

The inability to build houses for married employees at Waipa and Kaingaroa has been met by the adaptation of grouped huts. The amenities of the Kaingaroa settlement have been improved by the installation of septic tanks.

57. *Water-supply and Drainage.*—The heavy rains experienced at Rotorua and referred to in last year's annual report have again been experienced. The corrective measures then put in hand have, however, been effective in preventing a repetition of the flooding around the mill. Heavy rain at Te Whaiti caused an unprecedented flood which seriously damaged a private sawmill. The loss to the State Forest Service was, however, relatively small and confined to road damage. It was on this occasion that over 9 in. of rain fell at Pongakawa in twenty-four hours—the actual amount being unknown because the gauge overflowed.

In order to give more effective fire protection, an examination has been made of all surface indications of water on the Kaingaroa Plains with the object of creating water-storage at strategic points. This virtually waterless area presents a serious difficulty in providing fire-fighting facilities, and further mobile equipment is necessary in conjunction with the development of water-storage.

58. *Utilization Plant.*—The performance of the Waipa Sawmill during its third full year of working speaks for itself. The sawmill register shows that its production last year of over 9,000,000 board feet is more than three times that of the next largest insignis-pine mill. Its output is quite easily the most accurately sawn timber in the country, with 1 in. stock having a thickness variation of $\frac{1}{8}$ in., as compared with anything from $\frac{1}{4}$ in. to $\frac{3}{4}$ in. variation in circular insignis pine. Likewise, its kiln drying yields the brightest and cleanest looking stock to be found in New Zealand and in startling contrast to the dirty, blue-stained product so characteristic of many other mills.

All these are both achievements and planned objectives. They are the result of painstaking study of the best sawmilling practices in the world and of the courage, enterprise, and perseverance of the Government and of Forest Service officers determined that the national forestry effort in establishing a huge and renewable resource of growing exotic timber shall not be frustrated and defeated by the application of its initial exploitation of archaic conversion practices as typified by lack of log sorting, by carriage sawing with either circular or band saws, or by log edging. For the sawing of small and/or knotty logs which the exotic forests must produce in overwhelming proportions for the next twenty years at least there is no known economic alternative to log-frame sawing of size-classified logs. That, at least, is the position in Northern Europe, with a timber-production one hundred times as large as that of New Zealand and with the necessity for competing on the world's markets not merely in respect to price, but as regards accuracy of sawing and brightness of appearance.

Still, in face of Waipa performance and irrefutable evidence from Northern Europe, there is a marked reluctance to accept the principle of log-sorting and frame sawing. Any alternative, indeed, appears acceptable, and yet not one such alternative has been advanced which was not considered and was not examined in some part of the world or other before the decision was taken to follow Northern European practice. What is more, Waipa experience during the last year has adapted the equipment to New Zealand's peculiar requirements. So rapid is the growth of insignis and other pines in much of the pumice country of the Rotorua Conservancy that up to 70 per cent. of the logs yielded by several species have a significant sweep in their length, so much so that if they are to be converted into sawn timber by circular or band-saw without excessive waste they must first be cross-cut into short 6 ft. to 12 ft. lengths, which, of course, much reduces the usefulness of the timber they produce. On the other hand, a method has been evolved at Waipa whereby this class of log goes through the first frame with its sweep in a vertical plane, yielding small slabs and side boards and a centre cant having side sweep. This cant is then sawn around the second frame, yielding a number of curved boards which are conditioned in the dry kilns to give perfect flattened stock. By this means small crooked logs which, by circular sawing, would yield only about $5\frac{1}{2}$ board feet of short timber per cubic foot of log yield 6.6 board feet of long-length timber per cubic foot of log. The evolution of this sawing practice is a far-reaching contribution to the country's timber economy and, if not now, will some day be universally recognized as such.

Although designed originally for an annual production of only 6,000,000 board feet—a figure which was exceeded for the first full year's working of the plant—the mill has been called upon each subsequent year for a material increase in output in order to meet essential war requirements. The first increase was obtained by improved operation, but to secure the 9,149,000 board feet required last year it was necessary to supplement the log-frame equipment with a small circular-saw rig to work up all the very large and rough logs yielded by shelter-belts, marginal trees, &c. Again for the forthcoming year the demand for pine for war purposes is more acute than ever before and additional frame equipment originally secured for a mill in the Conical Hills State Forest has been installed with a view to increasing production to 11,000,000 board feet. In one four-week period already a production of 1,040,000 board feet has been attained. This is production. That small-log sawing and also kiln-drying costs are the lowest in New Zealand is efficiency.

The only other developmental work undertaken during the year consisted of trials with a bolt-sawing rig and an incising-machine. It has been found in thinning Corsican pine stands that "wolf" and double-leader trees often yielded too short a butt log to be dealt with either in the log frames or in the conventional type of Pacific carriage. After a study of the various types of equipment used abroad it was decided that the greatest promise attached to a bolting-machine in which the log is carried on a carriage gripped at its ends rather than at one side. A representative rig was duly obtained, and while successful trials with Corsican pine have been instituted, the machine has proved even more useful for the