

(d) WAIKATO RIVER POWER SURVEY.

Surveys and investigations were resumed in relation to further power schemes on the Waikato River, particularly with regard to a proposed dam-site at Karapiro, near Cambridge, and a project to install control gates at Taupo to control the flow of water into the Waikato River and also to increase the storage-capacity of the lake.

Sub-surface investigations were made on the proposed site at Karapiro, gauges were installed at selected points of the river, and levelling was completed from Arapuni to Cambridge. Work on the Karapiro Scheme was taken over by the General Branch in November, and a survey party proceeded to Taupo, where investigations are in progress in connection with a diversion channel in the vicinity of the bridge and a diversion tunnel at Otaraunga. A number of test bores have been drilled on each site, and various sections of the river, and also low-lying areas at Tokaanu, have been traversed. Proposed dam-sites were investigated at Ohakuri and Whakamaru also.

(2) OPERATION AND MAINTENANCE.

(a) POWER-STATIONS.

Arapuni.—The four original generators became very dirty while construction work on the powerhouse extensions was in progress, but it was not practicable to shut down the units for complete overhaul until Nos. 7 and 8 units were available for service. No. 4 unit was dismantled in April May before the winter loading set in, and Nos. 3, 2, and 1 units were dismantled in turn in the following summer. The ventilating-slots on each machine were found to be badly blocked with dust deposits, and a group of six-turn coils was found defective on No. 2 unit. The turbine runner on No. 1 unit was replaced by a reconditioned spare.

One of the transformers in an 11/110 kV. bank was damaged by a short circuit between turns on the L.T. winding in June, and both the L.T. and H.T. windings were replaced. Heavy deposits were found on the windings, and an inspection of the other 11/110 kV. transformers showed that all but one had similar heavy deposits on the windings. This deposit has now been fairly definitely explained as an exudation of excess varnish.

A total interruption to system supply was caused on 23rd April, 1938, by the breakdown of a 110 kV. O.C.B. bushing. In addition, there were two 50 kV. C.T. bushing failures during the year. The bushings and contacts on the original 110 kV. and 50 kV. O.C.B.'s are being replaced by equipment of a later type; bushings have been replaced on five 110 kV. O.C.B.'s.

The maximum load on the station was 110,000 kW. and the output for the year was 585,779,400 units. Corresponding figures for the previous year were 93,200 kW. and 512,604,700 units.

Horahora.—An 11 kV. C.T. failure occurred in August, and a flashover on an 11 kV. O.C.B. was caused by a bird in January. The 11 kV. induction regulator was removed in September preparatory to the installation of a booster transformer. Two 50 kV. O.C.B. bushings were replaced following low tests. One of these and another with a broken porcelain shell are being reconditioned.

Penrose Diesel Plant.—The plant was given a short maintenance run each week and was put on load for two days at the end of March.

(b) SUBSTATIONS.

Penrose.—A 22 kV. single-core cable-box broke down in June, and a flashover occurred inside a 50 kV. O.C.B. in July. The original 110 kV. O.C.B.'s on two banks were completely dismantled, and the concrete pads were altered to take two new O.C.B.'s. A defective 50 kV. strain insulator and eleven cracked 110 kV. pillar insulators were replaced. A 110 kV. pillar insulator that broke off when an isolating link was operated, and two other pillar insulators that were damaged by the falling insulator were also replaced.

Bombay.—The transformers in one 110/50 kV. bank were completely overhauled. Six defective 110 kV. post insulators were replaced. Alterations were made to No. 3 cottage.

Hamilton.—Two 110 kV. transformer bushings that were found defective by testing, and nine cracked 110 kV. pillar insulators, were replaced. Following low tests on a number of bushings on the four 110 kV. line O.C.B.'s the O.C.B.'s have been taken out of service pending further investigations.

Supply to Ruakura State Farm was taken over by the Central Waikato Electric-power Board on 23rd December.

Takapuna.—The 5 kVA. local service transformer was replaced by a new 25 kVA. transformer when the new 11 kV. O.C.B.'s were installed in December. Four defective 50 kV. strain insulators were replaced.

Henderson.—No. 1 11 kV. incoming feeder O.C.B. was damaged by a flashover in June. A transformer 50 kV. bushing broke down in September, and a flashover was caused by a cat on the 50 kV. structure in December. Two four-unit strings and two five-unit strings of insulators on the 50 kV. structure were replaced on account of defective units.

Tahekeroa.—A flashover on a 50 kV. O.C.B. bushing was caused by lightning in September.

Mareretu.—Fatal injuries were received by a relief operator on 27th January when he made accidental contact with the arcing horn of a 50 kV. O.C.B. bushing.

Kerepechi.—The insulators on a 50 kV. lightning arrester were replaced.

Waikino.—An 11 kV. C.T. failed in October, and a broken hold-on catch on a 50 kV. bus sectionalizing O.C.B. caused a station outage in March. No. 2 50 kV. O.C.B. on the incoming line tripped in February, but nothing was found to account for the tripping.

Waihou.—A third overcurrent relay was installed on each of three 11 kV. outgoing feeder panels.

Matamata.—The garage was altered to provide living-quarters for the relief operator.