DRAFT FINAL REPORT

FOR

RESIDUE RECOVERY, TRANSPORT, DENSIFICATION, AND STORAGE ECONOMICS

ACTIVITY 2

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SUBMITTED BY

LEONARD R. JOHNSON

HARRY W. LEE

MICHAEL HUGHES

FOREST PRODUCTS DEPARTMENT
UNIVERISTY OF IDAHO
MOSCOW, IDAHO

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Don Reynolds, fire control officer of the Colville National Forest, was responsible for finding and coordinating the field studies done in the Kettle Falls area. He was involved in the early stages of project development and made all the necessary arrangements for the sites and auxilliary equipment needed to conduct the studies. This was done in spite of two of the worst fire years in recent times.

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CHUNKWOOD RECOVERY, PRODUCTION AND TRANSPORTATION

EXECUTIVE SUMMARY

S.1 INTRODUCTION

Chunkwood is a unique product that has been under development for several years in the United States and the Scandanavian countries. Chunks vary in size with the diameter of the piece being processed and can be manufactured to depths of 2.5 to 4.5 inches. The larger chunks allow air flow through the stored wood, decreasing the chances of spontaneous combustion and increasing the amount of drying while in storage. Increased combustion efficiency could also occur in wood burning units designed to handle larger chunks of wood. The product can be produced in the woods with equipment similar to whole tree chippers. Keeping the material in a chunk form also retains options for the production of products other than energy.

An experimental prototype of a chunkwood processor was used to process logging residue and whole trees from thinning and clearcut operations. Three general methods were used to move the material from the woods to the processing point. Residue left after commercial timber harvest was moved to the roadside in a modified dozer piling operation. Earlier studies had suggested this as an efficient way to move the non-uniform residue material to an accessible point for processing. A second operation used a mechanical feller-buncher to cut and bunch trees from a dense, stagnant timber stand. Trees were skidded to the wood chunker with a grapple skidder. The third operation involved recovery of trees cut in a thinning operation. Trees were prebunched with a farm tractor and winch and skidded to decks at roadside with a wheeled skidder. The chunkwood processor recovered and processed material directly from the roadside decks. Objectives of the project included documentation of the production, problems, and costs associated with delivery and processing of chunkwood in these recovery operations.

Chunkwood from the first two study areas was delivered to a wood-fired electrical generating station in Kettle Falls, Washington, owned by the Washington Water Power Company. The Kettle Falls station burns wood biomass in a system with 50 megawatts of capacity. A test burn of the material was conducted in an attempt to identify handling problems with the material and to determine any combustion benefits of the larger chunkwood pieces.

The project was funded through the U.S. Department of Energy, Pacific Northwest and Alaska Regional Bioenergy Program. Participants included the Forest Products Department of the University of Idaho, the U.S. Forest Service, Colville National Forest, and the Washington Water Power Company.

S.2 DESCRIPTION OF EQUIPMENT

Equipment used in the study is not unique to timber harvesting. Dozer piling was conducted with a Kamatsu Model 65 crawler tractor with brush blade. The dozer pushed material into decks at roadside, but the decks could not be easily reached by the loading unit on the chunkwood processor. An intermediate sorting and piling operation was required. A long boom cable crane sorted acceptable and unacceptable material and piled the acceptable pieces in decks that could be reached for chunking.

Felling on the whole tree recovery site was accomplished with a Caterpillar Model 227 feller-buncher equipped with a Rotosaw felling head. The Model 227 feller-buncher is a tracked machine with the felling head mounted at the end of a hydraulic boom. The Rotosaw is one of several saw-head alternatives to traditional feller-buncher shears. Skidding operations from the feller-buncher utilized a John Deere Model 648D wheeled skidder with swinging grapple.

The chunkwood processing concept was developed in the United States by the U.S. Forest Service through the North Central Forest Experiment Station in Houghton, Michigan and the Missoula Technology and Development Center. The experimental prototype used in this study involved modification of a Morbark Model 18 whole tree chipper. The chipping disk had been replaced with a involuted disk cutter assembly. The cutter wheel and cutting blades are positioned horizontally in the machine with two or three equally spaced blades used for chunking.

Hauling was conducted on the first two study areas and was constrained by the road system accessing the units. Road width and curve radii limited the type of haul unit that could negotiate the curves to three axle trucks without long trailers. The chunkwood also had to be kept separate from the usual hog-fuel loads at the Kettle Falls Generating Station so the hauling vehicles had to be capable of unloading themselves. Although the haul capacity was relatively small, 12 cubic yard dump trucks were used to haul the chunkwood. The trucks were modified with sideboards to allow 16.4 cubic yards of capacity.

S.3 SITE CONDITIONS

The first two study sites were located on the Colville National Forest in northeastern part of the state of Washington. Recovery operations were conducted in July, 1987. Sites were approximately 5 acres in size. Slopes were gentle, averaging 7 percent and ranging from 0 to 25 percent. The residue recovery site had been harvested the previous season (1986) and was originally scheduled for dozer piling as a means of slash disposal. The whole tree recovery site was part of a proposed commercial timber sale that had not sold because of the number and density of small sized stems. The third study module was conducted on the University of Idaho Experimental Forest near Moscow, Idaho. A 2.7 acre stand was thinned and the trees prebunched and skidded to roadside. Conditions for the sites and the amount of recovered chunkwood are summarized in Table S1.

Location of Complete Research:

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