NFPA No.

46

File: 40 Series
Combustible Solids

Recommended Safe Practices for

OUTDOOR STORAGE OF FOREST PRODUCTS

May

1961

Fifty Cents*

NATIONAL FIRE PROTECTION ASSOCIATION
International
60 Batterymarch St., Boston 10, Mass.

3M-6-61-WP

*See inside front cover for quantity discounts

Printed in U.S.A.

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This is one of a large number of publications on fire safety issued by the Association. All NFPA standards and recommended practices, including this text, are prepared by the technical committees of the NFPA and adopted at an Annual Meeting of the Association. They are intended to prescribe reasonable measures for minimizing losses of life and property by fire.

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SHALL is intended to indicate requirements.

SHOULD is intended to indicate recommendations, or that which is advised but not required.

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RECOMMENDED SAFE PRACTICES FOR OUTDOOR STORAGE OF FOREST PRODUCTS

NFPA No. 46

These recommended safe practices were prepared by the Sectional Committee on the Storage of Forest Products and approved by the Committee on General Storage.

Part I, Outdoor Storage of Lumber and Timber at Other than Retail or Wholesale Yards, was adopted by the NFPA in 1960.

Part II, Outdoor Storage of Ties, Poles, Piles, Posts, and Other Similar Forest Products at Pressure Treating Plant Yards, was tentatively adopted by the NFPA in 1959. Following revisions in paragraphs 11, 3201, 3301 b and c, and 3412, Part II was finally adopted by the NFPA at the 1961 Annual Meeting.

It is contemplated that other parts will be prepared by the Sectional Committee that will deal with outdoor storage of logs, pulpwood and stumps.

Outdoor storage of lumber and timber at retail yards is covered in the Recommended Safe Practices for Retail and Wholesale Lumber Storage Yards, NFPA No. 47*.

*See Appendix for availability.

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PART I

Outdoor Storage of Lumber and Timber at Other Than Retail or Wholesale Yards

NFPA No. 46

Chapter 1. Purpose

11. The intent of these recommendations is to provide fire protection guidance to minimize the fire hazard in yard storage areas containing lumber, timber, and other similar forest products. 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 that are intended to be applied with due consideration of all local factors involved.

Chapter 2. Definitions

21. LUMBER as used herein shall mean lumber, timber and other similar forest products.

22. YARD shall mean the outdoor areas where lumber and other forest products, as described in Section 11, are stored outside buildings.

23. CLEAR SPACE shall mean any area free of combustible materials. This does not preclude the storage of noncombustible materials that will not transmit an exposure fire.

24. FIRE LANE shall mean a clear space suitable for fire fighting operations by motorized fire apparatus.

25. ALLEYWAY shall mean 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.

Chapter 3. Lumber Storage Yards

31. General.

3101. Fire loss experience indicates that large undivided piles, congested storage conditions, delayed fire detection and inadequate protection are the principal contributing factors in allowing lumberyard fires to reach serious proportions. The fire hazard potential inherent in lumber 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. Regular plant and yard inspections by trained personnel.

b. Facilities for early fire detection and extinguishment.

c. Access alleyways and fire lanes for effective fire fighting operations.

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

3102. Special problems of construction and protection are involved with cargo yards having piers or wharves and lumber storage on raised platforms. NFPA No. 87, Construction and Protection of Piers and Wharves* and the authority having jurisdiction should be consulted in each case.

32. Basic Lumberyard Protection.

3201. In all lumber storage operations, provision should be made for early fire detection and extinguishment. This requires watchman and alarm service, fire brigade manpower and extinguishing equipment, and ready access by means of alleyways into all parts of the lumber storage area so that portable fire extinguishers and fire hose can be promptly brought to the site of the fire. Alleyways should be unobstructed, of sufficient width for hand or cart fire hose laying operations, and spaced relatively close together so that small fires can be effectively controlled.

3202. When a fire is discovered, no matter how small, the public fire department and plant fire brigade shall be

*See Appendix for availability.

notified at once. The telephone number of the fire department and the location of the nearest fire alarm box shall be posted conspicuously in several locations in the yard and buildings.

3203. In storage yards, a reliable means for prompt transmission of fire alarms to public fire departments and private fire brigades should be provided at convenient and accessible locations in the yard.

