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GEOLOGICAL REPORT ON THE
 SURFACE PENSTOCK ROUTE AND THE No. 2 POWER STATION SITE
 PORT MORESBY HYDRO-ELECTRIC SCHEME

by

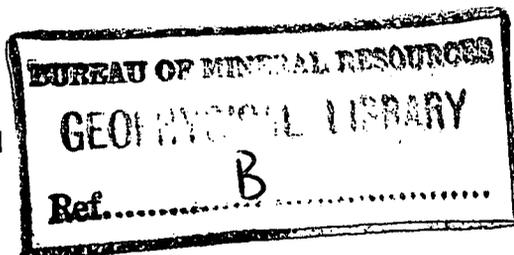
H. L. DAVIES.



The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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GEOLOGICAL REPORT ON THE

SURFACE PENSTOCK ROUTE AND THE No.2 POWER STATION SITE

PORT MORESBY HYDRO-ELECTRIC SCHEME

by

H. L. Davies.

SUMMARY

Water is to be conveyed from the projected Sogeri Dam, about half a mile above Rouna Falls, to the projected Power Station No.2 at the foot of the falls. One proposal is that a low-pressure penstock should be laid from the dam to a surge tank near the head of the falls, and a high-pressure penstock convey the water from this point to the power station.

The rocks are volcanic agglomerate, a few tuffs, and basal conglomerate, all part of the Astrolabe Agglomerate. They are flat-lying and undisturbed, except for jointing and one instance of minor shearing. The agglomerate and conglomerate are generally competent, but the tuff which marks the conglomerate-agglomerate transition is probably weak and incompetent.

Investigation has centred on the high-pressure penstock route and power station site, and has involved outcrop mapping and seventeen diamond drill holes. The main problem on the penstock route is the upper scree slope, where boulders and rubble are up to thirty feet deep. The best route appears to be a direct one from near peg T8 over hole P5 to the power station.

Power station foundations appear to be sound.

Alternative routes for the low-pressure penstock are at present being investigated.

Three or four shallow diamond drill holes will be needed at a later date.

INTRODUCTION

Water is to be conducted from the projected Sogeri Dam, about half a mile upstream from Rouna Falls, to the projected Power Station No.2, at the foot of the falls. One proposal is that a low-pressure penstock be laid from the dam to near the head of the falls, and a high-pressure penstock convey the water from this point to the power station.

The proposed penstocks will probably consist of two pipes, one of six feet and one of seven feet diameter. The approximate lengths of the two penstocks are :

low-pressure penstock : 2700 feet,

high-pressure penstock: 700 feet.

The high-pressure penstock will have anchor-blocks at 300 - 400-foot intervals and at any points of change in grade or alignment. In addition there will be rocker supports at about 30 feet intervals.

Alternative routes for the low-pressure penstock are at present being surveyed. Routes for the high-pressure penstock have been investigated by outcrop mapping and 355 feet of diamond drilling in nine holes numbered P1 to P9. The power station site has been investigated by outcrop mapping and 1011 feet of diamond drilling in eight holes numbered R8 to R15. Drill hole sites were selected by Mr. J.R.Brett of the Commonwealth Department of Works

and cores were logged by the writer. Drilling on the power station site was carried out by Messrs. V. Hiltunen and J. Allis, of the Commonwealth Department of Works, using Mindrill E1000 plant. The penstock holes were drilled by Nova Karavita, of the Department of Lands, Surveys and Mines, using a light-weight Hands-England plant.

GEOLOGY

The rocks exposed are volcanic agglomerate, some tuff, and basal conglomerate, all part of the Astrolabe Agglomerate formation. The beds are flat-lying and generally undisturbed except for strong near-vertical joints and one minor shear.

The conglomerate crops out from below the intake for the present hydro scheme (R.L. 921') to about R.L. 1060'. The component boulders are predominantly basalt, dolerite, and andesite, with rare boulders of schist and quartz. At about R.L. 1060' the conglomerate is overlain by tuff which ranges in thickness from three to ten feet and contains a few volcanic boulders. This grades upwards into volcanic agglomerate, which consists of angular boulders of basalt, dolerite, and andesite, in an unsorted tuff matrix. Thin tuff beds, which occur at three to six foot intervals throughout the agglomerate, probably mark the tops of individual beds of agglomerate. The basalt, dolerite, and andesite commonly show small phenocrysts of augite, and some of the boulders are moderately vesicular (up to 20%).

The section is :

| | |
|--------------------------------|---|
| R.L. 2000' (+) | Volcanic agglomerate with thin tuff beds |
| R.L. 1060' approx. ----- | Tuff, three to ten feet thick |
| R.L. 1050'-1057' approx. ----- | Volcanic conglomerate with rare schist components |
| R.L. 921' (-) ----- | Unconformity |

Structure

A shear zone is exposed in the cliff above survey peg D8. Movement probably did not exceed a few feet but has resulted in several zones, up to two feet wide, of brecciated and stretched agglomerate. The zone strikes at 070° and appears to align with valleys to east and west; it may therefore persist for more than 2,000 feet. It is about 40 feet wide.

Vertical jointing is very marked; most is probably due to regional stress after lithification. Sub-horizontal joints, and some vertical joints, are probably due to the relief of stress near the cliff faces. Horizontal joint-like partings are generally due to the weathering and erosion of thin tuff beds.

ENGINEERING GEOLOGY

Low-Pressure Penstock

The route along the left bank of the Laloki River is about 400 feet longer than the route along the right bank, owing to a bend in the river course and the entry of a major tributary, Elliots Creek. Length is an important factor as the pipe will cost approximately £100 per foot.

Other objections to the left bank route are (a) the lack of outcrop between Elliots Creek and the falls, and (b) the need for a tunnel or deep cut through the ridge of solid rock which flanks the head of the falls on the left bank.

The route along the right bank is at present being investigated. If this route is selected it will be necessary to bridge the river at the head of the falls.

From the head of the falls the penstock will run approximately 700 feet west-south-west to a surge tank near peg T8. Construction of this section should be quite simple as there is a fairly flat sloping surface with probably not more than ten feet of soil cover.

High-Pressure Penstock

The most direct route is a line from near peg T8 to the power station site, and the investigation has been concentrated in this area.

The main topographic features are the three cliff faces, upper (near T8), central (below T13), and lower (from the foot-track to the Laloki River). These are separated by scree slopes.

The lower cliff extends from R.L.921' to R.L.1029' and is composed of volcanic conglomerate which drilling has shown to be sound and stable, except for a few small lenses of fine-grained sediments.

