

NFPA

46

STORAGE OF FOREST PRODUCTS 1978



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NATIONAL FIRE PROTECTION ASSOCIATION

470 Atlantic Avenue, Boston, MA 02210

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Recommended Safe Practice for
Storage of Forest Products

NFPA 46 — 1978

1978 Edition of NFPA 46

This recommended safe practice was prepared by the Committee on Storage of Forest Products, and was adopted by the Association on November 15, 1978 at its Fall Meeting in Montreal, Quebec, Canada. It was released by the Standards Council for publication on December 4, 1978.

Origin and Development of NFPA 46

This document incorporates the subjects formerly covered in four separate documents: NFPA 46, *Outdoor Storage of Forest Products*; NFPA 46A, *Outdoor Storage of Wood Chips*; NFPA 46B, *Outside Storage of Logs*; and NFPA 47, *Retail and Wholesale Lumber Storage Yards*.

NFPA 46 was in two parts: Part I was first adopted in 1969; Part II was tentatively adopted in 1959 and officially adopted in 1961. The document was revised in 1973.

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NFPA 47 was first adopted in 1951, and revised in 1961 and 1973.

This document supersedes the 1973 edition of NFPA 46, the 1973 edition of NFPA 46A, the 1976 edition of NFPA 46B, and the 1973 edition of NFPA 47.

Committee on Storage

W. Robert Powers, Chairman
The New York Board of Fire Underwriters

- | | |
|--|--|
| Jack S. Barritt , Sectional Committee on Rack Storage | Edward Jefferson , Sectional Committee on Storage of Rubber Tires |
| Wesley L. D. Chisholm +, Committee on Motor Vehicle and Highway Fire Protection | R. A. Pedersen +, Committee on Piers and Wharves |
| William H. Doyle +, Sectional Committee on Storage, Handling, and Transportation of Hazardous Chemicals | E. C. Sommer +, Sectional Committee on Storage of Flammable Liquids |
| Thomas E. Goonan , Sectional Committee on Record Protection | W. P. Thomas, Jr. , Sectional Committee on General Storage |
| Philip M. Hamlin , Sectional Committee on Fur Cleaning and Storage | C. R. Thomson , Sectional Committee on Storage of Forest Products |
| + Nonvoting | |

Sectional Committee on Storage of Forest Products

C. R. Thomson, Chairman
Canadian Wood Council

- | | |
|---|---|
| G. R. Beach , Reed Shaw Stenhouse | Robert L. Hamelin , Industrial Risk Insurers |
| Gene J. Birchler , Personal | Walter J. Orey , St. Regis Paper Company |
| Robert W. Buscho , Fire Marshal, City of Portland | R. A. Pedersen , Washington Surveying and Rating Bureau |
| Edward C. Doherty , Doherty, Blacker, and Shepard Lumber (rep. National Lumber and Building Materials Dealers Association) | Kenneth R. Peterson , Georgia-Pacific Corporation |
| R. C. Everson , Marsh & McLennan, Inc. | W. Robert Powers , The New York Board of Fire Underwriters |
| Warren Hallen , Weyerhaeuser Company | |

Alternates

- | | |
|--|---|
| Arthur F. Munchler , Edward Hines Lumber Company (Alternate to Edward C. Doherty) | E. J. O'Donoghue , Industrial Risk Insurers (Alternate to R. L. Hamelin) |
|--|---|

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time changes in the membership may have occurred.

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Recommended Safe Practice for Storage of Forest Products

NFPA 46 - 1978

Chapter 1 General

1-1 Purpose. The intent of these recommendations is to provide fire protection guidance to minimize the fire hazard in areas used for the storage of forest products, particularly as they are stored outside buildings. These recommendations are not intended to be mandatory requirements. Each individual property will have its own special conditions of stock handling, exposure and topography. For this reason, only basic fire protection principles are recommended herein which are intended to be applied with due consideration of all local factors involved. The authority having jurisdiction should be consulted in all cases.

1-2 Scope. These recommendations cover: retail and wholesale lumber storage yards; outside storage of lumber and timber at other than retail or wholesale yards; outside storage of ties, poles, piles, posts and other similar forest products at pressure treating plant yards; outside storage of wood chips; and outside storage of logs.

Chapter 2 Definitions

2-1 Unless expressly stated elsewhere, the following terms will, for the purpose of this recommended practice, have the meanings indicated below.

Alleyway means an accessible clear space between storage piles or groups of piles suitable for housekeeping operations, visual inspection of piling areas, and initial fire fighting operations.

Chips means wood chips of various species used in the manufacture of pulp. These chips are usually $\frac{1}{4}$ inch to $1\frac{1}{4}$ inch in size, with nothing finer than what is retainable on a $\frac{1}{4}$ -inch screen; however, blower and conveyor systems may create some fine dust particles after screening.

Clear Space means any area free of combustible materials. This does not preclude the storage of noncombustible materials that will not transmit an exposure fire.

Cold Deck means a single ranked pile of logs with individual logs of regular or irregular length usually 20 to 50 feet long, but greater than 8 feet in length.

Cordwood means logs 8 feet or less in length customarily intended for pulpwood or fuel uses.

Cunit means 100 cubic feet of solid wood or 100 cubic feet of chips or hogged mill waste.

Fire Lane means a clear space suitable for fire fighting operations by motorized fire apparatus.

