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BARK RESIDUES IN WESTERN MONTANA

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The manufacturing industries of western Montana<sup>2</sup> are based primarily on natural resources; the forest industry is the area's largest employer. Although the utilization practices of the wood industries have steadily improved, one portion of the tree remains for which no economically satisfactory use has been developed, the bark.

At the present time, most of the residues from primary manufacture, such as slabs, edgings, trim ends, veneer log roundup, and clipper trim material, are chipped and used in the manufacture of pulp and paper. Sawdust, planer shavings, and bark are usually burned, often as boiler fuel. Bark is the single component of the residue fuel portion that is economically unsuitable for any other large-scale use.

One of the factors confounding the development of a profitable bark-utilization process is the area's mixture of timber species. Ponderosa pine, Douglas-fir, and western larch are the principal species used; however, Engelmann spruce, white fir, hemlock, lodgepole pine, western white pine, and western redcedar are also harvested in lesser quantities. The mixture of bark from these species precludes the development of a bark-utilization process based on a single species, as is done in some other parts of the country.

Essentially, the bark-utilization problem of western Montana is the need for a method or process whereby the vast quantities of bark generated can be used economically or further processed locally. Ideally, the process should utilize bark from all species indiscriminately and the final product should have a value sufficient to repay manufacturing and transportation costs at least. A prerequisite to bark utilization is a reasonably accurate estimate of the material available and its location. The objective of this paper is to provide this information.

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<sup>2</sup>As used in this paper, western Montana denotes that portion of the State west of the Continental Divide.



## AVAILABLE BARK RESIDUE

Within the last 15 years the timber processing industry of western Montana has become more diversified and complex. In earlier years, lumber, millwork items, poles, mine timbers, and railroad ties were the only items produced. Today, the area has a pulp and paper mill, a particle-board and six plywood plants, in addition to two large-, 11 medium-, and 21 small-sized sawmills.<sup>3</sup>

The 1969 estimate of processed production in western Montana includes: 300 thousand tons of pulp and paper; 457 million square feet of plywood (3/8-inch basis); and 1,206 million board feet of lumber.<sup>4</sup>

The pulp and paper mill west of Missoula is dependent upon chips and sawdust produced by other segments of the industry. This mill also utilizes hogged (ground up) waste containing 30 to 35 percent bark for boiler fuel. A particle-board plant has recently been constructed near Missoula. This plant will have an initial production of 300 tons per day and will use sawdust and planer shavings generated within a 100-mile radius. Therefore, the principal sources of bark and the bark disposal problems are and will continue to be centered at the plywood and sawmilling operations.

Bark yield per log varies considerably depending on its position in the tree, growth rate, log size, and species. For this reason, estimates of bark yield based on data derived from logs in other areas of the country may not be appropriate to western Montana. Krier and River<sup>5</sup> have developed a procedure for estimating bark yield at Missoula sawmills. Using this procedure, they estimated total annual bark production in the Missoula vicinity to be about 97,154 tons (based on a sawmill production of 268 million board feet), or 725 pounds of ovendry bark per 1,000 board feet log scale.

Assuming that this value can be applied throughout western Montana, the total annual ovendry bark tonnage produced by sawmills from 1965 through 1969 has varied from about 345,535 to 460,194 tons. Approximately 400 board feet of logs are required to produce 1,000 square feet of plywood (3/8-inch basis). With the inclusion of the bark produced at plywood operations, the annual bark tonnage produced over the same period varied from 426,127 to 550,594 tons. Calculated another way, using a conversion factor of 22 cubic feet of bark per thousand board feet log scale, the volume generated varied annually from about 24,750,000 to 31,906,600 cubic feet of bark. A recent survey<sup>6</sup> of sawmills in western Montana indicates that in 1969 about 30 percent of the available bark supply was used for fuel and the residual 70 percent was disposed of as waste. The volume of bark material available for use (even after discounting the total volume by 30 percent) is still quite sizable.

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<sup>3</sup>For purposes of this report, sawmills are classified individually by production, regardless of ownership. Large mills have an annual production in excess of 100 million board feet; medium-sized mills, from 30 to 100 million board feet; and small mills, from 5 to 30 million board feet.

<sup>4</sup>Source, the trade journals, *Pulp and Paper* and *Timber Industries*. Bureau of Census figures are not available.

<sup>5</sup>John P. Krier and Bryan H. River. Bark residues: a model study for quantitative determination. Proc. 22nd Annual Northwest Wood Products Clinic. Spokane, Washington. 1967.

<sup>6</sup>Obtained from primary wood products and plant residue survey data of 1970, collected by the Forest Survey research work unit, Ogden, Utah. These data are being compiled for future publication.



DISTRIBUTION OF BARK RESIDUE

Because of the relatively high cost of transporting bark long distances, the western Montana region has been divided into four areas, each of which has a 50-mile radius (fig. 1). Although the areas of this figure overlap somewhat, the transportation systems of the region hinder the movement of bark residue between circles. If a suitable bark-utilization method were developed, the bark obtained from the smaller mills might be processed at a centrally located plant.