There is a low-angle scree slope of boulders and rubble between the lower and central cliffs. Several gully sections show the depth of overburden to be between ten and fifteen feet, and it is thought that cover would probably not exceed this thickness anywhere on the slope.

The tuff bed at R.L.1060' lies at the base of the central cliff. It is not as competent as the conglomerate or agglomerate and might not form a suitable base for an anchor-block. The volcanic agglomerate which overlies the tuff is quite solid at the western end of the cliff, but elsewhere is strongly jointed, with deep weathering and erosion along the fissures. These sections of the cliff would probably require stripping to a depth of at least ten feet.

The shear zone mentioned above is exposed between T6 and I.S.5. Here the cliff is broken into large blocks separated by weak zones of sheared rock. Broken and weathered core at 373'-376' and at 394' in drill hole R11 may represent the shear zone at depth.

Between the central and upper cliffs is a rugged boulder slope with up to thirty feet of overburden. Outcrop mapping, together with nine shallow drill holes, show the bedrock surface to be very irregular. Agglomerate crops out only 12 feet south of the collar of hole P3, but this hole revealed 21 feet of overburden. This depression of the bedrock surface may coincide with the shear zone. Holes P1 and P7 and outcrop at T12 indicate a bench at R.L.1260'-1265' and hole P2 indicates a small depression in this bench. Hole P4 revealed an unexpected 29 feet of overburden near the top of the central cliff.

On the north-western side of the scree slope there is more or less continuous outcrop which extends up-hill to the Rouna Lookout. Down-hill the outcrop terminates in a steep rock face, about 20 feet west of hole P5. This cliff is strongly jointed and partly overhanging.

The upper cliff exhibits to a lesser degree the vertical and low-angle jointing noted in the central cliff. This is not critical as the penstocks will probably run around the western end of the cliff, near T8. An alternative, which has been considered, is to run the high-pressure penstock down a steep fissure about 80 feet south of T6.

Anchor-blocks and intermediate supports for the penstock should be sited on solid outcrop. Between the central and lower cliffs outcrop will probably be found at ten to fifteen feet below surface, but this should be tested by drilling at a later date. Between the central and upper cliffs there are a number of alternative routes, namely :

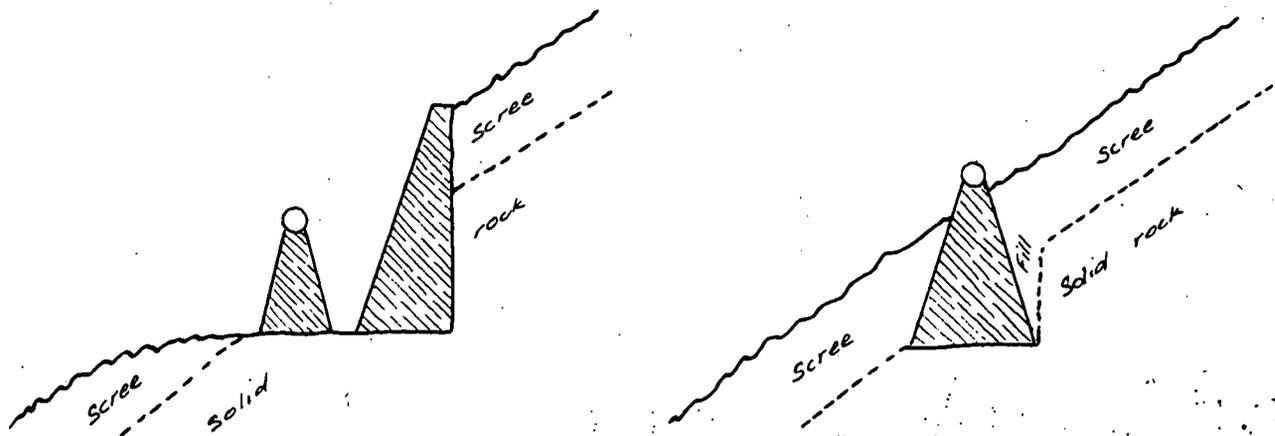
- (a) route through T6 and Instrument Station 5. This crosses the central cliff at the shear zone and, therefore, is not recommended.
- (b) route crossing the scree slope on contour from T8, and running down on the rock which crops out on the north-western side of the scree slope. As noted above, this rock forms high badly jointed cliffs near P5, and would require considerable stripping.
- (c) route from T8 through P5. This is the most direct route and is therefore the cheapest as regards anchor-blocks and length of pipe. This route is shown in the accompanying sections. (Plate 3).

When siting anchor-blocks the following areas should be avoided :

- (i) the vicinity of P7, where deep scree overlies rock which is badly weathered in patches,
- (ii) the area between P3 and P6, where deep scree and weak bedrock might be expected because of the probable presence of the shear zone, and
- (iii) the vicinity of hole P4, where there is 29 feet of overburden.

Mr. L.C. Noakes has contributed the following views on what form the anchor block foundations should take :-

PENSTOCK ANCHORBLOCK FOUNDATIONS — diagrammatic



Nº 1

Nº 2

To accompany
Record No 1961/81

PNG8C/21

".....Sketch No.2 should be satisfactory as far as an anchor point is concerned.....but, in this arrangement, the supports between anchors would be emplaced in scree; any movement of scree could then place an unbearable strain on the penstock between anchors.

".....Where the crossing of scree can be kept to a short section, an arrangement similar to sketch No.1 is attractive because both anchor and intermediate supports are protected from any slight movements in scree which would accompany the infrequent earth tremor."

Power Station.

Eight holes, numbered R8 to R15 and totalling 1011 feet, have been drilled on the site of the proposed Power Station No.2. These have shown that generally the volcanic conglomerate is sound and stable. However, there is a zone of no outcrop, about 40 feet south of the present intake and striking at roughly 060° , which has not yet been tested by drilling.

FUTURE INVESTIGATION

Low-Pressure Penstock

As noted above, a survey of a possible route along the right bank of the Laloki River is currently under way.

High-Pressure Penstock.

An inclined hole should be drilled to test the suspected shear zone about forty feet north of peg T12. This is not essential at the present stage of the investigation.

Several drill holes at the foot of the central cliff would give information on the foundations of the anchor-block which will probably be sited in this vicinity. These might be left to a later stage of the investigation.

Power Station.

A low-angle hole should be drilled to probe the zone of no outcrop 40 feet south of the present intake.

APPENDIX

Geological logs of diamond drill holes nos.

