46

NFPA 46 Recommended Safe Practice for Storage of Forest Products 1996 Edition

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An International Standards-Making Organization

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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Statement on NFPA Procedures

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NFPA 46

Recommended Safe Practice for

Storage of Forest Products

1996 Edition

This edition of NFPA 46, *Recommended Safe Practice for Storage of Forest Products*, was prepared by the Technical Committee on General Storage and acted on by the National Fire Protection Association, Inc., at its Fall Meeting held November 13-15, 1995, in Chicago, IL. It was issued by the Standards Council on January 12, 1996, with an effective date of February 2, 1996, and supersedes all previous editions.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

This edition of NFPA 46 was approved as an American National Standard on February 2, 1996.

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.

NFPA 46A was tentatively adopted in 1964 and officially adopted without change in 1965. It was revised in 1973.

NFPA 46B was tentatively adopted in 1969 and officially adopted in 1971. It was revised in 1976.

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

The 1978 edition superseded 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. The 1985 edition was a partial revision to the 1978 edition and included reference to "hogged material."

The 1989 edition is a reconfirmation of the 1985 edition.

With the exception of some new information regarding fire mains and hydrants, and idle pallet storage, the 1996 edition is primarily a reconfirmation of the 1989 edition. However, some additional changes were made to update requirements so that they are consistent with supporting standards. Editorial changes were also made to make the document more user friendly.

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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

NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on safeguarding general warehousing and commodities stored indoors or outdoors against fire. This Committee does not cover storage specifically covered by other NFPA standards.

Contents

NFPA 46

Recommended Safe Practice for

Storage of Forest Products

1996 Edition

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Information on referenced publications can be found in Chapter 9.

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:

(a) retail and wholesale lumber storage yards;

(b) outside storage of lumber and timber at other than retail or wholesale yards;

(c) outside storage of ties, poles, piles, posts, and other similar forest products at pressure treating plant yards;

(d) outside storage of wood chips;

(e) outside storage of logs; and

(f) outside storage of hogged material.

Chapter 2 Definitions

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

Alleyway. 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.

Authority Having Jurisdiction.* The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Chips. Wood chips of various species used in the manufacture of pulp. These chips are usually 1/4 in. (6.4 mm) to 1 1/4 in. (31.8 mm) in size, with nothing finer than what is retainable on a 1/4-in. (6.4-mm) screen; however, blower and conveyor systems may create some fine dust particles after screening.

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

Cold Deck. A single ranked pile of logs with individual logs of regular or irregular length usually 20 ft (6.1 m) to 50 ft (15.2 m) long, but greater than 8 ft (2.4 m) in length.

Cordwood. Logs 8 ft (2.4 m) or less in length customarily intended for pulpwood or fuel uses.

Cunit. 100 ft^3 (2.8 m^3) of solid wood or 100 ft^3 (2.8 m^3) of chips or hogged material.

Fire Lane. A clear space suitable for fire-fighting operations by motorized fire apparatus.

Hogged Material. Mill waste consisting mainly of hogged bark but may include a mixture of bark, chips, dust, or other by-product from trees. This also includes material designated "hogged fuel."

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

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

Should. Indicates a recommendation or that which is advised but not required.

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

Yard. 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 should apply to all retail and wholesale lumber storage yards except as modified herein.

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. (*See NFPA 72, National Fire Alarm Code.*)

(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 Cargo yards with lumber stored on piers or wharves, and lumber stored on raised platforms present special problems of construction and protection. NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 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-in. (63.5-mm) hose streams simultaneously [1000 gpm (63 L/sec) 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. Where the danger of underground fire is present, refuse- or sawdust-filled land should not be used.

3-3.2 The 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 in an open yard. As stacks of empty pallets present a severe fire problem, it is recommended that empty pallets be stored in accordance with the guidelines set out in Table 3-3.3(a) and Table 3-3.3(b).

3-3.4 The height of stacks should not exceed 20 ft (6.1 m) 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 practicable.

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 ft × 150 ft (15.2 m × 45.7 m) is produced.

3-3.7 Driveways should have a minimum width of 15 ft (4.6 m) and an all-weather surface capable of supporting fire department apparatus.

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

Table 3-3.3(a) Recommended Clearance Between Outside Idle Pallet Storage and Building

Wall Construction		Minimum Distance, ft (m) of Wall from Storage of		
Wall Type	Openings	Under 50 Pallets	50 to 200 Pallets	Over 200 Pallets
Masonry	None	0	0	0
	Wired glass with outside sprinklers 1-hr doors	0	10 (3.0)	20 (6.1)
	Wired or plain glass with outside sprinklers ¾-hr doors	10 (3.0)	20 (6.1)	30 (9.1)
Wood or metal with outside sprinklers				
Wood, metal, or other		20 (6.1)	30 (9.1)	50 (15.2)

Notes:
1. Fire-resistive protection comparable to that of the wall should also be provided for combustible eave lines, vent openings, etc.
2. When pallets are stored close to a building, the height of storage should be restricted to prevent burning pallets from falling on the building.
3. Manual outside open sprinklers generally are not a reliable means of protection unless property is attended to at all times by plant emergency personnel
4. Open sprinklers controlled by a deluge valve are preferred.