Lumber means boards, dimension lumber, timber, plywood, and other similar wood products.

Ranked Piles means piles of logs evenly arranged by conveyor, crane or other means.

Stacked Piles means piles of logs where logs are generally conveyed to the center of a pile presenting a cone shaped appearance.

Yard means the outdoor areas where lumber, wood chips, logs, and other wood products are stored outside buildings.

Chapter 3 Retail and Wholesale Lumber Storage Yards

3-1 Application.

3-1.1 The intent of the recommendations contained in this chapter is to provide fire protection guidance to minimize the fire hazard in (a) retail lumberyards handling forest products and other building materials, (b) wholesale lumber storage yards including distribution, holding, and transshipment areas, and (c) buildings in retail and wholesale lumberyards used for storage of forest products or auxiliary operations.

3-1.2 In addition to the recommendations contained in this chapter, the provisions outlined in Chapter 8, "General Fire Protection," should apply to all retail and wholesale lumber storage yards except as modified herein.

NOTE: The type of operations at properties to which these recommendations apply will be found to vary widely. Retail lumber and building material operations are often characterized by large area buildings with minor outside storage areas. On the other hand, wholesale and distribution yards may involve large outside storage areas, which present fire protection problems similar to mill yards. The principles outlined in Chapter 4, "Outside Storage of Lumber at Other Than Retail or Wholesale Yards," should be used as a further guide for large outside storage areas and the authority having jurisdiction should be consulted in all cases.

3-2 General.

3-2.1 Fire loss experience in lumberyards indicates that large undivided stacks, congested storage conditions, delayed fire detection, inadequate fire protection and ineffective fire fighting tactics are the principal factors that allow lumberyard fires to reach serious proportions. The fire hazard potential inherent in lumber storage operations with large quantities of combustible material can best be controlled by a positive fire prevention program under the direct supervision of top management and should include:

(a) Selection, design and arrangement of storage yard areas and materials handling equipment based upon sound fire prevention and protection principles.

(b) Facilities for early fire detection, transmission of alarm and fire extinguishment.

(c) Fire lanes to separate large stacks and provide access for effective fire fighting operations.

(d) Separation of yard storage from yard buildings and other exposing properties.

(e) An effective fire prevention maintenance program, including regular yard inspections by trained personnel.

3-2.2 Special problems of construction and protection are involved with cargo yards having lumber stored on piers or wharves and lumber stored on raised platforms. The *Standard for the Construction and Protection of Piers and Wharves*, NFPA 87, and the authority having jurisdiction should be consulted in each case.

3-2.3 It is recognized that retail and wholesale lumber storage yards are normally located within municipal boundaries where there are municipal water supplies available for fire protection. For basic fire protection, the municipal system should be capable of supplying at least four 2½-inch hose streams simultaneously (1,000 gpm minimum). Where large-scale fire fighting operations may be expected, larger water supplies are needed. Where protection from municipal water supplies and hydrant systems is not present or is not considered adequate by the authority having jurisdiction, a yard fire hydrant system should be provided.

3-3 Open Yard Storage.

3-3.1 Lumber stacks should be on solid ground, preferably paved or surfaced with materials such as cinders, fine gravel or stone. Refuse- or sawdust-filled land, where the danger of underground fire is present, should not be used.

3-3.2 Method of stacking should be solid wherever possible and in an orderly and regular manner.

3-3.3 It is recognized that some materials will be stored on pallets. As stacks of empty pallets present a severe fire problem, it is recommended that empty pallets be stored at least 50 feet from buildings and that stack heights be limited to 8 feet.

3-3.4 Height of stacks should not be over 20 feet with due regard for stability. Air-drying stickered stacks are subject to rapid fire spread through the air spaces and should therefore be kept as low as practical.

3-3.5 Where stacks are supported clear of the ground, adequate clearance should be provided for cleaning operations under the stacks.

3-3.6 Driveways should be so spaced that a maximum grid system of not over 50 feet by 150 feet is produced.

3-3.7 Driveways should have a minimum width of 15 feet and an all-weather surface capable of supporting fire department apparatus.

3-3.8 Boundary posts with signs designating stacking limits should be provided to indicate yard area and alley limits, where the yard has earth or crushed stone drives. In paved yard areas, painted boundary limits can be used instead of posts and signs.

3-4 Buildings.

3-4.1 Automatic sprinklers provide an efficient means of fire detection and extinguishment. Automatic sprinkler protection is therefore recommended for all large storage buildings containing combustible contents and auxiliary buildings containing hazardous operations that may constitute an exposure to outside lumber storage or other property. The authority having jurisdiction should be consulted for requirements pertaining to automatic sprinkler installations. (*See Standard for the Installation of Sprinkler Systems, NFPA 13.*)

3-4.2 Where automatic sprinklers are not installed, large storage buildings should be subdivided by fire walls into compartments not exceeding area limits specified in generally accepted model building codes.

3-5 Exposure Protection.

3-5.1 Many retail lumberyards sell clay, concrete, and stone products. It is recommended that these and other least burnable materials (large size timbers and flat-stacked stock) be stored or stacked on the perimeter of the yard to act as a barrier between the yard and adjacent properties or buildings.

3-5.2 Exposure to the Yard.

