

The present installed capacity of the Arapuni Station is 45,000 k.w. and consists of three units. The fourth unit is now in process of shipment from England, and, had the course of events not been interrupted, would have been installed on arrival, thus bringing the total capacity of the Arapuni plant to 60,000 k.w.

In a subsequent statement details will be given showing the cost involved in calling into operation standby plants and other stations which were required to take the load when supply ceased from Arapuni, but it may be remarked that the estimate at present for the generating-costs at those stations is at the rate of £85,000 per annum, as against £12,000 for generating-costs had Arapuni continued in commission.

GEOLOGICAL REPORT, TOGETHER WITH STATEMENT BY THE HON. W. B. TAVERNER, MINISTER OF PUBLIC WORKS.

17th July, 1930.

MINISTER'S STATEMENT.

I desire to lay on the table the geological report on the fracture of the rock at the Arapuni Spillway.

I also wish to say that, apart from the suggestions made in this report, an investigation is actively in progress on the water content and elastic content of the various materials in the neighbourhood of the dam and power-house.

Already there has been obtained information which indicates that the material has about one-tenth the elasticity of concrete, and a value which agrees with the conjecture that, after the initial crack in the forebay had been formed, the block between the forebay and the gorge bent over as a result of hydrostatic force. The present investigations are aimed at an estimation of the behaviour of the pumice breccia and rhyolite under different degrees of moisture content. One possibility suggesting itself is that water seeping into the rhyolite and breccia caused volume alterations, which, possibly, resulted in the original crack. This, and other investigations, are being actively pursued with a view to ascertaining more definitely the original cause of the disturbance.

I have submitted the geological report to my departmental Engineers, and I have asked them to now supply me with a report, based on the geological position, indicating what steps they consider should be taken from an engineering point of view to deal with the trouble that has occurred. This engineering report will be submitted by me to Professor Hornell, the expert from overseas who has been appointed by the Government to investigate the Arapuni scheme, in order that he may advise on the steps suggested by the Department.

GEOLOGICAL REPORT.

THE FRACTURE OF THE ROCK AT THE ARAPUNI SPILLWAY.

We (Professor Bartrum, and Drs. Marshall and Henderson) arrived at Arapuni on the morning of the 23rd June, and left on the evening of the 25th June. We examined the Arapuni area generally, paying special attention to the area about the spillway and the power-house where cracks had recently formed and tilting occurred. Mr. Rabone, Engineer in Charge, and his staff, gave every facility for examining the works, plans, and records, and we take this opportunity of expressing our thanks and appreciation of the courtesy everywhere extended to us.

OUTLINE OF GEOLOGY.

There are four geological formations, near the power-house, which in downward order are—

- (1) Unconsolidated sands and gravels, often 50 ft. thick ;
- (2) Much-jointed columnar rhyolite tuff, 50 ft. thick ;
- (3) Massive pumice breccia, 90 ft. to 100 ft. thick ; and
- (4) Tuffaceous clays, sands, and breccias, which extend to an unknown depth below the river.

The first group of beds, the unconsolidated sands and gravels, here need no further consideration. The second and third formations are relatively strong rocks. They are porous rocks and when dry readily absorb water, but are not readily permeable, though the joints in them allow the passage of water. Weathering accentuates these joints, which are conspicuous on the faces of the cliffs. In the solid they are tightly appressed and often scarcely perceptible. Between the columnar rhyolitic tuff and the pumice breccia are a few feet of weak beds consisting of a poorly consolidated silty phase of the columnar tuff and thin beds of gravel, sand, and clay, the last mentioned being the soil of the gently undulating old land-surface of the pumice breccia on which the columnar rhyolite tuff was deposited as volcanic ash. These weak beds, especially the old soil, are decidedly impervious. The upper few feet of the fourth and lowest set of beds consists of indurated clays, probably the old soils of a former land-surface carved from weak tuffs and bedded sands. The power-house is built on these beds, of which only a small area is exposed.