & Constr. Trades Dep't, AFL-CIO v. Brock, 838 F.2d 1258, 1266 (D.C. Cir. 1988); Industrial Union Dep't, AFL-CIO v. American Petroleum Inst., 448 U.S. 607, 655 n. 62 (1980).) At the same time, the

agency's technical expertise and policy-making authority must be exercised within discernable parameters. The lockout/tagout and grain handling standard decisions sought from OSHA more clarification on the agency's view of the scope of those parameters. In light of those decisions, OSHA believes it would be useful to include in the preamble to this safety standard a statement of its view of the limits of its safety rulemaking authority and to explain why it is confident that its interpretive views have in the past avoided regulatory extremes and continue to do so in this rule.

Stated briefly, the OSH Act requires that, before promulgating any occupational safety standard, OSHA demonstrate based on substantial evidence in the record as a whole that: (1) The proposed standard will substantially reduce a significant risk of material harm; (2) compliance is technologically feasible in the sense that the protective measures being required already exist, can be brought into existence with available technology, or can be created with technology that can reasonably be developed; (3) compliance is economically feasible in the sense that industry can absorb or pass on the costs without major dislocation or threat of instability; and (4) the standard is cost effective in that it employs the least expensive protective measures capable of reducing or eliminating significant risk. Additionally, proposed safety standards must be compatible with prior agency action, must be responsive to significant comment in the record, and, to the extent allowed by statute, must be consistent with applicable Executive Orders. These elements limit OSHA's regulatory discretion for safety rulemaking and provide a decision-making framework for developing a rule within their parameters.

B. Congress Concluded That OSHA Regulations Are Necessary To Protect Workers From Occupational Hazards and That Employers Should Be Required To Reduce or Eliminate Significant Workplace Health and Safety Threats

At section 2(a) of the OSH Act (29 U.S.C. 651(a)), Congress announced its determination that occupational injury and illness should be eliminated as much as possible: "The Congress finds that occupational injury and illness arising out of work situations impose a substantial burden upon, and are a hindrance to, interstate commerce in terms of lost production, wage loss, medical expenses, and disability compensation payments." Congress therefore declared "it to be its purpose and policy * * * to assure so far as possible every working man and woman in the Nation safe * * * working conditions [29 U.S.C. 651(b)]."

To that end, Congress instructed the Secretary of Labor to adopt existing federal and consensus standards during the first two years after the OSH Act became effective and, in the event of conflict among any such standards, to "promulgate the standard which assures the greatest protection of the safety or health of the affected employees [29 U.S.C. 655(a)]." Congress also directed the Secretary to set mandatory occupational safety standards [29 U.S.C. 651(b)(3)], based on a rulemaking record and substantial evidence [29 U.S.C. 655(b)(2)], that are "reasonably necessary or appropriate to provide safe * * * employment and places of employment." When promulgating permanent safety or health standards that differ from existing national consensus standards, the Secretary must explain "why the rule as adopted will better effectuate the purposes of this Act than the national consensus standard [29 U.S.C. 655(b)(8)]." Correspondingly, every employer must comply with OSHA standards and,

in addition, "furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees [29 U.S.C. 654(a)]."

"Congress understood that the Act would create substantial costs for employers, yet intended to impose such costs when necessary to create a safe and healthful working environment. Congress viewed the costs of health and safety as a cost of doing business. * * * Indeed, Congress thought that the financial costs of health and safety problems in the workplace were as large as or larger than the financial costs of eliminating these problems [American Textile Mfrs. Inst. Inc. v. Donovan, 452 U.S. 490, 519-522 (1981) (ATMI); emphasis was supplied in original]." "[T]he fundamental objective of the Act [is] to prevent occupational deaths and serious injuries [Whirlpool Corp. v. Marshall, 445 U.S. 1, 11 (1980)]." "We know the costs would be put into consumer goods but that is the price we should pay for the 80 million workers in America [S. Rep. No. 91-1282, 91st Cong., 2d Sess. (1970); H.R. Rep. No. 91-1291, 91st Cong., 2d Sess. (1970), reprinted in Senate Committee on Labor and Public Welfare, Legislative History of the Occupational Safety and Health Act of 1970, (Committee Print 1971) ("Leg. Hist.") at 444 (Senator Yarborough)]." "Of course, it will cost a little more per item to produce a washing machine. Those of us who use washing machines will pay for the increased cost, but it is worth it, to stop the terrible death and injury rate in this country [Id. at 324; see also 510-511, 517]."

[T]he vitality of the Nation's economy will be enhanced by the greater productivity realized through saved lives and useful years of labor.

When one man is injured or disabled by an industrial accident or disease, it is he and his family who suffer the most immediate and personal loss. However, that tragic loss also affects each of us. As a result of occupational accidents and disease, over $1.5 billion in wages is lost each year [1970 dollars], and the annual loss to the gross national product is estimated to be over $8 billion. Vast resources that could be available for productive use are siphoned off to pay workmen's compensation and medical expenses. * * * Only through a comprehensive approach can we hope to effect a significant reduction in these job death and casualty figures. [Id. at 518-19 (Senator Cranston)]

Congress considered uniform enforcement crucial because it would reduce or eliminate the disadvantage that a conscientious employer might experience when inter-industry or intra-industry competition is present. Moreover, "many employers--particularly smaller ones--simply cannot make the necessary investment in health and safety, and survive competitively, unless all are compelled to do so [Leg. Hist. at 144, 854, 1188, 1201]."

Thus, the statutory text and legislative history make clear that Congress conclusively determined that OSHA regulation is necessary to protect workers from occupational hazards and that employers should be required to reduce or eliminate significant workplace health and safety threats.

C. As Construed by the Courts and by OSHA, the OSH Act Sets a Threshold and a Ceiling for Safety Rulemaking That Provide Clear and Reasonable Parameters for Agency Action

OSHA has long followed the teaching that section 3(8) of the OSH Act requires that, before it promulgates "any permanent health or safety standard, [it must] make a threshold finding that a place of employment is unsafe--in the sense that significant risks are present and can be eliminated or lessened by a change in practices [Industrial Union Dep't, AFL-CIO v. American Petroleum Inst., 448 U.S. 607, 642 (1980) (plurality) (Benzene); emphasis was supplied in original]." When, as frequently happens in safety rulemaking, OSHA promulgates standards that differ from existing national consensus standards, it must explain "why the rule as adopted will better effectuate the purposes of this Act than the national consensus standard [29 U.S.C. 655(b)(8)]." Thus, national consensus and existing federal standards that Congress instructed OSHA to adopt summarily within two years of the OSH Act's inception provide reference points concerning the least an OSHA standard should achieve (29 U.S.C. 655(a)). As a result, OSHA is precluded from regulating insignificant safety risks or from issuing safety standards that do not at least lessen risk in a significant way.

The OSH Act also limits OSHA's discretion to issue overly burdensome rules, as the agency also has long recognized that "any standard that was not economically or technologically feasible would a fortiori not be `reasonably necessary or appropriate' under the Act. See Industrial Union Dep't v. Hodgson [499 F.2d 467, 478 (D.C. Cir. 1974)] (`Congress does not appear to have intended to protect employees by putting their employers out of business.') [American Textile Mfrs. Inst. Inc., 452 U.S. at 513 n. 31 (a standard is economically feasible even if it portends `disaster for some marginal firms,' but it is economically infeasible if it `threaten[s] massive dislocation to, or imperil[s] the existence of,' the industry)]."

By stating the test in terms of "threat" and "peril," the Supreme Court made clear in ATMI that economic infeasibility begins short of industry-wide bankruptcy. OSHA itself has placed the line considerably below this level. (See for example, ATMI, 452 U.S. at 527 n. 50; 43 FR 27,360 (June 23, 1978). Proposed 200 ug/m(3) PEL for cotton dust did not raise serious possibility of industry-wide bankruptcy, but impact on weaving sector would be severe, possibly requiring reconstruction of 90 percent of all weave rooms. OSHA concluded that the 200 ug/m(30 level was not feasible for weaving and that 750 ug/m(3) was all that could reasonably be required). See also 54 FR 29,245-246 (July 11, 1989); American Iron & Steel Institute, 939 F.2d at 1003. OSHA raised the engineering control level for lead in small nonferrous foundries to avoid the possibility of bankruptcy for about half of small foundries even though the industry as a whole could have survived the loss of small firms. Although the cotton dust and lead rulemakings involved health standards, the economic feasibility ceiling established therein applies equally to safety standards. Indeed, because feasibility is a necessary element of a "reasonably necessary or appropriate" standard, this ceiling boundary is the same for health and safety rulemaking since it comes from section 3(8), which governs all permanent OSHA standards.