3204. It is recommended that approved watchman service be maintained throughout the night and during all nonoperating periods. Watchman must be competent and should be supervised by approved central station or watchman's time detector or portable watch clock.

3205. Watchman and other employees shall be fully instructed in the proper procedure of transmitting a fire alarm and in the use of extinguishers and all other fire protection equipment. (Refer to NFPA No. 601, The Watchman*.)

3206. It is recommended that a 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. Reference is made to NFPA No. 27, Suggestions for the Organizing, Training and Equipment of Private Fire Brigades*, and the NFPA Industrial Fire Brigades Training Manual*.

3207. Portable fire extinguishers suitable for the fire hazard involved shall be provided at convenient conspicuously accessible locations in the yard. To be effective, some form of approved portable fire extinguishing equipment shall be placed so that maximum travel distance to the nearest unit shall not exceed 100 feet. See NFPA No. 10, Standard for the Installation, Maintenance and Use of Portable Fire Extinguishers*. It is recommended that approved fire extinguishers be provided on all power vehicles and units including haulage or private locomotives in the yard.

3208. A yard fire hydrant system connected to an ample water supply should be provided. For basic fire protection the system should be capable of supplying four 250

*See Appendix for availability.

gpm hose streams simultaneously. Where large scale fire fighting operations may be expected, larger water supplies with adequate mains are needed. See Section 33.

a. Hydrants should be of an approved type with the same hose threads as used by the local fire department and preferably located at fire lane intersections. For early extinguishment with basic fire protection, hydrants should be so spaced with sufficient 2½-inch hose attached to permit rapid hose lays 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. A hydrant hose house with at least 200 feet of hose and auxiliary equipment shall be provided at each hydrant in accordance with NFPA No. 24, Outside Protection*.

b. Hydrants and hose houses shall be kept free of obstruction at all times.

33. Special Lumberyard Protection.

3301. Yards consisting of single carrier loads of green flat piled lumber present a minimum hazard that generally requires only the basic protection provisions of Section 32 for fire control. High piles 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 provision of Section 32 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:

a. 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 1000 gpm for each appliance. Monitor towers may require supplies in excess of 1000 gpm for each unit. In large yards where the hazard is severe, many of these devices may be operated simultaneously.

*See Appendix for availability.

b. Fire lanes suitable for fire department operations shall 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.

c. Fire lanes shall be kept unobstructed. They shall have an all-weather surface sufficiently strong enough to support fire apparatus, and should be of sufficient width to permit maneuvering of motorized fire apparatus. Where practical, greater widths are desirable to minimize the effects of radiated heat, particularly in high piled yards. All weather roadways capable of supporting fire department apparatus should be provided to the plant and yard from public highway.

d. Pile heights should be limited. Heights in excess of 20 feet seriously restrict effective operation of hose streams. Air drying stickered piles are subject to rapid fire penetration through the air spaces and should be kept as low as practical.

e. Permanent means of designating fire lanes and piling boundaries shall be provided.

34. Exposure Protection.

340. Exposure To The Yard.

3401. Yard storage areas should be separated from mill operations and other structures so that fire exposure to the yard will be minimized. Minimum separation should be by means of clear space permanently available for fire fighting operations, and the clear space width 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 piling and height of adjacent lumber piles.

3402. Unsprinklered manufacturing buildings and other large structures with combustible contents represent severe exposure to yard storage unless the exterior walls are of masonry or other fire resistive construction without

excessive openings. In general, unsprinklered sawmills, planing mills and similar buildings without essentially blank masonry walls should be separated from yard storage by a clear space equivalent in distance to approximately three times the height of the building. Greater clear space than three times the height should be provided for large area buildings of low height.

3403. 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 Section 341.

3404. Forest, brush and grass fire exposure shall be minimized by providing adequate clear space which is carefully kept free of combustible vegetation. Clear space widths at least equivalent to fire lanes should be provided for grass exposures and clear space widths of at least 100 feet should be provided for light brush exposures. In forested areas clear space should be as large as possible.

341. EXPOSURE FROM THE YARD.

3411. Fire exposure between adjacent structures and nearby property constitutes one of the major fire protection problems of lumberyard operations which can be solved satisfactorily only by cooperation between adjacent property owners. The authority having jurisdiction should be consulted in all cases.

