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OCTOBER 1937

SAFETY FOR TREE WORKERS

Clemson University



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CIVILIAN CONSERVATION CORPS



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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SAFETY FOR TREE WORKERS

BY

A. ROBERT THOMPSON, FORESTER

CIVILIAN CONSERVATION CORPS
ROBERT FECHNER, DIRECTOR



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SAFETY FOR TREE WORKERS

By A. Robert Thompson, Forester

Chapter V of Tree Preservation Bulletin Series

Section I

Until comparatively recent years the toll taken by occupational accidents was thought to be a necessary evil, and few steps were taken to reduce the appalling waste of human life and limb. With the passage of modern legislation, however, which forces the private employer to protect his employees by accident compensation insurance, the enormous cost of accidents was forcibly brought home and organized safety work was begun.

Although an extremely small percentage of the industrial accident record is chargeable to tree workers, since the number of tree workers is comparatively small, the accident rate in this field is considerably higher than the general industrial average per worker employed. This is evidenced by the high insurance rates that are required of commercial tree preservation organizations. Depending upon the accident record of such companies, the basic rate of compensation insurance is from \$7 to \$15 per \$100 of pay rolls. At the end of the year the outlay for compensation is calculated, and several commercial tree preservation companies which have found that safety pays have enjoyed substantial rebates on their premiums as well as a more favorable basic rate for the next year.

Necessity for Safety Rules

Safety rules and regulations are as necessary in industry as civil laws in community life and like civil laws are formulated as the result of violation of basic safety principles or in anticipation of such violation. Safety rules are especially essential in connection with tree preservation activities because of the inherent dangers involved in working off the ground and because constant supervision of every workman is seldom possible.

Rules are also necessary to provide standard methods of performance for various jobs. There is at least one right way and there are almost invariably numerous wrong ways to do every job; these rules are intended to point out and emphasize the proper methods to be employed. They are put in printed form to prevent disorder and misunderstanding, to forestall excuses for not performing a job properly, and to indicate not only to workers but to supervisory officials the minimum safety requirements of National Park Service tree preservation work.

The Benefits of Accident Prevention

The actual advantages of a safety program are definitely tangible. A well organized and properly executed program not only results in lower operating and compensation costs, better morale, and increased efficiency but it prevents suffering and loss of earning ability.

Lower Operating Costs.--It has been definitely proved that efforts to improve safe practices do not interfere with production but rather increase and improve productivity. When an operator's mind is relieved of the fear of accidents and he becomes accustomed to performing his work in a safe manner, his production invariably is increased proportionately. This has a direct influence on operating costs as can be readily seen.

Lower Compensation Costs.--Lower insurance and accident costs are the reward of commercial companies which decrease their accident rate. Although individual Government agencies do not pay compensation costs directly, the total cost is heavy, both by reason of actual cash outlay by the United States Employees Compensation Commission and the indirect cost due to the loss of services by the various departments. An efficient safety program lowers such costs.

Better Morale.--An organization known to be safe is one to which its members are proud to belong. This fact is clearly evidenced among commercial organizations which carry on safety programs. Safe practices make for better working conditions, greater self-satisfaction, and better work.

Effect on Associates.--A man who is safety-conscious and who has been trained to be careful is not easily led into careless ways; rather the effect is reversed. The influence upon future associates of trained tree preservation workers is one of great possibilities since a careful worker is the nucleus of a careful crew.

Prevention of Suffering and Loss of Earning Ability.--A tree worker will receive more money through regular employment than through the accident compensation pay roll; to his family and dependents he is worth more alive and uninjured than he is crippled or dead. No amount of money can compensate for suffering as a result of an accident, the loss of a life, a permanent disability, or some kinds of temporary disability.

Safety Program

The safety program of the National Park Service as it concerns tree preservation work will consist of five major parts: standards, education, enforcement, accident reporting, and investigations.

Standards.--Standards represent the safe ways of doing things. In Section II of this bulletin, rules of safe practice are presented. These are based on the accumulated experience of many individuals and organizations over a period of several years and have resulted from demonstrated need.

Education.--Tree workers must be encouraged to form safe working habits. It is the duty of all members of supervisory staffs to encourage safe practices and to promulgate safety in tree preservation work. This may be done by constant encouragement, discussion, and demonstration. Participation in safety meetings should be obligatory.

Enforcement.--Rules of safe practice are made for the protection of workers. Observance of the rules is the duty of every worker engaged in tree preservation work, and rigid enforcement is obligatory on the part of all supervisory personnel. Failure to observe or enforce rules will result in disciplinary action.

Accident Reporting.--While certain basic safety principles for tree preservation work have been determined, there always will be room for improvement. Tree preservation crews will cooperate with the proper authorities in accurately reporting accidents and keeping statistics. Suggestions to improve safe working conditions should be reported through proper channels in order that all concerned may receive maximum benefit.

Investigations.--An investigation of each accident should be made by the person or board appointed for this purpose. The reports of such persons or boards are valuable not only for fixing the responsibility for accidents but for analyzing the causes of accidents so as to eliminate or minimize such causes in the future.

Section II

Rules of Safe Practice

Purpose

The purpose of these rules is to bring out the facts that: (a) the man who is to avoid accidents and reduce loss of life and human suffering must exert every personal effort; (b) all tree workers, especially those who are inexperienced, should be informed of the dangers incident to tree preservation work, so far as it is possible to do so in a set of rules; (c) precautions must be taken by all tree workers, experienced or inexperienced, to reduce the hazards of their work to a minimum; (d) experience with causes and prevention will be applied to future work.

The rules have been established not from one person's ideas of safety but from the accumulated experience and observations of many individuals and organizations over a period of many years. Each rule without exception has evolved directly from one or more accidents caused by failure to observe proper safety principles. Each rule has received the approval and endorsement of the National Park Service Safety Committee.

Scope

As in the case of other phases of tree preservation work which have been discussed in previously issued bulletins of this series, these rules of safe practice are intended to apply to all eastern areas administered by the National Park Service which have shade tree problems and to western areas where practicable.

A. General Safety Rules

1. Every tree worker should know these safety rules. It is his duty to observe them at all times. He should have a good working knowledge of first aid and resuscitation.

