FOREST SERVICE SAFETY CODE

Fellow Members of the Forest Service:

Here is your personal copy of the Forest Service Safety Code. I ask you to keep it handy for reference and to use it. The purpose of this Safety Code is to keep you gainfully employed, out of the hospital.

You won't find many "don'ts" in it. The Code tells you what you can do, not what you can't do. However, when you see the word "shall," that means a mandatory requirement. A recommended practice is indicated by "should." A paragraph marked with a large black dot ● is a "killer" item. Every such black mark shows that one or more Forest Service men died because they, or some one working with them, didn't do what the Safety Code says. Many fatalities can be traced back indirectly to failures of supervision. These show up on pages 7-8. The more direct reasons caused by the workers themselves are sprinkled all too frequently elsewhere in the Code.

Our Safety Code -- how to get the job done without getting hurt -- is not the product of any one person. It is the accumulated experience of many Forest Service people all over the country assembled here for your benefit. Nearly everyone has contributed to it. If you can suggest a still better -- and safer -- way to do a job, let's have it. Maybe you will save a life or prevent a painful, disabling injury.

This Safety Code has my full support. But you know as well as I do that merely sending you this Code won't keep you alive and well. You'll have to use it. Your safety depends on you. Speaking personally, I want my friends to stay alive and whole. Speaking officially, I cannot help but feel obligated to do what I can to help cure or take whatever steps are necessary to protect the people of the Service from the "Typhoid Marys," those people who seem to carry the germs of potential accidents with them, who just can't get jobs done without injuring themselves or their fellow workers. Do me a favor: Work safely.

Safety won't cost you anything -- until you forget it.

Richard E. McArdle

RICHARD E. McARDLE
Chief, Forest Service

PAGE

PART AND SECTION LISTING

Part 1 - Policy & Supn.

SECTION 11 POLICY

111 FOR INDIVIDUALS It shall be every employee's duty to protect himself and his fellows from accidents.

.1 This shall be done by:

a. Active participation in a continuing program for safe working conditions.

b. Watching for, immediately removing, or reporting all foreseeable hazards endangering employees or the public, whenever practicable.

c. Learning safe work methods to minimize hazards which cannot be removed.

d. Tactfully calling to the attention of fellow workers any unsafe practices or conditions.

e. Studying the Safety Code, and asking his boss if he is not sure of safe procedure.

f. Being continually alert to avoid actions endangering the safety of anyone, including himself.

112 FOR SUPERVISORY OFFICERS Work supervisors shall consider employees' safety a basic part of their jobs.

.1 They shall use every means at their disposal to integrate safety in all planning, training, inspection, and work execution.

.2 Safe working conditions shall be provided in all work in all activites, through:

a. Removing all foreseeable hazards wherever practicable.

b. Training in safe work methods.

c. Requiring employees to have physical condition consistent with job requirements.

.3 Good safety performance shall be acknowledged by suitable recognition, depending on the merits of each case.

.4 Responsibility shall be fixed for all preventable accidents if possible, and discipline shall be applied if warranted.

113 FOR INSPECTORS All general and functional inspectors at all levels shall be required, on their assigned activities, to:

.1 Be familiar with, and check for compliance with the Forest Service Safety Code. See Responsibility Check List 116.

.2 Examine working conditions and practices to determine hazards.

.3 Check the effectiveness of accident prevention, both for employees and for the general public.

.4 State, in inspection reports, ways to make jobs safer and to eliminate hazards to the public, as well as to give commendations for safety accomplishments.

.5 Check on compliance with accident prevention clauses when included in contracts.

114 REGIONAL FORESTERS AND DIRECTORS Regional Foresters and Directors shall have full responsibility for effective safety management. This includes:

.1 Recruiting those physically and mentally well qualified for the work.

.2 Placing people in jobs to which they are suited physically and mentally.

.3 Integrating safety into all work planning, training, inspection on all projects.

.4 Training personnel to identify and eliminate hazards, and to work safely.

.5 Awarding deserving employees with suitable recognition for good safety performance.

.6 Fixing responsibility for accidents*, applying discipline if warranted, and preventing recurrences.

*An accident is defined as an unexpected event which can result in personal injury, or damage to property, equipment, or material.

.7 Inserting, then enforcing, practical accident prevention clauses in work contracts where the nature of the project shows the need.

.8 Providing adequate job financing so jobs do not have to be highballed by inadequate, unskilled employees or unsafe materials.

115 ALL-SERVICE Every reasonable facility of our own and other organizations shall be used to carry out the policy of integrating safety into all work planning, training, inspection, and execution.

.1 All Forest Service handbooks shall include specific safe practices for their activities which supplement the Safety Code.

.2 Wherever applicable, local, state, or nationally recognized safety codes or standards shall be used in Forest Service work. See Appendix C for sources.

.3 Safety devices shall be used planwise in order to get maximum on-the-job benefits. For example:

a. Place posters strategically.

b. Display them attractively, not more than 3 at one location.

c. Change them frequently.

116 PRIMARY DIVISIONAL RESPONSIBILITY FOR ENFORCEMENT AND FIELD CHECKS OF FOREST SERVICE SAFETY CODE

DIVISION	CODE SECTION
.1 All Divisions	21 Contracts
	92 First Aid
	101 General Public
	53 Hand Tools Including Power
	94 Off The Job Safety
	11 Policy
	12 Supervision
	95 Woodsmanship
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	31 Color Code
	41 Concrete and Masonry
	74 Creosoting
	51 Crushers
	32 Electricity
	42 Excavation
	52 Graders
	54 Machine Equipment Oper.
	34 Machine Shops
	83 Motor Vehicles
	55 Power Shovels & Cranes
	36 Repair Shops
	43 Rigging & Gin Poles
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	61 Chemicals
	78 Scaling
	79 Surveying
	710 Timber Stand Improvement
	711 Tree Felling
.10 Wildlife Mgmt.	91 Firearms

SECTION 12 SUPERVISION

121 GENERAL

.1 A person who supervises the work of one or more individuals shall be responsible for taking every reasonable precaution to prevent accidents.

.2 Forest officers in immediate charge shall issue and review the Safety Code with foremen or superintendents when duties are assigned, and delegate responsibility for compliance. There is no job so important that it cannot be done safely.

.3 Supervisory officers and overhead shall be responsible for the following:

a. Analyze the hazards and determine the safest way of doing the job.

b. Locate and correct unsafe conditions and practices before they cause an accident.

c. When assigning a job to a foreman or worker, have him assist in cataloging the job hazards and emphasize the killer or more serious risks involved.

d. When in charge of new men, first check their experience by questions and demonstrations. Work shall not be started until thorough on-the-job instruction has been given, emphasizing safe work practices and pointing out job hazards.

e. Continue instructions as necessary to maintain safe working habits of all workers.

f. Insist on safe work methods. Recommend transfer to other kinds of work, discharge, or demotion of workers who cannot or will not follow instructions.

g. Anticipate the unexpected and be prepared to meet it.

h. Insist upon safety-minded attitudes at all times.

i. Provide first-aid kits for crews on each work project.

j. Consider advisability of appointing a special safety officer on projects where numerous or unusual hazards exist, such as on large fires.

122 EMPLOYEE CONDITION

.1 All employment officers shall employ only those physically and mentally fit for the job.

.2 Periodic physical examinations should be urged for all permanent personnel.

.3 Supervisory officers shall give serious attention to the physical condition of seasonal employees when they return to duty.

.4 If there is reason to question an employee's physical condition, he should be urged to undergo a physical examination by his personal physician at his own expense.

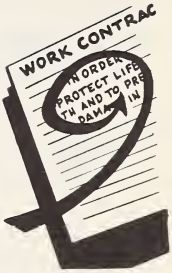
a. The doctor's report should be furnished to the supervisory officer.

.5 The practice outlined in .4 shall be mandatory if there is serious doubt that an employee is physically qualified to perform arduous work when such would be required.

Part 2 - Contracts

SECTION 21 CONTRACT SAFETY

211 GENERAL CLAUSES



.1 A general accident prevention clause shall be included in all hazardous work contracts, except for road construction but including memoranda of verbal agreement, worded as follows: "In order to protect life and health and to prevent damage in the performance of this contract, the contractor or any of his sub-contractors will use due diligence in preventing accidents and will comply with applicable provisions of Federal and State laws and regulations. The contractor will maintain a record of all cases of death, injury, or disease arising out of, or in the course of, employment on work under this contract. This record will be available upon the call of the contracting officer or his representative."

.2 Duplicate accident records shall not be necessary if reporting is already a state requirement.

.3 For road construction contract safety clauses, see pages 610-615 and 648-652 in Road Handbook.

212 SPECIAL CLAUSES

.1 All hazardous work contracts shall contain special safety clauses tailor-made to fit local conditions, in order to adequately protect our personnel and those of the contractor.

.2 Suggested sources are the Manual of Accident Prevention in Construction of the Associated General

Contractors of America, Inc., the Forest Service Safety Code, U. S. Engineers' Safety Requirements, and Air Operations Handbook for aviation activities.

.3 Prior to signing the contract, the contractor and forest officer shall arrive at a mutual understanding as to what hazardous conditions and practices need to be eliminated or curtailed to prevent injury to people and damage to property.

.4 This understanding shall be made a part of the contract.

213 ENFORCEMENT AND INSPECTION

.1 Forest officers shall be trained in the action they are to take in enforcing all accident clauses before agreements or contracts become effective, including the right Safety inspection methods.

.2 Inspection to assure compliance with applicable provisions of Federal and State laws and regulations, such as those of State industrial or Workmens Compensation Commissions, is not our responsibility.

.3 The special accident prevention knowledge and skill of regional, station and unit safety officers shall be fully utilized in developing practical contracts and in their enforcement.

.4 On larger or emergency jobs consideration should be given to employment of full-time or part-time safety officers, in order to protect the accident prevention interests of both the Government and the contractor and their respective employees.

Part 3 - Bldgs. & Grounds

31 COLOR CODE

311 SAFETY SIGNS should conform to these standards: See Chapter 1X, Sign Handbook, for layouts and suggested messages.

.1 Danger. To warn of specific dangers only, such as electrical or explosive hazards, "No Smoking" areas. White background on face of sign. Danger in white letters set in red oval, set in black rectangular panel. Red and black to be separated by white line. Message in black letters on the white background.

.2 Caution. To warn of possible dangers or unsafe practices. Yellow background on face of sign. Caution in yellow letters set in black panel. Message in black letters on the yellow background.

.3 Safety instruction. To provide information relating to general safe practices, such as good housekeeping. White background on face of sign. Heading in white letters set in green panel. Message in black letters on the white background.

.4 Directional. To indicate the way to stairways, fire escapes, exits, and other locations. Black letters on the white background.

.5 Informational. To carry messages of a general nature, such as rules, regulations, and markers when such postings do not conflict with Danger or Caution purposes. Any variety of color except that neither red, yellow, nor orange shall be used. Cautionary blue is good for the heading panel with white heading letters. Message in black on the white background.

312 COLOR IDENTIFICATION MARKING These standards should be used to identify accident hazards and protective equipment and warnings, and to assure orderly arrangement, including good housekeeping. They supplement but do not replace safeguarding of equipment and other safety devices.

.1 Safety Green, For safety equipment, such as:

a. First-aid rooms.
b. Dispensaries.
c. Medicine cabinets.
d. First-aid kits.
e. Safety bulletin boards.
f. Safety instruction signs.
g. Starting buttons on machines.
h. Clean rag containers.
i. Safety showers.
j. Safety equipment, such as stretchers, gas mask, and respirator containers.

.2 Alert Orange. More attention value than any other color. Use sparingly to identify extreme hazards and for dangerous parts of equipment which can crush, cut, electrocute. Use on:

a. Stopping buttons on machines.
b. Exposed parts of turning wheels, rims, edges of pulleys, wheels, sprockets, gears, chains.
c. Narrow strip on cutting edge

of cutting devices and rollers.

d. To identify moving control wheels and levers on lathes, drill presses, etc. Paint spokes of control wheels only.

e. Interior surfaces of electrical switchboxes and fuse box covers, switch handles, power boxes, and machinery guards to suggest replacement of cover.

f. Containers for explosives or highly combustible materials, and greasy rags.

.3 High Visibility Yellow. Highest visibility of any color under nearly all light conditions. Use to mark physical obstacles, such as striking against, stumbling, falling, caught between, and tripping hazards. Use parallel bars of yellow and black for unusually strong attention value. Use on:

a. Construction equipment, such as bulldozers, tractors, graders, and carryalls.

b. Movable objects, such as floor or overhead cranes, floor jacks, stands, hydraulic hoists, chain hoist blocks and hooks, loading buckets.

c. Edges of unguarded platforms, wells, open pits, and aisle markings around hazards.

d. Projections, protruding parts, low beams and pipes, low or impaired clearances, and coverings or guards for guy wires.

e. Conveyor parts or other fixtures suspended at hazardous levels from ceilings or walls extending into normal operating areas.

f. Elevation changes, such as stairway approaches, top and bottom steps, risers of off-standard steps,

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raised door sills, and curbings.

g. Pillars, posts, columns, and aisle obstructions which might be struck, such as those located in or near passageways.

h. Frames of elevator doors and gates; lips of horizontally closing doors.

i. Outdoor traffic signs and dead ends.

j. Hand and guard rails.

k. Unsafe drinking water supply.

.4 Fire-Protection Red. Signifies fire equipment and specific dangers. Use on:

a. Extinguishers (or board upon which mounted) hose nozzles and connections, sirens, pumps, fire-tool and ladder markings, buckets, pails, and water barrels.

b. Fire alarm stations and hydrants.

c. Fire doors and exit lights.

d. Safety cans and gasoline dispensing pumps.

e. Danger signs.

f. Water faucets or hydrants used for fire protection.

.5 Precaution Blue. To caution against operating certain equipment. Use on:

a. Machinery and equipment which should not be moved or started.

b. Machinery and equipment under repair.

.6 Traffic White, including Gray and Black. Good housekeeping and indoor traffic colors. Use on:

a. Marking for locations and width of aisles, passageways, and dead ends.

b. Marking for good housekeeping facilities.

c. Floor areas immediately surrounding waste receptacles.

d. Traffic controls.

e. Corners.

f. Walkways, gray or black.

g. Floors, gray.

h. Storage areas.

i. Waste receptacles.

.7 Interior Walls and Ceilings. Use flat buff, gray, cream, light green, or white for high-reflection value.

.8 Fixed Shop Equipment. Use contrasting colors, such as green on body, and buff, cream, or ivory on moving parts. Use colors which reflect rather than absorb light.

.9 Piping Systems. Use these colors:

a. Green, white, black, gray, or aluminum for safe materials such as water, brine, compressed air, hot water below 212° F. cold water pipes.

b. Yellow for dangerous materials, such as acids, gases, water hotter than 212° F.

c. Red for fire protection and sprinkler systems, hot water pipes.

313 COLOR STANDARDS (based on the following Pittsburgh paint specifications or their equals):

.1 Safety Green (Vista Green UC-10076)

.2 Alert Orange (Focal Orange UC-10081)

.3 High-Visibility Yellow (Focal Yellow UC-10078)

.4 Fire-Protection Red (Focal Red UC-10080)

.5 Precaution Blue (Focal Blue UC-10077)

314 Fluorescent and light reflecting paints and signs should be used where hazards justify it. Decalcomania or other transfer type signs are also acceptable.

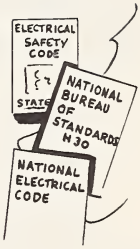
BLDGS & GROUNDS 16 COLOR CODE 31

PART 3 BUILDING & GROUNDS

32 ELECTRICITY

321 GENERAL

.1 All wire and apparatus shall be of a type approved by the Underwriters' Laboratories, Inc.



.2 Installation and maintenance shall comply with the Electrical Safety Code, National Bureau of Standards Handbook H30, National Electrical Code, or State Codes, whichever is appropriate.

322 INSTALLATION AND REPAIR

.1 Wiring in buildings, and other than minor repairs to electrical equipment, shall be made only by a competent electrician, licensed in States requiring licenses.

.2 Initial inspection of wiring in buildings for safe installation and insulation shall be made by a qualified electrician, holding a State license where available. Shut power off before work is done on "hot" lines. Exceptions: An authorized electrician, in an emergency, may work on a live line not exceeding 220 volts, if supplied with adequate safety devices.

.3 The lock on seal switches supplying current to lines being worked on shall be locked in the "off" position to prevent accidental closing. A warning tag shall be attached.

.4 Changes or repairs to company-owned lines leading to the master service switch shall be made only by the power company.

.5 Loose wires hanging from buildings or poles shall not be touched until you are certain they are not connected to live source of electricity.

.6 Insulation on wire shall not be completely trusted.

.7 These electric devices which may come in contact with electric circuits of more than 150 volts, shall be grounded and maintained in safe condition:

a. All metal, especially generator and motor frames, switch boxes, conduit and outlet boxes.

b. Electric tools and fittings.

.8 Exposed metal frames of portable appliances and devices shall be grounded regardless of voltage in hazardous locations, such as in damp places.

.9 The following unsafe conditions shall be remedied:

a. Defective or broken installation on a cord.

b. Improper or poorly made connections to terminals.

c. Broken or otherwise defective plug.

d. Loose or broken switch.

e. Sparking brushes.

.10 Workers shall be especially careful when working near power lines to prevent wire rope, telephone lines, derrick booms, water from fire pumps, or other conductors from coming within 15 feet of high voltage wires. Where there is less clearance, or where there is any question as to the electrical hazard, your work supervisor or power company authorities shall be consulted for advice before starting work or making changes. See 324.

.11 The power company shall be notified in advance concerning work to be done near power lines or high voltage installations.

.12 Switch shall be pulled before cartridge-type fuses are removed or replaced.

.13 Fuses shall be of right amperage to correspond to expected load up to the capacity of conductor. Below are the maximum current carrying capacities of various kinds and sizes of conductors. Never fuse in excess of these values, nor use substitutes such as pennies.

Gage No. (Am. Wire)	Rubber Insul.	Amperes varnished Cambric insul.	Other insul. and bare conductors
14	15	18	20
12	20	25	30
10	25	30	35
8	35	40	50
6	50	60	70
4	70	85	90
2	90	110	125

.14 Circuits shall not be overloaded. For example, wire to an electric range shall be not less than No. 6; wire serving kitchen or heater appliances not less than No. 12. Fuse sizes should not be changed to a higher rating than proper.

.15 Electric outlets and switches shall be so placed, especially in bathhouses and engine rooms, that:

a. They cannot be reached while standing on a wet surface.

b. That one cannot touch a grounded conductor, such as a water pipe.

.16 Extension cords:

a. Shall be hung on non-flammable non-conductors or insulated staples.

b. Shall not be run over by motor vehicles or other wheeled objects.

c. Shall not be overheated or allowed to become kinked or come in contact with oil, grease, or chemicals.

d. Shall be replaced when worn, frayed, or brittle.

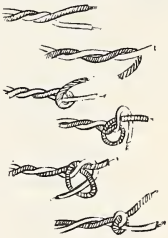
e. Shall be pulled by the plug, not the cord.

f. Shall have Underwriters' Laboratories label or equal,

g. Shall be stored in a clean, dry place where they can lie loosely coiled.

h. Shall be tied by Underwriter's knots when repairing plugs permitting this practice.

i. Should not be inserted through walls.



323 EQUIPMENT

.1 Electrician's hand tools shall be in good repair and restricted to their proper use.

.2 Rubber gloves shall be inspected and given the air test before using. Inspect used gloves, and similar equipment, before use, and then at 30-day intervals.

.3 Only non-conducting ladders shall be used for electrical work.

.4 Boxes, chairs, or other makeshifts should not be used as substitutes for ladders or platforms.

.5 Only dry powder smothering type, carbon dioxide, or other extinguishers without water solution shall be used on fires involving electrical equipment.

.6 Electric appliances shall never be touched with wet hands.

.7 Metal pull cords should have link insulators or be extended with ribbon or twine.

.8 Great care shall be used to avoid contact with 110 volt current, particularly when there is any chance that your body is grounded. 110 volt circuits can kill.

324. THESE GENERAL RULES SHALL BE USED FOR WORKING IN THE VICINITY OF POWER LINES:

.1 Always treat all power lines as dangerous.

.2 Stay away these distances from high tension lines:

a. Up to 6600 volts - 4 feet.

b. Over 6600 volts and not more than 66,000 volts - 10 feet.

c. Over 66,000 volts and when voltage is unknown-15 feet.

.3 Power shovels and other machinery, telephone wire, pipe, drills, well casing and other such materials shall be moved with extreme care when in the vicinity of all power lines. The above clearances are insufficient in such cases and shall be increased by the length of material being handled or the distance of its possibly uncontrolled movement.

.4 Surveying and measurements in the vicinity of power lines shall be made:

a. With clean, dry wooden rules or non-metallic cloth tapes.

b. By the stadia method.

c. By frequent "breaks" of tape to avoid long spans across canyons.

d. By offsetting away from dangerous areas.

.5 Telephone wire being stretched beneath a power line shall be held securely from contact with the power line by means of a clean, dry rope in sound condition a short distance on each side of the crossing.

.6 When a telephone line is supported on the same poles with a power line, everyone in contact with the ground, steel pole or tower, ground wire or other ground potential, shall remain clear of the wire while it is being stretched.

.7 Crews felling timber in the vicinity of a power line shall use one or more heavy rope lines, securely anchored to prevent the tree from falling into the power line. The rope shall be fastened high enough on the tree being felled to provide good leverage.

.8 Brush shall not be burned close to power lines because flame is a conductor of electricity.

.9 A stream of water shall never be played onto or near a line that may be electrically charged. Use water only after the line has been tested and found dead by the responsible power company employee. In the meantime, any work necessary to control a fire shall be done with all men, hose, and equipment at a safe distance from all broken or sagging conductors.

.10 Automatic breaker action on one or both ends of a line does not make it safe. The breaker may be reclosed, or the line may be subject to induced voltage. Never handle any power line conductor. Call power company employees to do that.

.11 Make the first contact with a telephone wire which passes in the vicinity of power lines, with the back of the hand, so that hand will not involuntarily close and grip a "hot" conductor.

.12 Never work with one hand on a wire which may become charged while the other hand or another part of the body is grounded. Never grasp a faucet with one hand while flipping a light switch with the other.

.13 Observe the condition of all power lines which may affect the national forest, our personnel, or the public. Report all broken or leaky insulators, line breaks, broken poles, dangerous trees or other conditions which appear to be unsafe.

.14 See Communications 73.

325 RESCUE

.1 Those engaged in any electrical work shall be able to give artificial respiration and first-aid treatment for burns to victims of electrical shock.

.2 To rescue persons in contact with live wires:

a. Assume that wire is alive and do not allow it to touch you.

b. Do not touch victim with bare hands until wire is removed.

c. Use a non-conductor such as dry pole or dry rope to pull wire from victim.

d. Shut off current at nearest switch.

.3 See First Aid 92.

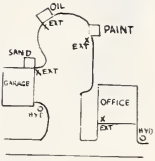
BLDGS & GROUNDS 24 ELECTRICITY 32

PART 3 BUILDINGS AND GROUNDS

33 FIRE PROTECTION

331 GENERAL

.1 See appendix C for standards and codes applicable to this section.



.2 There shall be a practical diagrammatic fire plan for stations or permanent camps involving groups of buildings. This shall show structures, locations of fire equipment, hydrants, fuse boxes, means of escape, chain of command, and individual responsibilities in case of fire.

.3 Only safety matches shall be used in forest area buildings unless special rodent proof containers are provided.

.4 Fires shall be started with non-explosive material, such as pitch or shavings, instead of gasoline, kerosene, or other flammable liquids.

.5 See Electricity 32, Flammables 62, Welding 712, Chemicals 612.7

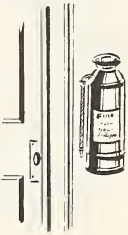
332 FIRE-FIGHTING EQUIPMENT

.1 Fire-fighting equipment, such as Underwriter Laboratory approved extinguishers or sand and water containers, and ladders as appropriate, shall be provided for all buildings where fire hazards exist; also in others where city fire department service is not available.

.2 Fire-fighting equipment is not necessary for all buildings in outlying stations where no special fire hazards exist, as long as the equipment is available nearby.

.3 Containers of dry sand, under suitable shelter, with shovels shall be placed at accessible sites within or adjacent to repair shops, oil or gas dispensers, and other high-hazard areas. Sand shall be checked frequently to be sure it is dry.

.4 Extinguishers should be placed near doors so fire will not block access to them.

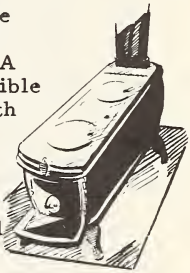


333 STOVES - FIREPLACES

.1 Stoves and pipe shall be kept in good repair.

.2 If building walls are combustible, stoves shall be installed not less than 2 feet from the walls. If a metal or asbestos shield is used, stoves shall be installed not less than 1 foot from the wall, with an open air space of 1 inch between the shield and the wall. The shield shall be extended at least 1 foot beyond the heating surface in all directions.

.3 A minimum ventilated air space of 5 inches shall be provided between stove bottom and combustible floor. A metal, cement, or other non-combustible shield shall be put on the floor beneath the stove to not less than 6 inches beyond door and draft slides of the stove. Non-combustible bases not a shield, shall be provided for stoves having fireboxes or ashpits supported directly on the floor.



.4 Pipe railings or metal screen guards 3 feet high not less than 18 inches from stoves should be

provided in shops and warehouses.

.5 A damper for wood-stove pipes 4 feet or more in length should be provided. Pipe shall be well braced and fastened by metal screws, stove bolts, rivets, or wire. Replace defective pipe.

.6 Spark arresters shall be required for each stove in tent camps where wood-burning stoves are used.

.7 Outside vertical pipe shall be at least 2 feet from tent and should extend a minimum of 3 feet above the peak of the tent to provide air space between tent and stove. Only metal guys shall be used, never wood.

.8 All chimneys and stove pipes shall be inspected at least annually, and dangerous accumulations of creosote and soot removed.

.9 Roofs and areas adjoining buildings with wood- or oil-burning stoves or fireplaces shall be kept free of flammable material.

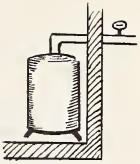
.10 The installation of spark arresters on permanent structures will be optional with Regional Foresters and Directors, subject to local ordinances.

.11 Fireplaces shall be equipped with screens.

.12 Bottomless stoves, such as Kimmel fire boxes, shall be placed on sand or other non-flammable material extending down to mineral soil.

.13 Live ashes from cleaning an ash pit shall be removed from the building at once and disposed of in a safe place.

.14 Pipe lines and connections used for conveying fuel to oil-burning stoves or furnaces shall be kept tight. If tank is outside building, shut-off valve shall be provided at tank for use in case of fire inside building.



.15 Wood boxes, beds, clothing, etc. shall be kept a safe distance from heating apparatus.

334 CHIMNEYS

.1 Old chimneys shall be checked for cracks, and repaired. Be sure supports are safe.

.2 New chimneys shall be built from the ground up.

.3 Stovepipes should go directly into the chimney. If necessary to go through a wall or ceiling, stovepipes shall be provided with a double metal ventilated thimble not less than 8 inches larger in diameter than the pipe, with the annular space filled with mineral or rock wool.

335 DEBRIS - FLAMMABLE MATERIAL See 62

.1 Oily cleaning rags or mops should be stored in a safe place.

.2 Metal cans with good covers should be provided for oily shop rags. Cans shall be emptied frequently.

.3 All flammable debris in all buildings shall be disposed of promptly.

.4 There shall be clear passageways to electric switches, hydrants, fire extinguishers, and exits in all buildings.

.5 Flammable materials such as dry grass, weeds, and brush, shall be cleared for a safe distance, of at least 25 feet if possible, around buildings, tent camps, oil or gasoline dispensers.

.6 Roofs shall be kept clean and hazardous branches shall be cut near chimney or stovepipe outlets.

336 IN CASE OF FIRE

.1 Turn in an alarm at once.

.2 Remember your part in fire plan and do your job well.

.3 Use the right type of extinguisher.

.4 Use equipment correctly. Do not delay.

.5 Make certain the fire is out.

.6 Be sure that any equipment involved is made ready for re-use.

337 SEVEN STEPS TO SAFETY

.1 Know the nearest regular and emergency exits of any building you may be in.

.2 If you detect fire or smoke, act quickly but coolly. Notify the telephone operator or other source of help. Give exact information.

.3 Feel of a door before you open it. IF IT IS HOT, KEEP IT CLOSED. Close transoms and cover cracks around the door.

.4 Take no unnecessary chances to get out of the room. Unless in immediate danger, you may be safer where you are.

.5 If the door is cool, open it a little. If the hall seems safe, leave by a known exit.

.6 If you must leave through heavy smoke, stay close to the floor. A wet cloth over your face may help breathing.

.7 Close doors and windows behind you to reduce drafts and the spread of fire.

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Type & Operation	Contents	Kinds of Fire & Use A. Wood rubbish	B. oil, grease flam-mables	C. live elec. equip.	D. motor vehi-cles	Subject to Freez-ing	Yearly Main-tenance	Comments
Dry chemical  Valve	bicarbonate of soda and drying agent-pressure by CO_2 gas cartridge.	NO but will control small fires.	YES	YES	YES	NO	weigh gas cartridge check nozzles and hose-tag.	Very effec-tive exting-uisher - also easy to use because it cools fire rapidly. Easy to maintain.
carbon dioxide  Valve	liquid CO_2 under pressure.	NO but will control small fires.	YES	YES	YES	NO	weigh; and tag.	must be returned to distributor or factory for recharg-ing.
Vaporizing liquid  Double Action pump or valve	Carbon Tetrachloride	NO	YES	YES	YES	NO	partly discharge, refill to capacity if OK - check pressure & for corrosion-tag.	Carbon tet fumes are poisonous, also those generated when fluid hits hot metals. Ex-tinguisher difficult to maintain.
Foamite  Inversion	Solution of aluminum sulfate and bicarbonate of soda.	YES	YES	NO Electric Shock Danger	NO	YES	Empty, clean, recharge, and tag yearly. Protect from freezing.	Check hose and nozzle frequently for plugging.
Soda Acid  Inversion	bicarbonate of soda solu-tion and sul-phuric acid.	YES	NO	NO Electric Shock Danger	NO	YES	Empty, clean, recharge, and tag yearly. Protect from freezing.	Check hose and nozzle frequently for plugging.

BLDGS. & GROUNDS 30 FIRE PROT. 33

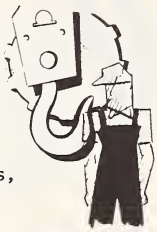
for

PART 3. BUILDINGS AND GROUNDS

34 MACHINE SHOPS

341 GENERAL

.1 Clear, adequate aisle and working space shall be maintained. Good housekeeping creates safe working conditions.



.2 Support of overhead cranes shall be checked to be sure they can withstand heavy strains.

.3 Hazardous drive belts, pulleys, gears, wheels shall be guarded.

.4 The operator shall assure himself that:

a. The work surface is clear of all tools, material, not required for the proposed operations.

b. The gear, belt, and other guards or other safety devices are in place and properly adjusted.

c. All parts such as grinding wheel guards, tool rests, are set to clear all moving parts.

d. The tools are adjusted for not too deep a cut, and the feed not too rapid.

e. The work is firmly and properly held in a chuck, clamp, or other holding device.

.5 All cutting tools shall be maintained in good condition. Defective tools shall not be used.

.6 Power-driven equipment shall be shut off immediately after completion of each work operation and the operator shall remain at the site of machine until it has stopped.

.7 Gloves shall not be worn by machine operators.

.8 Machine power shall not be used when mounting or changing chuck face plates, milling cutters.

.9 Chuck wrenches and drift pins shall always be removed as soon as work has been adjusted.

.10 Metal cuttings and chips shall be removed by a brush, not with the fingers.

.11 A chipper guard shall be used when operating the chipper or lathe, if the material requires.

.12 Close-fitting sleeves and clothing and non-skid shoes shall be worn. Do not wear finger rings, ties,

.13 Belts on operating machines should be replaced or shifted by means other than the hands, with machine operating at lowest possible speed.

.14 An operating machine shall never be left unattended.

.15 Belt dressing should be applied to the belt as it leaves the pulley.

342 GRINDING WHEELS

.1 Grinding machines shall be securely mounted on substantial foundations.

.2 New wheels shall be properly mounted as a precaution against breaking:

a. Clean the bearing surfaces of wheel, flanges, and spindle.

b. Make sure wheel fits spindle, neither too tight nor too loose.

c. Use washers of soft material between flanges and wheels.

d. Tighten spindle and nuts just enough to hold flanges firmly in place against wheel.

e. Before turning on power, turn wheel over a few times by hand to see that it runs true and does not strike guard or work rest.

.3 Wheels shall be equipped with tool rests, safe hoods, and belt guards. Hoods must extend beyond outside edge of stone.

.4 The tool rest shall be adjusted as close to the wheel as possible without touching it so the object being ground cannot be drawn between the guard and the wheel. Fasten the rest at the center line of the wheel, never below.

.5 Before turning on power, guards shall be adjusted and wheel shall be safely fastened on the spindle.

.6 Goggles or eye shield shall be worn at all times while power grinding.

.7 Signs should be placed above all grinding machines stating that eye protection is required.

.8 Operator shall stand to one side of the plane of a rotating grinding wheel during first few seconds of wheel's operation.

.9 When using a cold wheel, the work shall be applied gradually, to warm up the wheel and reduce breakage.

.10 Operator shall grind on the sides of a wheel only when it is made for side grinding, and then only when the sides are not badly worn or when not much pressure is needed. Avoid striking the wheel on the side.

.11 A wet-type grinding wheel shall not stand partly in water.

.12 Operator shall report immediately any grinding wheel that seems to be unsafe, or which is operating improperly, such as vibrating excessively.

.13 Before leaving the wheel, the power shall be shut off. The operator shall remain at the site of the machine until it has stopped.

343 BUFFING WHEELS

.1 A guard enclosing one-half of the sides and perimeter, extending from 30° above horizontal of the working face, shall be installed on stationary buffing wheels.

.2 Goggles, or a face shield, shall be worn when using a stationary buffing wheel unless it is equipped with a safety glass shield.

.3 Operator using a portable buffer shall wear a face shield and stand to one side of the wheel.

344 METAL LATHES, PLANERS, SHAPERS, MILLING MACHINES, ETC.

.1 The operator shall select a tool bit that is suited to the job, that is in good condition, and shall set it securely in the tool holder.

.2 Operator shall apply a wrench to work or parts only when they are not revolving, and remove it before starting operation.

.3 Hand power only shall be used when putting chucks or face plates on lathes, tightening arbor nuts on milling machines, etc., or when removing them.

.4 Machines shall be stopped to adjust length of stroke on planers or shapers, adjust tools, or change or adjust the work.

.5 Hoist shall be used for lifting heavy chucks and swinging work in place.

.6 Clutch or motor switch shall be placed within easy reach of the operator from his operating position.

.7 Tail stock, tool holder, and object being turned shall be tightly clamped before turning on the power.

.8 Goggles or plastic shield shall be worn when starting or observing a cut and while working cast-iron pieces.

.9 Operator shall file left-handed when filing close to chucks or dogs.

.10 Machines shall be stopped to change a cutting tool or to examine the cutting edge.

345 HYDRAULIC PRESSES

.1 Flat or squared stock shall be provided for pressing and supporting parts being worked on.