3412. The Special Lumberyard Protection facilities as provided under Section 33 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 that these facilities cannot be expected to cope with adverse weather conditions and flying brands. Where necessary and practical, additional protection against lumberyard exposure can be achieved through one or more of the following:

a. By providing greater clear space distance.

b. By 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. By employing perimeter piling methods that will furnish the equivalent of barrier walls, i.e., materials of greatest thickness and green flat piled stock.

d. By use of fire resistive or masonry wall construction for exposed structures.

e. By use of automatic sprinkler systems specially designed for protection of the exposed structures.

3413. Exposure consideration between lumberyards and lumber storage buildings or yard areas roofed over should be based upon the protection principles of Sections 33 and 34.

35. Operational Fire Prevention.

3501. 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, or areas where the hazard of underground fire is present should not be used.

3502. 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 shall not be used.

3503. Sawdust, chips, shorts and other debris shall be removed from piling areas as frequently as needed to prevent accumulation, particular attention being given to space under piles. Good housekeeping shall be maintained at all times, including regular and frequent cleaning of materials handling equipment.

3504. Smoking shall be prohibited except in specified safe locations. "No Smoking" signs should be posted throughout all buildings and in the yard except in specific locations designated as safe for smoking and signs permitting smoking should be posted in those areas. Smoking shall be specifically prohibited in and around railroad cars.

3505. 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.

3506. Miscellaneous occupancy hazards such as vehicle storage and repair shops, 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.

3507. Vehicles and other power devices should be of an approved type, safely arranged and operated. Vehicle fueling operations should be conducted in specified safe locations, isolated from storage areas and principal operating buildings. Refer to NFPA No. 505, Standard for the Use, Maintenance and Operation of Industrial Trucks*.

3508. All electrical equipment and installations should conform to the provisions of the NFPA No. 70, National Electrical Code* or the National Electrical Safety Code, National Bureau of Standards*.

3509. Salamanders, braziers, open fires and similar dangerous heating arrangements shall be prohibited. Heating devices should be limited to approved type equipment installed in an approved manner.

3510. Suitable safeguards should be provided to minimize the hazard of sparks from 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 No. 82, Standard for Incinerators, Rubbish Handling*. The design and location of large burners presents special problems and the authority having jurisdiction should be consulted.

3511. 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.

*See Appendix for availability.

3512. Solid fuel fired steam locomotives, cranes and similar equipment entering or operating in yards should be equipped with screen protection between the top of the ash pan and the mud ring to prevent hot coals 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 Diesel locomotives be equipped with screens or other devices to prevent the escape of glowing carbon particles from the exhausts.

3513. If yard storage areas are located in regions highly susceptible to lightning strokes, consideration should be given to the installation of lightning protection. See NFPA No. 78, Code for Protection Against Lightning*.

*See Appendix for availability.

PART II

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

NOTE: Outdoor lumber and timber storage are covered in the NFPA Recommended Safe Practices for Retail and Wholesale Lumber Storage Yards (No. 47).* Outdoor storage of lumber and timber at other than retail or wholesale yards is covered under Part I of these recommended safe practices. Outdoor storage of logs, pulpwood and stumps will be covered in subsequent parts of these recommended safe practices.

Chapter 1. Purpose

11. The intent of these recommendations 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, the general fire protection principles that are recommended herein are intended to be applied with due consideration of all local factors involved.

Chapter 2. Definitions

21. TIES as used herein shall include ties, poles, piles, posts and other similar forest products. Black ties are those pressure impregnated with oil type preservatives.

22. YARD shall mean the outdoor areas where ties and other similar forest products, as described in Section 11, are stored outside buildings.

23. CLEAR SPACE shall mean any area free of combustible materials. This does not preclude the storage of non-combustible materials that will not transmit an exposure fire.

*See Appendix for availability.

24. FIRE LANE shall mean a clear space free from stored materials and suitable for fire fighting operations by motorized fire apparatus.

25. ALLEYWAY shall mean 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.

Chapter 3. Tie Storage Yards

31. General

3101. Fire loss experience indicates that large undivided piles, congested storage conditions, delayed fire detection and inadequate protection are the principal contributing factors in allowing tie yard fires to reach serious proportions. The fire hazard potential inherent in tie 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. Regular plant and yard inspections by trained personnel.

b. Facilities for early fire detection and extinguishment.

c. Access alleyways and fire lanes for effective fire fighting operations.

d. Separation of yard storage from plant operations and other exposing properties.