Table 3-3.3(b)

For outdoor idle pallet storage, separation between piles of idle pallets and other yard storage should be as follows:

Pile Size	Minimum Distance, ft (m)
Under 50 pallets	20 (6)
50 — 200 pallets	30 (9.1)
Over 200 pallets	50 (15.2)

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. Automatic sprinkler protection for buildings used for indoor storage of forest products should be designed in accordance with NFPA 231, *Standard for General Storage*; NFPA 231C, *Standard for Rack Storage of Materials*; or NFPA 231F, *Standard for the Storage of Roll Paper*. The authority having jurisdiction should be consulted for requirements pertaining to automatic sprinkler installations. (*See NFPA 13, Standard for the Installation of Sprinkler Systems.*)

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, i.e., woodworking, glazing, painting, dry kilns, auto repairing, grain or feed milling or grinding, aboveground fuel or gasoline tanks, etc., should have at least 50 ft (15.2 m) of clear space to the nearest lumber stack, shed, or warehouse. Boundary posts with signs designating stacking limits should be provided to designate the clear space to the aforementioned buildings, tanks, etc.

3-5.3 Exposure from the Yard. 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 NFPA 91, *Standard for Exhaust Systems for Air Conveying of Materials.*

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 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 on sound fire prevention and protection principles.

(b) Facilities for early fire detection, transmission of alarm, and fire extinguishment. (*See NFPA 72, National Fire Alarm Code.*)

(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 Cargo yards with lumber stored on piers or wharves, and lumber stored on raised platforms present special problems of construction and protection. NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 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-in. (63.5-mm) hose streams simultaneously [1,000 gpm (63 L/sec) minimum] while maintaining a positive residual pressure in the fire protection hydrant system.

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 spaced with sufficient 2½-in. (63.5-mm) hose attached so as 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-ft (76.2-m) intervals so that any part of the yard can be reached with 200 ft (61.0 m) of hose. Hydrants preferably should be located at fire lane intersections. A hydrant hose house with at least 200 ft (61.0 m) of fire hose and auxiliary equipment should be provided at each hydrant. (*See NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*)

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

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 effective fire control. High stacks of lumber stickered for air drying present a 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 effective 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 adequate public or private fire department services are available. Large stream equipment, such as portable turrets and deluge sets, requires 750 gpm to 1000 gpm (47.3 L/sec to 63.1 L/sec) for each appliance. Monitor towers may require supplies in excess of 1000 gpm (63.1 L/sec) for each unit. In large yards where the hazard is severe, many of these devices might need to 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 ft (15.2 m) in any direction from access by motorized fire-fighting equipment. Where special extinguishing equipment, such as portable turrets, deluge sets, and monitor towers, is available, access distances may be governed by their effective reach with available water supplies. Fire lanes should be kept unobstructed, 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 ft (6.1 m) 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 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. 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 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. (*See NFPA 72, National Fire Alarm Code.*)

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

(d) Separation of yard storage from mill buildings 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 Unobstructed alleyways of sufficient width for hand or cart fire hose laying operations should be provided between piles. A minimum alleyway width of 4 ft (1.2 m) is recommended. Alleyways should be spaced so that initial fire-fighting operations can be effective. With relatively open stacking (stacking that will permit penetration of fire extinguishing streams) this can usually be accomplished by providing a 4-ft (1.2-m) or greater width alleyway between alternate rows of tie stacks [*see Figure 5-3.1(a)*]. Flat crib-style stacking without space between stacks that forms solid packed rows would require a 4-ft (1.2-m) or greater width alleyway between each row. Where the stacking area does not permit a 4-ft (1.2-m) or wider alleyway between each such row, the length of the rows (distance between fire lanes) should be held to 75 ft (22.9 m) or less. In no event should such alleyways be reduced to less than 2 ft (0.6 m) in width [*see Figure 5-3.1(b)*].

5-3.2* For basic fire protection, the hydrant system should be capable of supplying at least four 2½-in. (63.5-mm) hose streams simultaneously [1000 gpm (63 L/sec) minimum] while maintaining a positive residual pressure in the fire protection hydrant system.

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 spaced with sufficient 2½-in. (63.5-mm) hose attached so as 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-ft (76.2-m) intervals so that any part of the yard can be reached with 200 ft (61.0 m) of hose. Hydrants preferably should be located at fire lane intersections. A hydrant hose house with at least 200 ft (61.0 m) of fire hose and auxiliary equipment should be provided at each hydrant. (*See NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*)

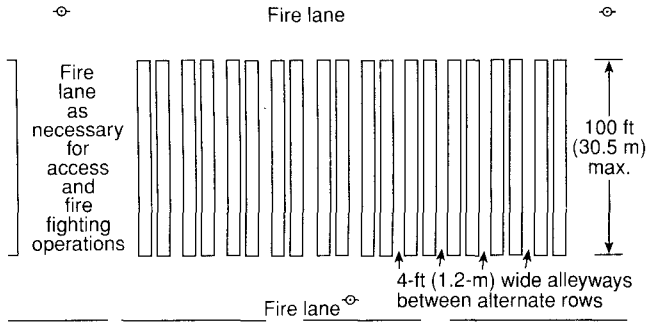

Figure 5-3.1(a) Relatively open stacking methods.

