

Waiohā for the Bay of Plenty Power Board, at Kerepehi and Matamata for the Thames Valley Power Board, and an additional substation at Huntly is being provided to supply the growing load of the Central Power Board at that point. Considerable alterations to provide for the increase of load are to be made at Waihou, and also at Waikino for the control of the Bombay-Waikino line, and the two existing lines to that point. A 1,500 kv.a. synchronous condenser is to be installed at Waikino.

OPERATION AND MAINTENANCE.

Headworks and Power-house.

During the year the system peak load increased from 11,860 kw. to 14,160 kw., and the maximum load on the Horahora plant increased from 11,400 kw. to 12,400 kw. The Horahora plant has been running under almost daily overload throughout the year, and credit is due to the Station Superintendent and staff for the satisfactory maintenance of the plant under these conditions. The ventilation has been improved by cutting openings in each generator-pit to allow access of air from underneath, and the performance of No. 1 turbine has been improved by putting a deflector in the head-race, which has overcome the tendency for debris to settle on the racks in front of this machine.

The following troubles have been experienced with the plant: A flashover damaged one of the line entrance bushings and necessitated replacement of it; a condenser bushing in No. 3 transformer-bank 50 kv. oil circuit-breaker failed, and was replaced; No. 7 generator cable broke down, probably because of overload, and was replaced by an overhead connection from power-house to transformer-house. In addition to the above, partial blockage of transformer-cooling coils, overheating of some of the connections and switches due to overload, and the usual wear on the turbine gate-operating gear have been the chief matters requiring attention. As in previous years, the screens have required continual attention to keep them clean. All turbines were overhauled during the year.

The McLaren's Falls plant (Tauranga Borough Council) has supplied power regularly throughout the year. The amount taken was increased as the demand grew, and in addition it became necessary towards the end of the year to run the Grand Junction plant during the peak periods.

Transmission-lines.

The system of lines supplied from Horahora consists of the following:—

- (1) Horahora-Arapuni-Ngongotaha line, supplying power at Arapuni and Rotorua.
- (2) Horahora-Waiorongomai-Waikino, supplying power at Waihou over a five-mile branch line from Waiorongomai, and at Waikino. It connects at Waikino with a thirty-two-mile line to Aongatete and McLaren's Falls Power-station.
- (3) Horahora-Claudeland-Bombay-Penrose-Henderson-Takapuna line, supplying power at Bombay, Penrose, Waitemata, and Takapuna, and connected at Penrose to the Auckland Power Board's steam plant at King's Wharf. This line can also be connected at Hamilton to line No. 4.
- (4) Horahora-Mystery Creek line, branching north to Hamilton and south to Te Awamutu and Hangatiki, and supplying power at Hamilton, Te Awamutu, and Hangatiki.

Interruptions.—For purposes of recording interruptions to service on lines, these four main branches are divided into the different sections between points of supply. One such section may in most cases be out of service while emergency supply is being given from one of the other sources of supply, so that the record of interruptions applies only to lines, and not to service to consumers. Apart from prearranged shut-downs, the interruptions are scheduled for the various lines hereunder:—

Horahora-Waiorongomai: Five interruptions, totalling 53 hours 46 minutes, due principally to insulator failures.

Waiorongomai-Waikino: Six interruptions, totalling 70 hours 11 minutes, of which five were directly attributable to the faults originating on the Horahora-Waiorongomai Section. The other interruption was due to insulator failure.

Waiorongomai-Waihou: The eight interruptions on the section, totalling 22 hours 49 minutes, were entirely due to faults originating on the other sections of the system.

Horahora-Arapuni: One interruption, of two minutes' duration, due to fault on Waikino section of the system.

Arapuni-Ngongotaha: No interruptions due to line faults.

Horahora-Mystery Creek: Two interruptions, totalling ten minutes, one of which was due to insulator failure and the other to fault on Waikino section previously mentioned.

Mystery Creek-Hamilton: Two interruptions, totalling 1 hour 32 minutes, one of which was due to insulator failure and the other to fault on Waikino section previously mentioned.

Mystery Creek-Te Awamutu-Hangatiki: No interruptions due to line failures.

Horahora-Penrose: No interruptions due to line failures.

In addition to the above sectionalized line failures, there were twenty-nine interruptions, totalling 16 hours 51½ minutes, the principal ones being: 4 hours 47 minutes whilst connecting in loop line of 110,000 v. line; 3 hours 10 minutes due to a faulty bushing on oil circuit-breakers at Waikino; 2 hours 1 minute due to a broken terminal on switch at Hamilton; and 53 minutes due to a faulty high-tension bushing on transformer at Arapuni. Others of short duration were due to a variety of causes—i.e., cable faults at Penrose and Arapuni, faulty bushings on transformers, also surges on the system tripping the oil circuit-breakers.

A considerable amount of tree-cutting has been carried out during the year, with good results. Live-line insulator testing and replacement has been carried out during the year, following on instruction given to the linemen in May, 1926.