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Geological Investigation of The Lower Warangoi Hydro-Electric Scheme,

New Britain, Territory of Papua and New Guinea
1964 – 1966
FINAL REPORT

by

J.R.L. Read

GEOLOGICAL INVESTIGATION OF THE LOWER WARANGOI HYDRO-ELECTRIC SCHEME, NEW BRITAIN, TERRITORY OF PAPUA AND NEW GUINEA

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CONTENTS

CONTENTS

SUMMARY

The Lower Warangoi Hydro-Electric Scheme was proposed to supply the future electricity requirements of Rabaul and eventually of the whole Gazelle Peninsula. The site of the proposed dam is at a narrow constriction of the Lower Warangoi River through a major ridge which to the south forms a narrow divide between the Warangoi and Sigule River systems. It is located 32 miles by road from Rabaul and about 13 river miles from the mouth of the Warangoi River. To provide sufficient head and storage for a power station capable of generating 10 megawatts it would need to be 120 feet high.

Preliminary geological investigation, followed by a programme of diamond drilling, geophysical investigation, and soils mechanics testing was carried out between 1964 and 1966.

The damsite consists of volcanic agglomerate overlain by lesser deposits of reef-coral limestone. The river channel at the damsite is filled with river alluvium to a depth of 150 feet.

Agglomerate forms both abutments of the damsite. In the right abutment agglomerate extends for about 2600 feet from the river; it is overlain on the downstream side by fine-grained sediments and coralline limestone, and is replaced laterally in the remainder of the ridge, to the south-west, by fine-grained sediments which are interbedded with coarser-grained deposits of sandstone and conglomerate. The remainder of the storage area consists of fine-grained sediments, minor coralline limestone, and superficial deposits of pumice.

A 120-foot high dam would be entirely founded on agglomerate and river alluvium: agglomerate extends for a depth greater than that penetrated by diamond drilling beneath the damsite. It is predominantly moderately to highly weathered, correspondingly weak, and moderately to highly permeable. Alluvium in the river channel consists of interbedded sand and gravel.

The fine-grained sediments in the ridge forming the divide between the Warangoi and Sigule drainages are soft to slightly indurated and, in the terms of the Unified Soils Classification, belong to soil types CH and SC-CL. The sandstone and conglomerate occur together in three layers within the ridge, the lowest of which extends along the base of the ridge immediately below the proposed top storage level. The sandstone is loosely compacted and is of soil type SP-SM: the conglomerate is a densely packed gravel and is of soil type GP-GW. Both deposits are highly permeable.

The proposed scheme is located in one of the most seismically active regions of Papua and New Guinea, and all structures would have to be capable of withstanding high ground accelerations. The tributary rivers carry a high bed load at times of high flow and the rate of siltation of the reservoir is expected to be high. Any disruption of the land surface by a major earthquake would increase the rate of siltation.

It is concluded that because of the combination of the weathered condition and permeability of the agglomerate, the configuration of the river channel, the presence of highly permeable deposits in the divide between the Warangoi and Sigule drainages, the high seismicity of the region, and the likely high rate of siltation of the reservoir, it is extremely doubtful whether the scheme is geologically and economically sound.

It is recommended that further investigation be discontinued and that a full analysis and comparison of costs of all alternative schemes be carried out. Design investigation could only be justified if it were proved beyond all reasonable doubt that the Lower Warangoi hydro-electric scheme was the most economic project for providing electricity for Rabaul and, eventually, the whole Gazelle Peninsula.

INTRODUCTION

General

Following a decision to discard for geological reasons a previously investigated site on the Towanokoko - Pondo River systems (Fisher, 1959; Carter, 1962; and Best, 1963), the Lower Warangoi hydro-electric scheme was proposed to fulfil the future electricity requirements of Rabaul in the Gazelle Peninsula of New Britain, Territory of New Guinea (Plate 1).

An initial inspection of two possible damsites on the Lower Warangoi River was carried out in March, 1964. During the inspection it was found that only one site was possibly suitable for a hydro-electric scheme and a recommendation was made for a preliminary geological investigation of the site (Carter & MacGregor, 1964). This survey was carried out between August and October, 1964. During the course of the survey the proposed damsite and reservoir area were geologically mapped and a programme of diamond drilling, geophysical and soils testing recommended (Read, 1965).

Diamond drilling commenced in June, 1965 and, after the geophysical and soils mechanics surveys had been undertaken between July and October, 1966 the recommended investigation was completed in October, 1966.

Outline of Scheme

The proposed hydro-electric scheme would involve the construction of a 120-foot high dam to provide the necessary storage and head to develop 10 megawatts at a 50% annual load factor.

The power generated would supply Rabaul and would eventually include a transmission link for the whole Gazelle Peninsula (Papua and New Guinea Electricity Commission, 1966).

Topography

The site for the proposed damsite is at a narrow constriction of the Lower Warangoi River through a major ridge extending for several miles to the south-west from high ground on the left bank of the river to form a divide between the Warangoi and Sigule River systems (Plate 1). The configuration of the ridge is given in greater detail in Read (1965).

The high ground on the left bank of the river, which is predominantly flat-lying, extends for several miles north of the damsite and supports an intensive cocoa and coconut growing industry. South and southwest of the damsite the countryside is dissected into a complex system of ridges and valleys. It is predominantly covered by natural bush and is sparsely populated.

Between the damsite and the confluence of the Upper Warangoi and Kavavas Rivers the Warangoi Valley is particularly wide and flat. Upstream of the confluence the reservoir area is split into two parts which follow the main river channels for a distance of about five miles towards the headwaters of the catchment area.

Location and access

The proposed scheme is 32 miles by road from Rabaul (Plate 1). The nearest township, Kokopo, is 13 miles by road from the damsite, the last five miles of which are along private plantation roads maintained during the investigation by the Commonwealth Department of Works, Rabaul.

The damsite is situated about 13 river miles, or about eight air miles, from the mouth of the Warangoi River, and approximately 2½ river miles downstream of the confluence of the tributary Upper Warangoi and Kavavas Rivers.

Public roads are open to light and heavy traffic at all times but plantation roads are accessible to light vehicles only during the wet season.

Mapping

Geological mapping of the main reservoir area was carried out during traverses down the Kavavas and Upper and Lower Warangoi Rivers using a base map drawn from aerial photographs of an approximate scale of one inch to 4000 feet.

Geological mapping of outcrop in the area of the ridge forming the divide between the Sigule and Warangoi River systems (the southern ridge) was carried out by tape, compass and abney level traverses. All traverses were subsequently tied to a surveyed line along the crest of the southern ridge and were re-surveyed by the Commonwealth Department of Works.

Detailed geological mapping of the left and right abutments was undertaken by plane table and tacheometric survey. Horizontal and vertical control was provided by a damsite survey grid pegged at 50-foot intervals by the Commonwealth Department of Works.

Diamond Drilling

The diamond drilling programme was carried out by drillers from the Commonwealth Department of Works using two E1000 and one F15C Mindrill rigs. All holes were drilled with either an NMLC or BMLC triple core barrel with a stationary, split, inner tube.

In all, 10 holes totalling 2186 feet were drilled: two, WD1 and WD2 on the left abutment; two, WD3 and WD9 on the right abutment; three, WD8, WD8A and WD4A in the foundations; and three, WD5, WD6 and WD10 along the southern ridge.

WD8 became jammed in river gravels and was abandoned in favour of WD8A which was drilled from the same location but at a steeper angle.

Owing to a lack of funds in the final stages of the investigation drillholes WD10 and WD5 were stopped before their specified depths were reached and a proposed hole on the southern ridge, WD7, was not proceeded with.

Geological logs of core from the drill holes are contained in Appendix 2.

Water Pressure Testing

Water pressure testing, generally at 20-foot intervals, was undertaken in all drill holes except WD4A and WD5. Testing was carried out using a Coventry Climax fire-pump, AX casing, and either NX or BX hydraulic and mechanical packers. Difficulties were experienced in obtaining a good seal using hydraulic packers and, whenever possible, mechanical packers were used.

Gauge pressures were corrected for hydrostatic head and friction losses in the supply line and packer. Packer losses were calculated from graphs determined from packer calibrations carried out at the site. The corrected results were used to determine the permeability, in feet per year, of each test section. The formula used to calculate permeability is one derived by the Snowy Mountains Hydro-electric Authority. In deriving the formula it was assumed that the rock in any test section has uniform permeability. This condition does not hold in fractured rocks, therefore the values obtained are useful only for comparison between test sections and as a gross indication of the transmissability of the rock tested.

Geophysical Survey

A geophysical survey was carried out by a team from the Geophysical Branch of the Bureau of Mineral Resources during July, September and October, 1966.

Ten seismic refraction profiles totalling about 15,200 feet were carried out across and along the crest of the southern ridge, in the damsite area, and north of the left abutment, and two magnetic intensity traverses were undertaken along the seismic profiles north of the left abutment.

In addition, 11 representative samples of agglomerate core from drill holes in the abutments were subjected to density, and sonic velocity measurements in the laboratory.

A report on the survey and testing is contained in a separate Bureau of Mineral Resources Record (Cifali, Milsom & Polak, in preparation).

Soils Investigation

Soil sampling and field permeability testing of sediments from the southern ridge was carried out by the Commonwealth Department of Works Central Testing and Research Laboratory during September and October, 1966.

The soil samples, which were classified and laboratory-tested for permeability and saturated shear strength, were taken from exposures on several traverses across the ridge, and from a costean and shaft excavated on the reservoir side of the ridge north of survey peg 8△(Plate 4).

A report on the investigation is contained in a Technical Report of the Central Testing and Research Laboratory (Blythe, 1967).

GEOLOGY

REGIONAL

The Gazelle Peninsula forms a prominent extension, of generally low to moderate relief, to the north-eastern end of the Island of New Britain. It consists of the Recent and Pleistocene volcanic complex of Blanche Bay (Fisher, 1939) overlying Tertiary sediments and volcanics which, in the west, abut unconformably against igneous and metamorphic rocks forming the central spine of the Island.

The oldest rocks exposed in the Warangoi area are basic volcanic agglomerate of probable Lower Tertiary age; at the damsite the agglomerate is overlain by Upper Miocene coralline limestone. The remainder of the stratigraphic sequence consists of claystone, siltstone, sandstone and conglomerate. A sample taken from these sediments near the base of the southern ridge was determined as Pliocene (Read, 1965).

All the sediments are flat-lying to gently dipping east or west. A regional fault pattern can be detected on aerial photographs of the Peninsula but no major fault lines were recognised on the ground.

DAMSITE

ABUTMENTS

Stratigraphy

Rock in the abutments is principally of two types: volcanic agglomerate; and coralline limestone.

Coralline limestone is draped unconformably in the form of a reef over the crest and on the downstream slopes of the left abutment, and also on the downstream flank of the right abutment (Plate 2). In addition, a thin lens of limestone was encountered at R.L. 60 feet in drill hole WD1 (Plate 3). The limestone is a pale buff, moderately hard rock containing many small ($\frac{1}{2}$ - 2 inch), cavities which are commonly infilled with calcareous debris.

Volcanic agglomerate forms the main bulk of the abutments, extending below river level deeper than was penetrated by diamond drilling (Plate 3). It is slightly to highly weathered and consists of medium to coarse-grained fragments of augite basalt and andesite set in a fine to medium-grained tuffaceous matrix.

Dykes and sills of augite basalt occur within the agglomerate and several beds of medium-grained tuffaceous sandstone were mapped within the agglomerate at the surface (Plate 2). The relationship to the rest of the sequence of the limestone encountered within the agglomerate in drill hole WD1 is not clear. In the absence of evidence of faulting the limestone is regarded as probably a continuation of the east-dipping bed of tuffaceous sandstone exposed at river level on the upstream face of the left abutment.

Structure

All the coralline limestone, and the tuffaceous beds within the agglomerate, dip between 10° and 35° to the east (Plate 2).

No regular jointing system is apparent at the surface or at depth in either the coral or the agglomerate. Joints are widely spaced and irregularly distributed, generally open, and coated with a thin layer of clay, calcite or chlorite, zeolites, or other secondary minerals.

Three faults, F1, F2 and F3 intersect the left abutment (Plate 2). F1 and F2 are normal faults offsetting the same sequence of tuffaceous sandstone, basalt flow and agglomerate in the upstream face of the abutment. Fault F1 has a displacement of 20 feet, strikes 056° (magnetic) and dips 85° north-west: fault F2 has a displacement of at least six feet, strikes 100° (magnetic) and dips 70° north. No trace of fault F2 was found in drill hole WD1.

Fault F3, on the downstream side of the abutment, strikes 065° (magnetic). It is considered to be a normal fault upthrown to the south-east, as coral overlying agglomerate on the western side of the fault does not occur to the east. A possible extension of the fault into the right abutment, suspected from surface mapping (Read, 1965), was not proven by diamond drilling.

RIVER CHANNEL

The minimum width of the river channel between the abutments is 300 feet. The river is only two or three feet deep at this point during periods of low flow although it is up to 15 feet deep in places nearby.

Diamond drilling and geophysical investigation have demonstrated that the river channel at the damsite is almost oblong in section and is filled with river gravels and sand to a depth of 150 feet (Plate 3).

Because of this unexpected configuration, drill holes specified to determine rock conditions beneath the channel could not be completed. However, agglomerate occurs throughout WD8A, which extends 60 feet beneath the base of the channel (Plate 3), and it appears that this rock type extends for some considerable depth beneath the damsite.

The possibility of faulting between the abutments was not proved. However, the exceptional depth of the river channel revealed indicates some form of structural control and the possibility of faulting cannot be ruled out.

STORAGE AREA

SOUTHERN RIDGE

Stratigraphy

The southern ridge extends to the south and south-west from the right abutment to form a divide between the Warangoi and Sigule River systems. The ridge is narrow, although for most of its length it stands more than 250 feet above river level at the damsite. Numerous creeks have been incised into the flanks of the ridge and in several places headward erosion by creeks has led to the formation of low-lying saddles in the crest of the ridge.

Over a crest length of about 2600 feet the ridge is composed of volcanic agglomerate flanked on the downstream side by a sequence of fine-grained sediments and coralline limestone: these sediments also occur on the upstream side of the ridge west of Ω18 (Plate 4).

Beyond 2600 feet the agglomerate and coralline limestone are replaced laterally by a sequence consisting entirely of fine-grained sediments, sandstone and conglomerate (Plate 4). The stratigraphic succession in this part of the ridge is broadly summarised below:-

Bed	Thickness (feet)
Silty and sandy claystone. CL* (?)	100
Sandstone and conglomerate. SP-SM,GP-GW	10 - 22
Blue mudstone. CH.	10 - 55
Sandstone and conglomerate.SP-SM, GP-GW.	8 - 50
Blue mudstone. CH.	28 - 60
Shell bed.	4 - 8
Blue mudstone. CH.	60
Sandstone and conglomerate. SP-SM, GP-GW	55
Blue mudstone. CH.	Unknown.

* Unified Soils Classification

The uppermost bed of silty and sandy claystone, visually classified as CL, extends along the length of the ridge except in the low-lying saddle areas between △1 and △3 and △6 to △9. It is underlain by three beds of sandstone and conglomerate each of which is separated by a bed of blue mudstone. A thin bed of grey, silty claystone containing an abundant Pliocene fauna (Read, 1965) is located within the blue mudstone between the middle and lower sandstone and conglomerate bed.

The sandstone consists of loosely compacted, uncemented, medium-grained sand which generally forms a layer about 10 feet thick above the conglomerate but in places occurs as thin layers within the upper 15 feet of the conglomerate. The sediment is poorly graded, contains minor amounts of silt and has been classified as SP-SM (Blythe, 1967). The conglomerate, classified as GP-GW (Blythe, 1967), consists of densely packed gravels containing variable quantities of fines, mostly clay.

The blue mudstone, which ranges in colour from blue where fresh to brown where weathered, has been classified as CH (Blythe, 1967). It is soft to slightly indurated and contains numerous bands of silty sand and silty clay (SC-CL, Blythe, 1967) especially near the upper and lower limits of the sandstone and conglomerate beds.

The thickness and vertical levels of the sandstone and conglomerate beds vary throughout the length of the ridge. The base of the upper bed rises from R.L. 275 feet at △37 to R.L. 350 feet at Ω34, from where it lenses out towards the agglomerate section of the ridge. The base of the middle bed increases considerably in thickness towards the east: at △ 37 the top of the deposit is located immediately below the shell bed at R.L. 204 feet but in the shaft has fallen to R.L. 170 feet. The extent of this lowermost sandstone and conglomerate bed east of the shaft is unknown but it probably continues at least to the agglomerate section of the ridge.

Structure

The sediments and the coralline limestone in the ridge are predominantly massive and poorly jointed. Bedding is essentially flat-lying with local variations east and west. Fore-set bedding and micro-bedding occur in the fine-grained sediments, and cross-bedding and graded-bedding occur in the sandstone.

Three minor faults were mapped in the ridge (Read, 1965). Two are in the agglomerate, strike east across the ridge and have vertical fault planes. The third is in the sediments north of Ω 33; it strikes east, has a vertical fault plane and shows a maximum displacement of two feet.

MAIN RESERVOIR

The reservoir area is underlain almost entirely by a succession of flat-lying, soft to moderately indurated silty claystone, fine-grained sandstone and rare conglomerate.

Isolated outcrops of coralline limestone occur on the left bank of the river immediately upstream of the damsite. Coral was also located by geophysical methods north of the left abutment but the extent of the deposits was not determined (Cifali et al., in preparation).

Minor deposits of pumice occur as surface coverings over the sediments, and extensive banks of river gravel and sand up to 100 feet thick occur along the margins of the Kavavas River.

ENGINEERING GEOLOGY

DAMSITE

ABUTMENTS

The abutments of a storage dam with a crest height of 120 feet would be founded entirely in agglomerate (Plate 2), and the coralline limestone is therefore disregarded in consideration of the geological suitability of the abutments.

After surface mapping had been carried out in the preliminary geological investigation it was considered (Read, 1965) that the agglomerate would probably be fresh, hard and strong at depth. This has been proved incorrect, however, as diamond drilling located little fresh agglomerate in the abutments.

In drill holes WD1, WD2, WD3 and WD9 only 9% of the core recovered was fresh to slightly weathered; 47% was slightly to moderately weathered and 23% moderately to highly weathered. The degree of weathering is reflected in the tuffaceous matrix of the rock. Fresh agglomerate has a satisfactory bond between the matrix and the volcanic rock fragments making up the rest of the rock. As the degree of weathering increases the matrix becomes progressively pitted and friable, losing cohesion and strength so that a moderately weathered core sample can be broken across the rock fabric by hand. The approximate value of the overall compressive strength of the agglomerate in the abutments, determined from sonic wave velocities, was 5000 p.s.i. (Cifali et al., in preparation).

The fracture density per 10-foot of core obtained from the abutments is shown on histograms in Figures 1 and 2. It is considered that a large proportion of the fractures, which are numerous, was caused by breaking of weak rock during drilling, rather than by jointing. Generally the joints were widely and irregularly spaced, although nearly all joint faces were stained and coated with clay and secondary minerals indicating that they were open and directly contributing to the moderate to high permeability of the agglomerate.

The results of the water pressure tests carried out in drill holes WD1 WD2, WD3, and WD9 (Appendix III) are summarised in Figures 1 and 2. Permeabilities were lowest in WD1 and WD3 which have respective figures of 230 and 650 feet per year. The average in WD9 is 3100 feet per year and in WD2 5400 feet per year. The average value in WD2 may be slightly high due to two seemingly anomalously high values of 100,000 feet per year in the results.

The overall results of the water pressure testing indicate that water losses through ungrouted abutments would be high. They further indicate that the quantity of grout required to seal the abutments would be extremely high.

The suspected continuations of faults F2 and F3 (Read, 1965) were not proven and no major additional structures which could add to the known weakness of the abutments were discovered, either by diamond drilling or by geophysical investigation.

RIVER CHANNEL

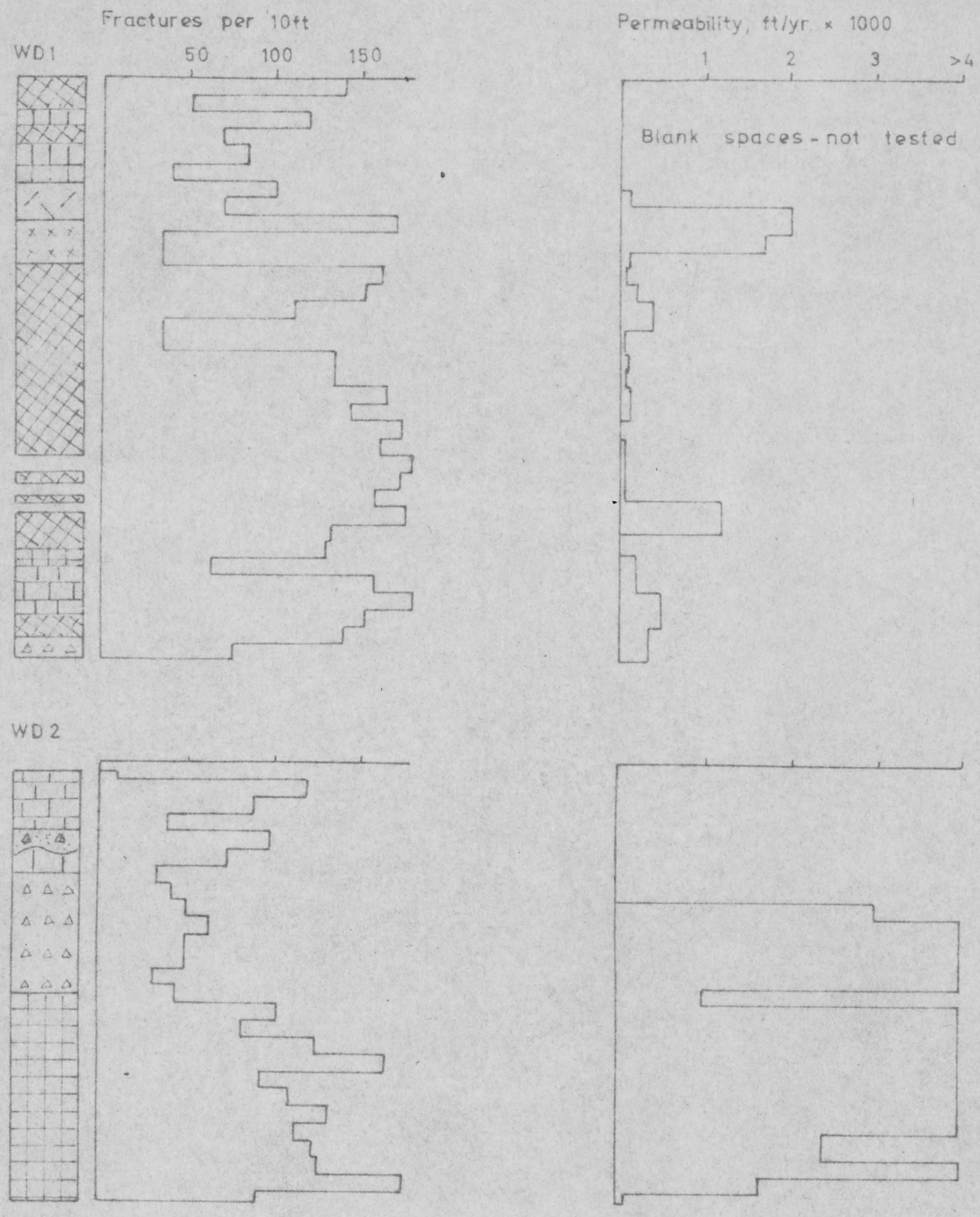
The most unexpected feature discovered at the damsite was the depth of the alluvium-filled river channel between the abutments.

Results of diamond drilling in the area are summarised in Figure 3. Drill hole WD8 broke into the river channel after only 74 feet of drilling in moderately to highly weathered agglomerate. Drill hole WD4A, drilled vertically through the alluvium, penetrated 109 feet of river gravel and sand before jamming and final confirmation of the configuration of the channel was not forthcoming until the completion of the geophysical investigation (Cifali et al., in preparation).

LOWER WARANGOI HYDRO-ELECTRIC SCHEME Fig. 1

SUMMARY LOGS OF DIAMOND DRILL HOLES WD1 & WD2

WD1	Coordinates :	E + 23ft, 353ft NE.	RL :	320ft	Angle : 70°, 178°M.
WD2	:	I + 34ft, 317ft NE		361ft.	: 90°



Agglomerate, Fresh to Slightly Weathered

Agglomerate, Slightly to Moderately Weathered

Agglomerate, Moderately to Highly Weathered

Agglomerate, Highly to Completely Weathered

Limestone and Agglomerate

Limestone

Andesite

Geological Office, Port Moresby PNGB56-2-15

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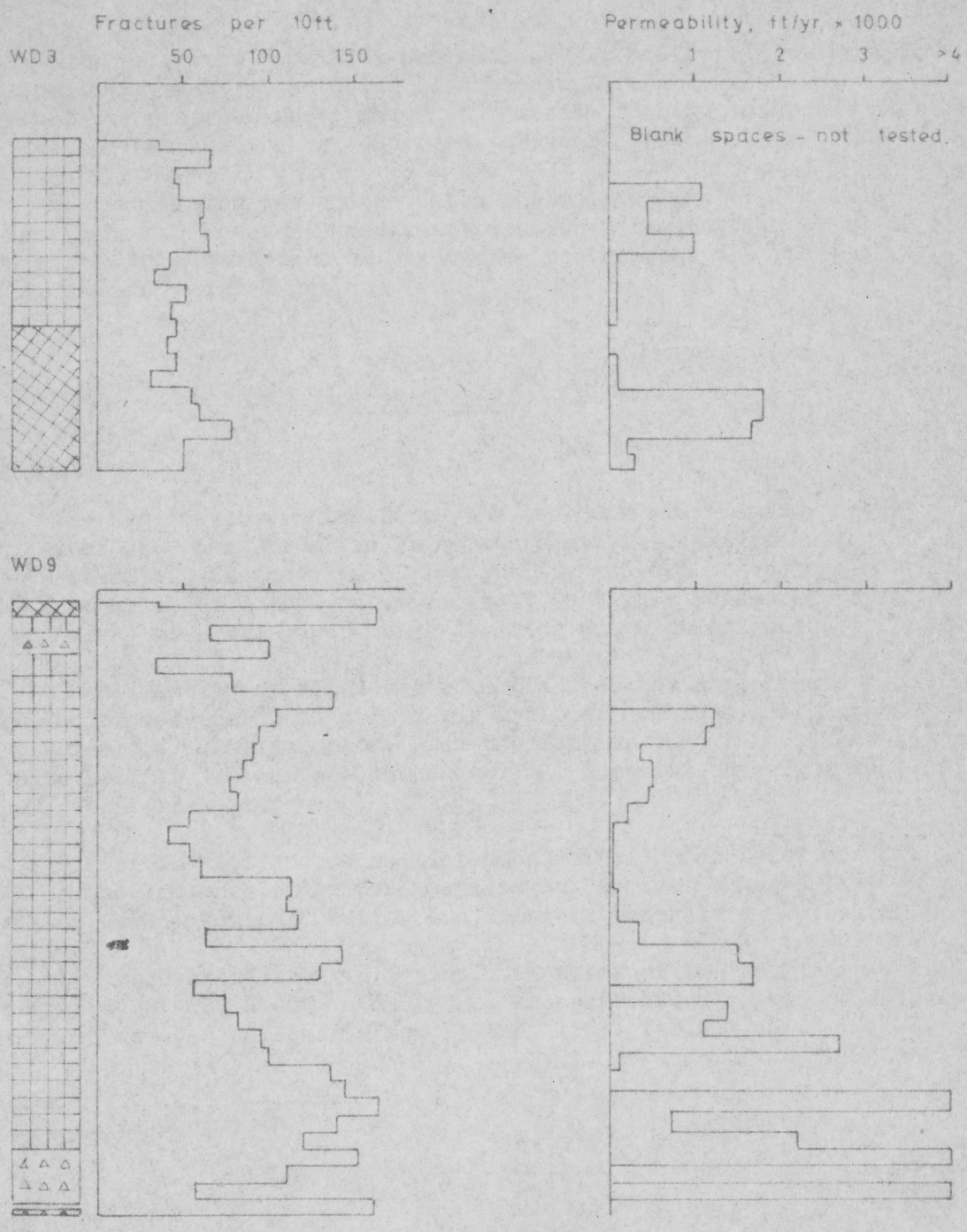
LOWER WARANGOI HYDRO-ELECTRIC SCHEME Fig. 7

SUMMARY LOGS OF DIAMOND DRILL HOLES WD3 & WD9

WD3	Coordinates :	J+ 30, 265ft. SW	RL :	130ft	Angle : 40°, 125° M
WD9	:	O+ 30, 300ft. SW	:	270ft.	90°



Agglomerate, Fresh to Slightly Weathered

Agglomerate, Slightly to Moderately Weathered

Agglomerate, Moderately to Highly Weathered

Geological Office, Port Moresby PNGB 56-2-16

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Core recovered from WD8A was slightly to moderately weathered and correspondingly weak: fracturing of the core during drilling was extensive. Water pressure tests showed a moderate to high loss, the average permeability for the hole being 1400 feet per year.

No information was gained as to the possibility of faulting beneath the channel. However, as already mentioned, the configuration of the channel indicates some form of structural control and the possibility of faulting cannot be ruled out.

STORAGE AREA

SOUTHERN RIDGE

The agglomerate, which forms the southern ridge over a crest length of about 2600 feet from the right abutment, is identical with that at the damsite. The rock is of low quality and 82% of the agglomerate retrieved from drill hole WD10 was moderately to highly weathered, soft, friable and weak: core breakage during drilling was high (Figure 4).

The limestone on the downstream flank of the agglomerate is coralline, moderately hard and strong but exhibits numerous small open cavities typical of coral deposits. The possibility that this limestone is connected beneath the surface with identical deposits occurring west of Ω18 (Read, 1965) was not proven.

Classification and consolidated undrained shear tests of sediments in the southern ridge were carried out by the Commonwealth Department of Works' Central Testing and Research Laboratory, Melbourne.

Samples tested triaxially included three of the four main soil types in the ridge: CH; SC-CL: and SP-SM. The calculated ranges of saturated shear strength were as follows (after Blythe, 1967, Table 4):-

Soil Type	C', p.s.i.	Ø'
CH	1-6	44-52°
SC-CL	0-1	36-41°
SM-SP	1-2.5	35-40°
GW-GP	Not tested but considered Ø ' would not be less than 45° and the gravel has some cohesion.	

As the sediments tested are typical of all those in the southern ridge these values would be representative for calculations of slope stability factors along the ridge.

Water losses during pressure testing of the agglomerate in the ridge were moderate to high, the average permeability being 1400 feet per year (Figure 4 and Appendix 3). The sediments were water-pressure-tested in drill hole WD6 (Figure 4 and Appendix 3) and field and laboratory permeability tests were carried out on selected samples by the Commonwealth Department of Works Central Testing and Research Laboratory.