346 DRILL PRESSES

.1 Clamps, or a vise attached to the face plate, shall be used for holding short material, or when holes larger than 3/8 inch are being drilled. If the work should slip from the clamp, stop the machine before attempting to make any adjustment or repair.

.2 The drill shall be run at the proper speed and feed. Excessive speeds and feeds may result in broken or splintered drills with serious injury to the operator.

.3 Pressure shall be released before point of break-through.

.4 A file or scraper shall be used to remove burrs from the drill hole.

347 TRIP HAMMERS

.1 A safety device to prevent accidental application of power shall be provided. When making repairs or adjustments, a substantial wooden prop shall be placed under hammer.

348 POWER PUNCHES AND SHEARS

.1 The machine shall be adjusted to suit the thickness of the material being processed.

.2 Die and punch shall be matched for size.

.3 Power shall be shut off when adjustments are made to the machine.

.4 An automatic safety device to prevent accidental application of power shall be provided.

PART 3 BUILDINGS AND GROUNDS

35 OFFICES

351 MANDATORY OFFICE REQUIREMENTS

.1 Aisles, halls, and stairways, shall be clear of objects that may cause falls.

.2 Sufficient lighting shall be provided so all employees can see and avoid the normal hazards in storerooms, halls, offices.

.3 File cabinets shall be fastened together when constructed with fastening devices.

.4 Bottom drawers in file cabinets shall carry heaviest loads wherever possible.

.5 Window sills and ledges shall be free of loose objects.

.6 Worn out insulation and exposed wire shall be repaired.

.7 Space shall conform with all local, State, Federal regulations regarding building codes, fire protection, sanitation, and health.

.8 Matches, cigars, cigarettes, pipe heels shall be dead out when disposed of.

.9 Fire-protection system shall be frequently checked, also fully understood by all employees. See 33.

.10 Elevators shall be operated within safe carrying capacities.

.11 Paper cutters and other hazardous equipment shall be guarded or marked.

.12 See floor loads, steps and hand rails 64.

352 GOOD OFFICE PRACTICES THAT SHOULD BE FOLLOWED:

.1 Extension cords for electrical equipment and telephones placed where they are not tripping hazards.

.2 Desk and file drawers, cabinet doors, bookcase slides, closed when not in use.

.3 Electric fans and paper cutters placed where they are no hazard.

.4 Ladders used to reach top shelves instead of makeshifts like chairs and boxes.

.5 All belts, gears, pulleys, rotating parts on office machines guarded.

.6 Lighting system meeting American Standards Association standards. See APPENDIX C

.7 Floors treated with non-skid wax.

.8 Small rugs provided with non-skid backing.

.9 Glass desk tops without breaks or sharp edges.

.10 Safe lifting practices. See 64.

.11 Regular paper fasteners used, never pins; also razor blades and pins in containers, never loose in desks or thrown in waste baskets.

.12 First aid for all scratches and cuts to prevent infection. See 92.

353 DISPOSAL OF GLASS

.1 Broken glass should be wrapped, marked, and put aside (not in waste-basket) for the janitor.

.2 Unusable fluorescent lamps shall be destroyed as follows:

a. Where lamp is found to have been broken before being used, it shall not be removed from the sleeve containing it, but shall be broken up in the sleeve.

1. Care shall be used not to break the sleeve and permit the poisonous powder to escape.

2. The sleeve and broken lamp shall then be disposed of in such a manner that neither people nor animals could come in contact with it, such as burning in a furnace or burying.

b. Where lamps burn out in service they can be inserted in a sleeve and disposed of as suggested above. Breaking them under water is also safe, after which the glass shall be disposed of as suggested above.

1. The water in which they are broken shall be flushed away because it will absorb some of the chemicals from the powder in the lamps.

2. Persons who have accidentally been exposed to the dust shall see a doctor at once.

3. When disposing of a lamp, heavy leather or rubber gloves shall be worn.

4. When disposing of a number of lamps, full-face respiratory protection shall be worn in addition to the gloves.

5. Lamps should be disposed of as soon as possible after they burn out.

354 HOT WATER SAFETY

.1 Hot water tanks shall be equipped with a safety relief valve in those cases where a check-valve prevents the hot water from backing-up into the cold water main, or where there is no expansion tank.

.2 The pressure at which a safety relief valve is set to operate shall not be in excess of the maximum allowable working pressure of the tank.

.3 There shall be no valve or other obstruction between the safety relief valve and the tank; the discharge opening shall be the full size of valve opening; and the safety valve shall be so arranged that no one may be scalded by its discharge.

355 GAS, OIL, KEROSENE SPACE HEATERS

.1 All gas or fuel oil type space heaters used to heat lookout tower cabs or other structures shall have vent pipes connected with an approved flue or piped directly to the outside of the building.

.2 Rooms heated with kerosene wick type space heaters shall be ventilated so no one is asphyxiated or made ill from a concentration of noxious gases.

.3 See Monoxide Gas 362.

PART 3 BUILDINGS AND GROUNDS

36 REPAIR SHOPS

361 GENERAL

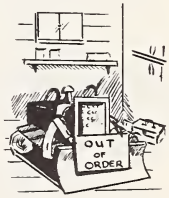
.1 Machinery shall be stopped before repair work, lubrication or cleaning is started.

.2 Machines shall not be adjusted while in motion if the same adjustment can be made with all motion stopped.

.3 Warning signs shall be placed on power-operated equipment, such as shovels, mixers, cranes, etc., to prevent unexpected starting.

.4 Machinery shall be repaired only when there is sufficient light to see clearly.

.5 An Out Of Order sign should be posted until repairs are completed. When special dangers are involved, the switch shall be locked in the off position, or the ungrounded cable shall be removed from battery post.



.6 When repairs or other work are completed, a check shall be made to see that everyone is in the clear before starting.

.7 Equipment which is supported by slings, hoist, or jacks for repairs, shall be blocked cribbed, or otherwise secured before men are permitted to work underneath.

.8 When repairs are made remote from the source of power on conveyors, cableways,

etc., chains, blocking, or other such devices shall be used to prevent injury in case of accidental starting.

.9 Blocking material should have wide parallel flat surfaces. Stage blocking shall be as nearly perpendicular as possible.

.10 Metal pedestal supports shall have sufficient base and top area to safely support load without danger of tipping over supports.

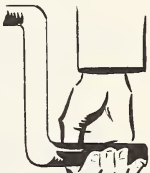
.11 Repairman should have at least one man to assist him when working on heavy equipment in the field.

.12 When any machine is operating, worker shall not attempt to lubricate, adjust, clean, or make repairs if it can be done with all motion stopped.

.13 Workers shall stay a safe distance from moving machines so clothing, hand tools, will not be caught.

.14 When cranking any gasoline engine, operator shall:

a. Retard spark, if adjustable.
b. Get safe footing.
c. Be sure fingers are clear when cranking.
d. Use safety grip; thumb not around handle.
e. Pull top quadrant.
f. Never spin crank.



.15 See Machine Equipment Operation 54, Clothing 56, Lifting 64, Flammables 62.

362 MONOXIDE GAS

This gas is odorless, colorless, and tasteless, and in concentrated form is a deadly poison, killing

quickly without warning.

.1 Employees shall guard against it at all times:

a. Operate gasoline motors in closed buildings only when ample ventilation is provided, or exhaust fumes are forced outside.

b. Provide interior ventilation by partly opened windows when driving vehicles.

c. Gas leaks in exhaust pipes and manifolds shall be repaired.

d. Manifold type heaters are dangerous, shall not be purchased or installed on motor vehicles.

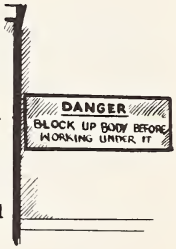
1. Old ones should be replaced.

.2 Sufficient tail pipe shall be installed to keep exhaust fumes from swirling up into the truck.

363 MOTOR VEHICLE SERVICING AND REPAIRS

.1 Forest Service vehicles shall be maintained in accordance with State motor vehicle laws and Forest Service equipment safety and maintenance standards.

.2 Before any work is done or adjustment made on the chassis of a dump truck while the body is in an elevated position, the body shall be secured by an attached prop strong enough to prevent its accidental lowering. A sign calling attention to this requirement shall be placed at eye level near each rear corner of the cab. This same precaution is required when operating a load lugger.



.3 If not jacked up, brake shall be applied and the wheel blocked to prevent car from rolling.

.4 Hydraulic lift shall have safety lock or other device to prevent accidental lowering.

.5 A grease pit below floor level shall not be used unless mechanically ventilated and provided with an exit. Plank ramps or power hoists and blocking are preferred.

.6 If pits are used, they shall be free of oil, grease, rags, and fumes, and provided with guardrails or a cover whether inside or outdoors.

.7 All electric power-operated equipment, including portable electric hand tools, shall be maintained in good repair, with particular attention to grounds, electrical connections, and insulation. See Electricity 32.

.8 Operator shall be careful when using electrical equipment under wet conditions, such as washing cars or when vehicles are on wet floor or ground.

.9 Foot brake and clutch pedals on all automotive equipment should be covered with rubber non-skid foot pads to minimize possibilities of driver's feet slipping off pedals.

.10 Windshield wipers should be positive-power operated.

.11 Lock ring shall be in correct position when inflating tire on vehicle.

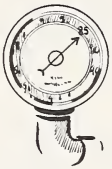
.12 When inflating tire, which is removed from vehicle, lock ring side shall be either down or against wall.

.13 All tire repair servicing stations should have safety chain or tire rack device to prevent possibility of accidents from flying rims.

364 COMPRESSORS

.1 All pressure tanks or lines shall be provided with safety valves, air pressure gauges, and with a drain cock at the lowest point on the tank. If either is defective, replace; do not repair.

.2 Safety valves shall be checked to make sure they unload at the rated safe capacity by holding unloader arm to build up pressure.



.3 Unloader mechanisms are set to maintain a pressure of 85 to 90 pounds. If they stick or get out of order, repairs shall be made by a competent mechanic.

.4 All tanks, excepting garage type, using over 80 pounds pressure shall be tested and stamped in compliance with the ASME Code, and that they conform with State laws. Any tanks not so stamped shall be given a hydrostatic test to 25 percent over maximum operating pressure. Date of test must be permanently marked on tank.

.5 The brass fusible plug shall not be replaced with an ordinary pipe plug.

.6 Airfilter screens shall be cleaned in crankcase oil, not solvents, kerosene, or gasoline.

.7 Compressor valves shall be removed for cleaning. Carbon may be loosened by soaking overnight in solvent, but shall be absolutely dry before reinstalling. Valves shall not be interchanged. When valves are removed, pistons or heads shall not be cleaned with solvent or kerosene at any time.

.8 A thorough monthly inspection shall be made for leaks, replacing any worn parts which might cause an accident.

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.9 See Compressors 543.

365 STEAM HOSE

.1 Operator shall:

a. Wear rubber boots and apron reaching below boot tops.

b. Grasp hose firmly close to nozzle to prevent whipping.

c. Point nozzle to floor before opening valve.

d. Turn on water first, then steam.

e. Turn off steam first, then water.

366 BATTERY SERVICING

.1 Battery acid shall be kept away from skin and clothing.

.2 If electrolyte is too strong, acid shall be poured slowly into the water, never water into the acid.

.3 Battery charger shall be in well ventilated area to avoid explosion.

.4 No exposed flame, spark, smokers'materials, gases, shall be brought near a battery being charged or shortly thereafter.

367 USE OF SOLVENTS

.1 Gasoline shall not be used for cleaning.

.2 Cleaning solvents shall have a flash point of 100° F. or higher.

PART 3 BUILDINGS AND GROUNDS

37 SANITATION

371 DRINKING FACILITIES

.1 Each domestic and public water supply system, serving any Forest Service administrative site or recreation area under our jurisdiction, shall be tested for purity annually or as often as necessary to insure continuous potability.

.2 Unsafe water supplies shall be condemned and plainly marked as unsafe. See 312.3k

.3 Where possible corrective action shall be taken immediately to eliminate contamination. Assistance may be requested from other Federal agencies and State public health bureaus.

.4 Sources of drinking water shall be protected from contamination at all times. See Water Developments and Sanitation Handbook 1940.

.5 Purification of water in emergencies may be accomplished by use of an appropriate form of chlorine, Chlorazene, or Halozone tablets; or by boiling for 10 minutes.

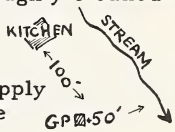
.6 Drinking water should be obtained from safe sources and dispensed in individual sanitary containers if fountains are not available.

.7 When milk is provided for drinking purposes, it shall be pasteurized, or else boiled @ 160°F. for 15 seconds.

.1 When authorized by the officer in charge, all refuse around camp that can be burned, should be piled and disposed of in this way.

.2 At temporary camps where fly-proof covers for garbage pits are not justified, a hole shall be dug and refuse covered currently with dirt.

.3 At more permanent camps, all refuse that cannot be burned shall be placed in pits equipped with a fly-proof cover. Fly-proof garbage containers, which are emptied and thoroughly cleaned daily, should be used.



.4 All garbage pits should be located below the source of water supply at least 50 feet from streams and the camp, and 100 feet from the kitchen.

.5 Kitchen, mess room, toilets, and garbage pits shall be periodically treated with chloride of lime, DDT, or other suitable insecticide during fly seasons.

.6 Permanent toilets shall be made fly proof and rodent proof.

.7 Temporary toilets as a general rule need not be fly proof, but shall be sprinkled frequently with dirt, ashes, or lime and sprayed with DDT.

.8 Toilets shall be located on the downstream side at least 100 feet from camp and 50 feet from nearest stream,

where there is no danger of contaminating the water supply. See Water Developments and Sanitation Handbook 1940.

.9 Dishes and utensils shall be thoroughly washed in soapy water, followed by thorough immersion for 2 minutes in scalding water, 170°F. or hotter, or by boiling for $\frac{1}{2}$ minute after each use. Dishes shall be air dried.

.10 All camps should be kept in sanitary condition by:

a. Maintaining a clean supply of free towels and toilet paper at all times.

b. Shaking and airing bedding each week.

c. Keeping personal effects clean.

d. Keeping cabins and tents clean and sanitary.

e. Keeping subsistence supplies carefully stored and protected from weather, flies, and rodents.

.11 If there is any doubt about the usability of canned rations or other food, they shall be destroyed or sent to be examined.

12. Prospective camp sites should be inspected for poison oak, ivy, or sumac, poisonous insects, snakes, and other animals.

.13 Showers shall be kept clean and disinfected. Foot racks and mats shall be regularly exposed to good sunning.

.14 DDT, see 611, 612.13.

a. All corrals adjacent to occupied buildings should be sprayed.

373 CERTIFICATION OF FOOD HANDLERS

.1 Where neither the State nor the local community requires medical certification, no one shall be employed or assigned as cook or food handler in the Forest Service, except in an emergency, without prior certification by public health authorities or a competent physician that he is free of communicable disease for purposes of handling food.

.2 Should any reasonable doubt develop after employing a food handler as to his continued freedom from communicable disease, a further examination and certification shall be obtained.

.3 Any existing local laws or higher standards covering food handling shall be met.

PART 3 BUILDINGS AND GROUNDS

38 WOODWORKING SHOPS

381 GENERAL

.1 Machines shall be stopped to oil, clean, or adjust them.

.2 Snug-fitting clothing, such as coveralls, shall be worn.

.3 Goggles, eye shield, or respirator shall be worn if there is danger of injury.

.4 A guard over treadle shall be provided on treadle-operated machines to prevent unintentional and unexpected starting.

.5 Before starting any power-driven machine, the operator shall assure himself that the working surface is clear, that safety devices are in place and all parts such as tool holders, are firmly adjusted for the work to be done and are set to clear all moving parts.

.6 Machine operators shall not wear gloves.

.7 Machinery shall be shut off immediately after completion of a particular work operation, and before adjustments are made, if possible. The operator shall not leave the site of the machine while it is running or coasting under its own momentum.

.8 Working space around machines shall be kept clear and the floor maintained in a non-slippery condition.

.9 Sticks or brushes shall be used to remove wood particles, chips or dust from machines, never the hands.

.10 Operators shall stand out of line of forward feed of piece being machined.

382 SHAPERS

.1 Shaper heads shall be protected by encircling guards above knives, extending beyond sweep of longest knife, and adjustable to height of work.

.2 Knives shall be kept sharp.

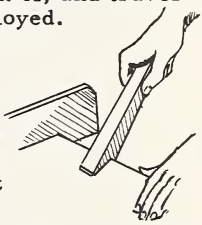
.3 Before starting the shaper the operator shall assure himself that the cutter-head assembly is securely tightened and locked to the spindle.

.4 Small pieces shall be held in jigs.

.5 In no case shall a warning device of leather or other material be attached to the spindle.

383 JOINTERS

.1 Jointers shall be equipped with guards consisting of metal cover wider than table opening and covering all of the cutter head in front of the guide. A guard covering the cutter head back of, and traveling with, the guide shall also be employed.



.2 A jig or pusher stick shall be used when jointing short pieces.

.3 Material being jointed shall be held so hand is not in front of work at start of cut, nor at back of work at finish of cut.

384 PLANERS, MOULDERS, STICKERS, TENONERS, MATCHERS, AND PANEL RAISERS

.1 Powered feed rolls shall be guarded to keep operator's hands from being caught between rolls and running stock.

.2 Corrugations of feed rolls shall be kept clean and sharp.

.3 Anti-kickback dogs shall be used in front of feed roll as further protection.

.4 An exhaust system should be used to take up chips. The exhaust hood over the cutting head can serve as a guard.

.5 Outrunning end shall be kept clear and workers out of line of finished pieces.

385 CIRCULAR TABLE SAWS

.1 Table-type saw guards shall include:

a. A hood covering saw at least to depth of teeth and giving a clear view of line of cut.

b. A spreader that is part of guard.

c. An anti-kickback device, also a part of the guard.

d. Safe under-table protection.

.2 Saw shall be used only for type of work for which it is intended.

.3 Saw shall be installed and used only for designed speed.

.4 Saw shall be kept set and sharp, and arbor nut tight.

.5 A pusher stick shall be used when sawing narrow stock, keeping hands and body out of line of cut.

.6 The ripping fence shall not be used as a guide when crosscutting material.

386 SWING CUT-OFF SAWS

.1 The saw shall be kept set and sharp and the arbor nut tight.

.2 The material to be sawed shall be free of loose knots, nails, etc.

.3 If material is fed from the right, operator should use his left hand to pull the saw and vice versa, in order not to be in line with material being sawed.

.4 The swing arm and counterweight shall operate smoothly.

387 BAND SAWS

.1 The upper wheel shall be turned manually before starting to assure that the saw band will travel smoothly on both upper and lower wheels and through the band guide.

.2 All of saw shall be enclosed except portion used in making cut.

.3 If equipped with powered feed rolls, rolls shall be guarded.

.4 Operator shall stand to side of cut to lessen chances of being struck by blade if it should break.

.5 The width of the saw band shall be as wide as the nature of the work will permit, but a wide saw band shall not be forced to cut on a small radius.

.6 Blade shall not be stopped too quickly or by thrusting a piece of wood against the cutting edge when the power is off.

.7 All material being worked shall be kept in firm full contact with the bed at all times. If material is of such size as to cause rocking on the bed due to overhang, supplemental supports shall be furnished.

388 DRILLS, BORERS

.1 The operator shall perform the following preliminary operations before starting the motor:

a. Make certain that mechanical parts are operating freely.

b. Be sure the drill is properly inserted and locked in the chuck.

c. Make vertical adjustment consistent with thickness of material to be drilled.

d. If it will be difficult to maintain material in proper position or alignment during drilling operations, it shall be clamped firmly to the bed.

e. Use a wooden drill block not less than 1 inch in thickness between the bed and material being drilled.

.2 Chucks for drills and boring bars shall have countersunk set screws so there are no projections.

.3 Where counterweights are used they shall be bolted to the bar.

389 SANDERS

.1 Powered feed roll shall be guarded between roll and stock.

.2 An exhaust hood should be provided to remove dust.

.3 Manually-fed sanders should be provided with work rests to give support for the work.

.4 Pieces too small to allow hands to be kept a safe distance from the work, shall be clamped securely.

3810 LATHES

.1 Tool rest shall be set slightly below center, close to the face, and too heavy cuts shall be avoided.

.2 Screen shall be furnished strong enough to hold a thrown head.

.3 The operator shall see that the following items are checked prior to starting the lathe:

a. All chucks, centers, etc. are securely attached to the spindle.

b. Cutting tool and tool holder are securely mounted and correctly positioned.

c. Work shall be securely centered or chucked to prevent work from being thrown from the lathe.

d. The spindle and all rotating parts shall revolve freely.

Part 4 - Gen. Constr.

41 CONCRETE AND MASONRY

411 GENERAL

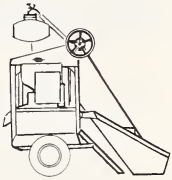
.1 See Goggles and Respirators 561, 563, 567.

.2 Highlines, buckets, or similar rigging transporting concrete shall be designed and constructed so as to safely carry the loads to be imposed. See Rigging, 43.

.3 Loaded concrete buggies and wheelbarrows should be pushed, not pulled. If necessary to pull them, rope can be attached to the front.

412 PLATFORMS

.1 Platforms for cement-mixer and pouring operations shall be constructed from sound lumber, free from large or loose knots of 2 inches or greater in diameter.



.2 Guardrails shall be constructed on sides of platforms which are 3 feet or more above ground level.

413 RUNWAYS

.1 Elevated runways or ramps for pushing material to and from mixer shall be well supported and braced. Ramps should have not more than 1 foot rise in 5 feet horizontal distance.

.2 Guardrails shall be provided as in 412.2. The minimum width of runway and clear distance between guardrails shall equal the overall width of the widest equipment using the runway, plus 2 feet.

414 GUARDS ON MACHINERY

.1 Guards shall be provided for gears, belts, chains, sprockets, or other hazardous moving parts.

415 INSPECTION OF MACHINERY

.1 Skip shall be landed when mixer is idle or when working on it.

.2 Everyone shall be in the clear before skip is moved up or down.

.3 Cables, hoist, and brake mechanisms shall be inspected daily during periods of use.

.4 Power shall be turned off and repairs made at once before worn or defective parts cause injury.

.5 Stationary equipment shall be blocked and leveled.

416 FORM WORK

.1 Wire ends, sharp ends of reinforcing, etc., shall not be left exposed.

.2 Men clipping ends of form tie wires should wear leather gloves.

.3 Forms shall be designed and constructed to safely carry the wet concrete load.

417 STONE AND BRICK MASONRY

.1 Goggles shall be worn when cutting or chipping stone or cleaning brick.

.2 Scaffolds and floors shall not be overloaded.

.3 Scaffolds shall be securely built, level, well-braced, and equipped with railings and toeboards. See Scaffolds 44.

.4 Back filling should not be done against green walls.

.5 Mortar boxes should be kept free from ragged edges.

.6 A bottle of glycerin or olive oil should be included in the first-aid kit where men are handling lime, and should be used when lime gets into open cuts or eyes.

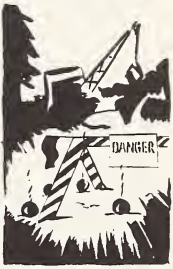
PART 4 GENERAL CONSTRUCTION

42 EXCAVATION

421 GENERAL

.1 When excavating next to buildings, adequate shoring and underpinnings shall be provided before excavating below foundations and footings.

.2 Excavated or other material shall be stored at least 2 feet from edge of excavation.



.3 Temporary guardrails and walkways shall be erected around excavations except where this will interfere with the work; then warning signs shall be posted. All excavations on or near public thoroughfares shall be protected at night by red lanterns or torches.

.4 Materials used for sheeting, sheet piling, bracing, shoring, and underpinning shall be in safe condition. Timbers shall be sound, and free from large or loose knots, No. 2 Common or better.

.5 Ladders extending from the floor of excavation to 3 feet above ground level shall be placed in all excavations 5 feet or more deep.

.6 Hard Hats - see 564.

.7 Equipment operators and workmen shall operate or work with only that equipment to which they have been assigned.

.8 All truck driveways and areas around equipment, such as ramps to crushers, driveways under bins, wells under elevators or conveyors, overflow from grating guards, etc., shall be kept clear of large rocks or other debris which might cause accidents.

.9 Barriers not less than 8 inches high shall be provided where vehicles are required to back up to open pits, hoppers, and excavations.

.10 If necessary to remove a high overhanging bank, work shall progress from the side toward the middle. Worker shall always face the point of danger and wear a safety belt and lifeline.

.11 Boulders shall be pried from above or sides.

.12 When resuming excavation after heavy rains or freezing weather, all banks shall be inspected for cracks and slight earth movements which may indicate the beginning of slides.

422 TRENCHES - HARD, COMPACT MATERIAL
Trench excavation is an extremely hazardous operation. Planning and construction of shoring shall be governed by the nature of the ground.

.1 Except in solid rock or hard shale on level planes, the sides of trenches, 5 or more feet deep and 8 or more feet long, in hard compact ground, shall be sloped to angle of repose or braced at horizontal intervals not exceeding 8 feet with 2 by 6 inch or larger planks placed vertically opposite each other against the walls of the trench. See sketch on page 61.

.2 These braces shall extend to trench bottom and be held in place by horizontal cross braces at right angles to both braces, cleated and tightly wedged, and of the sizes shown in sketch on page 61.

.3 Undercutting shall not exceed 6 inches on either side of trench.

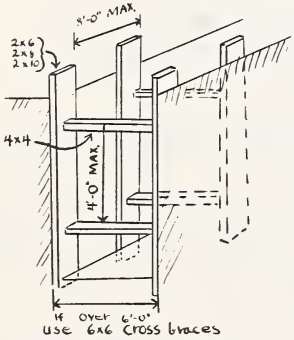
423 TRENCHES - UNSTABLE OR SOFT MATERIAL

.1 Vertical banks of trenches in unstable or soft material, 4 feet or more in depth shall be supported by use of continuing vertical sheet piling and braces.

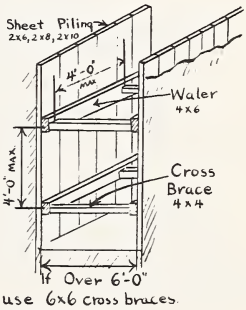
.2 Wooden sheet piling shall be not less than 2 inches thick.

.3 Sheet piling shall be held in place by longitudinal timbers, or walers, at vertical intervals of not more than 4 feet.

.4 Walers shall in turn be supported by 4 by 4 - inch cross braces spaced a maximum of 4 feet. See sketch:



TRENCHES IN HARD COMPACT MATERIAL



TRENCHES IN UNSTABLE OR SOFT MATERIAL

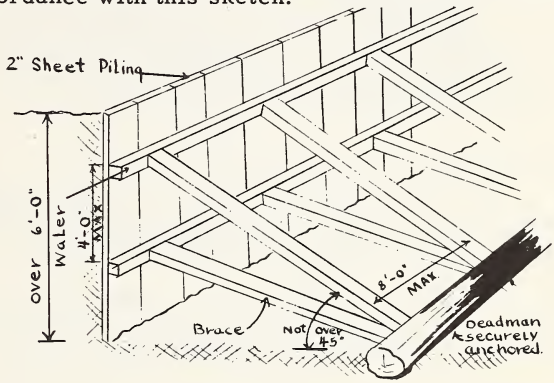
255434 O - 53 - 5

.5 Extra bracing shall be used to prevent slides or cave-in when excavations or trenches are made in locations next to back-filled excavations, or subjected to vibrations from railroad or highway traffic, operation of machinery, or any other hazardous source.

424 BULKHEADS AND RETAINING WALLS

.1 Banks over 6 feet high on one side only, resulting from excavating for bulkhead construction, retaining walls, bridge abutments, wing walls, etc., shall require shoring for protection of workers, unless sloped to the angle of repose of the material.

.2 The spacing of shoring and bracing shall be in accordance with this sketch:



Bulkheads and Retaining Walls

Height of Bank	Waler Size	Brace Size
6' - 8'	4" x 4"	4" x 4"
8' - 10'	4" x 6"	4" x 6"
10' - 12'	6" x 6"	6" x 6"
over 12'	8" x 8"	8" x 8"

.3 Adequate bearing shall be provided at the lower end of diagonal shoring to resist the thrust of the bank above.

.4 Long braces shall be center-braced to prevent buckling, if intended to carry maximum loads, where length exceeds 60 times least dimension.

425 GRAVEL PITS

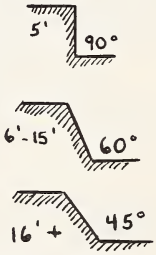
.1 Banks shall be sloped around the pit and at truck entrances and exits to eliminate slide danger.

.2 Overburden shall be stripped back from the edge of pit or bank at least 12 feet. For high banks or deep pits, the width of the stripped area shall be not less than one-half of the slope distance of the working face of the pit or bank.

.3 The cut bank of the overburden shall be sloped to at least 45°.

.4 Trees or boulders above the pit or near the edge of the overburden which could start a slide or fall into the pit, shall be removed.

.5 Hand-loading gravel pit or bank slopes shall not exceed the following:



Bank Height (feet)	Slope (degrees)
Up to 5	90 (no overhang)
6 to 15	60
16 and up	45

In all cases where rocks 4 inches or larger are present, bank slope shall not exceed 45°.

.6 Bank slopes in shovel-loading gravel pits shall not exceed the following:

Bank Height (feet)	Slope (degrees)
Up to 10	90 (no overhang)
Over 10	60

.7 Pit or bank faces and stripped area in old pits with banks over 4 feet high shall be examined before working.

.8 High gravel banks or deep pits shall be worked out in benches, removing all material from the top bench before working at lower levels.

.9 Special Precautions:

a. Gophering and undermining shall be prohibited.

b. Men working on slopes exceeding 60° in hard, compact material shall wear safety ropes when more than 6 feet above pit floor.

c. Pits, which have been blasted to loosen gravel, shall be inspected by blasters before workmen are permitted to return.

426 QUARRIES

.1 Overburden shall be stripped back from top edge of quarry for a distance of 12 feet.

.2 The cut bank of the overburden shall be sloped to at least 45°.

.3 Any trees, snags, or large rocks which can fall into quarry shall be removed.

.4 Quarry faces shall be scaled frequently to maintain safe working conditions.

a. Quarry faces shall be examined daily during freezing and thawing weather for rocks which may be

dislodged by weathering action.

b. Scalers shall wear hard hats and safety belts and be securely tied off while at work.

.5 After each shot, an examination shall be made by the blaster before workmen shall be permitted to return to the pit.

.6 Wherever practicable, a minimum distance of 10 feet should be maintained between workmen unless two or more are required to accomplish the same task.

.7 Respirators shall be worn by drillers and other workmen if dry-air drilling methods are used.

.8 If possible, the face of the quarry should slope enough to eliminate the danger of rocks falling upon the workmen.

.9 All quarries shall be fenced and signs warning of the danger of blasting should be posted.

.10 Special precautions:

a. Men shall wear safety ropes when working over 6 feet above pit floor.

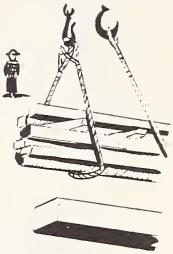
b. Danger areas in quarries shall be barricaded as a precaution to human beings and livestock.

c. See Hard Hats 564.1a, Respirators 567.2, Goggles 563.1b, Blasting 71.

PART 4 GENERAL CONSTRUCTION

43 RIGGING

431 GENERAL



.1 All employees shall keep away from moving lines, lines and blocks under strain, suspended loads.

.2 The following shall be removed from service: Drums, sheaves, or pulleys with eccentric bores or cracked hubs, spokes, or flanges; hooks, shackles, rings, and slings that have been bent or otherwise damaged; frayed ropes and cables.

432 ROPE

Manila fiber is preferable to other kinds of rope.

.1 Ropes shall be inspected frequently for broken strands, cuts, and worn or frayed spots. Unsafe rope shall be replaced.

.2 Acids and acid fumes shall be kept away from rope.

.3 Rope should be uncoiled from inside to prevent kinking.

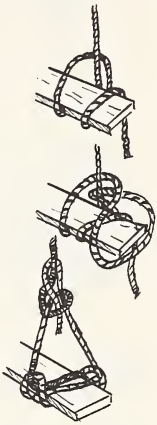
.4 Rope should not be dragged over rough surfaces.

.5 Rope should be dried thoroughly after use. Frozen or wet rope should not be piled against steam pipes or other heat sources.

.6 Rope should be coiled and piled or suspended so that air can circulate through the coils.

.7 Federal Standards for New Manila Rope:

Diameter (Approx.) Inches	Breaking Strength Minimum Pounds	Safe Load 1/8 Maximum Pounds
1/4	600	75
1/2	2,650	331
3/4	5,400	675
1	9,000	1,125
2	30,000	7,500



433 WIRE ROPES AND CABLES

.1 All working wire ropes and cables shall be inspected when installed, and at least weekly when in use.

a. Each free end should be fitted with a thimble or other fitting.

b. Wire rope shall be removed from hoisting or load carrying when any of the following conditions exist:

1. 3 broken wires in 1 strand of 6x7
2. 6 " " " 1 " " 6x19
3. 9 " " " 1 " " 6x37
4. 8 " " " 1 " " 8x19
5. When marked corrosion appears.
6. When 4 percent of the total number of wires composing such rope are broken.

c. Leather gloves shall be worn when handling cable with broken strands.

.2 Cables having broken and frayed strands shall be replaced. The new cable strength shall be equal to original, and strands shall be twisted in the same direction.

.3 Wire ropes that have been kinked shall be considered unsafe.

.4 Ropes shall be untwisted or unlaid only for splicing purposes.

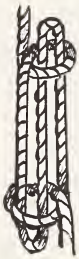
.5 Worn ropes shall not be used as line running over sheaves or drums.

.6 Wire rope should be lubricated regularly to avoid excessive internal strains and rusting.

.7 The working load of a wire rope shall not exceed one-fifth of its breaking strength (a safety factor of 5). The factor of safety shall be determined by careful consideration of all data, such as the load, speed, size, arrangement, and number of sheaves and drums, the degree of danger to life and property. See also Size of Sheave, 437.4.

.8 Guards should be provided at all points where persons or materials might come in contact with moving rope.

.9 Wire ropes shall be fastened to drums only by zinc plugs or suitable clamps.



.10 Wire rope should not overwrap unevenly on drums.

.11 Wire rope only of a size which will fit into pulley and sheave grooves properly, shall be used. If necessary, pulleys and sheaves shall be regrooved to size.

.12 Hands shall be kept off cable feeding a drum, pulley, or sheave.

.13 All clamps shall be attached with the "U" over short end of cable.

.14 Clamp nuts shall be inspected and tightened frequently.

.15 APPROXIMATE BREAKING STRENGTH OF WIRE ROPE IN 2000-POUND TONS

Size of Cable Diam. (Inches)	Material			
	Iron	Cast Steel	Mild Plow Steel	Plow Steel
1/4	1.0	1.8	2.0	2.2
5/8	5.5	10.4	11.4	12.5
3/4	7.8	14.8	16.3	17.8
7/8	10.6	20.0	22.0	24.0
1	13.7	26.0	28.6	31.2
1-1/8	17.2	32.8	36.0	39.4
1-1/4	21.0	40.4	44.4	48.4
1-3/8	25.2	48.6	53.4	58.3
1-1/2	29.7	57.5	63.3	69.0

434 CHAINS

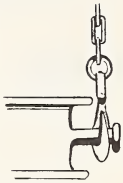
.1 Chains shall be inspected frequently for small cracks, signs of crystallization, and deformed or weak links and replaced, if in weakened or doubtful condition.

