

Though the generators have operated without mishap, the turbines have now begun to give a considerable amount of trouble, and frequent replacements of certain spare parts have had to be made within the last few months. It is hoped, however, that the trouble is a passing one, and indications are that the matter has been remedied for the present.

The transmission-line insulators have given further indications of an increasing deterioration in quality. At one period the replacements became so frequent that the stock of spare insulators was seriously reduced, and very considerable delay and difficulty has occurred in obtaining delivery of spares on order.

No serious trouble occurred during the year on any of the distribution-lines, and all the switch-gear and transformers have operated satisfactorily.

Interruptions to Service.—Transmission-line.

During the past twelve months only three breakdowns occurred which involved interruptions to the service of over fifteen minutes' duration, and of these two were due to abnormal snow conditions, causing both lines to be affected simultaneously.

The first interruption was on the evening of the 1st September, the fall of snow being of unusual severity both in the city and towards the power-house. The north line failed at 6.28 p.m., but service on the south line was maintained during the night. At 10.45 a.m. on the following day the south line also failed. Despite all efforts to locate the faults, it was not until 1.30 p.m. that the service could be restored, causing a total interruption of two hours forty-five minutes.

The second interruption occurred on the 21st September. After a severe gale heavy snow fell in the area beyond Snowdon, and the south line failed at 9.45 p.m. Before it could be restored the north line also failed, at 11 p.m. The severe weather conditions caused considerable trouble and delay in restoring the service, which was not resumed until 6.50 a.m., thus involving a total interruption of seven hours fifty minutes, fortunately during an off-load period.

The third interruption occurred on the 6th March, 1920, when very foggy conditions existed on the plains. Unfortunately both lines broke down simultaneously, at 1.14 a.m., and owing to the great number of insulators on both lines requiring replacing it was 5.30 a.m. before the service could be resumed. The period of interruption in this case, four hours sixteen minutes, occurred during night hours, and therefore with a minimum of inconvenience.

Apart from these serious cases due to special circumstances, the total period of interruptions for the year does not exceed fifty minutes.

Serious as the interruptions have been, the circumstances were in each case abnormal, and, though snow in such quantities may not be expected frequently, it is obvious that the line-construction will require to be of such a nature as not to be affected when such snowfalls do occur. The present insulators do not give a standard of construction providing this degree of reliability, but, from the indications already obtained as to the improvement in the manufacture of pin type porcelain insulators, there is every reason to believe that when the present insulators have been entirely replaced by a later type a much greater degree of reliability will result.

While the bulk of the interruptions have been due to faulty insulators, a certain number have occurred as the result of breaks in the aluminium wire on windy sections of the line, and arrangements have already been made to replace the aluminium with copper.

Water-storage.

Though snowstorms were experienced during last year, the winter was not consistently wet, and the frequent rains resulted in there being no sustained accumulation of snow, and the consequent absence of any pronounced thaw in the spring. As a result the lake-level did not recover as has been the case in previous years. The chart giving a record of lake-levels shows a recovery of only 18 in. above last year's lowest level—i.e., a rise from 1,664½ ft. in September to 1,666 ft. in November—the maximum level recorded during the year being 18 in. below overflow level. Since then the fall has been at practically the same rate as in previous years. Though the tunnel enters the lake at about 20 ft. below its surface, the lip of rock between the tunnel-mouth and the intake gates is the limiting level controlling the flow of water. It has therefore been necessary to reduce the level of the lip as the lake-level fell.

The diversion of the Harper River has always been included as part of the hydraulic development required with the installation of the fifth generator, and is now in hand, but work on the intake lip must be completed before the diversion of the Harper River is carried out. The deepening of the lip is therefore a recognized part of the work, and is being carried out under those conditions which were known to be necessary for its completion.

Selling-rates.

The Department is still giving supply on rates published in June, 1918, and in the case of the majority of wholesale consumers supply is being continued upon contracts negotiated four or five years ago, at prices which then compared favourably with any alternative source of power, and which at the present time provide supply at a rate recognized to be exceedingly favourable.

New Industrial Developments.

Owing to the restrictions placed upon supply as the result of the shortage of power, it has not been possible to give any encouragement to the development of new industries or special applications of electric power.

The Canterbury Frozen Meat Company at Belfast has installed electric plant for operating the freezing-works, but at present is limited to night supply only. Messrs. Kempthorne Prosser are erecting chemical-works at Hornby, but cannot be given supply for the present. A new woollen-mill has been erected by the Kaiapoi Woollen Company in Woolston, but power cannot for the present be supplied for its operation. Messrs. Waddell's 1,200 kw. steel furnace at Sockburn has been operated to the extent of burning in the refractory lining of the furnace, and the observations made during this operation indicate that the furnace load should be carried without any serious disturbance to the supply voltage. It is also restricted to night supply only in the meantime.