2. No man shall engage in any phase of tree work until he is able to tie the following knots readily and until he knows when to use them: bowline, bowline-on-a-bight, running bowline, square knots, clove hitch, timber hitch, taut-line hitch, and figure-of-eight knot.
3. Before any man attempts to do actual work in a tree he must be trained in the use of rope and knots and must spend sufficient time in practice climbing and knot tying to become proficient. 23/
4. Before starting any tree operation all necessary time should be taken to find out if any local danger exists. Haste causes accidents--take time to be careful.
5. Except under exceptional circumstances, trees should not be climbed or worked in when wet. It is impossible to get a good foothold or handhold on slippery bark, and knots are likely to slip if the rope is wet.
6. Men should stay out of trees during high winds except in emergencies.
7. Only men who are physically fit should be allowed in a tree. Men suffering temporary ill health should be sent home.
8. There is no place for intoxicating liquors on a tree preservation operation. Men suffering from immediate or after-effects of alcohol must not be allowed on the job.
9. A tree is not the place for a person with an exhibitionist complex. Men who persist in taking unnecessary risks or in showing off should be released from the job.
10. As a general rule only one man should work in a tree at a time--especially during pruning operations.
11. Workmen should request assistance only from men working directly on the job, never from passersby or casual observers, regardless of the simple type of assistance which may be required only temporarily.
12. Danger signs and/or red flags should be placed on sidewalks, roadways, or streets where any tree work is to be done. Dangerous areas should be roped off and ground men used to divert traffic when necessary.
13. The foreman should exercise close supervision over his men at all times. He should satisfy himself that the men working under him are efficient and competent to perform their work with safety. He should outline safe methods and see that his instructions are obeyed implicitly.
14. The foreman must make a daily inspection of all tools, rope, and other equipment before use, and he will condemn or destroy all tools, etc., which are unsafe in his opinion. Each tree worker must also inspect all tools, rope, etc., before using

them.

15. Foremen are held responsible for enforcing all safety rules.

B. Clothing

16. Men who are engaged in tree climbing will find that ordinary street and work clothes are unsuitable for tree work.

17. A cap is preferable to a hat because it offers less obstruction when passing between limbs and through thick foliage. Some workers prefer a cheap white cap for coolness and visibility.

18. High-topped leather shoes with composition or rubber soles are preferable to ordinary shoes with leather soles. Hob-nailed shoes should never be used for climbing, and nailed soles should be avoided.

19. Breeches of dark colored strong material are preferable to long trousers which are easily caught and torn. They should be fairly loose in the leg and knee to give freedom in cramped positions.

20. A long overcoat is unsuitable for tree work. Snug-fitting wool or leather jackets or extra shirts are preferable when cold weather requires extra warmth.

21. An athletic strap with a wide abdominal band should be worn by all men engaged in tree work.

22. For protection of the hands and wrists gloves of the gauntlet type are generally considered satisfactory for tree work. Sleeves should be kept rolled down to protect forearms and wrists.

C. Rope

23. Rope used by National Park Service tree workers shall correspond with specifications listed in the Federal Standard Stock Catalog T-R-601. Federal specifications for new manila rope include the following standards. This table should be used in connection with the table on page 20 in estimating stresses for manila rope used for tree work:

Federal Standards for New Manila Rope (3-strand) 7/

Diameter (approx.)	Length of coil (approx.)	Gross wt. of coil (approx.)	Wt. per foot (max.)	Length per lb. (min.)	Breaking strength (min.)	Safe load ($\frac{1}{8}$ max.)
inches	feet	pounds	pounds	feet	pounds	pounds
1/4	2,750	55	.020	50.0	600	75
1/2	1,200	90	.075	13.3	2,650	331
3/4	1,200	200	.167	6.0	5,400	675
1	1,200	324	.270	3.71	9,000	1,125

24. Under average conditions the working load placed on a rope should not exceed one-sixth of the breaking load, but under the best conditions, if the rope is new, the working load may be one-fourth the breaking load. Under unfavorable conditions where rope is used frequently and for indefinite periods, as in the case of a climbing rope, the working load should not exceed one-eighth of the breaking load.

25. The National Park Service standard safety rope will consist of a first-grade 3-strand, rot-treated, 1/2-inch diameter manila rope not less than 120 feet and preferably 150 feet in length. Standard power rope will consist of first-grade, 3-strand, rot-treated, 3/4-inch diameter manila rope in lengths of not less than 150 feet. A number of longer lengths are often desirable. Cheap rope or rope of other types must not be used for tree work.

26. Every rope must be thoroughly inspected for cuts or abrasions before each use. Do not hesitate to cut off a weak end or to discard an unsafe rope. Safety ropes that are questionable should be tested by the weight of three men before being used.

27. Kinking is one of the main causes of injury to manila rope and should be avoided, especially when the rope is wet. To avoid kinks in new rope when uncoiling, uncoil from the inside of the coil--never from the outside.

28. A rope should not be "burned" by allowing it to run through a crotch too rapidly. Great care should be used to avoid dropping cigarettes on rope. Rope should be kept away from fire and excessive heat.

29. Rope deteriorates rapidly when it is saturated with water and improperly dried, so unnecessary wetting must be avoided and wet ropes dried properly before storing. Rope should not be allowed to freeze after wetting, as frozen rope breaks easily. Rope should not be left in a tree over night when there is reason to expect a heavy dew or rain or where malicious persons might steal or injure it.

30. All rope should be kept coiled when not in use. It should never be stored or transported where sharp tools may cut it. Rope should not be dragged in the dirt, over rough surfaces, or across itself. Avoid sharp bends over unyielding surfaces.

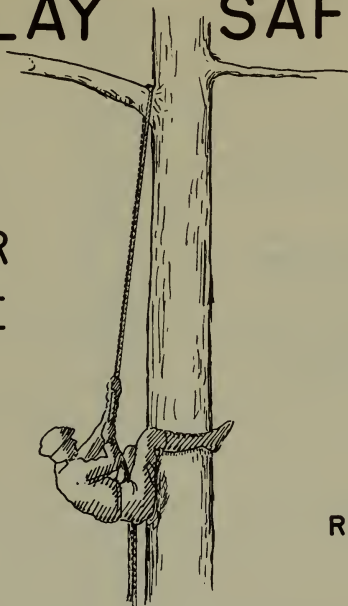
D. Climbing

31. All limbs should be inspected before the weight of the body is allowed to rest on them. Do not trust your weight to a dead limb. All dead limbs should be broken off if possible as the climber comes in contact with them in order that he will by no means entrust himself to such a limb.

32. Trees are of varying strengths but it is necessary to remember that no matter how tough the wood of the tree or how large the diameter of a limb, a rotten or decayed limb is never safe. The live limbs of old cherry and apple trees are likely to be weak because of heart rot, and black locusts are likely to be

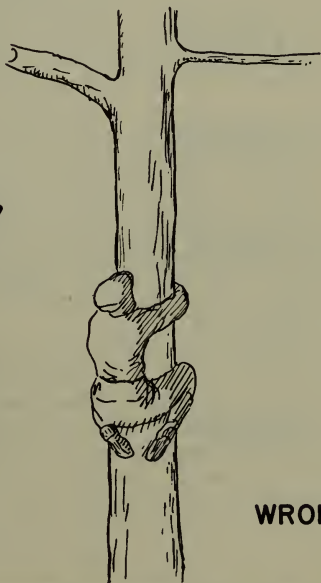
PLAY SAFE!

USE
YOUR
ROPE



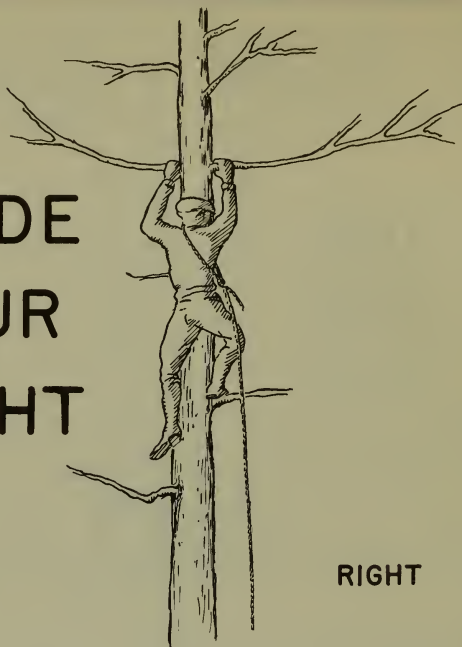
RIGHT

DONT
SHINNY!



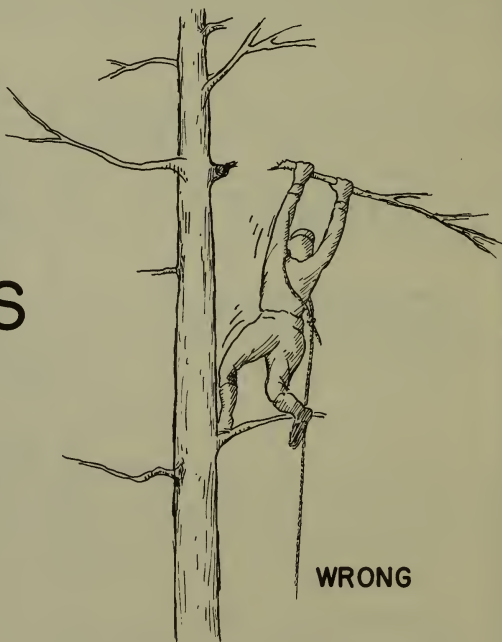
WRONG

DIVIDE
YOUR
WEIGHT



RIGHT

USE
TWO
LIMBS
NOT
ONE



WRONG

weakened by borer attack. All old or diseased trees may have invisible decay which makes them more hazardous than young ones.

33. "Tree Trimming Practices" 16/ lists the following groups of trees according to strength:

- (a) Very easily broken: Willow, poplar, aspen, box elder, catalpa, ailanthus, soft maple, white pine, and sassafras.
- (b) Split easily: Linden, ash, red elm, persimmon, magnolia, and tulip.
- (c) Rather hard to break: Apple, pear, plum, most of the conifers, hackberry, birch, oak, walnut, hickory, sycamore, hard maple, American elm, black locust, honey locust, and osage orange.
- (d) Trees with thorns which not only cut and scratch but which may set up infection are: Honey locust, osage orange, black locust, and hawthorn.

34. When climbing without a rope the climber's full weight should rarely be entrusted to one limb. Better practice is to keep one arm around the trunk or to keep the hands on separate limbs so that if one limb breaks the body can be supported by the trunk or the other limb. (See page 8.)

35. A rope should not be climbed hand over hand without using a footlock or using the legs around the tree. Shinning a tree over 15 feet is an unsafe practice. Climbs over 30 feet should be made by using a safety sling. Fatigue and cramps should be avoided. Feet, hands, and rope should be kept out of tight crotches. (See page 7.)

36. The standard safety sling for National Park Service use will consist of the combination of a bowline-on-a-bight and a taut-line hitch. The ordinary lineman's belt and strap are not approved for National Park Service tree work, but safety saddles approved by the Branch of Forestry may be used if available. The safety sling must always be used while working in a tree, even if a ladder or scaffold is also used. Many men have been injured or killed by failing to observe this cardinal rule. (See page 12.)

37. The safety sling should be tied immediately after the climber has crotched his rope as high and as close to the trunk as possible. Tight crotches which will bind the rope should be avoided. When practicable the rope should be crotched on the side of the tree opposite that to be worked so as to avoid accidentally slipping the rope out to a point where the limb cannot support the climber's weight. The climber should check the location of the entire length of the safety sling and the taut-line hitch before swinging free.

38. A figure-of-eight knot always should be tied in the ground end of a safety rope to prevent accidental pulling of the end through the taut-line hitch when coming down on the rope.

A
FIGURE
EIGHT
KNOT
ON
YOUR
SAFETY
ROPE



RIGHT

MAY
PREVENT
A
BAD
FALL



WRONG

If someone else ties the knots, the climber should check them himself before trusting his weight on them. (See page 10.)