All OSHA standards must also be cost-effective in the sense that the protective measures being required must be the least expensive measures capable of achieving the desired end (ATMI, at 514 n. 32; Building and Constr. Trades Dep't, AFL-CIO v. Brock, 838 F.2d 1258,

1269 (D.C. Cir. 1988)). OSHA gives additional consideration to financial impact in setting the period of time that should be allowed for compliance, allowing as much as ten years for compliance phase-in. (See United Steelworkers of Am. v. Marshall, 647 F.2d 1189, 1278 (D.C. Cir. 1980), cert. denied, 453 U.S. 913 (1981).) Additionally, OSHA's enforcement policy takes account of financial hardship on an individualized basis. OSHA's Field Operations Manual provides that, based on an employer's economic situation, OSHA may extend the period within which a violation must be corrected after issuance of a citation (CPL. 2.45B, Chapter III, paragraph E6d(3)(a), Dec. 31, 1990).

To reach the necessary findings and conclusions that a safety standard substantially reduces a significant risk of harm, is both technologically and economically feasible, and is cost effective, OSHA must conduct rulemaking in accord with the requirements of section 6 of the OSH Act. The regulatory proceeding allows it to determine the qualitative and, if possible, the quantitative nature of the risk with and without regulation, the technological feasibility of compliance, the availability of capital to the industry and the extent to which that capital is required for other purposes, the industry's profit history, the industry's ability to absorb costs or pass them on to the consumer, the impact of higher costs on demand, and the impact on competition with substitutes and imports. (See ATMI at 2501-2503; American Iron & Steel Institute generally.) Section 6(f) of the OSH Act further provides that, if the validity of a standard is challenged, OSHA must support its conclusions with "substantial evidence in the record considered as a whole," a standard that courts have determined requires fairly close scrutiny of agency action and the explanation of that action. (See Steelworkers, 647 F.2d at 1206-1207.) OSHA's powers are further circumscribed by the independent Occupational Safety and Health Review Commission, which provides a neutral forum for employer contests of citations issued by OSHA for noncompliance with health and safety standards (29 U.S.C. 659-661; noted as an additional constraint in Benzene at 652 n. 59). OSHA must also respond rationally to similarities and differences among industries or industry sectors. (See Building and Constr. Trades Dep't, AFL-CIO v. Brock, 838 F.2d 1258, 1272-73 (D.C. Cir. 1988).) OSHA safety rulemaking is thus constrained first by the need to demonstrate that the standard will substantially reduce a significant risk of material harm, and then by the requirement that compliance is technologically capable of being done and not so expensive as to threaten economic instability or dislocation for the industry. Within these parameters, further constraints such as the need to find cost-effective measures and to respond rationally to all meaningful comment militate against regulatory extremes.

D. The Logging Operations Standard Complies With the Statutory Criteria Described Above and Is Not Subject to the Additional Constraints Applicable to Section 6(b)(5) Standards

Standards which regulate hazards that are frequently undetectable because they are subtle or develop slowly or after long latency periods, are frequently referred to as "health" standards. Standards that regulate hazards, like explosions or electrocution, that cause immediately noticeable physical harm, are called "safety" standards. (See National Grain & Feed Ass'n v. OSHA (NGFA II), 866 F.2d 717, 731, 733 (5th Cir. 1989). As noted above, section 3(8) provides that all OSHA standards must be "reasonably necessary or appropriate." In addition, section 6(b)(5) requires that OSHA set health standards which limit significant risk "to the extent feasible." OSHA has determined that the revised PPE standard is a safety standard,

because the revised PPE standard addresses hazards, such as molten metal, falling objects and electricity, that are immediately dangerous to life or health, not the longer term, less obvious hazards subject to section 6(b)(5).

The OSH Act and its legislative history clearly indicate that Congress intended for OSHA to distinguish between safety standards and health standards. For example in section 2(b)(6) of the OSH Act, Congress declared that the goal of assuring safe and healthful working conditions and preserving human resources would be achieved, in part:

* * * by exploring ways to discover latent diseases, establishing causal connections between diseases and work in environmental conditions, and conducting other research relating to health problems, in recognition of the fact that occupational health standards present problems often different from those involved in occupational safety.

The legislative history makes this distinction even clearer:[The Secretary] should take into account that anyone working in toxic agents and physical agents which might be harmful may be subjected to such conditions for the rest of his working life, so that we can get at something which might not be toxic now, if he works in it a short time, but if he works in it the rest of his life might be very dangerous; and we want to make sure that such things are taken into consideration in establishing standards. [Leg. Hist. at 502-503 (Sen. Dominick), quoted in Benzene at 648-49]

Additionally, Representative Daniels distinguished between "insidious `silent killers' such as toxic fumes, bases, acids, and chemicals" and "violent physical injury causing immediate visible physical harm" (Leg. Hist. at 1003), and Representative Udall contrasted insidious hazards like carcinogens with "the more visible and well-known question of industrial accidents and on-the-job injury" (Leg. Hist. at 1004). (See also, for example, S. Rep. No. 1282, 91st Cong., 2d Sess 2-3 (1970), U.S. Code Cong. & Admin. News 1970, pp. 5177, 5179, reprinted in Leg. Hist. at 142-43, discussing 1967 Surgeon General study that found that 65 percent of employees in industrial plants "were potentially exposed to harmful physical agents, such as severe noise or vibration, or to toxic materials"; Leg. Hist. at 412; id. at 446; id. at 516; id. at 845; International Union, UAW at 1315.) In reviewing OSHA rulemaking activity, the Supreme Court has held that section 6(b)(5) requires OSHA to set "the most protective standard consistent with feasibility" (Benzene at 643 n. 48). As Justice Stevens observed:

The reason that Congress drafted a special section for these substances * * * was because Congress recognized that there were special problems in regulating health risks as opposed to safety risks. In the latter case, the risks are generally immediate and obvious, while in the former, the risks may not be evident until a worker has been exposed for long periods of time to particular substances. [Benzene, at 649 n. 54.]

Challenges to the grain dust and lockout/tagout standards included assertions that grain dust in explosive quantities and uncontrolled energy releases that could expose employees to crushing, cutting, burning or explosion hazards were harmful physical agents so that OSHA was required to apply the criteria of section 6(b)(5) when determining how to protect employees from those hazards. Reviewing courts have uniformly rejected such assertions. For

example, the Court in International Union, UAW v. OSHA, 938 F.2d 1310 (D.C. Cir. 1991) rejected the view that section 6(b)(5) provided the statutory criteria for regulation of uncontrolled energy, holding that such a "reading would obliterate a distinction that Congress drew between `health' and `safety' risks." The Court also noted that the language of the OSH Act and the legislative history supported the OSHA position (International Union, UAW at 1314). Additionally, the Court stated: "We accord considerable weight to an agency's construction of a statutory scheme it is entrusted to administer, rejecting it only if unreasonable" (International Union, UAW at 1313, citing Chevron U.S.A., Inc. v. NRDC, 467 U.S. 837, 843 (1984)).

The Court reviewing the grain dust standard also deferred to OSHA's reasonable view that the Agency was not subject to the feasibility mandate of section 6(b)(5) in regulating explosive quantities of grain dust (National Grain & Feed Association v. OSHA (NGFA II), 866 F.2d 717, 733 (5th Cir. 1989)). It therefore applied the criteria of section 3(8), requiring the Agency to establish that the standard is "reasonably necessary or appropriate" to protect employee safety.

As explained in Section III, Basis for Agency Action, and Section V, Summary and Explanation of the Standard, and Section VI, Summary of the Final Regulatory Impact Analysis and Regulatory Flexibility Analysis, of this preamble, OSHA has determined that logging operations pose significant risks to employees (158 fatalities, 6,798 lost workday injuries, and 3,770 nonlost workday injuries each year). The Agency estimates that compliance with the logging operations standard will cost $12.8 million annually and will reduce the risk of the hazards encountered during logging operations (i.e., 111 fatalities, 4,759 lost workday injuries, and 2,639 nonlost workday injuries). This constitutes a substantial reduction of significant risk of material harm to the 72,100 logging industry employees affected. The Agency believes that compliance is technologically feasible because the rulemaking record indicates that the hazard control measures required by the standard have already been implemented, to some extent, for all the logging operations covered by the standard. Additionally, OSHA believes that compliance is economically feasible, because, as documented by the Regulatory Impact Analysis, all regulated sectors can readily absorb or pass on compliance costs and economic benefits will exceed compliance costs.

As detailed in Section V, Summary and Explanation of the Standard, and in Section VI, Summary of the Final Regulatory Impact Analysis and Regulatory Flexibility Analysis, the standard's costs, benefits, and compliance requirements are reasonable and consistent with those of other OSHA safety standards, such as PPE ($52.4 million annual cost of compliance and will prevent 4 fatalities and 102,000 injuries annually) and Grain Handling ($5.9 to 33.4 million annual cost of compliance and will prevent 18 fatalities and 394 injuries annually) (Cf., 59 FR 16359, April 6, 1994).

