13. PRODUCT PROCESSING AND HANDLING

Most industrial operations in the wildlands, other than construction, produce some product, which requires processing, storage and handling. These operations not only create some fire risks themselves, but often produce conditions which make fire suppression difficult. Since, historically, the greatest fire problems in this category have been related to forest products, the bulk of this chapter is devoted to them, with minor sections on other products.

13.1 Sawmills

This general heading includes all types of timber processing plants except paper or particleboard plants which use chips or other preprocessed raw materials: permanent sawmills, portable sawmills, veneer plants, shingle mills, re-manufacturing plants, molding mills, planing mills, etc. Since the waste products in these mills are small cellulosic materials (e.g., sawdust, shavings, trimmings, edgings) and often very dry, they are highly flammable. Thus, effective fire prevention and suppression measures are a must to protect the large investment involved. This is particularly true when fire-killed or insect-killed salvage lumber is being processed.

Cleanliness is the most important fire prevention measure for sawmills. Most mills have conveyor and vacuum systems to remove waste materials, but they are never 100 percent effective. This is particularly true of conveyors, which have a tendency to jam and overflow. Regular daily sweeping and hand pick-up are required to avoid accumulations of waste in dangerous places.

Smoking is prohibited in most sawmills. This is a valuable rule which should be enforced in all mills on visitors as well as employees. Since the former are more difficult to control than the latter, their access should be restricted to areas where fire hazards are minimal.

Mills and yards should be laid out with adequate clearances provided for fire equipment to work. Their designs should incorporate enough space to avoid ignition caused by radiated heat of one building, lumber stack or log deck from another, or from a surrounding forest. California law requires a 30-foot clearance of flammable vegetation. The National Fire Protection Association (NFPA) recommends 100 feet from vegetation and a minimum of 30 feet between buildings, piles, and decks.

Most modern mills are equipped with automatic fire sprinklers, fire standpipes and hydrants, hose and nozzles, fire extinguishers, etc. All mills should have these protection devices. Also, it is important that all employees, including new ones, be trained in their use and in the fire defense roles which may be assigned to them. Formation of a company fire brigade handles this training most effectively.
In addition to the built-in fire protection previously discussed, a mill is required in California to have a box or cache of wildland firefighting tools sufficient to equip 50% of the employees. Employees also require training in the effective use of these tools. The types and minimum amounts of tools are set forth in Public Resources Code (PRC) Section 4429.

Since the conversion or replacement of most steam-powered sawmills to electric power, vast quantities of waste material have required disposal. For many years this was done primarily by burning either in open pits or in teepee burners. This was a highly hazardous practice which caused so many fires that special fire laws were passed to regulate it.

In California, these laws are contained in PRC Sections 4437-41. The restrictions were later tightened under air pollution control laws and regulations causing some operators to resort to landfills. In this activity, both water pollution and spontaneous combustion problems were encountered. Much of the waste is now processed into byproducts (e.g., paper chips, synthetic fireplace logs, and briquettes) and some is used as direct boiler fuel on the mill site, often for cogeneration of electric power.

Figure 13-1.
Proper Separation of Buildings
Portable sawmills present special fire problems in addition to any discussed above. By their very nature, they do not have the financial resources of large permanent mills. Therefore, they seldom have any built-in fire protection systems and cannot afford a legal waste burner. They rarely have any byproduct processing ability and thus create a much higher proportion of flammable waste than do permanent mills.

An internal combustion engine, either in direct drive or as a motor-generator set, powers most portable mills. These engines are normally located at the mill site where their exhaust systems and the prevalent sawdust create a potentially explosive mixture. All told, such mills are a serious fire hazard, both to themselves and to the surrounding country.

As a minimum, they should be surrounded by a 30-foot wide firebreak. They should be kept as clean as possible while operating and the waste pile should be removed or burned during the following winter.

13.2 Portable Processing Equipment

In the world of timber harvesting, methods of operation are rapidly changing. More and more portable processing equipment is being used to process the forest products at the site where obtained. This has created new fire risks and created problems which have no law to define the handling of such risk.

One example is the process of chipping the material at the location obtained. If the operation is to chip for pulp, large piles of by-product will be generated. These piles have been left behind for other processors to come in and further chip the remains for hog fuel. Some piles exceed ten feet in height and 100 feet in length and can ignite through spontaneous combustion.

The Oregon Department of Forestry has completed a study on this process. The Public Resources Code addresses fire prevention measures for mill wood waste. However, the piles left over in the woods are still a wood byproduct which the laws do not cover. (See Appendix F)
13.3 Log Decks

- **UFC Article 30 Section 3005.2 (Log storage areas)**
- **NFPA 46 - Recommended safe practice for storage of forest products 1996 edition, chapter 7 outside storage of logs, 7-1 application, 7-2 general, 7-3 basic log yard protection and 7-4 special yard log protection**

Log decks are to be found in three places: landings, transfer points, and mill yards. Decks on landings are relatively small, continually rotated and have equipment immediately available to break them up in case of fire. They therefore pose only a minor fire problem.