3-5.2.1 Except as noted in 3-5.2.2, open yard stacking should be located with as much clear space to buildings as practicable. Building walls should have sufficient fire resistance to contain a fire that originates in the building, and windows or other openings should be reduced in size or adequately blocked to prevent radiant heat exposure to the open yard stacking. (*See 8-3.1.*)

3-5.2.2 Unsprinklered buildings containing hazardous manufacturing or other operations — such as woodworking, glazing, painting, dry kilns, auto repairing, grain or feed milling or grinding, above-ground fuel or gasoline tanks, etc. — should have at

least 50 feet clear space to the nearest lumber stack, shed or warehouse. Boundary posts with signs designating stacking limits should be provided to designate clear space to the aforementioned buildings, tanks, etc.

3-5.3 Exposure from the Yard.

3-5.3.1 Because of the large quantities of material generally involved in lumberyard fires, some form of exposure protection for adjoining properties is recommended. Clear spaces or walls capable of providing fire barriers between yard storage and the exposed properties are desirable. The responsibility for the proper protection of properties adjoining a lumberyard is often a joint one to be worked out by the cooperation of the lumberyard and adjoining property owners. Refer in each case to the authority having jurisdiction.

3-6 Special Fire Prevention.

3-6.1 All power woodworking machines, except for portable units, should be equipped with refuse removal equipment conforming to the *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying*, NFPA 91.

3-6.2 Materials such as hay, coal, grain and feed should be stored in separate buildings or in the open with adequate clear space between yard buildings or open yard storage.

Chapter 4 Outside Storage of Lumber at Other than Retail or Wholesale Yards

4-1 Application.

4-1.1 The intent of the recommendations contained in this chapter is to provide fire protection guidance to minimize the fire hazard in large yard storage areas containing lumber, timber, and other similar wood products not intended for retail or wholesale distribution at the site. Each individual property will have its own special conditions of yard use, material handling methods and topography. For this reason, only basic fire protection principles are recommended herein which are intended to be applied with due consideration of all local factors involved.

4-1.2 In addition to the recommendations contained in this chapter, the provisions outlined in Chapter 8, "General Fire Protection," should apply to all large yard storage areas for lumber and timber at other than retail or wholesale yards except as modified herein.

4-2 General.

4-2.1 Fire loss experience in lumber storage yards indicates that large undivided stacks, congested storage conditions, delayed fire detection, inadequate fire protection and ineffective fire fighting tactics are the principal factors that allow lumberyard fires to reach serious proportions. The fire hazard potential inherent in lumber storage operations with large quantities of combustible material can best be controlled by a positive fire prevention program under the direct supervision of top management and should include:

(a) Selection, design and arrangement of storage yard areas and materials handling equipment based upon sound fire prevention and protection principles.

(b) Facilities for early fire detection, transmission of alarm and fire extinguishment.

(c) Fire lanes to separate large stacks and provide access for effective fire fighting operations.

(d) Separation of yard storage from mill operations and other exposing properties.

(e) An effective fire prevention maintenance program, including regular yard inspections by trained personnel.

4-2.2 Special problems of construction and protection are involved with cargo yards having lumber stored on piers or wharves and lumber stored on raised platforms. The *Standard for the Construction and Protection of Piers and Wharves*, NFPA 87, and the authority having jurisdiction should be consulted in each case.

4-3 Basic Lumberyard Protection.

4-3.1 For basic fire protection, the hydrant system should be capable of supplying at least four 2½-inch hose streams simultaneously (1,000 gpm minimum). Where large-scale fire fighting operations may be expected, larger water supplies with adequate mains are needed. (See *Section 4-4*.)

For early extinguishment with basic fire protection, hydrants should be so spaced with sufficient 2½-inch hose attached to permit rapid hose laying to all parts of the stacking areas. For this reason, it is recommended that hydrants be spaced at about 250-foot intervals so that any part of the yard can be reached with 200 feet of hose. Hydrants should preferably be located at fire lane intersections. A hydrant hose house with at least 200 feet of fire hose and auxiliary equipment should be provided at each hydrant. (See *Standard for Outside Protection*, NFPA 24.)

4-3.2 All-weather roadways capable of supporting fire department apparatus should be provided to the plant and yard from public highways.

4-3.3 The storage site should be reasonably level, solid ground, preferably paved or surfaced with material such as cinders, fine gravel or stone. Refuse or sawdust-filled land, swampy ground, or areas where the hazard of underground fire is present should not be used.

4-4 Special Lumberyard Protection.

4-4.1 Yards consisting of single carrier loads of green flat-stacked lumber present a minimum hazard that generally requires only the basic protection provisions of Section 4-3 for fire control. High stacks of lumber stickered for air drying present a very severe hazard that will require effective use of large stream equipment and greatly expanded water supplies for fire control. In yards requiring more than the basic protection provisions of Section 4-3 for fire control, the following provisions are recommended as a guide. The relative importance of these provisions and the degree to which they

may be needed will vary with yard conditions and the authority having jurisdiction should be consulted in all cases.

4-4.2 Powerful water supplies and large mains should be provided where public or private fire department response, with manpower and equipment that can use these supplies, is available. Large stream equipment such as portable turrets and deluge sets requires 750 to 1,000 gpm for each appliance. Monitor towers may require supplies in excess of 1,000 gpm for each unit. In large yards where the hazard is severe, many of these devices may be operated simultaneously.