.2 Sudden shocks and overloading shall be avoided.

.3 Chains shall not be kinked or knotted.

.4 After hitching or hooking chains or cables to logs, stumps, or machines,

everybody shall stand clear and as far away from the tractor or load as the length of chain between them if possible.



.5 Chains which have been stiffened or stretched by overloading shall be condemned.

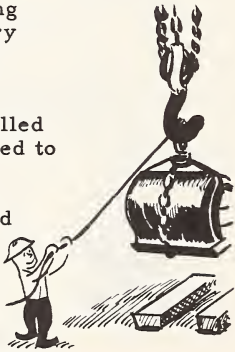
.6 The hook shall be completely over a link so chain cannot slip and hook will not be bent, and as far from the load as possible, so the pull is on the back of hook; then a straight steady pull shall be made.

.7 Safe load in tons for iron chain is 6 times the square of the chain stock in inches.

435 CHAIN BLOCK HOISTS

.1 Hooks, straps, and chains shall be inspected to make sure they will not slip or give way under strain.

.2 Overhead support and rigging shall be sufficiently strong to carry maximum loads with ample safety factor of 2 1/2 to 1.



.3 Chain block shall be side pulled only when super-structure is braced to withstand lateral strain.

.4 Heavy loads should be guided with ropes rather than by hand.

436 HAND HOISTS

.1 Operators shall act only on signals clearly understood by everyone concerned.

.2 Ratchet pawl shall be engaged when lifting or suspending loads.

.3 Crank shall be removed when suspending aload.

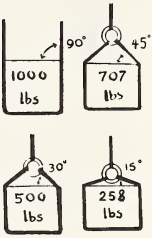
.4 Operator shall have a free floatinggripon crank handle such that thumb cannot be broken.

437 SHEAVES, TACKLE BLOCKS, AND PULLEYS

.1 They shall be inspected immediately before use and condemned if defective.

.2 They shall be kept well-lubricated.

.3 Loads shall not be placed on points of hooks.



.4 Sheaves should be not less than 6 times the diameter of Manila rope, and not less than 32 times the diameter of wire rope.

.5 Bent hooks shall be condemned.

.6 The angle of a sling alters the safe carrying capacity of a load as follows:

438 GIN POLES

.1 Gin poles shall be set perpendicular or raked slightly toward the load to be lifted so the pole will not interfere with the load or hoist lines. See Telephone Handbook for erection methods.

ROLLING HITCH

.2 A safety factor of 3 shall be used for strength determination of pole, guy cables or braces, hoist lines, and blocks. This means that the load shall not exceed one-third of the breaking strength of these items.

BOWLINE

.3 A safety factor of 6 shall be used as allowance for shock loads when using power-operated hoist or tractor drawbar for lifting loads.

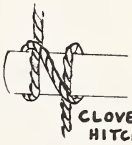
OVERHAND KNOT

.4 The pole shall be straight and free from any serious defects.

SQUARE OR REEF KNOT

.5 Pole length shall be less than 60 times its top diameter.

.6 Hoisting tackle and guy lines shall be securely attached to pole. See Improvement Handbook.



CLOVE HITCH

.7 Guy lines or braces shall be safely attached to adequate anchorages.

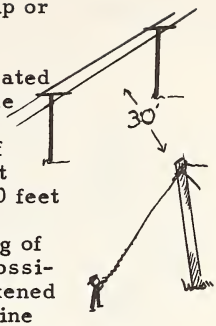
.8 Pole base or sill shall be large enough in area to prevent settlement, and braced against slippage.

a. A shallow hole 9 inches deep will serve as a ground anchorage.

b. The base of the gin pole shall be guyed against the winch pull.

WALL KNOT

.9 A gin pole shall not be set up or operated under an electric line.



.10 When gin pole is to be operated in vicinity of a power line, extreme care shall be used to see that the winch line and the guy lines are of such lengths and so positioned that they could not come closer than 30 feet to the power line in the event of a cable break or a sudden slackening of the guy lines. Do not forget the possibility that a sudden pull on a slackened line may carry the middle of the line to a higher point than it would be when taut.

PART 4 GENERAL CONSTRUCTION

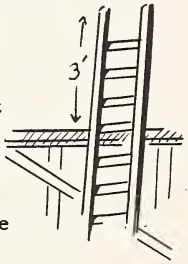
44 SCAFFOLDS AND LADDERS Falls of persons rank second only to motor vehicles as the most frequent cause of fatal accidents in the United States. Most of these can be avoided by proper safeguards.

441 GENERAL

.1 Scaffolds shall be well-made, erected and removed only by experienced men.

.2 Lumber shall be carefully inspected and of adequate strength for the purpose, sound, and free from large knots and other imperfections.

.3 Uprights shall be plumb, shall rest on solid footing, and be fixed at the bottom to prevent shifting.



.4 Ramps and runways shall be at least 20 inches wide.

.5 Stairs or ladders shall be provided for safe access to scaffolds. Ladder rails shall extend 3 feet above scaffold.

.6 Scaffolds built by one crew shall never be used by another crew until they have been thoroughly inspected and pronounced safe.

.7 Overhead protection shall be provided if it is necessary to work under scaffolds.

.8 During the winter season, snow and ice shall be removed from scaffolds before starting work. Sprinkle with sand or ashes when slippery.

.9 Scaffolds shall not be overloaded.

.10 Tools and rubbish shall be lowered carefully at end of each day.

.11 Scaffolds shall be removed immediately after the completion of the work for which they were built.

.12 All nails should be pulled from each piece of scaffolding as it is removed, and the materials should be orderly piled.

.13 This table should be used as a guide in deciding on safe loads for scaffold planks.

Safe Loads in Pounds for Scaffold Planks

Span Feet	2x6	2x8	2x10	2x12	3x10	3x12
6	108	144	182	220	536	650
8	76	102	129	156	389	472
10	56	75	95	115	293	361
12		56	72	87	235	285
14			54	64	188	228
16				47	151	183
18					120	146
20					95	114

The above values are for loads concentrated in the center of the plank.

The above values may be doubled for loads uniformly distributed over the entire length of the plank.

Loads are computed for spruce or norway pine and may be used for Douglas-fir or longleaf yellow pine if load is multiplied by the following constants: Douglas-fir, 1.14; longleaf yellow pine, 1.55.

442 POST AND POLE SCAFFOLDS

.1 If poles are used in place of posts, the diameter shall not be smaller than the largest dimension in the corresponding members, as given below.

.2 The following dimensions shall be used as guides for pole scaffolds not more than 25 feet in height:

Material Dimensions for Scaffolds (Up to 25 feet high)

Item	Heavy Trades*	Light Trades**
Uprights	4x4x6' c-c	2x4 or 2x6x8' c-c
Ledgers	2 - 1x6 or 1 - 2x6	2 - 1x6 or 2 - 1x8
Ribbon (or Stringer)	1 - 1x6 or larger	1 - 1x6 or larger
Handrail	1x6, 1x8, or 2x4 Place 3' above platform	1x6, 1x8 or 2x4x3' above platform
Platform	2x10 or 2x12 planks overlapping at least 1'	Not less than 2 - 2x10 planks overlap 1'
Toeboard	1x6 or wider	1x6 or wider
Cross bracing	1x6 or larger	1x6 or heavier
Foot blocks	2x8 or larger	2x6 or larger
Scaffold width	4'	3'
Splices on upright	4 - 1x4x30	2 - 1x4 or 2 - 1x6x30 or larger

*Heavy Trades: Stonemasons, Bricklayers, Plasterers
**Light Trades: Carpenters, Painters
Definitions: Ledgers are nailed to uprights transversely for support of platform planks. Ribbons are nailed to inside of upright longitudinally and directly below ledgers.

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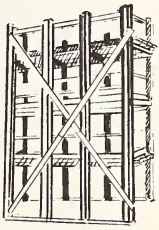
Toeboards are nailed to inside of outside uprights longitudinally and adjacent to top surface of platform plank. Where concrete buggies are to be used on a scaffold, it should be designed to support a concentrated load of 500 pounds on ledgers and planking in addition to the normal scaffold loading.

.3 Scaffolds 25 to 64 feet high shall use these uprights:

4'' x 6'' for stonemasons
4'' x 4'' for bricklayers and plasterers
3'' x 4'' for carpenters and painters

.4 If scaffold is 6 feet high or more, uprights shall be extended 3 feet and guard rails attached.

.5 Cleats used to splice uprights shall be of sound wood not less than 30 inches long, well-nailed onto adjacent sides of the uprights at the joints, using two cleats a splice.



.6 Spliced joints shall be staggered to provide stiffness for the entire structure.

.7 Width of flooring will depend upon the type of work such as bricklaying, stone work, framing, and the need for space for working materials, but in no case shall the flooring be less than 24 inches wide to provide ample width for movement of men and materials.

.8 Toeboards not less than 4 inches high should be provided for the outer edge of the platform to prevent tools and materials from falling.

443 HORSE SCAFFOLDS

.1 Tops of horse scaffolds should be level, irrespective of the height of the horse.

.2 All legs shall stand securely on a solid footing.

.3 Horse scaffolds should not exceed 6 feet in height.

444 SWINGING SCAFFOLDS

.1 Painters' scaffolds and other light swinging scaffolds that are supported by ropes shall be tested before use by raising them a foot or so off the ground and loading them with a weight at least four times as great as the expected load.

.2 Ropes shall be protected from contact with acid and other chemicals.

.3 Swinging scaffolds shall always be lowered to the ground or lashed to the structure when leaving the work for the night.

.4 Swinging scaffolds shall be provided with back rails and 5/8-inch wire rope or 3/4-inch round steel bridle at each end.

445 RIVETING SCAFFOLDS

.1 Guardrails shall be provided whenever practicable and every precaution taken to prevent accidents.

.2 All suspended riveters' scaffolds shall have not less than 1 1/4-inch Manila rope, or its equivalent, so secured to the beams or girders as to prevent slipping.

446 LADDERS

.1 Wood side rails shall be free from cross-grain, cracks, splits, and shall not be patched. Knots shall not exceed 1/2 inch in diameter and shall not be nearer than 1/2 inch from edge of rail or 3 inches from a rung. Wood rungs shall be free of knots, cross-grain, large checks, and decay. Rungs shall be inserted in

notches or holes in side rails and securely fastened, with uniform spacing, not exceeding 12 inches.

.2 All ladders shall be constructed to carry their intended loads safely. All weakened, worn, broken, or patched ladders shall be destroyed.

.3 Linseed oil or clear varnish rather than paint should be applied to ladder surfaces to avoid covering defects.

.4 Cleats, metal points, safety shoes, lashing, or other effective means, shall be used if there is danger of slipping.

.5 Ladders should be extended 3 feet above any landing surface. Rungs may be omitted above the landing.

.6 When carrying a ladder, the front end should be raised higher than the head of anyone in front of you.

.7 The base of a long ladder being raised should be held or blocked against something solid.

.8 Extension ladder should be raised to vertical position or against wall before extending.

.9 Ladder should be set with base one-fourth the distance to the top support.

.10 Ladder should be moved to new position when person has to lean more than 1 foot to side.

.11 When not in use, ladder should be out of way of activity, preferably flat.

Note: Tables from Associated General Contrs. Manual of Accident Prevention.

Part 5- Equipment

51 CRUSHERS

511 CONSTRUCTION

.1 Safety switch shall be provided for stopping motor in an emergency, placed preferably near chute to crusher jaw.

.2 All walkways, ladders, and guards shall be completed before the plant is placed in operation.

.3 Feed platform shall be level and surfaced with non-skid material, such as rough lumber.

.4 Guardrails - see 442.4

.5 Periodic inspection shall be made of all wood construction for evidence of possible structural failures.

512 OPERATION

.1 Close fitting clothing, non-skid shoes, shall be used by workmen at crushers when conditions warrant it.

.2 Goggles 563, Respirators 567, Hard Hats 564.

.3 When operating crusher from platform above, crusher opening shall be provided with a guard large enough for entrance of rock of crusher size but small enough to give protection against falling into the opening.

.4 A rock hook shall be used to feed, turn, or remove rock from the crusher.

.5 When removing or replacing belts, power shall be shut off if possible, and a stick or bar shall be used. Do not use your hand.

.6 Machinery shall be motionless before attempting to clean or service it.

.7 Portable crusher operation:

a. Power shall be stopped before removing obstructions.

b. Employees shall not stand on or close to the flexible power drive mechanism.

.8 See Machine Shops 34, Repair Shops 36, Machine Equipment Operation 54.

PART 5 EQUIPMENT

52 GRADERS Motor or Pull Type

521 PUBLIC PROTECTION

.1 "Men and Equipment Working," signs or red flags shall be posted on road section being worked if traffic warrants this, to warn and protect forest users of danger.

.2 When graders are moved over public roads:

a. State requirements as to lights, brakes, licenses, etc., shall be complied with, particularly for night travel.

b. The mouldboard shall be angled enough so both ends are within the width limits of the tires. It is safer if the back side of mouldboard is facing ahead.

c. Red flags or lights should be mounted on the front and rear of all operating graders.

d. On narrow roads operator shall stop for oncoming traffic to pass.

.3 Blading should be so planned that the blading on each section will be completed each day. Where windrow must be left overnight, warning signs or lights shall be placed to warn motorists.

522 OPERATION

.1 Operators shall be alert to danger from fatigue due to monotony of the job.

.2 Foremen shall allow only competent operators to drive. Beginners shall operate only under the immediate supervision of a skilled operator.

.3 Only the operator shall be allowed on the machine when in motion. Exceptions:

a. When operator is instructing a trainee.

b. Foreman may ride to direct work on fine finishing of bank slopes or close grading.

.4 Operators shall:

a. Wear composition soled shoes, never caulks or hobs, to minimize slipping on wet, oily, or metal surface.

b. Keep cab ventilated to avoid effects of exhaust fumes. Exhaust tail pipe should be set at angle of 45° to right or left of line of travel.

c. Adjust levers or controls direct, never reach through steering wheel.

adjust any levers or controls.

d. Get on or off a grader only w en it is stopped.

e. Watch the road for hazards. Dismount and look things over carefully if you cannot see clearly.

f. Pull rather than push logs and windfalls out of the road where there is danger of them sliding or rolling on the machine.

g. Always travel at a safe speed regulated to road and weather conditions.

h. Grade slowly enough to prevent the machine or yourself being thrown out of control when striking roots, rocks, or stumps.

i. Only on rare occasions operate the grader on any work at speeds exceeding 5 or 6 miles per hour.

j. Be sure all of the crew is in full view before starting, and that men do not get too close to machine when in motion.

k. Shift into lowest gear necessary to climb a grade, especially when pulling load behind grader.

l. Maintain control on hills by keeping machine in gear; never coast out of gear. This is particularly important for makes that have transmission shaft drum brakes only. Do not depend entirely on brakes to hold grader while traveling, working, or when parked.

m. When traveling on mountain roads, always keep the mouldboard angled with the leading end to the bank side of the road.

n. Keep graders away from edge of road on fills with soft shoulders.

o. In bank sloping, watch above the cut for rocks, logs, and trees which may roll when loosened by the blade action.

p. When turning a patrol grader, point the front wheels toward the fill shoulder. This is the light end and if the shoulder breaks down, the blade will lodge and hold the machine.

q. Maintain and use rearview mirror; never back machine until sure there are no hazards.

r. When backing up older machines, remember that brakes do not hold so well in reverse as when going forward.

s. Always drop blade to the ground before leaving driver's seat.

t. When stopping on a slope, always drop blade in the ground.

523 MAINTENANCE

.1 Motor shall be stopped when filling fuel tank.

.2 Before working on the machine employee shall: Set brakes; drop blade; stop motor.

.3 Before checking the blade bolts:

a. Follow 2 above, and put block under blade.

.4 Oil leakages on cab floors shall be corrected and floors cleaned before operating.

PART 5 EQUIPMENT

53 HAND TOOLS, INCLUDING POWERED

531 GENERAL

Most Forest Service injuries are caused by unskilled use of hand tools, of which those from glancing ax blows occur the most frequently.

.1 The right tool shall be selected for the job, avoiding makeshifts.

.2 Handles shall be smooth, straight grained, and free of slivers and knots, taping, or wire wrappings. Handles shall be properly fitted, and inspected daily for tightness when in use, or other defects.

.3 Only sharp tools in good repair shall be used.

.4 Tools shall be left where they are not a hazard.

.5 When carrying tools, workers shall stay at least 6 feet away from other workers, with tools on downhill side.

.6 Tools shall be used for their intended purpose only.

.7 When using hand tools, workers shall keep at least 10 feet away from other workers if possible.

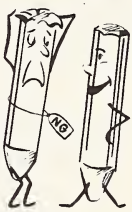
.8 Workers shall never throw tools, nor use them in such a way that anyone could be injured.

.9 When not in use, tools shall be placed against a wall, bank, tree, or stump, or laid down in plain sight with points down.

.10 Sharp-edged tools shall be guarded or sheathed when carried to and from the job, except in emergencies.

.11 Sharp-edged tools shall be safely stored.

a. All tools should be inspected and properly conditioned before storage.



b. Worn-out tools, or those needing repair or sharpening, shall be segregated from tools ready to use, and adequately signed or locked up to prevent their use.

c. Racks and bins for tools shall be constructed so that men cannot fall on or collide with sharp edges; and so tools cannot fall out.

d. Tools shall be stored and transported so as to protect both employees and tools.

e. Tools shall be stored in such a way that handles will not warp.

f. First aid shall be given to all injuries, no matter how minor. See First Aid 92.

532 HAND-ACTIVATED HAND TOOLS

.1 AXES AND PULASKIS

a. Maintenance:

1. Ax shall be ground to safe bevel, grinding slowly toward cutting edge on wet wheel to preserve temper.

2. Ax shall be placed in secure position when filing. Thin ax as needed to $\frac{1}{2}$ inch of edge, then roll off a beveled cutting edge. Use a hand stone to finish after filing.

3. Axes which are excessively round-cornered shall be condemned.

b. Use:

1. Axes shall be covered with sheaths when carried to and from the job. See 531.10. When carrying unsheathed ax or Pulaski, handle shall be grasped close to ax head, with bit parallel with leg, at arm's length and free from body. Never carry on shoulder. Carry on downhill side.

2. Be sure footing is firm.

3. Always chop away from feet, legs, and body.

(a) Stand in such a way that when ax glances, it cannot strike your feet or legs.

(b) If it is necessary to swing toward feet or legs, strike light blows so that if ax glances, it will be controlled.

4. Axemen shall:

(a) Remove underbrush which might interfere with chopping.

(b) Remove overhead branches which ax might hit.

(c) Chop only in a natural position where there is sufficient clearance to swing the ax. Never chop cross-handed.

(d) Guard against chips hitting the eyes.

(e) Use special care when working on hillsides.

(f) Watch out for spring when cutting a sapling which is bound down, cutting from underneath. Watch for sudden breakage in brittle wood.

(g) Chop when standing on logs or springboards only when equipped with calked or non-skid shoes.

5. Axes should not be used as wedges or to drive metal wedges or stakes.

6. Two men shall not chop together on a tree of less than 20 inches in diameter.

7. When grubbing with a Pulaski, roots should be cut rather than pulled out.

8. In very cold weather ax should be warmed before use, if possible, to prevent crystallization and chipping of the blade.

9. When lopping limbs from a felled tree, axeman should stand on the opposite side from the limb being chopped, cutting toward the top of the tree.

10. On projects involving continuous ax work, special foot and shin protection such as non-skid shoes, steel capped shoes and shin guards should be used.

11. Kindling splitters shall keep block or log between stick and feet, or hold stick at sides, and never with fingers on top. Belt axes should be used for fine splitting.

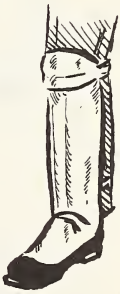
.2 ADZ

a. Shin and foot protectors shall be used.

b. Operator should adz away from any part of body whenever possible.

c. Feet shall not be used to hold the material being adzed.

d. Never grind or file the face side of an adz. If it needs smoothing, use oil stone.



.3 BARS

a. Fulcrums and toe holds shall be secure, to avoid mashed fingers and toes.

b. When prying, operator shall grasp bar to place it, then push with his palms. Foot or other part of body shall be kept out of line with bar.

c. Bar shall be laid flat and in the clear when not in use on the job, such as along side of materials or foot of a wall, except in desert country where bars heat up.

d. Bent or twisted bars shall be discarded.

e. When applying leverages, worker's body shall be kept out of danger in case the pry, blocks, or load should slip.

.4 BROAD AXES

a. Axeman shall chop away from any part of body if possible.

.5 CHISELS

a. Wood-handled chisel should be protected with a leather band on the striking end. Wooden or rubber maul should be used.

b. All parts of the body shall be kept out of the way.

c. Head of cold chisel shall be ground with a slight radius at first sign of burring or mushrooming.

.6 DRAW KNIVES

a. Cutting edge shall be sharp, free of nicks, with handles in place.

b. Material being worked shall be at working height, firmly anchored and held steady. Draw knife shall not be used on material being braced by the worker's knees.

.7 FILES

a. File shall have handle. A knuckle guard should be used when filing against cutting edge.

b. Dull file or one with bent tang, shall be condemned.

c. File and tool shall be kept free of oil or grease.

.8 GRUB HOES

a. Blade shall be fixed so it cannot slide down handle.

b. Legs and feet shall be kept in the clear when swinging.

.9 HAMMERS

a. Badly rounded, cracked, or mushroomed hammer shall be repaired before use.

b. Hammer shall be free of oil and grease.

c. Nails, being driven should be held just under the head and not at the base.

d. When pulling nails, a block of wood under hammer claw should be used for leverage.

.10 HAND TRUCKS

a. Load shall be no higher than one can see over.

b. Load shall be secure and well balanced.

c. Operator shall:

1. Keep feet away from wheels.
2. Keep fingers where they cannot be crushed.
3. Push truck instead of pull it if possible.
4. Slow down at blind corners and intersections.
5. Place truck clear of passageways when not in use.

.11 JACKS

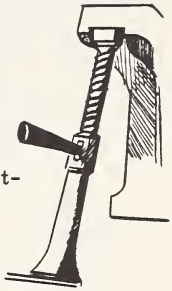
a. Jack shall be inspected for safe capacity and condition of screws, lift, and safety pawl.

b. Both ends shall be examined to make sure they are not bent over or rounded.

c. Jack shall be set on solid footing.

d. Load shall be centered on jack to prevent load tipping.

e. Load shall be blocked up before getting under an object supported by jacks.



.12 LADDERS See 446.

.13 PICKS

a. Pick shall be pointed up, tempered, and checked for cracks and flaws.

b. Head of pick shall be fixed so it cannot slide down handle when in use. See 531.2

c. To swing pick safely, worker shall spread feet, get firm footing and good grip, then keep feet and legs in the clear when swinging.

.14 PIKE POLES

a. Point shall be kept sharp.

b. Keep body balanced when pushing the pole.

c. There should be guards on points when not in use or when being transported. See 531.11e

.15 SAWS

a. Handsaw

(1) First cut of handsaw should be made toward you to avoid cutting hand. Guide with thumb placed above teeth.

b. Crosscut

1. Teeth guard shall be used while transporting crosscut saw to and from job. When carrying, saw shall be placed on shoulder, teeth outward, hand grasping front handle from underneath saw blade, rear handle off.

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2. Logs lying above the ground should be shored up before bucking.

3. When cutting logs, watch out for springing.

4. Logs shall not be bucked from downhill side where there is danger of roll.

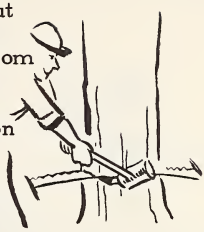
5. Wedge shall be used as soon as saw binds.

c. Bow Saws

1. When inserting a blade in a bow-saw frame, hands and fingers shall be kept in the clear when the tension lever snaps into or against the saw frame.

2. When removing a bow-saw blade from the frame, operator shall stay in the clear of the blade.

3. Bow saw shall be carried over shoulder, blade to rear.



.16 SCREW DRIVERS

a. An awl, auger, drill, boring kit, or driven nail should be used when starting a screw.

b. All parts of the body should be kept in the clear in case screw driver slips.

c. Screw driver should be right size for screw slot.

d. Screw driver with insulated handles shall be used for electrical work.

.17 SHOVELS

a. Shovel should be kept sharp. See 531.1

b. It should not be used as pry bar.

c. Legs should be used as fulcrum.

.18 SLEDGES AND MAULS

a. Sledge and maul faces shall be squared up and not mushroomed.

b. When driving a large bar or other object, other worker shall hold it with tongs or holder rather than with his hands. See goggles 563.

c. A harder tempered maul shall be used than the wedge, bar, or drill steel to be struck.

d. When striking, your eye shall be kept on the head of object being struck. Other workers not using sledge shall be at safe distance or turn their backs.

.19 TOOLBOXES

a. Toolbox shall have strong, safe handles, and shall be designed for safe placing and removal of tools. See 832.4a.

b. Drop lid shall be free from rough or broken edges of sheet metal.

c. Portable box shall be limited to size suitable for safe handling.

.20 WEDGES

a. Steel wedge shall be checked for cracks and flaws.

b. It shall be properly pointed and tempered, with a 3/16-inch bevel ground around the head.

c. Temper of wedge shall be a little softer that of the sledge being used.

d. Heavy wedge should not be carried in pocket.

e. All mushroomed heads shall be reconditioned before use.

.21 WHEELBARROWS

a. Workers shall:

1. Keep barrow in good repair, with handles clean, strong, and free

of splits and cracks. Tighten loose bearings, bolts, and legs.

2. Keep back straight and use legs when lifting handles on loaded wheelbarrow.

3. Keep load evenly balanced, with weight well forward to avoid lifting and strain. Push, don't pull, it.

4. Walk, not run, with a wheelbarrow.

5. Provide enough clearance so knuckles will not get bruised or skinned.

6. Construct all ramps and platforms in accordance with instructions in Concrete Section 41.

.22 WRENCHES

a. Workers shall:

1. Use right size and type of wrench for the job. Don't use shims to reduce size of opening.

2. Be sure it is applied to the nut so the wrench handle will turn in the direction in which the jaws point. Face jaws of adjustable wrench in direction of pull.

3. Pull toward you and at right angles to the wrench, if possible, when tightening nuts.

4. Never use wrench or other makeshift as a hammer.

5. Never use a piece of pipe to increase leverage.

6. Inspect daily for defects.

7. Have firm grip on the work before hard pull is exerted.

b. Pipe wrenches shall be used only on round surfaces.

c. A bent wrench shall be replaced, not used.

d. Wrench shall not be used on material or machine in motion.

533 POWER-ACTIVATED HAND TOOLS

.1 AIR HAMMERS

a. Operators shall wear clothing adapted to the job. See 56.

b. On all air tools on which a replaceable bit or jackset is not retained by a fixture on the tool, a loop of annealed wire shall be run around the collar of the bit or jackset, and fastened to the handle of the tool.

c. Hammers shall be equipped with safety tool retainers to prevent tools flying from sockets.

d. Tool retainers shall be inspected daily for cracks due to vibration.

e. To avoid hazards of flying particles or whipping of air hose, pressure shall be released before breaking connections. Air hose shall never be kinked to cut off pressure.

f. Operator shall be sure that no nearby workers are in line of air flow. Never under any circumstances shall an air hose be aimed at anyone.

g. If the tool becomes detached from the air hose under pressure, operator shall not try to grasp the hose and kink it. The air shall be turned off at the base control valve.

h. Control valve shall be closed before turning on the air, and kept closed until hammer is ready to use.

i. Air shall never be used to blow dust or chips from hair, clothing or work bench.

j. Line oilers shall be placed so that oil cannot drain back into the tank.

k. When using wagon drill, operator shall:

1. Always run hammer down when changing angle of drill.

2. Secure wheels and dogs of the wagon drill before starting drill.

3. Stand out of line with a hole which is being air blown.

l. Extra precautions shall be observed in side-hill or sloping rock drilling, especially when starting

the hole. Temporary scaffolding or other device to give the operator secure footing is important. Footwear shall be non-skid. Operator shall stand far enough away from tool so that he cannot be injured if it slips.

m. Operator shall:

1. Be especially careful when laying hammer down that trigger cannot be operated accidentally.

2. Loosen tool by rocking back and forth instead of trying to pull it out, if it sticks.

3. Never leave hammer standing when not in use.

n. See Goggles 563, Respirators 567, Hard Hats 564, Compressors 364 and 543.

.2 ELECTRIC TOOLS

a. Only tools that are in good condition shall be used. Keep them clean, oiled, and repaired, and do not misuse them.

b. Only tools that are supplied with a three-wire cord should be used, with the third wire completing the grounding of the tool through the use of a threeway plug or a ground wire equipped with a grounding clip attached to an effective ground, such as a water pipe.

c. Operators shall wear goggles while using electric hand tools if there is any danger of flying particles.

d. A portable electric tool shall not be used in the presence of flammable materials or gases unless it is sparkproof.

e. The tool shall not be overstrained.

f. Electric saw guards shall remain in place.

g. See Goggles 563, Electricity 32.

.3 SAWS, WOODS POWER, CHAIN OR CIRCULAR

a. Preparing for lifting:

1. Guards shall be provided for exposed moving parts.

b. When lifting, operators shall:

1. Shut motor off. See Flammables 62.

2. Pick best possible footing.

3. Lift with leg muscles.

4. Prevent positions which could result in being cut if you slip.

c. When transporting, operators shall:

1. Turn off motor.

2. Guard the saw.

3. Carry by handles and not by working parts, with blade in vertical position.

4. Be abreast on steep or slippery ground, if possible.

5. Use wheel device for moving heavy saw any distance, if possible.

6. Fasten saw firmly in truck.

d. When preparing for operation, operators shall:

1. Use safety can for filling gas tank.

2. Never smoke when filling tank.

3. Have motor in level, solid position before cranking.

4. Have good footing and firm grasp.

5. Never wrap cranking rope around hand.

6. Disengage clutch when cranking.

e. When operating, operators shall:

1. Be sure belt or tension chain is properly adjusted and that blade is locked in right cutting position.

2. Stop motor before replacing if belt or chain jumps off.

3. Place guard on transmission end tight against log before starting cut.

4. Use special guards if wheels are used while cutting.

5. Never start engine, or operate it, until all workers are clear of the saw.

6. Be sure chain is free of all obstructions.

7. If possible have a third man for: lookout
wedging
spelling off
using pike pole to direct tree fall

8. Observe usual precautions in felling and bucking. See Tree Felling 711.

9. Operator and assistant shall check with each other to be sure both are ready. Keep hands away from exhaust.

10. When bucking on a slope, engine shall be on high side.

11. The tail stock man shall hold saw by handle only, preferably with both hands.

12. Wood wedges should be used.

13. Tail stock shall not be removed while motor is running.

14. Some holding wood should be left to prevent kickbacks and to guide tree fall.

15. When tree starts to fall, engine shall be stopped, wedges removed, saw removed and set on ground behind stump, then crew shall make retreat.

16. Inspect daily for loose bolts, leaks.

17. Comply with manufacturer's operating and safety instructions.

f. When storing, operators shall:

1. Empty gas tank.
2. Put saw where it won't be a hazard.
3. Guard the chain.

PART 5 EQUIPMENT

54 MACHINE EQUIPMENT OPERATION

541 GENERAL

.1 Machinery shall be located or operated where operators will not be endangered by blasts, or cave-ins. Machines shall be moved into blasting area only after being instructed to do so by the foreman or blaster in charge.

.2 Fire extinguishers shall be provided where machine hazards warrant them, such as on asphalt distributors.

.3 Ample clearance shall be provided for a man between any solid material and the tail swing of a dragline, shovel, or crane.

.4 Workers shall:

a. Never go under or in dangerous places around equipment without notifying the operator and being on the lookout for hazards.

b. Never jump on or off moving equipment.

c. Never wear caulked or steel-plated footwear when working on steel-decked equipment.

.5 Nobody shall stand directly in front or back of a self propelled machine being started by another.

.6 All engines shall be stopped before refueling.

.7 Heavy-equipment operator should have a general helper to assist in work when necessary.

.8 Whenever changing operators, the man in charge shall discuss with the new operator and the crew the plan of work, the existing hazards, the hand signals, etc.

.9 Any machine with parts which are lowered by gravity, like shovels or buckets, shall be left only with the movable part in a lowered position resting on the ground.

.10 For cold weather cranking, crank shall be pulled, not pushed, over top quadrant, or use rope on crank.

.11 When filling a gasoline tank, the funnel or container shall be kept in contact with the gasoline tank to avoid the possibility of a static spark igniting the gas.

.12 See Repair Shops 36, Clothing 56, Flammables 62.

542 GUARDS AND SAFETY DEVICES

.1 All gears, sprockets, drive belts or chains, pulleys, drums, gears, fans, and moving parts which create hazards shall be provided with guards where practical to do so.

.2 Sawmills shall be provided with guards for belts, saw, and carriage.

.3 Guards shall not be removed or made ineffective except while making repairs.

.4 Power for the machine shall be shut off until repairs are made and guards replaced.

.5 Operating platforms surfaced with non-skid material, footwalks, ladders, steps, handholds, guard-

rails, and toeboards necessary for safe operation shall be installed before operating the machine.

.6 Suitable protection against falling objects, swinging loads, and similar hazards shall be provided for the operators. See Hard Hats 56.

.7 Safety glass shall be used in shields, cabs, or enclosures on machines.

.8 Exhaust pipes shall be constructed and located so fumes and gases will not endanger the operator or other workers.

a. Connections leading into and out of the exhaust manifold shall be sufficiently tight to prevent the escape of fumes.

b. Motor shall not be operated in any idling equipment unless to furnish heat to prevent freezing of operator, and then only with window open.

.9 Cranks for all hand-cranked gas engines shall be so mounted that they cannot fly out and strike the operator.

543 COMPRESSORS

.1 When starting a compressor, the intercooler and air receiver safety valves shall be tripped after the air receiver pressure has increased to approximately 60 pounds.

.2 Compressors shall never be run faster than manufacturer's specifications.

.3 For all compressors in daily use, tank and air lines shall be drained each day.

.4 Garage compressors shall be drained once each week during use.

.5 For all compressors that are not drained at the end of each shift, a card shall be provided on which to record the date drained and the initials of the responsible employee.

.6 On two-stage compressors, the intercooler or air radiator shall be drained once a day to remove condensation or accumulation of oils.

.7 Safety valves shall be unloaded daily by pulling the lever on valves.

.8 Crankcase shall not be overfilled.

.9 See Compressors 364.

544 END LOADERS

.1 Load shall be picked up under center of its weight if possible.

.2 Machine shall not be moved until safely loaded.

.3 It shall be started and stopped slowly, when raising, lowering, traveling.

.4 Only the operator and his apprentice shall ride on seat of vehicle.

545 INSPECTION

.1 When machinery or equipment is received, remodeled or repaired, it shall be inspected for safe operating condition by a qualified person before it is turned over to the operator.

.2 Operator shall currently inspect his machine for safe operating condition, and promptly notify his

superior officer of needed repairs.

.3 Where safety of operator, crew or equipment is concerned, defective machinery shall be shut down until repairs are made, and inspected as outlined in 545.1 above before being placed back in service.

546 SIGNALING

.1 Signalmen shall be posted at dangerous or congested points.

.2 Only one man shall give signals.

.3 The right use of hand signals shall be observed. See that signals and instructions are clearly understood.

.4 All signal motions shall be big so that operator can make out what you are giving. Repeat frequently.

