

Waikino-Waihi.—A number of corroded steel-tower members were replaced by reconditioned parts.

Arapuni Village.—Five new 30 ft. poles were erected for service lines.

Grand Junction Tap and Hamilton-Frankton.—These lines gave satisfactory service throughout the year.

(iv) *General.*

Maintenance.—Routine patrol and maintenance work was carried out on the various lines and access tracks, live-line testing of insulators was carried out on the 110 kV. and 50 kV. lines, poles were tested by boring, and grub-holes in poles were cleaned out and filled with compound.

Insulator Replacements.—The results of live-line testing are as follows:—

	110 kV. Units.	50 kV. Units.	50 kV. Pin.
Number tested	49,065	11,393	13,852
Number defective by test	1	..	187
Number defective by inspection	2	8	34

Total number tested, 74,310; total number defective, 232; percentage defective, 0·312.

Of the 221 defective 50 kV. pin insulators all but four were part of shipments of two makes purchased in 1920 and 1924-25 respectively, and which are being replaced whenever opportunity permits. Twenty-seven defective 50 kV. pin insulators were replaced with the use of live-line tools.

In addition to the insulators listed above, twelve cracked pin insulators and one that failed in service were replaced on 11 kV. lines.

Pole Replacements.—Fifty-two defective poles consisting of twenty 52 ft., one 50 ft., one 45 ft., sixteen 42 ft., three 38 ft., and eleven 25 ft. poles were replaced. Of this number, twenty-one I.B. and fifteen M.A.H. poles had decayed heartwood, five I.B. and five M.A.H. poles had decayed or extensive knot-holes, three silver-pine poles were damaged by fire, two I.B. poles were shattered by lightning, and one I.B. pole was replaced on account of slimmess.

(d) TESTING.

In addition to the routine testing of instruments, meters, relays insulators, &c., installation tests were made on new equipment at Arapuni, Horahora, Penrose, Bombay, Henderson, Takapuna, Mareretu, Maungatapere, Waihou, Matamata, Ngongotaha, and Rotoiti, and a preliminary test was made on the on-load tap changing transformers and control gear for Ongarue. Tests were made on all 110 kV. and 50 kV. bushings, and check tests were made on a number of bushings with the Schering Bridge.

Work carried out at Arapuni included current-meter and salt-efficiency tests on No. 7 turbine; tests for speed of response of regulators, and open and short-circuit characteristics of Nos. 7 and 8 generators; and pressure tests on No. 2 generator windings after the completion of repairs.

(e) GENERAL.

System Operation.—For normal operation Arapuni Power Station was run continuously in parallel with the Mangahao-Waikaremoana system. Assistance was given by Horahora Power Station for one load shift daily five days a week, with the exception of holidays, until 9th January, when the running-time was increased to one load shift every day to improve voltage regulation on the Waihou line.

Owing to lack of rain Arapuni was called on to give a considerably increased supply over the Stratford line in February to assist the southern stations in conserving water, and Horahora running-time was increased to twelve load shifts a week on 2nd February, and to continuous operation on 5th April.

The Penrose Diesel plant was put on load for two days in March, and King's Wharf steam-station was put on load on 5th April and has continued to operate as required by Arapuni. The heavy loading on Arapuni, together with a decreased flow in the Waikato River, resulted in the level of water in the headrace at Arapuni being below the spillway crest for several weeks.

Assistance has been given to McLaren's Falls supplying Tauranga Borough Council on five to seven days a week, as required, since July, 1938.

Load.—The units generated at Arapuni, Horahora, and Penrose totalled 607,263,950, an increase of 10·8 per cent. over the total output in the previous year. Units actually sold (within the district) totalled 450,205,766; net supply to the southern system totalled 105,713,550 units; and units used by auxiliaries totalled 3,370,020. The balance of 47,974,614 units represents transmission and distribution losses amounting to 7·90 per cent. of the total output.

The maximum load on the generating-plants was 120,000 kW., compared with 96,856 kW. in the previous year, and the maximum load excluding supply to the southern system was 100,920 kW., compared with 84,140 kW. in the previous year. The average load factor was 57·77 per cent.

The total connected load increased from 500,795 kW. to 598,707 kW., and the demand factor or ratio of maximum load to connected load, excluding supply to the southern system, was 16·86 per cent.