they take more starting. Once started they will keep going on a flatter angle, probably down to 12° or even 10°, but the chutes can be, and are, used even on flat ground, for it is much easier to push half a dozen billets in the chutes than to carry one at a time to the truck. They are frequently pushed up hill in loading the trucks.

If the slope from the felling ground is not too steep the billets may be chuted directly into the truck, but if the ground is steeper than about 18° or 20° the billets travel so fast as to be dangerous, and it is then more usual to chute them into a heap a few feet above truck level. Loading can then be done in safety.

J. L. Harrison-Smith.

A NOTE ON BARK THICKNESS IN RADIATA PINE

During the course of a series of studies involving log measurements over the past three years, a record was made of bark thicknesses together with log diameters of radiata pine sawmill logs and felled trees.

These measurements have now been compiled to give average values for bark thickness as related to under bark diameter.

The measurements were taken on logs from trees planted at 8 ft. x 8 ft. spacing, and aged 26 to 29 years at time of felling.

Four hundred measurements were taken on the butts of trees felled in the course of thinning part of the David Henry Grove in 1953, and the balance were recorded in the course of mill recovery studies carried out at the Kinleith, Pinedale, and Maraetai sawmills during the years 1952, 1953, and 1954. Altogether, 11,163 measurements were used in the compilation.

Measurements from the sawmill recovery studies were taken on a representative range of end diameters of logs entering the mills. Log under bark diameters were recorded by half-inch classes, and represent the average of longest and shortest diameter where logs were elliptical. Bark thicknesses were taken only on logs showing normal bark in complete and uninjured form. Cases where the crosscut came through a knot whorl were excluded, as were all cases where the bark was abraded. Where the bark was fissured, the measurement aimed to record the typical thickness of the unfissured portions. That is, the bark thickness derived by the study is that which would be indicated by the difference between an over bark reading taken with a diameter tape, and the under bark diameter.

The chief value of the table as it stands is for the conversion of forest measurements taken over bark with diameter tape to the under bark equivalent.

For computation of actual bark volume where it is used as fuel, as is the case at Kinleith, it is necessary to apply a reduction factor to cover the loss in volume due to the fissures in the bark. It has not yet been possible to develop this aspect.

The following table has been derived from a graph on which total bark thickness was plotted against log diameter under bark. Total bark thickness, that is, double the radial measurement, was used. Thus, the table enables diameter measurements to be converted directly from over bark to under bark or vice versa.

TABULATION OF RESULTS

Diameter under bark inches	Total bark thickness inches	Diameter under bark inches	Total bark thickness inches
7	0.20	22	2.05
7½	0.25	22½	2.14
8	0.30	23	2.22
8½	0.35	23½	2.31
9	0.37	24	2.40
9½	0.40	24½	2.45
10	0.44	25	2.50
10½	0.46	25½	2.57
11	0.50	26	2.64
11½	0.59	26½	2.70
12	0.65	27	2.75
12½	0.72	27½	2.80
13	0.77	28	2.86
13½	0.82	28½	2.92
14	0.86	29	2.98
14½	0.90	29½	3.03
15	0.94	30	3.07
15½	0.98	30½	3.12
16	1.02	31	3.17
16½	1.08	31½	3.22
17	1.15	32	3.27
17½	1.22	32½	3.31
18	1.30	33	3.35
18½	1.40	33½	3.40
19	1.48	34	3.44
19½	1.57	34½	3.47
20	1.66	35	3.50
20½	1.75	35½	3.52
21	1.85	36	3.55
21½	1.95		

I. D. Hutchinson.