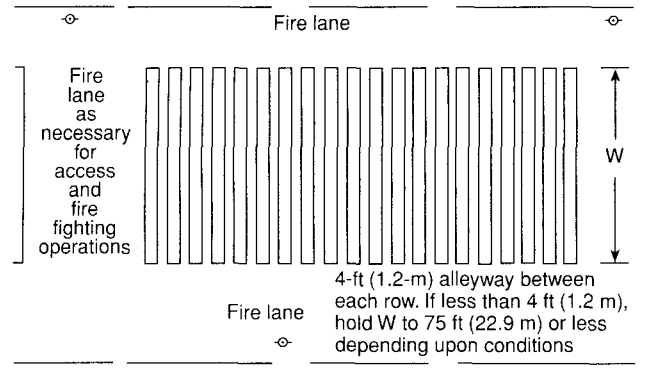

Figure 5-3.1(b) Crib-style stacking into solid rows.

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

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 effective fire control. High stacking over extensive areas, congested storage, and large amounts of treated tie storage present increased hazards that require additional safeguards and protection facilities. In yards requiring more than the basic protection provisions of Section 5-3 for effective 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 services are available. Large stream equipment, such as portable turrets and deluge sets, requires 750 gpm to 1000 gpm (47.3 L/sec to 63.1 L/sec) for each appliance. Monitor towers may require supplies in excess of 1000 gpm (63.1 L/sec) for each unit. In large yards where the hazard is severe, many of these devices might need to 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 ft (15.2 m) in any direction from access by motorized fire-fighting equipment. Where special extinguishing equipment, such as portable turrets, deluge sets, and monitor towers, is available, access distances may be governed by their effective reach with available water supplies. Fire lanes should be kept unobstructed, 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 ft (6.1 m) seriously restrict effective extinguishing operations.

5-4.5 Treated ties should not be intermixed with untreated products. A 100-ft (30.5-m) clear space should be maintained between treated tie storage and untreated storage.

Chapter 6 Outside Storage of Wood Chips and Hogged Material

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 and hogged material. Each individual property will have its own special conditions of yard use, handling methods, and topography. It is recognized that climate conditions, wood species, and the age of piles are all factors affecting fire safety. 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 Except for the surface layer, the moisture content of a pile of wood chips or hogged material is quite high, so 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 should apply to all outside storage of wood chips and hogged material, 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 storage piles — surface fires and internal fires. Fire prevention activities and fire protection facilities should, therefore, be prepared 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 pile.

(c) Facilities for early fire detection and extinguishment. (*See NFPA 72, National Fire Alarm Code.*)

(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 and hogged material that will progress to spontaneous combustion under certain pile conditions. Internal fires are difficult to detect and extinguish. Unless provisions are 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 by digging out the burning portions or removing the unburned portions of the pile. Experience has shown that these conditions create very large losses and special attention should be given to the prevention of spontaneous combustion and to prefire planning as how best to handle an imminent or actual fire in a particular 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 pile. The following are some of the important items that should be considered when establishing operating procedures:

(a) Avoid all refuse and old chips in the chip pile base.

(b) 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.

(c) 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 or hogged material) may be subject to greater degrees of spontaneous heating and thermal degradation and should be reclaimed more frequently.

(d) Limit pile size. Fundamentally, several small piles are better than one large pile. Keep pile heights low, particularly for piles that inherently carry a larger percentage of fines and are subject to greater compaction. For example, veneer chip piles should be limited to 50 ft (15.2 m) in height.

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

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

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

(h) Wetting the pile regularly will help keep fines from drying out and help maintain the moisture content of the surface layer of the pile. It is important to minimize the diffusion of water from wet stored material 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.

(i) Vehicles used on all piles should be of a type that minimizes compaction.

6-3 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 pile 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 ft (18.3 m) in height, 300 ft (91.4 m) in width, and 500 ft (152.4 m) 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, arrangements should be made to provide fire-fighting service in these areas and small fire stream supplies should be available on the top of the pile for handling small surface fires and for wetting the pile in dry weather. When piles exceed 500 ft (152.4 m) in length, they should be subdivided by fire lanes having at least 30 ft (9.1 m) clear space at the base of the piles. Low barrier walls around piles are recommended to clearly define pile perimeters, prevent "creeping," and 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 placed 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 piles, it is not practical to provide portable fire extinguishers within 75 ft (22.9 m) 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. (*See NFPA 10, Standard for Portable Fire Extinguishers.*)

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-in. (63.5-mm) and 1½-in. (38.1-mm) hose, a 2½-in. × 1½-in. (63.5-mm × 38.1-mm) gated wye, and 1½-in. (38.1-mm) combination nozzles.