.5 When fast pull or move is wanted, signal motions shall be made at fast tempo.

.6 When slow pull or easy move is wanted signal motions shall be made at slower tempo.

.7 Signalman shall get as close to operator as safety permits so operator can clearly see movements of signals.

.8 Signals: These signals should be observed when directing vehicular or construction equipment, except when standard industrial specialized signals are agreed upon and understood in advance:

a. Move Forward: Pull motion, one hand

b. Move Backward: Push motion, one hand

c. Turn Around: Circle one hand above head

d. Slack Up: One arm in front, hand moving up and down

e. Raise: Raise one hand, palm up

f. Lower: Lower one hand, palm down

g. Stop: One arm raised, palm forward

547 TRANSPORTATION

.1 Before heavy machinery is moved, route of travel shall be checked for hazards, such as overhead and side clearance, culverts and bridges, and overhead high tension lines.

.2 Operator shall know load weight, width and height; obtain State permit; comply with the State requirements of flagging and signaling.

.3 When hauling heavy equipment on trucks with false beds, the false bed shall be removed or securely bolted to truck bed to prevent slipping on steep hills.

.4 In addition to blocking heavy equipment sidewise and lengthwise on truck beds, it shall be securely bound to the truck bed both front and rear or on each side, using chain or cable and tightening with load-binders.

.5 Loose tires, planks, or other heavy material shall not be left in the path of moving equipment.

.6 See Motor Vehicles 83.

PART 5 EQUIPMENT

55 POWER SHOVELS AND CRANES

551 PLACEMENT

.1 Hazards shall be investigated and corrected before moving machine into operating position.

.2 Mats or heavy planking shall be used on soft ground to distribute the load.

.3 If machine is placed near an excavation, shoring and bracing shall be installed to prevent a cave-in, or else machine shall be kept back from the edge, a distance about equal to depth of excavation.

.4 Machine shall be placed on as level ground as possible. If necessary to use cribbing or shims to level it, be sure they are sturdy and will not overturn or shift.

.5 When operating pneumatic-tired self-propelled machines, outriggers shall be used to stabilize the unit when necessary.

.6 The machine shall be well blocked to prevent roll after being placed in operating position.

552 OPERATIONS

.1 Operator shall wear close-fitting clothing, like coveralls, and non-skid shoes.

.2 All gears and other hazardous moving parts of machinery shall be protected with suitable guards.

.3 A shovel or crane shall be operated only by a competent operator. Exception: An apprentice can perform simple operations under the direct supervision of an experienced operator.

.4 Operator shall:

a. Use a competent signalman when working near crew or blind areas.

b. Take signals from only one man.

c. Permit only mechanic, inspector, or apprentice operator in cab while machine is in operation.

d. Give signal and wait until everyone is in the clear before hoisting materials.

.5 A data sheet showing operating ranges and capacity ratings with boom at various angles should be posted in the cab. Operator shall hoist only those loads well within the rated crane capacity. When lifting heavy loads, a 2-, 3-, or 4-part line shall be used to keep within the rated capacity of the hoisting cable.

.6 Booms and cables shall not be overloaded.

.7 Crane operations shall be at a safe distance from high tension lines unless power has been cut off. See 324.3.

.8 If boom should come in contact with overhead wires carrying electrical current:

a. Stay on machine until boom is cleared or the current cut off.

b. Keep everyone on the ground away from the machine.

c. If you have to leave the machine, jump. Do not step off.

.9 Hands shall be kept clear of moving cables and other moving parts.

.10 All slings, ties, and hooks shall be safely placed and secured before hoisting.

.11 Everyone shall be kept away from dipper, boom, or load being operated or moved. Handlines should be used for guiding long materials.

.12 Men shall not go under idle dipper or boom, because it might drop, due to cold or damp brakes.

.13 Men shall be kept away from tail swing.

.14 Truck driver shall be out of cab and in the clear before loading the truck.

.15 Load trucks only when they are safely placed.

.16 Load shall be swung over rear of truck and not over cab when possible.

.17 Machine shall be mounted only when it is not moving.

.18 Everyone shall be in the clear before machine is backed up or moved.

.19 The master clutch shall be disengaged before leaving the cab temporarily.

.20 Power shall be shut off, controls locked, and movable parts secured before leaving the cab for the day.

.21 The dipper or other load shall rest on the ground before leaving the cab. Never leave it suspended.

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553 MAINTENANCE

.1 All cleaning, greasing, oiling, and repairing shall be done with the engine turned off, if possible, and with all movable parts secure. If necessary to leave the engine running, the master clutch shall be disengaged, and a DO NOT OPERATE sign put near the controls.

.2 Leaking feed lines and fuel tanks shall be repaired promptly.

.3 Machine shall be maintained in safe operating condition, especially the controls, cable, and brake system.

.4 Iron floor plates, walkways, and ladder used for oiling or making repairs shall be kept in safe condition and free of ice, mud, oil, or grease.

.5 Cables shall be inspected each day for ravels or breaks. Cable clamps shall be kept tight and free of slippage.

554 TRANSPORTING

.1 Boom shall be lowered so that tip is no higher than the cab, if feasible. If machine is provided with a cradle or rack for supporting boom, it shall be used.

.2 A flagman shall be used when there are hazards to the operator or other persons.

.3 All doubtful bridges or structures shall be examined before driving on them.

.4 Operator shall watch for overhead obstructions such as underpasses, low-hanging limbs, or wires.

.5 Free rolling or coasting with traveling gear disengaged shall not be done.

PART 5 EQUIPMENT

56 SAFETY EQUIPMENT

561 GENERAL

.1 Employees shall be furnished with one or more of the following where there is danger of irritant or toxic substances coming in contact with the skin or clothing:

a. Protective clothing: Gloves, helmets, goggles, respirators, footwear.

b. Protective ointment for exposed skin areas.

c. Necessary facilities and solvents, soap, and hot water for removal of toxic and poisonous substances.

d. First-aid equipment.

e. Snake bite kits in snake infested country.

.2 All woods workers should provide themselves with non-skid shoes, cuffless, snag-proof, and tear-resistant trousers, gloves.

.3 Those working around machinery in motion shall wear close fitting clothing fastened from top to bottom, with sleeves snug at wrist or cut short; they shall remove neckties, gloves, rings, or ragged clothing.

562 FOOT AND LEG GUARDS, SAFETY SHOES

.1 They should be worn where there are hazards from:

a. Falling objects, such as stone, rocks, or timber.

b. Tool cuts from the adz, axe, broadaxe, brushhook, or other sharp-edged tools.

.1 Goggles, safety spectacles, face shields, or welder helmets shall be worn to protect the eyes from:

a. Small flying particles when cutting, scaling, and grinding metals, dressing stone, woodworking, overhead pruning or brushing.

b. Flying objects when hand drilling, chipping, calking, riveting, quarrying, rock cutting and crushing; or when using a cyclone seeder.

c. Concentrations of cement or other dust, or from dust and sand when sandblasting.

d. Hot metal when handling babbitt or pouring lead joints, or shaping metal on an anvil.

e. Gases, fumes, and liquids when handling acids and caustics, such as sulphuric or muriatic acids, ammonia, creosote.

f. Reflected light or glare such as snow exposure (colored glasses).

g. Injurious radiant energy and flying hot particles.

1. When using gas cutting and welding torches, goggles shall be light-proof around the edges, ventilated, and fitted with lens of shade #4 for cutting, light welding and brazing; shade #5 for medium and heavy welding; and shade #6 when greater density is needed.

2. When using electric arc welder, welder helmets shall be fitted with lens of shade #10 for ordinary metallic welding; shade #12 for carbon arc and heavy metallic welding.

.3 Foremen and helpers shall wear shade #5 or #6 to protect them from indirect flashes of electric arcs.

.4 Approved welder helmets with safe shade lens can be used in lieu of goggles. In either case they shall be frequently inspected and overhauled as needed.

.5 Workers wearing glasses should be provided with approved welder helmets in lieu of goggles to prevent glasses from steaming.

.2 Goggle wearers should:

a. Keep goggles in a protective container.

b. Wipe the lens frequently with a clean cotton cloth or soft tissue.

c. Keep goggle frames, including side screens, free from dust and grit.

d. Change headbands frequently, keeping the webbing flat.

e. Treat lenses to prevent fogging when necessary.

564 HARD HATS

.1 Hard hats shall be worn:

a. Where there is danger from falling or flying objects, such as rocks in some quarries, trees, or limbs, hazardous excavations, building and road construction jobs.

b. In felling trees and snags, when there is danger of loose bark, limbs, weak tops or burning bark or chunks falling when tree is on fire.

c. By right-of-way clearing crews and dozer operators in large or dangerous timber.

d. By blasters and powder men.

.2 Hard hats are optional in fire caches, depending on whether local hazards warrant them. If crew is using a crosscut saw, hard hats should be worn. Initial attack crews on lightning fires in timbered areas should wear them also.

.3 Hard hats shall be equipped with liners in winter.

.4 Headband and hammock shall be adjusted to fit snugly, leaving an air space between the head and crown of hat.

.5 Headband and hammock can be sterilized by thorough cleansing with detergent powder or saddle soap, followed by exposure to sun for 10 hours.

565 LIFE PRESERVERS

.1 Persons engaged in work where there is danger of falling in deep or swift water, shall be provided with a suitable life line, vest type life preservers, or life rings.

566 PARACHUTES See 825

567 RESPIRATORS

.1 Respirators shall be worn where persons are exposed to harmful materials when fumigating, toxic fumes around chemicals, and when repairing or servicing equipment such as crushers under dusty conditions.

.2 Dust respirators shall be worn where workmen are exposed to excessive dust caused by such work as quarrying, tunneling, rock crushing, jack hammer operation, cement work, sandblasting, and in certain types of road work such as tractor or grader operations in light, dusty soils.

.3 Paint respirators shall be worn when using paint spray guns.

.4 Respirator wearer shall:

a. Be sure respirator fits face snugly.

b. Inspect and sterilize frequently. Wash with soap and water to remove any corrosive material, such as oil, grease, or solvent on the rubber parts. Keep the filter or cartridge dry.

c. Renew filters before they clog with dirt.

d. Frequently replace dirty cloth face pieces with clean ones.

e. Renew chemical cartridges as soon as objectionable odor becomes noticeable.

f. Store respirator in a clean box away from heat and moisture.

568 RUBBER GLOVES

.1 These shall be worn where there is danger of electric shock or when handling toxic materials.

.2 Gloves shall be inspected and given the air test before using. Inspect gloves before use, then at 30-day intervals.

.3 Gloves shall be peeled off instead of pulling on fingers.

.4 Leaky gloves shall be destroyed, never patched.

569 SAFETY BELTS AND ROPES

.1 These shall be worn where practicable when climbing or when working high off the ground where there is danger of falling.

.2 They shall be inspected for worn, dry, hard leather, pliability, worn or broken stitching, cuts, cracks, loose rivets, worn buckles, snaps, rollers and tongues, D-rings.

.3 Safety belts and straps shall never be spliced nor weakened by punching extra holes.

.4 Safety ropes shall be frequently checked for broken fibers by twisting the strands back.

	1 Sparks	2 Hot Materials	3 Heat	4 Hot Liquids	5 Moisture	6 Acids and Alkalis	7 Slips and Falls	8 Falling Objects	9 Flying Particles	10 Electric Shock	11 Cuts and Abrasions	12 Dermatitis	13 Explosives	14 Machinery	
HATS, CAPS HELMETS	X	X	X												Asbestos
				X	X	X				X		X			Plastic-Rubber
	X		X									X		X	Cotton-Wool
								X	X		X				Metal
	X							X	X	X	X				Plastic

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
COATS, APRONS	X	X	X												Asbestos
	X	X		X					X		X				Chrome Leather
WAIST PROTECTION				X	X	X				X		X		X	Plastic
				X	X	X				X		X		X	Rubber
									X		X			X	Canvas-Fiber

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
SLEEVES WRISTLETS	X	X	X												Asbestos
	X	X		X					X		X				Chrome Leather
	X	X	X						X					X	Flameproofed Duck
				X	X	X									Plastic
				X	X	X									Rubber

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
GLOVES MITTENS HAND PADS FINGER GUARDS	X	X	X												Asbestos
	X	X		X					X		X				Chrome Leather
				X	X	X				X		X			Rubber
				X	X	X						X			Plastic-Rubber Coated Fabric
											X				Metal Mesh
											X				Cotton-Canvas

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
PANTS, KNEE PADS, LEGGINGS	X	X	X												Asbestos
	X	X		X					X		X				Chrome Leather
	X	X	X						X					X	Flameproofed Duck
	X							X	X		X			X	Fiber-Metal
				X	X	X						X			Plastic
				X	X	X				X		X			Rubber

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
SHOES BOOTS								X			X			X	Steel Toe Caps
					X		X								Non-Skid Shoes
		X	X	X	X	X	X				X				Wooden Soles
	X	X	X	X											Chrome Leather
				X	X	X				X		X			Rubber
													X		Conductive Rubber

PART 5 EQUIPMENT

57 TRACTORS Injuries from tractor operation are usually very serious, often fatal. For this reason defensive operation shall be practiced all the time. This means:

a. Understanding the equipment and its limitations.

b. Accepting competent advice.

c. Operating with accident prevention always in mind.

d. Avoiding doubtful or spectacular operations which cause accidents.

571 GENERAL

.1 Operators shall wear snug fitting clothing, and composition soled shoes.

.2 Only competent operators shall be allowed to drive.

a. Apprentices shall operate a tractor only under the immediate supervision of a skilled operator.

b. No one except a trainee or mechanic engaged in actual repair shall be permitted to ride with the operator, and then only if slope is less than 30%.

.3 Dozer operators should be given a helper whenever possible.

.4 Hand holds should be installed on seat frame, fuel-tank frame or upon hydraulic-jack assembly to assist in mounting and dismounting from drivers' seat.

.5 Persons shall not get on or off tractor while it is in motion.

.6 Tractor shall not be operated if any part of the control, hoist or hydraulic system, including steering

and brakes, is not in safe operating condition. Foreman or mechanic shall be advised.

.7 Before starting the engine, transmission shall be in neutral, master clutch disengaged, and blade down.

.8 When motion is stopped and engine is idling, the transmission shall be in neutral and the master clutch engaged, so tractor cannot be jarred into motion.

.9 Operator shall know whereabouts of all tractor crewmen.

.10 All workmen shall keep clear of a tractor in motion. To stop operator, signal from safe distance.

.11 Heavy mesh screen should be installed on rear of cab protector between operator and rear-mounted powercontrolunit to protect the back of the operator.

.12 See also Hard Hats 564, Refueling 541.11, Cranking 361.14, 542.9.

572 DRIVING

.1 The master clutch shall be engaged gently, especially when going up a hill or pulling out of a ditch.

.2 Operator shall:

a. Look over the ground to be traveled. Where it cannot be clearly seen from the driver's seat, he shall dismount and examine it before proceeding.

b. Be extra careful around overhanging rocks, on rock slides, and near dead trees.

c. Use extreme caution in going over obstacles when headed downhill. Be sure the slope is safe. Drive carefully.

d. Observe and comply with safe limits of tractor operation on side slopes.

e. Reduce speed before making a turn or applying brakes. If the speed of a tractor is doubled, the danger of overturning is increased four times.

.3 When on steep side slopes operator shall:

a. Guard against running over rocks with upper track.

b. Keep off solid rock faces.

.4 The transmission shall be in gear when tractor is going down steep grades.

.5 If tractor slides sideways, usually uphill track should be locked and the machine turned immediately.

.6 Turns shall be made so that operator is on uphill side if possible.

.7 When power control unit is in operation, hands shall be kept free from the cable and working parts.

.8 Dozer blade shall be dropped whenever operator dismounts while tractor engine is running.

573 TIMBER OPERATIONS

.1 Tractors and bulldozers used in dangerous timbered country, or in places where there is danger of falling objects, shall be equipped with a canopy which will protect the driver.

.2 Dozer operators shall be thoroughly instructed in the skills of pushing over trees before operating alone.

.3 All tractors operating in timber areas should be equipped with a heavy mesh screen installed to protect the back of the operator.

574 HITCHING AND TOWING

.1 A bar or stick shall be used to steer coupling bar into drawbar jaws.

.2 Nobody shall be allowed to ride on the drawbar nor on the equipment being pulled, unless his presence is necessary for operation of the unit and a seat is provided thereon. Dragged logs, roots, stumps, rocks, or other material shall not be ridden.

.3 Operator shall look behind before backing up to slack the chain or cable. Slack in the chain or cable shall not be taken up with a jerk.

.4 When hooking towline to the front pull hook, the blade shall be rested on the line on soft ground or, on a block or rock, then climb over the blade to attach the line.

.5 Hookers and ground men shall stand clear of all chains and lines, and shall keep a distance from the tractor of at least the length of the towline.

.6 When working near any electric power line, the length of cable attached to load shall be at least 10 feet shorter than the distance from the tractor to the power line so it cannot strike line.

.7 Tractor shall be operated when pulling a heavy load upgrade so it does not nose up or tip, or slide sideways when pulling around a side hill.

.8 Tractor shall be stopped out of gear and the brake set before the load is released.

.9 When skidding with a tractor:

a. Tractor operator and choker setter shall inspect equipment each morning and after each hard haul, including rope and eye splices on winch, choker eye splices and ferrules.

b. After chokers are set, choker setter shall get out of danger where he can see the operator, and vice versa, at all times.

c. Choker setter shall stay at least 10 feet behind the load.

575 TRACTOR ADJUSTMENTS

.1 Power control unit shall not be adjusted while the tractor engine is running except with transmission in neutral and master clutch engaged.

.2 Before working on power control unit, the dozer mouldboard and the scraper bowl shall be lowered to the ground.

.3 No one shall get under an unblocked, raised blade for any purpose.

576 SCRAPERS, CARRYALL

.1 When changing the cutting edges or working underneath the scraper, the bowl shall be blocked up to prevent it from dropping.

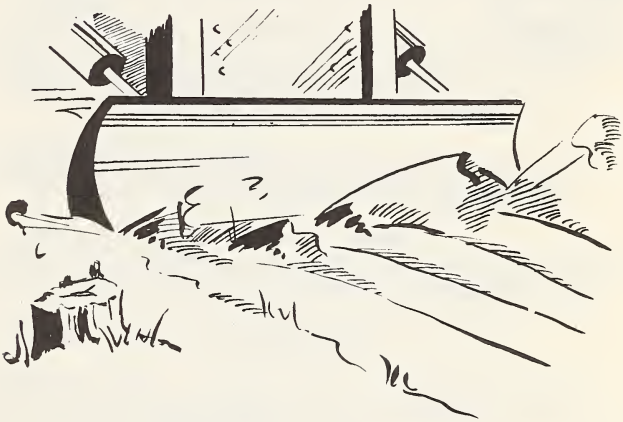
.2 Blocks shall be placed between the apron arms and scraper sides before working under the apron.

.3 Hands shall be kept free from the cable, sheaves, and linkage while the unit is in operation.

.4 Leather-faced gloves shall be worn when handling cable.

.5 When traveling down a steep hill, operator shall be ready to drop the cutting edge to the ground to serve as a brake if the scraper should start to jack-knife or get out of control.

.6 Weak or frayed cable shall be replaced immediately.



Part 6 - Materials

61 CHEMICALS

611 GENERAL

Every year people are injured, some fatally, from thoughtless use of poisonous or flammable chemicals. Breathing fumes, poor housekeeping and personal uncleanliness are the greatest sources of danger around chemicals. The best clothing and safety devices are only a partial remedy. Complete safety depends upon how the worker handles the chemicals.

.1 Manufacturers' instructions shall be followed regarding use of chemicals, wherever applicable to our work.

.2 One person shall be designated to supervise the use of chemicals including their transportation, mixing, storage:

a. He shall be designated only after he has acquired thorough safe handling techniques of chemical to be used, including:

1. Toxic or flammable characteristics of chemical.
2. Toxic or flammable characteristics of base material, if chemical is diluted for application.
3. Transportation, mixing, storage of chemical and base.
4. Use and care of equipment.
5. All precautions needed, such as fire protection, safe clothing and protective devices.
6. Chemical first-aid procedures.
7. Safe work methods.

.3 Storage:

a. Chemicals shall be kept in a safe, cool, well ventilated dry location, both in transit and in storage, where there is no danger of food contamination.

b. Storage place shall be cleaned thoroughly before using for other purposes.

c. Dangerous, toxic, flammable, or corrosive chemicals shall be kept locked up. See Flammables 62.

d. Chemicals in glass bottles shall be stored out of the sun and away from heat.

.4 All chemical containers shall be labelled as to contents, and whether they are toxic, flammable, or corrosive. If in doubt about contents of unlabelled container, they shall be destroyed. In many cases this can be accomplished by pouring on the ground in unfrequented areas.

.5 No smoking or fire shall be allowed near flammable chemicals.

.6 Adequate warning signs shall be displayed prominently showing precautions necessary around hazardous work.

.7 Only sufficient amounts of highly toxic, corrosive or flammable chemicals shall be purchased to complete one project at a time.

a. Small quantities remaining at end of project shall be disposed of in one of the following ways:

1. Flammable liquids shall be destroyed by burning, and shall never be poured into drains or sewers, exception: If miscible with water, dissolve in at least 20 parts of water and flush down drain.

2. Acids or alkalies can be destroyed by diluting with water and flushing down the sink. When diluting an acid or alkali, it shall always be poured slowly into water, never the reverse.

3. Dangerous chemicals such as those capable of making poisonous gas shall not be emptied into drains, but shall be destroyed by some one familiar with handling chemicals.

.8 Workers shall avoid breathing chemicals, sprays, gases, vapors, fumes, or dust as much as possible:

a. Persons with suspected allergies should be placed on work where contact with the chemicals will not aggravate their condition.

b. Respirators shall be worn if chemical is toxic, when mixing large quantities, or when working with a chemical for long periods.

c. Chemicals shall be sprayed or dusted to windward as much as possible.

.9 Employees handling acids, toxic, or corrosive substances shall wear suitable protective accessories such as rubber gloves, goggles, face masks, aprons, and long-sleeved, high-necked clothing which will expose as little of the skin as possible.

a. If skin contact cannot be avoided, workers shall use protective lotions.

b. Clothing shall be kept dry of water or solutions.

.10 A supply of water shall be readily available to dilute chemical burns and to flush away spills.

.11 Chemicals shall be washed from face and hands, shoes and clothing as soon as possible. Eyes should be immediately flushed with copious quantities of water.

.12 Dangerous substances like allyl alcohol, alkalis, or acids, shall be removed from their containers by pump, ejector, or siphon.

.13 Before lifting glass containers, workers' hands and glass shall be dry.

.14 Guard against animals eating chemical or the treated shrubs.

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.15 Toxic effects of some chemicals are cumulative, so workers complaining of headache, nausea, giddiness, or body pains should be taken to a doctor.

.16 See First Aid 92.

612 CHEMICALS USED IN FOREST SERVICE WORK:

.1 Allyl alcohol is extremely dangerous, explosive, flammable, toxic, and corrosive. Fumes are blinding.

a. It shall be kept tightly sealed, away from heat, flame, gas, or oil, 50 feet from buildings or in a separate shed.

b. Equipment shall be grounded for static.

c. Equipment shall be thoroughly flushed after use.

d. Any spills on skin or clothing shall be removed immediately with soap and water to avoid serious burns.

.2 Ammonium Sulfamate (Ammate) is not toxic or flammable.

a. Excess contact shall be avoided.

b. Exposed skin shall be washed at end of shift and clothing cleaned at least weekly.

.3 Arsenic Oxide is toxic and corrosive. Workers shall avoid breathing the dust. Wash off when on skin.

.4 Atlacide is flammable. Treat like sodium chlorate.

.5 Beryllium see 353.2.

.6 Calcium Chlorate is highly flammable and explosive when in contact with organic materials or other combustible materials. Clothing shall be changed if chemical gets on it.

.7 Carbon tetrachloride is extremely toxic if used in confined space, and fatal if vapors are breathed for long periods.

a. Adequate ventilation shall be provided.
b. Keep it off the skin.

.8 Chlordane Dust is more toxic than DDT. Avoid breathing it.

.9 Chloropicrin or tear gas users shall wear gas masks at all times.

.10 Copper sulfate is mildly toxic. Workers shall wash carefully and keep clothes clean.

.11 See Creosote 74.

.12 Cyanides are extremely poisonous.
a. When fumigating, warning signs and barriers shall be placed at all building entrances.
b. Workers shall work in pairs and each be provided and wear masks.
c. When in fumigation area, workers shall wear mask designed to protect against cyanide.
d. When fumigation is complete, doors and windows shall be opened by persons wearing respirators and occupants shall enter only after 12 hours of airing; children after 18 hours.

.13 DDT is less poisonous than Sodium fluoride, but oil base makes a flammable mixture.
a. All food supplies shall be covered when spraying.
b. After use, wash with soap and warm water.

.14 Dinitro Amyl Phenol is a toxic chemical and should be treated accordingly.

.15 Ethylene Dibromide is poisonous, and will blister the skin. Treat like allyl alcohol.

.16 Methyl bromide is more toxic than ethylene dibromide. Treat like allyl alcohol.
a. Cans shall be tightly packed for transportation.

b. Cans shall be stored in a cool, dry place, in tight metal cabinet, never with gas or oil.

c. Cans shall be opened outside, and destroyed immediately after use.

d. In storage, cans shall be watched closely for corrosion releasing the gas.

e. Applicators and gas-proof covers shall be thoroughly cleaned before storage.

.17 Mineral spirits are flammable.

a. Equipment and drums shall be grounded for static.

b. There shall be no smoking.

.18 Orthodichlorobenzene is flammable in oil solution.

a. If fluid enters eyes wash immediately with copious amounts of water and treat with lanolin. Goggles should be worn.

b. Skin and clothing shall be washed frequently.

.19 Parathion is flammable and highly toxic.

a. Respirator shall be worn.

b. Avoid getting it on skin or breathing it.

c. Wash from skin with soap and warm water.

d. Clothing should be changed daily.

.20 Pentachlorophenol is flammable, toxic, and causes dermatitis, and is sometimes used with flammable solvents.

a. Avoid breathing it and getting it on skin.

b. Wash from skin immediately.

.21 Polybor chlorate is flammable. Change clothing if chemical gets on it.

.22 Sodium arsenite is toxic and causes burns. It shall be mixed outside. Ammate is preferred.

.23 Sodium chlorate can be ignited by friction. It is explosive and flammable when in contact with organic matter or other combustible material.

a. It shall be mixed on the job, never transported in solution.

b. Workers shall change clothes on the job, wash work clothes at least weekly.

c. Containers, liners, and debris shall be burned immediately.

d. Fire extinguisher shall be readily available.

.24 Sodium chromate is a poison. Avoid breathing and immediately wash off skin.

.25 Sodium fluoride shall be treated like Sodium chromate.

.26 Sodium fluoracetate (180) is a deadly poison, worse than thallium sulphate.

a. Workers shall be specially trained before using it.

b. Extreme care shall be used in storage and use.

c. Use metal spoon for mixing.

.27 Sodium trichloroacetate is a poison.

a. Workers shall avoid breathing it, getting it on skin, or in eyes. If it enters eyes flush with copious quantities of water.

b. Workers shall change clothes daily.

.28 Strichnine and strichnine alkaloid are very poisonous.

.29 Sulphur dioxide is toxic and irritating.

.30 Sulphuric acid is corrosive and dangerous to handle. To dilute, always pour acid into water, slowly.

.31 Thallium sulphate is a deadly poison.

.32 2,4-D is mildly toxic.

.33 2,4,5-T is mildly toxic and flammable in an oil base.

.34 Warfarin (Warf 42) is toxic.

.35 White arsenic is very poisonous and a powerful skin irritant.

a. Wash skin off immediately.

b. Change clothes daily.

c. Wear protective clothing, coveralls, goggles, mask.

.36 Zinc chloride is a poison.

PART 6 MATERIALS

62 FLAMMABLES

621 GENERAL

.1 A separate building should be used for storage of quantities of flammables exceeding one drum. Small quantities of oil can be currently dispensed in garage or shop, if kept away from flame and fire protection is provided.

.2 Oil-house floors should be made of fire-resistant material.

.3 Oil-houses should be located 50 feet from any other building.

.4 Doors should open outward or be overhead uplifting or sliding panel type. If there is a back door it should operate independently.

.5 Proper ventilation shall be provided to prevent accumulation of vapors.

.6 Electric light globes shall be protected as needed to avoid accidental breakage. On new construction, all fixtures and switches shall be vapor- and spark-proof where explosion hazards exist.

.7 Oily rags or rubbish shall be disposed of currently by placing in fireproof containers outdoors.

.8 Containers used for any flammable shall be tagged to show contents.

.9 Containers for flammables shall be tightly closed when not in use, whether full, partly full, or empty.

.10 When filling containers, a vapor space shall be left above the liquid level to permit expansion with changing temperatures.

.11 Smoking, open flames, or sparks shall not be permitted in same room with, or within 50 feet of, areas where flammables with a flash point below 100° F. are stored or used.

.12 Only electric lamps shall be used in storage houses or when working near flammables.

.13 Glass bottles or jugs containing flammables shall not be left where the sun will shine on them.

.14 Dry cell batteries shall not be placed in an open fire for disposal.

.15 See Fire Protection 33.

622 FLAMMABLE LIQUIDS OTHER THAN PAINT

Flammable liquids are those which give off flammable vapors at or below 200° F. They are dangerous when in open containers, when leaks or spills occur, or when heated. The degree of danger is determined by the flash point, whether vapor-air mixture is in explosive range, and possibility of source of ignition. The flash point is the lowest temperature at which a liquid gives off enough vapor to burn when lighted. A flash point of 100° F. is the point at which relative hazards change, those below getting increasingly hazardous as the flash point lowers.

Flash Points of Commonly Used Liquids in Degrees Fahrenheit

Gasoline	- 45	Diesel Fuel	100
Acetone	- 1	Kerosene	100 to 115
Lacquer	0 to 80	Stoddard Solvent	100 or higher

Paint	0 to 80	Fuel Oil, burner	100 to 200
Shellac	40	Penetrating Oil	110
Ether	45	Creosote Oil	165
Alcohol	52 to 91	Machine Oil	300
Varnish	80 or less	Motor Oil	315
Mineral Spirits	85	Linseed Oil	403
Turpentine	95		

.1 At permanent stations, underground storage tanks shall be provided for 100 gallons or more of gasoline. Underground storage tanks shall be vented by a pipe of not less than 1-1/4-inch diameter.

a. Lower end shall extend not more than 1 inch into top of tank.

b. Upper end shall have a weatherproof fitting.

c. It shall terminate outside, and not closer than 2 feet from any building opening.

d. It shall extend 8 feet above top of the fill pipe.

.2 Small amounts of gasoline shall be stored in closed drums or safety cans in separate buildings or outside, but not in the sun.

.3 Underwriter-approved dispensing pumps shall be used for removing gasoline from barrels and underground tanks.

.4 All gasoline or other flammable fluids with flash points under 100° F. shall be handled by pumps or in Underwriter-approved and labelled safety cans.

a. Gasoline, and other flammable fluids shall not be stored on equipment, except in fuel tanks or safety cans, and not more than one day's requirement.

.5 Gasoline can be kept in warehouses with assembled fire suppression units, if:

a. No more than one 5-gallon can is assigned to each unit.

b. It is in the fuel tanks of any assembled fire-suppression units such as power pumps, slip-on tankers, etc.

c. When the forest fire season is over, gasoline cans shall be removed from the units and stored in the oil house.

.6 Smoking shall not be allowed in or near oil houses or near gasoline pumps.

a. Red letter No Smoking signs shall be posted at pumps, on outside and inside of all buildings which contain gasoline and other flammables.

b. Smoking or the use of open flames shall not be allowed on or in the immediate vicinity of equipment being refueled.

c. Engines shall be shut off before filling tanks with liquid fuel.

.7 Men shall not work in clothing soaked with gasoline, kerosene, oil, or other flammables.

.8 Static electricity precautions:

a. Storage platforms for all flammables with flash point below 100° F. shall be grounded to prevent accumulation of static electricity.

b. All tank trucks shall have tank grounded to the truck frame, and shall have a positive bond between truck and fill pipe.

c. Delivery hose or gas cans shall be grounded by holding the nozzle or spout against the container being filled.

.9 Gasoline and kerosene lamps shall be filled in daylight hours in the open air.

.10 Workers shall be instructed in care and use of gas lanterns.

.11 Spilled gasoline, kerosene, or oil shall be cleaned up at once. Gasoline spilled on any part of body shall be washed off immediately.

.12 Flammables with flash points below 100° F. shall not be transported or stored in glass containers.

.13 Substantial closed metal cans shall be used for handling and storing flammables.

a. Underwriter-approved safety cans should be used indoors.

b. Army jeep or blitz cans can be used on rough field work, such as engineering or fire control.

c. For permanent use, gasoline cans shall be red and labelled.

d. Temporary cans shall be identified with a red tag marked gasoline.

e. Kerosene can be stored in dwellings in 2-gallon closed cans if they are kept away from flames and sparks, and kept well below 100° F. temperatures.

f. A safety can which leaks more than 4 drops per minute when inverted shall not be used until repaired.

623 PAINTS

.1 Paint should be stored in oil house or in other special building if possible.

.2 Storage of unopened paint containers shall be permitted in safe, well-ventilated storage space not exposed to excessive heat, when oil house or other isolated structure is not available, if adequate fire protection is provided.

.3 Opened containers of paint or lacquer exceeding 2 gallons shall be stored in oil house. Up to 2 gallons, in current use, should be kept in a metal locker in a repair shop or warehouse. Cans shall be tightly covered.

.4 No Smoking signs shall be displayed wherever paint is stored or used.

.5 Neither smoking nor open flame shall be permitted in rooms where spray guns are in operation.

.6 When painting indoors, windows shall be opened to provide adequate ventilation.

.7 Paint rags shall be disposed of currently.

624 RAILROAD FLARES - FUSEES

.1 They shall be kept clean, dry, away from steam, water, oil, or excessive heat.

.2 500 fusees or less can be stored in a rodent proof container in a warehouse or fire cache.

.3 Over 500 fusees should be stored in their original containers in oil houses or other structures built for flammables.

.4 Defective fusees shall be destroyed by burning, but not in a stove.

625 BOTTLED GAS

This gas is heavier than air, like gasoline vapor. It will flow long distances and settle in low places in explosive mixtures.

.1 All ordinances, Underwriters' standards and Petroleum Engineers' recommendations on bottled gas storage, installation, and use shall be observed.

.2 Each installation utilizing bottled gas shall be inspected and approved by the local authority having jurisdiction.

.3 Tanks of Butane, Flamo, Shellane, etc. shall be stored in vertical position in shade or open shed, never in basement; and always with good ventilation.

.4 Tanks in snow or sleet country shall be protected so connections cannot be broken. In these locations tanks shall be placed on firm foundations, not on the ground, with supports for holding tanks upright.

.5 No Smoking signs shall be posted prominently.

.6 Tanks shall be transported and stored in a vertical position so that the safety valve is at the highest point.

.7 Tanks shall not be dropped.

.8 Tanks shall not be repainted.

.9 No container other than that furnished by distributor shall be used for bottled gas.

.10 Gas regulators shall be checked by authorized persons only.

.11 No cylinder shall be located within a building enclosed on 4 sides, nor within 5 feet of a source of ignition, nor below ground, nor below ground level, nor with the outlet less than 5 feet away from any building opening which is below the level of such outlet.

