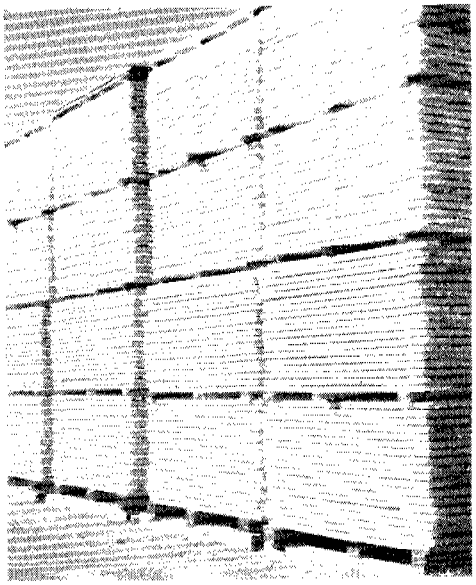
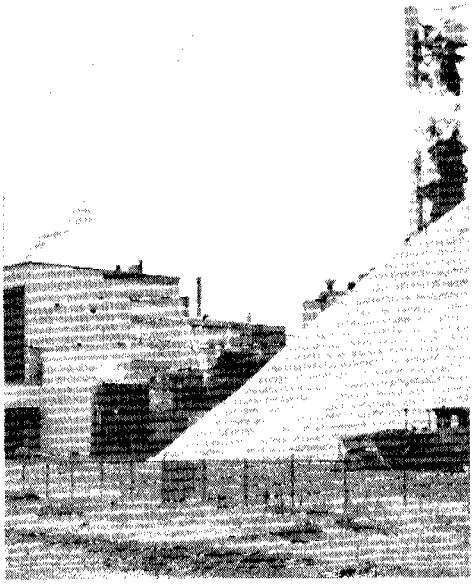
HARVESTING AND UTILIZATION OPPORTUNITIES FOR FOREST RESIDUES in the northern rocky mountains





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TECHNICAL AND ECONOMIC ASPECTS OF HARVESTING DEAD LODGEPOLE PINE FOR ENERGY

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ABSTRACT

This study highlights the results of a study of the economic feasibility of harvesting dead lodgepole pine for fuel and products. Costs, production rates, and recoverable wood volumes were obtained from a 3-month study of a whole-tree logging operation in which dead lodgepole pine was harvested for fuel and products.

KEYWORDS: Lodgepole pine, harvesting, energy, residues

National energy problems have drawn attention to wood as a source of energy. At the same time, wood residue in dead timber is creating serious forest land management problems in the West. An obvious and desirable solution is to utilize the dead timber for energy and other products. The solution, however, requires that the dead timber be harvested, transported, and converted to products including fuel, in an economic and environmentally acceptable manner.

The USDA Forest Service, in cooperation with the Department of Energy, is studying the economic feasibility of harvesting dead lodgepole pine timber for energy and other products. Harvesting operations using mechanized equipment for falling, yarding, delimbing, bucking, sorting, chipping, and loading were studied for three months this past summer in the dead lodgepole pine stands of eastern Oregon. Cost, production rate, recoverable wood volume, wood fuel characteristic, and environmental effect data were obtained. This presentation focuses on technical and economic aspects of harvesting dead lodgepole pine for energy. It is based on personal observations and some preliminary analyses of information gathered during the study. Since study analysis and reporting are in progress, the information presented here is preliminary and subject to change.

The logging contractor for the study was Crisstad Enterprises, Inc.,1/ which has considerable experience in harvesting dead lodgepole pine timber from northeastern Oregon. It is a whole-tree chipping operation. The chips are trucked to the U. S. Gypsum plant at Pilot Rock, Oregon, where they are used in manufacturing fiberboard.

The basic harvesting equipment used by Crisstad includes John Deere 544B/Rome feller bunchers, Caterpillar 518 and Clark 667 skidders with Esco 36 grapples, and Morbark Model 18 and Model 22 chippers. Support equipment includes shuttle trucks for vans, crawler tractors, water pumper trucks, fuel trucks, crew rigs, and mechanic's truck. Chip and log trucking are contracted.

A Hahn tree-length delimber and a log loader were added to the equipment array during the study. This equipment was used in several different configurations or systems to recover logs of sufficient quality, diameter, and length for available markets. The log markets included house logs and dead and green saw logs.

During the study, cutting units on timber sales in the Umatilla and Wallowa-Whitman National Forests were harvested. The units ranged from about 15 to 35 acres in size. All of the lodgepole pine trees on the units were clearcut, green as well as dead. The average diameter at breast height (d.b.h.) of the lodgepole stands ranged from 5 to 9 inches. Most of the lodgepole pine had been dead for 4 or 5 years.

Initially, the Hahn delimber was operated alongside a chipper. The skidder brought turns beside and in between the two machines. The loaders on the machines sorted and fed tree stems as appropriate, and tops from the Hahn were chipped as they developed. Time spent in sorting and waiting for input material slowed production in both machines.

The Hahn delimber was also operated separately from a chipper. To speed production, the feller-buncher operator separated stems by diameter as much as possible for the skidder. Trees that contained no logs and tops from trees that did were decked by the Hahn for later chipping. The Hahn also sorted the manufactured logs according to market specifications. This sorting slowed production.

On some cutting units, no logs were produced due to small stem size. The 3-month period of the study covered a variety of stand conditions as well as harvesting procedures.

The chip material probably has the most potential for being used as an energy source. Lodgepole pine wood has a heating value of about 8600 Btu/lb. (over 3,800 Btu per kg.).

The average weight of the wood in the chip vans was about 42,500 lbs. (19,000 kg.) as loaded, and 32,500 lbs. (14,700 kg.) bone dry. So there were about 13.5 bone dry units (2400 lbs. or 1,080 kg.) per chip van.

About 20 to 55 dry tons/acre of chips and logs were removed. Approximately 7 to 27 dry tons of wood were left on the ground as slash or logging residue. Much of this was already down prior to harvesting and caused problems for the feller/buncher and the skidder operators.

1/ The use of trade, firm, or corporation names does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others which may be suitable.

Machine production rates were quite variable because of a number of factors. Production ranges were:

	(Dry tons/hour)
Chipper	5 to 20
Feller-Bunchers	8 to 18
Skidder	10 to 13

With no delays and everything working right, the Model 22 chipper could produce about 40 dry tons/hour.

The diesel fuel used in producing chips was monitored. It appears that the diesel fuel requirements per van load of chips (13.5 bone dry units) are:

Chipper	12.5 gallons
Feller-buncher	7.0 gallons
Skidder	8.2 gallons

This presentation has discussed some highlights of the harvesting study underway on dead lodgepole pine in northeastern Oregon. Work on a comprehensive report on the study is in progress. The report should be published by the USDA Forest Service, in 6 to 9 months.