4-4.3 Fire lanes suitable for fire department operations should be provided with storage arranged so that no part of the occupied area is more than 50 feet distant in any direction from access by motorized fire fighting equipment. Where special extinguishing equipment such as portable turrets, deluge sets and monitor towers are available, access distances may be governed by their effective reach with available water supplies. Fire lanes should be kept unobstructed. They should have an all-weather surface sufficiently strong to support fire apparatus, and should be of sufficient width to permit maneuvering of motorized fire apparatus.

4-4.4 Stack heights should be limited. Heights in excess of 20 feet seriously restrict effective extinguishing operations. Air drying stickered stacks are subject to a more rapid fire involvement and should be kept as low as possible.

Chapter 5 Outside Storage of Ties, Poles, Piles, Posts and Other Similar Forest Products at Pressure Treating Plant Yards

5-1 Application.

5-1.1 The intent of the recommendations contained in this chapter is to provide fire protection guidance to minimize the fire hazard in yard storage areas containing treated and untreated ties, poles, piles, posts and other similar forest products in yards connected with pressure treating plants but not including the treating buildings, processes or storage of treating materials. Each individual property will have its own special conditions of yard use, stock handling methods and topography. For this reason, only basic fire protection principles are recommended herein which are intended to be applied with due consideration of all local factors involved.

5-1.2 *Ties* as used herein includes ties, poles, piles, posts and other similar forest products. Treated ties are those pressure impregnated with preservatives.

5-1.3 In addition to the recommendations contained in this chapter, the provisions outlined in Chapter 8, "General Fire Protection," should apply to all outside storage of ties, poles, piles, posts and other similar forest products at pressure treating plant yards except as modified herein.

5-2 General.

5-2.1 Fire loss experience in tie storage yards indicates that large undivided stacks, congested storage conditions, delayed fire detection, inadequate fire protection and ineffective fire fighting tactics are the principal factors that allow fires to reach serious proportions. The fire hazard potential inherent in tie storage operations with large quantities of combustible material can best be controlled by a positive fire prevention program under the direct supervision of top management and should include:

(a) Selection, design and arrangement of storage yard area and materials handling equipment based upon sound fire prevention and protection principles.

(b) Facilities for early fire detection, transmission of alarm and fire extinguishment.

- (c) Fire lanes to separate large stacks and provide access for effective fire fighting operations.
- (d) Separation of yard storage from mill operations and other exposing properties.
- (e) An effective fire prevention maintenance program, including regular yard inspections by trained personnel.

5-3 Basic Tie Yard Protection.

5-3.1 Alleyways should be provided between piles, should be unobstructed, and of sufficient width for hand or cart fire hose laying operations. A minimum alleyway width of four feet is recommended. Alleyways should be spaced so that effective action from initial fire fighting operations can be obtained. With relatively open stacking (stacking that will permit penetration by fire extinguishing streams) this can usually be accomplished by providing a four foot or greater width alleyway between alternate rows of tie stacks (*see Figure 5-3.1A*). Flat crib-style stacking without space between stacks so as to form solid packed rows would require a four foot or greater width alleyway between each row. Where stacking area does not permit a four foot or wider alleyway between each such row, the length of the rows (distance between fire lanes) should be held to 75 feet or less. In no event should such alleyways be reduced to less than two feet in width (*see Figure 5-3.1B*).

5-3.2 For basic fire protection, the hydrant system should be capable of supplying at least four 2½-inch hose streams simultaneously (1,000 gpm minimum). Where large-scale fire fighting operations may be expected, larger water supplies with adequate mains are needed. (*See Section 5-4.*)

For early extinguishment with basic fire protection, hydrants should be so spaced with sufficient 2½-inch hose attached to permit rapid hose laying to all parts of the stacking areas. For this reason, it is recommended that hydrants be spaced at about 250-foot intervals so that any part of the yard can be reached with 200 feet of hose. Hydrants should preferably be located at fire lane intersections. A hydrant hose house with at least 200 feet of fire hose and auxiliary equipment should be provided at each hydrant. (*See Standard for Outside Protection, NFPA 24.*)