It is recommended that hydrants be spaced at about 250-ft (76.2-m) intervals so that any part of the yard can be reached with 200 ft (61.0 m) 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 pile fire will vary substantially depending upon the size of the pile. Weather conditions, operating methods, geographic location, the type of material stored, 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, that require many hose streams for control depending on the size of the pile, can occur.

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

A minimum flow of 500 gpm (31.5 L/sec) 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 psi to 100 psi (413.7 kPa to 689.5 kPa) at the hydrants.

6-3.7 Standard automatic sprinkler protection should be provided in all tunnels and enclosures under the pile. (*See NFPA 13, Standard for the Installation of Sprinkler Systems.*) All other handling and conveyor installations of combustible construction, or elevated ones of noncombustible construction that 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 switch gear enclosures should be provided with approved, suitable portable fire extinguishers. (*See NFPA 10, Standard for Portable Fire Extinguishers.*)

6-3.8 Power-operated, shovel- or scoop-type vehicles, dozers, or similar equipment should be available for use in moving stored material for fire fighting. With the use of this equipment, 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 stored material.

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 combustible material. A high standard of housekeeping should be maintained around all potential heat sources.

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

6-4 Exposure Protection.

6-4.1 Experience indicates that radiated heat from exposing fires in storage piles does not ordinarily pose a serious ignition threat to other 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 storage piles.

6-4.2 Buildings or other structures near storage piles may pose a serious exposure hazard to the pile. A clear space should be maintained between piles and exposing structures, yard equipment, or stock, depending on the degree of exposure hazard. Pile-to-pile clearance of at least 30 ft (9.1 m) 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 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. (*See NFPA 72, National Fire Alarm Code.*)

(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 or wharves. NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 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 Access to the plant and yard from public highways should be provided by all-weather roadways capable of supporting fire department apparatus.

7-3.3 All sides of each cold deck should be accessible by means of fire lanes. A fire lane width of 1½ times the pile height, but not less than 20 ft (6.1 m), is recommended with fire lanes between alternate rows of two pile groups providing a clear space of at least 100 ft (30.5 m). The length of each cold deck should not exceed 500 ft (152.4 m). Fire lanes for access across each end, providing a clear space of at least 100 ft (30.5 m) 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.*)

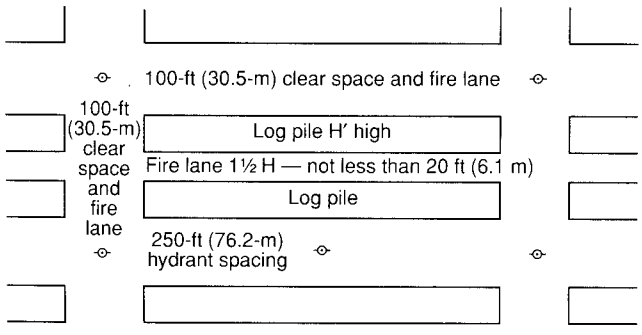

Figure 7-3.3 Layout of log storage yard.

7-3.4* For basic fire protection, the hydrant system should be capable of supplying at least four 2½-in. (63.5-mm) hose streams simultaneously [1000 gpm (63.1 L/sec) minimum] while maintaining a positive residual pressure in the fire protection hydrant system.

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 spaced with sufficient 2½-in. (63.5-mm) hose attached so as 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-ft (76.2-m) intervals so that any part of the yard can be reached with 200 ft (61.0 m) of hose. Hydrants preferably should be located at fire lane intersections. A hydrant hose house with at least 200 ft (61.0 m) of fire hose and auxiliary equipment should be provided at each hydrant. (*See NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*)

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 equipped with irrigation or lawn-type sprinklers on the top of each log pile is recommended.

7-4 Special Log Yard Protection.

7-4.1 Small log yards containing a single cold deck of low height [10 ft (3.0 m) 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 effective fire control. Higher piles, multiple piles over extensive areas, congested storage, or serious exposure situations present increased hazards that require additional safeguards and protection facilities. In yards requiring more than the basic protection provisions of Section 7-3 for effective 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 gpm to 1000 gpm (47.3 L/sec to 63.1 L/sec) for each appliance. Monitor towers may require supplies in excess of 1000 gpm (63.1 L/sec) for each unit. In large yards where the hazard is severe many of these devices might need to be operated simultaneously.

7-4.3 Fire lanes suitable for fire department operations 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 ft (6.1 m) seriously restrict effective extinguishing operations as successful extinguishment of log pile fires requires penetration of the pile from the side by hose streams. Where pile heights exceed 20 ft (6.1 m), it is recommended that elevated monitor nozzles or mobile elevated nozzles, or both, be provided, and mobile elevated nozzles should be considered when piling height exceeds 12 ft (3.7 m).

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. Applica-

tion of the principles of fire prevention in Section 8-2 can reduce 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 any vegetation growth 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. Combustible waste materials such as bark, sawdust, chips, and other debris should not be permitted to accumulate in quantity or location that will constitute an undue fire hazard.

