

The live-line (or buzz-stick) method of testing insulators has been used during the year to determine the condition of practically the whole of the line-insulation of the scheme.

Another seven linesmen were trained in the testing-work early in the year, and, but for the Waipukurau-Napier section, which was only livened at 110,000 volts on the 20th March, 1927, all sections on 110,000 v. lines have been gone over. After each batch of insulators which had tested faulty by the buzz-stick was removed from the line they were shipped to Khandallah and tested on the 250,000 v. oscillator set. Those units standing up to the flashover tests were then subjected to an immersion test and then retested, which often brought to light hidden flaws.

At the beginning of the year it was noticed that some insulators which showed faulty by the buzz-stick method proved sound by the flashover and immersion tests, and eventually it was found that weather conditions materially affected the buzz-stick tests. However, this was overcome by the linesmen gradually gaining experience in the work and being able to pick days suitable for testing.

A few of the power-station and substation operators were trained in the testing, particularly as applied to post and bushing insulators.

The year's experience of live testing of insulators has shown that, generally speaking, the insulation of the lines is in very good condition, and by periodical retesting there is no doubt that the insulation of the lines can be maintained at a very high standard, and the chances of line-insulators failing whilst in service practically eliminated.

During the year the surveys of the transmission-lines in connection with Waikaremoana scheme have been completed. These were the surveys of the line from the substation at Taradale to the power-house site at Waikaremoana. This line is to be a double-circuit steel-tower line, and the towers and wire have been ordered. The surveys of the 50,000 v. wood-pole line from the power-house site at Waikaremoana to Gisborne were also completed, and surveys made and substation site acquired at Gisborne.

WAIKAREMOANA POWER DEVELOPMENT.

The plant originally erected in 1922, partly to provide power for the construction of the major development and partly to supply power to the Wairoa Power Board, continues to be operated under lease by the above-mentioned Board. The total connected load is now 2,571 kw., and the maximum demand on the station reached 1,010 kw. during the year. The installed capacity is now 1,750 kw.

The financial results for the year ending 31st March, 1927, are as follows:—

	£
Capital (including initial losses)	185,703
Annual capital charges (interest and depreciation)	6,771
Revenue	2,404

leaving a loss of £4,367 on the year's operations.

Major Scheme.—Work on the major scheme has progressed rapidly during the year under review, and is dealt with more fully in the Engineer-in-Chief's report. The headworks and power-house are well under way, and contracts have been let for the supply of the first two 20,000 kv.a. hydro-electric sets together with the necessary switch-gear and transformers for 110,000-volt operation.

Contracts have also been let for the supply of steel towers and copper for the transmission-line from the power-house to Taradale Substation, at which point connection will be made with the existing 110,000-volt lines from Mangahao. Similarly, a contract has been let for the supply of poles and conductors for the 50,000-volt line to Gisborne. The plant is expected to be ready for operation in the early part of 1929.

INVESTIGATIONS, SURVEYS, ETC.

Investigations have now proceeded sufficiently far to enable a fairly definite pronouncement to be made on the future policy to be adopted in providing additional power for the Canterbury District. In considering this matter an endeavour has been made to look at the position with as broad a view as possible. Any works that have to be provided for this purpose will involve very heavy capital expenditure, and must be designed to meet the needs of the districts to be served for a considerable period ahead. They must also be designed so that the requirements of any one district are not catered for at the expense of other less fortunate districts.

The first point for consideration is therefore the prospective load for a considerable period ahead, and the capabilities of the existing plants to supply the demand. The value of comparatively large generating plants interconnected by transmission-lines is now generally accepted. The obvious adoption of this policy on the eastern side of the South Island (Canterbury and Otago) is that we should have an extra-high-tension main transmission-line running from north to south through Canterbury and Otago, and that this transmission-line should be tapped at various points by main substations to supply the various load-centres, and supplied with power at various points where such power can be most economically supplied.

The nucleus of such a system already exists in the main transmission-line recently completed between Oamaru and Hororata and Addington, which will undoubtedly at a later date be extended to link up with the existing transmission systems in Otago and Southland. This line is now tapped to supply load at Addington, Hororata, Ashburton, Timaru, and Oamaru, but at present is supplied with power at only one point—viz., Hororata—where the main lines from Lake Coleridge feed in power. In selecting the point at which more power has to be fed into this main transmission-line several main factors have to be taken into consideration:—

- (1) The cost at which power can be generated at the generating-station and supplied to the main line:
- (2) The location of the feed-point in respect to the centre of gravity of the load and prospective load to be supplied: