

Excavation on the power-house extension site was carried out on three shifts, and at the end of March, 1935, a total of 22,710 cubic yards of rock had been broken out and removed.

A composite steel-and-concrete dam with a timber waterproof face was erected across the existing tail-race at the south end of the present power-house, to dam off the site of the proposed new tail-race and power-house foundations. Sinking pumps of a total capacity of 178,000 gallons per hour were installed and put into operation, lowering the water in the new tail-race site to 2 ft. below the required tail-race floor. A complete concrete plant has been installed in readiness for work on the power-house extension, and during March this plant was put into operation on pouring the power-house foundations.

A road was constructed leading from the lower power-house road to the front of the existing building and along the stop-log platform.

The excavation of the tail-race commenced during March, 1935, after the water had been pumped out and the country dewatered.

At the end of March a total of 124 persons was employed on the power-house extensions, exclusive of contractors.

Turbines: The new electric governor drives installed on Nos. 2, 3, and 4 units have operated successfully, and have eliminated the corrosion of steel strips in the pendulums.

(b) *Substations.*

*Hamilton No. 1.*—The new steel structure was put into service on the 22nd April, and the transformers (50/11 kv.) were moved into their permanent positions in May. The workshop-roof was raised, and a new crane installed.

*Edgecumbe, Ngongotaha, and Te Awamutu.*—A new 50 kv. O.C.B. was installed, with relays, to control the outgoing line at each substation. New cottages were built at Edgecumbe and Ngongotaha, at each of which substations there are now three cottages.

(c) *Transmission-lines.*

No transmission-line construction was done, but a start was made on the houses and buildings at Ongarue depot.

(2) OPERATION AND MAINTENANCE.

(a) *General.*

Since completion of the Arapuni-Stratford line at the end of last year the Arapuni-Horahora Section has been run in parallel with the Mangahao-Waikaremoana Section for the greater part of the year without any difficulties.

In the early part of the year, with four units available at Arapuni, it was practicable to shut down Horahora for one shift per day and on Sundays, but after the failure of No. 1 generator on 15th February, it became advisable to run Horahora continuously again. The standby plants have not been required to operate during the year, but the Diesel plant at Penrose was given a short-period full-load test. The Okere plant of the Tourist Department, Rotorua, was run regularly as required for their own purposes.

A large amount of work was done at power-stations and substations to make apparatus safe against earthquake damage.

(b) *Power-stations.*

*Arapuni.*—Turbines: Two new spare runners were received and one was installed on No. 4 and tested for efficiency.

Generators: No. 1 generator developed a fault in the winding, which burnt out on the 15th February, and it was decided to put in a complete new winding of a slightly different type.

Transformers: Blow-out vents were installed on the main transformers.

Switch-gear: There were the following failures during the year: one 10/5 amp. 50 kv. current transformer bushing broke down and damaged the transformer; a flashover when operating an 11 kv. isolating-switch damaged six pillar insulators; one 110 kv. O.C.B. bushing flashed over on the lower porcelain cone, causing a surge, which cleared itself without loss of load or operation of relays; one 50 kv. O.C.B. bushing which burst off half its porcelain shed without causing a flashover; two 110 kv. pillar insulators which failed on the same day.

Generator over-voltage relays were put in service.

*Horahora.*—Head-race, &c.: The pit-gates were cleaned and painted and the operating-gear overhauled. The station was shut down from the 7th to 14th October, 1934, to install new screens of improved design.

Generators: Rain blown into the station in a violent storm caused burn-outs on Nos. 4 and 5 generators, damaging the iron as well as the coils. No. 4 was repaired with the spare coils and with iron taken from No. 5. Additional coils and iron have been ordered to repair No. 5.

Transformers: Fault-current due to breakdown of a 50 kv. O.C.B. bushing resulted in a short circuit in the high-tension winding of a 50 kv. transformer.

Switch-gear: There were the following failures during the year: A rubber-insulated cable which had been damaged by mice, three 50 kv. O.C.B. bushings, one 11 kv. current-transformer.

A new cable was installed for generator No. 7 replacing the old overhead wires, and a good deal of work was done on replacing the old overhead control wires by cables and on installation of new relays.

*Penrose Diesel Plant.*—The Diesel engines were run weekly for a few minutes, and were given a full-load test run during the year.