Results of the tests on the various soil types were as follows:-

Pressure Testing, Drill Hole WD6

Reduced Level (feet)	Soil Type	Range of Permeability, Feet/Year
216-196	CH	180-2000
196-176	CL	750-2200
176-166	GP-GW & SP-SM	350-1300
166-156	GP-GW	100,000

Permeability Testing (after Blythe, Table 4, 1967)

Sample	Soil Type	Range of Permeability, Feet/Year
11-0-2, 11-0-6	CH	1-10
11-0-7, 11-0-11	SC-CL	1-10
11-0-1, 11-0-12 and 11-0-26	SM-SP	1-10
11-0-9	GW	10-1000
11-0-10	GP	1000-10,000

The discrepancy between the pressure testing and the permeability testing results has not been satisfactorily explained. It is clear, however, that the permeability of the silty and clayey sediments (CH,CL and SC) is considerably lower than that of the sandstone and conglomerate beds (SP-SM and GP-GW) which, although showing variable results, have an extremely high permeability. When pressure testing the GP-GW layer between R.L. 166 feet and R.L. 156 feet in drill hole WD6 a very high rate of flow (74 gallons per minute) occurred, and it was possible only to produce sufficient pressure to counteract pressure losses caused by friction in the supply line and packer. Even if the range of permeabilities calculated by the Central Testing and Research Laboratory for the sandstone and conglomerate beds is accepted as the more reliable, the total volume of water likely to be lost through the lowermost sandstone and conglomerate bed, which is 55 feet thick and extends immediately below top water line (R.L. 220 feet) over a distance of at least 8000 feet around the base of the ridge, is impressive.

MAIN RESERVOIR

The sediments in the remainder of the reservoir are similar to those in the southern ridge and values of saturated shear strength and internal friction calculated from samples from the ridge should be valid for any calculations of slope stability factors.

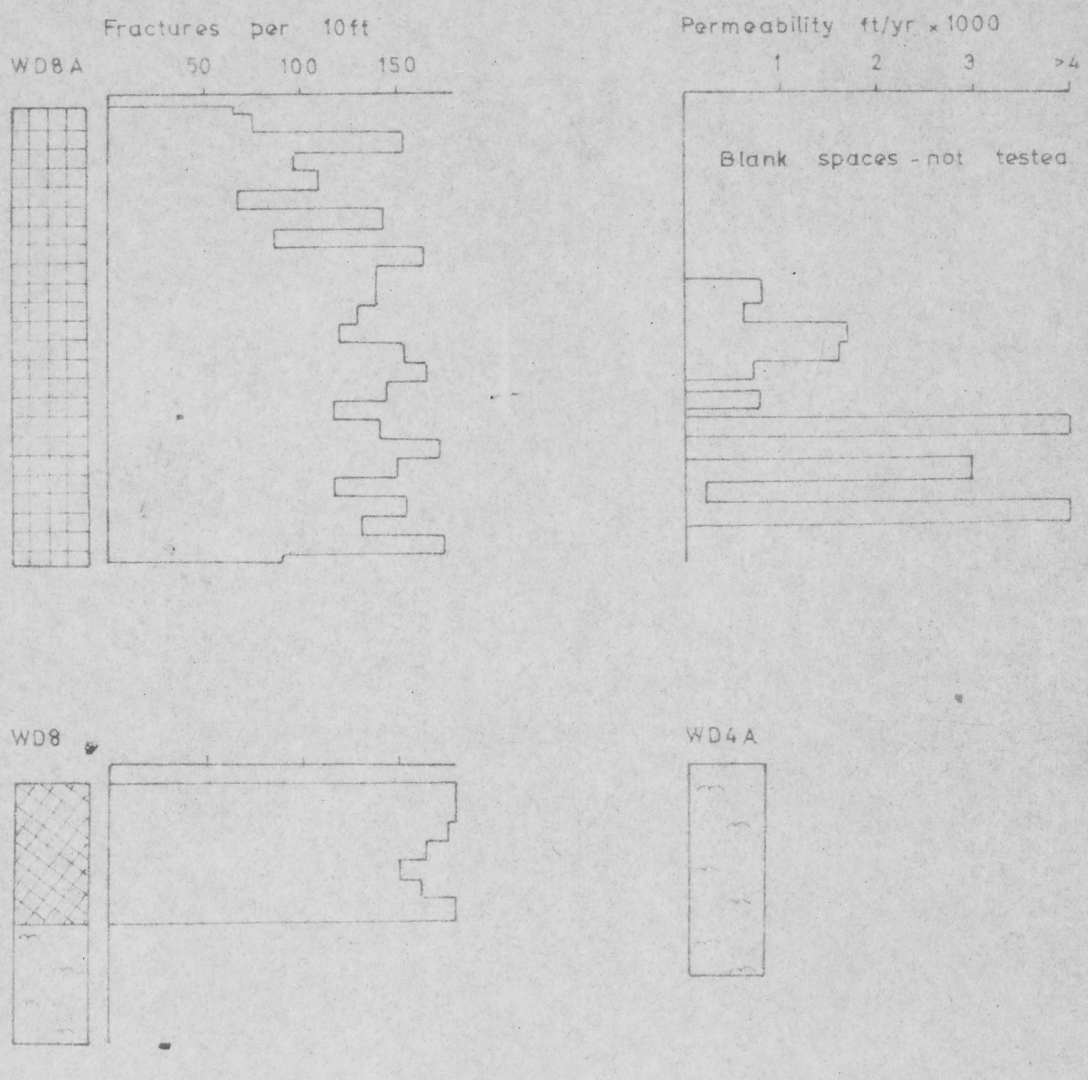
No other major leakage paths were proven. The distribution of coral limestone north of the left abutment was not clarified by geophysical investigation and the likelihood of leakage in this area remains unknown.

LOWER WARANGOI HYDRO-ELECTRIC SCHEME

Fig. 3

SUMMARY LOGS OF DIAMOND DRILL HOLES WD8A, WD8 ¢ WD4A

WD8A	Coordinates :	K + 23, 134ft NE.	RL :	120ft.	Angle : 70°, 252M.
WD8	:	K + 25, 134ft NE.		120ft	40°, 252M.
WD4A		J + 10, 155ft SW.		110ft	90°



Agglomerate. Slightly to Moderately Weathered

Agglomerate. Moderately to Highly Weathered

River Gravel ¢ Sand

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PNGB56-2-17

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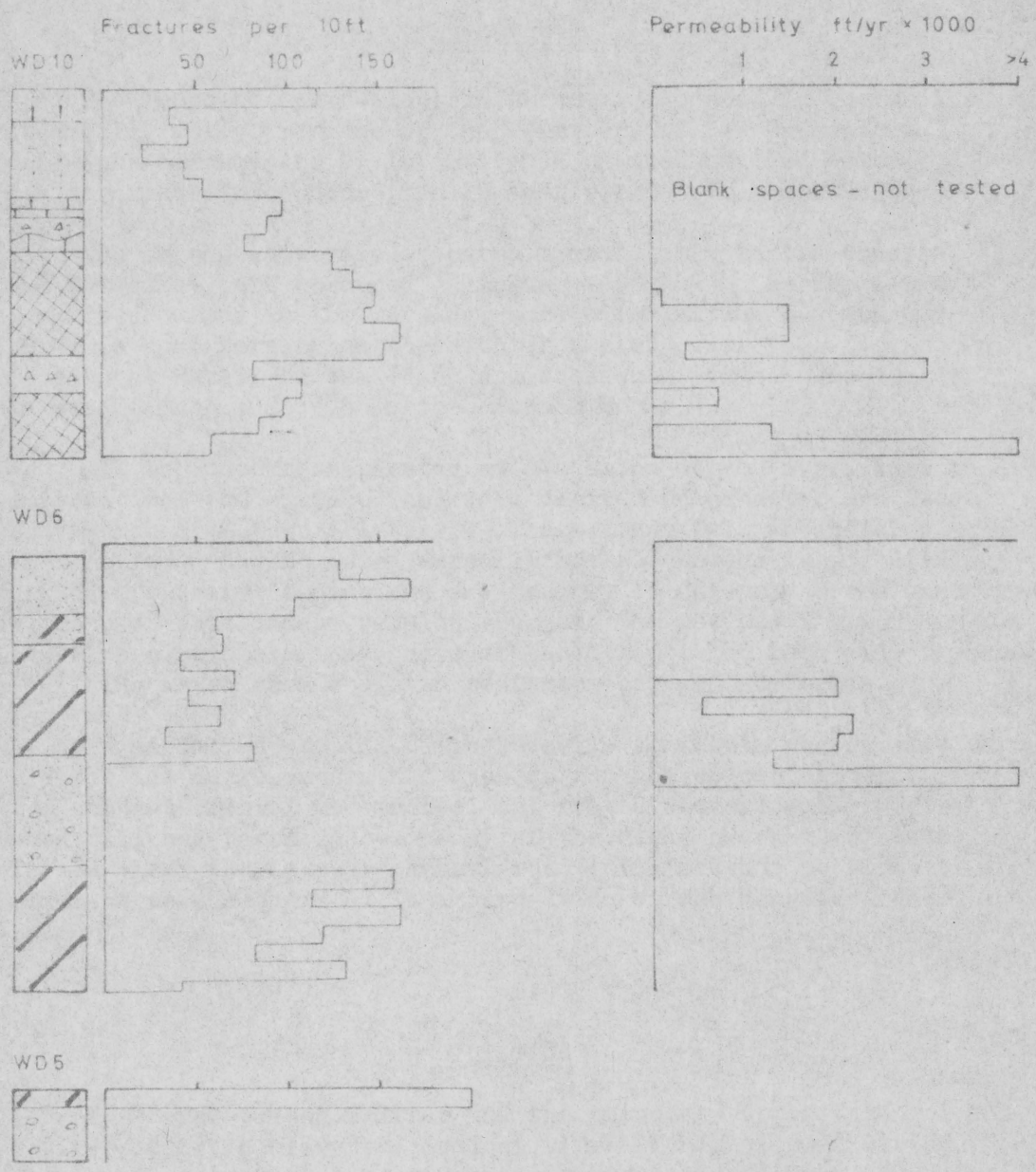
B56/A2/60-29

LOWER WARANGOI HYDRO-ELECTRIC SCHEME

Fig 4

SUMMARY LOGS OF DIAMOND DRILL HOLES WD10, WD6 & WD5

WD10	Location :	Traverse T4, Peg 15	RL : 300 ft.	Angle :	55°, 295°M
WD6		Midway Pegs Δ8 & Δ9	: 291 ft.		90°
WD5		Traverse T16, Peg 5	194 ft.		90°



Claystone and Mudstone

Sandy Claystone

Limestone and Agglomerate

Limestone

Agglomerate. Fresh to Slightly Weathered

Agglomerate Moderately to Highly Weathered

Claystone and Sand

Mudstone, Claystone and Sand

Blue Mudstone

Sandstone and Conglomerate

Geological Office, Port Moresby

PNGB56-2-18

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B56/A2/60-30

SEISMICITY

The proposed hydro-electric scheme is located in one of the most seismically active regions of the Territory of New Guinea: an average of four earthquakes of intensity IX on the Modified Mercalli Scale can be expected to occur in a 25-year period (Brooks, 1965).

The strongest series of earth tremors felt in the Gazelle Peninsula for some years occurred on August 14, 1967. The two largest shocks, which occurred in the morning, were of magnitude 6.2 and 6.4 as measured in Port Moresby on the Richter Scale. Over 150 aftershocks were recorded at Rabaul on the 14th, and subsequent days. The largest of these was of magnitude 5.6 on the Richter Scale.

All the shocks originated at a shallow depth (i.e., less than 33 kilometres from the surface) and were centred between two and four miles south-east of Kokopo (Plate 1). The maximum felt intensities recorded were IX on the Modified Mercalli Scale. Wooden frame buildings were shifted off their foundations and masonry of category D was destroyed. However, most of this damage resulted because the methods of founding the buildings were completely inadequate and no attempt had been made to ensure that a building acted as a whole in resisting horizontal forces.

An aerial inspection of the Gazelle Peninsula was carried out shortly after the disturbances had ceased. In the epicentral area extensive but superficial movement of cultivated slopes, embankments and placed fill had taken place. Many of the high, overhanging cuts in volcanic ash along the Kokopo - Rabaul road collapsed but no signs of earth movement were seen in a close inspection of the damsite, reservoir and catchment areas.

SILTATION

The Lower Warangoi River and the tributary Upper Warangoi and Kavavas Rivers carry a heavy bed load at times of high flow. During the preliminary geological investigation it was noticed (Read, 1965)that rapid increase in load took place after only moderate rainfall in the catchment area. The rate of siltation in the reservoir is therefore expected to be high, especially in the wet season.

Slope failure induced by earthquake activity would increase the rate of siltation. Although no landslides were observed in the Warangoi district following the Kokopo earthquakes in August, 1967, the extent of earth movements, even though only superficial, which took place in the Kokopo area underlines the likely reaction of potentially unstable slopes to a strong seismic shock with an epicentre located in the vicinity of the catchment or reservoir area.

CONCLUSIONS

Topographically, the proposed damsite and reservoir area on the Lower Warangoi River are suitable for the development of a hydro-electric scheme. However, there are unfavourable geological features which restrict considerably the usefulness of the site. These are:-

1. The weathered condition of the volcanic agglomerate. A high proportion of the agglomerate recovered from the damsite and the southern ridge by diamond drilling is moderately to highly weathered and correspondingly weak. Although more detailed strength testing of selected samples would be required for design purposes the overall weakness of the abutments indicates that either an earth-fill or rock-fill dam rather than a concrete structure would be required.

2. The configuration of the river channel between the abutments. The river channel is 300 feet wide at the narrowest point between the abutments, is approximately square-shaped, and is filled with river gravel and sand to a depth of 150 feet. Any structure would therefore require the use of river gravel and sand as a foundation which would again limit the choice to either an earth- or rock-fill dam. Problems associated with any design would include the likelihood of differential settlement between the river alluvium in the channel and the agglomerate in the abutments, and the provision of a suitable cut-off wall in the alluvium beneath the dam. To make the most effective use of the site a particularly sophisticated, and probably expensive, design would be necessary.

3. The permeability of the agglomerate. Jointing and weathering of the agglomerate has produced a body of rock at the damsite and along the southern ridge which has proved during water-pressure testing to be moderately to highly permeable. Prevention of further deterioration in rock condition due to water seepage, and loss of water through the abutments and the agglomerate sections of the southern ridge, would require extensive grouting. Although test holes would be necessary to estimate reliably the quantity of grout required per hole permeabilities indicate that the consumption would be high. As grout protection would be required over a total horizontal distance in excess of 3000 feet and to an average depth of at least 200 feet, the cost would be extremely high.

4. The presence of highly permeable sandstone and conglomerate beds in the southern ridge. The lowermost sandstone and conglomerate bed in the southern ridge is 55 feet thick and extends for a distance of at least 8000 feet around the base of the ridge immediately below the proposed top storage level. As water-pressure testing in drill hole WD6 and field permeability testing carried out by the Commonwealth Department of Works Central Testing and Research Laboratory has demonstrated the permeability of these beds to be extremely high, the potential water loss from the reservoir into the Sigule River drainage system is of serious proportions. In addition to the hazard of loss of water from the reservoir the possible long term effect of pressurised water seepage on the strength of the deposits should also be considered. Any failure in these beds could lead directly to increased leakage and eventual failure of the surrounding fine-grained sediments in the ridge. To ensure the safety and long life of the reservoir it would therefore be necessary to ensure that the lowermost sandstone and conglomerate bed was effectively sealed - an undertaking which, because of the extent and location of the bed, may be impracticable.

5. Seismicity. The location of the proposed scheme in an area of high seismicity poses several problems, which can be summarised as follows:-

(i) Any design would be complicated by the need to found the dam on two materials- agglomerate and river sand and gravel - which would have markedly different responses to seismic shocks. Also more detailed investigation would be required to determine the particle velocity and acceleration developed in the sand and gravel foundation and the possible momentary loss of load-bearing capacity due to liquification or partial liquification of water-saturated sand.

(ii) The cut-off wall in the river alluvium beneath the damsite, which would be a deep structure, would need to be flexible or self-healing to withstand high ground accelerations.

(iii) In addition to allowing for high accelerations in the design of the dam it would also be necessary to give full consideration to the effect of regular, moderate to high seismic activity in the storage area. Any tendency towards slope instability, especially during the wet season, may be exaggerated by direct seismic impact on the sediments in the storage area, or by the erosive action of earthquake-induced waves in the reservoir.

(iv) The dam would have to have sufficient freeboard to avoid overtopping by waves induced directly by seismic waves or by major landslide activity.

6. Siltation. The Lower Warangoi River and its tributaries carry a heavy silt load at times of high flow which would be reinforced following any disruption of the land surface by a major earthquake. In order to determine the probable useful life of the storage area it would be desirable to undertake an intensive programme of measurement of the bed load movement.

Overall, it is concluded that the Lower Warangoi hydro-electric scheme is, geologically, a doubtful proposition requiring further selective and expensive investigation before a structurally sound design could be specified. Although further investigation would probably provide sufficient information to enable the scheme to be implemented, it is considered that the cost would prove prohibitive.

RECOMMENDATIONS

Further investigation of the Lower Warangoi hydro-electric scheme should be discontinued until all other alternative methods of producing the power required to supply Rabaul and eventually the Gazelle Peninsula have been fully investigated. Design investigation could only be justified if studies of alternative schemes proved beyond reasonable doubt that the Lower Warangoi Scheme was the most economic proposition.

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APPENDIX I

DEFINITIONS OF SEMI-QUANTITATIVE DESCRIPTIVE TERMS

The following terms have been used in this report:

Grade Scale.

Coarse-grained	$\frac{1}{2}$ mm to 1 mm in diameter
Medium-grained	$\frac{1}{4}$ mm to $\frac{1}{2}$ mm in diameter
Fine-grained	$\frac{1}{8}$ mm to $\frac{1}{4}$ mm in diameter

Weathering

Fresh	Rock shows no discolouration, loss of strength nor any other defect due to weathering.
Slightly weathered	Rock is slightly discoloured, but not noticeably lower in strength than the fresh rock.
Moderately weathered	Rock is usually discoloured and weakened to such an extent that a 2-inch drill core can be broken up readily by hand across the rock fabric. Wet strength usually much lower than dry strength.
Completely weathered	The rock is discoloured and is entirely changed to a soil, but the original fabric is mostly preserved. The properties of the soil depend upon the composition and structure of the parent rock.

APPENDIX 2

Geological Logs of Diamond Drill Holes

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRANGOI M-E SCHEME

SITE: LEFT ABUTMENT

DAMSITE GRID: 8423, 398 MB

ANGLE FROM HORIZONTAL: -70°

DIRECTION: 178° M

HOLE NO. WD 1

AGGLOMERATE Moderately to Highly Weathered.	Light to dark brown coarse-grained andesite. Soft moderately weak. Pieces up to maximum size of 12 ins. Average pieces 18 ins.	10	Irregular jointed, open, joints coated & showing evidence of water action. Broken zones 7'-9' 12'-15'10"
AGGLOMERATE Slightly to moderately Weathered.	Light grey. Soft to moderately hard, weak to moderately strong.	20 / 21'6" / 29'3"	Clay & calcite on joints. Broken zones 23' - 28' 28'6" - 29'9" 35' - 37'1"
AGGLOMERATE Moderately to Highly Weathered	Light grey, coarse-grained. Soft & weak but core intact, with pieces up to maximum size of 36 ins. Average pieces 7 ins.	30 / 40 / 41'5"	Broken zone 30' - 32'9"
AGGLOMERATE Slightly to Moderately Weathered.	Light grey, medium to coarse-grained, andesite. Soft, weak to moderately strong. Pieces from ½ - 27 ins. Average pieces 4 ins.	50 / 60 / 63'8"	Broken zone 56' - 56'3" Broken zone 58'6" - 63'8".
ANDESITE Fresh to Slightly Weathered.	Light grey. Fine-grained, vesicular. Pieces from ½ - 18 ins. Average pieces 3 ins.	70 / 80 / 82'9"	Contact apparently horizontal. Broken zones - 60' - 66'8" 65' - 68'8" 66'9" - 67'5" 68' - 68'6" 69' - 70' 70'6" - 70'8" 72'6" - 73" 76'4" - 77'6" 82' - 82'9"
AGGLOMERATE Highly Weathered.	Dark to light grey, coarse-grained, andesite. Soft, friable & weak but core intact. Pieces up to maximum size of 18 ins. Average pieces 4 ins.	90	Broken fragmental zone 89'6" to 92'.

Standard F/SC Hydraulic
Type of drill: NMLC Triple Barrel
Commenced: 8 Weeks C.P.W.
Completed: 7.8.65
Started: 25.11.65
Contractor: I.R.L. Reed
Operator: 1 man 10 Prof.

Type of drill: 10" Hydraulic
Type of casing: 10" Casing
Casing: Length 100 p.s.l.

B56/A2/60-1

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARAMBEI H-E SCHEME

LOCATION: LEFT ABUTMENT

DAMSITE GRID, E-23, 593 NE

ANGLE FROM HORIZONTAL: -70°

DIRECTION: 178° M

COORDINATES:

RL: 324 FT.

HOLE NO. WD1

SHEET 2 OF 4

Rock Type & Degree of Weathering	Description	Drilling Data	Depth	Log	Structure	Water Pressure Test
AGGLOMERATE. Highly Weathered.	As above.		NHLC, 110		Irregular jointing, surfaces lightly clay coated. Broken zones – 108'5" - 109'3"; 111'4" - 112'3"	
AGGLOMERATE. Moderately to Highly Weathered.	Light to dark grey, medium to coarse-grained. Moderately soft, weak and very broken. pieces up to maximum size of 10 in. Average pieces ½ in.	NC	120, 130, 135'			
AGGLOMERATE. Moderately to Highly Weathered.	Light to dark brown, medium to coarse-grained. Moderately soft and weak but core intact. Average pieces 6 in.		140, 150, 160		Broken zone 136'1" - 136'6". Occasional irregular joints, lightly coated with calcite. Broken zone 144'8" - 145'. Broken zone 148' - 148'5".	
AGGLOMERATE. Moderately to Highly Weathered.	Light to dark brown, medium to coarse-grained. Soft, friable and very broken. Very weak. Rare slightly weathered pieces with maximum size of 9 in. Average pieces ½ in.	NC, NC	170, 180, 190			

Machine: Christensen F15C Hydraulic

Drill Barrel: Triple Barrel

Logged by: G. Walpole C.D.W.

Date: 7-6-65

Date: 26-11-65

Checked by: I.A.L. Read

Scale: 1 inch = 10 Ft.

Water Pressure Test: Pump: N.K. Hydraulic; Gauge: A.K. Boring; Area of gauge: 1 inch = 100 p.s.i.

Photographic Reference System

B56/A2/60-2

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRANGA H.E. SCHEME

LOCATION: LEFT ABUTMENT

DACITE DRID : RW3, 393 MB.

ANGLE FROM HORIZONTAL: -70°

DIRECTION: 128° M

COORDINATES:

R.L. 380 M.

HOLE NO. WD1

SHEET 3 OF 4

ROCK TYPE & LOGGED INTERVAL	DESCRIPTION (LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC)	GRAPHIC LOG	DEPTH & RATE OF CORE	FRACTURE LOSS	% CORE RECOVERY	CASING	STRUCTURES (JOINTS, VEINS, SEAMS, FAULTS, CHANNEL ZONES)	WATER LEVEL	WATER PRESSURE TEST (LOSS IN 10 MIN AT 10 PSI)
AGGLOMERATE. Moderately to Highly Weathered.	Light to dark grey, medium to coarse grained matrix slightly calcareous soft, friable & weak. Rare fresh to slightly weathered pieces with maximum size of 3cm. Average pieces 1cm.	NC	210, 220, 230, 240, 250, 260, 270, 275				Rare irregular joints lightly coated with calcite. Core breaks easily through matrix into component fragments.		
AGGLOMERATE. Slightly to Moderately Weathered.	Reworked zone. Fragments of limestone contained in moderately hard, calcareous matrix.		280, 286'-6"				Broken zone 285' - 286'8"		
CORALLINE LIMESTONE. Slightly to Moderately Weathered.	Cream coloured. Numerous voids. Moderately hard and strong but with occasional very soft, highly weathered patches.	NC, NC	290				Agglomerate - limestone contact, although reworked apparently normal to core axis.		

Drill: Mr Hydraulic Drill
Hydraulic
Type: Triple Barrel
Driller: R. Muddings
Commenced: 2.4.65
Completed: 25.4.65
Logged: I.R.L. Read
Vertical scale: 1cm = 10 feet

NOTES

WATER PRESSURE TESTS
Method: St. Hydraulic - Packer
Supply: Co. Supply
Initial pressure: Local - 200 p.s.i.

PROJECT GRID REFERENCE SYSTEM

B56/A2/60-3

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GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRANGOI H-E SCHEME.
PLACE: LEFT ABUTMENT.
DAMSITE GRID: E123, 393 NE.
DIRECTION: 178° M.
R.L. 320 ft.

HOLE NO: WD1

SHEET 4 OF 4

Rock Type Alteration or Weathering	Description	Graphic Log	Depth	Core Recovery	Structure	Water Level	Water Pressure Test (Lugeon Units) 10 20	Remarks
CORALLINE LIMESTONE Slightly to Moderately Weathered.	As above.		310					
AGGLOMERATE Moderately to Highly Weathered	Recrystallized zone. Fragments of limestone contained in a soft, friable, calcareous matrix. Rare fresh pieces of agglomerate, maximum size 2 in.		320					
AGGLOMERATE. Slightly Weathered.	Light grey to brown. Medium-grained. Moderately hard and strong.		330		Broken zones – 330' 5" - 330' 8" 333' 3" - 333' 11"			
	END OF HOLE		340					

Machine: Minuteman E.S.E.
Type: Hydraulic
Core barrel: B.M.L.E. Triple barrel.
Driller: R. Maddings
Commenced: 7.6.65
Completed: 25.11.65
Logged by: J.R.L. Read
Vertical scale: 1 inch = 10 feet.

NOTES

WATER PRESSURE TEST
Instrument: B. Packer
Correct line: 1.1 Lugeon
Vertical scale: 1 inch = 2 Lugeon

PHOTOGRAPHY REFERENCE SYSTEM
Black and white:
Colour:

B56/A2/60-4

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

PROJECT: LOWER WARANGEL HYDRO-ELECTRIC SCHEME

LOCATION: BATSTON, LEFT ABUTMENT

GEOLOGICAL LOG OF DRILL HOLE

LIMESTONE Fresh to Slightly Weathered	Coralline, abundant cavities, off-white to cream, moderately hard moderately strong. Pieces ½"-12", mode 4"	NC NC NC	10 20 30	Moderately broken zone 18'3" - 21'10" Slightly broken zone 18'1" - 18'3" Joints 30°, 05 Slightly broken zone 26'6" - 29'	
LIMESTONE AND AGGLOMERATE Slightly Weathered	Recrystallized coralline limestone and andesitic agglomerate. Agglomerate light grey, limestone white. Agglomerate moderately hard, moderately strong. Limestone moderately soft, chalky texture, moderately weak. Pieces ½"-14", mode 4"	NC NC NC	40 50 60 66'	Highly broken zone 45'8" - 47'2" Moderately broken zone 49'10" - 51'10" Joints, 30°, 65°, 80°, calcite coated, widely spaced	
AGGLOMERATE Fresh to Slightly Weathered	Andesitic, fine to medium grained, light to dark grey, hard and strong. Pieces ½"-10", mode 5"		70 80 90	Moderately broken zone 71'3" - 72' Irregular <½" thick calcite veins Moderately broken zone 86'10" - 87'4", 90'10" - 91'8" Joints 30°, 40°, 70°, thinly calcite coated, widely spaced	50 mm

Drilling Rig: Hydraulic
Core Barrel Type: NQ/LC
Triple Tube
Driller: R. McKeddie, Cairns
Commenced: 22-11-65
Completed: 14-2-66
Logged by: J.E.C. & J.R.L.R.
Vertical Scale: 1 inch = 10 feet

Water Pressure Tests
Pump Type: N.Q. Hydraulic
Pump Log: B.S. Corong
Vertical Scale: 1 inch = 50 p.s.i.

Photomicrographs Reference Index

B56/A2/60-5

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRANDYTE HYDRO-ELECTRIC SCHEME

LOCATION: DAMSITE, LEFT ABUTMENT

ANGLE FROM HORIZONTAL: -90 DIRECTION:

COORDINATES: E 24 N 17 R.L. 361 ft

HOLE NO. WD 2

SHEET 2 of 3

Description	Water Pressure Test
ASBLOMERATE Fresh to Slightly weathered	Agglomerate as above. Pieces ½"-15", mode 6"
AGGLOMERATE Moderately weathered	Andesitic volcanic fragments light to dark grey, irregularly vesicular. Matrix brown to dark brown, friable. Predominantly moderately soft with irregular moderately hard patches. Weak. Easily broken by hand. Pieces ½"-4", mode 1"

Depth scale: 100, 110, 120, 130, 140, 150, 160, 170, 180, 190

Moderately broken zones 100'-100'6", 101'3"-101'9"

Slightly broken zone 109'3"-109'6"

Moderately broken zones 110'-110'6", 110'-110'5"

Some irregular ½" thick calcite veins

Joints 20°, 45°, 85° widely spaced

Fractures or rent due to flaking of weak matrix during drilling

Joints 30°, 20°, 45°, 70° widely spaced

Highly broken zones 180'-180'5", 185'5"-185'6"

Water Pressure Test: 50 lb/sq in, 10 lb/sq in

Drilled by: Hydrotech E.S.S.

Hydraulic

Water

Drill Table

R. Hocking

Rotary

Diamond

E.S.C. & E.R.R.

Core Barrel: 10 feet

Water Pressure Test: Mr. Hydrotech & Mechanics

Photographs Reference Index

B56/A2/60-6

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI HYDRO-ELECTRIC SCHEME

LOCATION: DAMSITE, LEFT ABUTMENT

ANGLE FROM HORIZONTAL: -90 DIRECTION:

COORDINATES: 7+30, 317 ft. N.E. R.L. 341 ft.

HOLE NO. WD 2

SHEET 3 OF 3

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION (LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC.)	GRAPHIC LOG	DEPTH & SIZE OF CORE	FRACTURE LOG	% CORE RECOVERY	STRUCTURES (JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	WATER LEVEL	WATER PRESSURE TEST (LOSS IN GALLONS PER MINUTE PER FOOT) 50 100
	Agglomerate as above.	NC	NMLC					
			210					
ACCLOMERATE - Moderately to Slightly weathered	Andesitic Volcanic fragments light grey. Matrix light grey to brown, irregularly vuggy and pitted. Moderately soft to moderately hard. Moderately weak to moderately strong. Pieces ½"-8" mode 2"	NC	220'			Joints 30°, 45° widely spaced.		
			220			Moderately broken zones 229'3"-229' 229'6"-230' 230'10"-231'5" 232'6"-232'11" 232'6"-234' 235'4"-235'8" 236'6"-237'		
			230					
			240					
						Highly broken soft and friable zone 245'8"-249'2"		
			250					
	End of hole 258' 4".							

DRILL TYPE: Standard E15C

PUMP: Hydraulic

CORE BARREL TYPE: NMLC Triple Tube

DRILLER: R. Meadings C.D.O.

COMMENCED: 27-11-65

COMPLETED: 14-3-66

LOGGED BY: I.S.C. & F.R.A.R.

VERTICAL SCALE: 1 inch = 10 feet

NOTES

FRACTURE LOG – Number of fractures per foot of core. Dashes of each type are displayed in the core log.

BEDDING AND JOINT PLANES – Angles are measured relative to the core axis.

WATER PRESSURE TESTS

PACKER TYPE: AX Hydraulic & Mechanical

TUBING LINE: AX Casing

VERTICAL SCALE: 1 inch = 200 psi

Figures given are gauge pressures. Test intervals are indicated graphically on diagram in column.