39. The ground end of a safety rope must not be left dangling over roadways or walks, and it must be kept free from obstructions, tight crotches, and fallen brush. All slack must be kept out of the safety rope.

40. The safety rope may be recrotched whenever it will make the work safer or quicker. To be absolutely safe, the climber should tie himself to a convenient limb while making the change.

41. The climber should stay in the safety sling until he is again safely on the ground. To release the taut-line hitch before coming out of a tree is forbidden in the National Park Service.

42. A climber should not slide down a limb or tree trunk without carefully inspecting it for projecting stubs, nails, or loose bark. Severe gland injuries have been sustained by failure to observe this rule.

43. All knots should be removed from a rope at the end of a working day. To leave knots tied for a prolonged period or to tie knots repeatedly in the same point in a rope will cause kinking and undue wear.

44. Remember: A good safety rope is the tree worker's most important accident insurance policy. Use it!

E. Ladders

45. Always use a safety sling even if a ladder is used also.

46. Ladders used in connection with tree work should comply with all of the provisions contained in the "American Standard Safety Code for Construction, Care, and Use of Ladders."2/

47. Ladders should not be used in tree work unless the base can be set on a firm foundation. They should never be used in trees with the bottom rung or rail bases resting in a crotch. A ladder should never be set on a truck or other object which can be moved while a man is working on it. If absolutely necessary to place a ladder in a street or on a walk, and no other footing can be obtained, it should be guarded by a ground man and lashed in place with hand lines.

48. Ladders should be frequently inspected to make sure they are sound. Ladders with broken or cracked rungs or rails should be discarded or immediately repaired, and protruding slivers should be removed.

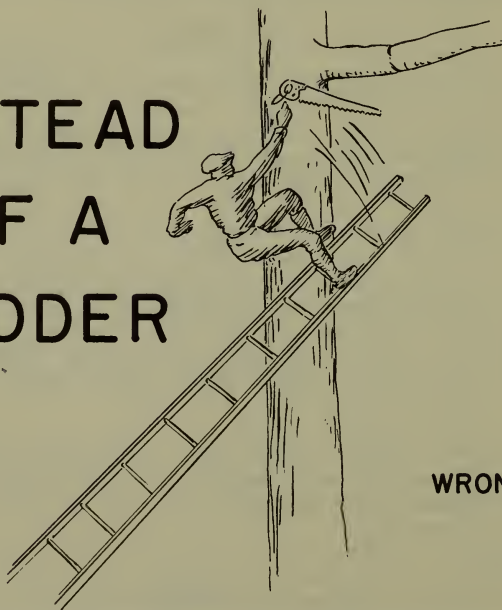
49. Ladders used against trees where the limbs will not support the weight of the climber should be secured with hand lines. Lashings should pass over the rails and the ends of the rungs, not the center of the rungs.

RELY
ON
YOUR
SAFETY
ROPE



RIGHT

INSTEAD
OF A
LADDER



WRONG

50. When a ladder is leaned against a tree, the weight should be distributed equally on both rails and not against the top rung unless this has been especially braced. It should be lashed in place if there is any danger of slipping.

51. Ladders should be placed in proper racks or on the ground after use and not left leaning against trees or buildings. They should not be left on the job at the end of a working day unless secure from tampering or use by unauthorized persons.

F. Pruning 22/

52. Tree pruning or other work in the crowns of trees should be performed only when weather conditions are favorable. Branches are more apt to snap off on a cold day than on a warm one. Branches wet by rain or snow or covered with ice are dangerous to the climber.

53. Before starting any tree job the program should be worked out carefully with the foreman when possible. This may avoid extra climbing and additional hazards.

54. Automobiles that are found under trees where overhead work is being done should be pushed clear or the owners found and asked to move them to a safe place. "No parking" signs should be placed in advance of the work when possible.

55. Warning should always be given when a limb is about to be dropped from a tree. The shouts "timber," "heads up," or "look out below" are common signals for this purpose. The dropping of limbs or stubs should be permitted only when there is no danger to men or objects beneath.

56. A limb which cannot be controlled by hand while being severed from the tree should have a line or lines attached for controlled lowering before it is cut off. The end of the safety sling should never be used for this purpose. In estimating the weight of green limbs and logs the table on page 20 will be found useful.

57. Lowering ropes should be snubbed to prevent injury to the holder. It is well to remember that a snubbed rope does not hold as well on wet limbs or trunks as on dry wood. A man should hold only one rope at a time.

58. The trimmer should never cut a large limb which is above him if it can be avoided.

59. When large limbs or parts of the trunk of a tree are to be sawed off and no suitable crotch is available for passing the support rope, the limb should be snubbed to the lower portion of the trunk and lowered when completely severed. The climber should be sure that he is in a safe position or on the ground before the stub or branch is finally swung clear.

60. Care should be used in pulling branches out of trees by hand or by means of pole pruners as they may fall and strike the

tree worker and cause injury. A worker should stand in a place to the side, or if possible above the limb in order to allow it to fall without striking him.

61. Never leave "hangers" or anything not securely fastened in the tree. If a tree is not completely pruned at the end of a working day, all "hangers," tools, and ladders should be removed, since they might become dislodged during the night and fall on someone. If necessary to leave a climbing rope in a tree over night, it should be tied up out of reach.

G. Electrical

62. Special care must be exercised when working in close proximity to charged wires or technical apparatus. Only men who are thoroughly familiar with the dangers connected therewith should be allowed to do this work. Only insulated tools should be used under such conditions.

63. Before working in trees that are close to or touching live wires contact should be established with the power company concerned so that the lines may be deenergized and grounded by the power company, if possible, under local conditions. In any event, lines should be declared safe by a qualified power company employee before men are allowed to work in trees touching wires.

64. Wet materials are conductors of electricity, even those which normally are nonconductors. Trees near or touching wires should not be worked in if clothing, rope, equipment, or the tree are wet or even damp. The use of weatherproof rope and periodic shellacking of poles and other wooden handles are worth-while practices.

65. The climber should never pass between wires unless authorized by the foreman and until rubber guards such as hoods, snakes, or blankets are placed on the wires by a thoroughly experienced man. No one should ever stand on wires, either conductors or guys.

