

(e) Consumers' Installations.

Contracts were let to change over those consumers' installations which were on the old fused neutral system to the multiple-earthed neutral system, and this work is nearing completion. Satisfactory progress is being maintained with the re-inspection work.

(f) General.

Overhauling distribution transformers in the field was continued during all but the winter months, a new lorry having been delivered for this work and improved handling facilities provided. Besides being engaged on construction work the workshops staff has carried out transformer overhauls and the making up and repairing of distribution equipment.

Earth-testing has been organized on a basis commensurate with the requirements of the Electrical Supply Regulations 1935.

Test-work consisted of investigation into voltage complaints, checking transformer loading for the distribution department, testing of rubber gloves, relays, and over 1,500 consumers' meters.

(g) Units generated and purchased.

Generated at Monowai	25,597,100
Generated at Waitaki and supplied to Southland	1,710,570
Generated by steam (Invercargill)	2,889,484
Units obtained from other sources	1,286,916
Total	31,484,070

Of these, 23,694,225 were sold; the balance, representing losses, totalled 7,789,845, or 24.74 per cent. of the total units.

DESIGN OFFICE.

A. Electrical Section.*(a) Introductory.*

The year under review was one of exceptional activity in design work in connection with the various hydro-electric systems.

The wider use of electricity for primary and secondary industries, domestic heating and cooking, general heating and traction, along with higher standards of artificial illumination and a continued decrease in the average price per unit, have all contributed to an accelerated growth of load in both Islands.

In 1938 the peak load approached the installed generating-capacity in the South Island and exceeded it in the North Island, and as no additional generating-plant has since gone into commission it has been necessary to call on fuel-plants in the latter to assist in carrying the load this winter. The position has been somewhat accentuated by the increased demand due to the unusually cold winter, and also by depleted water-power resources following a very dry summer.

(b) Hamilton District.

Arapuni Power-station.—Drawings were prepared for tendering purposes for two additional generating-units and associated equipment. These units, which will be Nos. 5 and 6 of the ultimate development, will each include a Francis turbine rated at 30,000 b.h.p., and an 11 kV. alternator rated 21,600 kilowatts at 0.9 power factor. Each generator will be direct coupled to a 24,000 kVA 11/110 kV. transformer bank, all switching being carried out on the 110 kV. side. The addition of these units will increase the installed generating-capacity of the station to its ultimate capacity of 146,700 kilowatts. Drawings were prepared for tendering purposes for the two 24,000 kVA. 11/110 kV. transformer banks, and for the 110 kV. switchgear and steelwork. The latter includes controlling switchgear for outgoing transmission-lines to Edgecumbe and Bunnythorpe substations in addition to switchgear for the new generators. Specification was prepared for air-conditioning equipment for the control-room, and alternative designs for the air-circulating arrangements.

Belmont Substation.—The existing 50 kV. lines to Takapuna are to be extended to a new substation at Belmont to provide an additional source of supply to the Waitemata Power Board. The initial equipment for this substation will include two 5,000 kVA. 50/11 kV. transformer banks. A preliminary layout drawing of the substation was prepared, and drawing of proposed transformer banks for tendering purposes. The transformers will be fitted with automatic on-load tap-changing equipment.

Bombay Substation.—Drawings were prepared for tendering purposes for one 10,000 kVA. 110/50 kV. and two 3,000 kVA. 50/11 kV. banks of transformers. The latter, which will replace existing 1,500 kVA. banks, are fitted with automatic, on-load, tap-changing equipment.

Edgecumbe Substation.—An arrangement drawing, as well as a preliminary layout-drawing, was prepared for temporary supply at 50 kV. from the new 110 kV. Arapuni-Edgecumbe transmission line.

Hamilton No. 1 Substation.—Floor and foundation details were prepared for the 11 kV. iron-clad switchgear which is to replace existing switchgear of insufficient rupturing-capacity for present-day requirements.

Hamilton No. 2 Substation.—A drawing was prepared for tendering purposes for a 10,000 kVA. 110/50 kV. bank of transformers.