R8 - R15 - power station site, and
 P1 - P8 - high-pressure penstock route

Core size : NMLC unless indicated otherwise
 Core barrel type : Stationary split inner tube
 Core recovery : 90 - 100% unless noted otherwise
 Collar sites indicated on Plate 2.
 Logs compiled by H.L. Davies.

Rock types are (i) volcanic conglomerate with matrix of volcanic greywacke or fine volcanic agglomerate, (ii) tuff, and (iii) volcanic agglomerate. In some of the logs the coarser-grained rocks are referred to simply as "conglomerate" or "agglomerate".

D.D.H. No. R8

Location: Below Rouna Falls Objective: Penstock & power station invest-
 Direction: 200°M igation.
 Angle: Horizontal
 November, 1958.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|---|-------------|---|
| 00 | 15' | Conglomerate, boulders up to 15" diameter of basalt, dolerite, and andesite (some 75% feldspar), in greywacke matrix. Greywacke comprises fragments of same rock types, also quartz. Calcite veining common. Fractures at : 2' : 50° with calcite 4'3" : 50° " " 5' : 40° 5'6" : 60° 6'3" : broken 9'6"-10' : broken 10'2" : 30° 11'6" : 80° 14'8" : 30° |
| 15' | 16'4" | Coarse greywacke |
| 16'4" | 21' | Fine conglomerate (1" - 2" boulders) |
| 21' | 26' | Coarser " (6" boulders) |
| 26' | 30'6" | Fine " |
| 30'6" | 50' | Coarse " note porphyritic hornblende ? andesite boulders. |
| Note that the greywacke matrix shows no sedimentary features such as bedding or graded bedding. | | |
| | 35' - 36'6" | Broken 40'8" 65° fracture |
| | 38'9" | 30° fracture 50' broken |
| | 40'6" | 35° " |
| 50' | 63'8" | Fine conglomerate (1" boulders) |
| | 63' - 63'8" | broken |

R8 contd.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|---|
| 63'8" | 89' | Coarse conglomerate 65' broken 70'3" " 76' broken 71'9" " 77' " |
| 89' | 95' | Fine conglomerate 93' " |
| 95' | 129'6" | Coarse and minor fine conglomerate 104' 70° fracture 139'6"-140' Broken 107'9" 35° " with calcite 145' " 108'4"-108'8" broken 149' " 113'6" 50° fracture 149'6" " 126'-127' poorly cemented 151' " 130'3" broken 153' 30° fracture 132' 45° fracture 154'6" Broken 139' & 139'6" opposed 20° fractures 181'6" " |
| 189'6" | 191'6" | Tuffaceous mudstone grades (laterally) into grit and coarse greywacke |
| 191'6" | 196'6" | Conglomerate |
| 196'6" | 202'6" | Tuffaceous mudstone with one 12" boulder of andesite |
| 202'6" | 207' | Conglomerate with porphyritic hornblende? andesite boulders up to 20" |
| 207' | 266'6" | Coarse-grained volcanic greywacke with rare andesite boulders and one quartz boulder at 208'6" 242' - 242'6" broken 263'6" fracture, horizontal 265'6" " " |
| 266'6" | 270' | Agglomerate?, component boulders up to 2" diameter, badly broken. |
| 270' | 276' | 37% core recovery; fine agglomerate? grades into large boulders of augite? basalt. |
| 276' | 280' | 8% core recovery, badly broken |
| 280' | 283' | 30% core recovery, fine greywacke, soft friable. |

Note : abandoned at 283'
- caving prevented further drilling.

End.

D.D.H. No. R9

Location : Near R8 Objective : Power station foundations
Direction: 255° M Angle 45° January, 1959.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|---|
| 0 | 39' | Conglomerate : large (to 10") rounded boulders of augite? andesite in matrix of tuffaceous greywacke or fine volcanic agglomerate. 17'6" broken 18' 60° fracture 31'6"-32' broken 20'-20'6" broken 32'6"-33' " 26' 45° fracture 35'6" " 30'6" 30° " 37' 60° fracture |

Note quartz crystals in vesicle at 30'

Water loss : At 39' depth driller reported considerable water loss (about 2 gal./min.)

End.

D.D.H. R11 - contd.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|--|
| 200' | 210' | Coarse greywacke - 205' broken This 10' section cored at AX size, recovery only 25%. |
| 210' | 214' | Conglomerate |
| 214' | 230' | Coarse volcanic greywacke 220'6" 60° fracture 220' 1/4" band of secondary silica (?) at 60° 222'6" 60° fracture 229'-229'3" broken 226'6" 40° fracture, weathered 228' vuggy calcite vein at 40° |
| 230' | 246' | Conglomerate, broken, only 25% core recovery 245'6" calcite vein 1/4" thick at 45° |
| 246' | 261' | Conglomerate, minor calcite in fractures, not broken but only 70% core recovery. 248'6" 60° fracture 251' 60° fracture 259' 40° " |
| | | Between 250'2" and 250'4" drill tapped percolating groundwater; flow of water (which is quite fresh) has persisted at rate of about 1 gal. in 2 minutes (very rough estimate) for last two years. |
| 261' | 271' | Conglomerate 262' - 262'3" broken 265'6" 1/8" calcite vein at 45° |
| 271' | 272'6" | Coarse greywacke, badly broken. |
| 272'6" | 314' | Conglomerate, calcite veining around most boulders. 274' 60° fracture with 1/8" thick calcite vein 276' 45° " " " " " " 279' 60° " " " " " " 281' 30° " " " " " " 283'6" 75° fracture 293'-293'6" broken 298' 30° fracture 300'-301' broken and slightly weathered Between 301' and 305' calcite replaces matrix in places. 304'9" 45° fracture 313' 60° fracture |
| 314' | 315' | Clay or soft weathered rock. |
| 315' | 400' | Conglomerate 334'-334'6" broken 339'-339'2" weathered & broken 349'6" 70° fracture Noted 2" quartz boulder at 352'6" 353'6" 45° fracture 367'-368' slightly weathered & broken 373'-373'6" broken & weathered 374' weathered 376' " and broken 387'-387'1" broken 388'-388'2" " 393'9"-394' weathered 397'3"-397'6" broken 400' 35° fracture |

End.

D.D.H. No. R12.