PHOTOGRAPH REFERENCE SYSTEM

BLACK AND WHITE

COLOUR

856/A2/60-7

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GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI HYDRO-ELECTRIC SCHEME

LOCATION: DAMSITE, RIGHT ABUTMENT

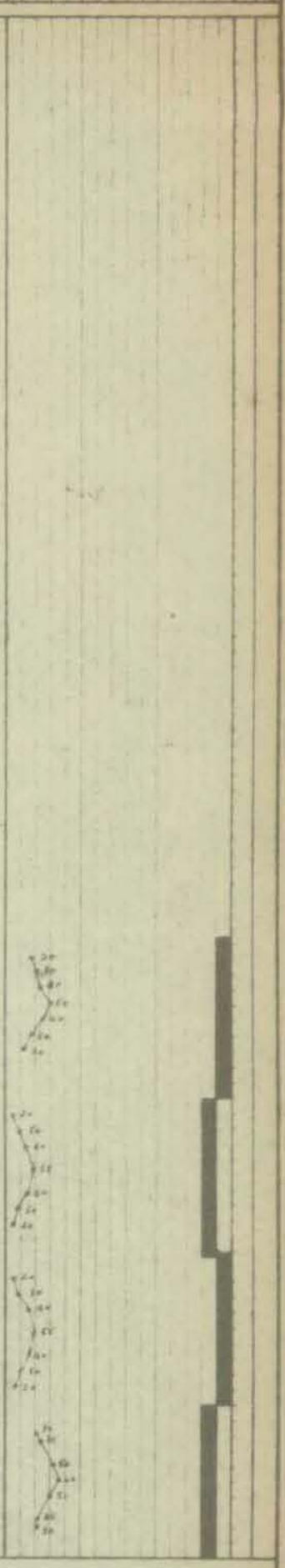
ANGLE FROM HORIZONTAL: -40° DIRECTION: 125° Mag.

COORDINATES: J+70, 265 ft. S.W. R.L. 130 ft.

HOLE NO. WD 3

SHEET 1 OF 3

OVERBURDEN	Soil and agglomerate scree	NMLC	
AGGLOMERATE Slightly to Moderately Weathered	Andesitic Volcanic fragments ¼"-8", mode ½". light grey, commonly vesicular. Matrix medium to fine-grained, light grey to brown. Vuggy and pitted. Moderately hard to moderately soft. Moderately strong. Pieces ¼"-12" mode 4".	10	
		20	
		30	
		33'6"	Slightly broken zones 36'6"-36'10", 36'5"-36'10", 36'8"-37'2"
		40	Joints widely spaced 30°, 70°, lightly to moderately coated with clay & calcite
		50	Moderately broken zones, 48'0"-48'4", 52'5"-53'
		60	
			Highly broken zone 66-65'
		70	Joints widely spaced, lightly coated with clay, 25°, 45°, 70°
	Pieces ¼"-12", mode 5"		Moderately broken zone along dominant joint 77'6"-78'6". Highly broken zones 79'9"-80', 81'1"-81'6"
		80	Moderately broken zone 85'5"-86'
		90	Moderately broken zone 91'-92'5"



DRILL: Longyear Hydraulic
CORE BARREL TYPE: NMLC
FROM: Burial
DRILLER: F. Cardon, C.S.W.
COMMENCED: 31-5-60
COMPLETED: 2 Feb. 1960
VERTICAL SCALE: 1 inch = 10 feet

WATER PRESSURE TEST
PACKER TYPE: N. Mechanical
CLAMP: on Bit Casing
VERTICAL SCALE: 1 inch = 100 p.s.i.

PHOTOGRAPHY REFERENCE SYSTEM
BLACK AND WHITE
COLOUR

B56/A2/60-8

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI HYDRO-ELECTRIC SCHEME
LOCATION: DAMSITE, RIGHT ABUTMENT
ANGLE FROM HORIZONTAL: -40 DIRECTION: 125° Mag
COORDINATES: J+30, 265 Ft, S.W. R.L. 130 Ft.

HOLE NO. WD 3
SHEET 2 OF 3

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION (MINERAL, COLOUR, STRENGTH, HARDNESS, ETC)	GRAPHIC LOG	DEPTH & SIZE OF CORE	FRACTURE LOSS	RT & % CORE RECOVERY	STRUCTURES (JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	WATER LEVEL	WATER PRESSURE TEST (LOSS IN GALLONS PER MINUTE PER FOOT)	RQD
AGGLOMERATE Slightly to Moderately Weathered.	Agglomerate as above but with occasional andesite boulders up to 2ft. in length. Pieces ½"-15", mode 5".		NMLC 110 120			Slightly broken zones 107'6"-107'10", 109'9"-110'. Joints widely spaced, 30°, 45°, 65°, lightly coated with calcite & clay.			
	Pieces ½"-10", mode 4".		130 140			Moderately broken zone 127'8"-128'2".			
AGGLOMERATE Moderately weathered.	Volcanic fragments light to dark grey. Matrix brown. Moderately soft, rarely moderately hard. Moderately weak matrix friable and core readily broken by hand. Pieces ½"-15", mode 8".		148' 150 160			Moderately broken zones 143'8"-144', 146'6"-146'8", 147'10"-148'3". Moderately broken zone 155'7"-156'2". Slightly broken zone 165'10"-166'.			
	Pieces ½"-8", mode 2".		170 180 190			Joints widely spaced, 45°, 70°, coated with calcite & clay. Moderately broken zones 187'0"-188'3", 189'8"-190', 193'-194', 196'5"-196'10", 197'4"-197'8".			

Machine: Mindrill E1000
Type: Hydraulic
Core barrel type: NMLC
Triple Tube
Driller: T. Condon C.D.W.
Commenced:
Completed: 21-5-66
Logged by: J.A.L. Read
Vertical scale: 1 inch = 10 feet

NOTES

WATER PRESSURE TEST
Packer type: N. Mechanical
Supply line: AR. Coring
Vertical scale: 1 inch = 2 g.p.m.

PHOTOGRAPH REFERENCE SYSTEM
Black and white:
Colour:

B56/A2/60-9

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGA HYDRO-ELECTRIC SCHEME

LOCATION: DAMSITE, RIGHT ABUTMENT.

ANGLE FROM HORIZONTAL: -40° DIRECTION: 125° Mag.

COORDINATES: Z+30, 265 Ft. S.W. R.L. 130 Ft.

HOLE NO. WD 3

SHEET 3 OF 3

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION (LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC.)	GRAPHIC LOG	DEPTH & SIZE OF CORE	FRACTURE LOG	% CORE RECOVERY	STRUCTURES (JOINTS, FAULTS, SHEARS, VEIN, FOLIATION, BEDDING, ETC.)	WATER LEVEL	WATER PRESSURE TEST (LINE IS GAUGE PRESSURE, BAR TOP)
ABBLOMERATE Moderately Weathered	Agglomerate as above. Matrix pitted and friable. Pieces ¼"-6", mode 2".		NWLC 210 220 230			Moderately broken zone 207'-207'5" Slightly broken zone 210'8"-210'6" Moderately broken zone 220'-220'10" Slightly broken zones 224'7"-224'9", 230'6"-230'7"		
	End of hole 231 feet.							

DRILL: Mindrill E1000
PUMP: Hydramatic
CORE BARREL TYPE: NWLC
BIT: Triple Barrel
DRILLER: T. Condon C.B.W.
COMMENCED: 1966
COMPLETED: 1966
LOGGED BY: J.B.L. Read
VERTICAL SCALE: 1 inch = 10 feet

NOTES
FRACTURE LOG: Number of fractures per foot of core. Lines of dots are core breaks.
BEDDING AND JOINT PLANES: Angles are measured relative to the core axis.

WATER PRESSURE TESTS
PACKER TYPE: Mechanical
SUPPLY LINE: Casing
VERTICAL SCALE: 1 inch = 200 p.s.i.
Figures given are gauge pressures
Test sections are indicated graphically by header-to-other

PHOTOGRAPHY REFERENCE SYSTEM
BLACK AND WHITE:
COLOUR:

856/A2/60-10

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRANGO HYDRO-ELECTRIC SCHEME
LOCATION: DAMSITE RIVER FLAT, RIGHT ABUTMENT

WD 4A

ANGLE FROM HORIZONTAL: -90° DIRECTION:
COORDINATES: T.L.10, 155 R.W. RL 110

PAGE 1 of 1

ROCK TYPE, COLOUR, WEATHERING	DESCRIPTION	GRAPHIC LOG	DEPTH	CORE LOSS	RECOVERY	SAMPLE	WEATHERING	BREAKS	ROCK MECHANICS TEST	RQD
RIVER GRAVEL AND SAND	Sandy sludge, medium-coarse grained sand and gravel throughout hole. Gravel sizes from ¼"-1½". Predominantly gravel from 15' to 25' where some gravel fragments have been cored from larger boulders. End of hole 109 feet in sand & gravel.		NX 10 20 BX 30 40 50 60 AX 70 80 90 EX							

Mindrill 8 1000
Hydraulic
NX, BX, AX & EX
P. Koppitz C.D.W.
27-4-66
11-6-66
J.R.L. Read
1 inch = 10 ft.

B56/A2/6.0-11

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI HYDRO-ELECTRIC SCHEME
LOCATION: SOUTHERN RIDGE, MOWAY PIPES 4 AND 5, TRAVERSE T/6
ANGLE FROM HORIZONTAL: -90 DIRECTION:
COORDINATES: RL 194 Feet

HOLE NO. WD 5
SHEET 1 OF 1

Rock Type & Content of Mineralisation	Description (Colour, Strength, Hardness, etc)	Graphic Log	Depth & Scale of Depth	Core Loss	Core Recovery	Fracture Data (Angle of Joints, Faults, Shears)	Core Size	Water Pressure Test (Rate of Loss of Water, etc)
MUDSTONE Fresh	Blue mudstone with thin lenses of brown claystone. Poorly indurated, soft & weak.		NMLC					
CONGLOMERATE	Sandy sludge from 10'-24', with bands of brown, sandy claystone between 19'4" & 19'10", and 23' & 24'. Gravel (¼"-1½", mode ½") and minor sand 24' to 30'10". Sandy sludge 30'10" to 33'5". Gravel 37'6" to 38' and pebbly, sandy claystone 38' to 39'.		10, 20, 30, 40					
	END OF HOLE 40 Feet.		50, 60, 70, 80, 90					

Drill Type: Mindrill F.B.C.
Drill Method: Hydraulic
Core Barrel Type: NMLC
Bit Type: Triple Tube
Driller: R. Stockbridge
Commenced: 18-7-66
Completed: 21-7-66
Logged by: J.R.L. Read
Elevation Datum: Leach's 18 RL

NOTES

WATER PRESSURE TEST
Pressure Unit:
Gauge Line:
Vertical Scale:
Water pressure test graph attached
Test results are tabulated graphically, in tabular or other form
PHOTOGRAPH REFERENCE SYSTEM
Roll No. and Frame:
Film Type:

BRS/08/60-12

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRAGO HYDRO-ELECTRIC SCHEME

LOCATION: SOUTHERN RIDGE SADDLE, MIDWAY

PEGS Δ8 AND Δ9

ANGLE FROM HORIZONTAL: -90 DIRECTION:

COORDINATES: R.L. 291 Ref.

HOLE No. WD 6

SHEET 1 of 3

Rock Type, Weathering	Description	Graphic Log	Depth	Structure	Other Features	Water Pressure Test
OVERBURDEN	Soil and scree		NMLC			
CLAYSTONE & SAND Fresh	Interlingering lenses of brown claystone and brown, fine-medium-grained, clean, well sorted sand with rare lenses of gritty sand. Poorly indurated, soft and weak.		2'	Bedding horizontal. Sludge only 20'-21' 21'10"-22'6" 25'-22'9" 30'-31' 34'6"-36'9"		
MUDSTONE, CLAYSTONE & SAND Fresh	Predominantly blue mudstone with thin, irregularly spaced lenses of claystone and sand as above. Slightly indurated, soft and weak. Pieces c ¼"-10", mode 5".		39'	Bedding horizontal		
MUDSTONE Fresh	Blue - blue grey mudstone. Slightly indurated, soft to moderately soft and weak. Pieces ½"-18", mode 8". Pieces ½"-18", mode 8"		54'	Bedding horizontal. Joints, 25°, 05° & 70° at average spacing of 3ft		

Drilled: Mindrill Eleco
Method: Hydraulic NMLC
Triple Tube
Driller: P. Kapolers S.D.W.
Commenced: 23-6-66
Completed: 8-12-66
Logged: E.A.G. Reed
Level: Reduced to Ref.

Water Pressure Test: N. Hydraulic
Air Casing
Check: 100 PSI

B56/A2/60-13

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRAMBOI HYDRO-ELECTRIC SCHEME

LOCATION: SOUTHERN RIDGE SADDLE, NOWRAY

266½ C.S. AND 4.9

ANGLE FROM HORIZONTAL: -90 DIRECTION:

COORDINATES: R. 291 feet

HOLE NO. WD 6

SHEET 2 OF 3

Rock Type & Depth of Weathering	Description	Graphic Log	Depth	Casing	Core Loss	Water Pressure Test
MUDSTONE fresh	Mudstone as above. Pieces < ½" - 16", mode 8"		NMLC 110			
SANDSTONE AND CONGLOMERATE	Green and medium-grained sand lines washed out during drilling		114.6 120 130 140 150 160 170 BMLC			
MUDSTONE fresh	Grey-blue to light brown. Slightly indurated soft to moderately soft and weak. Considerable loss of mudstone has occurred due to washing out and crumbling of core.		180 190		Joints marked by shrinkage cracks. Lower contact at 90°	

Water Pressure Test: Scale 50 150

Drilling Method: Hydraulic

Core Barrel Type: DOUBLE

Bit: 8 Diam. Tube

Commenced: 22-6-64

Completed: 4-10-64

Logged by: F.B.L. Reed

Vertical Scale: 1 inch = 10 ft.

Drilling Method: Hydraulic

Casing: AX Casing

Vertical Scale: 1 inch = 100 ft.

856/A2/60-14

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGO HYDRO-ELECTRIC SCHEME

LOCATION: SOUTHERN RIDGE SADDLE, MIDWAY PEGS Δ 8 AND Δ 9

ANGLE FROM HORIZONTAL: -90 DIRECTION:

COORDINATES: R.L. 291 feet

HOLE NO: WD 6

SHEET 3 OF 3

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION (COLOUR, GRAIN SIZE, HARDNESS, HARDNESS, ETC.)	DRILLING TYPE	DEPTH	RECOVERY		STRUCTURES (DIP, STRIKE, SEAMS, FAULTS, CRUSHED ZONES)	WATER LEVELS	WATER PRESSURE TESTS (LOSS OF WATER, DRY HOLE, ETC.)	
MUDSTONE. Fresh.	Mudstone, as above.	N.C.	BMLC			Jointing masked by shrinkage cracks. Minor laminations, 90°.			
			210						
			220						
			230						
		N.C.							
			240						
	END OF HOLE 245 FT.								

DRILL: Mindrill E 1000

TYPE: Hydraulic

CORE BARREL TYPE: BMLC Triple Tube

DRILLER: E. Walpole C.D.W.

COMMENCED: 22-6-66

COMPLETED: 4-10-66

LOGGED BY: J.R.L. Reed

DEPTH SCALE: 1 inch = 10 ft.

NOTES

WATER PRESSURE TESTS

PROJECTION REFERENCE SYSTEM

B56/A2/60-15

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

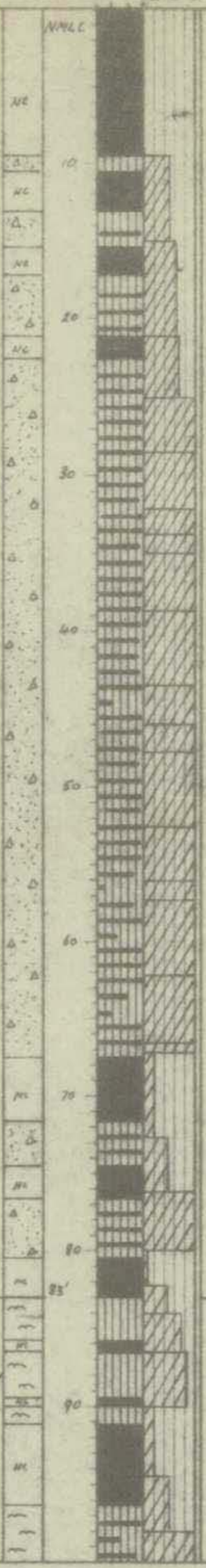
GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI H-E SCHEME
LOCATION: LEFT ABUTMENT
DAMSITE GRID K125. 134HE.
ANGLE FROM HORIZONTAL: -40
DIRECTION: 242° M
COORDINATES:
R.L.: 125 ft.

HOLE NO. WD 8

SHEET 1 OF 2

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION	STRUCTURE
AGGLOMERATE Moderately to Highly Weathered.	Light to dark grey. Medium to coarse-grained. Andesitic. Moderately soft to soft. Weak, friable, very easily broken into small fragments. Occasional pieces up to a maximum size of 6". Average pieces 1".	Lack of determinable structure. Core breaks into component fragments through the weak matrix
RIVER GRAVELS.	Small, 1-1", pieces of agglomerate and rounded pebbles of agglomerate, augite basalt, granodiorite, limestone & feldspar porphyry. Average diameter 1/2".	



DRILL TYPE: Mindrill E1000
FEED: Hydraulic
CORE BARREL TYPE: NMLC
Triple Barrel
DRILLER: F. Schneider CDW
COMMENCED: 13-10-65
COMPLETED: 9-3-66
LOGGED BY: J.R.L. Read
VERTICAL SCALE: 1 inch = 10 ft.

NOTES:

FRACTURE LOG: Number of fractures per foot of core. Zones of core loss are blocked in.
BEDDING AND JOINT PLANES: angles are measured relative to a plane normal to the core axis.

WATER PRESSURE TESTS
PACKER TYPE
SUPPLY LINE
VERTICAL SCALE
Figures given are gauge pressures.

PHOTOGRAPH REFERENCE SYSTEM
BLACK AND WHITE
COLOUR

B56/A2/60-16

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGA H-E SCHEME

LOCATION: LEFT ABUTMENT, DAMSITE GRID R+35, 130 NE

ANGLE FROM HORIZONTAL: -60 DIRECTION: 262° M

COORDINATES: R.L. 120 FT.

HOLE NO. WD8

SHEET 2 OF 2

WELL TYPE & LOCATION OF BEATHERPAN	DESCRIPTION (LITHOLOGY, COLOUR, STRENGTH, WEATHERING, ETC)	SAMPLES	DEPTH (FEET)	LITHOLOGY	RQD %	STRUCTURES (DIP, CLASS, SEAM, FACTS, BEDDING, ETC)	WATER LEVEL	WATER PRESSURE TEST (PSI = PRESSURE OR HEIGHT OR DAY)	RQD
RIVER GRAVELS.	From 96'5" to 106" drill has either re-entered river bank or passed through large boulders.		NMLC, 110, 120, 130, 140						
	Hole abandoned, 146 ft.		150, 160, 170, 180, 190						

DRILL TYPE: Mindrill E 6000

FEED: Hydraulic

CORE BARREL TYPE: NMLC Triple Tube

DRILLER: F. Schneider E.D.M.

COMMENCED: 18-10-65

COMPLETED: 9-3-66

LOGGED BY: T.D.L. Read

VERTICAL SCALE: 1 inch = 10 ft.

NOTES

FRACTURE LOSS – NUMBER OF FRACTURES PER FOOT OF HOLE. LOSSES OF LESS THAN ONE INCH ARE INDICATED BY 1.

BEDDING AND JOINT PLANES – Angles are measured relative to a plane normal to the core axis.

WATER PRESSURE TESTS

PACKER TYPE

SUPPLY LINE

VERTICAL SCALE

PHOTOGRAPH REFERENCE SYSTEM

BLACK AND WHITE

COLOUR

B56/A2/60-17

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRAGAMBA HYDRO-ELECTRIC SCHEME
DAMSITE, LEFT ABUTMENT

DIP FROM HORIZONTAL: -70°
BEARING: 252° Mag.
COORDINATES: Ks 23, 134.61 NE
RL: 120.11

WD8A
SHT 1 of 3

ABBREVIATE	Andesite, medium-coarse-grained volcanic fragments light to dark grey, commonly vesicular. Matrix medium to fine-grained light grey to brown, pitted and vuggy. Soft to moderately hard. Weak to moderately strong in irregular patches. Core readily broken by hand. Pieces <½"-9", mode 2"	Moderately to Slightly Weathered	Highly broken zone 8'7"-9'	
			Highly broken zone 12'-13'9"	
			Highly broken zone 22'9"-23'8"	
			Rare irregular joints lightly coated with clay & calcite.	
			Highly broken zone 47'6-48'	
			Slightly broken zone 53'10"-54'7"	
			Moderately broken zone 58'10"-59'3"	
	Pieces <½"-10", mode 2"		Highly broken zone 72'-72'5"	
			80'-100' core very fragmented due to failure of weak matrix during drilling.	

Mondeil Bros
Hydramin
NMLC
Triple Barrel
F. Sabazides C.D.W.
19-11-65
10-3-66
J.R.L. Read
Lock 2 18 Feet

B56/A2/60-18

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRANGOI HYDRO-ELECTRIC SCHEME
LOCATION: DAMSITE, LEFT ABUTMENT
ANGLE FROM HORIZONTAL: -70° DIRECTION: 252° Mag.
COORDINATES: K+23, 134 ft. N.E. R.L. 120 ft

HOLE NO. WD8A
SHEET 2 of 3

Description of Strata & Weathering	Description (Colour, Strength, Hardness, etc.)	Sample	Depth	Core	Structure (Joints, Shears, Faults, Bedding, etc.)	Water Pressure Test (Lugeon Units)
			NMLC		Joint parallel to core 102'-124'	
	Pieces <¼"-3", mode ½"		110		Joints rare, 35°, 45° lightly coated with clay & calcite	
AGGLOMERATE					100-200' core very broken due to failure of weak matrix during drilling	
Moderately to Slightly Weathered	—		120			
	Agglomerate as above					
	Pieces <¼"-4", mode ½"		130			
		NC				
		NC				
			140			
		NC				
	—		150			
	Pieces ¼"-10", mode ½"		160			
		NC				
			170			
		NC				
	—		180			
	Pieces ¼"-5", mode 1"					
		NC				
			190			
		NC	BMLC			
		NC				

Water Pressure Test: 25 30

Machine: Mentech E1000 Hydraulic
Bit: NMLC & BMLC Triple Tube
Driller: F. Schneider C.D.M.
Commenced: 19-11-65
Completed: 19-1-66
Logged by: J.R.L. Read
Scale: 1 inch = 10 Feet

Water Pressure Test: NX & BX Hydraulic & Air Swing. Terminated Lugeons 100 & 200 psi

B56/A2/60-19

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI HYDRO-ELECTRIC SCHEME

LOCATION: DAMSITE, LEFT ABUTMENT

ANGLE FROM HORIZONTAL: -70° DIRECTION: 252° Mag.

COORDINATES: K+23, 134 ft N.E. R.L. 120 ft

HOLE NO. WD8A

SHEET 3 OF 3

Rock Type & Degree of Weathering	Description (Lithology, Colour, Strength, Hardness, etc.)	Graphic Log	Depth & Size of Core	Fracture Log	Core Recovery	Structures (Joints, Veins, Seams, Faults, Crushed Zones)	Water Level	Water Pressure Test (Loss in Gallons per Minute per Foot) 35 / 540
AGGLOMERATE Moderately to Slightly Weathered	Pieces ½"-14", mode 1"		BMLC 210 220 230 240			Joint parallel to core 200°-205° Highly broken zone 222'7"-222' Highly broken zones 224'5"-224'8", 228'3"-229'2"		
	End of hole 245 feet.							

Drilling Co. Madsell R 1000

Type: Hydraulic

Core Barrel, Type: BMLC Triple Barrel

Driller: F. Schneider C.D.W.

Commenced: 29-11-66

Completed: 10-3-66

Logged by: J.R.L. Read

Vertical Scale: 1 inch = 10 feet

NOTES

Water Pressure Tests

Packer Type: B.X. Mechanical

Supply: AX Casing

Vertical Scale: 1 inch = 200 g.p.m.

Photograph Reference System

Black and White

Colour

B56/A2/60-20

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI HYDRO-ELECTRIC SCHEME

SITE: DAMSITE, RIGHT ABUTMENT

ANGLE FROM HORIZONTAL: -90° DIRECTION:

COORDINATES: 0+20, 300 ft. S.W. RL: 270 ft

HOLE NO: WD9

SHEET 1 OF 4

Geological Unit	Description	Sample	Depth	Core	Structures	Water Test	Water Pressure Test (Lugeon) 1/10 2/10
OVERBURDEN	Soil and agglomerate scree		NWLC 3'9"				
AGGLOMERATE Moderately to Highly weathered	Andesitic, fine to medium grained, dark grey. Soft, friable and weak. Pieces < ½"		10, 16'		Highly broken 11'4"-13'		
AGGLOMERATE Slightly to Moderately weathered	Andesitic, fine to medium-grained, light grey. Moderately hard, moderately strong. Pieces ½"-8", mode 1"		20, 25'		Greenish calcite veining. <½"-½" thick. Soft, highly broken zone 19'8"-21'4". Moderately broken zones 22'2"-22'6", 25'3"-25'11"		
AGGLOMERATE Fresh to Slightly weathered	Andesitic, fine to medium-grained, light grey. Hard, strong. Pieces ½"-17", mode 6".		30, 33'7"		Joints, slightly calcite, 25°, 50°, widely spaced. Moderately broken zones 33'5"-33'11", 34'6"-35', 35'10"-36'6". Highly broken zone 37'5"-38'8".		
AGGLOMERATE Slightly to Moderately weathered	Andesitic, fine to medium-grained, light grey to light brown. Moderately hard, moderately strong. Pieces ½"-20" mode 10"		40, 50, 55'		Moderately broken zone 44'4"-44'8". Joints rare, 25°, 40°, slightly calcite. Minor irregular calcite veins < ½" thick.		
AGGLOMERATE Moderately to Slightly weathered.	Andesitic, medium grained. Volcanic fragments light grey, often vesicular. Matrix brown, vuggy and pitted. Moderately soft to moderately hard. Moderately weak with occasional moder-strong patches. Core mostly readily broken by hand. Pieces ½"-2", mode ½".		60, 70, 80		57'-81' very broken due to failure of weak matrix during drilling and at widely separated joints, 30°, 50°, 65°.		
	Pieces ½"-2", mode 1". Cuttings only 96'-94'5".		90		Moderately broken zone 90'-90'6".		

DRILL: Mondrill F156

TYPE: Hydraulic

CORE BARREL: NWLC Triple Barrel

DRILLER: R. Medding CDU

COMPANY:

COMPLETED:

LOGGED BY: S.R.L. Read

VERTICAL SCALE: 1 inch = 10 ft.

NOTES

STRUCTURE LOG: Number of fractures per foot of core. Zones of core loss are designated as BROKEN AND JOINT BLOCKS — angles are measured relative to the core axis.

WATER PRESSURE TEST: PRESSURE TYPE: N. Mechanical. PACKER TYPE: AX Packer. VERTICAL SCALE: 1 inch = 200 psi. Figures given are gauge pressures. All readings are uncorrected pressures in pounds per square inch.

PHOTOGRAPHIC REFERENCE SYSTEM

B.M.R. FILE NO.

COLOUR

B56/A2/60-21

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRANGO HYDRO-ELECTRIC SCHEME

LOCATION: DAMSITE, RIGHT ABUTMENT

ANGLE FROM HORIZONTAL: -90° DIRECTION:

COORDINATES: C.W.O., SEC. 5, S.W. R.L. 220 ft.

HOLE NO. WD9

SHEET 2 OF 4

ROCK TYPE & FORMATION	DESCRIPTION (INCLUDING COLOUR, STRENGTH, HARDNESS, ETC.)	DRILLING	CORE	FRACTURE	WATER PRESSURE TEST (LOW 0 - 10 - 20 HIGH)
ACGLOMERATE Moderately to Slightly Weathered.	Cuttings only 102'-104'6"	NMLC			
	Agglomerate, as above		110	Highly broken zone 111-113'	
	—		120		
	Cuttings only 129'6"-130' Pieces ½"-8", mode 3".	NC	130	Highly broken friable zone 125'3"-125'10" Moderately broken across intersecting joints 127-127'10" Moderately broken zones 133'-133'4", 134'7"-135' 135'7"-135'10".	
			140	Slightly broken zones 141'-141'3", 143'8"-143'7" Joints lightly coated with clay & calcite, widely spaced 30°, 55°, 70°	
	—		150	Slightly broken zone 150'-150'4"	
	Cuttings only 155'-155'8" Pieces ½"-12", mode 2".		160		
	Cuttings only 171'-171'8" and 175'5"-177'5"		170	Moderately broken zones 166'8"-166'11", 167'8"-168'2", 170'-170'3"	
	— Pieces ½"-5", mode ¾". Cuttings only 189'3"-190'9".	NC	180	Core highly broken 180'-200' due to failure of weak matrix during drilling	
			190		

Mindrill F15C Hydraulic

BARREL TYPE: NMLC Triple Barrel

R. Meddings C.O.W.

DRILLED BY: I.R.L. Read

VERTICAL SCALE: 1 inch = 10 feet.

WATER PRESSURE TEST

HOLE SIZE: N Mechanical

CASING: AX Casing

VERTICAL SCALE: 1 inch = 201 ft.

PHOTOGRAPH REFERENCE SYSTEM

B56/A2/60-22

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI HYDRO-ELECTRIC SCHEME.
LOCATION: DAMSITE, RIGHT ABUTMENT.
ANGLE FROM HORIZONTAL: -90°
DIRECTION:
COORDINATES: 01 30, 300 ft S.W.
R.L. 270 ft.

HOLE NO. WD 9
SHEET 3 OF 4

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION (LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC)	GRAPHIC LOG	DEPTH & SIZE OF CORE	FRACTURE LOG	LIFT & % CORE RECOVERY	STRUCTURES (JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	WATER LEVEL	WATER PRESSURE TEST (Loss in gallons per minute per foot)	CORE LOSS
AGGLOMERATE Moderately to Slightly Weathered.	Pieces ¼"-12", mode 4".		NMLC			Moderately broken zone across intersecting joints, 10° & 20°, 207'6" - 208'4".			
	Agglomerate, as above.		210			Highly broken zone 210'-212', & 214'9" - 217'.			
	Pieces ¼"-10", mode 3".	N.C.	220			Highly broken zone 222'9"-224'6"			
						Highly broken zone 227'4"-227'9"			
			230			Moderately broken zone 235' - 235'6"			
			240			Joints widely spaced, 15°, 30°, 45°. Broken zones due to failure of weak matrix during drilling.			
	Pieces ¼"-8", mode 3".		250			Highly broken zones, 248' - 248'7" 249'7 - 250' 250'9" - 251'4" 252' - 252'9" 255'5 - 255'10" 258 - 259'3" 261 - 261'7" 264'8" - 265' 265'6" - 265'10"			
			260						
			270			Moderately broken zone 269' - 270'			
	Matrix calcitic 274' - 279'6".	N.C.				Highly broken zones 273' - 273'7" 276'6" - 277'			
			280						
	Pieces ¼"-7", mode 1".	N.C.				Highly broken zone 286'7 - 286'10"			
			290						
		B.M.L.C.							

Drilled by: Mindrill F.S.C.
Method: Hydraulic
Core barrel: NMLC & BMLC. Pipe Tube
Driller: R. Meadings. E.D.W.
Commenced:
Completed:
Logged by: I.R. Reed
Vertical scale: 1 inch = 10 feet.