.12 Regulating or filling equipment on tanks or cylinders shall not be less than 15 feet from any opening into or under a building where such opening is below the level of the outlet of such regulating or filling equipment.

.13 Stoves:

a. Workers shall install and maintain them in accordance with local ordinances and Underwriters standards.

b. Operating instructions shall be permanently posted.

c. Extra care shall be used when lighting stoves because the gas is heavier than air and it does not escape up the vent.

d. Match shall be lighted first, then the valve opened.

.14 When tracing gas leaks, employees shall:

a. Forbid smoking or any open flame or spark.

b. Open windows and doors.

c. Close gas cock.

d. Apply soapy water with brush to connections and watch for bubbles revealing leak.

e. Call gas company or fire department if leak is serious.

626 PROPANE TANKS AND TORCHES

.1 They shall be stored in a cool dry place, top end up, out of sun, and safely away from fire, with smoking prohibited.

.2 They shall be transported with top end up, fastened down, fixtures tight, handled carefully and without friction, with smoking prohibited.

.3 Filling propane torches:

a. Supply tank shall be placed higher than receiving tank.

b. 10-percent filler safety valve shall be attached in place in torch tanks.

c. Supply tank shall be warmer than receiving tank, accomplished by:

(1) Placing supply tank in warm room for an hour or more prior to transfer.

(2) Placing supply tank in sun, and receiving tank in shade.

(3) Submerging receiving tank in water colder than the air.

(4) Wrapping hot blankets around the supply tank.

(5) Pouring hot water over the wrapped or unwrapped supply tank.

d. Propane shall be kept away from person or clothing.

e. Propane tanks, empty or filled, shall be protected from hot sun and fire at all times.

f. Storage place shall be properly posted with No Smoking sign.

.4 See Firefighting Equipment 765.

627 NITROCELLULOSE FILM

.1 All employees who use the film shall be informed of its explosive and toxic characteristics.

.2 Storage and use shall conform with National Board of Fire Underwriters and local fire codes.

a. All wiring and equipment shall conform to the National Electrical Code.

b. Only incandescent electric lights shall be permitted, protected with either substantial wire guards or vapor-proof globes, or both.

c. Portable lights on extension cords shall not be used in any storage room or vault.

d. Illuminators shall be so built that the diffusing glass does not become overheated.

e. Film driers, if used, shall be spark-proof.

.3 Storage in one location of not more than 1000 pounds of film in cabinets shall be allowed, provided that the location is equipped with automatic water sprinklers and vented to exterior of building.

a. No cabinet shall contain more than 250 pounds.

b. Storage under 100 pounds need not have sprinklers, providing cabinet is so constructed and insulated that each roll of film is in an individual compartment where it could burn without igniting adjoining film.

c. Fire extinguishers of types using water or

water solutions shall be provided for the protection of all rooms containing film where sprinklers are not installed.

.4 Storage of over 1000 pounds of film shall be in fire-proof vaults:

a. Vaults should preferably be located on roof or top floor so they can be vented to the outside.

b. Vents shall be in the ratio of one square inch of vent area per 5 pounds of film storage.

c. Vents shall be located at least 50 feet from nearest wall opening.

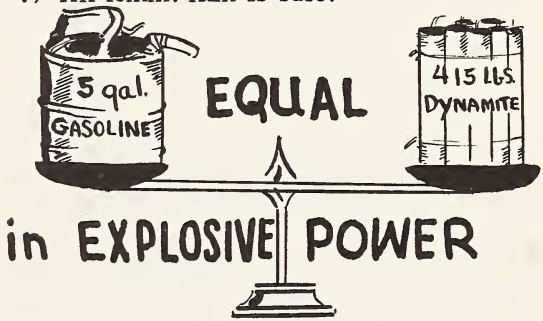
.5 No films shall be stored within 2 feet of steam pipes, radiators, chimneys, or other sources of heat.

.6 Smoking shall be prohibited in rooms where film is handled or stored, with conspicuous No Smoking signs posted in prominent places.

.7 Proper warning should be marked on the file or the container.

.8 Discarded film shall be stored and handled in the same manner as other film until removed from the premises.

.9 All 16mm. film is safe.



PART 6 MATERIALS

63 RADIOACTIVE MATERIALS

631 GENERAL

.1 Wherever radioactive materials are to be used, safety of the project shall be planned after studying the following National Bureau of Standards references, procurable through Washington Office:

a. Handbook 20 X-Ray Protection

b. Handbook 23 Radium Protection

c. Handbook 41 Medical X-Ray Protection Up To 2,000,000 Volts

d. Handbook 42 Safe Handling of Radioactive Isotopes

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MATERIALS 142 RADIOACTIVE MTRS 63

PART 6 MATERIALS

64 WAREHOUSING

641 GENERAL HANDLING AND STORAGE

.1 Clothing fit for the job should be worn:

a. For handling heavy or sharp-edged objects, use gloves or hand leathers and pads, leather or canvas aprons, safety shoes.

b. For handling harmful chemicals, use goggles, rubber gloves, apron.

.2 When unpacking material, boards with nails shall be put where they can't be stepped on. Nails shall be removed from opened boxes and kegs used for storage or material carrying.

.3 Neatness and orderliness shall be maintained at all times.

.4 Piling instructions:

a. Safe floor load limits shall be observed. Storage of heaviest items should be near walls where floor joists have the greatest strength.

b. Each pile shall have a firm foundation.

c. Round objects shall be blocked or bracketed so they cannot roll.

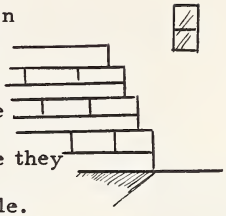
d. Tiers shall be crosspiled or tied so that materials support each other if possible.

e. Insecure tiers shall be interlocked with boards or other materials.

f. Material shall be piled only high enough for safe lifting, handling, storage.

g. Material shall be leaned away from aisles to prevent toppling.

h. Piles shall be broken down from top, with stepbacks or taper maintained, and no undercutting.



.5 Tools or materials shall be stored away from:

a. Unguarded windows where they might fall out.

b. Heat sources, if flammable.

c. Aisles, fire escapes, and fire equipment.

.6 Grease, oil or paint, rags, excelsior, paper, or other flammable material shall be placed only in metal receptacles, which should be emptied frequently. Wet excelsior and similar fibrous packing encourages spontaneous combustion and should be removed from warehouse immediately.

.7 When using hoist, load shall be secure and workers out from under load before lifting.

.8 Watch for pinch points, slivers, projecting nails.

.9 Ladders, see 444; Handtools, see 53.

642 LIFTING

.1 To avoid injury, mechanical devices shall be used such as skids, rollers, hand and lift trucks, hoists, wheelbarrows, tongs, cant hooks, peavies, haypoles, hand spikes.

.2 Employee's immediate supervisor shall:

a. Be sure of worker's physical fitness to lift.

b. See that worker is given instruction in how to lift.

c. Check frequently on lifting practices.

.3 Workers shall:

a. Use gloves or hand leathers. Get a firm grip.

b. Keep the body upright. Lift with the leg and arm muscles and not with the back and stomach.

c. Get a good footing. Crouch when starting to lift.

d. Take a deep breath and hold while load is being lifted or lowered.

e. Test the load first. Lift gradually; avoid jerky motions. Keep the load close to the body.

f. Avoid twisting motions. Don't shift positions of the feet while lifting until load is raised.

g. Ask for help if the load is heavy. Don't try to lift beyond your strength.

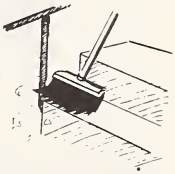
h. If in doubt how to handle material, check with supervisor to make sure the best methods are used.

i. Don't give a foolish "show off" demonstration of strength.

643 STAIRWAYS AND FLOORS

.1 All stairways, aisles, floors, working spaces, platforms, and exits shall be kept free from defects, rubbish, slippery substances, loose material, or obstructions which might cause falls.

.2 Stairways and hazardous platforms shall be protected by handrails.



.3 All floor or wall openings, where floor on other side is not at same elevation, should be guarded by railings, barriers or marked by paint if unsafe.

.4 Windows or other openings into elevator and hoist shafts, drying towers, etc. should be posted on the outside of building as warning to firemen forcing entrance to building.

644 MATERIALS HANDLING

.1 Bagged material:

a. Shall be crosstied when piling.

b. Bag mouths should be placed toward center of pile.

c. Pyramid method shall be used when over 5 feet high.

.2 Barrels, kegs, and drums:

a. If piled on ends, should have planks between layers. Planking should be as wide as bearing surface of container.

b. If piled on side, first row shall be blocked to prevent rolling.

.3 Boxes and crates should be stacked on side having greatest area, unless contents require special handling like crated glass.

.4 Cartons, loaded:

a. Should be piled with care, as sides are not rigid and will not support a heavy load.

b. Should be protected from moisture to prevent collapse.

.5 Cement should not be stacked more than 10 sacks high to avoid heavy lifting and to prevent piles from tipping over. If practical, alternate sack layers should be cross-piled.

.6 Culverts, pipes, poles:

a. Crew shall lift, move, and lower object only upon prearranged signal of one member of group.

b. Object shall be moved slowly, without sudden stops and starts.

c. Carrying bars or tongs should be used if possible.

.7 Glass:

a. This shall be carried on outside of arm, with palm of hand facing outward and the other hand reaching across the body and grasping the glass on top.

b. Sleeves shall be rolled down and buttoned around the wrists.

c. When considerable amount of glass work is to be done, arteries and wrists shall be protected by wearing leather cuffs.

d. Large panes shall be handled singly.

e. Glass shall be stored on edge where it cannot be run against by workers.

f. Broken glass disposal. See 353.

.8 Grass, hay, straw, and baled excelsior should be stored in a separate building, taking only what is needed into the packing room.

.9 Lumber:

Leather-faced gloves and aprons should be worn when loading and unloading lumber and when handling rough lumber. Watch out for splinters.

645 GOOD HOUSEKEEPING, First Step in a Safety Campaign. This means:

.1 Nothing to trip or slip over in office or field.

.2 No trash in or around buildings or work areas.

.3 Fire hazards controlled: Flammables in safe containers. Electrical wires and equipment in A-1 shape.

.4 Safe storage: A place for everything. Is everything in its place?

Part 7- Project Work

71 BLASTING

711 GENERAL See chapter on Explosives in F. S. Road Handbook.

.1 All explosives work shall be done only under the direct supervision of a blaster, certified as such after passing an examination and field demonstration on handling, storage, and use of explosives. Inexperienced men shall be trained by an experienced man.

.2 Only electric detonators shall be used for exploding charges, except near power lines 715.4 and radio installations 734.4.

.3 Only explosives listed in the Forest Service acceptable list should be used.

.4 All persons using explosives shall be familiar with and comply with the Federal, State, and local laws.

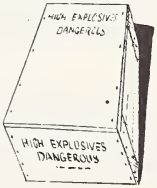
.5 Prior company approval shall be secured before blasting near a power line. Where possible, arrange to have current shut off while blasting.

.6 All persons such as loggers, fishermen, or recreationists in or near blasting areas shall be warned about the operation.

.7 Hard hats see 564

712 HANDLING

.1 Explosives shall be handled with extreme caution.



.2 Fire and sparks shall be kept away from explosives.

.3 Explosives should be handled only during daylight. If necessary at other times, use only electric lights. Flashlights should have non-conductive cases, and shall not touch explosives.

.4 Only wooden wedges and mallets shall be used for opening wooden boxes of explosives.

.5 Fibre board cases can be opened with metallic slitters provided slitter does not touch the metallic fasteners of the case.

.6 Cases shall not be opened inside of storage magazine.

.7 Cases shall be lifted clear and set down carefully. One case shall not be allowed to slide over another or dropped from one level to another.

.8 Explosives should not be left exposed to the direct rays of the sun.

.9 Explosives or wrappers shall not be left where children, unauthorized persons, or animals have access to them.

.10 Empty cases that have contained deteriorated explosives or powder residue, shall not be used for any other purpose. See 717.

.11 A shipment of explosives shall be inspected to see if it arrived in good condition. If any cases have been broken in transit, proceed with caution to sweep up and destroy all loose explosive and broken debris. See 717.

.12 Broken cases shall not be repaired.

713 STORAGE

.1 The location of permanent magazines shall be made in accordance with the American Table of Distances which states:

*Explosives Pounds Over	Pounds Not Over	Distances in feet when storage is not barricaded. Inhab. Bldgs.	Rail-ways	High-ways
2	5	140	60	60
10	20	220	90	90
50	75	340	140	140
100	125	400	160	160
200	250	510	210	210
500	600	680	270	270
1000	1200	850	340	330
2000	2500	1090	440	360
5000	6000	1460	590	470
10000	12000	1750	740	540
20000	25000	2110	970	630
40000	45000	2680	1140	800

*Interpolate distances for amounts between those above.

Above distances can be reduced 50 percent if screened by natural or artificial barriers.

.2 Magazines shall be bullet-proof, fire resistant, well-ventilated, and located and constructed in accordance with Regional, State, and Federal requirements. There should be a distance of at least 100 feet between dynamite and detonator houses. See F. S. Road Handbook for specifications.

.3 Doors shall be securely locked at all times when men are not working in magazine.

.4 Metal tools shall not be used or stored in magazines.

.5 Surrounding area, within a radius of 25 feet, shall be kept free of leaves, dead grass, or other flammable material.

.6 Cleared area shall be conspicuously posted with white warning signs reading DANGER - EXPLOSIVES in red letters not less than 4 inches high. See Color Code 311.

.7 Electric detonators shall be stored in a separate magazine from other explosives.

.8 Magazine floors should be swept regularly and magazines shall be kept clean at all times. If magazine floors become stained with nitroglycerin or before starting repairs to floors, scrub well with this solution:

1 1/2 quarts of water
3 1/2 quarts of denatured alcohol
1 quart of acetone
1 pound of 60 percent commercial sodium sulphide. It is preferable to dissolve the sodium sulphide in the water before adding the alcohol and acetone. Use plenty of the liquid in order to thoroughly decompose the nitroglycerin. Scrub well with a stiff broom or brush.

.9 Explosives shall be stored at least 4 inches from the wall for ventilation, with top side up so cartridges will not be on end. It is not necessary to turn explosives boxes in storage.

.10 Different grades of explosives shall be stored in different piles so that brand and grade can be plainly seen without shifting piles. Oldest stock shall be placed so it will be available for earliest use

within 6 months if possible. Opened cases should be used promptly.

.11 Explosives used on jobs that can be reached by trucks, shall be stored in temporary explosives and detonator magazines, constructed according to specifications in F. S. Road Handbook. On small jobs, such as trails in the back country where explosives are transported by pack train, explosives and detonators shall be stored separately behind natural or prepared bulletproof barriers, protected from the weather by waterproofed and fire-resistant canvas if possible. Storage area shall be cleared and posted as outlined above.

.12 Temporary magazines shall consist of:

a. box, of double wall construction, with a 5-inch sandfilled space on all sides, and a heavy double board lid not less than 2 inches thick. Exterior of magazine and lid shall be covered with not less than 24-gauge iron. Or

b. 2 inch plank box covered with a heavy double board lid not less than 2 inches thick, exterior of magazine and lid to be covered with heavy flat iron.

c. Magazine lid shall be hinged, hasped, and provided with a substantial lock.

.13 Temporary magazines or daily supplies shall be posted, and located under or behind natural or artificial barriers such as heavy timber, ridges, embankments.

.14 All explosives shall be stored in permanent or temporary magazines.

714 TRANSPORTATION

.1 Trucks used for transporting explosives including detonators shall have signs EXPLOSIVES in red letters not less than 4 inches high on

front and rear ends and both sides, in addition to two red flags on the front.

.2 Trucks shall be of ample size for the load and in first-class operating condition, preferably of the closed body type. Open trucks may be used only if the explosives are protected with waterproof tarpaulin, which should also be fireproof if possible. Trucks shall carry reflector signs or electric flares.

.3 Packages of explosives showing stain from interior leakage shall not be hauled in any vehicle.

.4 Truck shall be provided with two pressure powder type or CO_2 fire extinguishers. These shall be tested frequently, depending on the number of trips made.

.5 Trucks shall have sides high enough to prevent packages from falling off.

.6 Trucks should have wooden floors. Any metal in body likely to come in contact with cases shall be covered with wood or waterproof canvas.

.7 Detonators shall not be carried with other explosives in same vehicle or by same man. Exception: Regional foresters can give special authorization as follows:

a. If both must be transported in the same conveyance or be carried by the same man, not more than one day's supply shall be so moved.

b. Dynamite shall be carried in the back of truck or pickup, detonators in the cab on the floor.

c. Detonators shall be carried in original container, in a box made of 2-inch lumber lined with 1/2-inch of padding, or in a box made of not less than 16-gauge sheet metal lined with wood not less than 3/8-inch thick so no metal is exposed inside. Hinged cover, fastener, and label, are required.

.8 Detonators shall not be carried in a vehicle equipped with 2-way radio, unless they are in an all-metal can. Can shall consist of a 16-gauge iron box as specified above.

.9 Unboxed metal tools, firearms, cartridges, acids, flammable substances, storage batteries, chemicals, or corrosive materials shall not be carried in same truck body with explosives.

.10 Trailers shall not be attached to trucks transporting explosives, nor used to haul explosives.

.11 Loads shall not exceed the rated capacity of the vehicle.

.12 The driver of a truck used for transporting explosives shall:

a. Be careful, capable, and reliable.

b. Be able to read, write, and understand the English language.

c. Be familiar with and comply with the rules of the road and the State and local regulations regarding the transportation of explosives.

d. Stop, look, and listen, before attempting to cross any railroad tracks.

e. Avoid unnecessary stops.

f. Stop outside of town for meals, preferably at a roadside restaurant, and park the truck as far as possible from traffic and parked vehicles. Driver shall never get out of truck or car without first stopping engine, setting brakes, and setting gearshift lever in low or reverse.

g. Avoid having truck repaired during trips. In emergencies, make repairs in the open air only.

h. Stop the truck engine before putting gasoline in the tank.

i. Never coast downhill out of gear.

.13 Driver shall not:

a. Smoke while driving the truck.

b. Carry matches.

c. Carry firearms or loaded cartridges while driving.

d. Permit unauthorized persons to ride on the truck.

e. Leave truck containing explosives unguarded.

.14 Animal transportation shall provide for:

a. Detonators and dynamite on separate animals.

b. Detonators in original containers, well wrapped and padded, and packed with non-metallic articles such as bed rolls, tents.

c. Dynamite mantied and roped.

d. Signing is not necessary in a packstring.

715 USE

.1 A sign CAUTION - BLASTING AHEAD, or one with similar wording, shall be posted on all roads and trails leading to the scene of any active blasting operations. These signs should be not closer than 700 feet from the scene of the blasting, and usually not farther than 1,000 feet.

.2 Preparation:

a. When preparing primers of half cartridges, the cartridge shall be cut in half first and then prime each half separately.

b. Primers shall be prepared for loading each hole, or series of holes, as needed.

c. Primers shall not be prepared or stored in a magazine, or carried over to the next day.

d. Loose electric detonators shall not be carried in pockets of clothing, or in the same container with dynamite.

e. Where practicable, the blasting machine shall be kept in a moisture-proof, locked box and removed only when used. Where this cannot be done, machine shall be in locked box overnight.

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1. On the job, the blaster shall remove handle of 10-hole machine, and always keep larger ones locked when not in use.

2. The machine shall be tested at the start of the project against a rheostat to see if the full electric energy is developed.

3. It shall fire without failure at least five times in succession two electric detonators in series, through resistance as follows:

75 ohms for 10-cap machines
144 ohms for 30-cap machines
208 ohms for 50-cap machines

4. The safe capacity shall be noted on a tag placed on inside cover of box.

f. A wiring diagram shall be kept with rheostat always.

.3 Electric detonators within 300 feet of any 2-way radio transmitter, shall be tightly enclosed in an all-metal can or metal encased box. Can shall not be opened when transmitter is in use. See 714.8.

.4 In areas of high risk from electricity escaping from power lines or other sources of extraneous electricity, explosive experts shall use Primacord in place of wiring.

.5 Loading:

a. Only blunt wooden rods shall be used for placing cartridges or tamping stemming material.

b. Cartridges shall be slit with knife so that gentle pressure will expand them to fill hole by tamping lightly.

c. The last half of stemming material shall be tamped firmly in place.

d. Detonator wires should not touch or cross each other any more than necessary.

e. Remember that mud capping and shallow shots throw material farther than deep, heavy shots.

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f. Holes shall not be loaded during a thunder storm.

1. If holes are loaded and a storm occurs, the danger area shall be kept clear and flagmen posted the same as when shots are fired, except that traffic shall not be held up unless the road is adjacent to the loaded holes.

2. If holes are loaded but not connected to lead wire, the detonator wires shall be twisted together.

g. If necessary to leave over night, the ends of the detonator wire shall be twisted together, coiled, and covered with dirt.

h. Every hole or surface shot shall be marked with a 6-inch red cloth at time of loading.

1. Cloth shall be removed when circuit is tested before attaching detonator wire.

i. Where more than one powder man has been loading holes in the same area, all shall accompany the blaster to be sure all charges of each powder man are connected in the circuit.

j. The blaster shall be the last man to leave the danger area so he can assure himself that everyone is in a safe location.

1. He shall also be held responsible for posting flagmen and warning signs, notifying every person and all traffic in the danger area, and shouting all warning signals.

k. Blaster shall wait at least 2 hours before loading a sprung hole, being sure it has cooled off from heat of springing.

1. A hole shall not be sprung adjacent to a loaded hole.

.6 Wiring:

a. All rounds shall be wired in series, using 18-gauge connecting wire. No more shots shall be wired in one series than the current rated capacity of the blasting machine.

b. Only standard covered 12- or 14-gauge single strand, solid copper lead wire shall be used with no bare joints. Splices shall be taped and supported off the ground.

c. After lead wires have been wired into the circuit and all connections are tight and the wire clean, and before attaching to the blasting machine, the circuit shall be checked to see if it is closed by means of a blasting galvanometer.

d. If the blasting galvanometer test is OK and the shot is ready to be made, the handle of the blasting machine shall be vigorously pushed down three or four times to warm up the generator before connecting the lead wires to the machine.

e. Detonators shall be kept shorted out by twisting together bare ends of the wires until ready to connect in series.

f. Only detonators of the same manufacture shall be used in the same circuit.

g. Each detonator shall be tested before preparing primer:

1. Scrape ends of detonator wires clean.

2. Touch them to contact parts of blasting galvanometer.

3. If needle swings across scale, detonator is OK. Each detonator shall be tested, as in g, immediately after tamping bore hole.

h. Sufficient lead wire shall be provided to permit the blaster and crew to be at least 500 feet distant, airline, from the nearest shot unless blastproof areas are provided at a safe distance from the danger area.

1. Crew shall not be allowed to return until blaster has assured himself that there are no misfires or delayed shots.

i. Lead wires and detonator wires shall be kept from coming in contact with any part of a telephone line, transmission line, or other electric installation.

j. The blaster in charge of the shot shall connect the wires to the blasting machine.

k. Immediately after the blast, the wires shall be disconnected from the machine and twisted together, and the machine shall be put back in the box until needed. See 715.e.

.7 Firing:

a. Vehicle and pedestrian traffic shall be stopped on roads at least 700 feet away from the blasting area.

1. Vehicle drivers and passengers shall be urged to stand outside of cars during the blast.

2. Traffic shall be resumed only after a check-up of the blasted area by the blaster.

b. A warning cry of Fire in the hole shall be shouted three times by the blaster before each shot, sufficiently in advance to permit all persons to reach a point of safety. If he has guards posted, he will call Fire in the hole once only, followed by guard's name, until all guards have answered.

c. The blaster and all employees shall face the blast, with backs to the sun if possible, to give best chance to watch for and avoid flying matter.

d. Immediately after the blast, the lead wires shall be removed from the machine and the bare ends twisted together. Blaster shall coil up the lead wires as he approaches the blasted area for at least 100 feet to prevent tampering when he is away from machine.

e. Before work is resumed after a blast, wires shall be traced by the blaster through the broken rock and a search made for any unexploded cartridges and misfires.

f. Blaster shall give the all clear signal before men return. See 541.1.

.8 For avalanche control by blasting, see 1023.

.9 For radio use and blasting see 714.8, 715.3, 734.4.

.10 For machine equipment and blasting see 541.1.

716 MISFIRES

.1 There shall be a waiting period of at least an hour before returning to a misfire if some of the shots did not explode, and at least 15 minutes for single shots.

.2 If there is any reason to believe a charge is burning in a hole, everybody shall be removed from the danger area and the area posted and guarded for 12 hours.

.3 If a misfire is in a mudcap or shallow shot, another detonator shall be inserted into the shot and fired again.

.4 If a misfire is in solid material and has been stemmed with water, another primer shall be prepared, placed on top of the first charge, and fired again.

.5 If a misfire is in solid material and has been stemmed or tamped with dirt or clay, the packing or stemming material shall be blown out using compressed air and a stiff rubber hose or bronze pipe nozzle. When enough of the stemming material has been removed to expose the explosives in the hole, prepare and place another primer and refire the blast.

.6 Only in cases where the foregoing methods cannot be successfully used, shall an attempt be made to detonate a misfire by drilling a nearby hole, loading, and firing. This shall be done only under the direct supervision of the most experienced blaster.

.7 If the missed hole is on a flat rock or a slightly sloping face, the newly drilled hole shall be back of and at least one foot above the missed hole.

.8 When necessary to drill another hole, on a vertical rock face, it should be at least a foot in front of and above the missed hole. The distance shall depend on the probable radius of the sprung hole and the angle of the drilled hole. Never drill behind or below it, or into the misfired charge.

.9 After the blast, a careful search shall be made for undetonated explosives.

717 DISPOSAL

.1 Dynamite:

a. Sweepings from cars, shipping and magazine floors, and all deteriorated dynamite which is soft and mushy or which shows nitroglycerin stains, and dynamite in cases which are discolored due to leakage, shall be destroyed by burning at least 200 feet away from the car, buildings, and highways.

b. The dynamite or cases of dynamite shall be removed to a safe distance, at least 200 feet, and opened, using wooden wedges and mallets only.

c. Small amounts shall be destroyed by exploding in a safe place. Larger quantities can be burned.

1. The amount burned at any one time shall be not more than 50 pounds, depending on local conditions. A new site shall be selected if more is to be destroyed.

2. Gelatins are particularly prone to detonate on burning, so not more than 10 pounds shall be destroyed at a time.

3. Dynamite shall never be burned in cases or deep piles.

4. The cases shall be opened with wooden mallets and wedges, using special care if there are any signs of leakiness.

5. The cartridges shall be removed, slit, and spread not more than 3 inches thick over the ground, preferably with a mat of loose paper or excelsior underneath them.

6. If the dynamite is wet and does not burn readily, pour a little kerosene, never gasoline, over it.

7. The pile shall be ignited by a small pilot fire of paper or wood shavings. This shall be arranged so that it will have to burn several feet, preferably against the wind, before it reaches any explosive material. Then the operator will reach a place of safety before there is any possibility of an explosion.

d. There shall be no smoking or open lights.

e. Dynamite shall not be placed on hot ground.

f. Never return until all smoke and flame is out and the debris is cool.

g. Burning explosives shall not be stirred, nor shall more explosives be added after burning has started.

h. The ground where the dynamite was destroyed shall be plowed as soon as it has burned, first making sure that all explosive material has been consumed and the ground is cool.

i. Empty cases shall be piled and burned separately.

.2 Detonators:

a. Employees shall not tamper with detonators in any manner.

b. Detonators which have been shown to be defective by galvanometer tests, or which have deteriorated shall be destroyed by explosion with dynamite under some confinement.

c. Detonators shall not be thrown into small lakes or bodies of water such as rivers, creeks, ponds, wells, or water-filled abandoned quarries. They shall be destroyed this way:

1. First cut the wires off about one inch from the top of the detonator preferably with a pair of tin snips, one detonator at a time.

2. Not more than 100 detonators shall be placed in a box or paper bag, primed with about half a pound of dynamite and a good electric detonator. This shall be buried under paper and dry sand or fine dirt, in a hole at least 6 inches deep.

3. This shall be fired from a safe distance with a blasting machine.

4. Not more than 100 detonators shall be fired at one time.

5. The ground around the shot shall be thoroughly examined to be sure no unexploded detonators remain.

6. The same hole shall not be used for successive shots unless the entire inside surface of the hole feels cool to the touch.

PART 7 PROJECT WORK

72 BLISTER RUST CONTROL

721 CLOTHING

.1 Workers shall wear:

a. Puncture-, tear-, and snag-resistant trousers without cuffs.

b. Logger-type shoes with non-skid soles, such as boot calks, hob-nail, or composition soles. depending on local requirements.

c. Tear-resistant shirts, especially in brush areas and for prevention of sunburn.

d. Leather-faced gloves.

.2 Safety spectacles are recommended as protection against branches hitting the eyes.

722 OPERATIONS

.1 Leaders shall:

a. See that workers are adequately guided to and from their work.

b. Check each worker to assure his safety, and to eliminate the possibility of his becoming lost, where a dragline is used and one man assigned to a strip.

.2 Workers shall:

a. Grub out the larger shrubs.

b. Swing the tool away from legs and feet.

c. Use only sharp, safely conditioned tools.

723 See also Policy 11, Supervision 12, Contract Work 21, Fire Protection 33, Sanitation 37, Hand Tools 53, Safety Equipment 56, Chemicals 61, Flammables 62, Warehousing 64, Transportation 81-84, General 91-95.

PROJECT WORK 166 B. RUST CONTROL 72

PART 7 PROJECT WORK

73 COMMUNICATIONS

731 TELEPHONE LINE, C&M, GENERAL

.1 All on-the-job orders shall be given by the foreman in direct charge.

.2 Before starting on any job, all essential tools, equipment, and supplies shall be in safe working condition.

.3 All installations having possible conflict with power lines shall be carefully planned so there is no danger to personnel working on telephone circuits.

.4 Employees shall:

a. Have thorough knowledge of location of telephone and power lines, including the hazards involved.

b. Check with power company before testing for trouble on lines crossing or close to power lines. If a power line short exists, company shall correct it.

c. Stay away from wires which there is any reason to believe might be dangerous.

d. Never go above the top telephone wires for any reason when working on jointly used poles.

.5 Where 99a arresters are being installed, the connection to neutral wire of the power system shall be made only by power company workmen.

.6 For other safety precautions; See Electricity 32, Rigging and Gin Poles 43, and Telephone Handbook.

.1 Condition of all tools and equipment shall be checked, and repaired or replaced when unsafe.

.2 Climbers:

a. Shall be worn only when working on unstepped poles or trees.

b. Shall not be left where persons may stumble on them, or where points may be damaged.

c. Pole gaffs should be used on poles and thin-barked trees, and tree gaffs on rough thick-barked trees. Climbers with replaceable gaffs are satisfactory.

d. Gaffs shall be kept sharp:

1. Use a file, never an emery wheel.

2. File toward point and down the outer rounded surfaces so as to retain their original shape. File the inner flat surface starting about $\frac{1}{2}$'' from the point and filing until the point curves outward slightly. Final point shall be in top ridge, unfiled. Never file the outer edge of the gaff.

3. See page 312 Telephone Handbook for minimum dimensions to which gaffs may be sharpened.

.3 Safety Belts and Straps:

a. Linemen shall:

1. Personally inspect safety belts and straps daily for worn, hard, or dry leather; pliability; worn or broken sewing; cuts; cracks; loose rivets; worn buckles, snaps, rollers, and tongues.

2. Carry them in special compartments or hang them where they cannot be damaged.

3. Keep them away from heat.

4. Never punch extra holes in them, or splice them.

5. Bend them smooth side out, over a 1-inch pipe to check for cuts.

6. Place keeper of snap hook on strap, away from body when hooked in D-ring.

7. Discard belts or straps if:

a. They are cut or torn enough to affect their strength.

b. Leather is worn to less than 1/8 inch thickness.

c. There are other serious defects.

8. Ropes and leather should be kept away from acids, fumes and strong alkalies.

.4 Ropes:

a. Wire-cored safety rope shall be used to prevent flip when crossing under power lines and when climbing and trimming large trees. Safety ropes shall be 1-inch Manila, 12 to 15 feet long, with a steel core of six strands of seven twisted steel wires.

b. Ropes used for telephone construction shall be of best quality Manila hemp.

c. Rope shall not be taped or covered with other wrappings.

d. Rope shall be handled carefully so it will not be damaged.

e. All hand lines shall be examined frequently to be sure they are safe at all times.

.5 Belt hand ax shall be sheathed.

733 POLE AND TREE OPERATIONS See Telephone Handbook, Pages 55-65.

.1 Loading and Transporting:

a. Substantial, well-secured, and well-braced skids shall be provided where hand loading is necessary. Eliminate heavy lifting.

b. Loading with power equipment, see 43.

c. Poles shall be securely chained while hauling vehicle is in motion, except after distribution has started along pole right-of-way.

d. Red flag shall be attached to rear end of longest pole.

e. Men shall be kept away from side of load while poles are being distributed.

f. No one shall be allowed to ride or stand on load of poles, when unloading and distributing poles, unless absolutely necessary.

.2 Raising:

a. Pike poles and hook ladders shall be inspected for serviceable condition.

b. When raising long pole, four steadying pikes shall be used near top.

c. Poles should be held near ground line with two peavies or cant hooks to prevent roll when being raised with pike poles.

d. Plank or small pole should be used to force butt of pole into the hole when it is being raised. Don't stand on pole.

.3 Climbing:

a. Every new employee whose duties include climbing, shall be tested to check his ability. Those unskilled shall be trained in climbing technique before being put to work.

b. Poles shall be examined especially at the ground line, for rot before climbing.

1. Surface defects both below and above ground can be noted with the naked eye, but a screw driver or a bar should be used vigorously to discover inner decay.

2. If a pole seems sound but age warrants suspicion, 3/8-inch holes shall be bored and examined. If not necessary to remove pole, plug holes with creosoted plugs.

3. Lineman shall not depend on testing a pole by "sounding" it with a block of wood or a heavy tool, nor by swaying it back and forth.

4. If the ground is frozen, assume that the pole is unsafe until tested.

c. Where immediate repair work is necessary, unsafe poles shall be cut off at the ground line and reset prior to climbing.

d. Signs or nails shall be removed from poles before climbing.

e. Climbers, gaffs, and straps shall be dependable and properly fitted to the legs.

f. Serviceable work gloves and high shoes should be worn while climbing. Trouser legs shall be pulled up so they will not snag on gaffs, and so knees will be free.

g. When off the ground, safety belt with safety strap properly adjusted to pole or tree shall be worn.

h. The safety strap shall not be around pole or tree while lineman is moving up or down, except when there is danger of being thrown off balance by high wind or other causes. It shall hang free with both ends of strap snapped into one D-ring.

i. When climbing poles or trees, short steps shall be taken and gaff placed where it will not slip. Make each step deliberate and forcible, with knee bowed out away from pole.

j. Climbers shall be extra careful when climbing icy, frozen, cracked, knotty, rotten, crooked, case hardened, or especially soft poles or trees.

k. When it is necessary to climb icy poles or trees, gaffs shall be put in the icy side, climbing the pole with hands on the drier side. On stubbed poles, lineman shall climb on side opposite stub so he won't strike it coming down.

1. Lineman shall step down from trees or poles when wearing gaffs. Don't jump.

2. Ladders should be used instead of climbers whenever practical to do so, on large thick barked trees, or when every pole or tree in a line must be climbed.

