

It is worthy of note that this increase in load of the Power Boards, combined with the increase of other consumers' load also, has caused an increase of only 500 kw. in the maximum load on the power-house. The growth of load from date of purchase is shown in attached Figure 2.

For the present year it is estimated that the mining load and revenue will drop considerably, and the increase in revenue from the Power Boards will be practically equal to this, so that the total revenue will be almost the same. Expenses will be slightly higher, so that the net revenue will be a little lower.

As regards future prospects outside the original area of supply, supply is intended to be given to the Auckland and Franklin Power Boards and to Rotorua. The work for this should be completed before the end of the coming financial year, but it will have little effect on the financial position.

#### *Extensions during the Year and Future Extensions.*

(a.) Waihou Substation was put into operation in September, 1923, supplying power to the Thames Valley Power Board, in the Te Aroha - Morrinsville district. The 50,000-volt line connecting Horahora to Arapuni was completed, and is supplying power to Arapuni at 11,000 volts. No additional large consumers were supplied during the year.

The total system supplied from Horahora (on the 31st March, 1924) consisted of 86 miles of 50,000-volt lines, and 38 miles of 11,000-volt lines belonging to the Department, and 334 miles of 11,000-volt lines, 444 miles of 3,300-volt lines, and 371.5 miles of low-tension lines belonging to the Power Boards.

The connected load has increased from 19,565 kw. to 25,123 kw. during the year, an increase of 5,558 kw., or 28 per cent.; but the increase in power-house maximum load has been only 500 kw. The diversity has increased from 2.84 to 3.4, but is still lower than is usually found, owing to the low diversity of the two large mining companies.

(b.) *Extensions at Horahora.*—The additions to the headworks and generating station to accommodate two additional 2,000 kw. units have been in progress all the year, and one of the additional units should be ready by November, 1924, and the other by February, 1925.

(c.) *Additional Transmission-lines.*—The 110,000-volt line to Auckland is under construction. Difficulties have been experienced in making a final survey of the route which would be satisfactory from the point of view of possible interference with the Post and Telegraph lines, and difficulty has been met with in construction, owing to the wet nature of a considerable portion of the country. The opportunity was made use of during the dry weather to erect the poles on the worst portion of the route, south of Mercer. This line is to be completed by January, 1925. 50,000-volt lines to Rotorua (Ngongotaha) and to Waitomo (Hangatiki) are being surveyed, and should be completed in the coming summer.

(d.) *Substations.*—Plans have been prepared and material ordered for the Auckland Substation at Penrose, and the preliminary work for substations for Rotorua and Waitomo is in hand.

#### *Operation.*

(a.) *Headworks and Power-house.*—The maximum load of 7,400 kw.—i.e., an overload of 1,100 kw., or 18 per cent. on the plant capacity of 6,300 kw.—was carried without serious difficulty, although it was necessary at times to ask the Grand Junction Company to run their steam plant for power-factor correction, and to arrange for the Waihi Company to reduce their load slightly. In addition, the Grand Junction plant was called on for emergency or overhaul purposes on seven occasions during the year, for a total time of 75 hours, during which 42,400 units were supplied by steam power with a maximum load of about 1,000 kw., in addition to the company's own load at these times. Of this time, 20 hours was for line overhaul. As for last year, this co-operation between the two plants was of great value.

This is the first year in which it has not been considered necessary to shut the power-house down completely for some alteration or examination. During the year considerable sums were spent out of the maintenance fund on temporary improvements to the weir to enable more water to be got into the race, and for renewals on the turbines, now ten years old, to put them into good operating condition.

The power-house operated under overload almost daily throughout the year, and credit is due to the Superintendent and staff for maintaining and improving it under these conditions.

(b.) *50,000-volt Transmission-line, Horahora-Waikino.*—There were fourteen accidental stoppages on this line, for a total time of 46 hours 44 minutes. One of these was for 44 hours 34 minutes, this being due to a mechanical defect on a tower on the Mountain section, combined with telephone trouble. Wind and heavy rain made it difficult to locate the trouble. The other interruptions were of short duration, the longest being for 33 minutes. The standby supply minimized inconvenience to consumers. There were also seven prearranged interruptions, for a total time of 24 hours 42 minutes.

Two insulators (pin type) were replaced during the year. Orders have been placed and arrangements made to replace several of the towers on the Mountain section which show signs of deterioration.

(c.) *50,000-volt Transmission-line, Horahora-Hamilton.*—There were twenty-eight accidental stoppages on this line, for a total time of 7 hours 12 minutes, including one of 5 hours 2 minutes; also two prearranged interruptions, for a total time of 1 hour 7 minutes. Most of these accidental interruptions were only momentary, and the cause of them has been removed.

One insulator (pin type) was replaced.

(d.) *11,000-volt Lines.*—No insulators have been replaced on these, and the accidental interruptions have been only momentary.