

For the Lyttelton-Christchurch electrification the design office prepared layout drawings covering the electrical equipment for the guidance of the electrical staff, and drawings in connection with the new arrangement of the 11,000-volt switch-gear in Woolston Substation were also prepared.

GENERAL.

In connection with the electrification of the Lyttelton-Christchurch line, a contract was let in August, 1927, for supply of two 1,350 kw. rotary converters, together with all switch-gear for conversion of 11,000 volts A.C. to 1,500 volts D.C. A contract for the substation building at Woolston to house this equipment was let in April, 1928. Considerable delay was experienced in delivery of equipment and in completion of the building. The machinery commenced to arrive about the middle of October, 1928, and despite difficulties due to unfinished state of building and non-arrival of certain apparatus the full equipment was installed, dried out, and tested at the end of January, 1929. Actual supply for electrification purposes was available at the beginning of February, and the formal opening of the line took place on the 14th February, 1929.

During the year the construction work for the Lyttelton-Christchurch Railway electrification supply at Woolston Substation was completed, a special duplicate circuit 11 kv. line being constructed for this purpose. This line was completed and tested on the 12th January, 1929.

An annexe to the above substation has been used to accommodate 11 kv. switch-gear for the supply of local consumers by the Department, and the low-tension supply to all wholesale consumers supplied by the Department has been converted to 11,000 volts, and on the removal of the old substation these consumers will be supplied through the new 11 kv. switch-gear.

During the year two areas of supply have been sold to local supply authorities: (1) The Department's consumers north of the Waimakariri River, to the North Canterbury Electric-power Board; (2) the Department's wholesale consumers in the Hornby-Islington area, to the Springs-Ellesmere Power Board. The North Canterbury Power Board took over all the Department's reticulation north of the Waimakariri River on 1st July, 1928.

In February, 1929, several main-line interruptions were caused by a continued period of fogs coupled with dust where the lines parallel roads, and it was necessary to employ gangs of men to wipe down insulators between Addington and Aylesbury on the south and middle lines, and between Addington and Bealey on the north line.

The construction of the North Canterbury duplicate circuit 33 kv. line was completed and put into service at 11 kv. on the 15th March, 1929. This supply will be changed to 33 kv. on the installation of the new outdoor transformer-banks at Addington.

The new outlet weir at the lake was completed in April, 1929, thus bringing the normal level of the lake to 1,672 ft.

INSTALLATION OF NO. 1 GENERATING-UNIT.

During July, 1928, the work of installing the third 7,500 kw. (8,830 kv.a.) generating-unit was commenced. The weir-basin has been completed and the tail-race widened. At the 31st March last 1,340 ft. of pipe-line had been fitted and riveted up. To date (30th June, 1929) the pipe-line has been completed with the exception of the closing-piece at the power-house, and the generating-set bed-plate has been grouted in and part of the turbine and generator lined up in position.

RAINFALL.

The rainfall at the power-house for the year was 36.28 in., and the number of rainy days was 132—a record.

MANGAHAO ELECTRIC-POWER SYSTEM.

FINANCIAL RESULTS.

The capital outlay at the close of the year was £2,416,713, as against £2,373,921 for the previous year, an increase of £42,792, which is analysed in Table X. The net revenue for the year was £114,148 5s. 6d., as against £44,111 15s. 2d. for the previous year, an increase of £70,036 10s. 4d., or 158.8 per cent.; and the gross revenue for the year £186,712 12s., as against £155,856 10s. 1d., an increase of £30,856 1s. 11d., or 19.8 per cent. The increase in net revenue is largely due to a reduction in the amount of power purchased from outside sources. During the year power purchased cost £72,563 6s. 6d., as against £111,744 14s. 11d. for the previous year, or a decrease of 54 per cent. Included in power purchased during the year is £15,038 9s. 4d. from Waikaremoana hydro-electric power scheme, which is a credit to that scheme and a debit to Mangahao. Working-expenses were £34,344, as analysed in Table XI. The gross financial results of the system are analysed in Table XIII.

OPERATION AND MAINTENANCE.

Headworks and Power-house.

Storage was available in the upper Mangahao dam from the beginning of the year, heavy rainfall in April filling the dam and causing the automatic gates to tip. Several minor troubles were thus brought to light, but these have been rectified and the gates have since functioned satisfactorily. For several short periods during the year the storage was insufficient to meet the demands on the station, and it was necessary to call on stand-by plants to give relief. Since generation was commenced by the Waikaremoana Station the number of such calls has been reduced considerably, and it has been possible to maintain ample storage in the Mangahao dams. A water-level indicator has been installed at the upper Mangahao dam, and is operating satisfactorily, as are those at the two other dams and at the surge-chamber. Painting has been carried out on the pipe-lines, and the surge-chamber-gate