

taken off the line, have been thoroughly tested with the 125,000-volt oscillator, 100,000-volt transformer, and 1,000-megohm megger, and these tests in conjunction with those being made elsewhere have enabled the trouble to be fairly definitely determined as consisting in an undue concentration of electrostatic stress, due to the design of the insulator and to incipient porosity in the material, resulting in occasional breakdowns of the transmission-line with no apparent external cause. Sample shipments of other standard types of insulators are on order, and an ideal design has been worked out which it is anticipated will overcome the greater part of the difficulty.

In addition to this cause of breakdown, several interruptions occurred owing to pieces of bark being blown across the lines from the adjacent gum-trees. This source of trouble is also being dealt with drastically by the removal of gum-trees in the proximity of the lines.

In spite of these difficulties a very satisfactory record for continuity of service has been maintained, due to the high state of efficiency to which the patrol and breakdown organization has been developed.

There was a total of sixteen actual interruptions to service during the year, thirteen of these being momentary interruptions of less duration than one minute. Of the three interruptions in excess of one minute, only one was of a serious nature, but being at night (1.43 a.m.) it caused no industrial inconvenience. Particulars of these three stoppages are as follows :—

Date.	Hour.	Period of Interrup- tion.
April 30	1.43 a.m. ..	51 minutes.
May 19	12.26 p.m. ..	3 ..
October 18	7.24 p.m. ..	1½ ..

The total number of insulators replaced during the year owing to failure from all causes was forty-seven out of 5,220 insulators in service—that is less than 1 per cent. compared with the usual replacements of extra-high-tension insulators in American systems, amounting to 10 to 25 per cent. each year.

DISTRIBUTION SYSTEM.

Several additions have been made to the reticulation system during the year. The length of primary 10,500-volt feeders in service has been increased from 57¾ to 60¼ miles, made up as follows, all feeders being in duplicate :—

					On 31st March, 1917.	On 31st March, 1918.
					Miles.	Miles.
City Council (Armagh Street)	..	..	..	..	2¼	2¼
City Council (Montreal Street)	..	..	..	..	1½	1½
Tramway Power-station	..	..	..	..	2½	2½
Northern feeder	..	..	..	..	19	20
Southern feeder	..	..	..	..	23	24
Lyttelton feeder	..	..	..	..	9½	9½
Addington local feeder	..	..	..	..	..	½
Totals	..	..	..	..	57¾	60¼

The 3,000-volt reticulation has been increased during the year from 6½ to 10 miles. Low-tension 400/230-volt reticulations have been carried out by the Department in the following districts during the year :—

District.	Number of Consumers	
	On 31st March, 1917.	On 31st March, 1918.
Kaipoi Borough	..	214
Paparua County	118	137
Halswell County	..	27
Eyre County	..	49
Rangiora County	6	13
Totals	124	440

A very striking feature of the year's development has been the increasing insistence of the demand from country districts for a supply of power. The supply of electricity is much appreciated in the country districts already supplied, there being twenty-five milking plants driven by electric motors in the Tai Tapu Company's area of supply, and twenty in the Eyre County.