DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

ENGINEERING DIVISION

REPORT ON SALT CREEK PUMPED STORAGE PROJECT
PRELIMINARY GEOLOGICAL ASSESSMENT OF SUPPORT REQUIREMENTS
- Electricity Trust of South Australia -

by

D.H. Stapledon
Supervising Geologist

24th February, 1966.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept. Bk. No. 62/51
G.S. No. 3398
D.M. 142/61

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CONTENTS

FIGURES

Fig. No.	Title	Ref. No.
1	Salt Creek Pumped Storage Site Progress Geological Plan.	65-1312 Hc7
2	Salt Creek Pumped Storage Project Power Station Area Geological Plan	66-162 Hc7
3	Salt Creek Pumped Storage Project Power Station Area Geological Sections	66-163 Hc7

DRILL HOLE LOG

Title	Ref. No.
Geological Log of Drill Hole B	S5042 (3 sheets)

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EXPLANATORY NOTES

The assessment shown in Table 1 has been made on the layout shown on Drgs. G186774 and G186775. It is based on a re-assessment of diamond drill cores and reports from prior investigations, (Refs. 1, 2 and 3), and one week of geological mapping carried out in February, 1966.

Fig. 1 shows the current project layout, and the generalised results of recent detailed mapping. Figs. 2 and 3 show progress results of detailed mapping in the power station area.

The detailed mapping and reassessment of the core of Hole B confirm the existence of numerous bedding - plane faults (Ref. 4). These consist mainly of crushed seams (material with essentially soil properties) ranging from a quarter of an inch up to one foot in width, formed mainly in the less competent schist beds. Two main groups or zones of faults are recognised. Zone 1 is exposed near the mouths of the two creeks upstream and downstream of the power station site. Zone 2 is encountered in the core of Hole B, but is not well exposed at the surface. Structure-contours on these two zones, assuming uniform planar boundaries, show these two zones to pass above and below the proposed power station (Fig. 3). Hole B did not penetrate deep enough to intersect the beds which will occur at the power station site. Incomplete surface exposures in the creeks upstream and downstream suggest, however, that the rocks will be interbedded greywacke, schist, and sandstone, containing a number of bedding-plane faults. Considering the depth of chemical weathering indicated

by Hole B, it appears likely that at the power station site shown on Fig. 3 the rocks will be appreciably effected by weathering, at least near roof levels. The economic feasibility of a vertical-walled station in this location is therefore doubted, and the estimates given (for the machine hall only) are assuming that the station will be located 1000 ft. or more northeast of the present position. It has also been assumed that its long axis will be oriented roughly NW - SE, i.e. almost at 90° to its present direction.

DHS:AWK
24.2.66

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ENGINEERING DIVISION.

REFERENCES

1. JOHNSON, W., 1959. Preliminary Geological Report on the Salt Creek Site for a Pumped Storage Electricity Generation Scheme.
Geol. Surv. of S. Aust. Report 49/84.

2. HIERN, M.N., 1960. Progress Report on Damsite Investigations, Salt Creek Pumped Storage Scheme.
Geol. Surv. of S. Aust. Report 50/23.

3. HILLWOOD, E.R., 1961 Preliminary Report on Geological Investigations, Salt Creek Pumped Storage Scheme, Upper Site A.
Geol. Surv. of S, Aust. Report 52/101.

4. Attachment A of letter from Director of Mines, to Chairman, Electricity Trust of S.A., dated 25th November, 1965, on D.M. 142/61.