Notes:
Fracture log: Number of fractures per foot of core. Degree of core loss are marked in missing and joint planes. Angle are measured relative to the core axis.

Water pressure tests:
Packer type: N & B Mechanical
Casing size: A2 Casing
Vertical scale: 1 inch = 200 p.s.i.
Photographs: Black and white:
Colour:
Photograph reference system

B56/A2/60-23

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WAHRANGOI HYDRO-ELECTRIC SCHEME.

LOCATION: DAMSITE, RIGHT ABUTMENT.

ANGLE FROM HORIZONTAL: -90 DIRECTION:

COORDINATES: 0+30, 200 ft. S.W. R.L. 270 ft.

HOLE NO. WD 9

SHEET 4 OF 4

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION (CONSISTENCY, COLOUR, STRENGTH, HARDNESS, ETC)	DEPTH & SIZE OF CORE	FRACTURE LOG	CORE & % CORE RECOVERY	REMARKS (ALTERATION, SEAMS, FAULTS, CRUSHED ZONES)	WATER LEVEL	WATER PRESSURE TEST (LITRES PER MINUTE PER FOOT)
ASGLOMERATE Moderately to Slightly weathered	Agglomerate, as above Pieces ½"-5", mode 2½"	BMLC 310 320 330			Core highly broken, 300'-306'6" Highly broken zones 316'10"-317'1" 319'6"-320' 323'4"-324'4" 327'2"-327'8"		50
ASGLOMERATE Slightly Weathered.	Andesite. Light to dark grey. Medium-grained. Vesicular. Moderately hard, moderately strong. Pieces ½"-12", mode 4".	340 350 360			Highly broken zones 331'6"-332'6" 336'6"-336' Highly broken zone 347'1"-347'10" Moderately broken zone 352'2"-352'10" Moderately broken zone 360'10"-361'2"		
	END OF HOLE 370 FT.						

DRILL TYPE: Mindrill F15C

PUMP: Hydraulic

CORE BARREL TYPE: BMLC Triple Tube

DRILLER: R. Cheddings C.D.W.

COMMENCED:

COMPLETED:

LOGGED BY: Z.B.I. Read

VERTICAL SCALE: 1 inch = 10 Feet

NOTES

WATER PRESSURE TESTS

PACKER TYPE: B Mechanical

SURFACE CASING: AX Casing

VERTICAL SCALE: 1 inch = 200 p.s.i.

PHOTOGRAPH REFERENCE SYSTEM

BLACK AND WHITE:

COLOUR: 1

B56/A2/60-24

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARRANBOI HYDRO-ELECTRIC SCHEME

LOCATION: SOUTHERN RIDGE TRAVERSE TA, PEG 15.

ANGLE FROM HORIZONTAL: -55° DIRECTION: 295° MAG.

COORDINATES: R.L. ≈ 300 ft.

HOLE NO: WD 10

SHEET 1 OF 2

ROCK NAME & DEGREE OF WEATHERING	DESCRIPTION LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC	GRAPHIC LOG	DEPTH & SIZE OF CORE	FRACTURE LOG	LIFT & % CORE RECOVERY	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	WATER LEVEL	WATER PRESSURE TEST Loss in gallons per minute per foot
CLAYSTONE Fresh	Soft, weak, brown silty plastic clay							
MUDSTONE Fresh	Black. Soft, weak, with numerous shrinkage cracks.		10; 18'6"					
SANDY CLAYSTONE. Fresh.	Light grey to light brown irregularly sandy & silty. Moderately indurated, moderately weak. Although core largely intact is easily snapped by hand. Pieces ¼"-26", mode 14".		20; 30; 40; 50			Broken & crushed zone 21'4" - 22'4". Broken & crushed zone 40'8" - 41'8". 45° joints at 49'1" & 49'6". 30° joints at 54' & 56'6"		
	Becoming calcareous medium-coarse-grained from 55'.							
LIMESTONE Slightly to Moderately Weathered.	Whitish-cream. Coralline. moderately soft to moderately hard. Moderately weak. Slight solution activity. Pieces ¼"-6", mode 2"		61'; 70; 71'					
LIMESTONE & AGGLOMERATE Slightly to Moderately Weathered	Cream-light grey-brown. Reworked coralline limestone & agglomerate. Contact gradational. Moderately soft to moderately hard. Moderately weak. Slight solution activity. Pieces ¼"-10", mode 3".		80			Highly broken zones 70'10" - 71'10" & 72'8" - 72'11". Highly broken zone 86'10" - 87'2".		
AGGLOMERATE Moderately to Highly Weathered.			90					

DRILL TYPE: Mindrill E1000
FEED: Hydraulic
CORE BARREL TYPE: NMLC Triple Tube
DRILLER: T. Conaim C.D.W.
COMMENCED: 15-6-66
COMPLETED: 8-66
LOGGED BY: J.R.L. Read
VERTICAL SCALE: 1 inch = 100 ft.

NOTES

FRACTURE LOG: Number of fractures per foot of core. Zones of core loss are shaded in.
BEDDING AND JOINT PLANES: Angles are measured relative to the core axis.

WATER PRESSURE TEST

PACKER TYPE:
SUPPLY LINE:
VERTICAL SCALE:
Figures given are gauge pressures.
Test sections are indicated graphically as shown.

PHOTOGRAPH REFERENCE: 25 EM

BLACK AND WHITE:

COLOUR:

B56/A2/60-25

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: LOWER WARANGOI HYDRO-ELECTRIC SCHEME

LOCATION: SOUTHERN RIDGE, TRAVERSE TO PEG 15.

ANGLE FROM HORIZONTAL: -55 DIRECTION: 295° Mag

COORDINATES: R.L. ≈ 300 Ft.

HOLE NO: WD 10

SHEET 2 OF 2

ROCK-TYPE & DEGREE OF WEATHERING	DESCRIPTION LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC	GRAPHIC LOG	DEPTH & SIZE OF CORE	FRACTURE LOG	% CORE RECOVERY	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	WATER PRESSURE TEST Lines in gallons per minute per foot (510)
AGGLOMERATE Moderately to Highly Weathered	Purple-brown, dark grey in patches. Soft to moderately soft, friable. Weak. Pieces <½"-5", mode ½".		110, 120, 130, 140, 147'4"			From 90' core is badly broken due to failure of rotten matrix during drilling. Continues to 147'.	
AGGLOMERATE Fresh to Slightly Weathered	Fine-grained. Light grey. Moderately hard, Moderately strong. Pieces ½"-12", mode 2".		150, 160, 167'6"			Moderately broken zone 151'3"-161'6". 45° joint 162'1". Slightly broken zone along joint parallel to core axis 166'10"-169'9". Slightly broken zone 160'5"-160'7".	
AGGLOMERATE Moderately to Highly Weathered	Volcanic fragments light grey, matrix yellow & brown. Soft, friable, weak. Pieces <½"-10", mode 3"		170, 180, 190			Moderately broken zones 167'9"-168'5", 192'6"-195'. Remainder of core, although largely intact is weak and can be readily broken.	

END OF HOLE 203 FEET.

DRILL TYPE: Mindrill E1000
FEED: Hydraulic
CORE BARREL TYPE: N.M.L.C. Triple Tube
DRILLER: T. Condon C.D.W.
COMMENCED: 15-6-66
COMPLETED: 8-66
LOGGED BY: J.R.L. Read
VERTICAL SCALE: 1 inch = 100 ft.

NOTES

FRACTURE LOG — Number of fractures per foot of core. Zones of core loss are shaded in.
BEDDING AND JOINT PLANES — Angles are measured relative to the core axis.

WATER PRESSURE TESTS
PACKER TYPE: N Mechanical
SUPPLY LINE: AX Casing
VERTICAL SCALE: 1 inch = 200 p.s.i.
Figures given are gauge pressures.
Test sections are indicated graphically to thickness shown.

PHOTOGRAPH REFERENCE SYSTEM
BLACK AND WHITE
COLOUR

B56/A2/60 - 26

APPENDIX 3

Water Pressure Test Computation Sheets

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

WD 1 Sheet 1

DATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/year
Hole No. W.D.1					Co-ordinates E+23', 353'NE (C.D.W. Survey Grid)					R.L. 320 feet			Angle from horizontal -70°				
Packer:- N		Hydraulic			Supply line:- AX Casing			Water Supply:- Coventry Climax pump					Bearing 178° magnetic				
29.6.65	67'	77'	5	10	18560.0	18566.3	6.3	1.26	10	62	64'6" Ax Casing	26.9	0	0	37	0.16	140
			5	10	18566.3	18574.0	7.7	1.54									
			5	10	18574.0	18582.9	8.9	1.78									
			5	10	18582.9	18591.8	8.9	1.78									
			5	10	18591.8	18600.6	8.8	1.76									
			5	16	18624.0	18637.5	13.5	2.70					0	0	43	0.27	200
			5	16	18637.5	18650.8	13.3	2.66									
			5	16	18650.8	18663.9	13.1	2.62									
			5	25	18700.0	18725.0	25.0	5.00					0	0	52	0.50	300
			5	25	18725.0	18750.4	25.4	5.08									
			5	25	18750.4	18775.4	25.0	5.00									
			5	30	18810.0	18838.1	28.1	5.62					0	0	57	0.56	300
			5	30	18838.1	18865.7	27.6	5.52									
			5	30	18865.7	18910.0	27.7	5.54									
			5	25	18910.0	18933.5	23.5	4.70					0	0	52	0.47	350
			5	25	18933.5	18970.0	23.2	4.64									
			5	16	18970.0	18983.5	13.5	2.70					0	0	43	0.27	200
			5	16	18983.5	19005.0	13.2	2.64									
			5	10	19005.0	19014.1	9.1	1.82					0	0	37	0.18	150
			5	10	19014.1	19023.1	9.0	1.80									
8.7.65	77'	90'	5	15	200	345	145	29.0	13	83'	74'6" Ax Casing	36	1.2	15	35	2.46	2000
			5	15	345	505	160	32.0									
			5	15	505	675	170	34.0									
			5	15	675	845	170	34.0									
14.7.65	89'	100'	5	10	500	623	123	24.6	11	88'	86'6" Ax Casing	38.2	0.7	7.4	40	2.05	1700
			5	10	623	738	115	23.0									
			5	10	738	845	107	21.4									
			5	10	845	953	108	21.6									
			5	15	0	113	113	22.6					0.7	7.4	45	2.05	1500
			5	15	113	226	113	22.6									
			5	15	226	400	113	22.6									
			5	25	400	550	150	30.0					1.1	12	50	2.64	1500
			5	25	550	690	140	28.0									
21.7.65	94'	110'	5	20	19120.0	19135.4	15.4	3.08	16	86'	91'6" Ax Casing	37.5	0	0	57	0.19	110
			5	20	19135.4	19150.8	15.4	3.08									
			5	20	19150.8	19166.1	15.3	3.06									
			5	20	19166.1	19181.4	15.3	3.06									
			5	30	19200.0	19215.7	15.7	3.14					0	0	67	0.19	90
			5	30	19215.7	19231.2	15.5	3.10									
			5	30	19231.2	19246.6	15.4	3.08									
			5	30	19246.6	19262.1	15.5	3.10									
			5	40	19290.0	19305.5	15.5	3.10					0	0	77	0.19	80
			5	40	19305.5	19321.0	15.5	3.10									
			5	40	19321.0	19351.7	15.3	3.06									
			5	40	19336.3	19370.0	15.4	3.04									
			5	50	19370.0	19386.2	16.2	3.24					0	0	87	0.20	75
			5	50	19386.2	19402.1	15.9	3.18									
			5	50	19402.1	19418.0	15.9	3.18									
			5	50	19418.0	19433.9	15.9	3.18									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

WD1 Sheet 2

DATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Hole No WD1 (Cont.)																	
21.7.65	94'	110'	5	40	19450.0	19465.3	15.3	3.06	16	86'	91'6"	37.3	0	0	77	0.19	80
			5	40	19465.3	19480.7	15.4	3.08			Ax						
			5	30	19490.0	19504.8	14.8	2.96			Casing		0	0	67	0.19	90
			5	30	19504.8	19519.7	14.9	2.98									
			5	30	19519.7	19534.4	14.7	2.94									
			5	20	19545.0	19559.8	14.8	2.96					0	0	57	0.19	110
			5	20	19559.8	19574.2	14.4	2.88									
			5	20	19574.2	19588.8	14.6	2.92									
22.7.65	103'6"	120'	5	20	19635.0	650.1	15.1	3.02	16.6	90'	101'	39	0	0	59	0.18	90
			5	20	650.1	664.8	14.7	2.94			Ax						
			5	20	664.8	679.5	14.7	2.94			Casing						
			5	20	679.5	694.5	14.7	2.94									
			5	35	710.0	724.4	14.4	2.88					0	0	74	0.17	70
			5	35	724.4	738.7	14.3	2.86									
			5	35	738.7	752.3	13.6	2.72									
			5	35	752.3	766.4	14.1	2.82									
			5	35	766.4	780.2	13.8	2.76									
			5	45	800.0	814.1	14.1	2.82					0	0	84	0.17	65
			5	45	814.1	828.4	14.3	2.86									
			5	45	828.4	842.8	14.4	2.88									
			5	45	842.8	857.1	14.3	2.86									
			5	55	880.0	895.8	15.8	3.16					0	0	94	0.19	65
			5	55	895.8	911.7	15.9	3.18									
			5	55	911.7	927.7	16.0	3.20									
			5	55	927.7	943.6	15.9	3.18									
			5	45	955.0	969.8	14.8	2.96					0	0	84	0.18	65
			5	45	909.0	984.4	14.6	2.92									
			5	45	984.4	999.0	14.6	2.92									
			5	35	20010.0	23.8	13.8	2.76					0	0	74	0.17	70
			5	35	23.8	37.5	13.7	2.74									
			5	20	50.0	62.8	12.8	2.56									
			5	20	62.8	75.4	12.6	2.52					0	0	59	0.15	65
			5	20	75.4	87.9	12.5	2.50									
9.8.65	109'6"	130'	5	25	20160.0	20198.3	38.3	7.66	20.5	102	107	44.3	0	1	69	0.38	160
			5	25	198.3	235.1	36.8	7.36			Ax						
			5	25	235.1	272.5	37.4	7.48			Casing						
			5	25	272.5	399.7	42.2	8.44									
			5	35	390.0	441.5	51.5	10.30					0	18	74	0.50	200
			5	35	441.5	493.0	51.5	10.30									
			5	35	493.0	545.0	52.0	10.40									
			5	45	600.0	667.3	67.3	13.46					0.22	2.2	77	0.56	200
			5	45	667.3	714.3	47.0	9.40									
			5	45	714.3	771.3	57.0	11.40									
			5	45	771.3	828.5	57.2	11.44									
			5	45	828.5	886.8	58.3	11.66									
			5	55	970.0	21033.8	63.8	12.76					0.27	2.6	96	0.63	200
			5	55	21033.8	097.7	63.9	12.78									
			5	55	097.7	162.5	64.8	12.96									
			5	45	200.0	260.5	60.5	12.10					0.24	2.4	87	0.59	200
			5	45	260.5	320.7	60.2	12.04									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

WD1 Sheet 3

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Hole No W.D.1 (cont)																	
9.8.65.	109'6"	130'	5	35	360.0	416.7	56.7	13.34	20.5	102'	107'	44.3	0.21	2.1	77	0.55	200
			5	35	416.7	473.0	56.3	11.26			Ax						
			5	35	473.0	529.3	56.3	11.26			Casing						
			5	25	560.0	610.0	50.0	10.0									
			5	25	610.0	660.0	50.0	10.0					0	1.7	68	0.49	200
			5	25	660.0	709.8	49.8	9.96									
23.8.65	130'6"	145	5	25	650	698	48	9.6	145	124'	128'	53.8	0	1.5	77	0.66	250
			5	25	698	744	46	9.2			Ax						
			5	25	744	792	48	9.6			Casing						
			5	40	850	908	58	11.6					0.3	2.2	91	0.80	300
			5	40	908	966	58	11.6									
			5	40	966	023	57	11.4									
			5	55	050	133	83	16.6					0.6	4.8	103	1.17	350
			5	55	133	222	89	17.8									
			5	55	222	305	83	16.6									
			5	65	400	505	105	21.0					0.9	6.6	111	1.47	400
			5	65	505	610	105	21.0									
			5	65	610	720	110	22.0									
			5	55	800	892	92	18.4					0.7	5.2	103	1.28	400
			5	55	892	985	93	18.6									
			5	55	985	088	93	18.6									
			5	40	150	225	75	15.0					0.4	3.1	90	1.01	350
			5	40	225	300	75	15.0									
			5	40	300	370	70	14.0									
			5	25	400	455	55	11.0					0	1.8	77	0.72	300
			5	25	455	505	50	10.0									
			5	25	505	558	53	10.6									
25.8.64	145'	159'2"	5	25	21960.0	975.7	15.7	3.14	14.2	119'	142'6"	51.6	0	0	77	0.22	90
			5	25	975.7	991.4	15.7	3.14			Ax						
			5	25	991.4	22007.2	15.8	3.16			Casing						
			5	45	030.0	044.7	14.7	2.94					0	0	97	0.20	65
			5	45	044.7	059.1	14.4	2.88									
			5	45	059.1	073.7	14.6	2.92									
			5	55	095.0	108.9	13.9	2.78					0	0	107	0.19	60
			5	55	108.9	122.6	13.7	2.74									
			5	55	122.6	136.3	13.7	2.74									
			5	70	150.0	163.8	13.8	2.76					0	0	122	0.19	50
			5	70	163.8	177.8	14.0	2.80									
			5	70	177.8	191.7	13.9	2.78									
			5	55	200.0	213.4	13.4	2.68					0	0	107	0.19	60
			5	55	213.4	226.7	13.4	2.68									
			5	55	226.7	240.3	13.5	2.70									
			5	45	250.0	264.1	14.1	2.82					0	0	97	0.20	65
			5	45	264.1	278.2	14.1	2.82									
			5	45	278.2	292.3	14.1	2.82									
			5	25	305.0	321.1	16.1	3.22					0	0	77	0.22	90
			5	25	321.1	336.9	15.8	3.16									
			5	25	336.9	352.8	15.9	3.18									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WD1 Sheet 4

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Hole No WD.1 (cont.)																	
26.8.65	158'6"	169'2"	5	25	22400.0	416.5	16.5	3.3	10.6	138'	156'	59.9	0	0	85	0.31	110
			5	25	416.5	433.6	17.1	3.42			Ax						
			5	25	433.6	449.5	15.9	3.18			Casing						
			5	25	449.5	465.9	16.4	3.28									
			5	45	490.0	505.3	15.3	3.06					0	0	105	0.28	100
			5	45	505.3	520.3	15.0	3.00									
			5	45	520.3	535.2	14.9	2.98									
			5	60	580.0	595.4	15.4	3.08					0	0	120	0.30	80
			5	60	595.4	610.7	15.3	3.06									
			5	60	610.7	627.6	16.9	3.38									
			5	60	627.6	644.3	16.7	3.34									
			5	75	665.0	682.5	17.5	3.50					0	0	135	0.33	80
			5	75	682.5	700.0	17.5	3.50									
			5	75	700.0	717.3	17.3	3.46									
			5	60	730.0	747.1	17.1	3.42					0	0	120	0.32	90
			5	60	747.1	764.0	16.0	3.20									
			5	60	764.0	781.0	17.0	3.40									
			5	45	790.0	806.6	16.6	3.32					0	0	105	0.32	90
			5	45	806.6	823.4	16.8	3.36									
			5	25	835.0	851.4	16.4	3.28					0	0	85	0.31	110
			5	25	851.4	867.6	16.2	3.24									
			5	25	867.6	883.8	16.2	3.24									
1.9.65	169'	179'6"	5	25	22900.0	908.3	8.3	1.66	10.5	164'	166'6"	71'2"	0	0	96	0.15	50
			5	25	908.3	916.2	7.9	1.58			Ax						
			5	25	916.2	924.1	7.9	1.58			Casing						
			5	25	924.1	932.0	7.9	1.58									
			5	50	950.0	964.8	14.8	3.96					0	0	121	0.28	75
			5	50	964.8	979.3	14.5	3.90									
			5	50	979.3	991.1	11.8	2.36									
			5	50	991.1	23002.3	11.2	2.24									
			5	50	002.3	013.0	10.7	2.14									
			5	65	030.0	041.4	11.4	2.28					0	0	136	0.22	50
			5	65	041.4	052.8	11.4	2.28									
			5	65	052.8	064.5	11.7	2.34									
			5	65	064.5	075.8	11.3	2.26									
			5	80	090.0	102.2	12.2	2.44					0	0	151	0.23	50
			5	80	102.2	114.1	11.9	2.38									
			5	80	114.1	126.0	11.9	2.38									
			5	80	126.0	138.0	12.0	2.40									
			5	65	145.0	155.6	10.6	2.12					0	0	136	0.20	45
			5	65	155.6	166.2	10.6	2.12									
			5	50	170.0	179.2	9.2	1.84									
			5	50	179.2	188.5	9.3	1.86					0	0	121	0.18	45
			5	50	188.5	197.7	9.2	1.84									
			5	25	202.0	209.1	7.1	1.42					0	0	96	0.13	45
			5	25	209.1	215.9	6.8	1.36									
			5	25	215.9	222.8	6.9	1.38									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

WD1 Sheet 5

DATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Hole No. WD1 (cont.)																	
2.9.65	179'	192'6"	5	25	23240.0	256.0	16.0	3.20	13.5	168'	176'	72.9	0	0	98	0.24	80
			5	25	256.0	271.9	15.9	3.18			Ax						
			5	25	271.9	287.7	15.8	3.16			Casing						
			5	50	310.0	330.6	20.6	4.12					0	0	123	0.30	80
			5	50	330.6	350.8	20.2	4.04									
			5	50	350.8	370.9	20.1	4.02									
			5	75	390.0	417.5	27.5	5.50					0	0	148	0.41	90
			5	75	417.5	445.3	27.8	5.56									
			5	75	445.3	473.0	27.7	5.54									
			5	85	500.0	530.1	30.1	6.02					0	0	158	0.44	100
			5	85	530.1	559.8	29.7	5.94									
			5	85	559.8	589.8	30.0	6.00									
			5	75	610.0	638.5	28.5	5.70					0	0	148	0.43	90
			5	75	638.5	667.3	28.8	5.76									
			5	75	667.3	696.1	28.8	5.76									
			5	50	710.0	733.0	23.0	4.60					0	0	123	0.34	80
			5	50	733.0	755.5	22.5	4.50									
			5	50	755.5	779.9	22.4	4.48									
			5	25	785.0	803.3	18.3	3.66					0	0	98	0.27	90
			5	25	803.3	821.4	18.1	3.62									
			5	25	821.4	839.4	18.0	3.60									
7.9.65	192'6"	202'2"	6	30	23870.0	886.2	16.2	3.24	9.6	179'	189'6"	77.7	0	0	108	0.34	90
			5	30	886.2	902.3	16.1	3.22			Ax						
			5	30	902.3	918.3	16.0	3.20			Casing						
			5	55	940.0	958.5	18.5	3.70					0	0	133	0.39	90
			5	55	958.5	977.0	18.5	3.70									
			5	55	977.0	995.5	18.5	3.70									
			5	75	24010.0	032.3	22.3	4.46									
			5	75	032.3	054.7	22.4	4.48					0	0	153	0.47	90
			5	75	054.7	077.4	22.7	4.54									
			5	75	077.4	100.1	22.7	4.54									
			5	95	135.0	160.5	25.5	5.10					0	0	173	0.53	90
			5	95	160.5	185.9	25.4	5.08									
			5	95	185.9	211.4	25.5	5.10									
			5	75	220.0	243.2	23.2	4.64					0	0	153	0.48	90
			5	75	243.2	266.3	23.1	4.62									
			5	55	275.0	295.6	20.6	4.12					0	0	133	0.43	100
			5	55	295.6	316.1	20.5	4.10									
			5	30	330.0	347.8	17.8	3.56					0	0	108	0.37	90
			5	30	347.8	365.6	17.8	3.56									
30.9.65	213'6"	232'6"	5	30	24375.0	377.8	2.8	0.56	19	199'	211'	86.3	0	0	116	0.029	8
			5	30	377.8	380.6	2.8	0.56			Ax						B. Hydraulic Packer
			5	30	380.6	383.2	2.6	0.52			Casing						
			5	65	395.0	398.6	3.6	0.72					0	0	151	0.038	8
			5	65	398.6	402.0	3.4	0.68									
			5	65	402.0	405.8	3.8	0.76									
			5	90	410.0	412.4	2.4	0.84					0	0	176	0.026	5
			5	90	412.4	414.8	2.4	0.84									
			5	90	414.8	417.3	2.5	0.50									
			5	110	418.6	421.3	2.7	0.54					0	0	196	0.028	5
			5	110	421.3	424.0	2.7	0.54									
			5	110	424.0	426.6	2.6	0.52									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

W.D1 Sheet 6

DATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
Hole No W.D.1 (cont.)																	
30.9.65	213'6"	232'6"	5	90	427.0	428.5	1.5	0.30	19	199'	211'	86.3	0	0	176	0.016	3
			5	90	428.5	430.0	1.5	0.30			Ax						
			5	65	430.0	430.5	0.5	0.10			Casing		0	0	151	0.005	1
			5	65	430.5	431.0	0.5	0.10									
			5	30	430.1	430.4	0.3	0.06					0	0	116	0.003	<1
			5	30	430.4	430.7	0.3	0.06									
16.10.65	232'	248'	5	30	24450.0	24453.1	3.1	0.62	16	207'	229'6"	89.8	0	0	120	0.039	10
			5	30	453.1	456.1	3.0	0.60			Ax						@ Hydraulic Packer
			5	30	456.1	459.2	3.2	0.64			Casing						
			5	65	470.0	474.2	4.2	0.84					0	0	155	0.053	11
			5	65	474.2	478.5	4.3	0.86									
			5	65	478.5	482.7	4.2	0.84									
			5	90	490.0	494.5	4.5	0.90									
			5	90	494.5	498.9	4.4	0.88					0	0	180	0.054	9
			5	90	508.9	503.1	4.2	0.84									
			5	115	510.0	514.7	4.7	0.94									
			5	115	514.7	519.2	4.5	0.90					0	0	205	0.056	9
			5	115	519.2	523.6	4.4	0.88									
			5	90	530.0	532.2	2.2	0.44					0	0	180	0.027	5
			5	90	532.2	534.4	2.2	0.44									
			5	65	536.0	537.8	1.8	0.36					0	0	155	0.022	5
			5	65	537.8	539.5	1.7	0.34									
			5	30	541.0	541.8	0.8	0.16					0	0	90	0.010	4
			5	30	541.8	542.6	0.8	0.16									
23.10.65	248'6"	263'	2:18	30	150	200	50	21.72	14.5	212'	246'	92	2.0	40	80	1.57	600
			2:05	30	200	250	50	24.00			Ax						@ Mechanical Packer
			2:12	30	250	300	50	22.74			Casing						
			1:35	70	400	450	50	31.56					4.1	68	90	2.26	800
			1:30	70	450	500	50	33.30									
			1:30	70	500	550	50	33.30									
			1:20	95	600	650	50	37.50					5.6	88	93	2.69	900
			1:18	95	650	700	50	38.46									
			1:13	95	700	750	50	41.10									
			1:1	120	850	900	50	49.18					7.8	120	84	3.18	1200
			1:6	120	900	950	50	45.48									
			1:9	120	950	1000	50	43.50									
			1:8	95	050	100	50	44.16					6.3	97	84	2.89	1000
			1:14	95	100	150	50	40.56									
			1:13	95	150	200	50	41.10									
			1:23	70	250	300	50	36.30					5.5	82	75	2.60	1100
			1:19	70	300	350	50	37.98									
			1:17	70	350	400	50	38.94									
			1:38	30	450	500	50	30.60					3.5	60	59	2.07	1100
			1:41	30	500	550	50	29.70									
			1:41	30	550	600	50	29.70									
2.11.65	279'6"	300	5	35	610.0	613.7	3.7	0.74	10.5	203	278.5	88.2	0	0	123	0.067	18
			5	35	613.7	617.2	3.5	0.70	0.70								@ Mechanical Packer
			5	35	617.2	620.5	3.3	0.66									
			5	100	635.0	647.2	12.2	2.44	2.48				0	16	187	0.236	40
			5	100	647.2	659.9	12.7	2.54									
			5	100	659.9	672.2	12.3	2.46									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
Drill Hole WD1 Sheet 7.																	
2.11.65	279'6"	300	5	120	680.0	702.0	22.0	4.40	7.41				0	8.3	200	0.705	110
			5	120	702.0	727.9	25.9	5.18									
			5	120	785.0	830.6	45.6	9.12									
			4.34	120	870.0	920	50	10.95									
			4.35	100	920	970	50	10.90	10.95				0	14	174	1.04	190
			4.37	100	970	20	50	10.85									
			4.31	100	20	70	50	11.10									
			5	35	935.0	959.7	22.7	4.54	4.49				0	4	119	0.428	110
			5	35	957.7	980.2	22.5	4.50									
			5	35	980.2	002.4	22.2	4.44									
13.11.65	299	320	2.13	40	200	250	50	22.6	21	213	297	92.5	2.5	40	90	1.07	400
			2.14	40	250	300	50	22.4	22.5		AX						B Mechanical Packer
			2.02	40	300	350	50	24.6			Casing						
			1.27	100	450	500	50	34.5	33.5				5.3	69	118	1.59	400
			1.32	100	500	550	50	32.6									
			1.30	100	550	600	50	33.3									
			1.16	120	680	730	50	39.4	38.4				6.8	87	119	1.82	500
			1.20	120	730	780	50	37.5									
			1.18	120	780	830	50	38.4									
			1.27	100	80	130	50	34.5	35.0				5.6	72	115	1.66	450
			1.24	100	130	180	50	35.7									
			1.26	100	180	230	50	34.9									
			2.14	40	310	360	50	22.4	22.4				2.5	40	90	1.06	400
			2.12	40	360	410	50	22.7									
			2.15	40	410	460	50	22.2									
17.11.65	319	340	2.31	40	400	450	50	19.9	21	213	317	92.5	2.0	34	97	0.92	300
			2.37	40	450	500	50	19.1	19.3		AX						B Mechanical Packer
			2.40	40	500	550	50	18.8			Casing						
			1.51	90	600	650	50	27.0	26.8				3.6	51	128	1.23	300
			1.52	90	650	700	50	26.8									
			1.53	90	700	750	50	26.6									
			1.25	110	800	850	50	35.3	31.6				5.1	65	132	1.50	300
			1.42	110	850	900	50	29.4									
			1.42	110	900	950	50	29.4									
			1.32	110	950	00	50	32.6									
			1.36	110	00	50	50	31.2									
			1.30	125	100	150	50	33.3	32.1				5.4	66	146	1.53	350
			1.36	125	150	200	50	31.2									
			1.34	125	200	250	50	31.9									
			1.43	110	300	350	50	29.1	30.2				4.8	61	137	1.44	350
			1.37	110	350	400	50	30.9									
			1.38	110	400	450	50	30.6									
			1.47	90	500	550	50	28.0	28.1				4.1	55	123	1.34	350
			1.46	90	550	600	50	28.3									
			1.47	90	600	650	50	28.0									
			2.15	40	680	730	50	22.2	21			92.5	1.6	27	104	0.83	250
			2.54	40	730	780	50	17.2	17.4								
			3.13	40	880	830	50	15.5									
			3.25	40	930	970	50	14.6									

B56/A2/60-51.