66. Special care must be used to avoid dropping limbs or branches on wires, but if they accidentally fall or are resting on wires they should be removed by means of a dry rope slung over the branch or with a long-handled pruner equipped with a rope pull. Rope or pruner should be handled with rubber gloves.

67. Fallen wires should not be touched. The power company should be called at once and the wires guarded from passers-by until the company responds to the call. Even if the wires are known to be dead, they should be brushed lightly with the back of the hand before touching them.

68. In case of contact with live wires do not allow the victim to be touched. The wire may be lifted from him or he may be lifted off the wire by using nonconductive materials such as dry clothing, dry rope, dry boards, or dry rubber materials. After rescue the prone pressure method of artificial respiration should be applied if the patient has stopped breathing and a doctor or

the emergency squad should be called.

69. During thunderstorms trees, especially those standing alone, should be avoided.

H. Tools

70. Tools should be raised or lowered by means of a hand line or the free end of the safety rope. They must never be thrown into or dropped from a tree.

71. Tools should not be left in such a manner that they may be tripped over or stepped upon, nor in a leaning position from which they may fall. Rope and rope ends should be kept free.

72. Handsaws with teeth on one edge only should be used for general tree work. They should be kept sharpened and properly set so that they will not jump out of the cut and cause injury. Each handsaw and builsaw and other small handled tools should be provided with a leather or wire loop through the handle.

73. Handsaws should not be carried on the belt or in the hand when climbing. A saw may be attached to the end of the safety line or hand line before the tree is climbed and then pulled up. When temporarily out of use a saw should not be laid on a limb or in a crotch, but it should be securely hooked on the belt or over a branch of sufficient size to hold it securely.

74. Pole saws should be as light in weight as possible and of sufficient length to allow the trimmer to reach his work readily. They should be made with one-piece wooden handle, angular in cross section, and be provided with a hook just below the blade.

75. Pole saws should be raised or lowered by means of a rope tied below the blade. When temporarily out of use in a tree, they may be hooked over limbs of sufficient size to hold the weight. They should never be laid on limbs or in crotches or hung on wires.

76. Pole pruners should be as light in weight as possible and of sufficient length to allow the trimmer to reach his work readily. They should be made with a one-piece wooden handle and be provided with a rope pull leading from the lever arm to the end of the handle. Poles which are hexagonal or square in cross section are easier and safer to handle than round ones.

77. Pole pruners should never be raised or lowered by placing a finger in the hook. They should be raised or lowered by means of a rope tied under the head, never over the jaw, as the cutting edge may close on the rope and cut it. A pole pruner temporarily out of use in a tree may be hooked over a limb of sufficient size to hold the weight securely. They should never be hooked over wires, laid on limbs or in crotches, or used for lifting other equipment.

78. Chisels and gouges and other sharp-edged tools should never be carried in the boot. A leather kit with a wooden bottom is a convenient way to carry such tools. Chisel kits should be made so as to prevent the tools falling out if the kits are accidentally tilted. When working in awkward or confined places the operator should use long chisel handles to prevent bruising his hands. When using a chisel or gouge he should keep his head out of the line of swing to prevent possible injury of the face from the rebound of the mallet. Chisel handles should be provided with iron ferrules to prevent splitting. Operators should remember that chisels and gouges are cutting tools and should not be used as levers or wedges. They should be kept sharp.

79. Axes are, of course, necessary on tree operations for felling and bucking, but they should never be used as wedges or for pruning or trimming shade trees. They should not be used for driving wedges. They should be kept sharp.

80. Spurs or climbing irons should never be used on live trees except possibly during tree removal operations. The use of spurs at any time is a questionable practice and should be discouraged since the gaffs are apt to tear out of the bark and cause the climber to slip, fall, or spur himself. The tree climber has so little occasion to use spurs that he rarely becomes expert and consequently should avoid them.

81. Wedges should be provided on each felling operation. They should be kept free from burred edges. They should be driven only with a sledge hammer--never with an axe.

82. Toolboxes should provide special places for saws, chisels and other sharp-edged tools so that they will not come in contact with other tools and rope. Saws, rope, small tools, picks, shovels, etc., should be placed inside the toolbox after use in the place designated for each tool. When out of use tools should be kept covered with light machine oil or other easily removed metal protector to prevent rust.

I. Tree Felling

83. Before any tree is felled the crew should be properly instructed by competent authority in the proper manner of notching and wedging so that the tree may fall where desired.

84. Before each tree is felled it should be carefully studied by a competent man in order that the following factors may be taken into consideration: (a) height of tree, (b) soundness, (c) direction of lean (d) slope of ground, (e) species of tree, (f) its top-heaviness, (g) direction of wind, (h) proximity to other trees, structures, and wires.

85. If there is danger that trees being felled may injure property, block and tackle should be used. In most cases in shade tree felling guide lines will be necessary to avoid damage. Guide lines should be tied and snubbed around other trees before any cutting is done at the base of the tree.