8-2.3 Smoking should be prohibited except in specified safe locations. "No Smoking" signs should be posted in those areas where smoking is prohibited, and signs indicating areas designated as safe for smoking should be posted in those locations. 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 allow the 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.

8-2.6 Vehicles and other power devices should be of an approved type, and should be safely maintained and operated. Vehicle fueling operations should be conducted in specified safe locations, isolated from storage areas and principal operating buildings. (*See NFPA 505, Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Maintenance, and Operation.*)

8-2.6.1 Diesel or gasoline fueled vehicles that operate on hogged material or chip piles, in log storage areas, or in lumber storage areas should be equipped with fixed fire extinguishing systems of a type approved for off-road vehicles.

8-2.7 All electrical equipment and installations should conform to the provisions of NFPA 70, *National Electrical Code®*.

8-2.8 Salamanders, braziers, open fires, and similar dangerous heating arrangements should be prohibited. Heating devices should be limited to approved-type equipment installed in an approved manner.

8-2.9 Suitable safeguards should be provided to minimize the hazard of sparks caused by such equipment as refuse burners, boiler stacks, vehicle exhausts, and locomotives. Burning of shavings, sawdust, and refuse materials should be conducted only in an approved enclosed refuse burner equipped with an approved spark arrester and located at a safe distance from the nearest point of any yard. See NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment*, for small rubbish burners. The design and location of large burners presents special problems, and the authority having jurisdiction should be consulted.

8-2.10 Stacks from solid fuel-burning furnaces and boilers should be equipped with spark-arresting equipment to prevent hot sparks from reaching the ground, and consideration should be given to spark hazard in determining the height of such stacks.

8-2.11 Solid fuel-fired steam locomotives, cranes, and similar equipment entering or operating in yards should be equipped with heavy screening and hinged openings between the mud ring and the flare of the ash pan to prevent hot coals from dropping from the ash pan. It is recommended that front end screens of coal-fired locomotives be examined at frequent intervals. Oil-fired steam equipment should be provided with fully enclosed drip pans to prevent burning oil from escaping. It is recommended that diesel locomotives be equipped with approved spark arresters or other devices to prevent the escape of glowing carbon particles from the exhausts.

8-2.12 If yard storage areas are located in regions highly susceptible to lightning strikes, consideration should be given to the installation of lightning protection on masts or towers to provide area protection. (*See NFPA 780, Standard for the Installation of Lightning Protection Systems.*)

8-2.13 No cutting, welding, or other use of open flames or spark-producing equipment should be permitted in the storage area unless by an approved permit system.

8-3 Exposure Protection.

8-3.1 Exposure to the Yard.

8-3.1.1 Yard areas should be separated from plant operations and other structures so that fire exposure into the yard will be minimized. Minimum separation should be by means of a clear space permanently available for fire-fighting operations. The width of the clear space should be based upon the severity of exposure, which will vary with the area, height, occupancy, construction, and protection of the exposing structure, and the type of stacking and height of adjacent stacks.

8-3.1.2 Unsprinklered manufacturing buildings and other large structures with combustible contents represent a severe exposure to yard storage, unless the exterior walls have the necessary fire resistance to act as a fire separation and are essentially absent of unprotected openings. In general, unsprinklered saw mills, planing mills, treating plants, adzing mills, and similar buildings without essentially blank walls should be separated from yard storage by a clear space, as recommended by NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures.*

8-3.1.3 Fully sprinklered structures present a lesser exposure hazard. Automatic sprinkler protection is desirable in all operating and principal storage buildings. Separation consideration between yards and sprinklered buildings will generally be determined by the seriousness of the exposure from the yard. (*See 8-3.2.*)

8-3.1.4 Forest, brush, and grass fire exposure should be minimized by providing adequate clear space that is carefully kept free of combustible vegetation. Clear space of widths at least equivalent to fire lanes should be provided for grass exposures, and clear space of widths at least 100 ft (30.5 m) should be provided for light brush exposures. In forested areas, a wider clear space should be provided.

8-3.2 Exposure from the Yard.

8-3.2.1 Fire exposure to adjacent structures and nearby property constitutes one of the major fire protection problems of forest products storage operations that can be solved satisfactorily only by cooperation between adjacent property owners. The authority having jurisdiction should be consulted in all cases.

8-3.2.2 Special protection provisions discussed in this recommended practice furnish a reasonable degree of protection against direct radiated heat through a combination of special protection facilities and controlled storage methods. It should be recognized, however, that these facilities cannot be expected to cope with adverse weather conditions and flying brands. Also, in situations where yard materials and storage methods need special protection facilities but where such protection (which includes adequate water supplies, fire department manpower, and equipment) is not available, exposure from the yard creates serious conflagration potential. Where these conditions prevail, additional protection against storage yard exposure should be provided, as practicable, by one or more of the following:

(a) Providing greater clear space.

(b) Use of barrier walls of such fire-resistive properties and stability that the passage of flames and heat can be effectively prevented for a prolonged period of time.

(c) Employing perimeter stacking methods that will furnish the equivalent of barrier walls, i.e., materials of greatest thickness and green flat-stacked stock.