Location : same as R11. Objective : Power station foundations.
 Direction: 144° M Angle : 15°
 February, 1959.

| <u>From</u> | <u>To</u> | <u>Core Description.</u> |
|-------------|-----------|--|
| 00 | 25'6" | Volcanic conglomerate, mostly weathered and broken with less than 50% core recovery. Solid and fresh between 6'8" and 11'5" |
| 25'6" | 150' | Conglomerate fresh and solid except at 38' 45° fracture 43'-44'7" slightly weathered 74' broken 1" 46'-47'4" weathered 80' " 1" 47'2"-47'5" broken From 83' onwards calcite vein- 48'-48'1" " ing common, vuggy in places. 53' weathered, opposed 45° and 70° fractures 97'6" broken 12" 55' weathered. 99'3" " 4" 56' " 1" 103' " 6" 57' " 3" 108' weathered & broken 9" 58' " 9" 111' broken 1" 63' 60° fracture 119' badly broken 12" 64' weathered and broken 8" 128'6" 50° fracture |

End.

D.D.H. No. R13.

Location : Near R11 and R12. Objective : Power station foundations.
 Direction : 100° M Angle : 30°
 March, 1959.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|--|
| 00 | 3' | Coarse volcanic greywacke, slightly weathered 00-2' |
| 3' | 50' | Volcanic conglomerate with boulders up to 20" diameter. Solid and fresh except at 6'3" Opposed 45° and 55° fractures 15' 70° fracture 17'6" broken 10" 18'4"-20' broken 22'10" rough weathered fracture 26' broken & weathered 2" 27' broken, 45° fracture 27'9" broken 3" 29'6" broken and weathered 6" 30'-32' broken into ½" to 3" pieces, some weathered. 39' 40° fracture 40'6" - 42' broken and partly weathered; driller reported some loss of water. 45'10"- 50' only 60% recovery, broken at about 47' and 49'6". |

End.

D.D.H. No.R14.

Location : Foot of Rouna Falls, 30 ft. from R9 on Brg 310° T.
 Angle : vertical
 Objective : Power station foundations.
 November, 1959.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|---|
| 00 | 3'4" | Conglomerate, most or all components volcanic, boulders up to 3", calcite stringers and some fine calcite crystals in small cavities; moderately weathered, some matrix yellow; broken into 1/2" - 3" fragments. |
| 3'4" | 19'7" | Conglomerate, most components volcanic but a few small quartz pebbles, boulders up to 10", most 2"-4", calcite stringers form network in places; only slightly weathered, a few boulders show weathering rims; 5"-21" lengths, 1" of broken core at 15'2" probably broken by core barrel. |
| 19'7" | 19'9" | Fine tuff, fresh. |
| 19'9" | 20'9" | Fine tuff weathered yellow, more friable, 2 irregular fractures. |
| 20'9" | 24'11" | Conglomerate as above 19'7" |
| 24'11" | 25'4" | Fine conglomerate and tuff; weathering increases from 24'5"; one irregular 30° fracture. |
| 25'4" | 26' | Fine conglomerate or tuff; badly weathered, soft, iron-stained; broken into small fragments. Bounded by 30° fractures. |
| 26' | 29'7" | Conglomerate, 1"-5" components; weathering decreases from bad at 26' to slight at 29'7"; similarly size of fragments increases from 1" to 3"-9". |
| 29'7" | 34' | Conglomerate, boulders up to 15"; slightly weathered; solid. |

End.

D.D.H. No.R15.

Location : Foot of Rouna Falls: Objective : Power station foundations.
 November, 1959. Angle : vertical

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|--|
| 00 | 1'3" | Soil; not cored. |
| 1'3" | 4'6" | Conglomerate, components mostly or entirely volcanic, boulders up to 6"; matrix moderately weathered but boulders fresh; broken into 1" - 6" fragments. |
| 4'6" | 17'11" | Conglomerate, boulders up to 10", a few calcite stringers around and through boulders; matrix moderately weathered at 8', elsewhere slightly weathered, boulders fresh; mostly broken into 12"-15" lengths, fractures around boulders. |
| 17'11" | 18'3" | Finer conglomerate, 2"-3" components, more calcite veining; matrix and coarse-grained boulders moderately weathered, fine-grained boulders show weathering rims; solid. |
| 18'3" | 26'11" | Conglomerate, boulders up to 27", very little matrix except for 19'4"-20'3" fine conglomerate, a few calcite veins; fresh boulders, matrix slightly weathered; few fractures around boulders. |
| | 26'11" | 60° fracture with thin calcite film, adjacent rock weathered for 1/2" above and about 6" below. Driller reports loss of water at about this depth. |
| 26'11" | 28'8" | Conglomerate, 1"-9" boulders; all moderately weathered except boulder 27'2"-28'; fractures around boulders, 3" & 10" lengths. |
| 28'8" | 30'11" | Conglomerate, 2"-6" boulders, a little calcite veining; slightly weathered. 50° fracture at 30'5". |
| <u>End</u> | | <u>End</u> |

D.D.H. No.P1.

Location : Penstock route. Objective : Depth overburden.
 January, 1960. Angle : vertical

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|--|
| 00 | 6'10" | Volcanic agglomerate; moderately weathered, weathering increases below 5'; 3"-15" lengths. This is a large scree boulder. |
| 6'10" | 14' | Clay, clayey gravel, and agglomerate; moderate to bad weathering; a few 6" lengths, mostly broken. 3' core lost. |
| 14' | 49'11" | Fine ($\frac{1}{4}$ ") and medium (to 4") grained agglomerate; slight to moderate weathering to 20', slight weathering 20'- 49'11"; lengths 6" to 3' except where broken at 17'; fractures, some with clay, some with iron staining at 19'5"70° 23'8"70° 26'30° 28'7"80° 35'10".....60°) 36'9"45°) Dip in same direction. 37'3"50°) 40'4"30° 41'90° rough surface 44'9"30° " " |

End

D.D.H. No.P2.