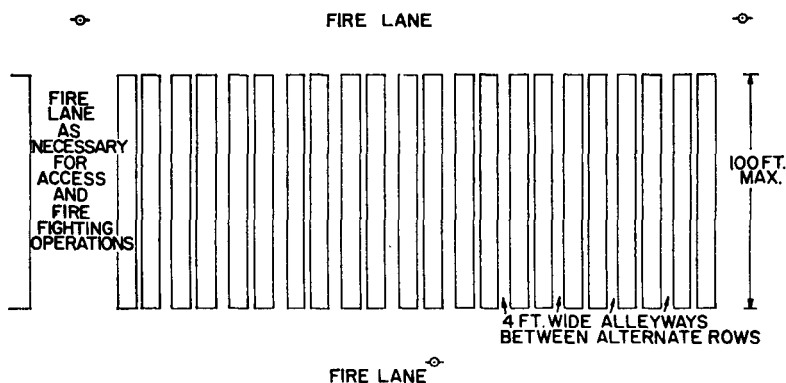


Figure 5-3.1A. Relatively Open Stacking Methods

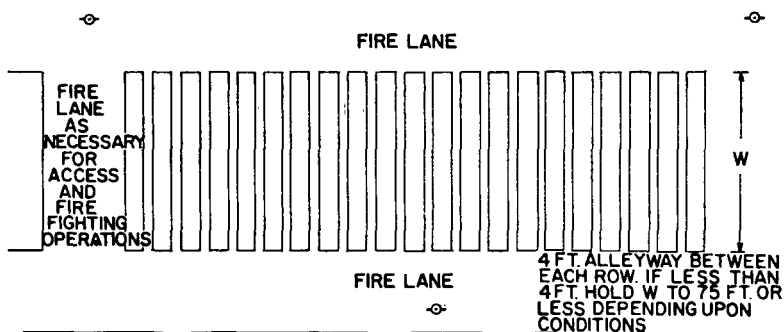


Figure 5-3.1B. Crib Style Stacking into Solid Rows

5-3.3 All-weather roadways capable of supporting fire department apparatus should be provided to the plant and yard from public highways.

5-3.4 The storage site should be reasonably level, solid ground, preferably paved or surfaced with material such as cinders, fine gravel or stone. Refuse- or sawdust-filled land, swampy ground or areas where the hazard of underground fire is present should not be used.

5-4 Special Tie Yard Protection.

5-4.1 Tie yards containing low-stacked storage, small amounts of treated ties and well-separated treating facilities present minimum hazards that generally require only the basic protection provisions of Section 5-3 for fire control. High stacking over extensive areas, congested storage, and large amounts of treated tie storage present increased hazards which require additional safeguards and protection facilities. In yards requiring more than the basic protection provisions of Section 5-3 for fire control, the following provisions are recommended as a guide. The relative importance of these provisions and the degree to which they may be needed will vary with yard conditions and the authority having jurisdiction should be consulted in all cases.

5-4.2 Powerful water supplies and large mains should be provided where public or private fire department response, with manpower and equipment that can use these supplies, is available. Large stream equipment such as portable turrets and deluge sets require 750 to 1,000 gpm for each appliance. Monitor towers may require supplies in excess of 1,000 gpm for each unit. In large yards where the hazard is severe, many of these devices may be operated simultaneously.

5-4.3 Fire lanes suitable for fire department operations should be provided with storage arranged so that no part of the occupied area is more than 50 feet distant in any direction from access by motorized fire fighting equipment. Where special extinguishing equipment, such as portable turrets, deluge sets and monitor towers are available, access distances may be governed by their effective reach with available water supplies. Fire lanes should be kept unobstructed. They should have an all-weather surface sufficiently strong to support fire apparatus, and should be of sufficient width to permit maneuvering of motorized fire apparatus.

5-4.4 Stack heights should be limited. Heights in excess of 20 feet seriously restrict effective extinguishing operations.

5-4.5 Treated ties should not be intermixed with untreated products. A 100-foot clear space should be maintained between treated tie storage and untreated storage.

Chapter 6 Outside Storage of Wood Chips

6-1 Application.

6-1.1 The intent of the recommendations contained in this chapter is to provide fire protection guidance to minimize the fire hazard in yard storage areas containing wood chips for use in pulp and paper mills. Each individual property will have its own special conditions of yard use, chip handling methods and topography. It is recognized that climate conditions, wood chip species and age of piles are all factors affecting firesafety. For these reasons, only basic fire protection principles are recommended herein which are intended to be applied with due consideration of all local factors involved.

6-1.2 Since, except for the surface layer of chips, the moisture content of the chips in piles is quite high, surface fires will not generally penetrate more than a few inches into the pile. Fire tests indicate that, for areas of average humidity conditions, the flame propagation over the surface is relatively slow. These conditions permit ready extinguishment, provided that there is early detection and good access. It is expected that, in areas where long periods of low humidity prevail, faster surface flame spread may be anticipated, increasing the importance of early detection and good access.

6-1.3 In addition to the recommendations contained in this chapter, the provisions outlined in Chapter 8, "General Fire Protection," should apply to all outside storage of wood chips except as modified herein.

6-2 General.

6-2.1 Fire experience and fire tests indicate that two completely different types of fires may occur in chip storage piles — surface fires and internal fires. Fire prevention activities and fire protection facilities should, therefore, be planned to cope with both situations. These programs should be under the direct supervision of top management and should include:

(a) Selection, design and arrangement of storage yard areas and materials handling equipment based upon sound fire prevention and protection principles.

(b) Establishing control over the various factors that lead to spontaneous heating, including provisions for monitoring the internal condition of the chip pile.

- (c) Facilities for early fire detection and extinguishment.
- (d) Fire lanes around the piles and access roads to the top of the piles for effective fire fighting operations.
- (e) Facilities for calling the public fire department and facilities needed by them for fire extinguishment.
- (f) An effective fire prevention maintenance program, including regular yard inspections by trained personnel.

6-2.2 Internal heating is a hazard inherent to long-term bulk storage of chips, which will progress to spontaneous combustion under certain pile conditions. Internal fires are difficult to detect and extinguish. Unless provision is made for measuring internal temperatures, such fires may burn for long periods before emission of smoke at the surface indicates an internal fire. Extinguishment then becomes a lengthy and expensive loss-control and operating problem, requiring equipment and manpower to move large portions of the pile, either in digging out the burning portions, or removing the unburned portions of the pile. Experience has shown that these conditions create very large losses, demanding that special attention be given, first to the prevention of spontaneous combustion and, secondly, to prefire planning as how best to handle an imminent or actual fire in a particular chip pile.