LOAD BRUSH

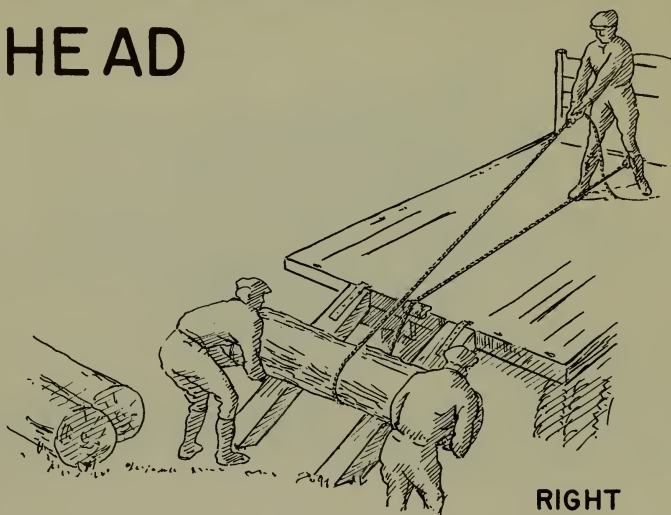


PROPERLY

KEEP
YOUR
WORK SITE
CLEAN

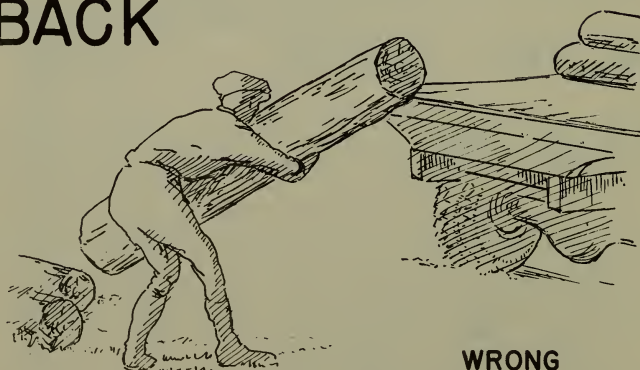


USE YOUR
HEAD



RIGHT

AND SAVE
YOUR
BACK



WRONG

86. In many cases it will be necessary to fell a tree by lowering it in sections instead of simply cutting it off at the ground. If this is done, careful study must be given to the size and position of limbs, location and order of making cuts, and methods of snubbing and guiding. Great care must be exercised to avoid severing guide or power ropes. Special precautions in roping rotten or split trees are important because they may fall in an unexpected direction even though the cut is made on the proper side.

87. Not more than two men at a time should be allowed to work on the base of a tree being felled.

88. Persons should keep away from the butt of a tree starting to fall. It may kick back or take an unexpected roll.

89. Just before a tree is ready to fall the shout "timber" should be given. All who are working in the vicinity should immediately take cover in a place safely out of range.

90. Felling operations once started should be finished before the crew leaves the job for lunch or at the end of the working day. It is especially important to complete such operations when roots have been excavated or cut, or when the base cut has been started.

J. Brush and Wood Removal

91. Brush and logs should not be allowed to accumulate at the site of the operation but should be cleared away as rapidly as possible. Pending removal debris should be piled so it will not interfere with the operation or where men might stumble over it. (See page 17.)

92. Ground men handling brush should not attempt to pick up the brush or limbwood from under that side of a tree where the climber is working.

93. A ground man having his attention called by workmen in a tree should first step out from under the tree before looking up in order to avoid falling brush.

94. Men should not try to lift logs or other loads that are too heavy. A large number of tree accidents result from strains. The loads should be reduced by the use of skids, by cutting logs into shorter lengths, etc. (See table on page 20.)

95. The man who is loading the brush on the truck should stand between the brush and the cab--never on or straddle a load of brush. Brush should be kept within the bed of the truck and held down tightly by means of a rope lattice. This gives a better vision to cars passing around the truck and prevents the brush from scraping cars or striking pedestrians. Whenever brush extends beyond the confines of the truck red flags should be placed on the ends. (See page 17.)

96. When disposing of brush by burning, the truck driver

WEIGHT TABLE FOR GREEN LOGS

To use: Multiply length of log in feet by the weight of a one-foot section, using the mean diameter of the log.

SPECIES	Weight per cubic foot*	Weight of one-foot sections - based on mean diameters													
		10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs
Apple	55	30	43	59	77	97	120	145	173	203	235	270	307	347	388
Ash, white	48	26	38	51	67	85	104	126	150	177	205	235	267	302	338
Basswood	42	23	33	45	59	74	92	111	132	155	180	206	235	265	297
Beech	54	29	42	58	75	95	118	142	169	199	231	265	301	340	381
Birch, paper	50	27	39	53	70	88	109	132	157	184	214	245	279	317	353
Birch, yellow	57	31	45	61	80	101	124	151	179	210	244	280	319	360	403
Butternut	46	25	36	49	64	81	100	121	144	170	197	226	257	290	325
Cherry, black	45	25	35	48	63	79	98	119	141	166	192	221	251	283	318
Chestnut	55	30	43	59	77	97	120	145	173	203	235	270	307	347	388
Cottonwood	49	27	38	52	68	86	107	129	154	180	209	240	273	310	346
Elm, American	54	29	42	58	75	95	118	142	169	199	231	265	301	340	381
Gum, black	45	25	35	48	63	79	98	119	141	166	192	221	251	283	318
Gum, red	50	27	39	53	70	88	109	132	157	184	214	245	279	317	353
Hackberry	50	27	39	53	70	88	109	132	157	184	214	245	279	317	353
Hickory, shagbark	64	35	50	68	89	113	140	169	201	236	273	314	357	403	452
Honeylocust	61	33	48	65	85	108	133	161	192	225	261	299	341	385	431
Magnolia, ev.	59	32	46	63	82	104	129	156	185	217	252	289	329	372	417
Maple, red	50	27	39	53	70	88	109	132	157	184	214	245	279	317	353
Maple, silver	45	24	35	48	63	79	98	119	141	166	192	221	251	283	318
Maple, sugar	56	31	44	60	78	99	122	148	176	206	239	275	313	353	396
Oak, black	62	34	48	66	86	109	135	163	194	228	265	304	346	390	437
Oak, live	76	41	60	81	106	134	166	200	238	280	324	372	424	478	536
Oak, red	63	34	49	67	88	111	137	166	198	232	269	309	351	397	445
Oak, white	62	34	48	66	86	109	135	163	194	228	265	304	346	390	437
Osage, orange	62	34	48	66	86	109	135	163	194	228	265	304	346	390	437
Pecan	61	33	47	65	85	108	133	161	192	225	261	299	341	385	431
Persimmon	63	34	49	67	88	111	137	166	198	232	269	309	350	397	445
Poplar, yellow	38	21	30	40	53	67	83	99	119	140	162	186	211	239	268
Sassafras	44	24	34	47	61	78	96	116	138	162	188	215	245	277	310
Sycamore	52	28	41	55	72	92	113	137	163	191	222	254	290	327	366
Walnut, black	58	32	45	62	81	102	126	153	182	213	248	284	323	364	409
Hemlock, eastern	50	27	39	53	70	88	109	132	157	184	214	245	279	317	353
Pine, n. white	36	20	28	38	50	64	78	95	113	133	154	176	201	227	254
Spruce, red	34	19	27	36	47	60	74	90	106	125	145	166	189	214	239
Tamarack	47	26	37	50	65	83	102	124	147	173	200	230	262	295	331

*Strength & Related Properties of Woods Grown in the United States
L. J. Markwardt and T. R. C. Wilson. Tech. Bul. 479. U.S.D.A. 1935.

should not back his truck close to the fire but should dump the brush some distance to one side where it may be fed to the fire by hand. Care must be exercised to keep the fire under control. Be sure that there is no chance of fire spreading to fields, fences, woods, or buildings. Fires must never be left unattended, and all fires must be extinguished before the crew leaves for lunch and before it has finished its work for the day.