32. Basic Tie Yard Protection

3201. In all tie storage operations, provision should be made for early fire detection and extinguishment. This requires watchman and alarm service, fire brigade manpower and extinguishing equipment, and ready access by means of alleyways into all parts of the tie storage area so that portable fire extinguishers and fire hose can be prompt-

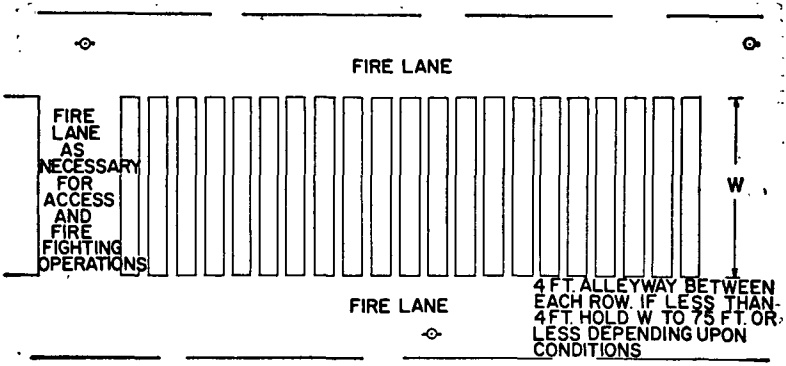

Figure 1. Relatively Open Piling Methods

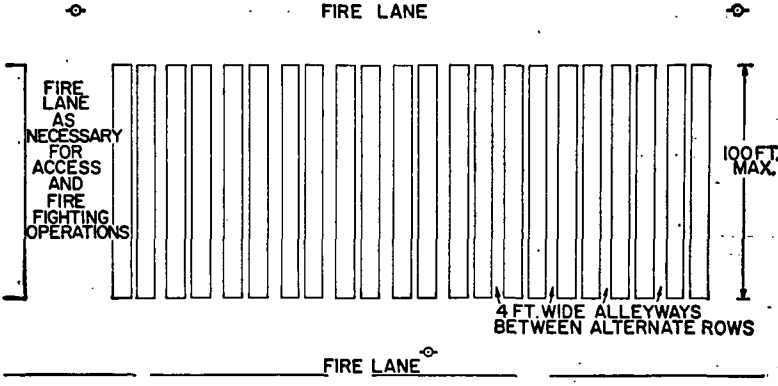

Figure 2. Crib Style Piling into Solid Rows

ly brought to the site of the fire. Alleyways should be unobstructed, of sufficient width for hand or cart fire hose laying operations. A minimum alleyway width of 4 feet is recommended. Alleyways must be spaced so that effective action from initial fire fighting operations can be obtained. With relatively open piling (piling that will permit penetration by fire extinguishing streams) this can usually be accomplished by providing a 4 foot or greater width alleyway between alternate rows of tie piles (see Figure 1). Flat crib-style piling without space between piles so as to form solid packed rows would require a 4 foot or greater width alleyway between each row. Where piling area does not permit a 4 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 2 feet in width (see Figure 2).

3202. When a fire is discovered, no matter how small, the public fire department and plant fire brigade shall be notified at once. The telephone number of the fire department and the location of the nearest fire alarm box shall be posted conspicuously in several locations in the open yard and buildings.

3203. A reliable means for prompt transmission of fire alarms to public fire departments and private fire brigades should be provided at convenient and accessible locations in the yard.

3204. It is recommended that approved watchman service be maintained throughout the night and during all nonoperating periods. Watchman must be competent and should be supervised by approved central station or watchman's time detector or portable watch clock.

3205. Watchman and other employees shall be fully instructed in the proper procedure of transmitting a fire alarm and in the use of fire extinguishers and all other fire protection equipment. Refer to NFPA No. 601, The Watchman*.

3206. It is recommended that a fire brigade be organized. It should be well trained and adequately equipped to

*See Appendix for availability.

combat fire while the public fire department is responding to the alarm. Reference is made to NFPA No. 27, Suggestions for the Organization, Training and Equipment of Private Fire Brigades*, and the NFPA Industrial Fire Brigades Training Manual*.