6-2.3 Prevention of internal fires requires an understanding of the factors that cause exothermic oxidation so that steps can be taken to minimize this hazard and to provide means of monitoring temperature conditions inside the chip pile. Following are some of the important items that should be considered when establishing operating procedures:

- (a) Avoid all refuse and old chips in the pile base. The storage site should be reasonably level solid ground, or should be paved with blacktop, concrete or other hard-surface material that has been thoroughly cleaned before starting a new pile.
- (b) Operating plans for the buildup and reclaiming of the pile should be based upon a maximum turnover time of one year under ideal conditions. Piles containing other than screened chips made from cleaned and barked logs (for example, whole-tree chip piles containing bark, leaves, and other extraneous materials) may be subject to greater degrees of spontaneous heating and thermal degradation and should be reclaimed much more frequently.

(c) Limit pile size. Fundamentally, several small piles are better than one large pile. Keep pile heights low, particularly for chip types that inherently carry a larger percentage of fines and are subject to greater compaction. For example, veneer chip piles should be limited to 50 feet in height.

(d) Install thermocouples during pile buildup, or provide other means for measuring temperatures within the pile with regular (normally weekly) reports to management.

(e) Control quality of chip supplies in terms of percentage of fines.

(f) Avoid concentration of fines during pile buildup. Pneumatic systems produce an air-classification of chips that must be recognized and appropriate steps taken to minimize concentration of fines. It is preferable to spread new chips in a relatively even layer over the pile.

(g) Wetting the pile regularly will help keep fines from drying out and help maintain moisture content of the surface layer of chips. It is important to minimize the diffusion of water from wet chips into dry fines to reduce exothermic heating caused by sorption effects, and it is also important to maintain surface moisture content so as to reduce the hazard of surface fires during periods of hot, dry weather.

(h) Vehicles used on the chip pile should be of a type that minimize compaction.

6-3 Chip Pile Protection.

6-3.1 It is recommended that piles be constructed with an access roadway to the top of the pile in order to reach any part of the pile. For very large piles, two or more access roadways on opposite sides of the piles are recommended. This applies only to storage in excess of 30 days.

6-3.2 Narrow low piles facilitate fire extinguishment; therefore, piles should not exceed 60 feet in height, 300 feet in width, and 500 feet in length. Where pile height and width are such that all portions of the pile cannot be reached by direct hose streams from the ground, arrangement should be made to provide service and small fire stream supplies readily available on the top of the pile for handling small surface fires and for wetting the pile in dry weather. When piles exceed 500 feet in length, they should be subdivided by fire lanes having at least 30 feet clear space at the base of the piles. Low barrier walls around piles are recommended to clearly define pile perimeters, prevent "creeping" and to facilitate cleanup of fire lanes.

6-3.3 It is recommended that, where suitable, a small motorized vehicle amply equipped with portable extinguishing equipment or a water tank and pump be provided. Lightweight ladders that can be placed against the side of the pile should be provided at convenient locations throughout the yard for use by the plant emergency organization. Training of the plant emergency organization should also include procedures and precautions to be observed by yard crews employing power equipment in fighting internal fires. (See 8-4.6.)

6-3.4 Due to the size and configuration of chip piles, it is not practical to provide portable fire extinguishers within 75 feet of travel distance to any point. At a minimum, however, portable fire extinguishers suitable for Class A fires should be provided on all vehicles operating on the pile in addition to the normal Class B units for the vehicle. Where hydrant hose houses are provided, a Class A extinguisher of at least a 2-A rating should be provided (refer to *Standard for Portable Fire Extinguishers*, NFPA 10).

6-3.5 Fire hydrants connected to yard mains should be provided so that any part of the pile(s) may be reached by hose equipment provided in each hydrant hose house. Each hydrant hose house should be equipped with a complement of 2½-inch and 1½-inch hose, a 2½-inch by 1½-inch gated wye and 1½-inch combination nozzles.

It is recommended that hydrants be spaced at about 250-foot intervals so that any part of the yard can be reached with 200 feet of hose.

Where pile configurations are such that all parts of the pile cannot be reached by the hose, a fire hose cart(s) equipped with an ample supply of hose and nozzles should be strategically placed in the storage area.

6-3.6 The amount of water needed to control a chip pile fire will vary substantially depending upon the size of the pile. Weather conditions, operating methods, geographic location, the type of wood chip, and the degree to which wetting may be employed affect the potential for a large area surface fire. Experience indicates that exposure to long periods of hot, dry weather with no regular surface wetting creates conditions under which fast-spreading surface fires can occur, requiring many hose streams for control depending on the size of the pile.

Likewise, the frequency of pile turnover and operating methods affect the potential for serious internal fires. Piles built using methods which allow a concentration of fines and piles stored for long periods of time with no turnover are subject to internal heating which, if undetected, can create intense internal fires.

A minimum flow of 500 gpm should be provided at any fire hydrant in the pile area. Additional flows should be provided as needed where conditions are likely to produce serious surface fires or large internal fires. Fire mains should be engineered to deliver the above gallonage plus allowance for operational uses and special extinguishing equipment at a residual pressure of 60 to 100 pounds per square inch at the hydrants.