97. Brush must never be burned except in places that have been definitely designated by competent authority, and then only when burning conditions are authoritatively pronounced satisfactory and safe. Poisonous vines should not be burned ordinarily because the smoke is likely to affect susceptible persons. If absolutely necessary to burn such material, care should be taken to keep out of the smoke which carries the poisonous principle.

98. If brush is piled on a public dump, the foreman should make sure that he complies with all the requirements of that particular dumping ground.

K. Transportation

99. Truck drivers shall qualify under all rules which apply to licensing, driving, and maintenance of motor vehicles.

100. All persons shall get on and off the truck only on the right or curb side of the truck or the rear. No one shall get on or off when the truck is in motion. Before starting the truck the driver shall be the last one to get on and must first make certain that all riders are safely within the truck bed.

101. No person shall be allowed to ride on any part of the truck except within the cab or bed. No part of the body may extend beyond any part of the truck when it is in motion. Stake sides and tail gates must be in place in trucks carrying persons.

102. Tools and equipment must not be carried loosely on the truck beds but in proper boxes or receptacles provided for them.

L. Spraying

103. All spray materials must be used with extreme caution. Arsenic in any form is a deadly poison, and serious injury or discomfort may be received from many materials.

104. Insecticides, fungicides, and containers must not be left where they are accessible to children or animals. Spray wastes should be buried or drained into a sewer and containers should be burned or otherwise destroyed as soon after emptying as possible. Sprayer drippings and materials accidentally spilled should be washed off lawns, walks, and roads.

105. Although it is questionable whether lead arsenate in concentrations normally deposited in ordinary operations is lethal to birds and stock, it is safer to use nonpoisonous substitutes when spraying in or near bird runs and pastures.

106. Spray materials are especially deadly to fish. Extreme care must be exercised to avoid pollution of ponds, streams, and other sources of drinking water.

107. Stomach poisons such as lead arsenate should not be used for insect control on fruits or garden vegetables if there is a possibility of leaving poison residues in harmful concentrations which may remain until the time of consumption.

108. To avoid the hazards of poisoning from lead, arsenic, and other spray materials the following rules should be followed:

- (a) If possible have a medical examination, including a complete blood examination, before working with spray materials. Workers having blood diseases should not work with lead.
- (b) Brush the teeth daily after work.
- (c) Wash the hands and face well before eating and after work.
- (d) Take a shower and change clothes as soon after work as possible.
- (e) Keep and eat lunch away from spray materials.
- (f) When mixing dry spray materials keep the nostrils and mouth covered with a respirator or wet cloth.
- (g) During the spraying season drink plenty of milk to counteract arsenic poisoning.
- (h) Wear a raincoat, hat and goggles while spraying.

109. Spray crews using lead arsenate may be subjected to both lead and arsenic poisoning. Symptoms of lead poisoning include headache, dizziness, colic, constipation, loss of weight, convulsions, blood changes, anemia, palsy, neuritis, weakness, blue line on gums, joint pains, twitching, and paralysis.^{5/} Arsenic poisoning symptoms include skin ulceration; loss of nails and hair; inflammation of the nose, mouth, throat, and lungs; brown discoloring of the skin; perforation of the bone-like part of the nose; muscular weakness; paralysis; and diarrhea.^{4/} Persons suspecting either type of poisoning should immediately consult a doctor.

110. Care must be exercised, especially when using a solid stream nozzle, to avoid contact of the spray stream or the nozzle with electric wires.

111. Spray apparatus should be kept as clean as possible at all times, not only for general reasons of good management but to avoid falls of persons from slippery surfaces.

M. Fumigation

112. Fumigants should be handled and used only upon the advice of and by persons thoroughly familiar with the individual properties and hazards of each.

113. Operators should make sure that they comply with all local laws and regulations covering fumigation.

114. Common fumigants and some of the properties and hazards connected with each are as follows:

- (a) Hydrocyanic acid gas. Formed from sodium or potassium cyanide combined with sulphuric acid and water. Both gas and solids are absolutely deadly even in minute doses and not even the smallest particle of powder or liquid should be allowed to touch lips or eyes. Used principally in fumigating buildings and their contents, greenhouses, and citrus fruits. Nonflammable. Lighter than air. Has acrid odor and taste resembling peach pits. Operators should use rubber gloves when handling chemicals and dispose of residues only by burying.
- (b) Calcium cyanid. Largely replacing liquid hydrocyanic acid gas and sodium and potassium cyanid because of comparative ease in use. Available in dust, flake, and granular form. Gives off a poisonous, nonflammable, lighter-than-air gas in presence of atmospheric moisture. Volatilization and effectiveness dependent upon fineness of particles. Useful for control of wood borers by injecting into burrows and then sealing orifices.
- (c) Carbon disulfide. A liquid which volatilizes upon exposure to air producing a gas which is heavier than air. Used for soil fumigation, borer control, etc. Used for wood borer control by injecting into galleries from an oil can and then sealing orifices. Highly flammable and explosive when mixed with right proportions of air so must be kept away from sparks or open flame. For this reason has been largely replaced by carbon tetrachloride and a mixture of ethylene dichloride plus carbon tetrachloride.
- (d) Carbon tetrachloride. A volatile liquid. Nonflammable. Produces a gas which is heavier than air. Used similarly to carbon disulfide. Used also in mixture with ethylene dichloride. Mixture nonflammable also. May produce headache or serious illness when used in confined places. Ventilation important.
- (e) Paradichlorobenzene. A volatile solid in crystalline form. Nonflammable. Produces a gas heavier than air. Used principally as a specific

for peach tree borer and clothes moths. Used as soil fumigant. May produce headache or serious illness when used in confined places. Ventilation important.