Log decks at transfer points and in mill yards commonly contain several million board feet and may not be moved for months at a time. Unless special measures are taken they present a very serious fire problem. The most basic precaution is to keep the piles small enough and with enough separation that in case one does catch on fire the fire can be confined to that pile and not consume the entire yard. According to National Fire Protection Association (NFPA) Pamphlet 46 (1996) individual piles should never exceed 300 feet in width, 20 feet in height and 500 feet in length.
Wherever an adequate water supply is available log decks should be kept continuously wet. The moisture not only promotes fire protection but retards blue stain and other deterioration and down-grading. If the sprinkler system is properly designed with adequate drainage back into a sump for recirculation, the amount of water needed is greatly reduced. Still some loss to evaporation must be expected.
Another fire safety measure for log decks is the provision of fire mains, hydrants, hose and nozzles. The initial investment for this is very high and can usually only be justified in mill yards. For basic fire protection, a hydrant system should be capable of supplying at least 4-2½ inch hose streams simultaneously 1000 GPM minimum while maintaining a positive residual pressure in the fire protection hydrant system. Where large-scale firefighting operations may be expected, larger water supplies with adequate mains are needed.

13.4 Outside Storage of Wood Chips and Hog Material

- **UFC Article 30 Section 3006.2 (Size of piles)**
- **NFPA 46—Recommended safe practice for storage of forest products 1996 edition, chapter 6 outside storage of wood chips and hog material, 6-1 application, 6-2 general, 6-3 pile protection**

This subject is well covered in NFPA pamphlet 46 (1996). It is recommended that anyone involved in operating or protecting such facilities become thoroughly acquainted with that publication. A few items not covered in NFPA pamphlet 46 will be discussed here.

The practices recommended in NFPA pamphlet 46 for chips generally apply to sawdust as well. Some differences, however, apply to stored bark chips. Bark chips, once piled, have a tendency to lock in place. They do not flow into conveyors as easily as paper chips or sawdust. Therefore, the common method of moving them out of storage is with end loaders.

In the scooping operation of the loaders, a vertical or sometimes overhanging wall of chips often results. Oxygen can then get into the top center of the pile and spontaneously ignite the sawdust. The best protection against this phenomenon is to keep the vertical or overhanging wall from forming by continually pushing bark from the top of the pile down to the scooping area with a bulldozer or similar machine.
Not enough emphasis can be placed on close working relationships between the operator of any chip, sawdust, or bark storage facility and the public fire protection agency in the area. Fires in such piles are extremely expensive to extinguish and result in high product loss. If fires escape additional liability is incurred. It is always cheaper to prevent the fires than to experience them. However, once a fire exists, quick suppression, while the fire is still very small, is the cheapest method. The local fire chief, ranger, or fire marshal can help with either of these goals.

13.5 Ore and Aggregate Plants

The products of ore and aggregate plants are generally nonflammable. Therefore, the fire problems involved relate mostly to the structure and machinery. Basically they are no different from those of any other industrial plant. An exception, however, is they are often in isolated or remote locations where public fire suppression forces are unavailable or not suited to structural protection. A good built-in fire protection system and a company fire brigade, therefore, become very important. Assistance in these matters can be obtained from local fire authorities, insurance companies, and consulting fire protection engineers.

13.6 Oil and Gas

Almost all processing and storage of petroleum and natural gas is done at locations remote from the producing wells and usually outside of forest and watershed areas. Storage and transportation of consumer products is discussed in the chapter on “Commercial Transportation.” Fire safety in pumping plants is so critical to personnel and capital safety that it is adequately provided for in governmental regulations, insurance company requirements, and operating company rules. Thus, the fire threat to wildlands is minimal.
13.7 Electrical Power Use

Most modern industrial plants, wherever located, are powered by electricity. Many of these plants now generate their own electricity either through burning of wood products producing steam to turn the generators or through the use of natural gas.

The most concern to wildland fire prevention is large stockpiles of chips for the wood fueled generation plants. This type of operation has almost totally eliminated the large wood waste piles at the sawmills which constantly were catching fire and posing fire control problems. Often these piles once on fire, continued to burn for years, even though fire control efforts were constantly being applied. Although the wood chips used at the co-generation plants are susceptible to fires caused by spontaneous combustion or other outside ignition sources, once the fire is discovered, after containment, the chips can be burned through the generating process, thus giving full extinguishment of the fires.

When a co-generation plant is to be established, consideration should be given to requiring that all chips be burned through the generation process at a minimum of every six months.