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

Hole No. WD 2 — Co-ordinates I.34, 317 NE (C.D.W. Grid) — R.L. 361 feet. — Angle from horizontal -90°

Packer :- N Hydraulic & Mechanical — Supply line :- AX Casing — Water Supply :- Coventry Climax Pump

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
11.12.65	80	90	1.20	20	450	500	50	37.5	10	NIL	77' AX Casing	34.7	1.7	19	35	3.78	3000
			1.21	20	500	550	50	37.0	37.8								
			1.17	20	550	600	50	39.0									
			1.22	30	650	700	50	36.6	28.1				1.0	11	43	2.81	2000
			1.48	30	700	750	50	27.8									
			1.59	30	750	800	50	25.2									
			1.56	30	800	850	50	25.9									
			2.00	30	850	900	50	25.0									
			1.52	35	950	1000	50	26.8	26.6				0.9	9.6	59	2.66	1500
			1.53	35	1000	050	50	26.5									
			1.53	35	050	100	50	26.5									
			1.54	40	150	200	50	26.3	26.8				0.9	9.6	64	2.68	1500
			1.51	40	200	250	50	27.0									
			1.51	40	250	300	50	27.0									
			2.10	35	400	450	50	23.1	24.2				0.7	8.5	61	2.42	1300
			2.8	35	450	500	50	23.5									
			2.00	35	500	550	50	25.0									
			1.59	35	550	600	50	25.2									
			2.00	30	650	700	50	25.0	24.8				0.7	8.8	55	2.48	1400
			1.59	30	700	750	50	25.2									
			2.04	30	750	800	50	24.2									
			2.25	20	900	950	50	20.7	21.8				0.5	6.4	48	2.18	1400
			2.20	20	950	1000	50	21.4									
			2.27	20	1000	050	50	20.4									
14.12.65	90	100	1.02	20	200	250	50	48.4	10	NIL	875' AX Casing	39.1	2.7	27	29	4.58	5000
			1.06	20	250	300	50	45.5	45.8								
			1.09	20	300	350	50	43.4									
			1.00	30	450	500	50	50.0	51.8				3.4	34	32	5.18	5000
			0.55	30	500	550	50	54.5									
			0.59	30	600	650	50	50.8									
			0.52	35	680	730	50	57.7	51.6				3.9	34	32	5.16	5000
			0.54	35	730	780	50	55.5									
			0.56	35	780	830	50	53.5									
			0.58	20	900	950	50	51.7	47.8				3.0	30	22	4.78	7000
			1.03	20	950	1000	50	47.6									
			1.08	20	1000	050	50	44.1									
			0.56	15	080	130	50	53.5	46.4				2.9	28	23	4.64	6500
			1.11	15	130	180	50	42.2									
			1.09	15	180	230	50	43.4									
20.12.65	98.5	110	0.48	20	520	570	50	62.4	11.5	NIL	97' AX Casing	42.7	6.5	55	1	5.80	7100,000
			0.43	20	600	650	50	69.6	66.6								
			0.44	20	650	700	50	68.2									
			0.41	30	770	820	50	73.2	79.4				9.0	74	10	6.90	
			0.35	30	820	870	50	85.8									
			0.38	30	870	920	50	79.2									
			0.35	35	980	1030	50	85.8	82.7				9.8	79	11	7.20	
			0.38	35	1040	1090	50	79.2									
			0.36	35	1090	1140	50	83.4									
			0.42	40	1230	1280	50	71.4	75.6				8.2	68	7	6.59	30,000
			0.39	40	1280	1330	50	76.8									
			0.38	40	1330	1380	50	79.2									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
WD 2 (cont.) Sheet 2.																	
20.12.65	985	110	0.46	35	1460	1510	50	65.4	11.5	NIL	97' AX Casing	42.7	7.6	61	9	6.24	22000
			0.39	35	1510	1560	50	76.8	71.5								
			0.41	35	1600	1650	50	73.2									
			0.41	30	1750	1800	50	73.2	74.9				8.2	67	2	6.54	
			0.38	30	1800	1850	50	79.2									
			0.41	30	1850	1900	50	73.2									
			0.44	20	2000	2050	50	68.2	71.2				7.4	61	6	6.22	
			0.42	20	2050	2100	50	71.4									
			0.40	20	2100	2150	50	75.0									
21-12-65	110	120	0.47	25	300	350	50	63.6	10	NIL	107' AX Casing	47.7	6.2	60	7	6.48	30,000 N Mechanical Packer
			0.46	25	350	400	50	65.4	64.8								
			0.46	25	400	450	50	65.4									
			0.42	35	540	590	50	71.4	73.2				7.7	78	3	7.32	
			0.41	35	590	640	50	73.2									
			0.40	35	640	690	50	75.0									
			0.41	50	850	900	50	73.2	77.8				8.6	90	1	7.78	
			0.38	50	900	950	50	79.2									
			0.37	50	950	1000	50	81.0									
			0.36	60	1140	1190	50	83.4	83.0				10.0	105	7	8.30	
			0.35	60	1190	1240	50	85.8									
			0.35	60	1240	1290	50	85.8									
			0.37	50	1410	1460	50	81.0	80.4				9.3	100	12	8.04	
			0.37	50	1460	1510	50	81.0									
			0.38	50	1510	1560	50	79.2									
			0.41	35	1700	1750	50	73.2	73.5				7.7	78	3	7.35	
			0.41	35	1750	1800	50	73.2									
			0.40	35	1800	1850	50	75.0									
			0.45	20	1930	1980	50	66.6	67.3				6.6	64	3	6.73	
			0.44	20	1980	2030	50	68.2									
			0.45	20	2030	2080	50	66.6									
22.12.65	120	130	0.52	25	180	230	50	57.6	10	NIL	119' AX Casing	52.1	6.4	50	21	6.00	9000 N Mechanical Packer
			0.48	25	230	280	50	62.4	60.0								
			0.50	25	280	330	50	60.0									
			0.47	35	400	450	50	63.6	61.2				6.6	53	28	6.12	6500
			0.51	35	450	500	50	58.8									
			0.49	35	500	550	50	61.2									
			0.46	45	580	630	50	65.4	67.7				8.1	65	24	6.77	9000
			0.43	45	630	680	50	69.6									
			0.44	45	680	730	50	68.2									
			0.37	50	830	880	50	81.0	79.8				11.1	98	7	7.98	
			0.38	50	880	930	50	79.2									
			0.38	50	930	980	50	79.2									
			0.44	45	210	260	50	68.2	64.1				7.3	58	32	6.41	6000
			0.46	45	260	310	50	65.4									
			0.51	45	310	360	50	58.8									
			0.55	25	450	500	50	54.6	55.4				5.5	42	30	5.54	6000
			0.54	25	500	550	50	55.8									
			0.54	25	550	600	50	55.8									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
W.O. 2 (cont) Sheet 3.																	
23.12.65	130	140	5.22	20	700	750	50	8.5	10	NIL	129' AX Casing	56.4	0	0.9	76	1.00	400 N Mechanical Packer
			4.54	20	750	800	50	10.2	10.0								
			4.42	20	800	850	50	10.6									
			4.38	20	850	900	50	10.7									
			2.57	35	950	1000	50	16.9	16.4				0.6	2.6	88	1.64	600
			3.03	35	1000	1050	50	16.4									
			3.07	35	1050	1100	50	16.0									
			2.10	50	150	200	50	23.0	23.5				1.2	5.9	99	2.35	750
			2.06	50	200	250	50	23.8									
			2.06	50	250	300	50	23.8									
			1.35	60	350	400	50	31.6	32.4				2.2	12.5	102	3.24	1000
			1.31	60	400	450	50	32.9									
			1.32	60	450	500	50	32.6									
			1.45	50	550	600	50	28.6	29.3				1.8	10	95	2.93	900
			1.41	50	600	650	50	29.7									
			1.41	50	650	700	50	29.7									
			1.55	35	750	800	50	26.1	26.1				1.4	7.5	83	2.61	1000
			1.55	35	800	850	50	26.1									
			1.57	35	850	900	50	26.0									
			2.10	20	950	1000	50	23.0	21.7				0.9	4.9	71	2.17	900
			2.23	20	1000	1050	50	20.9									
			2.22	20	1050	1100	50	21.1									
29.12.65	140	150	1.19	20	200	250	50	37.9	10	NIL	137'5" AX Casing	60.8	3.4	19.5	58	4.00	2200 N Mechanical Packer
			1.10	20	250	300	50	42.8	40.0								
			1.16	20	300	350	50	39.4									
			1.05	35	450	500	50	46.1	45.9				4.5	27	64	4.59	23000
			1.05	35	500	550	50	46.1									
			1.06	35	550	600	50	45.4									
			0.51	50	660	710	50	38.8	59.6				7.4	49	54	5.96	3500
			0.50	50	710	760	50	60.0									
			0.50	50	760	810	50	60.0									
			0.52	60	900	950	50	57.6	65.6				8.5	61	51	6.56	4000
			0.44	60	950	1000	50	68.2									
			0.44	60	1000	1050	50	68.2									
			0.44	60	1050	1100	50	68.2									
			0.50	50	630	680	50	60.0	60.4				7.4	52	51	6.04	3500
			0.50	50	680	730	50	60.0									
			0.49	50	730	780	50	61.2									
			0.56	35	850	900	50	53.5	53.1				5.9	36	54	5.31	3000
			1.00	35	900	950	50	50.0									
			0.54	35	950	1000	50	55.8									
			1.10	20	100	150	50	42.8	44.1				4.1	25	52	4.41	2500
			1.09	20	150	200	50	43.4									
			1.05	20	200	250	50	46.1									
30.12.65	150	160	1.00	25	330	380	50	50.0	10	NIL	147'5" AX Casing	65.1	5.7	35	49	5.11	3000
			0.58	25	380	430	50	51.7	51.1								
			0.58	25	430	480	50	51.7									
			1.00	35	540	590	50	50.0	51.4				5.7	35	59	5.14	2500
			0.59	35	590	640	50	50.8									
			0.56	35	640	690	50	53.5									
			0.55	50	800	850	50	54.6	55.2				6.8	42	66	5.52	2500
			0.54	50	850	900	50	55.5									
			0.54	50	900	950	50	55.5									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
WD 2 (cont) Sheet 4																	
30.12.65	150	160	0.42	70	1030	1080	50	71.4	10	NIL	1475' AX Casing	65.1	12.6	89	34	7.72	7000
			0.37	70	1080	1130	50	81.0	77.2								
			0.38	70	1130	1180	50	79.2									
			0.45	50	300	350	50	66.6	66.7				9.6	63	43	6.67	5000
			0.46	50	350	400	50	65.4									
			0.44	50	400	450	50	68.2									
			1.03	35	600	650	50	47.6	47.1				5.0	29	66	4.71	2200
			1.05	35	650	700	50	46.1									
			1.03	35	700	750	50	47.6									
			1.00	25	870	920	50	50.0	55.6				6.8	42	41	5.56	4500
			0.48	25	920	970	50	62.4									
			0.56	25	970	1020	50	53.5									
			0.55	25	1020	1070	50	54.5									
23.2.66	170	189	0.43	25	080	130	50	69.6	10	NIL	168' AX Casing	73.8	12.1	71	16	7.02	14000
			0.43	25	130	180	50	69.6	70.2								
			0.42	25	180	230	50	71.4									
			0.41	50	255	305	50	73.2	75.0				13.8	82	28	7.50	85000
			0.39	50	305	355	50	76.8									
			0.40	50	450	500	50	75.0									
			0.36	75	540	590	50	83.4	83.4				16.8	105	27	8.34	10,000
			0.36	75	590	640	50	83.4									
			0.36	75	640	690	50	83.4									
			0.35	90	780	830	50	85.8	87.4				18.1	118	28	8.74	10,000
			0.34	90	830	880	50	88.2									
			0.34	90	880	930	50	88.2									
			0.37	75	950	1000	50	81.0	83.4				16.8	105	27	8.34	10,000
			0.35	75	1100	1150	50	85.8									
			0.42	50	1170	1220	50	71.4	71.4				12.6	74	37	7.14	6,000
			0.42	50	1220	1270	50	71.4									
			0.45	25	1280	1330	50	66.6	68.1				11.6	66	21	6.81	10,000
			0.43	25	1330	1380	50	69.6									
25.2.66	185	195	0.41	30	1515	1565	50	73.2	10	NIL	182.5' AX Casing	80.3	14.1	79	17	7.29	13 000
			0.42	30	1565	1615	50	71.4	72.9								N Mechanical Packer
			0.41	30	1615	1665	50	73.2									
			0.37	55	1720	1770	50	81.0	79.0				16.7	93	26	7.90	10,000
			0.38	55	1770	1820	50	79.2									
			0.39	55	1960	2010	50	76.8									
			0.36	75	2040	2090	50	83.4	81.7				17.3	102	36	8.17	7,000
			0.35	75	2090	2140	50	85.8									
			0.35	75	2140	2190	50	85.8									
			0.35	100	2490	2540	50	85.8	84.6				19.7	117	44	8.66	60,000
			0.34	100	2540	2590	50	88.2									
			0.35	100	2590	2640	50	85.8									
			0.37	75	2550	2600	50	81.0	83.3				18.2	108	32	8.33	8,000
			0.35	75	2600	2650	50	85.8									
			0.36	75	2650	2700	50	83.4									
			0.38	55	2795	2845	50	79.2	80.6				16.7	100	19	8.06	14,000
			0.38	55	2845	2895	50	79.2									
			0.36	55	2895	2945	50	83.4									
			0.43	30	3050	3100	50	69.6	72.0				13.8	76	21	7.20	11,000
			0.40	30	3100	3150	50	75.0									
			0.42	30	3150	3200	50	71.4									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

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ATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability
WD 2 (cont.)	Sheet 5																
26.2.66	195	205	1.25	30	3275	3325	50	35.3	10	Nil	1925	84.6	3.6	13.5	96	3.50	1,100
			1.25	30	3325	3375	50	35.3	35.0		AX						N Mechanical Packer
			1.27	30	3375	3425	50	34.4			Casing						
			1.07	65	3460	3510	50	44.7	46.4				6.1	28	115	4.64	1,200
			1.03	65	3510	3560	50	47.6									
			1.04	65	3560	3610	50	46.9									
			0.54	90	3690	3740	50	55.5	53.6				8.3	38	128	5.36	1,300
			0.56	90	3740	3790	50	53.5									
			0.58	90	3790	3840	50	51.7									
			0.55	110	3875	3925	50	54.5	56.2				9.2	44	141	5.62	1,200
			0.53	110	4090	4140	50	56.6									
			0.52	110	4140	4190	50	57.6									
			0.57	90	4220	4270	50	52.6	52.3				7.8	37	130	5.23	1,300
			0.58	90	4270	4320	50	51.7									
			0.57	90	4320	4370	50	52.6									
			1.06	65	4440	4490	50	45.5	44.3				5.8	25	119	4.43	1,200
			1.08	65	4490	4540	50	44.1									
			1.09	65	4540	4590	50	43.4									
			1.41	30	4615	4665	50	29.7	29.1				2.7	8.8	103	2.91	900
			1.44	30	4665	4715	50	28.8									
			1.44	30	4715	4765	50	28.8									
28.2.66	205	215	0.40	30	4830	4880	50	75.0	10	Nil	202.5'	89	16.4	85	18	7.56	13,000
			0.40	30	4880	4930	50	75.0	75.6		AX						N Mechanical Packer
			0.39	30	4930	4980	50	76.8			Casing						
			0.38	50	5025	5075	50	79.2	71.8				15.0	72	52	7.18	4,500
			0.45	50	5150	5200	50	66.6									
			0.43	50	5200	5250	50	69.6									
			0.39	75	5370	5420	50	76.8	76.4				16.8	88	59	7.64	4,000
			0.38	75	5420	5470	50	79.2									
			0.41	75	5540	5590	50	73.2									
			0.38	100	5610	5660	50	79.2	80.6				18.8	99	71	8.06	3,500
			0.36	100	5660	5710	50	83.4									
			0.38	100	5710	5760	50	79.2									
			0.42	75	5825	5875	50	71.4	70.0				14.4	70	80	7.00	2,500
			0.40	75	5875	5925	50	75.0									
			0.47	50	5950	6000	50	63.6	64.5				12.2	59	68	6.45	3,000
			0.46	50	6000	6050	50	65.4									
			0.51	30	6140	6190	50	58.8	60.0				10.8	45	63	6.00	3,000
			0.51	30	6190	6240	50	58.8									
			0.48	30	6240	6290	50	62.4									
3.3.66	215	230	0.48	30	6365	6415	50	62.4	15	Nil	213'	93.3	11.9	48	63	4.13	2,000
			0.49	30	6415	6465	50	61.2	62.0		AX						N Mechanical Packer
			0.48	30	6465	7515	50	62.4			Casing						
			0.44	65	6550	6600	50	68.2	70.9				15.3	72	71	4.72	2,000
			0.41	65	6600	6650	50	73.2									
			0.42	65	6780	6830	50	71.4									
			0.40	90	6860	6910	50	75.0	76.3				18.1	88	77	5.08	2,000
			0.39	90	6910	6960	50	76.8									
			0.39	90	6960	7010	50	76.8									
			0.44	60	7240	7290	50	68.2	67.2				14.9	69	69	4.61	1,800
			0.43	60	7290	7340	50	69.6									
			0.43	60	7340	7390	50	69.6									

BUREAU OF MINERAL RESOURCES

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WD 2 (cont.) Sheet 6																	
3.3.66	215	230	0.47	30	7500	7550	50	63.6	15	NIL	213'	93.3	12.6	56	55	4.19	2,400
			0.48	30	7550	7600	50	62.4	63.0		AX						
			0.48	30	7600	7650	50	62.4			Casing						
8.3.66	228	240	0.43	35	7760	7810	50	69.6	12	NIL	225'	99	16.4	55	63	5.59	2,300
			0.41	35	7810	7860	50	73.2	67.1		AX						N Hydraulic Packer
			0.42	35	7860	7910	50	71.4			Casing						
			0.36	50	7940	7990	50	83.4	82.6				22.1	80	47	6.88	5,000
			0.37	50	8075	8125	50	81.0									
			0.36	50	8125	8175	50	83.4									
			0.34	75	8220	8270	50	88.2	87.6				24.3	87	63	7.29	3500
			0.35	75	8385	8435	50	85.8									
			0.34	75	8435	8485	50	88.2									
			0.37	50	8500	8550	50	81.0	80.3				20.7	77	51	6.68	3500
			0.38	50	8550	8600	50	79.2									
			0.39	35	8685	8735	50	76.8	76.8				19.4	70	45	6.40	4500
			0.39	35	8735	8785	50	76.8									
			0.41	25	8800	8850	50	73.2	72.4				17.3	63	44	6.03	4500
			0.42	25	8850	8900	50	71.4									
11.3.66	240	249	1.05	30	9120	9170	50	46.1	9	NIL	237.5'	104.1	7.8	28	98	5.18	1700
			1.05	30	9170	9220	50	46.1	46.7		AX						N Mechanical Packer
			1.03	30	9220	9270	50	47.6			Casing						
			0.58	40	9290	9340	50	51.7	51.6				9.5	35	100	5.74	1,700
			0.59	40	9340	9390	50	50.8									
			0.57	40	9390	9440	50	32.6									
			0.54	60	9510	9560	50	55.5	55.2				10.9	42	111	6.13	1,700
			0.55	60	9560	9610	50	54.5									
			0.54	60	9610	9660	50	55.5									
			0.53	75	9685	9735	50	56.6	57.7				11.6	45	123	6.41	1,600
			0.51	75	9735	9785	50	58.8									
			0.52	75	9785	9835	50	57.7									
			0.53	60	9910	9960	50	56.6	55.6				10.9	47	111	6.18	1,7000
			0.55	60	9960	010	50	54.5									
			0.56	50	030	080	50	53.5	52.5				9.9	37	107	5.84	1,700
			0.58	50	080	130	50	51.7									
			1.05	30	150	200	50	46.1	46.5				7.8	28	98	5.17	1,700
			1.04	30	200	250	50	46.9									
	249	258	5	35	36.0	48.5	12.5	2.5	9	252	245.5'	109.4	0	0	144	0.27	60
			5	35	48.5	60.5	12.0	2.4			AX						N Mechanical Packer
			5	35	60.5	71.5	11.5	2.3			Casing						
			5	50	74.0	88.5	14.5	2.9					0	0	159	0.31	60
			5	50	88.5	102.5	14.0	2.8									
			5	50	102.5	116.5	14.0	2.8									
			5	75	120.0	143.0	23.0	4.6					0	0	184	0.57	100
			5	75	143.0	169.5	26.5	5.3									
			5	75	169.5	196.0	26.5	5.3									
			5	50	200.0	222.0	22.0	4.4					0	0	159	0.48	100
			5	50	222.0	243.5	21.5	4.3									
			5	50	243.5	264.5	21.0	4.2									
			5	35	270.0	289.0	19.0	3.8					0	0	144	0.41	90
			5	35	289.0	307.0	18.0	3.6									
			5	35	307.0	325.5	18.5	3.7									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Drill Hole WO 3.					Co-ordinates J+30, 265 ft S.W. (C.D.W. Brid).						R.L. 130 ft.			Angle from Horizontal, -40°.			
Packer, N Mechanical					Supply Line, AX Casing					Water Supply, Coventry Climax Pump					Direction 125° Mag.		
25.4.66	59'6"	70'	5	20	300	350	50	10	10.5	17	57.5' AX Casing	7	0	0	27	0.92	1100
			5	20	350	400	50	10									
			5	20	400	445	45	9									
			5	30	460	515	55	11					0	1.0	36	1.01	900
			5	30	515	570	55	11									
			5	30	570	620	50	10									
			5	40	650	710	60	12					0	1.5	45	1.21	900
			5	40	710	775	65	13									
			5	40	775	840	65	13									
			5	50	880	960	80	16					0	2.5	55	1.52	900
			5	50	960	35	75	15									
			5	50	35	120	85	17									
			5	40	150	215	75	15					0	1.6	45	1.30	900
			5	40	215	280	65	13									
			5	40	280	340	65	13									
			5	30	420	470	50	10					0	0	37	0.92	800
			5	30	470	515	45	9									
			5	30	515	565	50	10									
			5	20	580	615	35	7					0	0	27	0.60	700
			5	20	615	645	30	6									
			5	20	645	675	30	6									
4.5.66	70'	80'4"	5	20	730	735	15	3	10.3	17	68' AX Casing	7	0	0	27	0.34	400
			5	20	735	755	20	4									
			5	20	755	775	20	4									
			5	20	775	790	15	3									
			5	30	800	825	25	5					0	0	37	0.49	400
			5	30	825	850	25	5									
			5	30	860	885	25	5									
			5	40	980	1014	34	6.8					0	0	47	0.66	450
			5	40	1015	49	34	6.8									
			5	40	50	84	34	6.8									
			5	55	110	157	47	9.4					0	0	62	0.91	450
			5	55	165	212	47	9.4									
			5	55	220	267	47	9.4									
			5	40	310	345	35	7					0	0	47	0.68	450
			5	40	350	385	35	7									
			5	40	390	425	35	7									
			5	30	450	472	22	4.4					0	0	37	0.49	400
			5	30	475	502	27	5.4									
			5	30	505	527	22	5.2									
			5	20	540	555	15	3					0	0	27	0.36	400
			5	20	555	575	20	4									
			5	20	575	595	20	4									
5.5.66	80'	90'	5	20	620	635	15	3	10'	17	77.5' AX Casing	7	0	0	27	0.30	350
			5	20	635	650	15	3									
			5	20	650	665	15	3									
			5	30	670	695	25	5					0	0	37	0.47	400
			5	20	695	715	20	4									
			5	30	715	740	20	5									

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
Drill Hole WD 3 Sheet 2																	
5-5-66	80	90	5	40	750	785	35	7	10	17	77.5	7	0	0	47	0.70	450
			5	40	785	820	35	7			AX						
			5	40	820	855	35	7			Casing						
			5	55	870	915	45	9					0	0	62	0.90	450
			5	55	915	960	45	9									
			5	55	960	5	45	9									
			5	40	20	55	35	7					0	0	47	0.70	450
			5	40	55	90	35	7									
			5	40	90	125	35	7									
			5	30	165	190	25	5					0	0	37	0.50	400
			5	30	190	215	25	5									
			5	30	215	240	25	5									
			5	20	250	270	20	4					0	0	27	0.37	400
			5	20	270	285	15	3									
			5	20	285	305	20	4									
7-5-66	90	100	5.00	30			49.5	9.90	10	16	87.5	7	0	1.0	36	1.08	900
			4.21	30			49.5	11.4			AX						
			4.35	30			49.5	10.4			Casing						
			4.22	30			49.5	11.4									
			4.00	35			49	12.2					0	1.3	41	1.20	900
			4.03	35			49	12.1									
			4.10	35			49	11.8									
			2.58	50			48	16.2					0	2.6	54	1.61	900
			3.00	50			48	16.0									
			3.00	50			48	16.0									
			2.38	60			47	17.9					0	3.0	64	1.75	850
			2.36	60			47	18.1									
			2.52	60			47	16.4									
			2.59	50			48	16.1					0	2.4	54	1.57	900
			3.05	50			48	15.6									
			3.07	50			48	15.5									
			4.22	35			49	11.2					0	1.1	41	1.14	850
			4.15	35			49	11.5									
			4.13	35			49	11.6									
			4.32	30			50	11.0					0	1.1	36	1.12	1000
			4.29	30			50	11.2									
			4.27	30			50	11.3									
10-5-66	100	112	5	20			5.0	1.0	12	16	97.5	7	0	0	27	0.079	95
			5	20			4.8	0.96			AX						
			5	20			4.4	0.88			Casing						
			5	45			5.5	1.10					0	0	52	0.089	55
			5	45			5.5	1.10									
			5	45			5.3	1.06									
			5	45			5.1	1.02									
			5	55			5.6	1.12					0	0	62	0.093	50
			5	55			5.8	1.16									
			5	55			5.3	1.06									
			5	55			5.6	1.12									
			5	70			7.1	1.42					0	0	77	0.121	50
			5	70			7.4	1.48									
			5	70			7.3	1.46									
			5	70			7.1	1.42									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Drill Hole	No 3		Sheet 3														
10.5.66	100	112	5	55			6.0	1.4	12	16	97.5	7	0	0	62	0.119	60
			5	55			6.3	1.46			AX						
			5	55			6.2	1.44			Casing						
			5	45			5.1	1.02					0	0	52	0.082	55
			5	45			4.9	0.98									
			5	45			4.9	0.98									
			5	20			3.1	0.62					0	0	27	0.052	65
			5	20			3.1	0.62									
			5	20			3.1	0.62									
12.5.66	112	122	5	25			5.6	1.12	10	16	109.6	7	0	0	32	0.111	110
			5	25			5.6	1.12			AX						
			5	25			5.0	1.0			Casing						
			5	50			6.7	1.34					0	0	57	0.128	70
			5	50			6.3	1.26									
			5	50			6.2	1.24									
			5	65			7.0	1.60					0	0	72	0.146	65
			5	65			7.0	1.60									
			5	65			6.5	1.30									
			5	65			6.7	1.34									
			5	80			7.7	1.54					0	0	87	0.153	55
			5	80			7.6	1.52									
			5	80			7.7	1.54									
			5	80			7.5	1.50									
			5	65			6.2	1.24					0	0	72	0.126	55
			5	65			6.5	1.30									
			5	65			6.3	1.26									
			5	65			6.1	1.22									
			5	50			5.1	1.02					0	0	57	0.101	65
			5	50			5.1	1.02									
			5	50			5.0	1.00									
			5	25			3.4	0.68					0	0	32	0.067	65
			5	25			3.4	0.68									
			5	25			3.2	0.64									
17.5.66	122	142	5	30			14.0	2.80	20	16	121.5	7	0	0	37	0.121	100
			5	30			11.7	2.34			AX						
			5	30			11.9	2.38			Casing						
			5	30			10.8	2.16									
			5	65			17.5	3.50					0	0	72	0.153	65
			5	65			15.0	3.00									
			5	65			14.2	2.84									
			5	65			14.4	2.88									
			5	90			16.8	3.36					0	0	97	0.169	55
			5	90			18.4	3.68									
			5	90			15.3	3.06									
			5	90			17.2	3.44									
			5	110			20.4	4.88					0	0	117	0.235	65
			5	110			2.30	4.60									
			5	110			23.7	4.74									
			5	110			23.1	4.62									
			5	90			19.5	3.90					0	0	97	0.191	65
			5	90			19.2	3.84									
			5	90			18.8	3.76									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft)	SECTION TESTED TO (ft)	TIME OF TEST (min)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft)	VERTICAL DEPTH STANDING WATER (ft)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft)	REMARKS Permeability ft/yr
Drill Hole WD 3. Sheet 4.																	
17.5.66	122	142	5	65			15.0	3.00	20	16	121.5	7	0	0	72	0.144	60
			5	65			14.1	2.82			AX						
			5	65			14.2	2.84			Casing						
			5	30			9.9	1.98					0	0	37	0.097	85
			5	30			9.9	1.98									
			5	30			9.3	1.86									
19.5.66	142	162	5	35			25	5.0	20	16	139.5	7	0	0	42	0.215	160
			5	35			21	4.2			AX						
			5	35			20	4.0			Casing						
			5	35			19	3.8									
			5	80			43	8.6					0	0	87	0.320	110
			5	80			35	7.0									
			5	80			25	5.0									
			5	80			25	5.0									
			5	105			33	6.6					0	0	112	0.290	80
			5	105			30	6.0									
			5	105			27	5.4									
			5	105			25	5.0									
			5	130			42	8.4					0	0	137	0.395	90
			5	130			41	8.2									
			5	130			37	7.4									
			5	130			37	7.4									
			5	105			22	4.4					0	0	112	0.225	60
			5	105			23	4.6									
			5	80			23	4.6					0	0	87	0.225	80
			5	80			22	4.4									
			5	35			13	1.6					0	0	42	0.080	60
			5	35			13	1.6									
21.5.66	162	183															