OSHA assessed employee risk by evaluating exposure to hazards in the logging industry. The Regulatory Flexibility Assessment, Section VI above, presents OSHA's estimate of the costs and benefits of the revised logging standard.

OSHA has considered and responded to all substantive comments regarding the proposed logging standard on their merits in Section IV, Major Issues, and Section V, Summary and Explanation of the Standard, earlier in this preamble. In particular, OSHA evaluated all suggested changes to the proposed rule in terms of their impact on worker safety, their feasibility, their cost effectiveness, and their consonance with the OSH Act.

IX. Recordkeeping

This final rule does not contain any recordkeeping requirements.**X. Federalism**

This standard has been reviewed in accordance with Executive Order 12612, 52 FR 41685 (October 30, 1987), regarding Federalism. This Order requires that agencies, to the extent possible, refrain from limiting State policy options, consult with States prior to taking any actions that would restrict State policy options, and take such actions only when there is clear constitutional authority and the presence of a problem of national scope. The Order provides for preemption of State law only if there is a clear Congressional intent for the agency to do so. Any such preemption is to be limited to the extent possible.

Section 18 of the Occupational Safety and Health Act (OSH Act), expresses Congress' clear intent to preempt State laws relating to issues with respect to which Federal OSHA has promulgated occupational safety or health standards. Under the OSH Act a State can avoid preemption only if it submits, and obtains Federal approval of, a plan for the development of such standards and their enforcement. Occupational safety and health standards developed by such Plan-States must, among other things, be at least as effective in providing safe and healthful employment and places of employment as the Federal standards.

The logging standard is drafted so that loggers in every State would be protected by general, performance-oriented standards. To the extent that there are State or regional peculiarities caused by the types of timber to be logged, the terrain, the climate or other factors, States with occupational safety and health plans approved under Section 18 of the OSH Act would be able to develop their own State standards to deal with any special problems. Moreover, the performance nature of this proposed standard, of and by itself, allows for flexibility by States and loggers to provide as much safety as possible using varying methods consonant with conditions in each State.

In short, there is a clear national problem related to occupational safety and health in the logging industry. While the individual States, if all acted, might be able collectively to deal with the safety problems involved, most have not elected to do so in the twenty-four years since the enactment of the OSH Act. Those States which have elected to participate under Section 18 of the OSH Act would not be preempted by this standard and would be able to deal with special, local conditions within the framework provided by this performance-oriented standard while ensuring that their standards are at least as effective as the Federal standard. State comments are invited on this proposal and will be fully considered prior to promulgation of a final rule.

XI. State Plan Standards

The 25 States with their own OSHA approved occupational safety and health plans must adopt a comparable standard within six months of the publication date of the final standard. These States are: Alaska, Arizona, California, Connecticut (for State and local government employees only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York (for State and local government employees only), North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming. Until such time as a State standard is promulgated, Federal OSHA will provide interim enforcement assistance, as appropriate, in these States.

List of Subjects

29 CFR Part 1910

Chain saw, Forestry, Harvesting, Incorporation by reference, Logging, Occupational safety and health, Pulpwood timber, Safety, Training.

29 CFR Part 1928

Agriculture, Migrant labor, Occupational safety and health.**XII. Authority and Signature**

This document was prepared under the direction of Joseph A. Dear, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210.

Accordingly, pursuant to sections 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657), Secretary of Labor's Order No. 1-90 (55 FR 9033), and 29 CFR part 1911, 29 CFR parts 1910 and 1928 are amended as set forth below.

Signed at Washington, DC, this 4th day of October 1994.**Joseph A. Dear,**

Assistant Secretary of Labor.

PART 1910--[AMENDED]

Subpart R--Special Industries

1. The authority citation for subpart R of part 1910 is revised to read as follows:

Authority: Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order Nos. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736) or 1-90 (55 FR 9033), as applicable.

Sections 1910.261, 1910.262, 1910.265, 1910.266, 1910.267, 1910.268, 1910.272, 1910.274, and 1910.275 also issued under 29 CFR part 1911.

Section 1910.272 also issued under 5 U.S.C. 553.2. Section 1910.266 is revised to read as follows:

1910.266 Logging operations.

(a) Table of contents. This paragraph contains the list of paragraphs and appendices contained in this section.a. Table of contents

b. Scope and application

c. Definitions

d. General requirements

1. Personal protective equipment

2. First-aid kits

3. Seat belts

4. Fire extinguishers

5. Environmental conditions

6. Work areas

7. Signaling and signal equipment

8. Overhead electric lines

9. Flammable and combustible liquids

10. Explosives and blasting agents

e. Hand and portable powered tools

1. General requirements

2. Chain saws

f. Machines

1. General requirements

2. Machine operation

3. Protective structures

4. Overhead guards

5. Machine access

6. Exhaust systems

7. Brakes

8. Guarding

g. Vehicles

h. Tree harvesting

1. General requirements

2. Manual felling

3. Bucking and limbing

4. Chipping

5. Yarding

6. Loading and unloading

7. Transport

8. Storage

i. Training

j. Effective date

k. Appendices

Appendix A--Minimum First-aid Supplies

Appendix B--Minimum First-aid Training

Appendix C--Corresponding ISO Agreements

(b) Scope and application.(1) This standard establishes safety practices, means, methods and operations for all types of logging, regardless of the end use of the wood. These 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. This standard does not cover the construction or use of cable yarding systems.

(2) This standard applies to all logging operations as defined by this section.

(3) Hazards and working conditions not specifically addressed by this section are covered by other applicable sections of Part 1910.

(c) Definitions applicable to this section. Arch. An open-framed trailer or built-up framework used to suspend the leading ends of trees or logs when they are skidded.Backcut (felling cut). The final cut in a felling operation. Ballistic nylon. A nylon fabric of high tensile properties designed to provide protection from lacerations.Buck. To cut a felled tree into logs. Butt. The bottom of the felled part of a tree. Cable yarding. The movement of felled trees or logs from the area where they are felled to the landing on a system composed of a cable suspended from spars and/or towers. The trees or logs may be either dragged across the ground on the cable or carried while suspended from the cable.Chock. A block, often wedge shaped, which is used to prevent movement;e.g., a log from rolling, a wheel from turning.

Choker. A sling used to encircle the end of a log for yarding. One end is passed around the load, then through a loop eye, end fitting or other device at the other end of the sling. The end that passed through the end fitting or other device is then hooked to the lifting or pulling machine.

Danger tree. A standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree.

Debark. To remove bark from trees or logs. Deck. A stack of trees or logs. Designated person. An employee who has the requisite knowledge, training and experience to perform specific duties.Domino felling. The partial cutting of multiple trees which are left standing and then pushed over with a pusher tree. Fell (fall). To cut down trees. Feller (faller). An employee who fells trees. Grounded. The placement of a component of a machine on the ground or on a device where it is firmly supported.Guarded. Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable enclosures, covers, casings, shields, troughs, railings, screens, mats, or platforms, or by location, to prevent injury.

Health care provider. A health care practitioner operating with the scope of his/her license, certificate, registration or legally authorized practice.

Landing. Any place where logs are laid after being yarded, and before transport from the work site.

Limbing. To cut branches off felled trees. Lodged tree (hung tree). A tree leaning against another tree or object which prevents it from falling to the ground.Log. A segment sawed or split from a felled tree, such as, but not limited to, a section, bolt, or tree length.

Logging operations. Operations associated with felling and moving trees and logs from the stump to the point of delivery, such as, but not limited to, marking, felling, bucking, limbing, debarking, chipping, yarding, loading, unloading, storing, and transporting machines, equipment and personnel from one site to another.

Machine. A piece of stationary or mobile equipment having a self- contained powerplant, that is operated off-road and used for the movement of material. Machines include but are not limited to tractors, skidders, front-end loaders, scrapers, graders, bulldozers, swing yarders, log stackers and mechanical felling devices, such as tree shears and feller-bunchers.

Rated capacity. The maximum load a system, vehicle, machine or piece of equipment was designed by the manufacturer to handle.

Root wad. The ball of a tree root and dirt that is pulled from the ground when a tree is uprooted.

Serviceable condition. A state or ability of a tool, machine, vehicle or other device to operate as it was intended by the manufacturer to operate.

Skidding. The yarding of trees or logs by pulling or towing them across the ground.

Slope (grade). The increase or decrease in altitude over a horizontal distance expressed as a percentage. For example, a change of altitude of 20 feet (6 m) over a horizontal distance of 100 feet (30 m) is expressed as a 20 percent slope.