3207. Portable fire extinguishing equipment suitable for the fire hazard involved shall be provided at convenient conspicuously accessible locations in the yard. To be effective, some form of approved portable fire extinguishing equipment shall be placed so that maximum travel distance to the nearest unit shall not exceed 100 feet. See NFPA No. 10, Standard for the Installation, Maintenance and Use of Portable Fire Extinguishers*. It is recommended that approved fire extinguishers be provided on all power vehicles and units including haulage or private locomotives in the yard.

3208. A yard fire hydrant system connected to an ample water supply should be provided. For basic fire protection the system should be capable of supplying four 250 gpm hose streams simultaneously. Where large scale fire fighting operations may be expected, larger water supplies with adequate mains are needed. See Section 33.

Hydrants should be of an approved type with the same hose threads as used by the local fire department and preferably located at fire lane intersections. 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. A hydrant hose house with at least 200 feet of fire hose and auxiliary equipment shall be provided at each hydrant. See NFPA No. 24, Outside Protection*.

Hydrants and hose houses shall be kept free of obstruction at all times.

3209. All weather roadways capable of supporting fire department apparatus should be provided to the plant and yard from public highways.

*See Appendix for availability.

33. Special Tie Yard Protection

3301. Tie yards containing low piled storage, small amounts of black ties and well separated treating facilities present minimum hazards that generally require only the basic protection provisions of Section 32 for fire control. High piling over extensive areas, congested storage, and large amounts of black tie storage present increased hazards which require additional safeguards and protection facilities. In yards requiring more than the basic protection provisions of Section 32 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:

a. 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 1000 gpm for each appliance. Monitor towers may require supplies in excess of 1000 gpm for each unit. In large yards where the hazard is severe many of these devices may be operated simultaneously.

b. Fire lanes suitable for fire department operation shall 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 or monitor towers are available, access distances may be governed by their effective reach with available water supplies.

c. Fire lanes shall be kept unobstructed. They shall have an all-weather surface sufficiently strong to support fire apparatus, and should be of sufficient width to permit maneuvering of motorized fire apparatus. Where practical, greater widths are desirable to minimize the effects of radiated heat, particularly in high piled yards. All weather roadways capable of supporting fire department apparatus should be provided to the plant and yard from public highway.

d. Pile heights should be limited. Heights in excess of 20 ft. seriously restrict effective operation of hose streams.

e. Permanent means of designating fire lanes and piling boundaries shall be provided.

f. Black ties should not be stored intermixed with untreated products. A 100 ft. clear space should be maintained between black tie storage and untreated storage.

34. Exposure Protection

340. Exposure to the Yard.

3401. Tie storage 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 clear space permanently available for fire fighting operations, and the clear space width 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 piling and height of adjacent tie piles.

3402. Unsprinklered Processing Buildings and other large structures with combustible contents represent severe exposure to yard storage unless the exterior walls are of masonry or other fire-resistive construction without excessive openings. In general, unsprinklered treating plants, adzing mills and similar buildings without essentially blank masonry walls should be separated from yard storage by a clear space equivalent in distance to approximately three times the height of the building. Greater clear space than three times the height should be provided for large area buildings of low height.

3403. 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 Section 341.

3404. Forest, brush and grass fire exposure shall be minimized by providing adequate clear space which is carefully kept free of combustible vegetation. Clear space

widths at least equivalent to fire lanes should be provided for grass exposures and clear space widths of at least 100 feet should be provided for light brush exposures. In forested areas clear space should be as large as possible.

341. EXPOSURE FROM THE YARD.

3411. Fire exposure between adjacent structures and nearby property constitutes one of the major fire protection problems to treating plant operations which can be solved satisfactorily only by cooperation between adjacent property owners. The authority having jurisdiction should be consulted in all cases.

3412. The Special Tie Yard Protection facilities as provided in Section 33 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 that these facilities cannot be expected to cope with adverse weather conditions and flying brands. Where necessary and practical, additional protection against tie yard exposure can be achieved by providing one or more of the following:

a. Greater clear space distance.

b. 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. Fire resistive or masonry wall construction for exposed structures.

d. Automatic sprinkler systems specially designed for protection of the exposed structures.

3413. Exposure consideration between tie yards and storage buildings should be based upon the protection principles of Sections 33 and 34.

35. Operational Fire Prevention

3501. 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.