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

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Drill	Hole	WO 3.	Sheet 5.														
21.5.66	162	183	5	40	753	774.8	21.5	4.3	21	16	159.5	7	0	0	47	0.19	130
			5	40	774.5	794.8	20.3	4.1			AX						
			5	40	794.8	814.8	20.0	4.0			Casing						
			5	100	530	571	41	8.2					0	0	107	0.36	110
			5	100	573	610	37	7.4									
			5	100	612	646	34	6.8									
			5	120	675	719	44	8.8					0	0	127	0.31	75
			5	120	723	757	34	6.8									
			5	120	761	789	28	5.6									
			5	120	793	816	23	4.6									
			5	150	900	830	30	6.0					0	0	157	0.29	60
			5	150	935	970	35	7.0									
			5	150	925	03	28	5.6									
			5	150	8	35	37	5.4									
			5	120	50	66	16	3.2					0	0	127	0.15	40
			5	120	70	86	16	3.2									
			5	100	100	105	5	1.0					0	0	107	0.043	11
			5	100	108	112	4	0.8									
			5	40	834.0	845.0	11.0	2.2					0	0	47	0.11	70
			5	40	845.0	856.7	11.7	2.3									
			5	40	856.7	868.0	11.3	2.3									
25.5.66	183	203	5	40	700	825	175	35.0	20	16	180.5	7	3.3	14	130	1.725	1700
			5	40	875	55	180	36.0			AX						
			5	40	55	230	175	35.0			Casing						
			5	40	230	390	160	32.0									
			5	100	470	745	275	55.0					8.5	41	57	2.78	1500
			5	100	745	35	290	58.0									
			5	100	835	320	285	57.0									
			5	100	320	585	265	53.0									
			3.09	120	700	900	200	63.6					10.9	57	59	3.175	1700
			1.32	120	900	0	100	64.8									
			1.38	120	100	200	100	61.2									
			1.33	120	200	300	100	64.2									
			1.27	150	400	500	100	68.4					12.5	67	77	3.43	1400
			1.29	150	500	600	100	67.2									
			1.27	150	600	700	100	68.4									
			1.25	150	700	800	100	70.2									
			1.40	120	300	400	100	60.0					9.6	49	68	2.965	1400
			1.41	120	400	500	100	59.4									
			1.43	120	500	600	100	58.2									
			1.41	120	600	700	100	59.4									
			1.46	100	800	900	100	56.4					8.9	46	52	2.88	1800
			1.44	100	900	0	100	57.6									
			1.43	100	00	100	100	58.2									
			1.43	100	100	200	100	58.2									
			1.25	45	300	350	50	35.4					3.6	15	33	1.80	1700
			1.24	45	350	400	50	36.0									
			1.23	45	400	450	50	36.6									
			1.24	45	450	500	50	36.0									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft)	SECTION TESTED TO (ft)	TIME OF TEST (min)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft)	VERTICAL DEPTH STANDING WATER (ft)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINES	FRICTION LOSSES PACKER	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft)	REMARKS Permeability ft/yr
Drill Hole	WD 3.		Sheet 6														
27.5.66	190	210	5	40	700	875	175	35.0	20	17	182.5 AX Casing	71	3.8	15	28	1.765	2000
			5	40	875	1060	185	37.0									
			5	40	1060	1230	170	34.0									
			1.55	100	410	510	100	52.2					7.9	38	61	2.645	1300
			1.50	100	510	610	100	54.6									
			2.00	100	610	710	100	50.0									
			1.50	100	710	810	100	54.6									
			1.34	120	920	20	100	63.6					10.3	51	66	3.03	1400
			1.40	120	20	120	100	60.0									
			1.40	120	120	220	100	60.0									
			1.42	120	220	320	100	58.8									
			0.49	150	500	550	50	61.2					11.1	57	89	3.165	1100
			0.47	150	550	600	50	63.6									
			0.45	150	600	650	50	66.6									
			0.44	150	650	700	50	68.4									
			0.49	125	870	920	50	61.2					10.5	53	68	3.075	1400
			0.49	125	920	970	50	61.2									
			0.48	125	970	20	50	62.4									
			0.49	125	20	70	50	61.2									
			0.54	100	220	270	50	55.8					7.5	33	66	2.56	1200
			0.55	100	270	320	50	54.6									
			1.03	100	320	370	50	47.4									
			1.04	100	370	420	50	46.8									
			1.42	40	510	560	50	29.4					3.0	12	32	159	1600
			1.30	40	560	6 0	50	33.6									
			1.35	40	610	660	50	31.8									
			1.32	40	660	710	50	32.4									
28.5.66	201	211	1.55	40	880	930	50	25.8		17	1985' AX Casing	71	2.0	6.3	39	2.42	1900
			2.02	40	930	980	50	24.6									
			2.05	40	980	30	50	24.0									
			2.16	40	30	80	50	22.2									
			1.20	100	200	250	50	37.2					4.9	19	83	3.95	1500
			1.05	100	250	300	50	46.2									
			1.12	100	300	350	50	41.4									
			1.23	100	350	400	50	36.0									
			1.22	100	400	450	50	36.6									
			1.06	120	500	550	50	45.6					6.3	26	95	4.50	1500
			1.07	120	550	600	50	45.0									
			1.08	120	600	650	50	44.4									
			1.07	120	650	700	50	45.0									
			0.57	150	800	850	50	58.8					9.6	45	102	5.72	1700
			0.57	150	850	900	50	57.6									
			0.54	150	900	950	50	55.8									
			0.53	150	950	00	50	56.4									
			1.07	120	100	150	50	45.0					6.4	26	95	4.56	1500
			1.05	120	150	200	50	46.2									
			1.08	120	200	250	50	44.4									
			1.04	120	250	300	50	46.8									
			1.22	100	350	350	50	36.6					4.0	15	88	3.62	1700
			1.24	100	400	450	50	36.0									
			1.22	100	450	500	50	36.6									
			1.25	100	500	550	50	35.4									
			2.21	40	650	700	50	21.2					1.4	4.4	42	2.11	1600
			2.21	40	700	750	50	21.2									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Drill	Hole	WD 3.	Sheet 7.														
28.5.66	201	211	2.24	40	750	800	50	21.0	10	17	1985	7					
			2.24	40	800	850	50	21.0			AX						
30.5.66	210	220	5	40	900	930	30	6.0	10	17	207.5	7	0	0	47	0.48	300
			5	40	930	955	25	5.0			AX						
			5	40	955	975	20	4.0			Casing						
			5	40	975	995	20	4.0									
			3.05	100	30	80	50	16.2					0	1.1	10.6	0.48	140
			4.31	100	80	130	50	10.8									
			5.09	100	130	180	50	9.6									
			5.30	100	180	230	50	9.0									
			4.50	125	280	330	50	10.2					0	0	132	0.94	220
			5.05	125	330	380	50	9.8									
			5.40	125	380	430	50	8.8									
			5.35	125	430	480	50	8.9									
			4.25	150	140	190	50	11.3					0	1	156	1.06	210
			4.35	150	190	240	50	10.8									
			4.55	150	240	290	50	10.1									
			4.55	150	290	340	50	10.1									
			5	120	350	390	40	8.0					0	0	127	0.77	200
			5	120	390	425	35	7.0									
			5	120	425	460	35	7.0									
			5	100	470	505	35	7.0					0	0	107	0.70	200
			5	100	505	540	35	7.0									
			5	100	540	575	35	7.0									
			5	40	930	950	20	4.0					0	0	47	0.38	250
			5	40	950	969	19	3.8									
			5	40	969	990	21	4.2									
	220'6"	231	5	40	710	740	30	6.0	10.5	17							
			5	40	740	765	25	5.0					0	0	47	0.52	350
			5	40	765	795	30	6.0									
			5	40	795	820	25	5.0									
			2.59	100	850	900	50	16.8					0	2.0	105	1.38	400
			3.36	100	900	950	50	13.8									
			3.41	100	950	00	50	13.6									
			3.42	100	00	50	50	13.6									
			2.55	120	80	130	50	17.1					0	2.1	125	1.44	350
			3.26	120	130	180	50	14.5									
			3.30	120	180	230	50	14.3									
			3.30	120	230	280	50	14.3									
			2.40	150	300	350	50	18.7					1.2	3.3	153	1.74	350
			2.45	150	350	400	50	18.2									
			2.46	150	400	450	50	18.1									
			2.47	150	450	500	50	18.0									
			3.46	120	520	570	50	13.3					0	1.6	125	1.26	300
			3.47	120	570	620	50	13.2									
			3.45	120	620	670	50	13.4									
			3.45	120	670	720	50	13.4									
			4.42	100	750	800	50	10.6					0	1	106	1.01	300
			4.45	100	800	850	50	10.5									
			4.45	100	850	900	50	10.5									
			4.38	100	900	950	50	10.7									
			5	40	980	00	20	4.0					0	0	47	0.45	300
			5	40	00	25	25	5.0									
			5	40	25	50	25	5.0									

BUREAU OF MINERAL RESOURCES

WARANGOI - HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft)	REMARKS Permeability Ft/Yr
Drill Hole W.D. 6.					Location, Southern Ridge, midway pegs Δ8 and Δ9.								R.L. 291 ft.		Angle from Horizontal, -90°.		
Packer, N. Hydraulic.					Supply Line, AX Casing.								Water Supply, Coventry, Climax Pump.				
	75'	85	3.28	15			50	14.4	10	NIL	75' AX Casing	33	0	2.8	45	1.33	980
			3.47	15			50	13.2									
			4.04	15			50	12.3									
			3.20	25			50	15.0					0	5.2	53	1.85	1100
			2.30	25			50	20.0									
			2.25	25			50	20.7									
			1.38	35			50	30.5					1	13	54	3.01	1700
			1.42	35			50	29.4									
			1.39	35			50	30.3									
			1.24	40			50	35.6					15	16	56	3.56	2000
			1.26	40			50	34.8									
			1.22	40			50	36.5									
			1.44	35			50	28.8					0	12	56	2.97	1700
			1.42	35			50	29.4									
			1.37	35			50	30.9									
			2.19	25			50	21.6					0	7.4	51	2.27	1400
			2.06	25			50	23.8									
	85	95	5	15			27.3	5.5	10	NIL	85' AX Casing	37	0	0	52	0.50	300
			5	15			25.6	5.1									
			5	15			24.3	4.8									
			5	15			24.3	4.8									
			5.32	25			50	9.0					0	1.4	61	0.94	500
			5.30	25			50	9.1									
			4.58	25			50	10.1									
			4.46	25			50	10.5									
			5	30			30	6.0					0	0	67	0.60	270
			5	30			29.9	6.0									
			5	30			29.4	5.9									
			5	40			34.2	6.8					0	0	77	0.68	270
			5	40			34.3	6.9									
			5	40			33.8	6.8									
			5	30			22.5	4.5					0	0	67	0.45	200
			5	30			22.5	4.5									
			5	25			20.7	4.1					0	0	62	0.42	190
			5	25			21.0	4.2									
			5	15			16.0	3.2					0	0	52	0.32	180
			5	15			16.7	3.3									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft)	SECTION TESTED TO (ft)	TIME OF TEST (min)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft)	VERTICAL DEPTH STANDING WATER (ft)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE P.S.I.	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE P.S.I.	WATER LOSS (g.p.m. per ft)	REMARKS PERMEABILITY FT/YR
	WD 6.	Sheet	2.														
	95	105	2.10	20			50	23.1	10	NIL	95	41	0	6.2	55	2.02	1100
			2.27	20			50	20.4			AX						
			2.28	20			50	20.2			CASING						
			2.37	20			50	19.1									
			1.47	30			50	28.1					1	11	59	2.85	1500
			1.44	30			50	28.8									
			1.45	30			50	28.6									
			1.24	40			50	35.7					2	18	61	3.66	1800
			1.20	40			50	37.5									
			1.22	40			50	36.6									
			1.09	50			50	43.5					3	25	63	4.48	2200
			1.05	50			50	46.2									
			1.07	50			50	44.7									
			1.25	40			50	35.4					2	18	61	3.73	1800
			1.17	40			50	39.0									
			1.20	40			50	37.5									
			1.47	30			50	28.1					1	11	59	2.84	1500
			1.45	30			50	28.6									
			2.56	20			50	17.0					0	4.4	57	1.70	900
			2.58	20			50	16.9									
9.7.66	105	115	3.25	20	550	600	50	14.6	10	90	102'5	39	0	2.8	56	1.33	750
			3.43	20	600	650	50	13.4	13.3		AX						
			4.10	20	650	700	50	12.0	10		CASING						
			2.20	30	750	800	50	21.4	21.3				0	6.8	62	2.13	1100
			2.19	30	800	850	50	21.5									
			2.23	30	850	900	50	20.9									
			1.42	40	960	10	50	29.4	28.2				1.3	11	67	2.82	1300
			1.37	40	10	60	50	25.8									
			1.42	40	60	110	50	29.4									
			1.10	55	150	200	50	42.8	44.1				3.0	24.5	67	4.41	2000
			1.06	55	200	250	50	45.4									
			1.08	55	250	300	50	44.1									
			1.32	40	320	370	50	32.6	31.6				1.6	14	64	3.16	1600
			1.38	40	370	420	50	30.6									
			1.35	40	420	470	50	31.6									
			2.15	30	580	630	50	22.2	22.2				0	7.3	62	2.22	1100
			2.15	30	630	680	50	22.2									
			3.22	20	690	740	50	14.8	14.2				0	3.3	56	1.42	750
			3.32	20	740	790	50	14.1									
			3.40	20	790	840	50	13.6									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft)	TO (ft)	TIME OF TEST (min)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft)	VERTICAL DEPTH STANDING WATER (ft)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	PRESSURE LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m./ft)	REMARKS PERMEABILITY FT/YR
	WD 6.	Sheet	3.														
11.7.66	115	125	3.06	20	810	860	50	16.1	10	NIL	112.5 AX CASING	50	0	3.6	66	1.51	700
			3.24	20	860	910	50	14.7	15.1								
			3.26	20	910	960	50	14.6									
			3.02	30	980	30	50	16.4	15.7				0	3.8	76	1.57	600
			3.10	30	30	80	50	15.8									
			3.23	30	80	130	50	14.8									
			1.32	45	170	220	50	32.6	31.8				1.8	14	79	3.18	1200
			1.35	45	220	270	50	31.6									
			1.36	45	270	320	50	31.2									
			1.15	60	420	470	50	40.0	38.8				2.6	19	88	3.88	1300
			1.19	60	470	520	50	37.9									
			1.18	60	520	570	50	38.5									
			1.45	45	600	650	50	28.6	27.5				1.4	10.5	83	2.75	1000
			1.49	45	650	700	50	27.5									
			1.47	45	700	750	50	28.0									
			3.17	30	770	820	50	15.2	15.1				0	3.6	76	1.51	600
			3.19	30	820	870	50	15.8									
			3.28	30	870	920	50	14.4									
			5.15	20	950	00	50	9.5	9.5				0	1.5	68	0.95	350
			5.16	20	00	50	50	9.5									
12.7.66	125	135	0.41	20	200	250	50	73.1	10	NIL	122.5 AX CASING	54.3	9.7	65	0	7.35	>100,000 MAXIMUM OBTAINABLE GAUGE PRESSURE
			0.42	20	250	300	50	71.4									
			0.40	20	300	350	50	74.9	73.5								
			0.41	20	350	400	50	73.1									
			0.40	20	400	450	50	74.9									
			0.41	20	450	500	50	73.1									
			0.40	20	500	550	50	74.9									
			0.42	20	550	600	50	71.4									
			0.40	20	600	650	50	74.9									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
Drill Hole No WD8A					Co-ordinates, K+23, 134 ft. NE.					R.L. 120 ft.			Angle from horizontal, -70°				
Packer, N Hydraulic					B Mechanical			Supply line, AX Casing				Water Supply, Coventry Climax pump.					Bearing 252° Magnetic
2.12.65	98.5	110	5	15	15.0	42.2	27.2	5.44	11.5	7	96' AX Casing	3.0	0	0	18	0.43	800
			5	15	42.2	68.3	26.1	5.22									
			5	15	68.3	92.0	23.7	4.74									
			5	15	92.0	114.1	22.1	4.42									
			5	25	140.0	168.8	28.8	5.56					0	0	28	0.47	500
			5	25	168.8	196.8	28.0	5.60									
			5	25	196.8	222.1	25.3	5.06									
			5	35	255.0	294.9	39.9	7.98					0	0	38	0.62	500
			5	35	294.9	331.5	36.6	7.32									
			5	35	331.5	364.1	32.6	6.52									
			5	40	385.0	422.8	37.8	7.56					0	0	43	0.63	500
			5	40	422.4	458.9	36.1	7.22									
			5	40	458.9	493.9	35.0	7.00									
8.12.65	108.5	120	5	20	540.0	565.8	25.8	5.16	11.5	6	106' AX Casing	2.6	0	0	23	0.40	600
			5	20	565.5	588.7	22.9	4.58									
			5	20	588.7	611.4	22.7	4.54									
			5	20	611.4	632.6	21.2	4.24									
			5	30	720.0	741.9	21.9	4.38					0	0	33	0.37	400
			5	30	741.9	763.8	21.9	4.38									
			5	30	763.8	784.6	20.8	4.16									
			5	40	810.0	842.1	32.1	6.42					0	0	43	0.52	400
			5	40	842.1	873.0	30.9	6.18									
			5	40	873.0	902.3	29.3	5.86									
			5	50	950.0	988.0	38.0	7.60					0	0	53	0.62	400
			5	50	988.0	025.1	32.1	7.42									
			5	50	085.0	122.0	37.0	7.40									
			5	40	130.0	156.3	26.3	5.26					0	0	43	0.45	300
			5	40	156.3	181.7	25.4	5.08									
			5	30	195.0	215.7	20.7	4.14					0	0	33	0.34	300
			5	30	215.7	236.8	20.6	4.12									
			5	20	245.0	259.8	14.8	2.96					0	0	23	0.25	300
			5	20	259.8	273.9	14.1	2.82									
			5	20	273.9	288.0	14.1	2.62									
10-12-65	120	130	4.13	20	200	250	50	11.8	10	7	117' AX Casing	3.0	0	2.4	21	1.13	1700
			4.40	20	250	300	50	10.7									
			4.20	20	300	350	50	11.5									
			3.35	35	400	450	50	13.9					0	3.4	35	1.37	1300
			3.40	35	450	500	50	13.6									
			3.40	35	500	550	50	13.6									
			2.35	50	600	650	50	19.3					0	5.7	47	1.93	1300
			2.30	50	650	700	50	20.0									
			2.40	50	700	750	50	18.7									
			2.20	60	800	850	50	21.4					0	7	56	2.19	1200
			2.10	60	850	900	50	23.0									
			2.20	60	900	950	50	21.4									
			2.50	50	1000	050	50	17.6					0	4.8	48	1.79	1100
			2.45	50	050	100	50	18.2									
			4.10	35	150	200	50	12.0					0	2.7	25	1.19	1,100
			4.15	35	200	250	50	11.8									
			5.00	20	310.0	352.9	42.9	8.6					0	0	25	0.83	1,100
			5.00	20	352.9	392.9	40.0	8.0									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
WD 8A Sheet 2																	
14.12.65	130	140	5	25	400	447	47	9.5	10	6	127'	2.6	0	1	27	0.77	900
			5	25	447	480	33	6.6			AX						
			5	25	480	515	35	7.0			Casing						
			3.10	45	550	600	50	15.8					0	3.7	44	1.54	1100
			3.20	45	600	650	50	15.0									
			3.15	45	650	700	50	15.4									
			2.12	55	750	800	50	22.7					0	7.2	50	2.21	1400
			2.15	55	800	850	50	22.2									
			2.20	55	850	900	50	21.4									
			1.55	70	950	1000	50	26.0					1.8	12	59	2.92	1600
			1.40	70	1000	050	50	30.0									
			1.35	70	050	100	50	31.6									
			2.15	55	150	200	50	22.2					0	7.3	50	2.22	1400
			2.15	55	200	250	50	22.2									
			3.05	45	300	350	50	16.2					0	39	44	1.58	1100
			3.15	45	350	400	50	15.4									
			5	25	450	485	35	7.0					0	0	28	0.65	700
			5	25	485	515	30	6.0									
20.12.65	139	150	5	20	420.0	444.8	24.8	4.96	11	6	136.5	2.6	0	0	20	0.45	700
			5	20	444.8	469.8	25.0	5.00			AX						
			5	20	469.8	494.5	24.3	4.86			Casing						
			5.45	35	700	750	50	8.64					0	13	36	0.79	700
			6.26	35	750	800	50	7.74									
			5.07	35	800	850	50	9.72									
			5.02	50	860	910	50	9.90					0	1.5	51	0.87	550
			5.16	50	910	960	50	9.48									
			5.24	50	960	1010	50	9.21									
			4.00	60	1020	070	50	12.50					0	2.6	60	1.14	600
			3.55	60	070	120	50	12.72									
			4.00	60	120	170	50	12.50									
			6.02	50	180	230	50	8.28					0	1.1	50	0.74	500
			6.10	50	230	280	50	8.10									
			7.12	50	260	330	50	8.04									
			5.02	35	340	360	20	3.97					0	0	38	0.34	250
			5.00	35	360	380	20	4.00									
			5.52	35	380	400	20	3.41									
			5	20	510	531	21	4.20					0	0	23	0.38	550
			5	20	531	551.7	20.7	4.14									
			5	20	551.7	572.0	20.3	4.06									
12.66	155	165	5	25	640	685	45	9.0	10	6	1525'	2.6	0	0	28	0.73	800
			5	25	685	725	40	8.0			AX						N Mechanical Packer
			5	25	725	759	34	6.8			Casing						
			5	25	759	785	26	5.2									
			5	25	785	823	38	7.6									
			5	50	540	575	35	7.0					0	0	53	0.50	300
			5	50	575	605	30	6.0									
			5	50	605	625	20	4.0									
			5	50	625	645	20	4.0									
			5	50	645	665	20	4.0									
			5	65	680	715	35	7.0					0	0	68	0.60	250
			5	65	715	740	25	5.0									
			5	65	740	770	30	6.0									
			5	65		800	30	6.0									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
WB 8A Sheet 3																	
12.1.66	155	165	5	80	830	875	45	9.0	10	6	152.5'	2.6	0	0	83	0.82	300
			5	80	875	915	40	8.0			AX						
			5	80	915	955	40	8.0			Casing						
			5	80	955	995	40	8.0									
			5	65	40	65	25	5.0					0	0	68	0.45	200
			5	65	65	90	25	5.0									
			5	65	90	110	20	4.0									
			5	65	110	130	20	4.0									
			5	50	140	155	15	3.0					0	0	53	0.28	170
			5	50	155	170	15	3.0									
			5	50	170	180	10	2.0									
	169	179	5	25	480	635	155	31.0	10	6	165'	2.6	2.1	9	17	2.88	5,500
			5	25	635	775	140	28.0			AX						N Mechanical Packer
			5	25	775	915	140	28.0			Casing						
			5	25	915	1060	145	29.0									
			5	25	1065	1200	140	28.0									
			5	50	350	535	185	37.0					3.8	18	31	3.86	4000
			5	50	535	725	190	38.0									
			5	50	725	920	195	39.0									
			5	50	920	1115	195	39.0									
			5	50	1115	1315	200	40.0									
			5	65	400	600	200	40.0					4.6	23	40	4.26	3000
			5	65	600	810	210	42.0									
			5	65	810	1030	220	44.0									
			5	65	1030	1250	220	44.0									
			5	65	1250	1465	215	43.0									
			5	80	540	775	235	47.0					5.9	31	46	4.85	3000
			5	80	775	1030	255	51.0									
			5	80	1030	1275	245	49.0									
			5	80	1275	1510	235	47.0									
			5	65	640	850	210	42.0					4.5	22	41	4.20	3000
			5	65	850	1060	210	42.0									
			5	65	1060	1270	210	42.0									
			5	65	1270	1480	210	42.0									
			5	50	570	675	165	33.0					3.1	14	36	3.45	3000
			5	50	675	850	175	35.0									
			5	50	850	1025	175	35.0									
			5	50	1025	1200	175	35.0									
			5	25	220	340	120	24.0					1.3	52	21	2.22	3000
			5	25	340	450	110	22.0									
			5	25	450	560	110	22.0									
			5	25	560	665	105	21.0									
26.1.66	193	203	3.52	25	780	830	50	12.9	10	6	190'	2.6	0	15.8	12	1.18	3000
			3.45	25	830	880	50	13.3			AX						B Mechanical Packer
			4.00	25	880	930	50	12.5			Casing						
			4.45	25	930	980	50	10.5									
			5.10	25	980	1030	50	9.7									
			2.45	50	60	110	50	18.2					0	28	25	1.78	2500
			2.47	50	110	160	50	17.9									
			2.50	50	160	210	50	17.6									
			2.49	50	210	260	50	17.7									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft)	VERTICAL DEPTH STANDING WATER (ft)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft)	REMARKS Permeability f.l.u.
WO 8A Sheet 4																	
26.1.66	193	203	2.30	70	320	370	50	20.0	10	6	190' AX Casing	2.6	1.1	31	41	1.89	1500
			2.32	70	370	420	50	19.7									
			2.45	70	420	470	50	18.2									
			2.43	70	470	520	50	18.4									
			2.45	70	520	570	50	18.2									
			2.23	90	600	650	50	20.9					1.4	38	53	2.17	1300
			2.17	90	650	700	50	21.8									
			2.17	90	700	750	50	21.8									
			2.20	90	750	800	50	21.4									
			2.20	90	800	850	50	21.4									
			3.07	70	880	930	50	16.0					0	2.3	40	1.54	1200
			3.07	70	930	980	50	16.0									
			3.14	70	980	1030	50	15.4									
			3.22	70	1030	1080	50	14.8									
			3.23	70	1080	1120	50	14.7									
			4.40	50	150	200	50	10.7					0	11.2	41	0.94	700
			5.05	50	200	250	50	9.8									
			5.19	50	250	300	50	9.4									
			5.55	50	300	350	50	8.4									
			5.47	50	350	400	50	8.6									
			9.45	25	410	450	40	4.1					0	2.6	25	0.34	400
			5	25	450	465	15	3.0									
			5	25	465	485	20	4.0									
			5	25	485	505	20	4.0									
			5	25	505	515	10	2.0									
1.2.66	203	213	5	30	616.0	627.0	11.0	2.20	10	6	200.5' AX Casing	26	0	1.0	32	0.172	180 B Mechanical Packer
			5	30	627.0	636.5	9.5	1.90									
			5	30	636.5	644.6	8.1	1.62									
			5	30	644.6	652.0	7.4	1.48									
			5	30	652.0	659.0	7.0	1.40									
			5	55	663.0	675.3	12.3	2.46					0	1.2	57	0.208	120
			5	55	675.3	686.1	10.8	2.16									
			5	55	686.1	696.0	9.9	1.98									
			5	55	696.0	705.5	9.5	1.90									
			5	55	705.5	714.9	9.4	1.88									
			5	75	720.0	733.4	13.4	2.68					0	1.6	76	0.238	100
			5	75	733.4	745.7	12.3	2.46									
			5	75	745.7	757.5	11.8	2.36									
			5	75	757.5	768.9	11.4	2.28									
			5	75	768.9	779.6	10.7	2.14									
			5	100	784.0	800.5	16.5	3.30					0	2.0	101	0.284	90
			5	100	800.5	815.4	14.9	2.98									
			5	100	815.4	828.8	13.4	2.68									
			5	100	828.8	842.0	13.2	2.64									
			5	100	842.0	855.1	13.1	2.62									
			5	75	859.0	868.6	9.6	1.92					0	1.2	77	0.187	80
			5	75	868.6	877.9	9.3	1.86									
			5	75	877.9	887.2	9.3	1.86									
			5	75	887.2	896.4	9.2	1.84									
			5	55	900.0	907.0	7.0	1.60					0	0	58	0.147	90
			5	55	907.0	914.0	7.0	1.60									
			5	55	914.0	920.7	6.7	1.34									
			5	55	920.7	927.5	6.8	1.36									