TABLE 1

PRELIMINARY SUPPORT ESTIMATES

Feature	(feet) Total Length	Estimated Support Requirements	Remarks
Low Pressure Manifold	820	Steel Ribs 410ft. Rock Bolts 205ft. Unsupported 205ft.	As shown on G186774
Machine Hall	-	Pattern bolting 5ft. and 4ft. spacing. Total 4,400 bolts each 10ft. long.	Assumed location 1000 ft. or more northeast of position shown on Fig 1.
High Pressure Manifold	720	Steel Ribs 70ft. Rock Bolts 180ft. Unsupported 470ft.	As shown on G186774
BY pass tunnel	440	Steel Ribs 40ft. Rock Bolts 200ft. Unsupported 200ft.	As shown on G186774
High Pressure Tunnel	2750	Steel Ribs 800ft. Rock Bolts 980ft. Unsupported 970ft.	Assuming interbedded rocks with scattered bedding plane faults dipping 20° to 35° over roof of tunnel.
High Pressure Shaft	640	Steel Ribs 140ft. Rock Bolts 100ft. Unsupported 400ft.	Bedding almost at right angles to shaft axis.
Transition Tunnel at Inlet	80	Steel Ribs 80ft.	In weathered zone.
Ventilation and Cable Shaft	395	Steel Ribs 200ft. Rock Bolts 100ft. Unsupported 95ft.	Uppermost 200ft. in weathered zone.
Access Tunnel	450	Steel Ribs 250ft. Rock Bolts 100ft. Unsupported 100ft.	

DEPARTMENT OF MINES — SOUTH AUSTRALIA

LOG OF DIAMOND DRILL HOLE

HOLE NO. B — SHEET 1 OF 3

SERIAL No. 78/60
PROJECT SALT CK. PUMPED STORAGE SECTION 175
FEATURE POWER STATION HUNDRED Yankalilla
LOCATION TUNNEL CO-ORDINATES
R.L. 620 FEET
ANGLE FROM HORIZONTAL 90°
DIRECTION —

ROCK TYPE / DESCRIPTION OF CORE / DEGREE OF WEATHERING SHOWN IN CORE	LIFT, CORE LOSS % (20 60)	CORE SIZE, DEPTH R.L. FT.	LOG	FRACTURE LOG (1 4 16 64)	STRUCTURES JOINTS VEINS SEAMS SHEARED, CRUSHED ZONES	WATER LEVEL CASING DRILL WATER LOSS % (25 75)	WATER PRESSURE TESTS PERMEABILITY IN LUGEON UNITS (10 20 30 / 40 80 120)
SOIL, CL, red-brown. Complete				NOT APPLICABLE	Bedding and cleavage dip 60° to 50° on bedding.	No water encountered.	NOT WATER PRESSURE TESTED.
SCHIST, fine-grained micaceous, chloritic, sandy bands, laminated, fissile, light brown to grey. Moderate to High. with Bands of SANDSTONE, felspathic (?), fine to medium grained, micaceous in part, dark grey to pale grey. High to Complete. Occasional veins of quartz up to 3 mm. Moderate M.W. to H.W.		10 NXC			Joints mainly along bedding, commonly sheared to give clay filling, limonite coating, planar, smooth to slightly wavy.		
		NMS			Joints dip 40° to 45° (normal to bedding), planar or irregular. Smooth, limonite coated. Some clay filled.		
		20					
		30			SHEARED, partly CRUSHED zone. Seams of Clay and C.W. rock up to 0.5 ft wide along bedding, spaced 0.05 to 0.2 ft apart.		
		NA					
		40			Joints dip 60° to 90° on core, irregular and smooth, limonite coated. Mainly tight, some clay fillings.		
		50			SHEARED, partly crushed zone. Seams of crushed rock and clay up to 0.05 ft. wide along bedding. Spaced 0.05 to 0.3 ft. apart.		
High Complete		60			Some clay seams up to 0.02 ft wide along bedding.		
Mainly Moderate, High to Complete near seams.		70					
		80					
		90					
		120					

CAMBRIAN KANMANTOO GROUP
SCHIST and SANDSTONE.

7 May 65
CASING
WATER LEVEL, DATE

FRACTURE LOG
1 4 16 64 — Breaks in core per foot, or
12 3 3/4 3/16 Inches Equivalent Diameter
1 / Diameter of fragments in feet

WEATHERING
FR — Fresh
SW — Slightly weathered
MW — Moderately "
HW Highly "
CW — Completely "

Core Recovered
Core Lost

N.A. Not Applicable.

ENGINEERING GEOLOGY SECTION

DRILL No.	LOGGED J.P.T.
TYPE	DATE 27 Jan 65
DRILLER SHARRAD THOMPSON	DRAWN J.P.T.
START 30 Nov 59	TRACED A.M.D.
FINISH 22 Dec 59	CHECKED L.V.W.