Location : Penstock route, Rouna Falls (near P.1)
 Objective: Overburden depth. Angle : vertical
 February, 1960.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|---|
| 00 | 10' | Not cored; scree soil and boulders |
| 10' | 12'9" | Agglomerate, medium-grained; slightly weathered; 15" lengths. |
| 12'9" | 19'9" | Agglomerate, medium-grained; moderately and badly weathered; 1" to 8" lengths |
| 19'9" | 20'8" | Agglomerate, one 10" boulder, fresh |
| 20'8" | 21'2" | Agglomerate, medium-grained, badly weathered. |
| 21'2" | 24' | Agglomerate, medium-grained, slightly weathered; |
| 24' | 24'7" | Agglomerate; badly weathered; badly broken |
| 24'7" | 43'4" | Agglomerate, fine and medium (to 4") grained, slightly weathered; 6" to 18" lengths, fractures with clay coating at 26'6" 80° 29'1" 30° 30'8" - 30'9" irregular, broken 31'8" 30° 33'9" 30° 35'11" 40° 42'2" - 42'3" 35° |
| 43'4" | 44' | Agglomerate, badly weathered, broken |
| 44' | 47' | Agglomerate, fine to medium (to 2") grained, moderately weathered and badly weathered near fractures, 3"-6" lengths with broken zones at 45'-46' and 46'6"-46'10", 75° fracture with clay filling at 45'4" Clay filling in fractures is probably residual, i.e. extremely weathered rock; adjacent rock is usually weathered (see 31'8"). |

End

D.D.H. No.P3.

Location : near Rouna Falls; Objective: Surface Penstock route.
February, 1960. Angle : vertical

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|--|
| 00 | 10' | Not cored; scree soil and boulders |
| 10' | 22' | Scree boulders of volcanic agglomerate, separated by clay and clayey gravel; mostly weathered, some boulders fresh; mostly broken but some 6" lengths. |
| 22' | 26'5" | Volcanic agglomerate, slightly weathered, a few irregular iron-stained fractures at 90° approx. |
| 26'5" | 28'5" | Tuff and fine agglomerate, slightly weathered, 25° iron-stained clay-coated fracture at 27'6" |
| 28'5" | 30'7" | Agglomerate, slightly weathered, irregular fractures between 0° and 30° with clay and iron-staining |
| 30'7" | 31'4" | Agglomerate broken into 1" pieces |
| 31'4" | 38'6" | Agglomerate with tuff bands at 33'4"-33'11" and at 36'3"-36'8"; slightly weathered; broken at 34', otherwise few fractures. |
| <u>End</u> | | |

D.D.H. No.P4.

Location: near Rouna Falls. Angle : vertical
Objective: Surface penstock route.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|--|
| 00 | 12'7" | Not cored, probably scree |
| 12'7" | 19' | Agglomerate, badly weathered and broken |
| 19' | 20'6" | Agglomerate, moderately weathered, broken at 20' |
| 20'6" | 27'9" | Agglomerate, slightly weathered, few fractures. |
| 27'9" | 29'6" | Agglomerate, slight to moderate weathering, broken at 27'9" and at 29'-29'6". |
| 29'6" | 35' | Agglomerate, slight weathering, irregular fractures 45° approx. around 33' with clay and iron staining |
| 35' | 36' | Tuff and fine agglomerate. |
| 36' | 48' | Agglomerate, slight weathering; broken at 39', 41'3", 42' and 47' - 47'6". |
| <u>End</u> | | |

D.D.H. No. P5.

Location : Rouna Falls: Objective ; Surface Penstock Route
March, 1960. Angle : vertical

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|--|
| 0' | 8'11" | Clay and rubble. |
| 8'11" | 12'11" | Agglomerate, slight to moderate weathering; 2" to 10" lengths irregular clay-coated fractures between 45° and 90°. |
| 12'11" | 13' | Tuff with fine agglomerate at base, slight weathering; four fractures between 60° and 80°. |
| 13' | 31' | Agglomerate, slight weathering; a few fractures between 60° and 80°. |
| 31' | 31'10" | Tuff, two irregular fractures. |
| 31'10" | 34'10" | Agglomerate, slightly weathered, solid. |
| <u>End.</u> | | |

D.D.H. No. P6.

Location : Rouna Falls. Objective : Surface Penstock route.

April, 1960.

Angle : vertical.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|---|
| 00 | 6' | Not cored, soil and rubble. |
| 6' | 9'9" | Agglomerate, slightly weathered - a boulder probably. |
| 9'9" | 16'11" | Rubble and weathered broken agglomerate. |
| 16'11" | 20'2" | Agglomerate, moderately weathered, few fractures. |
| 20'2" | 21'4" | Same but many fractures. |
| 21'4" | 35'11" | Agglomerate, slightly weathered, few fractures (two at 30°). Tuff 28'3" - 29' and 34'8" - 35'6". |

End.

D.D.H. No. P7.

Location : Rouna Falls. Objective : Penstock Route.

April, 1960.

Angle : vertical.

| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|--|
| 00 | 9'1" | Agglomerate, slightly weathered, few fractures-probably a boulder. |
| 9'1" | 11'8" | Clay and weathered agglomerate rubble. |
| 11'8" | 13'7" | Agglomerate, slightly weathered, few fractures. |
| 13'7" | 27'6" | Agglomerate, mostly badly weathered and broken, a few slightly weathered more solid sections. |
| 27'6" | 30'5" | Agglomerate, slightly weathered, few fractures. |
| 30'5" | 31'6" | Agglomerate, badly weathered and broken. |
| 31'6" | 37'7" | Agglomerate, slightly weathered, few fractures. |
| 37'7" | 40' | Agglomerate, badly weathered, 8" badly broken. |
| 40' | 43'8" | Agglomerate, slightly weathered, few fractures. |
| 43'8" | 44'3" | Agglomerate, moderately weathered, broken. |
| 44'3" | 45'8" | Same, few fractures. |
| 45'8" | 46'5" | Same, badly broken. |
| 46'5" | 47'10" | Same, many fractures. |
| 47'10" | 53'4" | Agglomerate, slightly weathered, few fractures. |
| 53'4" | 55'11" | Agglomerate, moderately weathered, irregular fractures at intervals of 2" - 10", Clay in all fractures. |

End.

D.D.H. No. P8.

Location : Rouna Falls: Objective : Penstock Route.

April, 1960.