BUREAU OF MINERAL RESOURCES

WARANGOT HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
WD 8A Sheet 5																	
1.2.66	203	213	5	30	930.0	934.5	4.5	0.90	10	6	200.5' AX Casing	2.6	0	0	33	0.09	90
			5	30	934.5	939.1	4.6	0.92									
			5	30	939.1	943.6	4.5	0.90									
			5	30	943.6	948.1	4.5	0.90									
4.2.66	215	225	2.57	30	760	810	50	16.9	10	4	213' AX Casing	1.7	0	25	7	1.65	8000
			2.54	30	810	860	50	17.2									
			3.01	30	860	910	50	16.6									
			3.09	30	910	960	50	15.9									
			3.10	30	960	1010	50	15.8									
			2.00	65	80	130	50	25.0					2.1	44	21	2.43	4000
			2.06	65	130	180	50	23.8									
			2.05	65	180	230	50	24.0									
			2.04	65	230	280	50	24.2									
			2.02	65	280	330	50	24.5									
			1.43	90	370	420	50	29.1					2.8	58	31	2.93	3000
			1.45	90	420	470	50	28.7									
			1.42	90	470	520	50	29.4									
			1.42	90	520	570	50	29.4									
			1.41	90	570	620	50	29.7									
			1.24	110	750	800	50	35.7					4.0	74	51	3.50	2000
			1.24	110	800	850	50	35.7									
			1.26	110	850	900	50	34.7									
			1.28	110	900	950	50	34.1									
			1.26	110	950	1000	50	34.7									
			1.40	90	60	110	50	30.0					3.0	58	31	2.97	3000
			1.39	90	110	160	50	30.3									
			1.43	90	200	250	50	29.1									
			1.40	90	250	300	50	30.0									
			1.43	90	300	350	50	29.1									
			2.15	65	400	450	50	22.2					2.1	42	23	2.34	3000
			2.02	65	450	500	50	24.5									
			2.05	65	500	550	50	24.0									
			2.10	65	550	600	50	23.0									
			2.08	65	600	650	50	23.4									
			3.11	30	700	750	50	15.7					0	24	8	1.47	6000
			3.17	30	750	800	50	15.2									
			3.34	30	800	850	50	13.8									
			3.28	30	850	900	50	14.4									
			3.27	30	900	950	50	14.5									
			3.29	30	950	1000	50	14.3									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Drill Hole WD 9.					Co-ordinates, 0+30, 300 ft. S.W. (C.D.W grid).						R.L., 270 ft.			Angle from Horizontal, -90°			
Packer, N q . B Mechanical.					Supply Line, AX Casing					Water Supply, Coventry Climax Pump.							
4.5.66	70	80	3.16	15	985	35	50	15.3	10	NIL	67' AX Casing	30.4	0	2.2	43	1.51	1100
			3.19	15	35	85	50	15.1									
			3.20	15	85	135	50	15.0									
			2.43	25	160	210	50	18.4					0	3.4	52	1.86	1100
			2.35	25	210	260	50	19.3									
			2.44	25	260	310	50	18.2									
			2.42	25	310	360	50	18.5									
			2.25	30	400	450	50	20.6					0	4.2	56	2.04	1100
			2.28	30	450	500	50	20.2									
			2.25	30	500	550	50	20.6									
			2.04	40	575	625	50	24.2					0	6	64	2.45	1200
			2.00	40	625	675	50	25.0									
			2.02	40	675	725	50	24.5									
			2.21	30	740	790	50	21.2					0	4.6	55	2.10	1200
			2.22	30	790	940	50	21.1									
			2.24	30	840	890	50	20.8									
			2.30	25	910	960	50	20.0					0	3.8	52	1.95	1200
			2.35	25	960	10	50	19.3									
			2.35	25	10	60	50	19.3									
			2.57	15	80	130	50	16.9					0	2.8	43	1.69	1200
			2.57	15	130	180	50	16.9									
			2.58	15	180	230	50	16.8									
6.5.66	84	94'6"	3.36	20			50	13.9	10.5	NIL	81.5 AX Casing	36.4	0	1.7	55	1.30	700
			3.39	20			50	13.7									
			3.39	20			50	13.7									
			2.28	30			50	20.2					0	4.2	62	1.94	950
			2.30	30			50	20.0									
			2.27	30			50	20.4									
			2.12	40			50	22.8					0	5.8	71	2.21	950
			2.07	40			50	23.8									
			2.11	40			50	22.9									
			2.10	40			50	23.1									
			1.46	50			50	28.3					1.1	9	76	2.69	1100
			1.46	50			50	28.3									
			1.47	50			50	28.1									
			2.33	40			50	19.6					0	3.5	73	1.78	750
			2.40	40			50	18.8									
			2.45	40			50	18.2									
			2.44	40			50	18.3									
			3.41	30			50	13.6					0	1.5	65	1.23	600
			3.55	30			50	12.7									
			3.53	30			50	12.9									
			3.57	30			50	12.6									
			4.39	20			50	10.7					0	1	45	0.97	650
			5.01	20			50	9.9									
			4.56	20			50	10.2									
			4.58	20			50	10.1									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION FROM	TO	TIME OF TEST	HOURS	WATER METER READINGS START	FINISH	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION	VERTICAL DEPTH BELOW WATER	CASING	MAXIMUM WATER PRESSURE	PRESSURE	LOSSES PACKERS	EFFECTIVE TEST PRESSURE	HOURLY LOSS	REMARKS
Drill Hole WD 9. Sheet 2.																	Permeability ft/yr
9.5.66	94	104	5	20			9.0	1.8	10	NIL	91	40.8	0	0	61	0.18	90
			5	20			9.5	1.9			AX						
			5	20			85	1.7			Casing						
			5	30			17.0	3.4					0	0	71	0.33	150
			5	30			16.5	3.3									
			5	30			16.5	3.3									
			5	40			28.0	5.6					0	0	81	0.56	200
			5	40			29.0	5.8									
			5	40			27.5	5.5									
			4.47	55			50	10.5					0	1	95	1.09	350
			4.30	50			50	11.1									
			4.39	55			50	10.7									
			4.31	55			50	11.1									
			5	40			35.0	7.0					0	0	81	0.70	250
			5	40			34.0	6.8									
			5	40			35.5	7.1									
			5	30			32.0	6.4					0	0	71	0.64	250
			5	30			32.0	6.4									
			5	30			32.0	6.4									
			5	20			28.5	5.7					0	0	61	0.57	300
			5	20			29.5	5.9									
			5	20			28.0	5.6									
11.5.66	104'6"	115	5	20			50	10.0	10.5	NIL	102	45.4	0	1	64	1.02	500
			5	20			55	11.0			AX						
			5	20			55	11.0			Casing						
			3.56	45			50	12.7					0	1.4	89	1.18	400
			4.07	45			50	12.2									
			3.58	45			50	12.6									
			4.10	45			50	12.0									
			3.46	55			50	13.3					0	1.7	99	1.27	400
			3.41	55			50	13.5									
			3.47	55			50	13.2									
			3.42	55			50	13.5									
			2.42	70			50	18.5					0	3.7	112	1.75	500
			2.45	70			50	18.2									
			2.42	70			50	18.5									
			3.16	55			50	15.3					0	2.3	98	1.46	450
			3.17	55			50	15.2									
			3.16	55			50	18									
			3.47	45			50	13.2					0	1.7	99	1.27	400
			3.45	45			50	13.3									
			3.46	45			50	13.3									
			4.47	20			50	10.5					0	1	64	0.97	500
			4.50	20			50	10.3									
			4.55	20			50	10.1									
			5.05	20			50	9.9									
16.5.66	114	124'6"	3.45	20			50	13.3	10.5	NIL	111.5	49.5	0	1.3	68	1.13	500
			4.20	20			50	11.5			AX						
			4.18	20			50	11.6			Casing						
			4.22	20			50	11.4									
			4.00	35			50	12.5					0	1.5	83	1.23	450
			3.35	35			50	13.9									
			402	35			50	12.4									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft)	SECTION TESTED TO (ft)	TIME OF TEST (min)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft)	VERTICAL DEPTH STANDING WATER (ft)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESS. (p.s.i.)	[illegible]	[illegible]	[illegible]	[illegible]	REMARKS Permeability ft/yr
Drill Hole WD 9. Sheet 3.																	
16.5.66	114	124'6"	3.37	50			49	13.5	10.5	NIL	111.5 AX Casing	49.5	0	1.8	98	1.31	400
			3.30	50			49	14.0									
			3.32	50			49	13.9									
			2.58	60			45	15.2					0	2.3	107	1.47	400
			2.55	60			45	15.4									
			2.53	60			45	15.6									
			3.07	50			45	14.4					0	1.8	98	1.34	400
			3.17	50			45	13.8									
			3.12	50			45	14.1									
			3.54	35			48	12.3					0	1.4	83	1.17	450
			3.56	35			48	12.2									
			3.54	35			48	12.3									
			4.53	20			50	10.2					0	1	69	0.98	450
			4.44	20			50	10.6									
			4.55	20			50	10.2									
			4.50	20			50	10.3									
	124'6"	135	5	25			20	4.0	10.5	NIL	122 AX Casing	54	0	0	79	0.362	140
			5	25			18	3.6									
			5	25			17	3.4									
			5	25			20	4.0									
			7.54	40			50	6.3					0	0	94	0.580	190
			8.08	40			50	6.1									
			8.09	40			50	6.1									
			5	55			34	6.8					0	0	109	0.675	190
			5	55			36	7.2									
			5	55			36	2.2									
			5	65			41	8.2					0	0	119	0.780	200
			5	65			41	8.2									
			5	65			41	8.2									
			5	55			38	7.6					0	0	108	0.675	190
			5	55			34	6.8									
			5	55			35	7.0									
			5	55			35	7.0									
			5	40			26	5.6					0	0	94	0.552	180
			5	40			29	5.8									
			5	40			27	5.4									
			5	25			21	4.2					0	0	79	0.381	150
			5	25			20.5	4.1									
			5	25			19.0	3.8									
			5	25			19.5	3.9									
19.5.66	135	144'6"	5	20			0.5	0.10	9.5	NIL	132.5 AX Casing	58.2	0	0	78	0.018	7
			5	20			1.0	0.20									
			5	20			0.5	0.10									
			5	45			1.0	0.20					0	0	103	0.017	5
			5	45			0.8	0.16									
			5	45			0.7	0.14									
			5	45			0.7	0.14									
			5	55			1.2	0.24					0	0	113	0.025	6
			5	55			1.3	0.26									
			5	55			1.2	0.24									
			5	70			2.3	0.46					0	0	128	0.046	12
			5	70			2.2	0.44									
			5	70			2.2	0.44									

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Drill Hole WD 9. Sheet 4.																	
19.5.66	135	144'6"	5	55			1.8	0.36	9.5		1325	58.2	0	0	113	0.038	11
			5	55			1.9	0.38			AX						
			5	55			1.8	0.36			Casing						
			5	45			1.5	0.30					0	0	103	0.032	10
			5	45			1.5	0.30									
			5	45			1.5	0.30									
			5	20			1.0	0.20					0	0	78	0.019	4
			5	20			0.8	0.16									
			5	20			0.9	0.18									
21.5.66	144'6"	155'															

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Drill Hole WD 9. Sheet 5.																	
21.5.66	144'6"	155	5	25	614.5	615.7	1.2	0.24	10.5	142	142.5 AX Casing	61.6	0	0	87	0.021	7
			5	25	615.7	616.8	1.1	0.22									
			5	25	616.8	617.8	1.0	0.20									
			5	45	620.0	622.1	2.1	0.42					0	0	107	0.031	9
			5	45	622.1	623.7	1.6	0.32									
			5	45	623.7	625.0	1.3	0.26									
			5	55	627.0	628.8	1.8	0.36					0	0	117	0.036	9
			5	55	628.8	630.8	2.0	0.40									
			5	55	630.8	632.8	2.0	0.40									
			5	75	637.0	641.8	4.8	0.96					0	0	137	0.092	20
			5	75	641.8	646.6	4.8	0.96									
			5	75	646.6	651.5	4.9	0.98									
			5	55	654.0	657.4	3.4	0.68					0	0	117	0.062	17
			5	55	657.4	660.7	3.3	0.66									
			5	55	660.7	663.8	3.1	0.62									
			5	45	665.0	667.7	2.7	0.54					0	0	107	0.050	15
			5	45	667.7	670.3	2.6	0.52									
			5	45	670.3	673.0	2.7	0.54									
			5	25	674.0	675.8	1.8	0.36					0	0	87	0.034	12
			5	25	675.8	677.6	1.8	0.36									
			5	25	677.6	679.4	1.8	0.36									
27.5.66	155	175' 6"	5	30	11.0	14.5	3.5	0.70	20.5	146	153' AX Casing	63.3	0	0	93	0.045	15
			5	30	14.5	17.8	3.3	0.66									
			5	30	17.8	23.6	5.8	1.16									
			5	30	23.6	28.6	5.0	1.00									
			5	30	28.6	34.0	5.0	1.08									
			5	55	43.0	58.5	15.5	3.10					0	0	118	0.138	35
			5	55	58.5	72.5	14.0	2.80									
			5	55	72.5	85.5	13.0	2.60									
			5	75	03.0	18.5	15.5	3.10					0	0	138	0.142	30
			5	75	18.5	32.7	14.2	2.84									
			5	75	32.7	46.7	14.0	2.80									
			5	100	57.0	81.0	24.0	4.80					0	0	163	0.213	40
			5	100	81.0	02.7	21.7	4.34									
			5	100	02.7	24.2	21.5	4.30									
			5	100	24.2	44.2	20.0	4.00									
			5	75	54.0	69.2	15.2	3.04					0	0	138	0.146	30
			5	75	62.2	84.2	15.0	3.00									
			5	75	84.2	99.2	15.0	3.00									
			5	55	19.0	37.5	8.5	1.70					0	0	118	0.083	20
			5	55	27.5	35.7	8.2	1.64									
			5	55	35.7	44.6	8.9	1.78									
			5	30	50.0	57.1	7.1	1.42					0	0	93	0.070	25
			5	30	57.1	64.5	7.4	1.48									
			5	30	64.5	71.5	7.0	1.40									
31.5.66	175'6"	196	5	30	81.0	86.5	5.5	1.10	20.5	165	173' AX Casing	71.6	0	0	102	0.052	16
			5	30	86.5	91.5	5.0	1.00									
			5	30	91.5	96.5	5.0	1.00									
			5	65	19.0	38.6	19.6	3.92					0	0	137	0.181	40
			5	65	38.6	56.2	17.6	3.52									
			5	65	56.2	73.4	17.2	3.44									
			5	65	73.4	90.0	16.6	3.32									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft)	REMARKS Permeability ft/yr
Drill Hole WD 9. Sheet 6.																	
31.5.66	175'6"	196	5	90	700	749	49	9.8	20.5	165	173 AX Casing	71.6	0	0	162	0.443	85
			5	90	749	794	45	9.0									
			5	90	794	838	44	8.8									
			5	90	838	881	43	8.6									
			4.47	115	940	990	50	10.4					0	1	187	0.517	85
			4.36	115	990	40	50	10.9									
			4.46	115	40	90	50	10.4									
			5	90	105	152	47	9.4					0	0	162	0.429	85
			5	90	152	195	43	8.6									
			5	90	195	237	42	8.4									
			5	65	250	283	33	6.6					0	0	137	0.317	70
			5	65	283	315	32	6.4									
			5	65	315	348	33	6.6									
			5	30	355	379	24	4.8					0	0	102	0.229	70
			5	30	379	402	23	4.6									
			5	30	402	425	23	4.6									
2.6.66	196'6"	210	5	35	03.0	15.6	12.6	2.52	13.5	160	194 AX Casing	69.4	0	0	104	0.184	60
			5	35	15.6	27.9	12.3	2.46									
			5	35	27.9	40.4	12.5	2.50									
			2.52	80	560	610	50	17.4					1.1	3.3	145	1.34	300
			2.45	80	610	660	50	18.2									
			2.45	80	660	710	50	18.2									
			2.43	80	710	760	50	18.4									
			2.17	105	820	870	50	21.8					1.5	4.9	168	1.61	300
			2.19	105	870	920	50	21.5									
			2.15	105	920	970	50	22.2									
			1.49	130	00	50	50	27.5					2.4	8.4	189	2.02	350
			1.52	130	50	100	50	26.8									
			1.47	130	100	150	50	28.0									
			2.13	105	170	220	50	22.5					1.7	5.7	167	1.71	300
			2.07	105	220	270	50	23.6									
			2.09	105	270	380	50	23.2									
			2.34	80	350	400	50	19.9					1.4	4.7	144	1.48	300
			2.27	80	400	450	50	20.4									
			2.30	80	450	500	50	20.0									
			3.51	35	585	635	50	13.0					0	1.5	103	0.948	300
			3.54	35	635	685	50	12.8									
			3.58	35	685	735	50	12.6									
3.6.66	210	220'6"	2.04	40	910	960	50	24.2	10.5	160	207.5 AX Casing	69.4	1.9	6	102	2.26	650
			2.08	40	960	10	50	23.4									
			2.06	40	10	60	50	23.8									
			1.03	90	160	210	50	47.6					7.6	32	120	4.73	1200
			0.59	90	210	260	50	50.8									
			0.59	90	260	310	50	50.8									
			0.53	110	360	410	50	56.6					10.4	44	125	5.41	1300
			0.52	110	410	460	50	57.7									
			0.53	110	460	510	50	56.6									
			0.46	140	510	560	50	65.2					13.3	63	133	6.30	1500
			0.45	140	560	610	50	66.7									
			0.45	140	610	660	50	66.7									
			0.50	110	800	850	50	60.0					11.2	50	118.	5.71	1500
			0.51	110	850	900	50	58.8									
			0.49	110	900	950	50	61.2									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft)	SECTION TESTED TO (ft)	TIME OF TEST (min)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m)	LENGTH OF SECTION (ft)	VERTICAL DEPTH STANDING WATER (ft)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft)	REMARKS Permeability ft/yr
Drill Hole WO 9. Sheet 7.																	
3.6.66	210	220'6"	0.56	90	10	60	50	53.5	10.5	160	207.5 AX Casing	69.4	8.7	37	114	5.0	1300
			0.58	90	60	110	50	51.7									
			0.57	90	110	160	50	52.6									
			1.17	40	310	360	50	38.9					4.8	18	87	3.64	1300
			1.20	40	360	410	50	38.5									
			1.18	40	410	460	50	37.4									
7.6.66	220'6"	233'	1.10	40	610	660	50	42.8	12.5	158	218 AX Casing	68.5	6.1	22	80	3.39	1300
			1.12	40	660	710	50	41.6									
			1.10	40	710	760	50	42.8									
			0.50	100	800	850	50	60.0					11.8	50	107	4.80	1300
			0.51	100	850	900	50	58.8									
			0.49	100	900	950	50	61.2									
			0.45	120	990	40	50	66.7					14.6	65	107	5.37	1500
			0.45	120	40	90	50	66.7									
			0.44	120	90	140	50	68.2									
			0.38	150	190	240	50	78.9					19.6	90	109	6.25	1700
			0.39	150	240	290	50	76.9									
			0.38	150	290	340	50	78.9									
			0.41	120	400	450	50	73.1					15.3	70	103	5.58	1700
			0.44	120	450	500	50	68.2									
			0.44	120	500	550	50	68.2									
			0.46	100	610	660	50	65.2					13.7	58	97	5.25	1600
			0.45	100	660	710	50	66.7									
			0.46	100	710	760	50	65.2									
			0.57	40	830	880	50	52.6					9.2	37	62	4.18	2000
			0.57	40	880	930	50	52.6									
			0.50	40	930	980	50	51.7									
9.6.66	243	253	1.18	40	770	820	50	33.4	10	160	240.5 AX Casing	69.4	5.5	18	86	3.81	1400
			1.16	40	820	870	50	39.4									
			1.18	40	870	920	50	37.4									
			0.56	100	975	25	50	53.5					10.3	39	120	5.38	1400
			0.55	100	25	75	50	54.5									
			0.56	100	75	125	50	53.5									
			0.52	120	175	225	50	57.7					11.8	45	133	5.73	1400
			0.52	120	225	275	50	57.7									
			0.53	120	275	325	50	56.6									
			0.48	150	370	420	50	62.4					14.2	58	147	6.38	1300
			0.46	150	420	470	50	65.2									
			0.47	150	470	520	50	63.8									
			0.58	120	550	600	50	51.7					11.1	42	136	5.53	1300
			0.52	120	600	650	50	52.7									
			0.53	120	650	700	50	56.6									
			0.58	100	790	840	50	51.7					9.6	34	126	5.08	1300
			1.00	100	840	890	50	50.0									
			0.59	100	890	940	50	50.8									
			1.21	40	990	40	50	37.0					5.2	16	88	3.68	1300
			1.21	40	40	90	50	37.0									
			1.22	40	90	140	50	36.5									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

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Drill Hole WD9 Sheet 8																	
10.6.66	253	268	1.55	40	240	290	50	26.0	10	160	250.5	69.4	2.9	7.6	99	2.63	900
			1.53	40	290	340	50	26.5			AX						
			1.53	40	340	390	50	26.5			Casing						
			1.05	100	430	480	50	46.1					8.3	28	133	46.7	1100
			1.05	100	480	530	50	46.1									
			1.04	100	530	580	50	46.9									
			0.58	120	600	650	50	51.7					9.8	35	145	5.08	1100
			1.00	120	650	700	50	50.0									
			0.59	120	700	750	50	50.8									
			0.55	150	775	925	50	54.5					11.5	41	167	5.52	1000
			0.53	150	825	875	50	56.6									
			0.55	150	875	925	50	54.6									
			1.02	120	960	10	50	48.4					9.0	32	148	4.86	1000
			1.01	120	10	60	50	49.1									
			1.02	120	60	110	50	48.4									
			1.10	100	140	190	50	42.8					7.0	23	139	4.26	900
			1.10	100	190	240	50	42.8									
			1.11	100	240	290	50	42.2									
			1.57	40	320	320	50	25.6					2.6	7.2	100	2.56	750
			1.56	40	320	420	50	25.9									
			1.58	40	420	470	50	25.4									
14.6.66	263	273	0.57	40	645	695	50	52.6	10	160	260.5	69.4	10.4	34	65	5.20	2500
			0.58	40	695	745	50	51.7			AX						
			0.58	40	745	795	50	51.7			Casing						
			0.44	100	850	900	50	68.2					17.2	66	86	6.77	2500
			0.45	100	900	950	50	66.6									
			0.44	100	950	00	50	68.2									
			0.42	120	65	115	50	71.4					20.4	80	89	7.31	2500
			0.40	120	115	165	50	74.9									
			0.41	120	165	215	50	73.1									
			0.38	150	260	310	50	78.9					24.3	100	95	8.07	2600
			0.37	150	310	360	50	81.6									
			0.37	150	360	410	50	81.6									
			0.43	120	445	495	50	69.7					18.8	71	100	7.03	2700
			0.43	120	495	545	50	69.7									
			0.42	120	545	595	50	71.4									
			0.47	100	690	730	50	63.7					15.4	56	98	6.33	2000
			0.47	100	730	780	50	63.7									
			0.48	100	780	830	50	62.5									
			1.06	40	875	925	50	45.4					8.1	26	75	4.48	1800
			1.04	40	925	975	50	46.9									
			1.05	40	975	25	50	46.1									
15.6.66	273	283							10	158	270.5						
											AX						
											Casing						

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft)	REMARKS Permeability ft/yr
Drill Hole. WO 9 Sheet 9.																	
15.6.66	273	283	5	40	145.0	157.0	12	2.4	10	158	270.5 AX Casing	68.5	0	0	109	0.225	65
			5	40	157.0	168.2	11.2	2.24									
			5	40	168.2	179.3	11.1	2.22									
			5	40	179.3	189.9	10.6	2.12									
			5	100	200.0	219.9	19.9	3.98					0	0	169	0.360	65
			5	100	219.9	237.7	17.8	3.56									
			5	100	237.7	254.8	17.1	3.42									
			5	100	254.8	271.9	17.1	3.42									
			5	120	281.5	305.6	24.1	4.82					0	0	189	0.458	75
			5	120	305.6	328.9	33.3	4.66									
			5	120	328.9	351.4	22.5	4.50									
			5	120	351.4	373.0	21.6	4.32									
			5	150	245	283	38	7.6					0	0	219	0.710	100
			5	150	283	315	32	6.4									
			5	150	315	352	37	7.4									
			5	150	352	386	34	6.8									
			5	120	441.0	468.5	275	5.5					0	0	189	0.535	90
			5	120	468.5	494.9	26.4	5.28									
			5	120	494.9	521.2	26.3	5.26									
			5	100	527.5	551.4	23.9	4.78					0	0	169	0.469	90
			5	100	551.4	575.0	23.6	4.72									
			5	100	575.0	597.9	22.9	4.58									
			5	40	602.0	618.4	16.4	3.28					0	0	109	0.319	90
			5	40	618.4	634.1	15.7	3.14									
			5	40	634.1	649.8	15.7	3.14									
21.6.66	296	308	1.43	40	490	540	50	29.1	12	156	293.5 AX Casing	67.7	3.8	56	48	2.38	1500 B Mechanical Packer
			1.45	40	540	590	50	28.5									
			1.46	40	590	640	50	28.3									
			1.02	100	675	725	50	48.4					10.6	1.20	37	4.05	3500
			1.01	100	725	775	50	49.1									
			1.02	100	775	825	50	48.4									
			0.57	120	880	930	50	52.6					12.9	14.0	35	4.49	4000
			0.55	120	930	980	50	54.5									
			0.55	120	980	30	50	54.5									
			0.50	150	30	130	50	60.0					15.9	165	37	5.50	4500
			0.50	150	130	180	50	60.0									
			0.50	150	180	230	50	60.0									
			0.6	120	275	325	50	53.5					13.5	145	29	4.57	5000
			0.54	120	325	375	50	55.5									
			0.54	120	375	425	50	55.5									
			1.00	100	420	520	50	50.0					11.5	130	26	4.21	5000
			0.58	100	520	570	50	51.7									
			1.00	100	570	620	50	50.0									
			1.20	40	650	700	50	38.5					6.4	83	18	3.15	5500
			1.19	40	700	750	50	37.9									
			1.21	40	750	800	50	37.0									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft)	REMARKS
Drill Hole WD 9. Sheet 10																	
22.6.66	308'	320	3.42	40	920	970	50	13.5	12	166	305.5 AX Casing	67.7	1.3	25	81	1.34	500 B Mechanical Packer
			4.07	40	970	20	50	12.1									
			4.20	40	20	70	50	11.5									
			4.25	40	70	120	50	11.3									
			2.08	100	200	250	50	23.4					2.7	42	123	1.95	500
			2.10	100	250	300	50	23.0									
			2.06	100	300	350	50	23.8									
			1.56	120	400	460	50	25.9					4.7	49	134	2.17	500
			1.55	120	450	500	50	26.0									
			1.55	120	500	550	50	26.0									
			1.28	150	600	650	50	34.1					5.9	74	128	2.87	650
			1.28	150	650	700	50	34.1									
			1.25	150	700	780	50	35.3									
			1.30	120	800	850	50	33.3					6.4	70	112	2.76	750
			1.31	120	850	900	50	32.9									
			1.30	120	900	950	50	33.3									
			2.07	100	10	60	50	23.6					2.4	38	127	1.83	500
			2.20	100	60	110	50	21.4									
			2.18	100	110	160	50	21.7									
			2.21	100	160	210	50	21.2									
			3.31	40	250	300	50	14.2					0	17	91	1.06	350'
			3.45	40	300	350	50	13.3									
			4.09	40	750	400	50	12.0									
			4.04	40	400	450	50	12.2									
			4.10	40	450	500	50	12.0									
	320	330	1.37	40			50	30.9	10	158	317.5 AX Casing	68.6	4.8	62	42	3.08	2300 B Mechanical Packer
			1.37	40			50	30.9									
			1.38	40			50	30.6									
			1.13	100			50	41.1					8.2	96	64	4.13	2000
			1.12	100			50	41.7									
			1.13	100			50	41.1									
			1.08	120			50	44.2					9.8	105	74	4.48	1900
			1.06	120			50	45.5									
			1.07	120			50	44.8									
			1.02	150			50	48.4					11.4	125	82	4.89	1900
			1.00	150			50	50.0									
			1.02	150			50	48.4									
			1.09	120			50	43.5					9.5	105	74	4.39	1900
			1.07	120			50	44.8									
			1.09	120			50	43.5									
			1.12	100			50	41.7					8.2	96	64	4.13	2000
			1.14	100			50	40.5									
			1.12	100			50	41.7									
			1.33	40			50	32.1					4.8	60	44	3.03	2200
			1.40	40			50	30.0									
			1.41	40			50	29.9									
			1.43	40			50	29.1									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS
Drill Hole WD 9. Sheet 11																	
	330	340	1.14	40			50	40.5	10	160	327.5	69.5	8.2	95	6	4.09	22,000
			1.13	40			50	41.1			AX						B Mechanical Packer
			1.13	40			50	41.1			Casing						
			0.51	100			50	58.8					16.5	160	-7	5.88	
			0.52	100			50	57.7									
			0.50	100			50	60.0									
			0.47	120			50	63.8					18.7	175	-4	6.29	
			0.49	120			50	61.2									
			0.47	120			50	63.8									
			0.44	150			50	68.2					22.2	195	2	6.87	> 100,000
			0.43	150			50	69.7									
			0.44	150			50	68.2									
			0.50	120			50	60.0					17.5	170	2	6.08	100,000
			0.48	120			50	62.5									
			0.50	120			50	60.0									
			0.53	100			50	56.6					15.2	150	4	5.66	45,000
			0.53	100			50	56.6									
			0.53	100			50	56.6									
			1.08	40			50	44.2					9.5	105	-5	4.40	
			1.08	40			50	44.2									
			1.09	40			50	43.5									
6.7.66	350	360	1.12	40			50	41.7	10	154	347.5	66.9	10.7	105	9	4.42	
			1.06	40			50	45.5			AX						
			1.10	40			50	42.8			Casing						
			1.00	100			50	50.0					13.9	150	23	5.18	7000
			0.56	100			50	53.6									
			0.58	100			50	51.7									
			0.58	120			50	51.7					15.6	145	26	5.46	7000
			0.54	120			50	55.6									
			0.53	120			50	56.6									
			0.51	150			50	58.8					17.7	160	39	5.80	4500
			0.48	150			50	62.5									
			0.57	150			50	52.6									
			0.51	120			50	58.8					17.0	155	15	5.70	12,000
			0.52	120			50	57.7									
			0.55	120			50	54.6									
			0.56	100			50	53.6					14.2	135	18	5.21	9,000
			0.58	100			50	51.7									
			0.59	100			50	50.9									
			1.14	40			50	40.5					90	95	3	4.07	40,000
			1.14	40			50	40.5									
			1.13	40			50	41.1									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	SECTION TESTED TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	WATER METER READINGS FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	FRICTION LOSSES PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS
Drill Hole WD 9. Sheet 12.																	
9.5.66	94	104	5	60			54	10.8	10	Nil	91	41	0	1	100	1.08	350
			5	60			59	11.8			AX		0	1	100	1.18	350
			5	60			58	11.6			Casing		0	1	100	1.16	350
			5	60			59	11.8					0	1	100	1.18	350
			5	60			62	12.4					0	1	100	1.24	400
			5	60			62	12.4					0	1	100	1.24	400
			5	60			65	13.0					0	1	100	1.30	400
			5	60			66	13.2					0	2	99	1.32	400
			5	60			67	13.4					0	2	99	1.34	400
			5	60			68	13.6					0	2	99	1.36	450
			5	60			66	13.2					0	2	99	1.32	400
			5	60			66	13.2					0	2	99	1.32	400
			5	60			66	13.2					0	2	99	1.32	N Mechanical Packer

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

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Drill Hole, WD 10.					Location, Traverse T4, Peg 15						R.L., ≐ 300 ft.			Angle from Horizontal, -55°.			
Packer, N Mechanical.					Supply Line, AX Casing						Water Supply, Coventry Climax Pump					Direction, 295° Mag.	
30.6.66	110	120	5	100			9.5	1.90	10	75	107.5	32.6	0	0	133	0.199	50
			5	100			10.0	2.00	1.99		AX						
			5	100			10.1	2.02			Casing						
			5	100			10.1	2.02									
			5	130			18.1	3.62	3.59				0	0	163	0.359	50
			6	130			17.2	3.44									
			5	130			17.0	3.40									
			5	130			19.5	3.90									
			5	150			26.0	5.20	5.16				0	0	183	0.516	90
			5	150			25.3	5.06									
			5	150			25.7	5.14									
			5	150			26.1	5.22									
			5	130			21.3	4.26	4.10				0	0	163	0.410	80
			5	130			20.5	4.10									
			5	130			20.0	4.00									
			5	130			20.1	4.02									
			5	100			15.2	3.04	2.91				0	0	130	0.291	70
			5	100			14.5	2.90									
			5	100			14.4	2.88									
			5	100			14.0	2.80									
6.7.66	120	130	5	25			62	12.4	10	78	117.5	33.8	0	1.5	57	1.29	700
			5	25			63	12.6	12.9		AX						
			5	25			66	13.2			Casing						
			5	25			67	13.4									
			5	50			115	23.0	22.0				0	5	79	2.20	850
			5	50			110	22.0									
			5	50			105	21.0									
			1.39	65			50	30.3	32.5				20	12.5	84	3.25	1200
			1.29	65			50	33.7									
			1.29	65			50	33.7									
			1.33	65			50	32.3									
			1.10	80			50	42.8	43.1				3.3	24	87	4.31	1500
			1.10	80			50	42.8									
			1.10	80			50	42.8									
			1.08	80			50	44.1									
			1.24	65			50	35.7	37.8				2.6	17.5	79	3.78	1500
			1.15	65			50	40.0									
			1.20	65			50	37.5									
			1.19	65			50	38.0									
			1.43	50			50	29.1	30.1				1.7	10.5	72	3.01	1300
			1.43	50			50	29.1									
			1.37	50			50	30.9									
			1.36	50			50	31.2									
			2.10	25			50	23.0	22.6				0	5.3	54	2.26	1300
			2.04	25			50	24.2									
			2.10	25			50	23.0									
			2.30	25			50	20.0									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

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Drill Hole WD 10, Sheet 2.																	
8.7.66	130	140	5	20	670	700	30	6.0	10	NIL	127.5	45.1	0	0	65	0.55	250
			5	20	700	730	30	6.0			AX						
			5	20	730	755	25	5.0			Casing						
			5	20	755	780	25	5.0									
			5	45	800	945	145	29.0	28.3				1.7	9.1	79	2.83	1100
			1.47	45	950	00	50	28.0									
			2.00	45	00	50	50	25.0									
			1.36	45	50	100	50	31.2									
			1.32	55	200	250	50	32.6	34.5				2.4	14	84	3.45	1300
			1.22	55	250	300	50	36.5									
			1.23	55	300	350	50	36.1									
			1.31	55	350	400	50	32.9									
			1.12	70	450	500	50	38.9	40.5				3.3	20.5	91	4.05	1400
			1.14	70	500	550	50	40.5									
			1.13	70	550	600	50	41.0									
			1.12	70	600	650	50	41.6									
			1.19	55	750	800	50	37.9	37.9				2.9	17.5	80	3.79	1500
			1.17	55	800	850	50	38.9									
			1.17	55	850	900	50	38.9									
			1.23	55	900	950	50	36.1									
			1.32	45	00	50	50	32.6	32.3				2.2	12.5	75	3.23	1300
			1.33	45	50	100	50	32.2									
			1.32	45	100	150	50	32.6									
			1.34	45	150	200	50	31.9									
			5	20	250	365	115	23.0	21.2				1.0	4.7	59	2.12	1100
			5	20	365	470	105	21.0									
			5	20	470	575	105	21.0									
			5	20	575	675	100	20.0									
12.7.66	140	150	5	20	0	0	0	0	10	NIL	137	48.6	0	0	69	0	0
			5	50	730	745	15	3	4.5		AX		0	0	99	0.45	140
			5	50	745	765	20	4			Casing						
			5	50	765	790	25	5									
			5	50	700	820	30	6									
			5	65	860	890	30	6	6.8				0	0	114	0.68	180
			5	65	890	925	35	7									
			5	65	925	960	35	7									
			5	65	960	995	35	7									
			3.52	80	00	50	50	12.9	14.2				0	1.9	127	1.42	350
			3.32	80	50	100	50	14.1									
			3.28	80	100	150	50	14.4									
			3.16	80	150	200	50	15.3									
			5	65	270	315	45	9	8.0				0	0	114	0.80	250
			5	65	315	355	40	9									
			5	65	355	300	35	7									
			5	65	390	425	35	7									
			5	50	430	450	20	4	4.0				0	0	99	0.40	120
			5	50	450	470	20	4									
			5	50	470	495	25	5									
			5	50	495	510	15	3									
			5	25	515	520	5	1	1.0				0	0	74	0.10	50
			5	25	520	525	5	1									
			5	25	525	530	5	1									