.4 Working Aloft:

a. Safety straps shall be fastened at all times.

b. Crossarms, braces, pins, and small limbs shall not be used for support.

c. Safety strap shall be used around that portion of the pole above the top crossarm only when the pole is 15 inches or more higher than the crossarm.

d. Hand lines should be used to pass tools, equipment, and materials to and from lineman or to rehang wire on insulators.

e. Ground workers should stay away from trees being limbed and not work under tree or pole workers.

.5 Limbing:

a. When limbing a tree, care shall be taken to avoid cutting safety gear or person.

b. Pruning saws and extensions should be used wherever possible.

.6 Wire Stringing:

a. Line wires shall not be cut without first guying or bracing, if there is danger of a pole falling.

b. In using stretchers, workers shall be in the clear so that in case of slip or breakage, the ends of the wire will not whip against them.

c. When working on lines adjacent to high voltage lines, rubber gloves, dry rope lines, insulated tools shall be used.

d. When repairing breaks on such lines, the line shall be grounded on both sides of the break before starting work.

e. Line workers shall not contact wire during lightning storms, even if storms are several miles distant.

f. Flip shall be guarded against when wire is cut or released from overhanging trees, branches, stumps, etc.

g. When stringing wire across a roadway, it shall not be carried up the pole unless a flag man is stationed on the road.

h. Wire shall not be tied to tool belt or body.

i. When in doubt about clearance, a hand line shall be used for raising wire. Hand line shall not be tied to the tool belt or body when the line wire is attached.

.7 Taking Up Wire:

a. When reeling up wire parallel to a power line, one man shall be at the rear to hold the wire taut so that the end will not catch and fly up into power wires.

b. Always hold to a dry rope tag line 20 feet or so in length tied to the end of the wire being pulled.

c. Where the telephone wires are being removed from a crossing under a power line, they shall be cut at the crossing and reeled in from the opposite ends.

d. After the wire is reeled up, coils shall be tied securely at four places and ends of tie wires pressed into the coils before removing from the reel.

.8 Dismantling:

a. Poles which will not be salvaged should be sawed or chopped off rather than dug out.

b. If pole is weak it shall be supported with pike poles before climbing, or:

1. Set new pole next to old one.
2. Before climbing, brace old pole with four pike poles.
3. Lash them together with rope.
4. Guy old pole four ways with 3/4-inch rope.
5. Guard against kickback when releasing last strain on old pole.

734 RADIO

.1 Due to the high voltages in certain circuits, only radio technicians or others specially instructed shall be allowed access inside of AC powered equipment.

a. AC cabinet shall be locked and the key shall be available only to radio technicians, or others specially instructed and authorized.

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.2 Permanent M or SPF set shall have antenna grounding switch, so connected that when antenna is grounded by operating the switch all wires leading inside the house will be disconnected.

.3 During lightning storms, operator shall:

a. Never use any radio if storm is within one mile.

b. Extend antenna on back-pack set only when storm is over a mile away.

c. Ground antenna on permanent M or SPF set.

.4 A radio transmitter shall not be used within 300 feet of any electric blasting. See also 714.8, 715.3.

.5 When using car radio, driver shall slow down and preferably stop except during emergencies.

.6 Insulating platforms or rubber mats shall be provided in radio repair shops.

.7 See Lightning Protection Handbook for grounding of broadcast receivers in lookout towers.

.8 Whip antennas shall be provided with safety knob, closed loops or other protective device to prevent injury when not extended.

.9 Technicians shall be physically well qualified and specifically trained before climbing in high places

PART 7 PROJECT WORK

74 CREOSOTING

741 BURN PREVENTION

.1 Shirt sleeves shall be rolled down.

.2 Gloves which creosote cannot penetrate shall be worn.

.3 Neck shall be covered by turning up collar or wearing handkerchief.

.4 Trouser legs shall be rolled down over the ankles and boot tops.

.5 Exposed portions of skin shall be covered with protective creams or yellow vaseline.

.6 Sunburn lotion and sun glasses should be used for protection from creosote reflection on bright days.

.7 Hands and face shall be washed thoroughly with soap and hot water immediately after work. Grease shall be removed.

.8 Hands or articles of clothing that have creosote on them shall be kept away from eyes.

.9 Change to fresh clothes after work day. Clothes that become soiled with creosote shall be laundered frequently.

742 OPERATIONS

.1 Workmen with fair skin and light hair should be used where they are not in frequent contact with creosote.

.2 Rubbing alcohol and cotton should be available for washing off creosote.

.3 Precautions shall be taken to avoid the addition of water, snow, or very wet posts or poles to hot creosote, to prevent foaming or surging.

.4 A 1-inch air space for expansion of creosote should be left when storing creosote in drums.

.5 Timbers shall be piled or removed in tiers; also blocked to prevent rolling.

.6 See Chemicals 611, Lifting 642, First Aid 92.

PART 7 PROJECT WORK

75 FENCING

751 GENERAL

.1 Safety requirements in the Hand Tools Section 53 shall be observed.

.2 Heavy gauntlet-type gloves, and leather chaps or heavy leather apron should be worn when working with barbed wire.

.3 Location for posts and jacks should be marked on ground before distribution to avoid unnecessary carrying.

.4 Posts should be laid up and down slope to prevent rolling.

.5 Fence work shall be stopped and workers shall get away from fence when lightning storms are in progress. See 93.

.6 Before climbing a fence, the objects being carried shall be placed on the other side.

752 HANDLING WIRE

.1 End of wire shall be firmly secured when unrolling from spool. Side guards on spool roller shall be used to prevent sidelash.

.2 Wire shall be secured on both sides of pliers to prevent backlash when cutting from a roll of wire under tension.

.3 Arm shall not be placed over or under line wire to steady post while driving staple.

.4 Staples shall not be driven too deep as wire can easily be severed, with chance of injury to workers along line.

.5 Smooth wire shall be used to make gate-post loops where wire gates are used in fence. Wood lever with smooth wire should be installed for closing gate.

.6 On projects where metal posts are used, a driver should be made of a pipe that will slide over the post. The pipe should be about 42 inches long, weigh about 15 pounds, and have one end closed by welding.

753 STRETCHING

.1 Kinks shall be removed and straightened before stretching.

.2 Old wire shall be checked for weak spots and splices before stretching.

.3 Stretchers of heavy construction with ropes not smaller than $\frac{1}{2}$ inch shall be used.

a. Worn ropes and wire clamps shall be replaced at regular intervals.

b. Machine power shall not be used to stretch wire.

.4 Side-cutting pliers shall not be used to pull wire.

.5 All workmen shall stay in the clear of wire while it is being stretched.

.6 Not more than 1/4 mile of wire shall be stretched at one time. In rough country, limit span of stretch between another post and stretcher to distance which can be seen.

.7 Top wire shall be stretched first.

.8 When stretching wire on sidehills, spool shall be secure, with no chance of rolling onto workers.

.9 When stretching wire, visual signals should be used when there is any doubt about hearing verbal signals, because of distance, wind, or other obstacles.

.10 Wire shall not be stretched to breaking point.

.11 Hammer or stick shall be used to hold wire in place while attaching weights, stapling, or releasing from obstacles.

.12 Pliers or a stick shall be used to pull wire down when stretched across a depression, or when releasing it from obstacles.

PART 7 PROJECT WORK

76 FIRE FIGHTING

761 GENERAL

.1 The most dangerous man on a fire crew is the one who is poorly trained and afraid. Many risks can be eliminated if each man knows his job. Experience shows that one of the best safety measures is aggressive, intelligent fire fighting aimed at the danger spot. This section and others shall be used to assist in efficient safe suppression. See also Aviation 82, Contract Work 21, First Aid 92, Flammables 62, Hand Tools 53, Motor Vehicles 83, Policy 11, Supervision 12, Tractors 57, Tree Felling 711.

.2 No fire fighters shall be recruited who are emaciated, overweight, or who have disabilities due to heart, lung, or intestinal defects. They should be between the ages of 18 and 55.

.3 See Clothing requirements 561, Boots 562, Hard Hats 564, Elec. 324.

.4 Drink water slowly. Make sure it is not contaminated. Avoid ash-laden water. Individual supply should be carried.

.5 One 10-grain enteric-coated salt tablet should be taken by a fire fighter with each good-sized drink of water, to prevent heat exhaustion. Exception: Salt should not be taken by those on salt-restricted diets.

.6 Fire camps shall be kept clean and sanitary.

.7 Sites for resting, lunching, or bedding down shall be safe from falling trees or snags, vehicles, and rolling logs or rocks.

762 TRAVEL

.1 Trails and routes shall be marked and maps consulted to prevent getting lost.

.2 Watch your footing at all times.

.3 For night travel only those lanterns and lights that are in safe condition and which will produce adequate light shall be used. Especially during cross country night travel, watch for holes such as mine shafts, wells, lava craters and cracks.

.4 Cliffs or slides shall be climbed up or down only after careful hazard survey and full preparations have been made.

.5 When traveling in rocky country rocks shall not be dislodged on men below. Men shall be on the alert for any rocks or logs that may possibly be dislodged.

763 FOREST FIRE FIGHTING

.1 The work supervisor's verbal or written instructions shall be followed at all times.

.2 Fire fighters shall:

a. Watch for hazards such as blow-ups, snags, rolling logs or rocks, falling limbs, snag tops or chunks, sliding or kick-back snags, tops breaking off, or falling trees knocking down other trees.

b. Be a minimum distance of 6 feet apart while walking and 10 feet or more apart

when working. Spacing shall be materially increased in traveling over country where there is danger of rolling rocks.

c. Keep shirts on to prevent possible burns.

d. Avoid walking in hot ashes.

e. Pass a burning or fire-weakened tree only on uphill side or above lean.

f. Keep inside the cold burn, if possible, when retreating.

g. Have retreat route picked so men will not run blindly from falling trees or rocks; do not let anything stampede them.

h. Never try to out-run a fire up a steep slope or through a dense unburned brushfield in the face of an oncoming fire front. Follow instructions of the foreman.

i. Stay clear of dozer in operation instead of depending on the dozer operator to keep away from men. Because of the size of rocks that a dozer can roll, men should not work below a dozer on a hill.

j. Build safety strip for retreat in case fire takes a run, when working in advance of fire with dozer, and especially when working along ridge top when fire is in canyon below.

764 FIRE OVERHEAD

.1 See Policy 11, Supervision 12.

.2 Full-time safety men should be assigned to large fires to survey fire line, fire camp and transportation hazards and recommend how to remove them; check on Safety Code compliance; check on first aid and medical facilities, and otherwise assist fire boss with safety.

.3 Crews shall be instructed as to safe working practices in advance of starting work; to stay together and obey the foreman's orders in the

event it becomes necessary to retreat from an on-rushing fire.

.4 Dangerous places shall be spotted by daylight before going on night patrol. Foreman shall be alert to eliminate hazards. Men shall be warned of unsafe working conditions.

.5 Lookouts shall be posted to:

a. Warn crews of falling trees, snags, or limbs, rolling rocks, and logs.

b. Keep watch and warn crew working in sections in case of blow up.

.6 Escape routes shall be planned to avoid traps from rapid frontal or flanking spread, spot fires, crowning, and blow ups. Overhead and crews shall thoroughly understand this plan.

.7 A frequent check shall be made to be sure all men are safe, and always immediately after a flare-up if it is necessary for a crew to run to safety.

.8 Reasonable rest periods shall be provided, particularly at high elevations and in high temperatures. Some reserve strength should be kept for emergency. Shifts should not exceed 10 hours.

.9 Fire crews shall be warned to be cautious when fighting fires near high tension lines because of the possibility that there might be a live wire on the ground. See Electricity 32.

.10 Wherever possible men shall not work above one another and at close intervals when constructing lines up or down steep hill.

.11 Guides or spotters ahead of fire line dozers shall be selected for their physical fitness as well as other qualities, specially instructed in job requirements, and required to wear hard hats on hazardous areas. At night it is suggested that the dozer guide wear two headlights, one shining to the front and one to the rear, so the operator can see him at all times.

.12 Prompt first aid shall be given to blisters, minor cuts, bruises, and other injuries. Make sure that adequate attention is given those more seriously injured.

.13 These safety measures shall be taken on critical fire days:

a. In crown fires, retreat to where wind will blow fire away.

b. In snag areas, cool down base fires and break up ground fuel, fell snags. Allow only snag crew in area.

c. In grass areas, watch out for fast runs. If an effort to cut across the head involves slow access and retreat, resort to control by flank attack from rear towards front. Burning rate increases after 10:00 a.m. and will be high by noon. Rate of spread apt to be extreme in late afternoon.

d. Patrol below for spots from hot material rolling down. Smouldering fire below a crew can race up slope.

e. Remember that south slopes can become explosive in late afternoon.

f. If cut off by fire, try to get into burned area.

g. Forecasts of high impending weather turbulence shall forewarn crews to expect crowning, sudden formation of large whirls, unusual fire behavior, exceptional rates of spread, gustiness, quick changes in wind direction, and the likelihood of danger even in flank attacks. Make fastest attack possible to restrict fire to smallest acreage before it reaches

breakaway point.

765 EQUIPMENT

.1 When fire-fighting equipment is parked adjacent to major roads, the following precautions shall be taken to avoid accidents and congestion:

a. Cars shall be parked so as to avoid congestion, even though it means some separation of vehicles at fire area.

b. Tank-truck operators shall be trained to utilize to the fullest extent possible, the side adjacent to the road edge for all operations.

c. If the fire is adjacent to major roads, "Fire-Danger" or "Forest Fire Ahead" signs should be placed on the road to warn motorists of possible dangers. Flares should be used when visibility is decreased by smoke.

.2 All backfiring torches shall be used only by those workers trained and qualified for this duty:

a. Fittings shall be kept tight.

b. Straps, fittings and exterior surfaces of torch shall be kept free of liquid fuel and flammable residues.

c. Pack straps shall permit rapid removal of torch.

d. Straight gasoline shall not be used as a fuel, except in gas-generator type (Hauck) torches especially designed for gasoline fuel.

e. Fuel for drip and cold oil-burning type flame throwersshouldcontain no gasoline.

f. If gasoline-oil mix is essential for drip torches and cold oil-burning type flame throwers, the mixture shall contain not more than one part gasoline to three parts of Diesel or heavier oil.

g. All torch fuel supply containers shall be clearly labeled as to kind of fuel.

h. The weight of back-pack type backfiring torches shall be limited to not more than 40 pounds, full.

i. Backfiring torches shall be kept out of hotly burning areas.

j. No one with oil on his clothes shall use a flame thrower or approach an open fire.

k. When using a cold oil-burning type of flame thrower which projects flaming partially burned Diesel oil, always fire with the wind if possible, quartering or at right angles if necessary, and never against the wind, because flames might envelop the user.

l. Ignition end of torch shall be held away from body when being lighted.

m. Non-pressurized back pack containers for torches shall not be used.

.3 When using fusees:

a. They shall be carried in hand or container, not in clothing.

b. A handle should be made from a stick or a limb.

c. Lighted ones shall be held so that hot slag won't fall on the body.

d. Keep them in original containers, never loose in tool boxes.

766 BUILDING FIRE FIGHTING

.1 Rescue victims and give first aid.

.2 Be sure water supply and extinguishers are functioning:

a. Beware of dangers of whipping high-pressure hose.

.3 Be sure electricity current is off especially if water is used.

.4 Ventilate so building can be entered:

a. Open top floor windows from top.

b. Open windows between top and first floors from both top and bottom.

c. Open first floor windows from bottom.

.5 Aim hose at base of flames.
.6 Protect adjacent buildings.

767 MISCELLANEOUS FIRE FIGHTING

.1 To put out gas fire, water should be used to cool area until leak can be shut off or until gas has vaporized, after which dry powder or CO_2 is effective.

.2 To put out vehicle fire, turn off ignition, shoot extinguisher through hood louvers. If no extinguisher available, smother flames with sand, dirt, blanket, or coat. Never use water on gasoline or oil fire.

768 LOOKOUT JOB

.1 Tower legs, stairway and treads, platform, and railing shall be inspected at least twice a year.
.2 Catwalks shall be equipped with safety gates to prevent falling or stepping into trap door opening to stairway.
.3 All lookout towers shall be equipped with drop gates, to prevent walking into stair well, when trap door is open. Drop gate shall be hinged off balance, so it will automatically drop in place unless fastened up.
.4 Tower telephone, wiring, lightning arrester installation and ground shall be inspected before occupancy, frequently thereafter, and after every lightning storm. Posted rules on Standard Form 901 shall be followed during storms.
.5 Do not hurry when going up or down the tower stairway.
.6 Beware of slippery or loose stair or ladder treads and handrails.
.7 Dispatcher shall make phone checks on lookouts after storms, and also before and after they make trips alone, to permit a check on their safety.
.8 See Flammables 62, Lightning 93, Heaters 355.

PART 7 PROJECT WORK

77 ROAD AND TRAIL CONSTRUCTION AND MAINTENANCE

771 GENERAL

.1 See page 207 Road Handbook, page 3 Trail Handbook.

a. Special instructions shall be prepared for situations not covered in the Safety Code, Road or Trail Handbooks.

b. Foremen shall not allow men to work under unsafe conditions.

.2 Barricades, danger, detour, and warning signs shall be erected and maintained, including red lights and watchman service, if traffic warrants it, on construction or maintenance projects, or where there are hazards to the public.

.4 See Parts 1 to 6, 8, 9 for other portions of Safety Code applicable to road and trail work.

772 ROADS

.1 Roads shall be barricaded if impassible due to washouts, bridge replacements, equipment use, stock piling, etc.

.2 Roads and bridges shall be posted for specific load limits under 20 tons, widths, vertical clearance, and guardrails, and reflectors shall be used, in accordance with pages 421 and 431 of Road Handbook.

.3 Bridge inspections shall be made at least annually, and shall be in conformance with page 424 Road Handbook.

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Trail-Crew safety is especially important because the men work in isolated areas where outside help is not available in emergencies. Workers shall guard against these trail injury sources: Unskilled use of hand tools; use of stock; falling trees, branches, logs, rocks; falls of persons from poor footing or tripping; lifting; eye injuries from branches, chips, dust.

.1 Trail-Crew workers shall be selected for their physical fitness for work in back country and preferably should be experienced in working under primitive conditions.

.2 Trail-Crew safety plan shall include:

a. Job hazard survey.

b. Check on knowledge and application of Safety Code.

c. Thorough safety training.

d. Prevention of recurrence of injuries of similar nature.

e. Provision for first aid.

.3 Trail Crew foremen shall:

a. Be alert to spot and correct unsafe work practices and conditions.

b. Insist on safety on the job always.

PART 7 PROJECT WORK

78 SCALING

781 GENERAL

Because of differences in the lay of the ground and the wide variation in the equipment used by different operators, no two operations are exactly the same. Each scaler shall be guided by these rules, and shall continue to watch for any additional hazards which may be peculiar to some jobs.

.1 All scalers shall be instructed in the job hazards beforehand.

.2 Scalers shall:

a. Wear clothing and footgear suited to the country and the work. Shoe heels should be low, soles should be calked or composition according to the footing where he works; trousers cuffless.

b. Have an understanding with the operator as to where and when the logs are to be scaled.

c. Let all woods workers know where he is working, but shall not depend on them for safety.

d. Move back to a safe place as soon as scaling is completed. Extensions in the scale book can be made after taking lengths, diameters, and defects on all the logs and moving to a safe place.

.3 See Tree Felling 711.

782 SCALING ON LAND

.1 Depending on the landing and the methods used, the safest work can be done by scaling each turn of logs as it comes to the landing, immediately after the chokers are off and before the logs are decked or the knots bumped.

.2 Scalers shall:

a. Stay clear of each turn of logs until the chokers are clear, the cat or other skidding equipment is out of the way, and the logs have stopped rolling and sliding.

b. Keep away from running lines, moving chokers, swinging logs and rigging, jammers or cranes while in operation.

c. Watch slivers on stumps and butt logs when stamping.

d. Never walk between truck and brow log or loading platform.

e. Stay clear of the loaded truck as it leaves the landing.

f. Watch for unguarded exhaust stacks on trucks.

g. Remember that caulks on steel frames on trucks are treacherous.

h. Scale on cars or trucks only after the load is bound by chains or cables.

i. Scale only while loaded truck or car is not moving.

j. Choose a safe and convenient place to stand when not actually engaged in scaling. The safest place is usually toward the front of the landing and away from turn-arounds, swinging lines, and logs rolling from the deck.

.3 Rubber or composition soled shoes should be used by anyone scaling on mill decks.

.4 Scalers shall not:

a. Walk between logs on mill decks or on landings, especially on sloping ground.

b. Engage in horseplay at the landing.

c. Speed up loading by taking chances in scaling.

783 SCALING ON WATER

.1 Anyone scaling on water shall be able to swim.

.2 When required to scale alone, a life jacket or belt should be worn. The carbon dioxide type that automatically inflates is approved.

.3 Footwear with sharp calks shall be worn.

.4 Scale only those logs which are satisfactorily rafted, boomed, or otherwise safely controlled.

.5 Scaling periods should be arranged to avoid the necessity of scaling when:

a. There are high winds, current, and tides.
b. Logs are covered with ice or snow.
c. Rafts are being towed.

.6 See Water 84, Woodsmanship 95.

PART 7 PROJECT WORK

79 SURVEYING

791 GENERAL

.1 Work shall not be done in timber when high winds are blowing and blowdown is likely to occur. Snags frequently fall anytime and constant caution is required.

.2 Calked or composition shoes shall be worn in down timber or in rough country over slide rocks or in boulders. Remember wet rocks are very slippery even with composition soles. See 56.

.3 Chain or tape shall not be handled during an electric storm. See 93.

.4 Caution shall be used when handling chain or tape near power and telephone lines, or when surveying across road cuts where lines may not be visible. See 32.

.5 Workers shall be especially careful when walking along swamped survey lines having protruding, sharp stubs.

.6 Inexperienced crews should be kept together in traveling to and from work.

.7 One arm and one hand should be free of equipment when walking on logs or over other dangerous places.

.8 See Woodsmanship 95, Electricity 324.4.

.1 Employees inexperienced in mining shall not examine underground mining claim workings or deep cuts, unless accompanied by a Bureau of Mines or State inspector.

.2 No examiner shall enter underground workings or deep pits unless his whereabouts and expected time of return are known to a responsible Forest officer. Dangerous workings shall not be entered by the examiner unless he has a helper. He shall especially instruct and post his helper at a strategic point, at mouth or portal of a tunnel or shaft, or within workings where safe and from which best rescue efforts can be carried on.

.3 When a claimant applies for final examination and patent of his claims, he shall be required to make his shaft, tunnel, or excavations safe for entry before an examiner enters the workings.

.4 When claims are inspected solely for the benefit of the Government, the bureau responsible shall be requested to make the workings safe for entry before examination is made.

.5 A mineral examiner shall see that his safety equipment is suited to the job and in perfect order before going into the workings.

.6 He shall be equipped with a properly fitted hard hat, a light sufficiently powerful for the job, candles for bad air tests; auxiliary light; and have a good first-aid kit readily available.

.7 Whenever non-flammable gases are suspected, the inspector, examiner, or helper shall first test the underground air for oxygen with a candle before tunnels or shafts are entered by the examiner.

.8 Open-flame lamps, candles, or matches shall not be used or carried in mines that might have flammable gas. Entry into such mines shall be made only with an experienced, properly equipped mine inspector.

793 SNOW SURVEYS

.1 No man shall go out on this work alone except in the rare instance when it can be proved that no unusual hazard is involved, such as a snow course a few steps from a main traveled highway.

.2 No one shall undertake a snow survey trip who is physically below par.

.3 Surveyors shall be equipped and clothed for this type of travel, and skilled in:

a. Using snowshoes or skis safely.
b. Specialized first-aid applicable to snow travel.
c. Avalanche hazard prediction.

.4 Easiest and safest routes of travel shall be selected, avoiding travel through areas of known snow-slide or avalanche hazard.

.5 Work plans shall be flexible enough so that the best days for travel can be utilized, considering storms and snow travel conditions.

.6 Snow courses shall be rerouted if unusual hazards are found, such as deep snow under a power line, or if no reasonably safe approach route is available.

.7 See Recreation 1023.

PART 7 PROJECT WORK

710 TIMBER STAND IMPROVEMENT

7101 GENERAL

.1 Each new member of the crew shall be given thorough instruction in safe job skills, such as safe use of hand and power tools.

.2 Hard hats and safety goggles shall be worn to protect head and eyes from branches, bark and sawdust when hazards warrant it.

.3 See Hand Tools 53, Tree Felling 711, Woodsmanship 95.

7102 GIRDLING AND THINNING

.1 Goggles shall be worn when using power girdlers.

7103 GROUND CREW PRUNING

.1 Tools shall be placed on the ground where workers will not trip or fall on them. Pruning saw shall have cutting edges protected when not in use.

.2 Pruning-saw pole handles shall be free of slivers, and the user should wear gloves.

.3 Pole pruners shall be carried in hand with saw ahead.

.4 Workers in the pruning crew shall work at least $1\frac{1}{2}$ pole lengths apart.

.5 Limbs shall be struck with pruning club from upper side only.

.6 Workers shall not stand directly under limbs being pruned.

.7 All workers shall see that there is no danger of falling limbs striking other men.

7104 TREE PRUNING

.1 At least 3/8'' diameter Manila rope shall be used for climbing operations.

.2 Rope shall be inspected daily for cuts, worn spots, strains, breaks.

.3 Gloves shall be used to prevent rope burns when using rope to climb.

.4 Inexperienced men shall be limited to heights of 15 feet until they have demonstrated their ability to work and climb safely.

.5 Any workman who does not readily adapt himself to climbing, or is subject to dizziness, shall be assigned to other work immediately.

.6 Safety rope shall be kept above waistline when climbing either up or down.

.7 Safety rope shall not be damaged with club or pruning saw.

.8 Safety rope shall be kept around large trees at all times when ascending, working, and descending; and on small trees while working.

.9 Both hands shall be kept on safety rope while climbing or descending.

.10 Gaffs shall not be put in knots or loose bark.

PART 7 PROJECT WORK

711 TREE FELLING

7111 GENERAL

Falling trees or branches are one of the greatest work hazards, causing a large number of accidental deaths. If the simple rules in the following references had been followed, most of these men would be alive today.

.1 See Clothing 562, Hard Hats 564, Electrical Hazards 324, Hand Tools 53, Tractors 57, Electricity 324.7, .8.

7112 JOB PLANNING

.1 Before felling, an experienced man shall carefully check each tree for:

a. Top-heaviness.
b. Direction of wind.
c. Nearness of other trees.
d. Nearness of people and other hazards.
e. Dead limbs.
f. Size of tree.
g. Direction of lean.
h. Soundness.
i. Slope of ground.
j. Species of tree.
k. Position of standing or down timber which might deflect tree to be cut.

.2 Tree fellers shall select a cleared getaway route ahead of the felling job.

a. A free-falling tree usually falls within an arc of 90, or at the most 180, degrees in accordance with its lean or the distribution of branches. Its balance is affected by rot, and undercut, wedging, or the wind, and workers shall watch particularly for the direction of fall and make safe getaway.

.3 Fellers shall be so placed that there is no danger to other nearby workers. Men should be placed on same contour rather than having some working above others on steep hillsides.

.4 One man shall be stationed to watch for falling limbs or tops in dangerous situations.

.5 Flagmen shall be stationed when felling across or alongside any route of travel.

7113 FELLING

.1 Before felling any tree or snag, enough space shall be cleared around the base and overhead to make plenty of working room, and to provide for escape in emergencies. Get firm footing.

.2 For a heavily leaning tree, deep undercut with side cuts shall be made. Next cut corners of backcut, then cut squarely across to prevent splitting or barberchair.

.3 Wood holding in partially rotted trees shall not be trusted.

.4 Once started, the felling of a tree shall be finished before the crew leaves the job for lunch or at the end of the day.

.5 When tractors are used:

a. Dozers shall not push over any tree except small green ones less than 10 inches in diameter, unless equipped with operator protection devices.

b. Trees shall be given slow steady push, never rocked.

c. A cable 50 percent longer than the height of the tree shall be used when pulling trees.

.6 Just before tree starts to fall, "TIMBER" shall be shouted or a whistle used by hand or power felling crew so those nearby will have time to get in the clear.

a. Get behind another tree behind tree being felled, if possible.

b. Be sure to get in the clear of the butt.

c. Look up and watch for falling branches, waiting for all broken branches to fall.

d. Usually quadrant opposite fall of tree is safest location.

.7 Fellers shall watch out for other trees which may fall in an undetermined direction when hit by a falling tree.

.8 A lodged tree shall be handspiked, or pulled down by a horse, tractor, or truck, and a chain, rather than by cutting the tree in which it is lodged.

.9 Stay on the ground behind a lodged tree. Never climb it.

.10 Push pole shall be held against your shoulder.

.11 See Power Saw Operation 533.3.

7114 LIMBING AND BUCKING

.1 When topping or limbing, be careful if tree is held off the ground by one of its branches.

.2 Cutters should stand on side of tree opposite the branches they are cutting.

.3 Blocking shall be used to prevent roll or sliding when bucking trees on sloping ground. If only one man is sawing, he shall work from the uphill side.

7115 SKIDDING AND BUNCHING

.1 Men shall keep clear of swinging logs, cables, and chains.

PROJECT WORK 204 TREE FELLING 711

PART 7 PROJECT WORK

712 WELDING

7121 GENERAL

.1 Only competent welders, mechanics, machinists, blacksmiths, or especially trained men shall be allowed to use welding equipment.

.2 Clothing that protects hands, arms, and body shall be worn, never low shoes nor trousers with cuffs. Flameproof gauntlet gloves should be worn.

.3 Welding hoods or goggles shall be worn by welders and their helpers. Clear goggles shall be worn when preparing the work. See also 56.

.4 Fire extinguishers, sand barrels, or water barrels shall be easily accessible at all times during welding operations.

.5 All welding shall be done in the blacksmith shop, repair shop, in the open, or on fireproof floor away from combustible materials. If necessary to weld in a confined space, be sure there are no leaks in the hose or connections, and that there is adequate ventilation.

.6 Welding shall be done behind a screen if other workers without hoods or goggles are present.

.7 Before cutting into tanks, drums etc., their contents shall be carefully determined, then:

a. Steamed or purged before being cut if they show any evidence of oil, gasoline, or other highly flammable fluids.

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b. Thoroughly dried in the sun.

c. Filled with water up to point to be welded, with opening left for escape of steam if any is generated during the welding.

.8 When welding brass or zinc-coated metal, job shall be done in a draft or wherever air is circulating; or a respirator shall be used. Never breathe the fumes.

.9 Whenever welding on metal coated with paint containing lead, respirator shall be used for protection against lead poisoning.

.10 Sparks and flames shall be kept away from cylinders and hose lines.

.11 Hose lines shall be inspected frequently and worn items replaced or repaired.

7122 ARC WELDING

.1 All electrical connections shall be checked before starting work.

.2 Welding machine shall be grounded.

.3 Insulated platform shall be used in wet places.

.4 Warning signs should be provided to prevent eye injuries to observers.

.5 Switch shall be off when work is stopped. Switch should be provided near at hand.

.6 Insulation and protective coverings shall be in safe condition. Only rubber-covered cable, without any splices, shall be permitted within 10 feet of the electrode holder.

.7 Cable should be supported overhead, out of the way, off the floor.

.8 Cable shall be checked often and replaced or repaired if worn.

.9 Welding leads shall be kept clear of the primary leads of electric motor-operated welders.

7123 OXYACETYLENE WELDING

.1 Oxygen or acetylene shall not be needlessly discharged through the torch before lighting.

.2 Oxygen or other gases shall not be used where oils or any combustible liquids are present.

.3 Welder shall:

a. Shut off gases when putting down a welding or cutting torch.

b. Avoid excessive pressures.

c. Never allow pressure to remain in the hose for long periods or overnight.

d. Protect hose from all sources of damage.

.4 All gauges shall be frequently checked for accuracy and perfect functioning of valves.

.5 Cylinders shall be subjected only to temperature below 130° F.

7124 HANDLING OXYGEN AND ACETYLENE EQUIPMENT

.1 Acetylene cylinders shall be used and stored in upright position only, to avoid possibility of draining out acetone, in which the acetylene is dissolved.

.2 If transported temporarily in horizontal position, cylinder should remain upright for 2 hours before use.

.3 Oxygen cylinders or apparatus shall not be handled with greasy or oily hands, gloves, or rags.

.4 Valve cap, gauge, coupling threads, hose, or connections shall not be oiled.

.5 Valves shall be closed and valve protection cap shall be in place before moving cylinders.

.6 A cylinder truck or equivalent device shall be provided to keep cylinders from upsetting while in use or being moved.

.7 All cylinders shall be carefully handled to avoid damage and prevent leaks.

.8 Valve requirements:

a. Open on cylinders for an instant before attaching regulators so as to remove any dirt.

b. Before valves are opened and after attaching regulators to cylinders, release the adjusting screws of regulators.

c. Open slowly.

d. If difficult to open, point valve opening away from you and use greater pressure on valve key or wheel.

e. Do not use wrenches on hand wheel valves.

f. Open torch valves sufficiently to purge both hoses before lighting the torch, whenever pressure has been cut off in either gas line.

g. Close cylinder valves and release all gas from regulators before regulators are removed from cylinder.

h. Close valves on all empty cylinders. Replace cap on oxygen cylinder.

i. When cylinders are not provided with fixed hand-wheel valves, keys or handles shall be kept on valve stems while cylinders are in service.

.9 Gas shall be taken from cylinders only through regulators and hose intended for and used only for this purpose.

.10 Acetylene shall be used only at 15 pounds pressure or less.

.11 Gas leaks shall be tested with soapy water only, never with open flame.

.12 Cylinders shall not be connected to pipe or manifolds.

.13 Gas shall not be transferred from one cylinder to another.

.14 Cylinders of oxygen and acetylene shall be stored separately, in a dry place away from stoves, heat, and flammable material, especially oils and greases.

.15 Individual chains or other steadying devices shall be provided to keep cylinders in vertical position.

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Part 8- Transportation

81 ANIMALS

811 SELECTION OF STOCK

.1 Only those animals shall be accepted which are known to have no dangerous habits.

.2 Every reasonable effort shall be made to discover dangerous habits of strange animals.

.3 Only experienced men shall break them of such habits.

.4 If animals cannot be corrected easily, they shall be removed from service.

.5 Stock rented or furnished by seasonal workers shall be gentle and properly broken.

.6 The Service shall not hire untrained or "spooky" animals which may injure those riding or working with them.

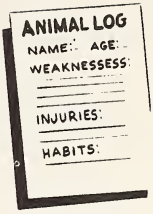
.7 Only thoroughly experienced persons shall be assigned the job of training saddle and pack stock.

812 ASSIGNMENT OF STOCK

.1 No animal known to be dangerous shall be assigned.

.2 Only gentle, well-broken stock shall be assigned to inexperienced personnel.

.3 Inexperienced personnel shall not be allowed to handle stock until they have been given adequate instructions.



.4 Forest officers shall assign stock only to those who can handle them.

.5 Special instructions shall be issued about animals suspected or known to have annoying or tricky habits.

.6 A written log shall be kept on all Government-owned animals by name, age, weaknesses, injuries, abilities and habits, tricky and otherwise. Log shall be kept current and transferred with animal.