(d) Use of wall construction for exposed structures having adequate fire resistance.

(e) Use of automatic sprinkler systems specially designed for protection of the exposed structures.

8-4 Fire Detection and Extinguishment.

8-4.1 In all forest product storage operations, provisions should be made for early fire detection and extinguishment. This requires watchmen and alarm service, plant emergency organization manpower and extinguishing equipment, and ready access by means of fire lanes into all parts of the storage areas so that fire extinguishing equipment can be promptly brought to the site of the fire.

8-4.2 When a fire is discovered, no matter how small, the public fire department and plant emergency organization should be notified at once. The telephone number of the fire department and the location of the nearest fire alarm box should be posted conspicuously in several locations in the yard and buildings.

8-4.3 In storage yards, a reliable means for prompt transmission of fire alarms to public fire departments and plant emergency organizations should be provided at convenient and accessible locations in the yard.

8-4.4 It is recommended that standard, hourly watchman service be maintained throughout the night and during all nonoperating periods. Watchmen should be competent, and rounds should be supervised by an approved central station watchman's time detector or recorded by a portable watch clock.

8-4.5 Watchmen and other employees should be fully instructed in the proper procedure of transmitting a fire alarm and in the use of all fire protection equipment. (*See NFPA 601, Standard for Security Services in Fire Loss Prevention.*)

8-4.6 It is recommended that an industrial fire brigade be organized. It should be well trained and adequately equipped to combat fire while the public fire department is responding to the alarm. (*See NFPA 600, Standard on Industrial Fire Brigades.*)

8-4.7 Portable fire extinguishers suitable for the fire hazard involved should be provided at convenient, conspicuously accessible locations in the yard. Where practicable, approved portable fire extinguishing equipment should be placed so that maximum travel distance to the nearest unit should not exceed 75 ft (22.9 m). (*See NFPA 10, Standard for Portable Fire Extinguishers.*) It is recommended that approved fire extinguishers of suitable type be provided on all power vehicles and units, including haulage or private locomotives in the yard.

8-4.8 A public or private fire main and hydrant system with ample water supply should be provided. Where adequate public fire protection is not available, private outside fire protection facilities should be provided.

8-4.8.1 Private Fire Service Mains and Hydrants. A private fire service main and hydrant system should be installed in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances.* Hydrants should be of an approved type and located so that any part of the yard can be reached with 200 ft (61.0 m) of hose. Where practicable, a 50-ft (15-m) separation should be provided between storage and yard hydrants.

8-4.8.2 Fire Pumps. Where provided, fire pumps should be installed in accordance with NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps.*

8-4.8.3 Pressure Tanks. Where provided, pressure tanks should be installed in accordance with NFPA 22, *Standard for Water Tanks for Private Fire Protection.*

8-4.8.4 Gravity Tanks. Where provided, gravity tanks should be installed in accordance with NFPA 22, *Standard for Water Tanks for Private Fire Protection.*

8-5 Testing and Maintenance of Fire Protection Systems. Water-based fire protection systems, such as fire pumps, storage tanks, fire hydrants, and their related equipment, should be tested and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.*

Chapter 9 Referenced Publications

9-1 The following documents or portions thereof are referenced within this recommended safe practice and should be considered part of the recommendations of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

9-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 10, *Standard for Portable Fire Extinguishers*, 1994 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1994 edition.

NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps*, 1993 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 1996 edition.

NFPA 24, *Standard for Installation of Private Fire Service Mains and Their Appurtenances*, 1995 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 1995 edition.

NFPA 70, *National Electrical Code*, 1996 edition.

NFPA 72, *National Fire Alarm Code*, 1993 edition.

NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, 1993 edition.

NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment*, 1994 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Materials*, 1995 edition.

NFPA 231, *Standard for General Storage*, 1995 edition.

NFPA 231C, *Standard for Rack Storage of Materials*, 1995 edition.

NFPA 231F, *Standard for the Storage of Roll Paper*, 1996 edition.

NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 1995 edition.

NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Maintenance, and Operation*, 1992 edition.

NFPA 600, *Standard on Industrial Fire Brigades*, 1996 edition.

NFPA 601, *Standard for Security Services in Fire Loss Prevention*, 1996 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems*, 1995 edition.

Appendix A Explanatory Material

This Appendix is not a part of the recommendations of this NFPA document but is included for informational purposes only.

A-2-1 Authority Having Jurisdiciton. The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A-3-1.2 The type of operations at properties where these recommendations apply will 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 that present fire protection problems similar to mill yards. The principles outlined in Chapter 4 should be used as a further guide for large outside storage areas and the authority having jurisdiction should be consulted in all cases.

A-4-3.1 The usual practice of maintaining a minimum residual pressure of 20 psi (137.9 kPa) is recommended.

A-5-3.2 The usual practice of maintaining a minimum residual pressure of 20 psi (137.9 kPa) is recommended.

A-7-3.4 The usual practice of maintaining a minimum residual pressure of 20 psi (137.9 kPa) is recommended.