Snag. Any standing dead tree or portion thereof. Spring pole. A tree, segment of a tree, limb, or sapling which is under stress or tension due to the pressure or weight of another object.Tie down. Chain, cable, steel strips or fiber webbing and binders attached to a truck, trailer or other conveyance as a means to secure loads and to prevent them from shifting or moving when they are being transported.

Undercut. A notch cut in a tree to guide the direction of the tree fall and to prevent splitting or kickback.

Vehicle. A car, bus, truck, trailer or semi-trailer that is used for transportation of employees or movement of material.

Winching. The winding of cable or rope onto a spool or drum. Yarding. The movement of logs from the place they are felled to a landing.(d) General requirements. (1) Personal protective

equipment. (i) The employer shall assure that personal protective equipment, including any personal protective equipment provided by an employee, is maintained in a serviceable condition.

(ii) The employer shall assure that personal protective equipment, including any personal protective equipment provided by an employee, is inspected before initial use during each workshift. Defects or damage shall be repaired or the unserviceable personal protective equipment shall be replaced before work is commenced.

(iii) The employer shall provide, at no cost to the employee, and assure that each employee handling wire rope wears cotton gloves or other hand protection which the employer demonstrates provides equivalent protection.

(iv) The employer shall provide, at no cost to the employee, and assure that each employee who operates a chain saw wears ballistic nylon leg protection or other leg protection the employer demonstrates provides equivalent protection. The leg protection shall cover the full length of the thigh to the top of the boot on each leg to protect against contact with a moving chain saw. Exception: This requirement does not apply when an employee is working as a climber if the employer demonstrates that a greater hazard is posed by wearing leg protection in the particular situation, or when an employee is working from a vehicular mounted elevating and rotating work platform meeting the requirements of 29 CFR 1910.68.

(v) The employer shall assure that each employee shall wears foot protection, such as heavy-duty logging boots, that are waterproof or water repellant, cover and provide support to the ankle, and protect the employee from penetration by chain saws. Sharp, calk-soled boots or other slip-resistant type boots may be worn where the employer demonstrates that they are necessary for the employee's job, the terrain, the timber type, and the weather conditions, provided that foot protection otherwise required by this paragraph is met.

(vi) The employer shall provide, at no cost to the employee, and assure that each employee who works in an area where there is potential for head injury from falling or flying objects wears head protection meeting the requirements of subpart I of Part 1910.

(vii) The employer shall provide, at no cost to the employee, and assure that each employee who works in an area there is a potential for injury due to falling or flying objects wears eye and face protection meeting the requirements of subpart I of Part 1910. Logger-type mesh screens may be worn where the employer demonstrates that they provide equivalent protection.

(2) First-aid kits.

(i) The employer shall provide first-aid kits at each work site where felling is being conducted, at each landing, and on each employee transport vehicle. The number of first-aid kits and the content of each kit shall reflect the degree of isolation, the number of employees, and the hazards reasonably anticipated at the work site.

(ii) At a minimum, each first-aid kit shall contain the items listed in Appendix A at all times.

(iii) The number and content of first-aid kits shall be reviewed and approved at least annually by a health care provider.

(iv) The employer shall maintain the contents of each first-aid kit in a serviceable condition.

(3) Seat belts. For each vehicle or machine (equipped with ROPS/ FOPS or overhead guards), including any vehicle or machine provided by an employee, the employer shall assure:

(i) That a seat belt is provided for each vehicle or machine operator;

(ii) That each employee uses the available seat belt while the vehicle or machine is being operated;

(iii) That each employee securely and tightly fastens the seat belt to restrain the employee within the vehicle or machine cab;

(iv) That each machine seat belt meets the requirements of the Society of Automotive Engineers Standard SAE J386, June 1985, "Operator Restraint Systems for Off-Road Work Machines." This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue NW., room N2625, Washington, DC 20210, or at the Office of the **Federal Register**, 800 North Capitol Street NW., suite 700, Washington, DC.

(v) That seat belts are not removed from any vehicle or machine. The employer shall replace each seat belt which has been removed from any vehicle or machine that was equipped with seat belts at the time of manufacture; and (vi) That each seat belt is maintained in a serviceable condition.

(4) Fire extinguishers. The employer shall provide and maintain portable fire extinguishers on each machine and vehicle in accordance with the requirements of subpart L of Part 1910.

(5) Environmental conditions. All work shall terminate and each employee shall move to a place of safety when environmental conditions, such as but not limited to, electrical storms, high winds, heavy rain or snow, extreme cold, dense fog, fires, mudslides, and darkness, may endanger an employee in the performance of their job.

(6) Work areas.

(i) Employees shall be spaced and the duties of each employee shall be organized so the actions of one employee will not create a hazard for any other employee.

(ii) Work areas shall be assigned so that trees cannot fall into an adjacent occupied work area. The distance between adjacent occupied work areas shall be at least two tree lengths of the trees being felled. The distance between adjacent occupied work areas shall reflect the degree of slope, the density of the growth, the height of the trees, the soil structure and other hazards reasonably anticipated at that work site. A distance of greater than two tree lengths shall be maintained between adjacent occupied work areas on any slope where rolling or sliding of trees or logs is reasonably foreseeable.

(iii) Each employee shall work in a position or location that is within visual or audible contact with another employee.

(iv) The employer shall account for each employee at the end of each workshift.

(7) Signaling and signal equipment.

(i) Hand signals or audible contact, such as but not limited to, whistles, horns, or radios, shall be utilized whenever noise, distance, restricted visibility, or other factors prevent clear understanding of normal voice communications between employees.

(ii) Engine noise, such as from a chain saw, is not an acceptable means of signaling. Other locally and regionally recognized signals may be used.

(iii) Only a designated person shall give signals, except in an emergency.

(8) Overhead electric lines.

(i) Logging operations near overhead electric lines shall be done in accordance with the requirements of 29 CFR 1910.333(c)(3).

(ii) The employer shall notify the power company immediately if a felled tree makes contact with any power line. Each employee shall remain clear of the area until the power company advises that there are no electrical hazards.

(9) Flammable and combustible liquids.

(i) Flammable and combustible liquids shall be stored, handled, transported, and used in accordance with the requirements of subpart H of Part 1910.

(ii) Flammable and combustible liquids shall not be transported in the driver compartment or in any passenger-occupied area of a machine or vehicle.

(iii) Each machine, vehicle and portable powered tool shall be shut off during fueling.

(iv) Flammable or combustible liquids shall not be used to start fires.

(10) Explosives and blasting agents.

(i) Explosives and blasting agents shall be stored, handled, transported, and used in accordance with the requirements of subpart H of part 1910.

(ii) Only a designated person shall handle or use explosives and blasting agents.

(iii) Explosives and blasting agents shall not be transported in the driver compartment or in any passenger-occupied area of a machine or vehicle.

(e) Hand and portable powered tools.

(1) General requirements.

(i) The employer shall assure that each hand and portable powered tool, including any tool provided by an employee, is maintained in serviceable condition.

(ii) The employer shall assure that each tool, including any tool provided by an employee, is inspected before initial use during each workshift. At a minimum, the inspection shall include the following:

(A) Handles and guards, to assure that they are sound, tight-fitting, properly shaped, free of splinters and sharp edges, and in place;

(B) Controls, to assure proper function;

(C) Chain-saw chains, to assure proper adjustment;

(D) Chain-saw mufflers, to assure that they are operational and in place;

(E) Chain brakes and nose shielding devices, to assure that they are in place and function properly;

(F) Heads of shock, impact-driven and driving tools, to assure that there is no mushrooming;
(G) Cutting edges, to assure that they are sharp and properly shaped; and

(H) All other safety devices, to assure that they are in place and function properly.

(iii) The employer shall assure that each tool is used only for purposes for which it has been designed.

(iv) When the head of any shock, impact-driven or driving tool begins to chip, it shall be repaired or removed from service.

(v) The cutting edge of each tool shall be sharpened in accordance with manufacturer's specifications whenever it becomes dull during the workshift.

(vi) Each tool shall be stored in the provided location when not being used at a work site.

(vii) Racks, boxes, holsters or other means shall be provided, arranged and used for the transportation of tools so that a hazard is not created for any vehicle operator or passenger.

(2) Chain saws.

(i) Each chain saw placed into initial service after the effective date of this section shall be equipped with a chain brake and shall otherwise meet the requirements of the ANSI B175.1-1991 "Safety Requirements for Gasoline-Powered Chain Saws." Each chain saw placed into service before the effective date of this section shall be equipped with a protective device that minimizes chain-saw kickback. No chain-saw kickback device shall be removed or otherwise disabled. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue NW., room N2625, Washington, DC 20210, or at the Office of the **Federal Register**, 800 North Capitol Street NW., suite 700, Washington, DC.