813 STOCK HANDLING

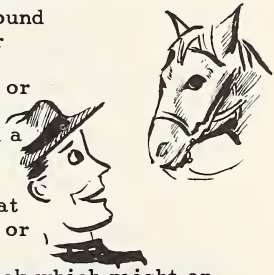
.1 Forest officers shall:

a. Keep cool, move quietly, speak softly, treat kindly but firmly with confidence.

b. Speak to animal when approaching and, if possible, avoid approach from rear.

c. Give all animals especially careful handling after prolonged layoffs.

d. Always lead an animal around after saddling, before mounting or packing.



e. Keep a firm hold on reins or lead rope.

f. Avoid too much plunder on a saddle horse, and avoid carrying tools and equipment in hands.

g. Avoid excess lead rope that may become entangled with hands or feet.

h. In tying a horse, avoid slack which might entangle horse or man.

i. Be frank; ask an experienced stockman for advice.

j. Keep stock away from all types of loose wire.

k. Never neck tie a horse with a slip-knot.

814 RIDING A HORSE

.1 Wear western riding or field boots. Avoid using type of shoe which may hang in stirrup.

.2 Wear snug fitting clothing.

.3 When mounting, rider shall:

a. Lead a short distance after cinching.

b. Check cinch again.

c. Head horse uphill, or preferably crosswise of slope with left side uphill.

d. Take up slack in reins.

e. Before mounting check stirrups for correct positions. Stand opposite and close to left shoulder, face animal's rear, take mane in left hand with reins well gripped, near rein tight, off rein slack, so twist of wrist can pull horse to you if he becomes unruly, turn near stirrup toward rider's left foot, right hand grasping saddle horn, swing into saddle quickly but lightly. Avoid scratching horse in mounting.

f. Don't shove feet clear into stirrups.

.4 When riding, rider shall:

a. Be alert to animal's movements and guide him firmly but gently.

b. Never wrap or tie reins around the saddle horn.

c. Never ride horse when lightning storm is nearby or overhead. See Lightning 93.

d. Swing off occasionally; check blanket and saddle position and tightness of cinch; look for worn or broken straps, cinches, reins, and in brushy country for trash under blanket.

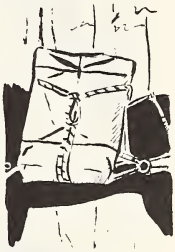
e. Always keep lead ropes free when leading stock from a saddle horse. Never tie the lead rope around the lead horse's saddle horn nor take wraps in rope around hand.

f. In dismounting, partly remove left foot from stirrup before swinging off to prevent a hung foot.

g. Always get off and lead a horse across excessively rocky or very steep terrain, corduroy, or pole bridges, where horse has poor footing.

h. Watch the slack in lead rope to avoid animal's straddling or stepping over it, and to keep it from getting under the lead horse's tail.

815 PACKING



.1 All pack animals shall be treated as dangerous until you find out better.

.2 Persons, particularly inexperienced horsemen, shall keep away from pack stock while loading or unloading, unless asked to help and instructed how to do it.

.3 Animals shall be tied short to solid post or hitching rack with heads pulled slightly up.

.4 Pack ropes shall be coiled and hung on saddles until actual packing begins, and immediately after unloading.

.5 A pack string shall be tied together with rope so animals can break apart in case of accident.

.6 Before putting on a pack, the animal's back shall be clean, the saddle blanket smooth, the saddle tight and properly fitted, and the side packs balanced.

816 WORKING WITH ANIMALS OTHER THAN SADDLE OR PACK STOCK

.1 Livestock shall be securely held in chutes or securely tied with ropes before eartagging, dehorning, vaccinating, and branding.

.2 Always be on guard when in a corral with livestock.

.3 Unusual care shall be exercised in the presence of bulls and stallions.

.4 Let livestock know you are around. Do not walk up to them unexpectedly.

.5 Rope attached to animal shall not be looped around the hand.

.6 When a horse or team are being used for skidding, they shall either be led by the bridle or shall be driven, using long reins which will permit the driver to stand to the rear of the horse and if possible to the rear of the object being skidded.

817 SHOEING

.1 Horseshoers should wear leather chaps or leather apron, and hard-toe shoes.

.2 If horse is hard to shoe and can't be readily trained he shall be replaced.

.3 Nails shall be bent over and cut off promptly when properly seated.

818 ANIMAL TRUCKING

.1 At regular loading locations a loading ramp with cleats to prevent slipping shall be constructed level with bed of truck.

.2 Floor of truck or trailer shall be cleated or covered to insure firm footing.

.3 Side boards or rack shall be substantial to discourage breaking out or climbing over.

.4 Animal's halter shall be used while hauling. Fasten head securely. Tie down ropes or straps over horses' backs should be used on horses that have habit of jumping out of single trucks or trailers.

.5 When tying animals, fingers should be kept out of loops.

.6 Trailer should be level and tail gates resting evenly on ground before loading or unloading.

.7 Men shall stand to one side when raising or lowering tail gate.

.8 Wind shield or goggles should be provided for horses.

.9 Loose gear shall not be carried in truck or trailer with animals.

.10 Quick stops and starts shall be avoided, particularly with an animal unused to hauling.

.11 Worker shall not get into trailer ahead of horse or ride horse in when loading.

.12 Two animals shall be hauled in trailer or pickup only when there is a bar between them.

.13 Trailer hitch and auxiliary safety tow chains shall be secure before starting.

.14 Driver shall learn to back an empty horse trailer, before attempting it with horse aboard.

PART 8 TRANSPORTATION

82 AVIATION

821 GENERAL

The Aviation Section is intended primarily to help those employees who occasionally use aircraft for official travel and do not have ready access to the Aerial Operations Handbook (AOH). Detailed instructions on all phases of Forest Service aerial activity are covered in the Aerial Operations Handbook which this section supplements. The AOH shall be studied by pilots, smokejumpers, cargo droppers, and others whose safety is not thoroughly covered below.

.1 All applicable CAA regulations pertaining to the care and operation of aircraft, including helicopters, shall be observed by all Forest Service and contract pilots and aircraft maintenance employees. In addition, the pilots shall see that all passengers fully conform.

.2 The pilot shall be responsible for the safety of the aircraft, occupants, and cargo. He shall have authority to cancel or change any air operation if he thinks it unsafe.

.3 When in the opinion of the Forest officer in charge of a flight, existing or impending conditions make air operations hazardous and the pilot fails to cancel, he shall direct the pilot to cancel flights not started, and to terminate other air operations already in progress.

.4 Forest Service personnel shall not accept invitations to make official flights in private planes primarily to satisfy personal desires. Free flights with private pilots shall conform to this section of the Safety Code and shall be made only to get worthwhile

information not otherwise obtainable, necessary to administer the work.

.5 In situations such as landings or take-offs from mountain lakes or small fields, charter plane pilot shall be informed of unusual wind currents, downdrafts, dead air pockets, and other hazards of the immediate area.

.6 Plane occupants shall carry and use only safety matches or mechanical lighters.

a. Only safety matches shall be used by smokejumpers and in cargo dropping, unless carried in a closed metal container.

.7 Smoking shall be prohibited:

a. During refueling and all ground operations.

b. During takeoffs and landings.

c. When carrying flammable cargo.

d. When aircraft is covered with flammable fabric or upholstery.

e. When there are no permanently installed ash trays.

f. When occupant is in fuselage sections containing gas tanks.

g. When pilot thinks it is dangerous.

.8 Pipe smoking shall be prohibited.

.9 All accessory equipment, baggage, cargo, shall be securely fastened in place.

822 PERSONNEL See AOH 1.2

.1 An air operations officer shall be designated in each region and on each forest which uses flying equipment, and on projects with considerable air

activity, such as some fires and spray jobs. He shall be responsible for coordinating, supervising, and inspecting the air operations of the region, unit, or project, including compliance with safety rules and other factors bearing on safety in flying. See AOH 1.201C.

.2 Forest Service and formal contract pilots, including helicopter operations, shall demonstrate to the regional forester or his representative that they possess sound judgement, favorable temperaments, attitudes, and character traits, mountain flying ability and experience to assure a high level of safety. See AOH 1.201A & B.

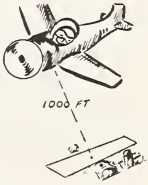
.3 Forest Service employees not employed as pilots but who pilot aircraft on official work shall observe qualification standards in AOH 1.201A(4).

.4 All pilots shall familiarize themselves with the area over which they are to fly, and with flying conditions peculiar to the area before engaging in actual operation.

.5 For occasional flights with chartered-plane pilots under informal agreement, pilot and plane shall be approved by the regional forester or his designated representative before flights are made. See AOH for pilot, plane flying requirements.

.6 In the air pilot shall:

a. After take-off, reach a safe altitude of 1000 feet above ground before leaving the vicinity of any landing field or lake, unless the nature of the terrain makes such practice impracticable.

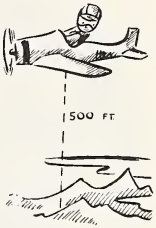


b. On all flights follow, as far as practicable, routes over valleys, high-

ways, plateaus, or other terrain offering best opportunities for safe emergency landings.

c. Except when necessary in landing or taking off, or in dropping supplies, or in emergencies, never fly a fixed-wing plane within less than 500 feet of the ground or of any hillside, cliff, mountain or ridge-top or timber, or any other object on the ground, without special authority from the regional forester. Cargo dropping ships shall fly no closer than 250 feet above tree tops.

d. Never fly low level up drainages unless sufficient altitude, plus a wide margin for safety, is maintained to permit safe turning or flying over the head of the drainage.



e. Never make instrument flight in single-engine aircraft, except for pilot training or practice or on urgent flight missions.

f. Always have wide margin for safety in mountain flying.

823 EQUIPMENT See AOH 1.3

.1 All single-engine, fixed-wing aircraft used in flying within 1000 feet of the ground shall have CAA approved shoulder harness in front seats, also seat belts or floor straps for all occupants if ship is built or can be altered to conform to this requirement. These shall be worn during take offs, landings, when flying within 1000 feet of ground, and at other times as specified by pilot.

a. Exception: Smokejumpers and cargo droppers will not be required to wear seat belts or floor straps until practical means can be provided for them to do so.

.2 In addition to all equipment required by the CAA Forest Service owned planes shall carry the following:

a. Land planes:

1. Parachutes See 825.

2. All aircraft used in flights over 1 hour, in vicinity of airport towers and airway range stations, or instrument flights, shall have 2-way voice radio permitting reception of radio range signals and voice tower messages.

3. Stall warning indicators.

4. Copy of aerial signals. See AOH 1.416.

5. Message droppers.

6. Fire extinguisher.

7. First aid kits.

8. Sectional aeronautical charts of surrounding areas.

9. Tool kit (optional for accessible forests).

10. Emergency rations (optional for accessible forests).

11. Flares for night flights.

12. Flashlight.

b. Seaplanes shall carry life preserver for each occupant, anchor, and canoe paddle in addition to 1-12 above.

.3 Chartered planes shall:

a. Meet all requirements listed under 823.2 above. For additional standards see Section 21 and AOH 1.7, Contract Safety. Stall warning indicators are optional.

.4 Contracting officers shall consider that:

a. The older the plane, the greater the likelihood of mechanical failure.

b. Rate of climb is more important than horsepower.

c. The slower plane has a shorter turning radius and is usually safer in case of forced landings.

d. Most Forest Service landing strips are short and rough, hence good brakes and rugged landing gear are important.

e. No plane should be accepted and used unless thoroughly maintained in first-class flying condition.

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824 AIRPORTS

.1 For detailed construction and maintenance standards, see AOH 1.6

825 USE OF CHUTES

.1 Chutes shall be worn by all contract-plane occupants on all flights except:

a. In multi-engine ships licensed and operated at safety standards equal to scheduled air carriers.

b. On occasional emergency flights when chutes cannot practicably be made available in advance. These flights shall be limited to daylight, clear weather, and on routes along which ship can glide to an emergency landing at any point.

.2 Chutes or chute harness shall be worn by all Forest Service land-plane occupants at all times during flight.

.3 Chutes shall be worn by all Forest Service seaplane occupants at all times except when within gliding range of water landings.

.4 Chute requirements shall be waived only when the plane is on an urgent emergency and the pilot determines that the extra weight of the chutes would increase the flight hazards.

.5 Everybody wearing chutes shall be given instructions on escape and chute operation before take off.

826 CARGO DROPPING See AOH Part 3

.1 Cargo shall be discharged in accordance with best safe practices developed through experimentation, which have been approved in AOH.

.2 Paracargo shall not be dropped from aircraft manned only by pilot unless aircraft is equipped with CAA approved remote controlled cargo releasing devices.

.3 Pilot shall not use his radio during dropping run.

.4 Cargo dropper shall:

a. Be fully qualified by previous training from an experienced instructor.

b. Wear smooth, snug fitting clothing, free of rips, tears, or other openings or protuberances which might catch on dropping cargo packages. He shall wear shoes with non-skid composition soles. During cargo dropping operations wear parachute and safety device which anchors him to the plane so he cannot be thrown out.

c. Have readily accessible a sharp sheathed knife to cut static or shroud lines in case of fouled drop or opening of a chute in the plane.

.5 Pilot shall see that cargo is safely secured to prevent jamming of controls, shifting or jarring, and to prohibit exposed flame or sparks for plane loads of explosives, gasoline, oil, or other high flammables. Passengers shall not be transported with explosives or gasoline for other than emergency fire purposes.

.6 Each cargo-dropping plane shall be provided with heavy strap, bar, or false door across open doorway, to be removed during flight only when necessary to drop cargo.

.7 Officer in charge of ground operations shall:

a. Be familiar with cargo-dropping technique. He shall select cargo-dropping targets with care and knowledge of essential safety precautions associated with low flying.

b. Select open sites with easy approach and getaway, free from excessive downdrafts and smokedrift or banks.

c. Arrange for alert and active lookouts (two if possible) to count and

spot cargoes delivered, stationed at least 200 feet from target, at right angles to the line of flight.

d. Remove all other personnel to distance of not less than 300 feet from the line of flight, or not less than 600 feet from the target.

e. Keep persons from bunching up within cargo-dropping zone.

f. Locate camp and occupied bed grounds about 600 feet from target.

g. Place his workers safely away from dead or defective trees or snags when cargo might break out limbs or tops. Open sites are preferable. Logs, brush, or steep hillsides which interfere with dodging dropped cargo shall be avoided.

h. Keep his crew out of danger zones until all clear signal has been given.

827 SMOKEJUMPING

.1 Only a person qualified as a smokejumper physically, by conditioning exercises and by training, shall be permitted to jump from a plane, except in a crash emergency. Standards for qualification, training, and operation shall be in accordance with the regional forester's instructions and AOH Part 2.

.2 Jumpers shall observe all other applicable safety rules.

828 HELICOPTERS See AOH 1.418 - 1.420

.1 Pilot shall be briefed before mission as to the terrain and location of surface hazards, such as box canyons, radio towers, power and telephone lines.

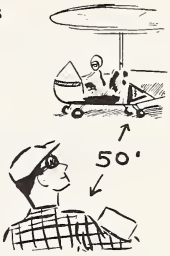
.2 Whenever possible, routes and altitudes shall be selected which will permit autorotation landing at any time.

.3 Relief pilots should be available so no pilot is normally required to fly more than 6 hours per day.

.4 All helicopters transporting Forest Service personnel shall have CAA approved wheel brakes.

.5 All personnel working on or near a helicopter project shall observe these safety requirements:

a. Stay away from helicopter when rotor blades are in motion unless authorized by the pilot or other authority. This means at least 50 feet.



b. When nearer than 50 feet, approach or leave from front, or from side near front, where the pilot can always see you.

c. Never approach or leave ship from any side where ground is higher than ground where ship is standing or hovering.

d. Unless equipped with safety goggles or glasses, do not watch landings, take offs, or hovering closer than 100 feet from the ship.

e. Safety belt shall be fastened at all times except when instructed by pilot to release it.

f. Remain seated in open cockpit models.

h. When leaving the ship, walk immediately away, to the front or side towards the front until you are at least 50 feet, clear of the rotors.

i. Stay away from tail rotor at all times and see that others do likewise.

829 STANDARD AERIAL SIGNALS

.1 These shall be standard aerial signals:

a. Ground to Plane

SOS Distress signal or ---
LL Jumpers OK
P Change jump spot
T Signal for saw
O Signal for climbers
F More grub wanted
V Need water
R Need radio

I Need doctor
H Drop cargo here
Need more help - write numbers
Signals should be 10-feet or longer. Do not change signals until pilot answers by rocking plane.

2 Able to ride horse

3 Need stretcher crew

4 Broken leg

5 Broken arm

6 Broken back

7 Head injury

8 Puncture wound

9 Unable to diagnose

b. Plane to ground
"Received message," - wave streamer or rock plane.
"Will drop message," - gun motor 3 times.
"Fire here," - circle plane 3 times over one spot.

c. Ground to plane circling fire
Put out LL marker if OK. If you have no marker, move around in the open, so plane can see you.

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PART 8 TRANSPORTATION

83 MOTOR VEHICLES

831 GENERAL:

Motor vehicles are one of our greatest killers. Therefore all drivers shall adopt a policy of defensive driving. This means:

a. Driving so as to avoid accident situations created by the mistakes of others or by weather and road conditions.

b. Yielding the right-of-way even when, by all rules of the road, it is actually yours.

c. An unbroken series of concessions to other drivers who are thoughtless, unskilled, or ignorant of the hazards they create.

.1 Vehicles, owned or leased by the Forest Service, shall be driven only by physically fit employees who have qualified for and hold both State and USDA operator's permits. Any employee who is required to drive in connection with his other major responsibilities shall pass a Forest Service written and road test.

a. Where physical defects are suspected, the driver shall be tested.

b. Where known deficiencies make his driving unsafe, the driver shall be grounded until deficiencies are remedied, or his driving restricted to compensate for them.

c. Any driver shall be grounded who is habitually careless, repeatedly uses poor judgement at the wheel, or who wilfully violates driving regulations.

.2 Student drivers shall always be accompanied by competent instructors during the training period.

.3 Forest Service drivers shall know and comply with State and local traffic and vehicle regulations. Speed laws shall be adhered to and speed reduced according to weather and road conditions, and for school and other congested areas.

.4 Any vehicle assigned shall be thoroughly checked by the driver for adequate brakes, steering, windshield wipers, tires, and lights before driving.

.5 While operating the vehicle, driver should have no additional duties such as reading a map or scouting the countryside,

.6 Every Forest Service vehicle should be equipped with a first-aid kit.

.7 On long trips time should be allowed for rest periods, especially at night.

.8 For off the job driving see 94.

832 OPERATIONS

.1 All drivers shall:

a. Drive at a speed which permits full control of the car. Never drive in excess of State or local speed limits.

b. Obey all State rules of driving and use common sense, as well.

c. Watch out for the other fellow.

d. Do no driving if drowsy, overly tired, or sick.

e. Be sure vehicle can stop within less than half of the visible distance on curves.

f. Shift vehicle into lower gear consistent with grade to be descended at beginning of such grade.

g. Always make allowance for road and weather conditions. Mud, snow, or tractionized tire treads or chains should be used for mud, snow, or slippery road conditions when necessary.

h. To avoid skidding:

1. Reduce speed slowly.

2. Slow down by taking foot off gas and leaving clutch engaged.

3. If brakes are applied use light pumping action, avoiding suddenly applied brake action that locks wheels.

4. Reduce speed before entering turns, then turn no sharper than necessary.

5. If vehicle skids, turn steering wheel in direction rear end of vehicle is sliding to bring car out of skid.

i. Run motor to furnish heat in cold weather only when window is open. See 362 regarding monoxide dangers.

.2 Drivers shall:

a. Make certain the way is clear before backing or maneuvering. Be directed by a qualified signalman, if available.

b. Avoid overloading the front seat. Unless there is plenty of room to manipulate controls, no more than two persons shall occupy the front seat.

c. Stop at all railroad crossings where clear view of right-of-way is restricted to less than 500 feet in each direction, or where train is approaching within that distance. Exception: Where a railroad watchman or automatic gate or signal service is provided.

d. When traveling in convoy, keep distance apart required by State law and a minimum of 200 feet.

.3 Every truck and pickup regularly used for transporting persons shall have:

a. Sufficiently high and strong guardrails to prevent falls.

b. Seats anchored to the vehicle bed.

c. Substantial steps or end gates for loading and unloading. Rear bumper can serve as step on pickups.

.4 Men and tools or supplies shall be hauled together only when:

a. Tools are enclosed in substantial toolbox attached to the bed and equipped with securely fastened cover.

b. In emergency, tools are wrapped in canvas or other material and lashed to the truck.

c. Supplies are securely lashed to the truck.

.5 In no case shall passengers ride on top of a load of supplies.

.6 No passengers shall be carried in the body of a truck carrying explosives, toxic or flammable substances, except that gasoline in safety cans may be carried with passengers.

.7 The driver or foreman in charge shall be sure all persons are seated and end gates in place before vehicle starts.

.8 Passengers shall ride only in cab or body of motor vehicles. This means:

a. Arms or legs inside of racks or ends of body.

b. Everybody seated while vehicle is in motion.

c. No riding on hood, fender, or running board.

.9 Dump-truck drivers shall:

a. Be sure the hoist control mechanism cannot be accidentally engaged, when hauling men and supplies.

b. Always get out of truck when it is being loaded by a power shovel.

c. Trip the tail gate. Nobody else shall do this.

d. See Servicing 36.

.10 Emergency driving:

a. Shifts should never exceed 12 hours.

b. Following the first 24 hours, truck drivers should operate under the 8-hour day.

c. Each duty shift shall be followed by off-duty rest period adequate in all ways to relieve fatigue.

d. Whenever men are being hauled at night, or under other condition of poor visibility, a relief driver or alert overhead shall ride in the cab with the driver.

e. Passengers may be transported in vehicles without seats or guardrails, provided they are required to sit on the floor. If such use continues, seats and guardrails shall be provided as soon as possible.

f. All vehicles going to fires shall abide by traffic lights and stop signs unless escorted by police, or unless drivers come to complete stop to make certain no other vehicles are approaching intersection with green light in their favor.

833 TRAILERS

.1 When any motor vehicle is used to tow a trailer, its brakes and the brakes of the trailer shall be able to stop the loaded trailer within maximum distances specified by State law.

.2 When used in night operations, trailers shall be equipped with standard taillights that function properly.

.3 Horse and similar trailers shall be equipped with trailer jacks or landing gear.

.4 A safety chain shall be used in addition to trailer coupling or towbar.

.5 Something other than the hand shall be used to steer the coupling device into position for locking.

834 RAILROAD SPEEDERS

.1 Forest Service employees riding on or operating railroad speeders shall know and comply with applicable safety regulations of the railroad.

PART 8 TRANSPORTATION

84 WATER

841 PERSONAL PROTECTION

.1 Men working over swift or deep water, other than on platforms or scaffolds equipped with guard rails, shall be provided with vest-type life preservers, or have a life line attached to them.

.2 When taking a swim, the buddy system shall be used. Have another fellow with you at all times. Also:

a. Never dive into strange water.

b. Wait for an hour after meals before swimming.

c. Do not swim if overheated.

842 BOATS AND FLOATING EQUIPMENT

.1 General

a. Boats shall never be overloaded. A safe margin well below the danger point, considering weather and other conditions, shall always be maintained. All boats shall be in first-class condition.

b. Boats shall be manned by experienced boatmen.

c. Men who are habitually sent out in boats shall be able to swim.

d. Life preservers shall be readily available at all times.

e. If you capsize and cannot get life preserver, discard heavy outer clothing and shoes, if possible. Hang on to boat, oar, or anything else that is floating nearby until help comes. Don't get panicky.

f. Somebody in boat party should be able to apply artificial respiration.

.2 Small boats under 20 feet:

a. Avoid wearing heavy clothing that cannot easily be removed.

b. Passengers shall remain seated while boat is in motion. Skylarking in small boats is strictly prohibited.

c. Oars and oarlocks shall be in good condition and oarlocks should be fastened to boat. Spare oars and oarlocks should be carried on long trips.

d. A bailing can shall always be carried.

e. A life preserver shall be provided for each person.

f. Too large a motor shall not be put on a small boat.

g. A 1-quart extinguisher shall be carried on long trips using an outboard motor. See 33.

h. Spare gasoline shall be carried in a safety can.

i. An engine shall be gassed up only when not operating.

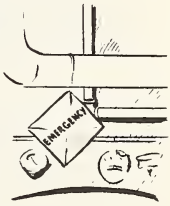
j. Only experienced persons should make surf landings, except in emergencies.

.3 Power vessels 20 feet and over:

a. Rules of the Road and Safety Regulations as required by Steamboat Inspectors shall be posted.

b. Forest Service power boats shall be operated only by physically fit employees who have a current license covering the class of vessel and the waters of navigation.

c. Clear instructions for starting and operating the main and auxiliary engines, anchor gear, radio, etc., shall be prepared and posted so that the vessel may be moved by someone other than the Marine Engineer in case of emergency. These instructions should be placed in an envelope, labeled and posted conspicuously in the engine room.



d. All permanent personnel who regularly travel on boats shall learn to start and operate the main and auxiliary engines, anchor gear, radio, etc., for emergency use. These operations shall be performed frequently enough to assure retention of the ability. Marine Engineers shall act as trainers.

e. While taking on fuel:

1. Fires shall be extinguished.
2. Motors shall be stopped.
3. There shall be no smoking.
4. Open flame lights shall not be allowed.
5. All portholes within 6 feet of filling intake shall be closed.

f. Operators shall:

1. Know and comply with all navigation regulations.
2. Currently check all safety equipment, salt water intakes, and horns to insure serviceability. Check lights each time used.
3. Keep engine room and bilges well ventilated.
4. Before putting to sea, check all ports, batten hatches and deck gear.
5. Keep decks free from oil and grease and unnecessary equipment.
6. Keep stove and exhaust pipes insulated and free from soot and carbon.
7. Allow no one on deck in rough weather unless absolutely necessary.

g. Fuel and water tanks shall be inspected and tested annually when ship is overhauled.

h. When vessel is on ways, renew zinc plates, check shafts and fastenings for electrolytic action, check all seacocks and underwater inlets and outlets.

i. Standard safety equipment for power vessels 20 to 40 feet in length shall be:

1. One lifeboat with oars
2. Life preservers for all persons aboard, including three cushion-type and three kapok vest-type life jackets for use on skiff trips; one life preserver at each bunk

3. One cork life ring on rear side of pilot house

4. Suitable anchor gear including sufficient chain and proper size anchor

5. Three 1-quart fire extinguishers

6. First-aid kit

7. One two-cell flashlight with fresh cells

j. Standard safety equipment for power vessels 40 feet and over in length, in addition to i2,3,4,6, shall be:

1. Two lifeboats with oars, 1 round-bottom boat with nested skiff preferred.

2. Minimum of fire extinguishers shall be placed as follows: Two in engine room, one of which shall be a $2\frac{1}{2}$-pound C02 type, and one each for galley, pilot house, rear compartment, and forward compartment. In addition, vessels powered with gasoline engines shall have one C02 extinguisher of not less than 10 pounds capacity, installed with the nozzle gunned into the bilge beneath the engine, ready for instant release.

3. Supply of caulking, canvas, and sheet lead for emergency repairs.

4. Outboard motor with tool kit and extra shear pins and spark plugs.

5. Three flashlights of minimum two-cell size.

.4 Scows:

a. Bilges shall be checked and pumped before making tows.

b. Scows shall be loaded evenly with load well lashed.

c. When towing, check shall be made frequently for shifting of cargo or change of draft due to water in the bilge.

d. Hatches shall be kept battened and manhole plates secure.

.5 Wanigans:

a. Life preservers shall be provided in a suitable place for all men aboard.

b. All compartments shall be equipped with suitable fire extinguishers.

c. First-aid kits shall be kept well stocked.

d. Stoves and chimneys shall be kept clean, free from soot, and properly insulated.

e. Escape hatches shall be kept free and accessible.

f. When wanigan is anchored and men are living aboard, a skiff with oars shall be kept aboard for emergency use.

g. Gasoline shall not be stored, mixed, or handled inside building.

843 ICE SAFETY

.1 Employees shall stay off dangerous ice.

.2 If alone when you fall through ice, put arms in front of you on solid ice, kick to keep body level, crawl forward on stomach until hips reach ice, then make quick full length roll onto ice. Keep rolling until safe. If ice is too thin to support you, break way to shore with one hand, support yourself with the other.

.3 When somebody falls through the ice, warm and dry him near the spot rather than delay getting him to camp or home if the distance is great.

.4 Rescuers should try to reach victim with pole, board, rope. Walking to ice edge is dangerous and should be a last resort. If necessary to do so, carry a long pole with you or push yourself to the edge in a prone position. Be careful to avoid a double casualty.

.5 Ice harvesting:

a. Workmen shall be provided with ice creepers to overcome slippery footing, unless slippery ice

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conditions can otherwise be prevented satisfactorily.

b. Slides of sufficient strength shall be provided with side boards to prevent cakes from sliding off.

c. Ice cakes shall not be lifted on the trucks or into ice houses.

d. Maximum size of ice cakes shall be 18 by 24 inches for hand loading and handling.

e. Ice should be of uniform size, with any irregular edges chiseled off to prevent hazards in handling.

f. The use of power-driven ice sawing equipment shall be done only by employees previously trained and fully experienced in handling such equipment.

Part 9 - General

91 FIREARMS

911 GENERAL

.1 Firearms shall be permitted on the job or in camp only after obtaining permission from a responsible forest officer.

.2 All Federal, State, and local laws shall be observed.

.3 Firearms and ammunition shall be kept in a safe place when not in use.

.4 Firearms shall always be treated as if they were loaded.

912 PROJECT WORK

.1 During hunting season:

a. Signs shall be posted to warn hunters of crew locations.

b. All employees working in hunting areas shall wear red markers.

c. Crews shall be placed outside of hunter concentration areas if possible.

.2 In brown or grizzly bear country in Alaska:

a. Each crew shall have one man who is familiar with local conditions and is an expert shot. He shall carry a dependable rifle, 30.06 or equivalent, with sufficient softnosed ammunition.

b. The rifleman shall sight-in the rifle at the beginning of the season before going into the woods and be responsible for maintaining it in good condition.

c. No one should be allowed to go on long trips into the woods unarmed or alone.

d. No one shall be allowed to shoot at wildlife unnecessarily, especially bear.

913 FIREARM USE

.1 Weapons shall be unloaded at all times in buildings, in vehicles, on horseback, and when not in use. The safest weapon has the action open.

.2 Weapons shall have the firing chamber empty in company with other persons and groups and in other non-emergency situations.

.3 While waiting turns at target practice in addition to empty firing chamber, the action shall be open.

.4 Safety devices shall be kept in perfect working order.

.5 Ammunition recommended by manufacturer shall be used. Advice of competent gunsmith on proper ammunition to use in foreign guns shall be secured.

.6 A tree or fence shall not be climbed with a loaded firearm. When going through a fence put gun through first, laying it on ground, pointing away from you.

.7 There shall be no target practice where there is danger from ricocheting bullets.

.8 Weapon shall be loaded only just before firing.

.9 Safety catch shall be used at all times when stalking game or in other situations when gun must be loaded, with weapon pointed at ground in front of you.

.10 Firearm shall be pointed at only those things you intend to shoot.

.11 Be sure no one is in your line of fire.

.12 Do not shoot at any movement in the brush.

PART 9 GENERAL

SECTION 92 FIRST AID

921 GENERAL

First Aid is the immediate and temporary care of an injured or suddenly ill person until a doctor can be obtained.

.1 Course requirements:

a. All supervisory personnel in direct charge of work crews shall possess a working knowledge of first aid.

1. They shall have an American Red Cross Standard Course Certificate or equivalent.

2. Their knowledge shall be kept current through Forest Service or equivalent refresher courses, taken at not less than 3 year intervals.

b. All other supervisory personnel, either seasonal or regular, who may be called upon to aid injured employees or citizens in areas under Forest Service jurisdiction, should receive the training outlined in .1 above.

.2 Sulpha powder or ointment shall be used only under the direction of a doctor.

922 FIRST AID KITS

.1 Contents will vary with locality, type of work, and season, but kits giving adequate protection for the size of the crew shall always be available.

.2 Approved first-aid kits shall be provided for each work project, guard station, lookout, etc. Contents of kits shall be handled by employees trained in first aid, as far as practical.

.3 First aid kits shall be inspected at least monthly during active field work, and replenished as needed.

Fire first aid kits shall be inspected after each fire. Opened bandages shall be replaced with sterile ones.

.4 Physicians designated by the U. S. Bureau of Employees' Compensation shall be used unless none is available.

PART 9 GENERAL

93 LIGHTNING

931 GENERAL PRECAUTIONS

Lightning kills 400 persons each year, injures 1000, and causes property losses up to $18,000,000, mostly in rural areas. Every precaution shall be taken to keep injuries and losses at a minimum.

.1 All lightning-protection installations shall be checked at beginning of season and also after direct strikes.

.2 Switch handles shall have rope throws to reduce chance of shock.

.3 See Lightning Protection Handbook for methods of grounding, and Form 901 for instructions for use of phone during storm.

932 DURING LIGHTNING STORMS WHEN IN THE FIELD

.1 Employees shall:

a. Seek shelter in dense woods, a grove of trees, if possible a stand of young growth, a cave, depression in the ground, a deep valley or canyon, or the foot of a steep cliff.

b. Sit or lie down.

c. Get under a steel bridge, but never touch the steel; and never sit or stand on damp ground.

d. Get in an automobile.

e. Choose in this order, if there is any choice of shelter:

1. Large metal or metal-frame buildings.
2. Buildings with lightning protection.
3. Large unprotected buildings.

4. Small unprotected buildings.

f. Avoid tops of ridges, hilltops, wide open spaces, ledges, and outcrops of rocks, sheds or shelters in exposed locations.

g. Keep away from wire fences, telephone lines, and metal tools. If absolutely necessary to work on telephone line with a lightning storm in distance, ground the line in the direction of the storm before attempting repairs.

h. Avoid large or lone trees.

i. Get away from horses and stock.

933 DURING LIGHTNING STORMS WHILE IN LOOKOUT OR OTHER BUILDINGS

.1 Employees shall:

a. Stay inside building and away from all metal objects and the walls.

b. Never use phone or radio while storm is overhead. Disconnect the incoming telephone line from the lookout. Ground it by pulling the rope attached to the switch handle of the connection arrester. Disconnect the switch.

c. Close and keep away from windows, doors and fireplaces. Lightning follows air currents.

PART 9 GENERAL

94 OFF THE JOB SAFETY

941 IN THE HOME

.1 Home Accident Prevention:

a. Falls: Repair defective ladders; don't use makeshift supports. Keep stairs repaired, clear; install handrails. Remove ice and snow outside; use non-skid wax inside.

b. Burns: Never use gasoline or kerosene to start fires. Use only non-flammable cleaning fluids. Don't smoke in bed. Keep extension cords and electric system in good condition.

c. Suffocation: Sleep children alone, with blankets safely fastened.

d. Asphyxiation: Always open garage doors before starting car. Keep rooms ventilated when using coal stoves. Be sure gas stove is lighted when turned on.

e. Firearms: Treat all guns as if loaded.

f. Poisons: Label them. Store them out of children's reach. "Read the label while you're able."

.2 Child Safety: Accidents are the leading cause of death among children up to 14 years old.

a. Teach children to play in enclosed places, away from traffic.

b. Keep cooking utensil handles turned so children can't reach them.

c. Keep matches, sharp objects, and poisons out of their reach.