BUREAU OF MINERAL RESOURCES

WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft.)	TO (ft.)	TIME OF TEST (min.)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr
Drill Hole WD 10 Sheet 3.																	
13.7.66	150	160	1.05	25	850	900	50	46.1	10	NIL	147 AX Casing	52.5	49	28	45	4.66	3000
			1.04	25	900	950	50	46.9	46.6								
			1.04	25	950	00	50	46.9									
			0.54	50	220	270	50	65.5	53.6				6.3	38	58	5.36	3000
			0.56	50	270	320	50	53.5									
			0.58	50	320	370	50	51.7									
			0.56	65	400	450	50	53.5	53.9				6.5	38	73	5.39	2500
			0.57	65	450	500	50	52.6									
			0.54	65	500	550	50	55.5									
			0.52	80	590	640	50	67.7	60.3				7.9	50	75	6.03	2500
			0.50	80	640	690	50	60.0									
			0.49	80	690	740	50	61.2									
			0.48	80	740	790	50	62.4									
			0.49	65	840	890	50	61.2	59.7				7.6	50	60	5.97	3000
			0.50	65	890	940	50	60.0									
			0.52	65	940	990	50	57.7									
			0.51	65	990	40	50	58.8									
			0.48	50	70	120	50	62.4	55.3				6.8	42	54	5.53	3000
			0.58	50	120	170	50	51.7									
			0.56	50	170	220	50	53.5									
			0.56	50	220	270	50	53.5									
			1.15	25	310	360	50	40.0	39.9				3.7	19.5	54	3.99	2500
			1.17	25	360	410	50	38.9									
			1.17	25	410	460	50	38.9									
			1.12	25	460	510	50	41.6									
15.7.66	164'8"	175'2"	5	25	373	399	26	5.2	10.5	NIL	162 AX Casing	57.7	0	0	83	0.50	190
			5	25	399	426	27	5.4	5.2								
			5	25	426	451	25	5.0									
			5	25	451	476	25	5.0									
			3.30	50	960	10	50	14.2	15.3				0	2.2	106	1.45	400
			3.14	50	10	60	50	15.4									
			3.12	50	60	110	50	15.6									
			3.06	50	110	160	50	16.1									
			1.57	70	190	240	50	25.6	24.9				1.6	6.2	120	2.37	600
			2.01	70	240	290	50	24.8									
			2.02	70	290	340	50	24.5									
			2.02	70	340	390	50	24.5									
			1.29	90	420	470	50	33.7	34.5				3.2	14	131	3.28	750
			1.25	90	470	520	50	35.3									
			1.28	90	520	570	50	34.1									
			1.26	90	570	620	50	34.9									
			1.47	70	650	700	50	28.0	28.8				2.2	9.4	116	2.74	700
			1.41	70	700	750	50	29.7									
			1.44	70	750	800	50	28.8									
			1.44	70	800	850	50	28.8									
			2.13	50	870	920	50	22.5	22.3				1.3	5.2	101	2.12	650
			2.13	50	920	970	50	22.5									
			2.16	50	970	20	50	22.0									
			3.18	25	120	170	50	15.1									
			3.28	25	170	220	50	14.4					0	2	81	1.40	550
			3.20	25	220	270	50	15.0									
			3.26	25	270	320	50	14.6									

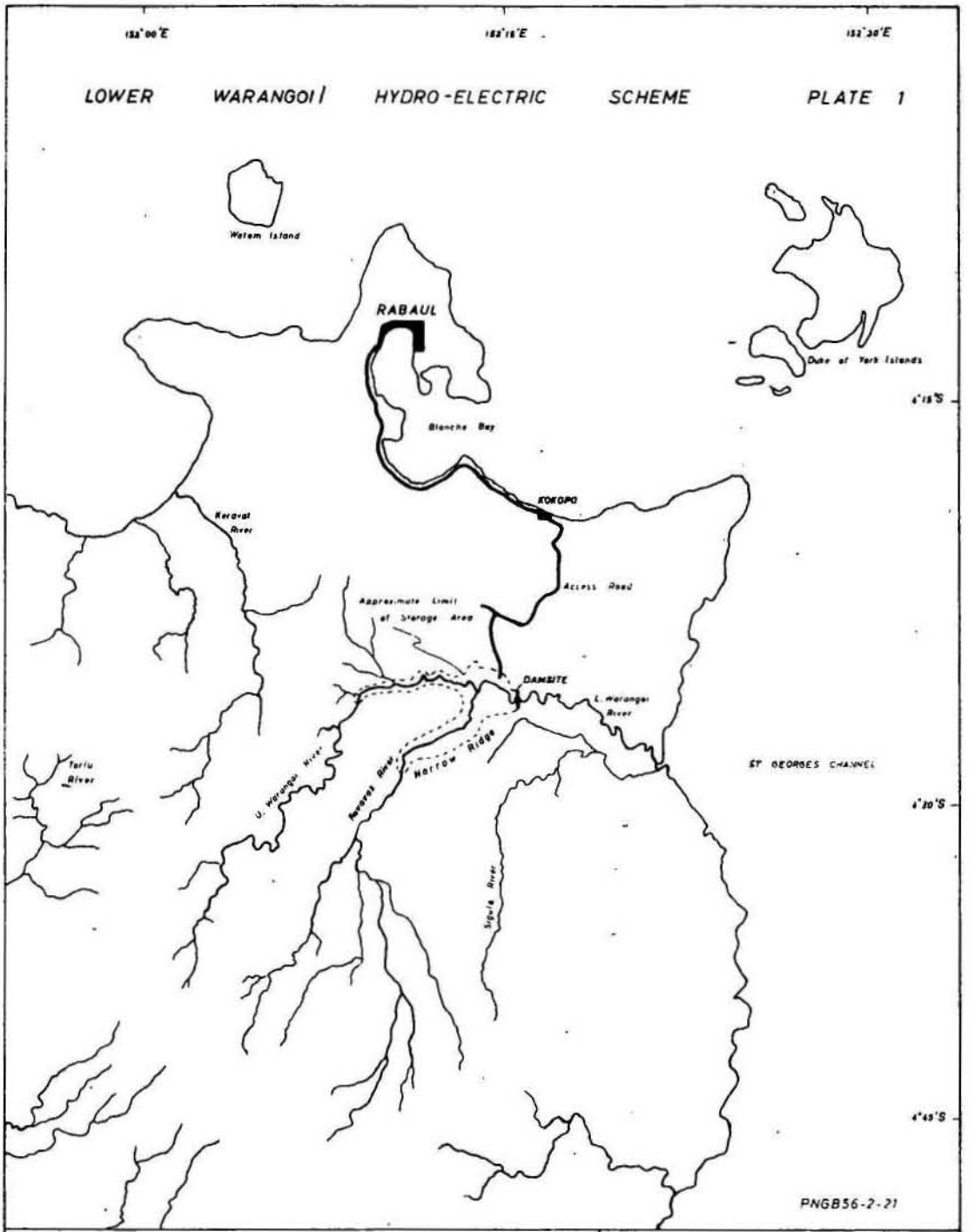
BUREAU OF MINERAL RESOURCES

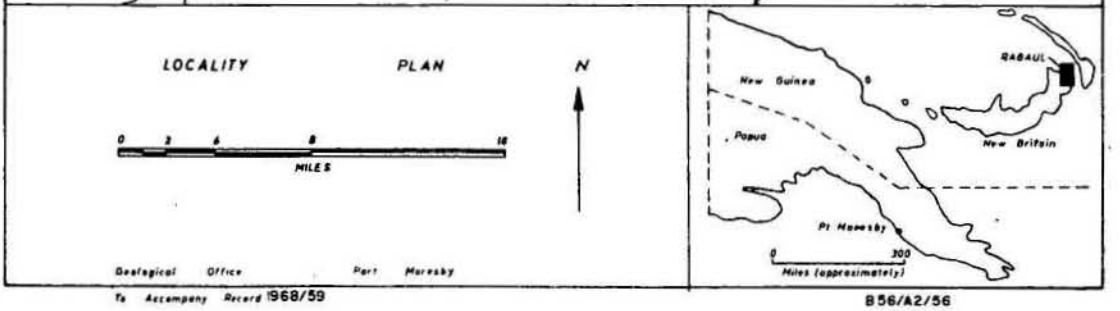
WARANGOI HYDRO ELECTRIC

WATER PRESSURE TEST RESULTS

DATE	SECTION TESTED FROM (ft)	TO (ft)	TIME OF TEST (min)	GAUGE PRESSURE (p.s.i.)	WATER METER READINGS START (gallons)	FINISH (gallons)	WATER LOSS (gallons)	LEAKAGE RATE (g.p.m.)	LENGTH OF SECTION (ft.)	VERTICAL DEPTH STANDING WATER (ft.)	LENGTH & SIZE OF SUPPLY LINE	WATER COLUMN PRESSURE (p.s.i.)	FRICTION LOSSES SUPPLY LINE (p.s.i.)	PACKER (p.s.i.)	EFFECTIVE TEST PRESSURE (p.s.i.)	WATER LOSS (g.p.m. per ft.)	REMARKS Permeability ft/yr.
Drill Hole WD 10 Sheet 4.																	
18.7.66	185	195	1.35	30	560	610	50	31.6	10	NIL	180' AX Casing	65.6	2.5	9.5	84	2.90	1100
			1.44	30	610	660	50	28.8	29.0								
			1.49	30	660	710	50	27.6									
			1.48	30	710	770	50	27.8									
			1.23	55	780	830	50	36.2	38.5				4.3	18	98	3.85	1200
			1.13	55	830	880	50	41.1									
			1.17	55	880	930	50	39.0									
			1.20	55	930	980	50	37.5									
			1.11	75	10	60	50	42.3	41.5				4.8	22	114	4.15	1200
			1.09	75	60	110	50	43.5									
			1.16	75	110	160	50	39.5									
			1.14	75	160	210	50	40.6									
			0.53	100	250	300	50	56.6	52.6				7.6	37	121	5.26	1300
			0.56	100	300	350	50	53.6									
			1.00	100	350	400	50	50.0									
			1.00	100	400	450	50	50.0									
			1.07	75	470	520	50	44.8	38.1				4.2	18	118	3.81	1000
			1.40	75	520	570	50	30.0									
			1.17	75	570	620	50	39.0									
			1.18	75	620	670	50	38.4									
			1.27	55	740	790	50	34.4	33.7				3.3	13.5	104	3.37	1000
			1.29	55	790	840	50	33.7									
			1.31	55	840	890	50	33.0									
			1.50	30	00	50	50	27.3	28.0				2.4	8.8	84	2.80	1100
			1.47	30	50	100	50	28.1									
			1.45	30	100	150	50	28.6									
25.7.66	193	203	0.51	30	340	380	50	59.8	10	NIL	190 AX Casing	68.6	8.7	42	48	5.57	3500
			0.55	30	390	440	50	54.6	55.7								
			0.56	30	440	490	50	53.6									
			0.55	30	490	540	50	54.6									
			0.47	55	570	620	50	63.8	62.1				11.0	55	58	6.21	3000
			0.49	55	623	670	50	61.2									
			0.49	55	670	720	50	61.2									
			0.42	75	800	850	50	71.5	73.3				14.8	78	51	7.33	4500
			0.39	75	850	900	50	76.9									
			0.42	75	900	950	50	71.5									
			0.42	100	00	50	50	71.5	75.1				15.8	84	69	7.51	3500
			0.39	100	50	100	50	76.9									
			0.39	100	100	150	50	76.9									
			0.48	75	250	300	50	67.5	65.8				12.2	61	70	6.58	3000
			0.45	75	300	350	50	66.7									
			0.44	75	350	400	50	68.2									
			0.49	55	650	700	50	61.2	64.4				11.6	59	53	6.44	3500
			0.45	55	700	750	50	66.7									
			0.46	55	750	800	50	65.2									
			0.54	30	900	950	50	55.6	57.1				9.3	45	44	5.71	400
			0.50	30	950	00	50	60.0									
			0.54	30	00	50	50	55.6									

LOWER WARANGOI HYDRO-ELECTRIC SCHEME PLATE 1





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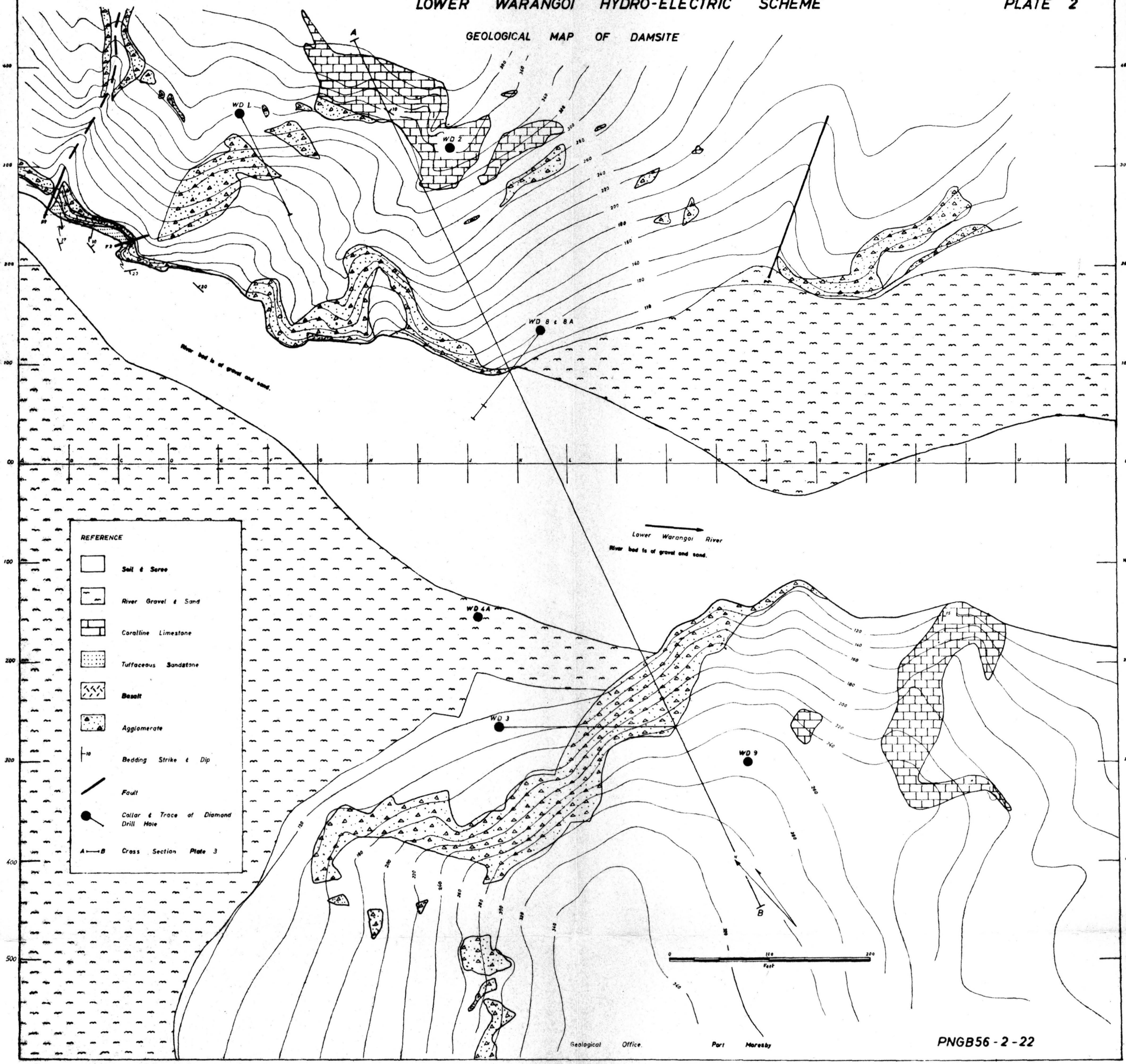
LOWER WARANGOI HYDRO-ELECTRIC SCHEME

PLATE 2

GEOLOGICAL MAP OF DAMSITE



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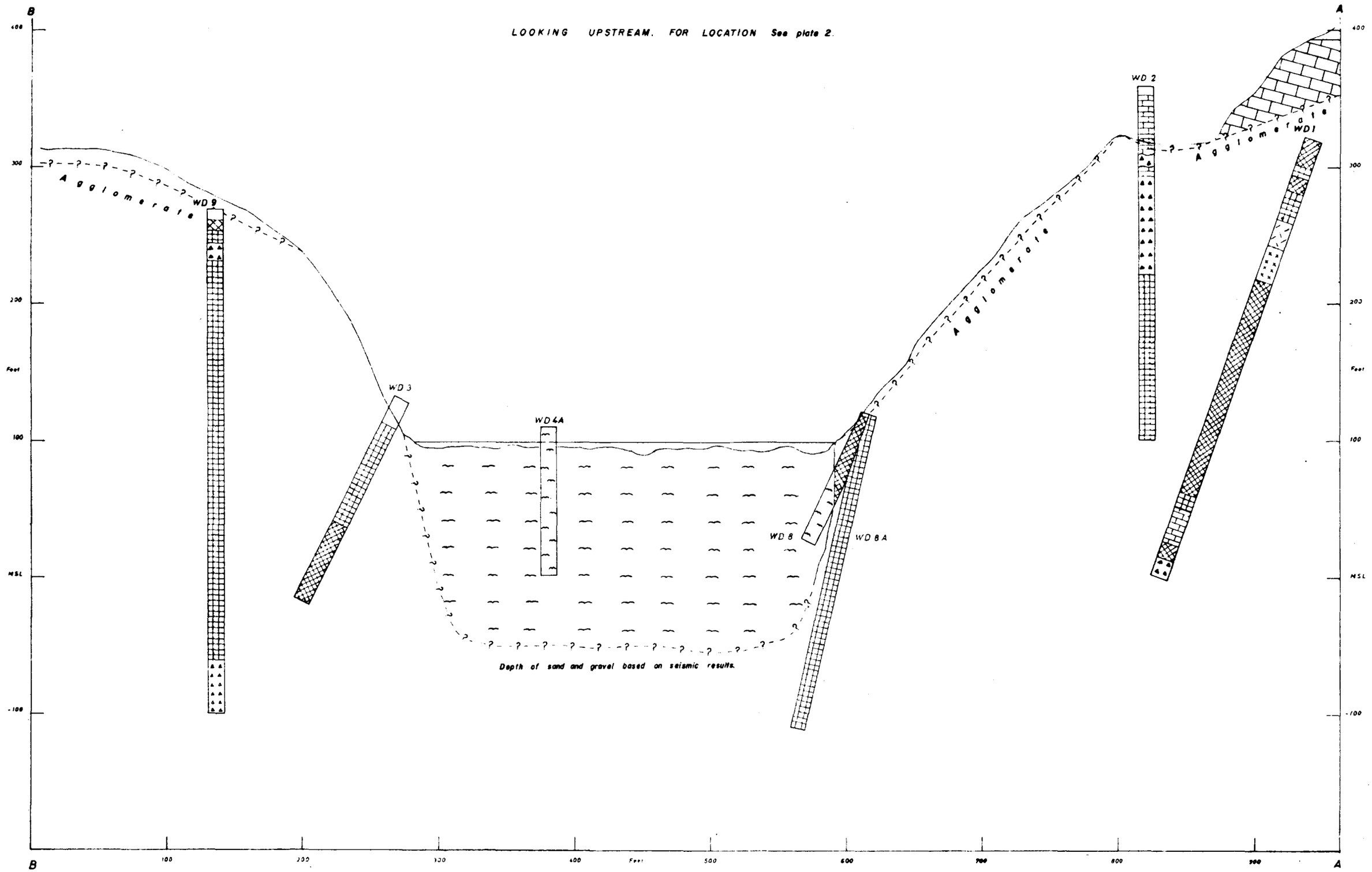
LOWER WARANGOI HYDRO-ELECTRIC SCHEME

PLATE 3

VERTICAL GEOLOGICAL SECTION ALONG AXIS OF PROPOSED DAM

LOOKING UPSTREAM. FOR LOCATION See plate 2.



Soil and Scree

River Sand and Gravel

Andesite

Limestone and Agglomerate

Limestone

Inferred Geological Boundary, position approximate.

Agglomerate Fresh to Slightly Weathered

Agglomerate Slightly to Moderately Weathered

Agglomerate Moderately to Highly Weathered

Agglomerate Highly to Completely Weathered

Diamond drill holes WD1 WD2 WD8A WD8 WD4A WD3 and WD9 are projected to centre line of section

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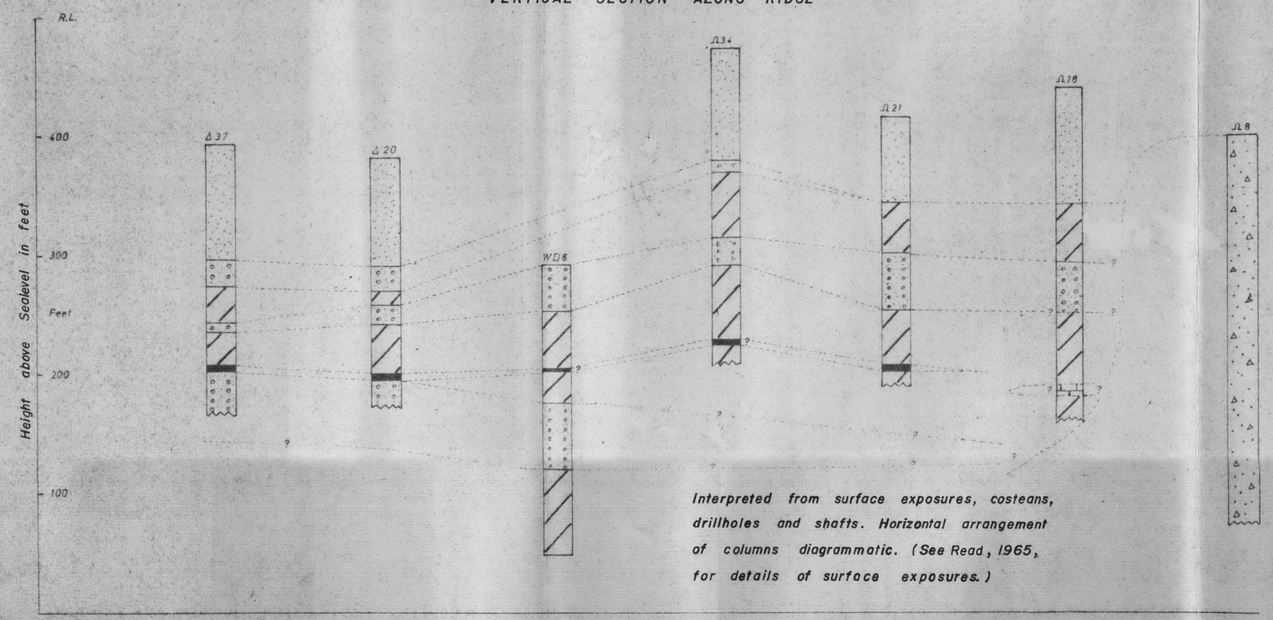
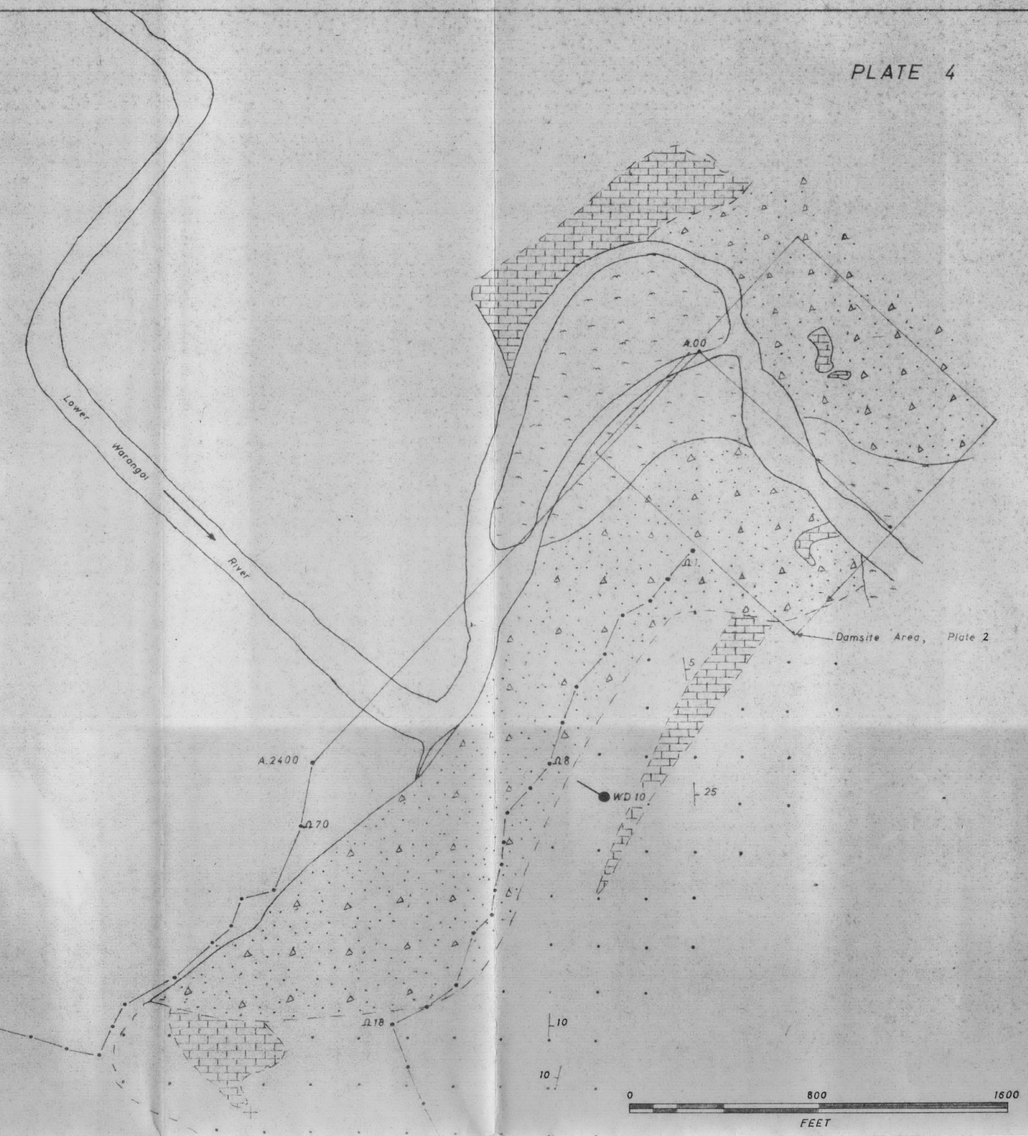
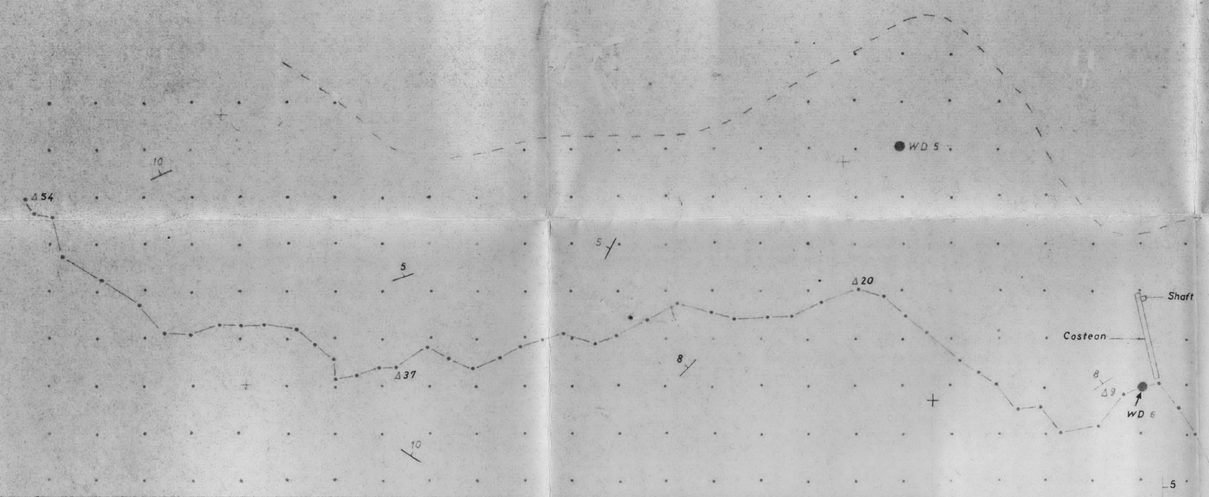
LOWER WARANGOI HYDRO-ELECTRIC SCHEME

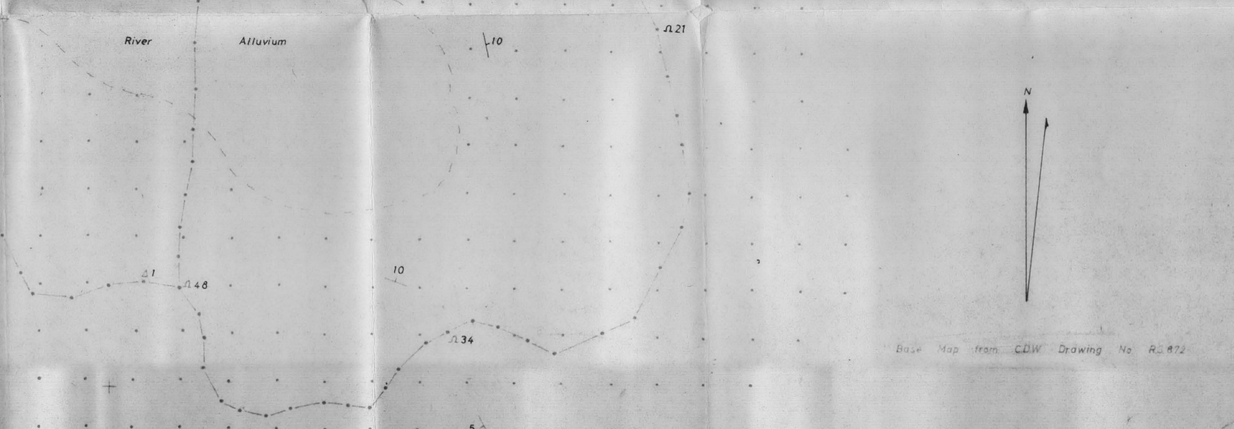
PLATE 4

GEOLOGY, WITH DIAGRAMMATIC SECTION, OF SOUTHERN RIDGE









Base Map from C.D.W. Drawing No. RΩ 972

REFERENCE

- Clastic Ridge Sediments. See section and key for details.
- Silty & Sandy Claystone, ?CL.
- Sandstone & Conglomerate, SP-SM, GP-GW.
- Blue Mudstone, CH, with interbeds of Sandy & Silty Claystone, SC-CL.
- Shell Bed.
- Coralline Limestone.
- Agglomerate.
- Bedding, Horizontal.
- 10 Bedding, Strike & Dip.
- Collar & Trace of Diamond Drill Hole.
- Δ54 Ω1 C.D.W. Survey Line.

Geological Office, Port Moresby.
To Accompany Record 1968/59.

PNGB56-2-24

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