(ii) Each gasoline-powered chain saw shall be equipped with a continuous pressure throttle control system which will stop the chain when pressure on the throttle is released.

(iii) The chain saw shall be operated and adjusted in accordance with the manufacturer's instructions.

(iv) The chain saw shall be fueled at least 20 feet (6 m) from any open flame or other source of ignition.

(v) The chain saw shall be started at least 10 feet (3 m) from the fueling area.

(vi) The chain saw shall be started on the ground or where otherwise firmly supported.

(vii) The chain saw shall be started with the chain brake engaged.

(viii) The chain saw shall 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.

(ix) The chain-saw operator shall be certain of footing before starting to cut. The chain saw shall not be used in a position or at a distance that could cause the operator to become off-balance, to have insecure footing, or to relinquish a firm grip on the saw.

(x) Prior to felling any tree, the chain-saw operator shall clear away brush or other potential obstacles which might interfere with cutting the tree or using the retreat path.

(xi) The chain saw shall not be used to cut directly overhead.

(xii) The chain saw shall be carried in a manner that will prevent operator contact with the cutting chain and muffler.

(xiii) The chain saw shall be shut off or at idle before the feller starts his retreat.

(xiv) The chain saw shall be shut down or the chain brake shall be engaged whenever a saw is carried further than 50 feet (15.2 m). The chain saw shall be shut down or the chain brake shall be engaged when a saw is carried less than 50 feet if conditions such as, but not limited to, the terrain, underbrush and slippery surfaces, may create a hazard for an employee.

(f) Machines.

(1) General requirements.

(i) The employer shall assure that each machine, including any machine provided by an employee, is maintained in serviceable condition.

(ii) The employer shall assure that each machine, including any machine provided by an employee, is inspected before initial use during each workshift. Defects or damage shall be repaired or the unserviceable machine shall be replaced before work is commenced.

(iii) The employer shall assure that operating and maintenance instructions are available on the machine or in the area where the machine is being operated. Each machine operator and maintenance employee shall comply with the operating and maintenance instructions.

(2) Machine operation.

(i) The machine shall be started and operated only by a designated person.

(ii) Stationary logging machines and their components shall be anchored or otherwise stabilized to prevent movement during operation.

(iii) The rated capacity of any machine shall not be exceeded.

(iv) The machine shall not be operated on any slope which is greater than the maximum slope recommended by the manufacturer.

(v) Before starting or moving any machine, the operator shall determine that no employee is in the path of the machine.

(vi) The machine shall be operated only from the operator's station or as otherwise recommended by the manufacturer.

(vii) The machine shall be operated at such a distance from employees and other machines such that operation will not create a hazard for an employee.

(viii) No employee other than the operator shall ride on any mobile machine unless seating, seat belts and other protection equivalent to that provided for the operator are provided.

(ix) No employee shall ride on any load.

(x) Before any machine is shut down, the machine brake locks or parking brakes shall be applied. Each moving element, such as but not limited to, such as blades, buckets and shears, shall be grounded.

(xi) After the machine engine is shut down, pressure or stored energy from hydraulic and pneumatic storage devices shall be discharged.

(xii) The rated capacity of any vehicle transporting a machine shall not be exceeded.

(xiii) The machine shall be loaded, secured and unloaded so that it will not create a hazard for any employee.

(3) Protective structures.

(i) Each tractor, skidder, swing yarder, log stacker and mechanical felling device, such as tree shears or feller-buncher, placed into initial service after February 9, 1995 shall be equipped with falling object protective structure (FOPS) and/ or rollover protective structure (ROPS). The employer shall replace FOPS or ROPS which have been removed from any machine. Exception: This requirement does not apply to machines which are capable of 360 degree rotation.

(ii) ROPS shall be installed, tested, and maintained in accordance with the Society of Automotive Engineers SAE J1040, April 1988, "Performance Criteria for Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forestry, and Mining Machines." This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue NW., room N2625, Washington, DC 20210, or at the Office of the **Federal Register**, 800 North Capitol Street NW., suite 700, Washington, DC.

(iii) FOPS shall be installed, tested and maintained in accordance with the Society of Automotive Engineers SAE J231, January 1981, "Minimum Performance Criteria for Falling Object Protective Structures (FOPS)." This incorporation by reference was approved by the

Director of the **Federal Register** in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW. Room N2625, Washington, DC 20210, or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

(iv) ROPS and FOPS shall meet the requirements of the Society of Automotive Engineers SAE J397, April 1988, "Deflection Limiting Volume-ROPS/FOPS Laboratory Evaluation." This incorporation by reference was approved by the Director of the **Federal Register** in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW. Room N2625, Washington, DC 20210, or at the Office of the **Federal Register**, 800 North Capitol Street, NW., Suite 700, Washington, DC.

(v) Each protective structure shall be of a size that does not impede the operator's normal movements.

(vi) The overhead covering of each cab shall be of solid material and shall extend over the entire canopy.

(vii) The lower portion of each cab, up to the top of the instrument panel, or extending 24 (60.9 cm) inches up from the cab floor if the machine does not have an instrument panel, shall be completely enclosed, except at entrances, with solid material to prevent objects from entering the cab.

(viii) The upper portion of each cab shall be fully enclosed with mesh material with openings no greater than 2 inches (5.08 cm) at its least dimension, or with other materials which the employer demonstrates provides equivalent protection and visibility.

(ix) The enclosure of the upper portion of each cab shall allow maximum visibility.

(x) When transparent material is used to enclose the upper portion of the cab, it shall be made of safety glass or other material that the employer demonstrates provides equivalent protection and visibility.

(xi) Transparent material shall be kept clean to assure operator visibility.

(xii) Transparent material that may create a hazard for the operator, such as but not limited to, cracked, broken or scratched safety glass, shall be replaced.

(xiii) Deflectors shall be installed in front of each cab to deflect whipping saplings and branches. Deflectors shall be located so as not to impede visibility and access to the cab.

(xiv) The height of each cab entrance shall be at least 52 inches (1.3 meters) from the floor of the cab.

(xv) Each machine operated near cable yarding operations shall be equipped with sheds or roofs of sufficient strength to provide protection from breaking lines.

(4) Overhead guards. Each forklift shall be equipped with an overhead guard meeting the requirements of the American Society of Mechanical Engineers, ASME B56.6-1992 (with addenda), "Safety Standard for Rough Terrain Forklift Trucks." This incorporation by reference was approved by the Director of the **Federal Register** in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017-2392. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW. Room N2625, Washington, DC 20210, or at the Office of the **Federal Register**, 800 North Capitol Street, NW., suite 700, Washington, DC.

(5) Machine access.

(i) Machine access systems, meeting the specifications of the Society of Automotive Engineers, SAE J185, June 1988, "Recommended Practice for Access Systems for Off-Road Machines," shall be provided for each machine where the operator or any other employee must climb onto the machine to enter the cab or to perform maintenance. This incorporation by reference was approved by the Director of the **Federal Register** in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW. Room N2625, Washington, DC 20210, or at the Office of the **Federal Register**, 800 North Capitol Street, NW., suite 700, Washington, DC.

(ii) Each machine cab shall have a second means of egress.

(iii) Walking and working surfaces of each machine and machine work station shall have a slip resistant surface to assure safe footing.

(iv) The walking and working surface of each machine shall be kept free of waste, debris and any other material which might result in fire, slipping, or falling.

(6) Exhaust systems.

(i) The exhaust pipes on each machine shall be located so exhaust gases are directed away from the operator.

(ii) The exhaust pipes on each machine shall be mounted or guarded to protect each employee from accidental contact.

(iii) The exhaust pipes shall be equipped with spark arresters. Engines equipped with turbochargers do not require spark arresters.

(iv) Each machine muffler provided by the manufacturer, or their equivalent, shall be in place at all times the machine is in operation.

(7) Brakes.

(i) Brakes shall be sufficient to hold each machine and its rated load capacity on the slopes over which it is being operated.

(ii) Each machine shall be equipped with a secondary braking system, such as an emergency brake or a parking brake, which shall be effective in stopping the machine and maintaining parking performance, regardless of the direction of travel or whether the engine is running.

(8) Guarding.

(i) Each machine shall be equipped with guarding to protect employees from exposed moving elements, such as but not limited to, shafts, pulleys, belts on conveyors, and gears, in accordance with the requirements of subpart O of part 1910.

(ii) Each machine used for debarking, limbing and chipping shall be equipped with guarding to protect employees from flying wood chunks, logs, chips, bark, limbs and other material in accordance with the requirements of subpart O of part 1910.

(iii) The guarding on each machine shall be in place at all times the machine is in operation.

(g) Vehicles.

