

A flash-over of one string of insulators occurred during the year, but, apart from a pitting of one unit, the insulators were not damaged, proving quite good when sent to Khandallah for test.

Another four linemen have been trained in live-line changing of insulators, but up to the present no need has been found for doing work on live lines, apart from testing of insulators, as in cases where a spare line is not available the Power Boards concerned were in agreement with having a shut-down on the lines between certain hours.

Trouble has been experienced during the year on failure of A.C.S.R. cables, which is almost certainly due to vibration, the affected portion of the line being between Bunnythorpe and Ashhurst. Five failures have occurred on a short section of about one mile, although in only one case did the steel core fail, causing a shut-down till the break was repaired.

Also, probably due to the same cause, the earth-wire on the system is showing a decided tendency to fail at the points of support, particularly on the section between Manawatu River and Bunnythorpe. On this section the steel cable was in such a bad state that it was necessary to remove it altogether, which has been done, except for about one mile south of Bunnythorpe Substation, which has been left as a protection to the substation apparatus.

#### CONSTRUCTION.

During the year the Mangahao No. 3 dam has been completed, and the spillway-gates erected. On 9th April, 1928, this dam was full for the first time, and revealed some minor defects, which have since been removed.

Further work has been done on the tail-race, a number of groynes being built or extended and the mouth of the Otauru Stream being dredged.

*Khandallah Substation.*—During the year the foundations for the 10,000 kv.a. synchronous condenser were put in. The condenser has now arrived and a start has been made to install same.

Permanent water-supply and sewerage from the Wellington City mains has now been installed.

In connection with the 250 kv. testing outfit, a tank for making puncture tests under oil has been installed at this station.

During the year a large number of tests have been made on insulators and other allied material under high voltages. These tests include flash-over tests (both high-frequency and 50-cycle), puncture tests (50-cycle), porosity tests, and immersion tests.

Tests have also been carried out on the influence of wind and rain on the voltage at which flash-over occurs at various distances to earth.

Reverse power relays have been installed on the incoming 110 kv. lines. Earth-leakage relays have also been installed on the two 11,000-volt feeders to the Hutt Valley Power Board.

*Bunnythorpe Substation.*—The tank-lowering mechanism and framework for the 110 kv. oil circuit-breaker used as a tie-switch at Bunnythorpe has arrived, and the switch has been dismantled and the framework erected ready for the switch. The re-erection of the switch is proceeding.

*Wanganui Substation.*—A new panel has been erected by the Wanganui-Rangitikei Power Board in the substation for the supply of 11 kv. power to the East Town Railway Workshops.

*Mangamaire Substation.*—The 1,500 kv.a. synchronous condenser ordered for this station has arrived, and been partly erected. The hand-operated crane has been installed. A 110-volt D.C. battery and motor-generator set has been purchased for operation of condenser and tripping of oil-switches. A new 2,200-gallon oil-storage tank has been ordered for this station.

*Dannevirke Substation.*—The building has been extended to accommodate a 1,500 kv.a. synchronous condenser, which is now nearly completely erected. A battery and motor-generator set have been installed for the control circuit. A hand-operated crane has also been installed, as also has an outdoor 2,200-gallon oil-storage tank.

*Waipukurau Substation.*—A battery and motor-generator-charging set have arrived to replace the present primary-cell tripping battery for the oil circuit-breaker controls.

*Napier Substation.*—Supply was given from this station to Hawke's Bay Power Board on the 8th April, 1927, and all apparatus has worked very satisfactorily throughout the year.

A 4,500 kv.a. synchronous condenser has been installed in this station for voltage and power-factor regulation. The machine has been tested out satisfactorily, but is awaiting some minor interlocks and trip-coils before it can finally be put into service.

#### LOAD.

During the year supply has been given to the Hawke's Bay Power Board, completing the whole system as designed.

The last quarter of the year was conspicuous by the almost entire absence of rainfall over the Mangahao drainage area, creating a very serious shortage of water-power, so that special arrangements had to be made with all Power Boards, Borough Councils, and large meat-works which possessed steam, gas, or oil generating plants, to start these up and either supply their own load or, where possible, deliver surplus power into the Mangahao system, this being in addition to the ordinary stand-by plants of Wellington and Wanganui Cities and Palmerston North Borough. Also, Power Boards were asked to restrict their load as much as possible. In general, the Power Boards proved anxious to co-operate and by cutting out street-lighting, getting large factories, &c., to change over to night shift, cutting out heating and cooking load where possible, the dry period was passed with as little inconvenience as possible, no arbitrary cutting-off of power or reduction of supply being necessary.