

after a surge had put them out of parallel. The remaining four were due to No. 2 feeder switch opening on overload when the Hutt Valley Power Board were taking all load on No. 2 feeder, without first notifying Khandallah operators and getting them to set up the overload relays to a heavier current value.

Khandallah-Petone Railway Section.—Apart from prearranged shut-downs there were eight interruptions on this line, totalling 13 hours 57 minutes. Of these, one, of 12 hours 22 minutes, was due to a wire falling on the cross-arm of a pole, setting the arm and pole on fire, necessitating considerable work before supply could be resumed; one, of 1 hour 14 minutes, was caused by the Railway Workshops Fire Brigade, during a small fire in the workshops, switching the live feeder on to an earthed one; five were due to trouble on the main power-house-Khandallah line; one was due to surge caused by trouble on Wellington City Council system.

Sap-testing carried out on poles, also a good deal of work in straightening and re-ramming poles.

A three-mile extension of the 11,000 v. Hutt Valley line has been built for the Railway Department.

Transmission-lines: General.

On all 110,000 v. lines in service the usual maintenance work has been carried out, such as repairs to tracks and small bridges, tree-cutting, &c. In addition, all insulators, except on the Waipukurau-Napier line, have been tested by the buzz-stick method.

On the power-house-Khandallah, power-house-Bunnythorpe, Bunnythorpe-Wanganui, and Bunnythorpe-Woodville sections all units reported defective by the buzz-stick method have been removed and sent to Khandallah to be tested on the oscillator set there. On the other sections the work of testing the remaining insulators and defective units is being carried out as opportunity offers.

On most of the lines, also, a good start has been made in testing for the amount of sap or rot on transmission-line poles, and calculating their factors of safety. The sap is now in most instances getting fairly soft, and in some cases has entirely rotted at the ground-line. A few poles have been found that will shortly require replacement owing to the proportion of sap being found to be greater than allowed for in designing and laying out the various lines, but generally the allowance made when designing has proved ample, especially for poles of large diameter.

It may be noted from the above report that a large number of interruptions have been arranged during the present year. In all cases these have been arranged after consultation with the Power Boards concerned, and have taken place in most instances just after midnight on week-days and from 1 to 3.30 p.m. on Sundays, as it is found that these times are the most convenient for the Power Boards. It is also estimated that after the end of June of the present year there will be little necessity for prearranged shut-downs for some time to come.

The work at present being carried out during these shut-downs is to bring the lines up to the highest point of efficiency for future service, experience having pointed that our exceedingly windy conditions need more attention paid to clearances, &c., than seemed justified when the lines were erected.

Substations.

The apparatus at the various substations operated satisfactorily throughout the year. At Waipukurau Substation a pot-head broke down and had to be repaired. At all substations it was necessary to change the current-transformers and to test relays and instruments. This work required prearranged shut-downs of short duration. Napier Substation was livened up at 110,000 volts on the 20th March, 1927.

CONSTRUCTION.

Headworks.—The road between Shannon and headworks has been kept in constant repair. The tail-race has also been protected from erosion by the placing of groynes and other protective works along the banks of the stream. Several bridges have been built across the tail-race for giving access to property across the stream.

Fair progress has been made on Mangahao No. 3 dam. During the year over 33,900 cubic yards of metal were passed through the crushers. Concreting did not commence until August, 1926, and to date 25,583 cubic yards of concrete have been poured. Work on No. 3 dam has been carried out in three shifts of eight hours. The average number of workmen employed is about 250, while the labour turnover is practically nil.

This section of the work is described in detail in the Engineer-in-Chief's Report.

Power-station.—During the year a considerable amount of work at the power-station has been carried out, this work including the installation of water-level indicators and wiring of same to power-station. The electric motor operating the gate at Arapeti has been wired ready for operation. The generator rheostats have been fitted with illuminating signal device so that the position of the regulator could be seen at any moment.

So that constant time and frequency control could be maintained a Warren clock was installed on the operating-gallery, and to ensure correct time each day a wireless time-receiving set was installed, so that the time signals broadcasted from the Observatory are received and the station synchronous clock checked each day. Definite time relays have been installed on the 110 kv. outgoing lines. The new induction regulators for the Horowhenua Power Board 11,000 v. feeders were received and have been installed. Fire-protection equipment has been installed. To facilitate the handling of the petrol for the line cars a bowser was installed near the power-house. General clearing up and dismantling of temporary buildings was also carried out.

Khandallah Substation.—During the year the high-tension testing equipment, including a 250 kv. transformer and 250 kv. high-frequency oscillator, was installed for the testing of insulator and other allied material.