Angle : vertical

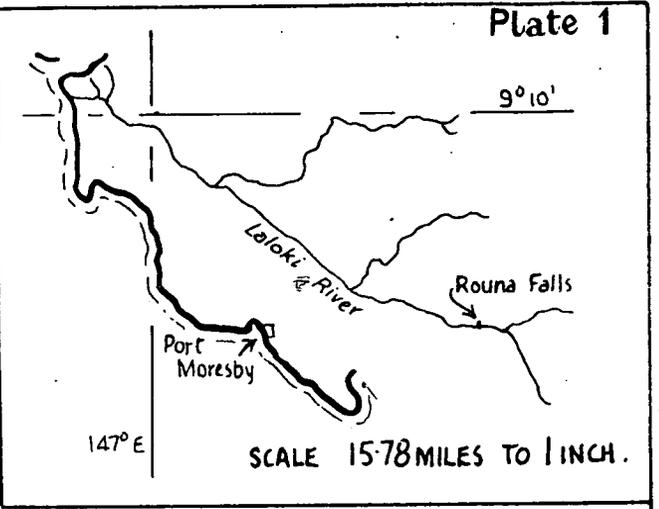
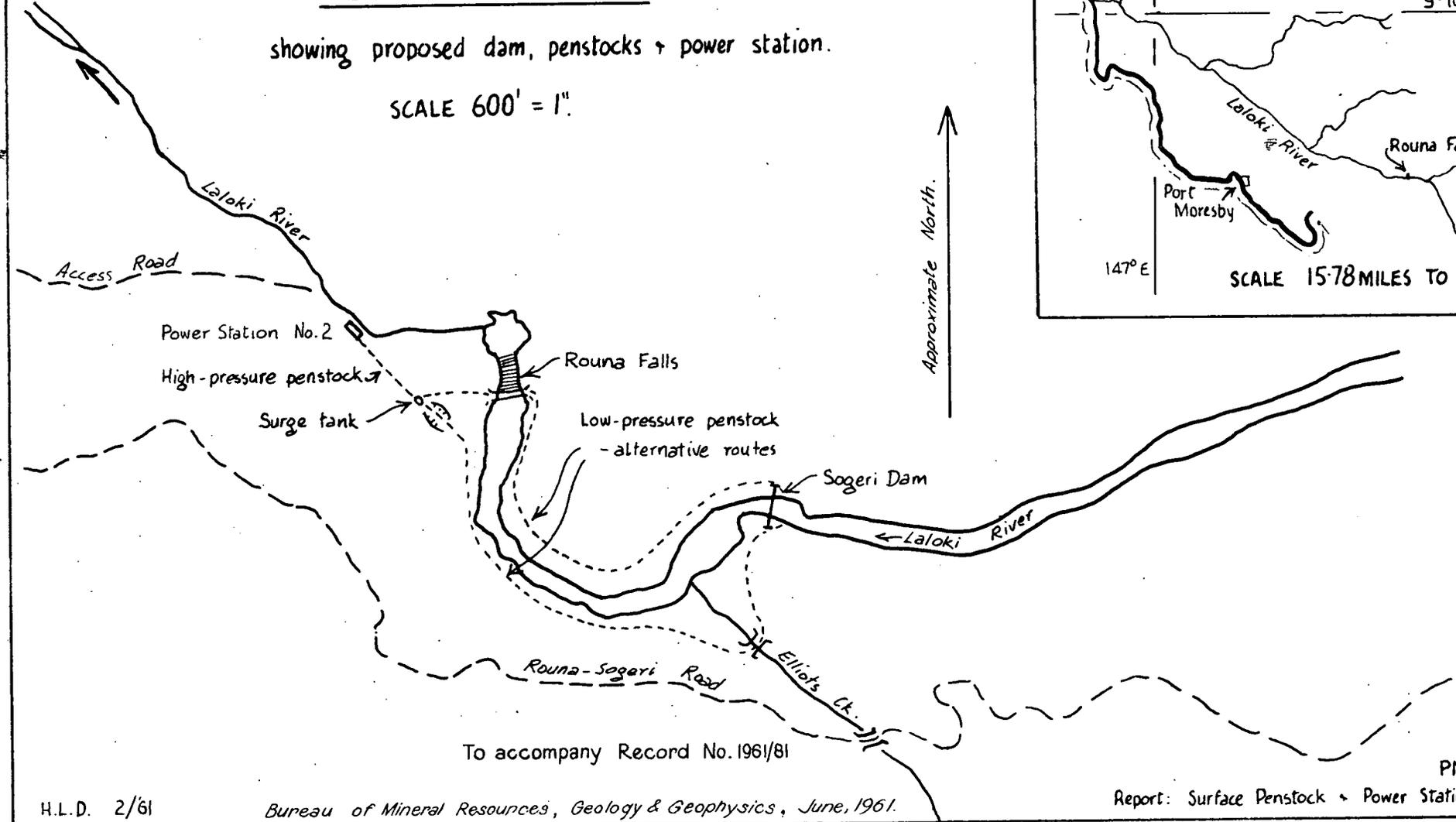
| <u>From</u> | <u>To</u> | <u>Core Description</u> |
|-------------|-----------|---|
| 00 | 6' | Not cored, soil and rubble. |
| 6' | 9'8" | Agglomerate, slightly weathered, few fractures. |
| 9'8" | 10' | Agglomerate, moderately weathered, broken. |
| 10' | 30' | Agglomerate, slightly weathered, few fractures. A little matrix lost at 20'. |

End.

LOCALITY MAP

showing proposed dam, penstocks + power station.

SCALE 600' = 1"



To accompany Record No. 1961/81

H.L.D. 2/61

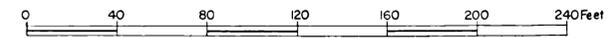
Bureau of Mineral Resources, Geology & Geophysics, June, 1961.