Index

1999 Spring Association Technical Meeting

Report on Proposals

A compilation of NFPA Technical Committee Reports on Proposals for public review and comment prior to October 2, 1998, and consideration at the NFPA Spring Association Technical Meeting

Please bring to the
1999 Spring Association
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PART I

(Log #CP1)

46- 1 - (Entire Document): Accept

SUBMITTER: Technical Committee on General Storage

RECOMMENDATION: The Technical Committee on General Storage proposes the withdrawal of NFPA 46, Recommended Safe Practice for Storage of Forest Products.

SUBSTANTIATION: This Committee Proposal is prompted by a Standards Council directive. At their July 1997 meeting, the Standards Council approved an initiative to centralize all requirements pertaining to the design and installation of sprinkler systems. The directive calls for the relocation of those portions of NFPA 24, NFPA 231, and NFPA 231C pertaining to sprinkler systems and fire mains into NFPA 13, and for the withdrawal of these documents. Those portions of NFPA 231 and NFPA 231C not pertaining to sprinkler systems are to be addressed by the Technical Committee on General Storage and redesignated as NFPA 230, Standard for the Fire Protection of Storage. While the directive does not specifically include NFPA 46, the Technical Committee on General Storage believes that it should as it is consistent with the overall initiative.

Since NFPA 46 contains no information on sprinkler systems, the Technical Committee on General Storage is recommending that this document be incorporated into NFPA 230, Standard on the Fire Protection for Storage. See the report on NFPA 230 in the Annual 1999 Report on Proposals.

COMMITTEE ACTION: Accept.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 23

NEGATIVE: 1

NOT RETURNED: 3 O'Rourke, Shiner, Thomas

EXPLANATION OF NEGATIVE:

MALANGA: The current version of NFPA 230 that is proposed for adoption has not been adequately reviewed nor revised by the committee in order to eliminate conflicts that have occurred via the consolidation of NFPA 46, NFPA 231, NFPA 231C, NFPA 231D, NFPA 231E, and NFPA 231F, and the extraction of sprinkler provisions there from into NFPA 13. Because of this, the individual standards should not be withdrawn until the proposed NFPA 230 document can stand on it's own without conflict.

PART II

(Log #CP1)

230- 1 - (Entire Document): Accept

SUBMITTER: Technical Committee on General Storage

RECOMMENDATION: Redesignate those portions of NFPA 46, NFPA 231, NFPA 231C, NFPA 231E, and NFPA 231F not pertaining to sprinkler systems as NFPA 230, Standard for the Fire Protection of Storage as indicated. Also, copy those portions of NFPA 231D not pertaining to sprinkler systems into NFPA 230 using NFPA's Extract Policy.

SUBSTANTIATION: This proposal is prompted by a Standards Council directive. At their July 1997 meeting, the Standards Council approved an initiative to centralize all requirements pertaining to the design and installation of automatic sprinkler systems into NFPA 13. The new project calls for the relocation of those portions of NFPA 24, NFPA 231, and NFPA 231C pertaining to sprinkler systems and fire mains into NFPA 13. Additionally, the project calls for the review of all NFPA standards containing sprinkler system requirements to determine how they can best be centralized.

The Standards Council also directed that non-sprinkler system portions of NFPA 231 and NFPA 231C be addressed by the Technical Committee on General Storage. The Technical Committee on General Storage proposes that those portions of NFPA 231 and NFPA 231C not pertaining to sprinkler systems be redesignated as NFPA 230, Standard for the Fire Protection of Storage.

In addition to incorporating non-sprinkler system related information from NFPA 231 and NFPA 231C, this proposal also recommends that those non-sprinkler system related portions of NFPA 46, NFPA 231E, and NFPA 231F also be redesignated as part of NFPA 230. While NFPA 46, NFPA 231E, and NFPA 231F where not specifically addressed by the Standards Council directive, the committee believes that they should be and has made a request to the Standards Council asking that those portions of NFPA 231E and NFPA 231F addressing sprinkler systems be assigned to the Sprinkler Project. NFPA 46 contains no sprinkler system information. Additionally, the committee has recommended that NFPA 46, NFPA 231E, and NFPA 231F be withdrawn. See the report for NFPA 46, NFPA 231E, and NFPA 231F in the Annual 1999 Report on Proposals.

This proposal also recommends that the non-sprinkler system related portions of NFPA 231D, Standard for the Storage of Rubber Tires, be copied into NFPA 230 using NFPA's extract policy. This action provides consistency with what is being proposed for the other storage document.

The information from NFPA 46, NFPA 231, NFPA 231C, NFPA 231D, and NFPA 231E, and NFPA 231F that is being redesignated as NFPA 230 or being copied into NFPA 230 is identified in parenthesis following the new section number. Information from NFPA 46 and NFPA 231E is being moved to the appendix of NFPA 230 because NFPA 46 and NFPA 231E are recommended practices providing advisory information only.