(1) The employer shall assure that each vehicle used to transport any employee off public roads or to perform any logging operation, including any vehicle provided by an employee, is maintained in serviceable condition.

(2) The employer shall assure each vehicle used to transport any employee off public roads or to perform any logging operation, including any vehicle provided by an employee, is inspected before initial use during each workshift. Defects or damage shall be repaired or the unserviceable vehicle shall be replaced before work is commenced.

(3) The employer shall assure that operating and maintenance instructions are available in each vehicle. Each vehicle operator and maintenance employee shall comply with the operating and maintenance instructions.

(4) The employer shall assure that each vehicle operator has a valid operator's license for the class of vehicle being operated.

(5) Mounting steps and handholds shall be provided for each vehicle wherever it is necessary to prevent an employee from being injured when entering or leaving the vehicle.

(6) The seats of each vehicle shall be securely fastened.

(7) The requirements of paragraphs (f)(2)(iii), (f)(2)(v), (f)(2)(vii), (f)(2)(x), (f)(2)(xiii), and (f)(7) of this section shall also apply to each vehicle used to transport any employee off public roads or to perform any logging operation, including any vehicle provided by an employee.

(h) Tree harvesting.

(1) General requirements.

(i) Trees shall not be felled in a manner that may create a hazard for an employee, such as but not limited to, striking a rope, cable, power line, or machine.

(ii) The immediate supervisor shall be consulted when unfamiliar or unusually hazardous conditions necessitate the supervisor's approval before cutting is commenced.

(iii) While manual felling is in progress, no yarding machine shall be operated within two tree lengths of trees being manually felled.

(iv) No employee shall approach a feller closer than two tree lengths of trees being felled until the feller has acknowledged that it is safe to do so, unless the employer demonstrates that a team of employees is necessary to manually fell a particular tree.

(v) No employee shall approach a mechanical felling operation closer than two tree lengths of the trees being felled until the machine operator has acknowledged that it is safe to do so.

(vi) Each danger tree shall be felled, removed or avoided. Each danger tree, including lodged trees and snags, shall be felled or removed using mechanical or other techniques that minimize employee exposure before work is commenced in the area of the danger tree. If the danger tree is not felled or removed, it shall be marked and no work shall be conducted within two tree lengths of the danger tree unless the employer demonstrates that a shorter distance will not create a hazard for an employee.

(vii) Each danger tree shall be carefully checked for signs of loose bark, broken branches and limbs or other damage before they are felled or removed. Accessible loose bark and other damage that may create a hazard for an employee shall be removed or held in place before felling or removing the tree.

(viii) Felling on any slope where rolling or sliding of trees or logs is reasonably foreseeable shall be done uphill from, or on the same level as, previously felled trees.

(ix) Domino felling of trees, including danger trees, is prohibited.

(2) Manual felling.

(i) Before felling is started, the feller shall plan and clear a retreat path. The retreat path shall extend diagonally away from the expected felling line unless the employer demonstrates that such a retreat path poses a greater hazard than an alternate retreat path.

(ii) Before each tree is felled, conditions such as, but not limited to, snow and ice accumulation, the wind, the lean of tree, dead limbs, and the location of other trees, shall be evaluated by the feller and precautions taken so a hazard is not created for an employee.

(iii) Each tree shall be checked for accumulations of snow and ice. Accumulations of snow and ice that may create a hazard for an employee shall be removed before felling is commenced in the area or the area shall be avoided.

(iv) When a spring pole or other tree under stress is cut, no employee other than the feller shall be closer than two trees lengths when the stress is released.

(v) An undercut shall be made in each tree being felled unless the employer demonstrates that felling the particular tree without an undercut will not create a hazard for an employee. The undercut shall be of a size so the tree will not split and will fall in the intended direction.

(vi) A backcut shall be made in each tree being felled. The backcut shall allow for sufficient hinge wood to guide the tree and prevent it from prematurely slipping or twisting off the stump.

(vii) The backcut shall be above the level of the horizontal cut of the undercut. Exception: The backcut may be at or below the horizontal cut in tree pulling operations.

(3) Bucking and limbing. (i) Bucking and limbing on any slope where rolling or sliding of trees or logs is reasonably foreseeable shall be done on the uphill side of each tree, unless the employer demonstrates that it is not feasible to buck or limb on the uphill side. Whenever bucking or limbing is done from the downhill side, the tree shall be secured with chocks to prevent it from rolling, sliding or swinging.

(ii) Before bucking or limbing wind-thrown trees, precautions shall be taken to prevent the root wad, butt or logs from striking an employee. These precautions include, but are not limited to, chocking or moving the tree to a stable position.

(4) Chipping (in-woods locations). (i) Chipper access covers or doors shall not be opened until the drum or disc is at a complete stop.

(ii) Infeed and discharge ports shall be guarded to prevent contact with the disc, knives, or blower blades.

(iii) The chipper shall be shut down and locked out in accordance with the requirements of 29 CFR 1910.147 when an employee performs any servicing or maintenance.

(iv) Detached trailer chippers shall be chocked during usage on any slope where rolling or sliding of the chipper is reasonably foreseeable.

(5) Yarding.

(i) No log shall be moved until each employee is in the clear.

(ii) Each choker shall be hooked and unhooked from the uphill side or end of the log, unless the employer demonstrates that is it not feasible in the particular situation to hook or unhook the choker from the uphill side. Where the choker is hooked or unhooked from the downhill side or end of the log, the log shall be securely chocked to prevent rolling, sliding or swinging.

(iii) Each choker shall be positioned near the end of the log or tree length.

(iv) Each machine shall be positioned during winching so the machine and winch are operated within their design limits.

(v) No yarding line shall not be moved unless the yarder operator has clearly received and understood the signal to do so. When in doubt, the yarder operator shall repeat the signal as it is understood and wait for a confirming signal before moving any line.

(vi) No load shall exceed the rated capacity of the pallet, trailer, or other carrier.

(vii) Towed equipment, such as but not limited to, skid pans, pallets, arches, and trailers, shall be attached to each machine or vehicle in such a manner as to allow a full 90 degree turn; to prevent overrunning of the towing machine or vehicle; and to assure that the operator is always in control of the towed equipment.

(viii) The yarding machine or vehicle, including its load, shall be operated with safe clearance from all obstructions.

(ix) Each yarded tree shall be placed in a location that does not create a hazard for an employee and an orderly manner so that the trees are stable before bucking or limbing is commenced.

(6) Loading and unloading. (i) The transport vehicle shall be positioned to provide working clearance between the vehicle and the deck.

(ii) Only the loading or unloading machine operator and other personnel the employer demonstrates are essential shall be in the work area during loading and unloading.

(iii) No transport vehicle operator shall remain in the cab during loading and unloading if the logs are carried or moved over the truck cab, unless the employer demonstrates that it is necessary for the operator to do so. Where the transport vehicle operator remains in the cab, the employer shall provide operator protection, such as but not limited to, reinforcement of the cab.

(iv) Each log shall be placed on a transport vehicle in an orderly manner and tightly secured.

(v) The load shall be positioned to prevent slippage or loss during handling and transport.

(vi) Each stake and chock which is used to trip loads shall be so constructed that the tripping mechanism is activated on the side opposite the release of the load.

(vii) Each tie down shall be left in place over the peak log to secure all logs until the unloading lines or other protection the employer demonstrates is equivalent has been put in place. A stake of sufficient strength to withstand the forces of shifting or moving logs, shall be considered equivalent protection provided that the logs are not loaded higher than the stake.

(viii) Each tie down shall be released only from the side on which the unloading machine operates, except as follows:

(A) When the tie down is released by a remote control device; and

(B) When the employee making the release is protected by racks, stanchions or other protection the employer demonstrates is capable of withstanding the force of the logs.

(7) Transport. The transport vehicle operator shall assure that each tie down is tight before transporting the load. While enroute, the operator shall check and tighten the tie downs whenever there is reason to believe that the tie downs have loosened or the load has shifted.

(8) Storage. Each deck shall be constructed and located so it is stable and provides each employee with enough room to safely move and work in the area.

(i) Training.

(1) The employer shall provide training for each employee, including supervisors, at no cost to the employee.

(2) Frequency. Training shall be provided as follows:

(i) As soon as possible but not later than the effective date of this section for initial training for each current and new employee;

(ii) Prior to initial assignment for each new employee;

(iii) Whenever the employee is assigned new work tasks, tools, equipment, machines or vehicles; and

(iv) Whenever an employee demonstrates unsafe job performance.

(3) Content. At a minimum, training shall consist of the following elements:

(i) Safe performance of assigned work tasks;

(ii) Safe use, operation and maintenance of tools, machines and vehicles the employee uses or operates, including emphasis on understanding and following the manufacturer's operating and maintenance instructions, warnings and precautions;

(iii) 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;

(iv) Recognition, prevention and control of other safety and health hazards in the logging industry;

(v) Procedures, practices and requirements of the employer's work site; and

(vi) The requirements of this standard.