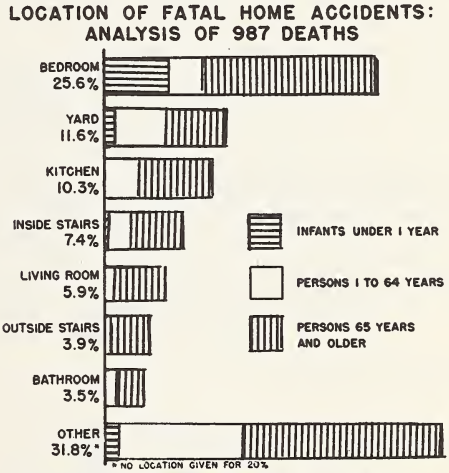
d. Select safe toys and put up gates or use playpens for toddlers.

e. Keep children out of administrative sites and where crews and machines are working.

.3 Yearly accident statistics from National Safety Council:

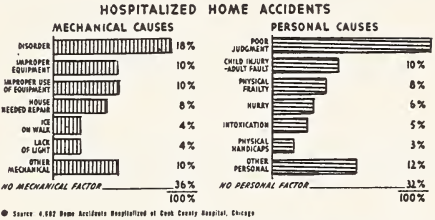
a. 4,750,000 are maimed, disfigured, or disabled.
b. 130,000 are permanently injured.
c. 32,000 are killed:
   16,000 by falls
   5,600 by burns, explosions, fires
   3,000 by suffocation and asphyxiation
   1,500 by poisoning
   1,200 by firearms
   4,700 by other ways
d. Children less than 5 are killed:
   In 1/3 of the poisonings
   In 1/3 of the burns, explosions, fires
e. 90% of suffocation victims are less than a year old.

.4 Location of 987 fatal home accidents:



● Source: Kansas Board of Health and Nassau County, N. Y. Health Dept.

.5 Causes of 4,602 home accidents:



942 ON THE HIGHWAY "DRIVE TO STAY ALIVE"

.1 Ten Life Savers:

L OOK SHARP! Drive every second that car is in motion.

I DRIVE BOTH CARS! Figure out what other driver will do.

F IRST GIVE CAR ON RIGHT THE RIGHT OF WAY!

E STIMATE ONE CAR LENGTH BEHIND FOR EACH 10 MILES OF SPEED! More on ice and snow.

S AFE SPEED! Too fast if you lack control in emergency.

A LWAYS DRIVE OUTER LANE! Extreme right side except when passing.

V ETERAN DRIVERS POSITION FOR TURNS! So other drivers will know what they intend to do.

E XPECT THE UNEXPECTED! Watch for hidden hazards.

R IGHT TO PASS ONLY WHEN AWAY FROM INTERSECTIONS, DANGEROUS CURVES, HILLS!

S AFEST TO UNDERDRIVE YOUR HEADLIGHTS! Be able to stop in half the visible distance. Two-thirds of the fatal accidents occur from dusk to dawn when there is only a third of the daily traffic.

GENERAL 248 OFF THE JOB SFTY 94

PART 9 GENERAL

95 WOODSMANSHIP

951 GENERAL

.1 Clothing and boots shall be suited to the country, climate, and job.

.2 Workers shall avoid working alone under hazardous conditions in isolated areas insofar as practicable.

.3 If it is necessary for a person to travel or work alone, he shall leave an itinerary of his planned trip with his immediate superior, some other responsible employee, and his wife.

a. This itinerary shall indicate where he is going, the planned route of travel, and the approximate day and hour he will return.

b. If he fails to return on schedule a search shall be started within a reasonable period.

.4 When traveling in back country, first-aid and snake-bite kits, compass, matches, and a pocket knife or belt ax should be carried.

.5 Workers shall:

a. Choose safe travel routes and safe stream crossings.

b. Make sure of secure footing and safe working positions.

c. Always be on guard against injury from falling trees, snags, limbs, rolling logs, or rocks. If you hear a rolling rock, log, or tree, don't run blindly. Determine its falling direction, then get in clear. Watch for snakes.

d. Be sure other workers know where you are working.

e. Guard against twigs and branches striking their eyes.

f. Watch your step! Rocky slopes and steep country are treacherous.

.6 See Firearms 91, Surveying 79, First Aid 92, Public Safety 101.

952 WINTER TRAVEL

.1 All forest officers who have on the ground planning, administrative or supervisory responsibilities calling for field work in mountainous snow areas should have training in winter mountaineering, avalanche hazard recognition and, where there is a distinct need, training in avalanche control.

.2 When traveling in the winter, workers shall:

a. Avoid so far as possible traveling in hazardous areas. In the spring, snowslide hazards are extreme after three or more days of unusually hot weather.

b. Stay out of snow country for 48 hours after heavy snowstorms, or until the new snow bonds with the old if in a snow slide hazard area.

c. In the spring or during periods of heavy thawing, arrange to travel over snow areas during the early morning hours, if in a snow slide hazard area, as wet snow avalanche hazard increases greatly after 12 noon.

.3 In deep snow and cold weather it is good plan to get early morning start, then make camp early preferably by 3 P.M., before traveler gets tired.

.4 See Snow Surveys 793.

953 EMERGENCIES

.1 If you get lost, keep calm. Don't walk aimlessly. Trust your map and compass. Shelter and warmth are much more important than food.

a. Climb to where you can see surrounding country, to locate yourself.

b. Select a sheltered spot and prepare camp, shelter and fire wood before dark.

c. When you reach a road, trail, or telephone line, follow it. At last resort, follow a stream downhill.

.2 In case you are injured and alone, keep calm. Stay where you are, clear an area to mineral soil, and build a signal fire of green boughs in it. Usually someone will find you.

.3 See First Aid 92.

954 POISON PLANTS, INSECTS, SNAKES

.1 Ivy, oak, sumac:

a. All employees subject to exposure to these hazards shall be instructed in plant identification.

b. Highly sensitive persons should not be exposed.

c. When working in affected areas employees should:

1. Fasten trouser legs closely over boot tops, or tuck them in.

2. Wear gloves, and keep them away from face or exposed parts of body.

3. After work, wash exposed parts thoroughly with thick soapsuds (yellow laundry soap best) in hottest possible water, then alcohol.

4. Clean tools with cleaning solvent before putting them away.

5. Wash exposed clothing in thick, hot suds separately from other clothes.

d. Where practicable, around improvements, plants should be destroyed:

1. Ammate; 2,4-D; 2,4,5-T; or 2,4,5 are recommended for killing the plants.

2. If burning, do this in isolated areas.

3. Avoid contact with smoke, particularly getting it in the eyes, or inhaling it.

e. Immunization treatments by a doctor are recommended.

f. If rash develops, make paste by heating soap and water to consistency of lard, apply thickly, allow to dry, and leave on overnight; or use calamine solution. See doctor if serious.

.2 Insects:

a. Employees exposed to dangerous infestations of Rocky Mountain spotted fever ticks should:

1. Wear medium high boots, fastening trousers over boot tops.

2. Avoid walking through low vegetation when possible.

3. Inspect body and clothing twice a day when there is a question of exposure to ticks.

4. At night place clothing where ticks cannot get in it; and arrange bed so ticks cannot crawl into it.

5. If tick is found attached to body, remove it, using care to prevent infection through skin abrasions or cuts on fingers.

a. Use tweezers if available.

b. Be sure to remove head of tick.

c. Hold lighted cigarette close to tick to make it release its hold.

6. Paint spot where tick was attached with alcohol or merthiolate.

7. Be urged to take the tick shots if working in tick areas. Facilities should be made available for them to do this.

8. Brush seed ticks off trousers with a switch.

9. Use repellents to keep ticks from attaching themselves.

10. See doctor immediately if in tick country and you have fever symptoms: chill, followed by continued fever, severe headaches, pains in bones and muscles, skin eruptions on third day.

b. Employees exposed to chiggers should:

1. Avoid sitting on ground or on logs; and avoid low vegetation when practicable.

2. Apply powdered sulphur to legs and hands; dissolve sulphur tablets in mouth.

3. Treat bite with alcohol or merthiolate.

4. Bathe in hot, soapy water.

5. Use insect repellents such as dimethyl phthalate, indalone.

c. In Black Widow spider areas:

1. Wear work gloves.

2. Turn them inside out if laid on ground temporarily.

3. Inspect material before handling.

4. Be careful in outdoor toilets.

5. If any bite shows rapid inflammation and pain, see doctor.

.3 Snakes:

a. Employees should:

1. Wear high boots in poison snake country.

2. Be careful, around places obscured by foliage or otherwise, when walking in rocky country or climbing ledges.

3. Use a bar for moving materials and timber that have been stacked or piled in snake areas. Do not put hands under any stored material where snakes might be present.

4. Take care not to step over logs. Step on them and look down before stepping off.

5. If bitten, keep cool. Don't run or get overheated.

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6. Carry a snake-bite kit in snake infested areas.
7. See First Aid 92 .

Part 10 - Public Safety

101 GENERAL PUBLIC

1011 AVIATION

.1 When granting permits to power companies, they shall be requested to minimize high line hazards by safe line location, to mark towers at ends of long spans, to avoid if possible putting lines across lakes.

.2 Forest Service telephone lines shall be located to minimize flying hazards also.

1012 SEARCH AND RESCUE

Primary responsibility for emergency assistance within National-forest boundaries is placed on sheriffs in some States and on highway patrols in others. In Alaska, U. S. Commissioners and postmasters are responsible. The Air Rescue Service of the Army Air Forces in the U. S., and the Coast Guard in Alaska, are responsible for search and rescue of crashed aircraft. The Forest Service will assist these primary agencies as follows:

.1 Persons lost, seriously ill, injured, or who die within the exterior boundaries of the national forests, shall be searched for and transported to the nearest place where there are interested parties or local authorities, if the situation can be met only through action by the Forest Service. Immediate steps should be taken to get clearance with the primary agency in each case.

.2 If search starts within exterior boundary of a national forest, it can extend to areas immediately outside if the emergency warrants it.

.3 For minor accidents where there is no immediate danger to life or health, incidental help, information, or advice shall be given, because the person can usually make his own arrangements for relief.

.4 For major accidents such as drowning, serious injuries, or lost persons, every assistance shall be given until the legally designated agency can take over.

.5 In air rescue work we shall render immediate aid where lives may be saved when the primary agency cannot arrive in time to do so, and also:

a. Assist primary agency in arrangements for transportation to the crash area, including taking ground crew to the scene.

b. Provide observer assistance where air search is necessary.

c. Furnish maps, details as to forest organization, best routes of travel to crash area.

.6 For further details as to cooperative agreements with airlines, Air Forces, primary agencies, fiscal and time charging aspects of search and rescue, see Forest Service Manual Vol. 1 GA-C11(1)-(3).

1013 RECREATION See 102.

1014 SPECIAL USES See 37 and 102.

1015 TRAVELING PUBLIC.

.1 See Road & Trail C & M 77.

.2 Where departure from regular traffic rules are necessary, such as on some logging projects, the following steps shall be taken:

a. Permit public use of Forest Service road only on certain hours or certain days, rerouting traffic where possible during times regular traffic rules are not in effect.

b. If traffic cannot be rerouted, signs shall be conspicuously posted at each end of road, worded about as follows: DANGER - LOGGING TRUCKS HAVE RIGHT OF WAY.

c. Whenever loaded trucks must travel in left-hand lane, all vehicles traveling in the same direction shall be routed in that same lane. All opposing travel shall be routed over its left-hand lane.

d. If driving rules depart from regular traffic rules, all approaches and frequent strategic places along the route shall be posted with reminder signs. Return to regular traffic rules shall be posted also.

e. Signs shall be immediately removed when special driving rules are no longer needed.

PUBLIC SAFETY 258 GENERAL PUBLIC 101

PART 10 PUBLIC SAFETY

102 RECREATION

1021 RECREATION AREAS

.1 See Sanitation 37.

.2 If it is impossible to assign life guards to swimming areas having heavy use, Swim At Your Own Risk signs shall be posted.

.3 Developed swimming areas shall have depth markers.

a. Life-saving equipment should be provided if practicable.

b. Diving facilities shall meet American Red Cross Standards.

.4 All facilities shall be kept in safe operating condition and all hazards shall be eliminated.

.5 Reasonable competence in skiing should be required of personnel administering winter sports areas.

1022 SPECIAL USES

.1 Special Use resorts shall be inspected critically and periodically from the safety and sanitation standpoint, to prevent unsatisfactory conditions.

a. Structures shall be strong enough to carry heavy snow loads if used in the winter.

b. Buildings shall have adequate fire exits.

c. Dormitories shall not be overcrowded.

d. Permitees shall be required to eliminate all hazards to public health and safety.

.2 Ski lifts and tows shall be inspected frequently during operation to be sure all safety standards are complied with. See FS Manual NF-G-Appendix (23)-(30) for Standards.

1023 AVALANCHE CONTROL

.1 Leaders of avalanche blasting parties shall be especially trained not only in the handling of explosives in general, but also for this particular purpose. They shall be further trained in all phases of ski mountaineering. See Blasting 71, First Aid 92, Snow Surveys 793, Woodsmanship 95.

.2 No man shall be considered competent to handle explosives in avalanche control work until he has received training in ski mountaineering, has actually handled explosives in the field and has demonstrated his proficiency in all phases of the operation, including the following:

a. Permanent and field storage.
b. Public safety procedures.
c. Party safety procedures.
d. Preparing and placing charges.
e. Ski mountaineering including use of the Safety Code.

.3 Avalance control work shall be done only when snow conditions are suitable.

.4 All areas threatened by avalanches due to blasting or possibly released by the party enroute, shall be closed to the public.

.5 If lift- or tow-served areas are endangered by the blasting operations, they shall be closed.

.6 Warning signs shall be placed indicating the danger area, supplemented by guards, if the party leader deems necessary.

.7 Advance notice of blasting operations shall be given by bulletin board, P. A. system, and all other available means.

.8 Blaster shall use commercial explosives with characteristics required for this type of work: Dry and insensitive to cold and damp, high degree of stability, detonation rate 20,000 feet per second or better, such as tetrytol, block and chain type.

.9 Actual firing shall be upon signal from an observer that the endangered area is clear. This observer shall have a clear view of the approaches as well as the slide path itself.

.10 Storage:

a. To be effective, explosives for avalanche control work shall be readily available to the officers responsible for control. The presently available explosives most suitable for this use are highly stable and offer minimum hazard of premature detonation.

b. At the discretion of the Snow Ranger, up to 40 pounds of explosives can be stored temporarily in the open in a remote area if it is placed under or behind a natural barrier such as heavy timber, a ridge, an embankment, etc. and is posted with suitable flags or signs.

c. Detonators shall not be so stored.

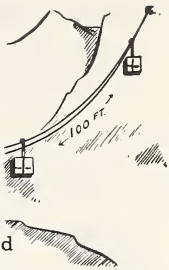
.11 Over-snow Transportation:

a. An avalanche hazard forecast shall be obtained before embarking on any mission.

b. Explosives and detonators shall not be carried by the same man.

c. Detonators shall be carried in a compartmented wooden box of not less than 3/8-inch thickness and built so that no metal is exposed to the detonators.

d. Packs containing explosive material shall be clearly marked with red and labelled, "Explosives - Danger."



e. If lifts and tows are used, there shall be a separation of at least 100 feet at all times between the explosive powder and the detonators. This shall apply on the platform and on the tow paths.

f. Passengers shall not be allowed on lifts and tows when explosives are being transported.

.12 Techniques of arming, placing and firing charges:

a. A blasting party for avalanche control shall consist of not less than three persons.

b. The leader shall carry the detonators and shall be responsible for the selection of routes to the firing points and for the firing technique.

c. Except for training purposes, he shall personally arm and place the charges.

d. Except when the operation is used for training, only one member of the party shall be exposed when the charge is armed and put into firing position.

e. Cornice shall be preplanted with explosives only when:

1. Special conditions exist in a remote and inaccessible location where skiers will not go.

2. It is unlikely the charge will be found and tampered with.

3. It is materially safer for blaster to preplant.

4. Charge is placed on top of ridge on earth or rock base where it cannot be swept downhill by a slide.

5. All unused preplanted charges shall be detonated in the spring before anyone can get into the area without skis or snowshoes.

f. When blasting a cornice already in place, the operator preparing the shot holes shall be roped to safe anchorage if his weight might fracture cornice.

g. If the operator placing the charge is exposed to premature or secondary avalanche release, he shall be roped also.

h. Loose snow and slab type avalanches shall be released by surface explosions.

i. All charges shall be fired by electrical detonators.

j. For tetrytol type of explosives at least one #10 detonator or two #6 detonators taped together shall be used. Detonator shall be securely taped to the charge.

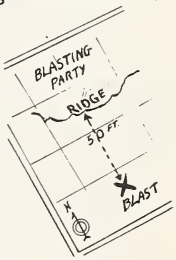
k. If the charge is to be thrown or lowered into position, it shall be prepared in such a manner that none of the strain shall be placed upon the lead-in wire of the detonator.

l. All leads shall be taped.

m. The various parts of the complete firing circuit shall be tested with a blasting galvanometer.

n. Party safety limits:

1. All members of the blasting party shall be in positions protected from secondary avalanches which may develop from the blast.



2. Flying debris is not a danger factor in this type of work. However, there shall be a minimum distance of 50 feet plus a substantial terrain barrier between the party and the blast.

3. Longer distances shall be used wherever possible to retain avalanche safety.

o. Standard avalanche-blasting party kit shall be:

1. Sufficient explosive on hand for the job.

2. Sufficient detonators previously tested with the galvanometer, plus an extra detonator, not to be returned but to be exploded with the final charge.

3. At least 200 feet of blasting wire.

4. Friction tape.

5. Hand-type blasting machine, tested before each trip. See 715.2.
6. Blasting galvanometer.
7. Wire cutters.
8. Knife.
9. First-aid kit.
10. 100 feet of safety rope.

.13 If projectiles are to be used, 75mm HE artillery shells with super-quick fuse or heavier, are recommended.

.14 All duds shall be searched out and destroyed. If not found, public warning signs shall be posted.

.15 Except as provided in this section, all transportation, storage, and use of explosives in connection with avalanche control shall conform with the provisions of the Blasting Section.

.16 When firing with the 75mm artillery, all personnel except the man pulling the trigger shall keep at least 30 feet away from, and to the rear of, the gun.

.17 When firing the 75mm, all live shells shall be placed not less than 30 feet from the gun, and to the rear.

.18 When firing over automobiles, windows of those within 50 feet, and in front of the gun shall be rolled down or the doors opened.

.19 Spectators shall not be permitted to remain in these vehicles during firing operations.

APPENDIX A

ACCIDENT INVESTIGATOR'S GUIDE

A NECESSITY FOR REPORTS

.1 To find basic causes of accidents, which information shall be used in preventing the suffering and losses of similar accidents in the future.

.2 To determine comparative status of accident-prevention efforts in units, regions, stations, Service-wide.

.3 To form basis of entire safety program if thoroughly prepared and promptly submitted.

B DEFINITIONS

.1 A Forest Service accident is an unexpected occurrence involving operations, equipment, or personnel while on official duty, which causes or results in injury to employees or private citizens, or damage to property.

a. Disabling Injury:

1. A Serious Injury is one causing death or which might result in death (fractured skull, broken back, internal injuries), or causing disabling injury to three or more people.

(a) A Death is any injury or occupational illness resulting in death, regardless of time interval between the initial cause and death.

(b) A Permanent Impairment is an injury or occupational illness which permanently and totally prevents one from working; or which results in a permanent partial disability, one resulting in loss of a member or part of a member; or permanent impairment to any part of body in any degree less than permanent total.

(c) A Permanent Total Disability is any injury or combination of injuries sustained in one accident which permanently and totally incapacitates the injured worker from following any gainful employment.

2. A Temporary Total or Lost Time Injury is one causing injuries which, in the opinion of the attending physician, prevent the injured person from performing his normal occupation on the entire calendar day following that on which the injury occurred, or on any day following, whether or not absence was covered by authorized leave, but which is not included in the "serious" category. If the day following injury is a non-workday, the injury shall be counted as lost time if the employee could not have worked on that day due to his injury. If injury does not prevent worker from working, but he elects to take leave, it is not a lost time injury. Lost time is only that lost due to the injury and not that due to travel time in securing medical care and return to duty. Lost time man hours includes weekends and holidays, but not the day of injury.

b. Non-Disabling Injury:

1. A Temporary Partial Injury prevents a worker from performing his own job, but does not prevent him from performing another regularly established job. This type and First Aid Medical Expense cases involve no lost time, but are to be reported monthly on AD-135.

c. Property Damage Accident:

1. A Property Damage Accident is one in which damage to Government property (including motor vehicles) estimated to be $25.00 or more occurs or damage to private property in any amount.

2. A Substantial Property Damage Accident is one which has cost or may result in an estimated cost of $100.00 or more to the Government.

3. A Motor Vehicle Accident is one involving a motor vehicle that results in death, injury, or more

than $25.00 in property damage, regardless of who is at fault, unless the vehicle is properly parked. The term motor vehicle means Government-owned or rented trucks, passenger cars, motorcycles, and employee-owned vehicles used on official business.

C INVESTIGATIONS

.1 Every disabling injury and property damage accident shall be investigated immediately as outlined in this guide.

.2 A coroner's inquest and an autopsy if desirable shall be requested from the coroner for all accidental deaths on the job. If special autopsy is requested by BEC, the investigating officer shall obtain approval from the responsible dependent legally entitled to the remains.

D INVESTIGATING OFFICERS

.1 The investigating officer shall be designated by the ranking administrative officer in the vicinity, provided that in case of disabling injuries or substantial property damage accidents, the investigating officer shall be the forest supervisor, research center leader, or the delegated representative of the corresponding unit where the accident occurred, and provided further that serious injuries shall be investigated by the regional forester, director, or a delegated officer, together with an investigator from the unit involved.

.2 The investigating officer shall be well qualified to make an immediate thorough, fair, and unbiased investigation and report, protecting not only the Government's interests, but also those of private parties. He shall not permit his loyalty to the Forest Service or its employees to influence him in determining and recording the facts on his recommendations concerning the accident.

E INVESTIGATING PROCEDURES

.1 The scene of the accident, wherever or to the extent possible shall remain undisturbed until investigated. The first step is a personal visit by the investigating officer to the scene as soon as possible after the accident.

.2 In the case of serious injuries, if the regional investigator cannot arrive as soon as the unit investigator, the latter should proceed with the investigation.

.3 The investigation shall determine the cause, fix the responsibility, and recommend steps to prevent similar accidents, including disciplinary action if warranted.

.4 On arrival, the investigator shall obtain the information outlined on SF 93, Report of Investigating Officer. In cases involving serious injury or substantial property damage, photographs should be taken, and a rough sketch map of the site prepared showing such items as topography, location of people and equipment before and after the accident, point of impact, if any, compass points, direction of travel, road, trail, and ground and weather conditions.

.5 The investigator shall interview, and if possible, obtain statements on Standard Form 94 from witnesses to the accident, being careful not to suggest or encourage the filing of claims. Witnesses should be interviewed separately. They may be given assistance in preparing statements, using their own words. In many cases time will be saved if the witness informally dictates a statement to the investigating officer.

.6 Get a statement from the attending physician if any, covering a description of the injuries and a prognosis of each injured person, whether disability is likely to be temporary or permanent, probable time required for recovery, and degree of permanent disability, if any.

.7 The following persons should participate in serious injury investigations:

a. Investigating officer.

b. Supervisory officer in immediate charge of the project or local administrative unit.

c. Persons responsible for the accident will if possible, testify as to what happened.

d. Responsible mechanical engineer, if construction or mechanical equipment is involved.

F THE REPORT

Use Standard Form 93 Report of Investigating Officer.

.1 The investigating officer shall bear in mind that reviewing officers have only the report upon which to base their recommendations and final adjustments. It forms the basis upon which administrators will determine:

a. Safety factors

b. Disciplinary action if any, to be taken against any negligent employee

c. Adjustment of claims

d. Property accountability

e. Facts and recommendations covering other administrative questions arising from the accident. These shall be included in the report, resolving all conflicting evidence, if possible.

.2 The report shall contain clear, concise statements of where, when, how, why, the accident occurred. Cross references should be made to the attached witness statements, pictures, and sketches. Also be sure to include:

a. Both the direct and indirect causes of the accident.

b. Conformance with the safety code and with State laws on the part of those involved.

c. Supervision and inspection in effect prior to and at the time of the accident.

d. The human element - mental-physical condition of those persons involved, contributing acts or

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omissions, judgment, safety attitudes, and training.

e. Detailed information on all physical factors and working conditions having a bearing on the accident such as weather, visibility, vegetative cover, road or ground conditions.

f. If possible include previous accident records of participants, and other information such as age, health, sobriety, working or driving experience, and general safety habits.

g. Determine, if possible, whether private parties are covered by insurance, particularly in vehicular accidents; if so, the name and address of insurer and extent of coverage. Determine also whether the Government driver is covered by property damage and liability insurance; if so he should file notice of the accident with his insurer, and attach a copy of such notice to his SF 91, Operator's Report of Motor Vehicle Accident.

h. Findings of coroner's inquest in cases of deaths on the job. See C.2.

.3 The term unavoidable shall be used only when an accident is caused by occurrences entirely unrelated to the activity, such as a landslide, lightning, or through actions by a non-employee over whom we have no control. The mere fact that somebody fails to use proper care, judgment, or prudence until too late to avoid an accident does not make the accident an unavoidable one, since at some point it becomes impossible to prevent any accident. The investigation is intended to develop the circumstances prior to the unavoidable stage.

.4 For serious injuries the investigating officer shall prepare the report SF 93 in quadruplicate (one for unit, two for regional office or station, one for Washington Office.)

.5 Fiscal procedures for handling personal property damage, and claim cases are covered in the Forest Service Manual, Vol. II Fiscal Control Sections N and O.

G REVIEWING OFFICERS

.1 Officials reviewing the Investigating Officers Report shall include their recommendations in the letter of transmittal to regional office, station, or Washington Office.

H ACCIDENT REPORTING ACTION SHEET

See also Compens. Forms and FS Manual Vol. 2 FC-O APP.B

Report Designation	Type of Accident	Prompt Notification (Include Name, Location, Time, Cause) To:	Prompt Investigation by:	Standard Forms to Use if Employee is Injured: SF-91 Motor vehic. Operator	SF-91A Transcript of SF-91	SF-92 Supervisor Rept. (3)	SF-93 Invest. Rept.	SF-94 Witness	CAA Forms
K-SAFETY	1. Serious Injury	Reg. For. or Dir. & Chief (1)	Regional Forester-Director or their representative			x 4 Copies:	x 3 to RF or D 1 to Unit Head	x	
	2. Disabling Injury (lost time)	Unit Chief	Unit representative			x 2 Copies:	x 1 to RF, & D 1 to Unit Head	x	
	3. Temporary partial-first aid (not lost time)	- - - -	Immediate work supervisor	CA-1 Employee's Notice of Injury - file locally.					
A-CLAIMS	4. Substantial Property Damage (over $100)	- - - -	Unit representative			x 2 Copies:	x 1 to Reg. or Sta. Fiscal Agent, 1 to Unit Head.	x	
	5. Property Damage $25 - $100 (including private damage 0 - $25)	- - - -	Immediate work supervisor			x To Unit Head - if private damage, 1 to RF also			
	6. Motor Vehicle See FS Manual FC-N1-2			By Operator (2)	As needed 4 Copies:	x 3 RFA; 1 Unit Head	x If serious injury or substantial	x	
	7. Non-employee injured	Reg. For. or Dir.	Reg. For. Dir. or their representative			x 2 Copies:	x 1 RFA, 1 Unit Head	x	
	8. Airplane	(See 1-5 above)				x 4 Copies:	x 3 RFA, 1 Unit Head	x	

Where there are witnesses get statements.

(1) Also send one copy (complete) report to Chief within 10 days. If complete report not available in 10 days send one copy preliminary report, followed by complete report within 30 days. Wire or phone in case of death or injury that may result in death.

(2) Use for any vehicle driven on official business, whether vehicle is Government or privately owned, leased, or rented. If driver is injured, another responsible employee should fill out SF-91.

(3) Where several people are hurt, use one SF-92 for each person injured.

APPENDIX B
COMPENSATION FORMS

(See FC-O, Vol. 2, F. S. Manual)

United States Dept. of Labor - Bureau of Employees' Compensation

Nature of Injury	CA Forms Required									
	1	2	3	4	5	8	16 or 17	32	42	S69
.1 Minor injury, first aid, no medical exp. or lost time. 1 copy for unit	x									
.2 Minor injury, medical expense but no lost time or compensation 1 copy, for unit except CA 16, 17 always 3 - original to doctor, 2 to Reg. or Sta to BEC	x	x					xa	xa	Dr. sends	x
.3 Injury resulting in less than 15 days lost time 1 unit copy, 1 Region or Station copy	x	x	xb	xc			x	x		x
.4 Injury resulting in more than 15 days lost time but not including back injuries or hernia cases 2 copies as above	x	x	xd	xc		xe	x	x		x
.5 Back injuries (2 copies as above)	x	x	xd	xc		xe		x		x
.6 Hernias f. 2 copies as above	x	x	xd	xc		x		x	x	x
.7 Deaths (2 copies as above)	x	x	x		x		x	x	xg	x

a. Use CA-16, -17 only when referring employees to medical facilities listed in CA-76. When employee referred to non-designated physician, supervisory employee should refer injured employee to such a physician by means of Request for Treatment by Non-Designated Physician, in letter form. See FS Manual, FC-01-1.
b. CA-3 not required in these cases if date of return to duty is given on CA-2 and CA-4.
c. CA-4 necessary only in cases where employee suffers loss of pay for more than 3 days or incurs medical, surgical, hospital, or other expenses in connection with his injury for which reimbursement is claimed.
d. Fill out CA-3 on termination of disability or in case of death.
e. Use CA-8 for continuation of disability past first half-month period only. To be submitted each 15 days, covering from 1st to 15th, and 16th to last day of the month, during disability period.
f. Hernia operations are authorized only by USBEC except in life or death emergency.
g. CA-42 needed when deceased leaves no estate requiring executor. If latter required, certified copies of letters testamentory and itemized burial expenses sent in lieu of CA-42. CA 1, 2, 3 must not be held if there is delay in CA-5 or CA-42.

.8 Injured shall use designated physician if possible. If list not available, see post office or any federal office. If none of those listed is available, or if more than 50 miles from one listed, or in emergency, see non-designated physician. In any case, submit forms promptly.

APPENDIX C
SAFETY REFERENCES

SUBJECT	REFERENCE
Accident Reporting	Personnel Handbook 95.10
Airplanes, Use of	Air Operations Handbook
Building Construction	Improvement Handbook
Chimneys	Improvement Handbook 269-276
Claims-Fed. Gov't. & Others	Forest Service Manual-FC-N USDA AR7-par. 182, 183
Compensation for Injury	Forest Service Manual-FC-O USDA AR8-chap. 51
Concealed Weapons	Forest Service Manual-GA-E-55.6(c)
Electric Service	Improvement Handbook 339-57
Equipment Information	Fire Control Equipment Handbook
Excavation	Improvement Handbook 15-24
Explosives	Road Handbook 111, 206, 208-219
Fire Hazards in Fed. Bldgs.	USDA AR4-pars. 72, 87, 88
Flammable Storage	USDA AR4-par. 72
Footings & Foundations	Improvement Handbook 25-34
Gin Poles & Derricks	Improvement Handbook 294-97
Health	USDA AR8-chap. 47
Inspection, Boiler, Building, Electrical, Elevator, Fire, Floor	Personnel Handbook E-95.14a-b USDA AR4-pars. 87-88
Loads, Heating	Safety AR8-1820 Motor Vehicle AR8-1819c
Insurance, Liability & Other	Forest Service Manual-GA-E-90.11 Forest Service Manual-FC-N1-2(1)

SUBJECT	REFERENCE
Landing Fields	Forest Service Manual-NF-K5-1 (1-2) Air Operations Handbook
Lightning Protection	Lightning Protection Handbook
Medical Attention Forest Service	Forest Service Manual-GA-A2-2 (1) Personnel Handbook E-95.14 (a-c)
Motor Vehicles-Operation, Accidents, Liability, Permits	Forest Service Manual-FC-N1-2 (1-11), T3 (1); Forest Service Manual-GA-H7-2 (3); USDA AR8-1821-23
Personal Injury & Illness	Forest Service Manual-FC-O; USDA AR8-Chap. 51
Physical Examinations	Forest Service Manual GA-E-95.5 (e) Personnel Handbook 95.14 (a-c) USDA AR8-chap. 51
Piling & Pile Driving	Improvement Handbook 35-41
Poison, Purchase of	Forest Service Manual-GA-H2-15 (18)
Power Saw Operation	Region 6 Snag Falling Handbook
Personal Injury Claims	Forest Service Manual-FC-N2 (1-8)
Property Damage	Forest Service Manual-FC-N
Liability	Forest Service Manual-FC-N1 (1-2)
Investigation	N1-2
Claims, Property	(9-13)
Recreation Areas, Safety in	Forest Service Manual-NF-G1 (2); Forest Service Manual-NF-G4 (2-6)
Reimbursement for Loss	Forest Service Manual-GA-H4-(1-3); FC-N4 (1-5)
Retaining Walls	Improvement Handbook 31-34
Rigging	Improvement Handbook 283-97

SUBJECT	REFERENCE
Safety-Use of NF Land	Forest Service Manual-GA-A3 (41)
Safety-Accidents Defined	Forest Service Manual-GA-E-95.9 (a)
Accident Causes	95.9 (b)
First Aid	95.5 (c)
Hazard Reduction	95.5 (a)
Inspection	95.7 (b)
Policy & Objectives	95.1 (a)
Responsibility	95.1 (b)
Sanitary Conditions	95.5 (d)
Selection & Placement	95.5 (e)
Supervision	95.7 (a)
Training	95.5 (b)
Training	85.6 (f)
Safety Signs	Sign Handbook 161-165
Sanitary Conditions	Forest Service Manual-GA-E-95.5 (d)
Sanitation	Water Development & Sanitation Handbook
Sanitation, Building	USDA AR4-par. 93
Scaffolds	Improvement Handbook 173-78
Sewage Disposal	Water Development & Sanitation Handbook 83-118
Sewage Disposal	Rural Sewage Disposal (Public Health Service Reprints 2461 & 1943)
Sheet Piling	Improvement Handbook 19-20
Smoking	USDA AR4-par. 73
Snag Removal	R-6, Snag Falling Handbook
Standards & Specifications	American Standards Assn., Inc. 70 E. 45 St., N.Y. 17, N.Y. National Board of Fire Underwriters 85 John St., N.Y. 7, N.Y.

SUBJECT	REFERENCES
Standards & Specifications	National Bureau of Standards Safety Codes Group Washington 25, D. C. National Fire Protection Assn. 60 Batterymarch St. Boston 10, Mass. Underwriters' Labs., Inc. 207 E. Ohio St., Chicago 7, Illinois
Steel Erection	Improvement Handbook 277-81
Storage in Buildings	USDA Title 4-AR-74
Swimming	Forest Service Manual-NF-G3 (17-18)
Swimming Pools	Water Development & Sanitation Handbook 121-130
Telephone Construction & Maintenance	Telephone Handbook
Trail Crew Work Practices	Trail Handbook
Transporting Injured Employees	Forest Service Manual-FC-O1-4 (1-4) USDA Title 8-AR-1888-1889
Water Treatment-Purification	Water Development & Sanitation Handbook 81-82
Winter Sports Administration	Forest Service Manual-NF-G4 (5-7)
Winter Sports Area Safety	Forest Service Manual-NF-G3 (8-12)

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