6-3.7 Standard automatic sprinkler protection should be provided in all tunnels and enclosures under the pile. (Refer to the *Standard for the Installation of Sprinkler Systems*, NFPA 13.) All other chip-handling and conveyor installations of combustible construction or elevated ones of noncombustible construction which are hood-enclosed should also be provided with automatic sprinkler protection. Automatic sprinklers are needed in the above areas due to the difficulty of hand fire fighting in concealed, enclosed, or elevated areas. All motor and/or switch gear enclosures should be provided with approved, suitable portable fire extinguishers. (Refer to the *Standard for Portable Fire Extinguishers*, NFPA 10.)

6-3.8 Power-operated, shovel- or scoop-type vehicles, dozers, or similar equipment should be available for use in moving chips for fire fighting. With this equipment availability, surface types of pile fires can usually be removed from the affected areas and extinguished.

Where deep-seated fires occur within the pile or under the pile in tunnels or other enclosures, this equipment is invaluable in breaking down the entire pile and spreading it out in a safe yard area, which allows fire fighters using hand hose lines or deluge units to extinguish both the pile and ground-spread chips.

6-3.9 Temporary conveyors and motors on the surface or adjacent to the piles should be avoided.

6-3.10 Physical protection should be provided to prevent heat sources such as steam lines, air lines, electrical motors and mechanical drive equipment from becoming buried or heavily coated with chips or wood dust.

6-3.11 Care should be exercised to prevent tramp metal from entering the chip piles or sections of blower pipes from being buried in the piles. Tramp metal collectors and/or detectors are recommended on all chip conveyor and/or blower systems.

6-4 Exposure Protection.

6-4.1 Experience indicates that radiated heat from exposing fires in chip piles does not ordinarily pose a serious ignition threat to other chip piles provided that recommended clear spaces are maintained. Flying brands from exposing fires, especially during high winds, do present a hazardous ignition source. Upwind forest or brush fires can also present a problem in relation to flying sparks and brands. Incinerators or open refuse burning should not be permitted in any area where sparks could reach the chip piles.

6-4.2 Buildings or other structures near chip piles may pose a serious exposure hazard to the pile. A clear space should be maintained between chip piles and exposing structures, yard equipment or stock, depending on the degree of exposure hazard. Pile-to-pile clearance of at least 30 feet at the base of the pile is recommended. Greater clearance is desirable when piles are high and side slopes are greater than 60 degrees.

Chapter 7 Outside Storage of Logs

7-1 Application.

7-1.1 The intent of these recommendations is to provide fire protection guidance to minimize the fire hazard in log yard storage areas containing saw, plywood or pulpwood logs stored in ranked piles commonly referred to as "cold decks." These recommendations do not apply to stacked piles of cordwood; however, where such material is stored in ranked piles, these recommended safe practices may be used as a guide, recognizing that pile widths will be substantially narrower than the typical log cold deck contemplated herein.

Each individual property will have its own special conditions for yard use, stock handling methods, and topography. For this reason, only basic fire protection principles are recommended herein which are intended to be applied with due consideration of all local factors involved.

7-1.2 In addition to the recommendations contained in this chapter, the provisions outlined in Chapter 8, "General Fire Protection," should apply to all outside storage of logs except as modified herein.

7-2 General.

7-2.1 Fire loss experience in outside storage of logs indicates that large undivided piles, congested storage conditions, delayed fire detection, inadequate fire protection and ineffective fire fighting tactics are the principal factors that allow log pile fires to reach serious proportions. The fire hazard potential inherent in log storage operations with large quantities of combustible materials can best be controlled by a positive fire prevention program under the direct supervision of top management and should include:

(a) Selection, design and arrangement of storage yard areas and materials handling equipment based upon sound fire prevention and protection principles.

(b) Facilities for early fire detection, transmission of alarm and fire extinguishment.

(c) Fire lanes to separate large piles and provide access for effective fire fighting operations.

(d) Separation of yard storage from mill operations and other exposing properties.

(e) An effective fire prevention maintenance program, including regular yard inspections by trained personnel.

7-2.2 Special problems of construction and protection are involved when logs are stored on piers and wharves. The *Standard for the Construction and Protection of Piers and Wharves*, NFPA 87, and the authority having jurisdiction should be consulted in each case.

7-3 Basic Log Yard Protection.

7-3.1 The storage site should be reasonably level solid ground, preferably paved or surfaced with material such as cinders, fine gravel or stone. Refuse or sawdust filled land, swampy ground or areas where the hazard of underground fire is present should not be used.

7-3.2 All-weather roadways capable of supporting fire department apparatus should be provided to the plant and yard from public highways.

7-3.3 All sides of each cold deck should be accessible by means of fire lanes. A fire lane width of $1\frac{1}{2}$ times pile height, but not less than 20 feet, is recommended with fire lanes between alternate rows of two pile groups providing a clear space of at least 100 feet. The length of each cold deck should not exceed 500 feet. Fire lanes for access across each end providing a clear space of at least 100 feet to adjacent pile rows or other exposed property should be provided. Where practical, greater widths are desirable to minimize the effects of radiated heat, particularly in high piled yards. (See Figure 7-3.3.)