(4) Training of an employee due to unsafe job performance, or assignment of new work tasks, tools, equipment, machines, or vehicles; may be limited to those elements in paragraph (i)(3) of this section which are relevant to the circumstances giving rise to the need for training.

(5) Portability of training.

(i) Each current employee who has received training in the particular elements specified in paragraph (i)(3) of this section shall not be required to be retrained in those elements.

(ii) Each new employee who has received training in the particular elements specified in paragraph (i)(3) of this section shall not be required to be retrained in those elements prior to initial assignment.

(iii) The employer shall train each current and new employee in those elements for which the employee has not received training.

(iv) The employer is responsible for ensuring that each current and new employee can properly and safely perform the work tasks and operate the tools, equipment, machines, and vehicles used in their job.

(6) Each new employee and each employee who is required to be trained as specified in paragraph (i)(2) of this section, shall work under the close supervision of a designated person

until the employee demonstrates to the employer the ability to safely perform their new duties independently.

(7) First-aid training.

(i) The employer shall assure that each employee, including supervisors, receives or has received first-aid and CPR training meeting at least the requirements specified in Appendix B.

(ii) The employer shall assure that each employee receives first-aid training at least every three years and receives CPR training at least annually.

(iii) The employer shall assure that each employee's first-aid and CPR training and/or certificate of training remain current.

(8) All training shall be conducted by a designated person.

(9) The employer shall assure that all training required by this section is presented in a manner that the employee is able to understand. The employer shall assure that all training materials used are appropriate in content and vocabulary to the educational level, literacy, and language skills of the employees being trained.

(10) Certification of training.

(i) The employer shall verify compliance with paragraph (i) of this section by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted prior to the employee's hiring or completed prior to the effective date of this section, the certification record shall indicate the date the employer determined the prior training was adequate.

(ii) The most recent training certification shall be maintained.

(11) Safety and health meetings. The employer shall hold safety and health meetings as necessary and at least each month for each employee. Safety and health meetings may be conducted individually, in crew meetings, in larger groups, or as part of other staff meetings.

(j) Effective date. This section is effective February 9, 1995. All requirements under this section commence on the effective date.

(k) Appendices. Appendices A and B of this section are mandatory. The information contained in Appendix C of this section is informational and is not intended to create any additional obligations not otherwise imposed or to detract from existing regulations.

Appendix A to 1910.266--First-aid Kits (Mandatory)

The following is deemed to be the minimally acceptable number and type of first-aid supplies for first-aid kits required for logging work sites under paragraph (d)(2). The contents of the first-aid kit listed should be adequate for small work sites, consisting of approximately two or three employees. When larger operations or multiple operations being conducted at the same location, additional first-aid kits should be provided at the work site or additional quantities of supplies should be included in the first-aid kits.

1. Gauze pads (at least 4" x 4").

2. Two large gauze pads (at least 8" x 10").

3. Box adhesive bandages (band-aids).

4. One package gauze roller bandage at least 2" wide.

5. Two triangular bandages.

6. Wound cleaning agent such as sealed, moistened towelettes.

7. Scissors.

8. Blankets.

9. Tweezers.

10. Adhesive tape.

11. Latex gloves.

12. Resuscitation equipment, such as a resuscitation bag, airway, or pocket mask.

13. Indelible marking pen.

14. Two elastic wraps.

15. Diphenhydramine Hydrochloride elixir or capsules.

16. Tourniquet.

17. Wire splint.

18. Directions for requesting emergency assistance.

19. Recordkeeping forms.

Appendix B to 1910.266--First-aid and CPR Training (Mandatory)

The following is deemed to be the minimal acceptable first-aid and CPR training program for employees engaged in logging activities.

First-aid and CPR training shall be conducted using the conventional methods of training such as lecture, demonstration, practical exercise and examination (both written and practical). The length of training must be sufficient to assure that trainees understand the concepts of first aid and can demonstrate their ability to perform the various procedures contained in the outline below.

At a minimum, first-aid and CPR training shall consist of the following:

1. The definition of first aid.

2. Legal issues of applying first aid (Good Samaritan Laws).

3. Basic anatomy.

4. Patient assessment and first aid for the following:

a. Respiratory arrest.

b. Cardiac arrest.

c. Hemorrhage.

d. Lacerations/abrasions.

e. Amputations.

f. Musculoskeletal injuries.

g. Shock.

h. Eye injuries.

i. Burns.

j. Loss of consciousness.

k. Extreme temperature exposure (hypothermia/hyperthermia)

l. Paralysis

m. Poisoning.

n. Loss of mental functioning (psychosis/hallucinations, etc.).

Artificial ventilation.

o. Drug overdose.

5. CPR.

6. Application of dressings and slings.

7. Treatment of strains, sprains, and fractures.

8. Immobilization of injured persons.

9. Handling and transporting injured persons.

10. Treatment of bites, stings, or contact with poisonous plants or animals.

Appendix C to 1910.266--Comparable ISO Standards (Non-mandatory)

The following International Labor Organization (ISO) standards are comparable to the corresponding Society of Automotive Engineers (Standards that are referenced in this standard.) Utilization of the ISO standards in lieu of the corresponding SAE standards should result in a machine that meets the OSHA standard.

SAE standard	ISO standard	Subject
SAE J1040	ISO 3471-1	Performance Criteria for Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forestry and Mining Machines.
SAE J397	ISO 3164	Deflection Limiting Volume--ROPS/ FOPS Laboratory Evaluation.
SAE J231	ISO 3449	Minimum Performance Criteria for Falling Object Protective Structures (FOPS).
SAE J386	ISO 6683	Operator Restraint Systems for Off-Road Work Machines.
SAE J185	ISO 2897	Access Systems for Off-Road Machines.

3. The introductory text of paragraph (r)(5) of Sec. 1910.269 is revised to read as follows:

1910.269 Electrical protective equipment.

* * * * *

(r) * * * (5) Gasoline-engine power saws. Gasoline-engine power saw operations shall meet the requirements of 1910.266(e) and the following:* * * * *

PART 1928--[AMENDED]

Subpart B--Applicability of Standards

4. The authority citation for part 1928 continues to read as follows:

Authority: Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736) or 1-90 (55 FR 9033), as applicable; and 29 CFR part 1911.

Section 1928.21 also issued under 5 U.S.C. 553.5. Paragraph (a)(3) of 1928.21 is revised to read as follows:

1928.21 Applicable Standards in 29 CFR Part 1910.

(a) * * * (3) Logging Operations--1910.266;* * * * *

[FR Doc. 94-24898 Filed 10-11-94; 8:45 am]

- **Information Date:** 02/08/1995
- **Federal Register #:** 60:7447-7449
- **Type:** Final
- **Agency:** OSHA
- **Subject:** Logging Operations
- **CFR Title:** 29
- **Abstract:** On October 12, 1994, the Occupational Safety and Health Administration (OSHA) issued a new standard for logging operations (59 FR 51672). This notice stays enforcement of the following paragraphs of Sec. 1910.266 until August 9, 1995: (d)(1)(v) insofar as it requires foot protection to be chain-saw resistant; (d)(1)(vii) insofar as it requires face protection; (d)(2)(iii) for first-aid kits that contain all the items listed in Appendix A; (f)(2)(iv); (f)(2)(xi); (f)(3)(ii); (f)(3)(vii); (f)(3)(viii); (f)(7)(ii) insofar as it requires that parking brakes be able to stop the machine; (g)(1) and (g)(2) insofar as they require inspection and maintenance of employee-owned vehicles; and (h)(2)(vii) insofar as it precludes backcuts at the level of the horizontal cut of the undercut when the Humboldt cutting method is used.

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Part 1910

[Docket No. S-048]

Logging Operations

AGENCY: Occupational Safety and Health Administration (OSHA).

ACTION: Final rule; partial stay of enforcement.

SUMMARY: On October 12, 1994, the Occupational Safety and Health Administration (OSHA) issued a new standard for logging operations (59 FR 51672). This notice stays enforcement of the following paragraphs of Sec. 1910.266 until August 9, 1995: (d)(1)(v)

insofar as it requires foot protection to be chain-saw resistant; (d)(1)(vii) insofar as it requires face protection; (d)(2)(iii) for first-aid kits that contain all the items listed in Appendix A; (f)(2)(iv); (f)(2)(xi); (f)(3)(ii); (f)(3)(vii); (f)(3)(viii); (f)(7)(ii) insofar as it requires that parking brakes be able to stop the machine; (g)(1) and (g)(2) insofar as they require inspection and maintenance of employee-owned vehicles; and (h)(2)(vii) insofar as it precludes backcuts at the level of the horizontal cut of the undercut when the Humboldt cutting method is used.

