

The number of milking-machines supplied increased from 5,493 to 5,868 (Table VII), electric ranges from 3,420 to 3,824, and electric water-heaters from 8,229 to 8,593. These are exclusive of Auckland figures.

The system maximum load (exclusive of Auckland) has increased from 17,600 kw. to 18,710 kw. The demand factor for the year was 17.5 per cent.

(b) *Power-stations.*

Arapuni.—Construction work at Arapuni during the year included the installation of No. 4 unit, No. 4 bank of transformers, two units (each consisting of turbine, A.C. generator, and D.C. generator) for auxiliary power-supply, and the necessary switch-gear for these different items. Of these, No. 4 bank of transformers was completed in July, 1931. No. 4 unit erection was started in June, 1931, and completed, except for some details, in March, and the auxiliary units were placed in the power-house ready for assembling in March.

Earthing-switches were installed on the outgoing 110 kv. lines.

Horahora.—An induction regulator was installed to regulate the voltage on the 11 kv. line to Cambridge.

Huntly Steam Plant (1,500 kw.).—This plant was put into regular service on the 6th April, 1931.

(c) *Transmission-lines.*

Survey work was continued on the Arapuni—Edgecumbe, Henderson—North Auckland lines up to the end of May, when these surveys were stopped and staff was concentrated on completion of survey work on the Arapuni—Stratford line.

This latter line is to be of wood-pole construction from Arapuni to Tatu, near Ohura, and of steel-tower construction in the rough country between Ohura and Stratford. A contract for cartage of poles was let in June, 1931, but work had to be suspended in August, and it was started again in October.

Pole fitting and erection was started on 15th October, 1931, and main-line wiring and telephone erection in January, 1932, and at the end of March, 229 structures out of a total of 540 on the Arapuni—Tatu wood-pole section had been erected, and 122 wired, and about 220 telephone-poles, out of approximately 1,200, had been erected and wired.

(d) *Substations.*

Penrose (Capacity: 110/22 kv. 60,000 kv.a., 22/50 kv. 5,000 kv.a.).—Installation of three new 22 kv. switch-gear panels was completed in August.

Installation of Merz-Price protective relays on the main transformer-banks was completed.

Bombay (Capacity: 110/50 kv. 5,000 kv.a., 50/11 kv. 3,000 kv.a.).—The new steelwork required for the second bank of transformers was erected, and alterations were made to the existing steelwork to allow of the installation of four 50 kv. O.C.B.s.

Takapuna (Capacity: 50/11 kv. 2,000 kv.a.).—Four new 750 kv.a. single-phase transformers were dried out and made ready for emergency service if required.

Te Awamutu (Capacity: 50/11 kv. 1,500 kv.a.).—The new switchgear controlling the Hangatiki line, &c., was installed.

4. OPERATION AND MAINTENANCE.

(a) *Power-stations.*

Arapuni.—Except for transmission of power through the 50 kv. gear from Horahora to the Bay of Plenty line, this station was not in service during the year.

The flange of the foundation ring of No. 1 turbine was chipped to give slightly larger clearance for the runner while this unit was dismantled. Other maintenance work of a routine nature was carried on during the year.

Horahora.—Maintenance work included the following: Mechanical: Overhaul and replacement of all runners on No. 4 unit and of runners and guide castings on No. 6 unit. Installation of some new sections of screen of an improved type.

Owing to loss of station excitation on several occasions due to stoppage of motor-generator exciter sets from low voltage during line troubles, the six original generators were run on their own exciters as from November, 1931.

Penrose Diesel Plant.—This plant operated successfully during the year.

Grand Junction Plant.—The remaining unit of this plant was run regularly in April, May, and June, and was finally closed down in July, 1931; after which a good deal of work was done on overhaul of the boilers and preparing the plant against deterioration while not in use.

Huntly Steam Plant.—Failure of the L.P. labyrinth caused a shut-down of this plant for ten days, a new labyrinth having to be made locally for replacement.

(b) *Transmission-lines.*

There were only two cases of breakdown of insulators in service during the year, both of these being pin insulators, as compared with four last year; 326 defective pin insulators and 29 strain or suspension units were located by live-line testing or otherwise and replaced, as compared with 330 and 97 the previous year.

A total of 65 wood poles was replaced (by 62 poles) during the year, compared with 92 the previous year.

On all lines during the year there were a total of seventeen accidental interruptions, involving outages of the lines on which they occurred of a total time of 32 hours 48 minutes, compared with twenty-nine interruptions and 26 hours 58½ minutes for the previous year.