N. First Aid and Poisonous Plants

115. Each member of a tree preservation crew should be trained in first aid and the prone pressure method of resuscitation. First-aid kits should be provided for each crew and kept handy for any emergency that may arise.

116. Small cuts, scratches, and blisters must be attended to immediately. Even the most minor scratch may easily become infected and lead to serious complications.

117. A common source of "lost-time" accidents among tree workers is contact with poisonous plants such as poison ivy, poison oak, and poison sumac. Susceptibility to the poison varies with individuals, but it is never safe to assume immunity from it.

118. If contact with poisonous plants cannot be avoided, the hands, arms, and face should be washed frequently with strong yellow soap or washing powder which will often prevent infection or at least retard it. A solution of 5 percent ferric chloride in a half-and-half mixture of alcohol and water is useful for this purpose also.

119. There is danger of reinfection through handling or wearing clothes which have been in contact with poisonous species even after the passage of months or even years hence. Susceptible persons should avoid wearing such clothes.

120. When poison eruptions on the skin are discovered a physician should be consulted. Home remedies should not be used as they may spread the infection instead of curing it.

121. The prophylactic use of poison ivy extract seems to have given favorable results in recent experiments in certain CCC camps. Favorable results were also obtained from inoculation given to men on the trail crew in Sequoia National Park. Persons susceptible to such poison should investigate this possible system of immunization before working in proximity to poison ivy.

122. What a First-Aid Man Should Do.^{19/}

- (a) Be calm.
- (b) Take command and give orders.
- (c) Locate the injury.
- (d) Keep onlookers away from the patient.
- (e) Use a knife or scissors to remove clothing.

- (f) Look for bleeding and check it by pressure of the fingers or thumb on the skin over the blood vessel at the location of the pressure point, by a tourniquet, or by a bandage compress and bandage applied with pressure over the wound.
- (g) Look for shock; if present, lower head of patient, apply blankets and wrapped hot water bottles, hot bricks, etc., and if patient is conscious give aromatic spirits of ammonia in water.
- (h) Keep the patient lying down.
- (i) Cover all wounds completely with a sterile bandage compress and a triangular or cravat bandage, except wounds of the nose, chin, fingers, or toes, where a bandage compress only is used.
- (j) Remove a loose foreign object from a wound with a piece of sterile gauze, but do not attempt its removal if it is embedded in the wound.
- (k) Look for a fracture; never move a patient unless absolutely necessary until splints have been applied.
- (l) Leave reductions of dislocations or fractures for the surgeon, except dislocation of jaw, fingers, or toes.
- (m) Place bandage compress and a bandage without undue pressure over a compound fracture before applying splints.
- (n) Exclude air as quickly as possible from burned surfaces by using tannic acid salve.
- (o) Only part of your work is completed when the patient is ready for the stretcher. Unnecessary or rough handling of a patient may undo all your work.
- (p) You should, therefore, slowly place the patient on the stretcher avoiding jerky movements and carry him to safety. Always test a stretcher before placing a patient on it.

123. First Aid Don'ts.^{19/}

- (a) Don't touch a wound with your fingers or any instrument.
- (b) Don't put an unclean dressing or cloth over a wound.
- (c) Don't allow bleeding to go unchecked.
- (d) Don't allow a patient with a fracture or suspected

fracture to be moved until splints have been applied.

- (e) Don't fail to put plenty of padding between limb and splint.
- (f) Don't neglect shock.
- (g) Don't make a severely injured person sit up, stand up, or walk.
- (h) Don't fail to give artificial respiration when needed.
- (i) Don't fail to remove false teeth, tobacco, or other foreign objects from the mouth of an unconscious person.
- (j) Don't remove the clothing from the injury in the usual way--cut or rip, at seams when possible.
- (k) Don't permit air to reach a burned surface.
- (l) Don't wash wounds.
- (m) Don't put drugs in or on a wound.
- (n) Don't remove a foreign object that is imbedded in a wound.
- (o) Don't put a quid of tobacco on a wound.
- (p) Don't reduce dislocations, except of the fingers, toes, or lower jaw.
- (q) Don't leave a tourniquet on over 20 minutes without loosening.
- (r) Don't tie knots over the eyeball.
- (s) Don't tie knots over wounds of skull when fracture is suspected.
- (t) Don't tie knots over protruding bones in compound fracture.
- (u) Don't fail to test a stretcher before placing a patient on it.

SUMMARY OF FUNDAMENTAL SAFETY RULES

1. Before starting any tree operation all necessary time should be taken to find out if any local danger exists. Haste causes accidents--take time to be careful. (Rule 4)

2. Every rope must be thoroughly inspected for cuts or abrasions before each use. Do not hesitate to cut off a weak end or to discard an unsafe rope. (Rule 26)

3. The safety sling must always be used while working in a tree even if a ladder is used also. Climbers must stay in the sling until again safely on the ground. (Rule 36-41)

4. In pruning and tree removal a limb which cannot be controlled by hand should have an adequate number of lines attached to permit controlled lowering. The end of the safety rope should never be used for this purpose. (Rule 55)

5. Special care must be exercised when working in close proximity to electric wires. Only men who are thoroughly familiar with the dangers connected therewith should be allowed to do this work. (Rule 62)

6. Tools should be raised or lowered by means of a handline or the free end of the safety rope. They should never be thrown into or dropped from a tree. (Rule 70)

7. Before any tree is felled the crew should be properly instructed by competent authority in the proper manner of notching, wedging roping, etc., so that the tree may fall as desired. (Rule 83)

8. Men should not attempt to lift logs or other loads which are too heavy. (Rule 94)

9. No person should be allowed to ride on any part of a truck except within the cab or bed. No part of the body should extend beyond any part of a truck when it is in motion. (Rule 101)

10. All spray and fumigation materials should be used with extreme caution. Certain materials are deadly poisons and serious injury or discomfort may be received from many materials. (Rule 103)

Acknowledgment

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