DATES: Effective on February 9, 1995. The partial stay will expires on August 9, 1995. The remaining requirements of Sec. 1910.266 are unaffected by this document and will go into effect as scheduled on February 9, 1995, or as otherwise provided in the Final Rule.

FOR FURTHER INFORMATION CONTACT: Ms. Anne Cyr, Office of Information and Consumer Affairs, Occupational Safety and Health Administration, Room N-3637, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC 20210, (202) 219-8148.

SUPPLEMENTARY INFORMATION: On October 12, 1994, OSHA issued a final rule governing worker safety in logging operations. Among other things, this rule included requirements for: personal protective equipment; first aid kits at logging work sites; machine stability and slope limitations; discharge of hydraulic and pneumatic storage devices on forestry machines; protective structures on machines; machine braking systems; vehicle inspection and maintenance; and tree harvesting. Several parties have raised questions about certain aspects of these requirements. After considering their questions, the Agency has determined that a six-month delay in the effective date of some of the provisions is appropriate in order to allow time for it to clarify language in the regulatory text so that it most adequately expresses its intent with respect to some of these provisions, and to provide additional information on other provisions.

Stay of Enforcement of Certain Provisions of Sec. 1910.266

Paragraph (d)(1)(v)--Foot protection. The final logging standard requires employees to wear foot protection, such as heavy-duty logging boots, that among other things, protect against "penetration by chain saws." Some interested persons have misinterpreted this provision to require steel-toed boots, although the preamble to the final rule explained that the rule does not require steel-toed boots.

OSHA has decided to grant a six-month delay in the effective date of the portion of this provision that requires that foot protection be chain-saw resistant. (The remaining requirements of the foot protection provision will go into effect as scheduled on February 9.) This delay will enable OSHA to review the logging community requirements on available foot protection, including many types of heavy-duty leather logging boots currently used, kevlar boots, and foot coverings that provide adequate chain saw resistance. Finally, this delay will allow greater availability of new products that manufacturers are developing in response to the standard.

Paragraph (d)(1)(vii)--Eye and face protection. The logging standard requires loggers to wear eye and face protection meeting the requirements of OSHA's general personal protection equipment (PPE) standards when there is a potential for injury due to falling or flying objects. Some interested persons have interpreted this provision to require both eye and face protection in all cases.

OSHA has decided to grant a six-month delay in the effective date of this provision to the extent that it requires face protection. (The current effective date of February 9 will continue to apply to the eye protection requirement.) The delay will allow OSHA to clarify what the standard requires, and to better inform employers about available face protection that does not limit worker vision.

Paragraph (d)(2)(iii)--Annual approval of first-aid kits by a health care provider. Paragraph (d)(2) states that employers mut provide and maintain adequate first-aid kits at each worksite, and that the number and contents of the kits must be reviewed annually by a health care provider. Some interested persons have interpreted the standard to require that a doctor inspect each kit annually.

OSHA has decided to grant a six-month delay in the effective date of the provision requiring annual health care provider review. The requirement that first-aid kits contain at least the items listed in Appendix A (paragraph (d)(2)(ii)) will go into effect as scheduled on February 9, 1995. During this period, OSHA will revise the statutory language to clarify its original intent.

Paragraph (f)(2)(iv)--Slope limitations on machine operation. This rule states that logging machines shall not be operated on any slope greater than the maximum slope recommended by the manufacturer. Some parties have interpreted this provision to require manufacturers to specify maximum slopes that would be applicable in all field situations. OSHA is granting a six-month stay of this provision to clarify this point.

Paragraph (f)(2)(xi)--Discharge of stored energy from machine hydraulic and pneumatic storage devices. This provision requires that pressure or stored energy from hydraulic and pneumatic storage devices be discharged after the machine engine is shut down. Some parties have interpreted this provision to require discharge of air and water from all machine components, even when the presence of air or water pressure will not create a hazard for any employee. OSHA is granting a six-month delay in order to clarify this point.

Paragraph (f)(3)(ii)--Machine rollover protective structures. The final rule requires that all rollover protective structures (ROPS) be installed, tested and maintained in accordance with the Society of Automotive Engineers (SAE) J1040, April 1988, performance criteria for rollover protective structures (ROPS). OSHA has learned that some logging equipment currently in production has not yet been designed to meet the 1988 SAE criteria document. OSHA has decided to delay the effective date of this requirement for six-months in order to determine whether any additional extension may be appropriate.

Paragraph (f)(3)(vii) and (viii)--Machine operator cab protective structures. These provisions require that the lower portion of the operator's cab be enclosed with "solid" material that will prevent objects from entering the cab. Some parties have interpreted this provision to encourage the use of materials like steel plating that may restrict the operator's field of vision. OSHA is granting a six-month delay in the effective date of this provision in order to clarify this requirement.

Paragraph (f)(7)(ii)--Machine braking systems. This provision requires that each machine be equipped with "a secondary braking system, such as an emergency brake or a parking brake, which shall be effective in stopping the machine and maintaining parking performance." OSHA has since learned that the terminology used in this provision is inconsistent with that used by some manufacturers. These manufacturers consider a secondary braking system to be a subsystem of the service brake system and that each subsystem should be capable of stopping the machine even though the other subsystem fails. The parking brake system is not designed to stop the vehicle in motion but rather to restrain it once movement has stopped; thus it is not considered a secondary system.

OSHA is granting a six-month delay in this provision only to the extent that it requires that parking brakes be able to stop the machine. During this period, employers must still assure that each machine has a service brake system that is capable of stopping the machine and a parking brake system that can hold the machine and its maximum load on any slope that the machine is operated. OSHA will revise the terminology in this provision to clarify its intent.

Paragraph (g)(1) and (2)--Inspection and maintenance of employee- owned vehicles. These provisions require that any vehicle used off public roads at logging work sites or to perform any logging operation, including employee-owned vehicles, be maintained in a serviceable condition. Some parties have interpreted this provision to require logging employers to inspect and maintain all vehicles, including those employee-owned vehicles that they allow on their logging sites.

OSHA is granting a six-month delay in the effective date of these provisions insofar as they apply to employee-owned vehicles. The additional time will enable OSHA to reexamine the record on this issue and clarify its intent of the standard.

Paragraph (h)(2)(vii)--Backcuts. This rule requires that backcuts be above the horizontal line of the undercut. OSHA is aware that when loggers use the Humboldt cutting method, in which the diagonal cut is below the horizontal cut of the undercut, the backcut is at the level of the horizontal cut. The Agency is granting a six-month delay in the effective date of this provision only to the extent that the rule does not permit loggers using the Humboldt method to place the backcut at the level of the horizontal cut. (OSHA emphasizes that backcuts may never be made below the horizontal cut.) OSHA will reexamine the record on this issue.

III. Authority

This document was prepared under the direction of Joseph A. Dear, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210.

The actions in this document are taken pursuant to sections 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657), Secretary of Labor's Order No. 1-90 (55 FR 9033), and 29 CFR part 1911.

Signed at Washington, DC., this 2nd day of February, 1995.**Joseph A. Dear,**

Assistant Secretary of Labor.

For the reasons set forth above, 29 CFR part 1910 is hereby amended as follows:

PART 1910--[AMENDED]

1. The Authority citation for subpart R of 29 CFR part 1910 continues to read as follows:

Authority: Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), or 1-90 (55 FR 9033), as applicable.

Sections 1910.261, 1910.262, 1910.265, 1910.266, 1910.267, 1910.268, 1910.272, 1910.274, and 1910.275 also issued under 29 CFR part 1911.

Section 1910.272 also issued under 5 U.S.C. 553.2. A note is added at the end of Sec. 1910.266, to read as follows:

1910.266 Logging operations.

* * * * *

Note: In the **Federal Register** of February 8, 1995, OSHA stayed the following paragraphs of Sec. 1910.266 from February 9, 1995 until August 9, 1995:

1. (d)(1)(v) insofar as it requires foot protection to be chain- saw resistant.

2. (d)(1)(vii) insofar as it requires face protection.

3. (d)(2)(iii).

4. (f)(2)(iv).

5. (f)(2)(xi).

6. (f)(3)(ii).

7. (f)(3)(vii).

8. (f)(3)(viii).

9. (f)(7)(ii) insofar as it requires that parking brakes be able to stop the machine.

10. (g)(1) and (g)(2) insofar as they require inspection and maintenance of employee-owned vehicles.

11. (h)(2)(vii) insofar as it precludes backcuts at the level of the horizontal cut of the undercut when the Humboldt cutting method is used.

[FR Doc. 95-3041 Filed 2-7-95; 8:45 am]