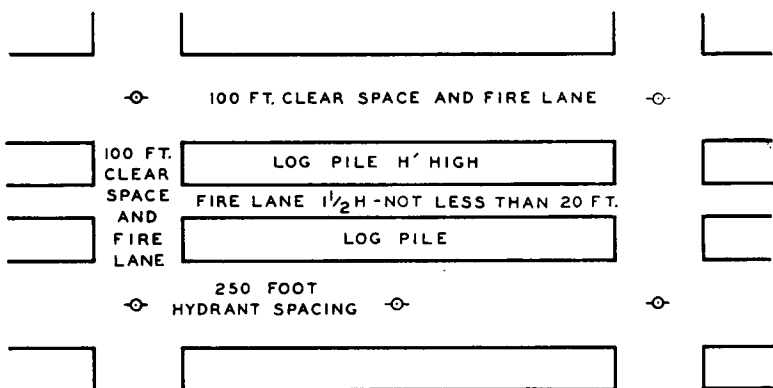


Figure 7-3.3. Layout of Log Storage Yard

7-3.4 For basic fire protection, the hydrant system should be capable of supplying at least four 2½-inch hose streams simultaneously (1,000 gpm minimum). Where large-scale fire fighting operations may be expected, larger water supplies with adequate mains are needed. (*See Section 7-4.*)

For early extinguishment with basic fire protection, hydrants should be so spaced with sufficient 2½-inch hose attached to permit rapid hose laying to all parts of the piling areas. For this reason, it is recommended that hydrants be spaced at about 250-foot intervals so that any part of the yard can be reached with 200 feet of hose. Hydrants should preferably be located at fire lane intersections. A hydrant hose house with at least 200 feet of fire hose and auxiliary equipment should be provided at each hydrant. (*See Standard for Outside Protection, NFPA 24.*)

7-3.5 Dynamite should never be used as a means to reclaim frozen log piles.

7-3.6 During dry weather, piles should be wet down periodically. The installation of a portable piping system on the top of each log pile equipped with irrigation or lawn-type sprinklers is recommended.

7-4 Special Log Yard Protection.

7-4.1 Small log yards containing a single cold deck of low height (10 feet or less), having good access and well separated from other property, present minimum hazards that generally require only the basic protection provisions of Section 7-3 for fire control. Higher piles, multiple piles over extensive areas, congested storage or serious exposure situations present increased hazards which require additional safeguards and protection facilities. In yards requiring more than the basic protection provisions of Section 7-3 for fire control, the following provisions are recommended as a guide. The relative importance of these provisions and the degree to which they may be needed will vary with yard conditions and the authority having jurisdiction should be consulted in all cases.

7-4.2 Adequate water supplies and large mains should be provided to supply large stream equipment such as portable turrets and deluge sets which require 750 to 1,000 gpm for each appliance. Monitor towers may require supplies in excess of 1,000 gpm for each unit. In large yards where the hazard is severe many of these devices may be operated simultaneously.

7-4.3 Fire lanes suitable for fire department operation should be provided as outlined in 7-3.3. Fire lanes should be kept unobstructed. They should have an all-weather surface sufficiently strong to support fire apparatus, and should be of sufficient width to permit maneuvering of motorized fire apparatus.

7-4.4 Pile heights should be limited. Heights in excess of 20 feet seriously restrict effective extinguishing operations as successful extinguishment of log pile fires requires penetration of the pile from the sides by hose streams. Where pile heights exceed 20 feet, it is recommended that elevated monitor nozzles and/or mobile elevated nozzles be provided, and mobile elevated nozzles should be considered when piling height exceeds 12 feet.

Chapter 8 General Fire Protection

8-1 Application.

8-1.1 The two key points to reducing fire losses in areas used for the storage of forest products are reduction of the sources of fire ignition and a positive program for early detection and extinguishment of incipient fires. Application of the principles of fire prevention in Section 8-2 reduces fire occurrences. Principles of good fire protection are set forth in Sections 8-3 and 8-4.

8-1.2 These principles are intended to apply to all facilities as outlined in Chapters 3 through 7.

8-2 Operational Fire Prevention.

8-2.1 Weeds, grass and similar vegetation should be prevented throughout the entire yard and should be sprayed as often as needed with a satisfactory herbicide or ground sterilizer or grubbed out. Dead weeds should be removed after destruction. Weed burners should not be used.

8-2.2 Good housekeeping should be maintained at all times, including regular and frequent cleaning of materials handling equipment. Bark, sawdust, chips and other debris should be removed from stacking areas as frequently as needed to prevent accumulation.

8-2.3 Smoking should be prohibited except in specified safe locations. "No Smoking" signs should be posted in the yard except in specific locations designated as safe for smoking and signs permitting smoking should be posted in those areas. Smoking areas should be provided with approved noncombustible ash receptacles. Smoking should be specifically prohibited in and around railroad cars.

8-2.4 Access into the yard areas by unauthorized persons should be prohibited. Where needed, storage areas should be enclosed with a suitable fence equipped with proper gates located as necessary to permit entry of fire department apparatus.

8-2.5 Miscellaneous occupancy hazards such as vehicle storage and repair shops, cutting and welding operations, flammable liquid storage, liquefied petroleum gas storage and similar operations should be safeguarded in accordance with recognized good practice. Refer to various NFPA standards applicable to specific occupancy hazards.