PNG 8C/81
Report: Surface Penstock + Power Station

HIGH PRESSURE PENSTOCK ROUTE AND POWER STATION SITE

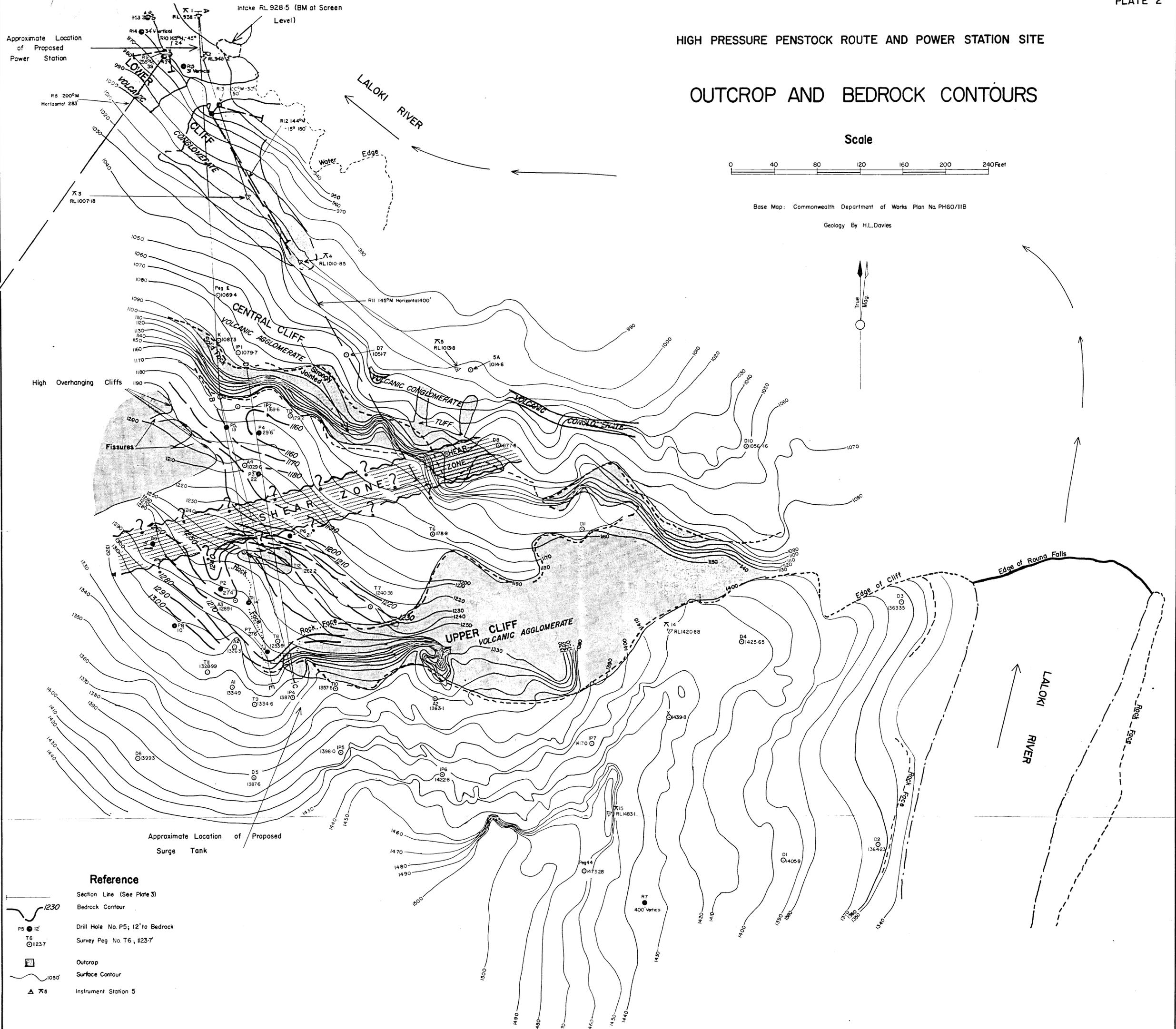
OUTCROP AND BEDROCK CONTOURS

Scale



Base Map: Commonwealth Department of Works Plan No PH60/III B

Geology By H.L. Davies



Approximate Location of Proposed Power Station

R8 200'PM Horizontal 283'

Intake RL 928.5 (BM at Screen Level)