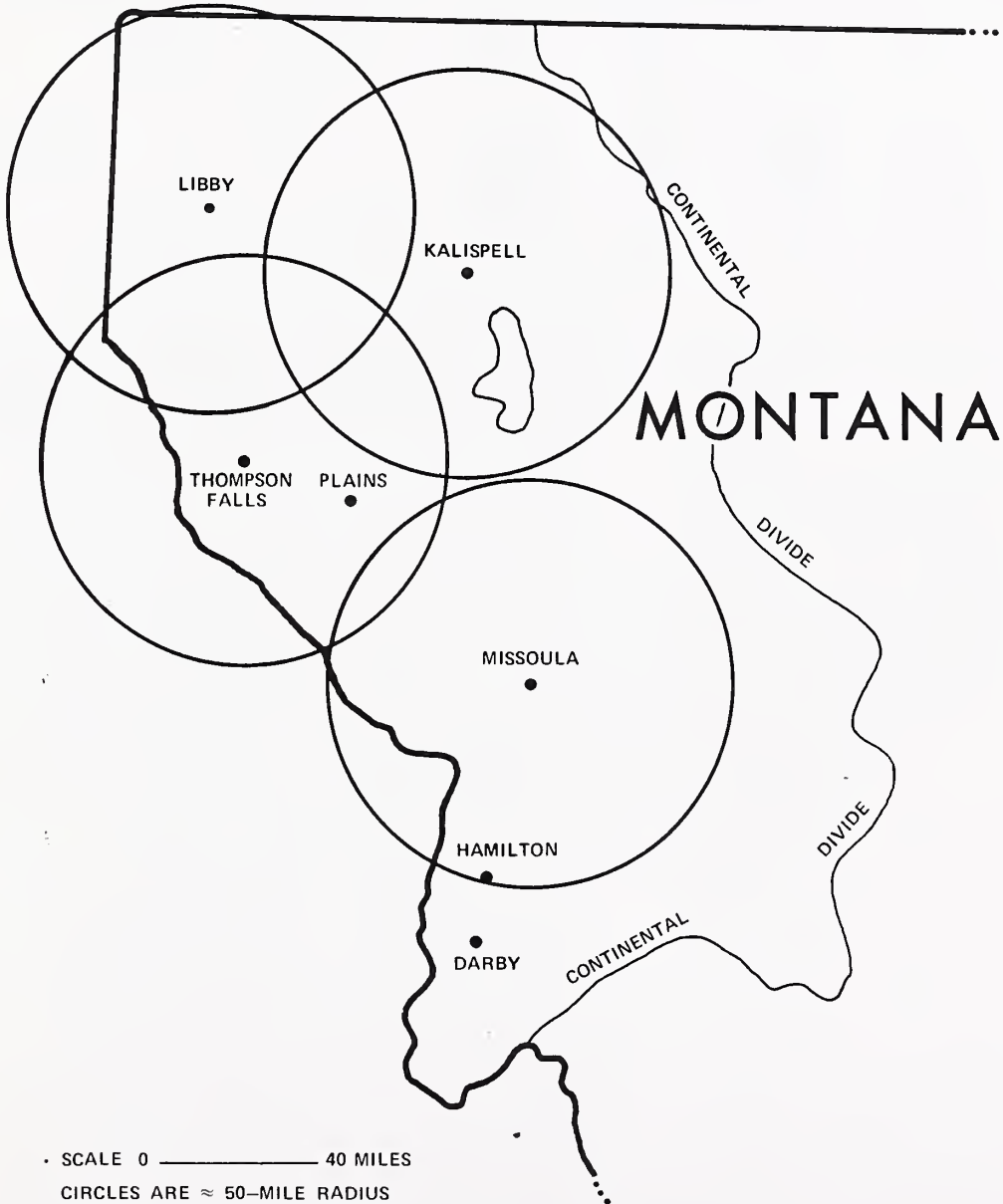


Figure 1.--Bark production circles with a 50-mile radius in western Montana.



The first area is centered at Missoula and contains one plywood plant and 15 sawmills, which together produce approximately 200,000 tons of bark per year. The second area, centered at Thompson Falls, produces about 40,000 tons per year. The third and fourth areas are centered at Kalispell and Libby, respectively. The Kalispell area contains four plywood plants and 14 sawmills and the annual bark production has exceeded 170,000 tons. The Libby area produces about 90,000 tons of bark annually. Estimates of the bark production for each area for the past 5 years are shown in table 1.

Table 1.--*Estimates<sup>1</sup> of the oven-dry bark produced at plywood and sawmill operations in each of four circular areas for the years 1965 through 1969*

Circle	: Number of : plywood : plants	: Number of : saw- : mills <sup>2</sup>	: Estimate of tons of bark produced				
			: 1965	: 1966	: 1967	: 1968	: 1969
Missoula	1	15	187,702	193,792	188,355	210,902	202,311
Thompson Falls	0	4	34,256	39,114	38,389	41,107	42,521
Kalispell	4	14	142,028	167,693	171,934	180,271	173,306
Libby	1	2	48,974	81,055	87,580	93,453	85,296
Total	6	35	412,960	481,654	486,258	525,733	503,434

<sup>1</sup>Estimates are based on the factor of 725 pounds of bark per thousand board feet of lumber.

<sup>2</sup>Sawmills producing more than 5 million board feet annually.