COMMITTEE ACTION: Accept.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27

VOTE ON COMMITTEE ACTION:

AFFIRMATIVE: 21

NEGATIVE: 1

ABSTENTION: 1

NOT RETURNED: 4 Everson, O'Rourke, Shiner, Thomas

EXPLANATION OF NEGATIVE:

MALANGA: The current version of NFPA 230 that is proposed for adoption has not been adequately reviewed nor revised by the committee in order to eliminate conflicts that have occurred via the consolidation of NFPA 46, NFPA 231, NFPA 231C, NFPA 231D, NFPA 231E, and NFPA 231F, and the extraction of sprinkler provisions there from into NFPA 13. Because of this, the individual standards should not be withdrawn until the proposed NFPA 230 document can stand on it's own without conflict.

COMMENT ON AFFIRMATIVE:

SMITH: Fire testing and fire experience demonstrates that the probability of controlling a fire in a storage facility that falls within the current scope of NFPA 230 without automatic sprinkler protection is very low.

Accordingly, if the stated purpose of this standard is to provide a reasonable degree of protection based on sound engineering principles, test data and field experience, the scope of this standard should provide a cleaner and more consistent approach regarding protection. Currently, the general and roll paper chapters of the standard exclude unsprinklered buildings by scope whereas the rack storage chapter is silent on this issue.

EXPLANATION OF ABSTENTION:

COLLINS: I am a new member on this committee (NFPA 230/NFPA 231) and missed my first meeting as I was on business travel in South America.

The NFPA Codes and Standards Development Process

Since 1896, one of the primary purposes of the NFPA has been to develop and update the standards covering all areas of fire safety.

Calls for Proposals
The code adoption process takes place twice each year and begins with a call for proposals from the public to amend existing codes and standards or to develop the content of new fire safety documents.

Report on Proposals
Upon receipt of public proposals, the technical committee members meet to review, consider, and act on the proposals. The public proposals – together with the committee action on each proposal and committee-generated proposals – are published in the NFPA's Report on Proposals (ROP). The ROP is then subject to public review and comment.

Report on Comments
These public comments are considered and acted upon by the appropriate technical committees. All public comments – together with the committee action on each comment – are published as the Committee's supplementary report in the NFPA's Report on Comments (ROC).

The committee's report and supplementary report are then presented for adoption and open debate at either of NFPA's semi-annual meetings held throughout the United States and Canada.

Association Action
The Association meeting may, subject to review and issuance by the NFPA Standards Council, (a) adopt a report as published, (b) adopt a report as amended, contingent upon subsequent approval by the committee, (c) return a report to committee for further study, and (d) return a portion of a report to committee.

Standards Council Action
The Standards Council will make a judgement on whether or not to issue an NFPA document based upon the entire record before the Council, including the vote taken at the Association meeting on the technical committee's report.

Voting Procedures
Voting at an NFPA Annual or Fall Meeting is restricted to members of record for 180 days prior to the opening of the first general session of the meeting, except that individuals who join the Association at an Annual or Fall Meeting are entitled to vote at the next Fall or Annual Meeting.

"Members" are defined by Article 3.2 of the Bylaws as individuals, firms, corporations, trade or professional associations, institutes, fire departments, fire brigades, and other public or private agencies desiring to advance the purposes of the Association. Each member shall have one vote in the affairs of the Association. Under Article 4.5 of the Bylaws, the vote of such a member shall be cast by that member individually or by an employee designated in writing by the member of record who has registered for the meeting. Such a designated person shall not be eligible to represent more than one voting privilege on each issue, nor cast more than one vote on each issue.

Any member who wishes to designate an employee to cast that member's vote at an Association meeting in place of that member must provide that employee with written authorization to represent the member at the meeting. The authorization must be on company letterhead signed by the member of record, with the membership number indicated, and the authorization must be recorded with the President of NFPA or his designee before the start of the opening general session of the Meeting. That employee, irrespective of his or her own personal membership status, shall be privileged to cast only one vote on each issue before the Association.

Sequence of Events Leading to Publication of an NFPA Committee Document

Call for proposals to amend existing document or for recommendations on new document.

▼

Committee meets to act on proposals, to develop its own proposals, and to prepare its report.

▼

Committee votes on proposals by letter ballot. If two-thirds approve, report goes forward. Lacking two-thirds approval, report returns to committee.

▼

Report is published for public review and comment. (Report on Proposals - ROP)

▼

Committee meets to act on each public comment received.

▼

Committee votes on comments by letter ballot. If two-thirds approve, supplementary report goes forward. Lacking two-thirds approval, supplementary report returns to committee.

▼

Supplementary report is published for public review. (Report on Comments - ROC).

▼

NFPA membership meets (Annual or Fall Meeting) and acts on committee report (ROP and ROC).

▼

Committee votes on any amendments to report approved at NFPA Annual or Fall Meeting.

▼

Complaints to Standards Council on Association action must be filed within 20 days of the NFPA Annual or Fall Meeting.

▼

Standards Council decides, based on all evidence, whether or not to issue standard or to take other action, including hearing any complaints.

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Appeals to Board of Directors on Standards Council action must be filed within 20 days of Council action.