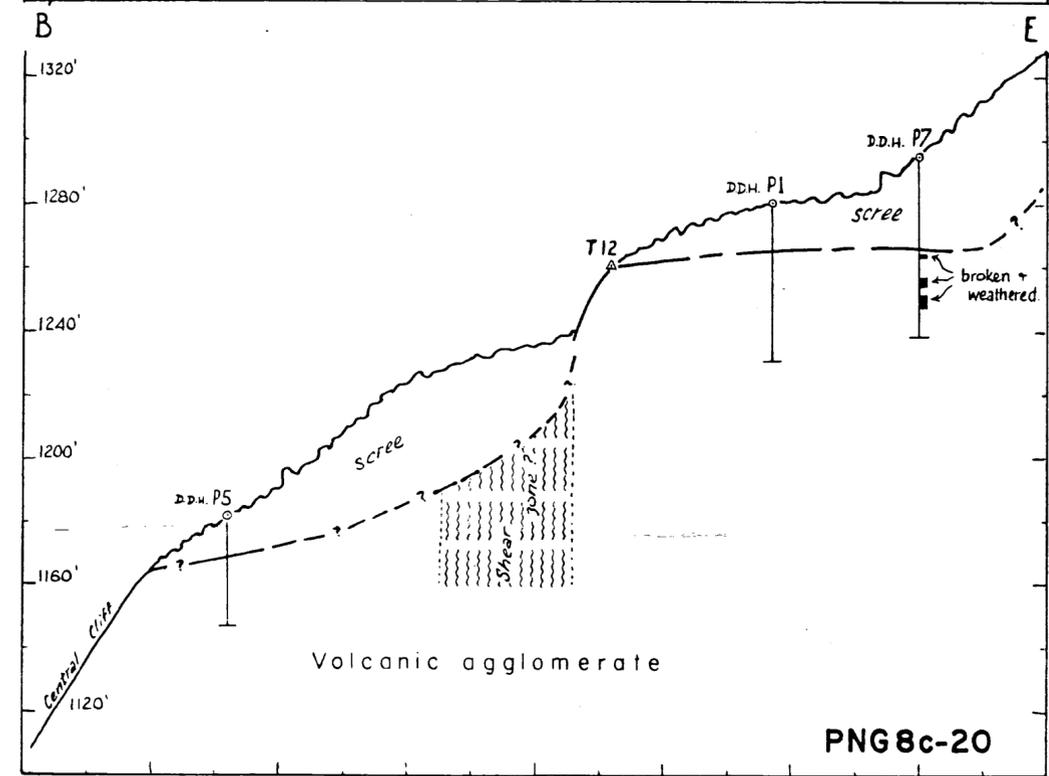
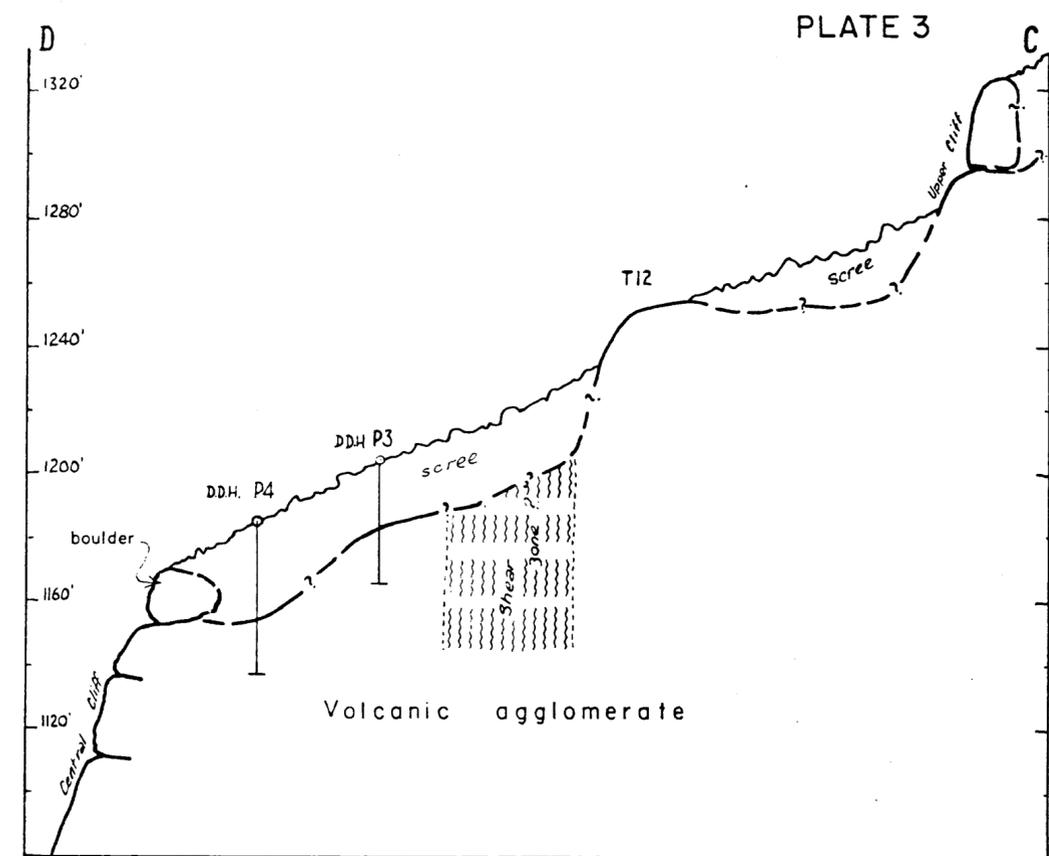
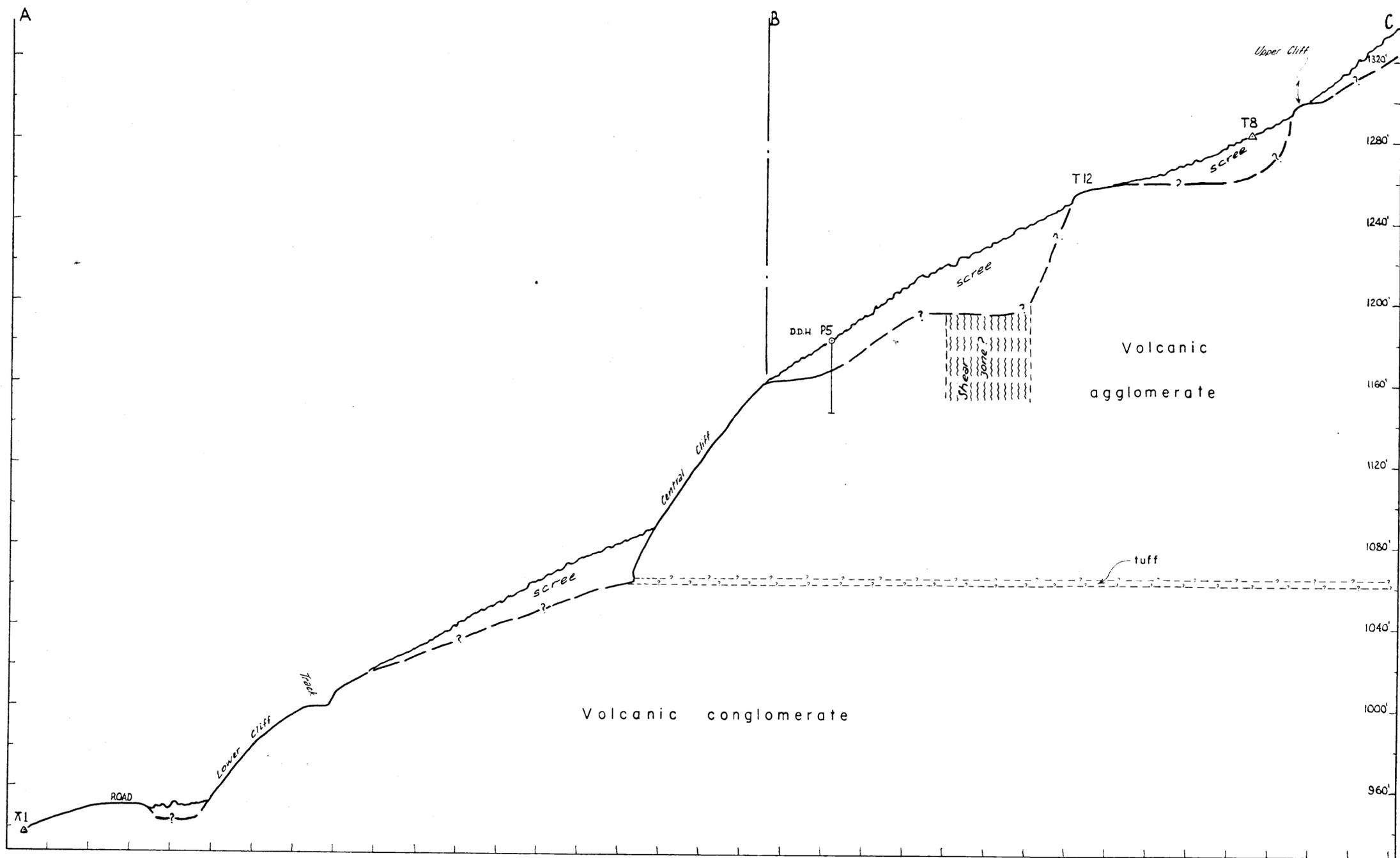
High Overhanging Cliffs

Fissures

Approximate Location of Proposed Surge Tank

Reference

- Section Line (See Plate 3)
- Bedrock Contour
- Drill Hole No. P5; 12' to Bedrock
- Survey Peg No. T6; 123.7'
- Outcrop
- Surface Contour
- Instrument Station 5



SECTIONS — SURFACE PENSTOCK ROUTE, ROUNA.

Scale 40' = 1"

 Diamond drill hole showing depth
 Report: Surface penstock & power station

For location of section lines see plate 2.

Sections face east to conform with C.D.W. Section HC60/166 B.