

one mile below the power-house site, had been formed on the diversion of the Waikato River over the Waiteti Flat. Pumps were installed at this spot and were successful in reducing the water-level in the old river-bed from level 146 ft. to level 135 ft. This level was further gradually reduced till November last, when water-level 129 was reached, which permitted excavation in the dry.

The greater portion of the excavation was in the first 20 ch. down-stream from the power-house, from which length a total of 63,000 cub. yd. was removed, over 10,000 cub. yd. being handled in one month. Owing to the awkward location in the gorge, all material had to be handled by the use of three cranes, loaded into trucks, and hauled to near-by dumping-grounds.

All material in the bed of the river above the 129.0 level was removed; this, together with the widening, should have the effect, neglecting the backing-up of the river below the sand-bar, of providing a maximum tail-water level of 145.0 for full-load conditions of eight turbines.

The whole of the tail-race work was completed by the end of April last, and the tail-race was at once brought into use for the drying-out period of No. 3 unit on short circuit. The total tail-race excavation was 70,300 cub. yd., all except 4,000 cub. yd. being done during the period under review.

To provide against possible erosion of the floor of the tail-race immediately in front of the draught-tubes, a 30-ft.-wide protecting slab consisting of 12 in. of concrete was laid down for the full length of the power-house structure.

Coffer-dam.—To provide for the future dewatering of the gorge above the existing portion of the power-house, on account of future extensions to the power-house and tail-race, piers for a coffer-dam were constructed in concrete across the gorge just up-stream of No. 4 draught-tube; this work was completed just prior to the coming into use of the tail-race at beginning of May. The completion of the dam, which comprises the placing of steel joists and sheeting, has been left over until it is required.

100-ton Crane.—Subsequent to the completion of the erection of the first section of the generator-room steel frame the 100-ton crane was erected and put into service on the erection of turbines, valves, generators, &c.

Outdoor Station.—Miscellaneous work has been carried out and completed at the outdoor station. This includes alterations to the top of the cable-tunnel, further work on the oil- and water-circulating systems, including the installation and connecting-up of the transformer water-supply pumps, the construction of steel towers, and the erection of cables to the water-rheostat, together with other miscellaneous works.

Penstock Intakes.—Trimming and grassing of the batter above the intakes, together with the permanent fencing, has been finished. The completion of the concrete slab near the pump-house is at present in hand.

Overflow-channel.—The investigation, by the use of boring plant, into the nature of the tuff near the waterfall, which was in hand at the end of last period, was completed, five holes in all being put down. A certain amount of erosion has taken place at the overfall from the overflow-channel at the Waiteti Flat. A survey of locality has been made, and measures for dealing with the situation are under consideration.

Erection of Equipment.—The erection of the equipment has been carried out under the control of the construction staff. The work done is detailed in the Chief Electrical Engineer's report.

WAIKAREMOANA POWER DEVELOPMENT.

During the year practically all construction work has been completed.

Headworks.—In the intake-race a temporary timber dam was shifted into the by-pass channel. Should the necessity arise this dam can be removed quickly, and the top 5 ft. of Lake Kaitawa drawn off.

The permanent diversion weir was completed in April, 1928, but owing to a serious leakage under the foundation it was necessary to construct a concrete mat between the weir and this wall. Excavation here amounted to 252 cub. yd., and concrete poured to 276 cub. yd. Pumping operations involved a good deal of work, one 10 in., one 8 in., and three 4 in. centrifugal pumps being operated. On completion of the cut-off wall and mat the foundations above and below the weir were grouted under pressure. Tests showed that there is now no appreciable leakage. The spoil-dump below the weir was sluiced away when the stream was turned over the weir. The bed of the stream below the weir was then paved with stone, connected in place, and the banks stone-pitched, 283 sq. yd. being placed. Clay was sluiced into the river-bed up-stream to seal bottom. The temporary spillway in the earth dam was back-filled, 902 cub. yd. being placed. Total filling in the dam amounted to 16,806 cub. yd., and 1,680 sq. yd., of stone pitching was placed in position. In the approach canal the temporary dam was removed when the tunnel-portal was completed, and all stone pitching finished. Excavation totalled 14,498 cub. yd., and stone pitching 1,448 sq. yd.

The construction of the main-tunnel portal was completed in July, 1928, 177 cub. yd. of concrete being required. Stop-logs were placed temporarily in position. Back-filling behind the portal and over the additional 70 lineal feet of tunnel constructed in cut was completed, 3,328 cub. yd. being placed. The tunnel was filled for testing in November, 1928, and tests revealed that there was a large leakage through the tunnel-lining. Grouting was commenced and the lining was grouted throughout the whole length of the tunnel, and the arch plastered with a cement-gun. Final tests showed that the leakage is now of small proportions.

In the spillway-channel to the surge-chamber 530 cub. yd. were excavated and 213 sq. yd. were stone-pitched. Wing walls to the surge-chamber, facing the pipe-line bench, were formed of stone pitching, 82 sq. yd. being placed.

All banks of ramps and nigger-head in Lake Kaitawa were removed; also all floating timber.

The pipe-line was completed by the contractors in October, 1928, the total length for two pipes being 7,176 lin. ft. Venturi meters were installed and the exciter bus-pipe connected. Connection