DRG. No. S 5042 Hc 7

DEPARTMENT OF MINES — SOUTH AUSTRALIA

LOG OF DIAMOND DRILL HOLE

HOLE NO. B

SHEET 2 OF 3

SERIAL No. 78/60

PROJECT SALT CK. PUMPED STORAGE SECTION 175

FEATURE POWER STATION. HUNDRED Yankalilla

LOCATION TUNNEL. CO-ORDINATES

R.L. 620 FEET

ANGLE FROM HORIZONTAL 90°

DIRECTION

ROCK TYPE / DEGREE OF WEATHERING SHOWN IN CORE	DESCRIPTION OF CORE	LIFT, CORE LOSS % 20 60	CORE SIZE, DEPTH R.L. FT.	LOG	FRACTURE LOG 1 4 16 64	STRUCTURES: JOINTS, VEINS, SEAMS, SHEARED, CRUSHED ZONES	WATER LEVEL — CASING — % DRILL WATER LOSS 25 50 75	WATER PRESSURE TESTS PERMEABILITY IN LUGEON UNITS 10 20 30 40 80 120
CAMBRIAN KANMANTOO GROUP SCHIST and SANDSTONE. Mainly Moderate High to Complete near Sheared zones. Moderate to High Complete near seams.	SCHIST, finegrained micaceous, chloritic, sandy bands, light brown to grey, laminated fissile, with bands of SANDSTONE, quartzitic, felspathic (??), fine to medium grained, micaceous in part, dark grey to pale grey. Occasional veins of quartz up to 2 m.m. wide		110 N/MS 120 130 140 150 160 170 180 190 200			Bedding dips 50° on core. Joints mainly along bedding. SHEARED, partly crushed zones up to 1 ft. thick, mainly along bedding direction as shown. Joints dip 20° to 40°, planar, smooth, some irregular. Limonite coated. Some clay coated. Joints dip 60° to 90° on core, planar or irregular, clay or limonite coated.	No water encountered.	NOT WATER PRESSURE TESTED.

FRACTURE LOG

1 4 16 64 ... Breaks in core per foot or ... 1 / Diameter of fragments in feet

12 3 3/4 3/16 Inches Equivalent Diameter

WEATHERING

FR — Fresh

SW — Slightly weathered

MW — Moderately "

HW Highly "

CW — Completely "

CASING

7 May 65

WATER LEVEL, DATE

← Core Recovered

← Core Lost.

ENGINEERING GEOLOGY SECTION

DRILL No. LOGGED J.P.T.

TYPE SHARP & DOHMAN DATE 27 Jan 65

DRILLER THOMASON DRAWN J.P.T.

START 30 Nov. 59 TRACED A.M.D.

FINISH 22 Dec. 59 CHECKED L.V.W.

DRG. No. S 5042 0 HC 7

DEPARTMENT OF MINES — SOUTH AUSTRALIA

LOG OF DIAMOND DRILL HOLE

HOLE NO. B
SHEET 3 OF 3

SERIAL No. 78/60
PROJECT SALT CK. PUMPED STORAGE. SECTION 175
FEATURE POWER STATION. HUNDRED Yankalilla
LOCATION TUNNEL. CO-ORDINATES
R.L. 620. FEET
ANGLE FROM HORIZONTAL 90° DIRECTION

ROCK TYPE / DEGREE OF WEATHERING SHOWN IN CORE	DESCRIPTION OF CORE	LIFT, CORE LOSS % 20 60	CORE SIZE, DEPTH R.L. FT.	LOG	FRACTURE LOG 1 4 16 64	STRUCTURES JOINTS, VEINS, SEAMS SHEARED, CRUSHED ZONES	WATER LEVEL / CASING / DRILL WATER LOSS 25 75	WATER PRESSURE TESTS PERMEABILITY IN LUGEON UNITS 10 20 30 40 80 120
CAMBRIAN. KANMANTOO GROUP SCHIST and SANDSTONE. Moderate to Complete	SCHIST, fine grained, micaceous, chloritic, laminated, fissile, light brown to grey. with Bands of SANDSTONE, quartzitic, felspathic (?), fine to medium grained, micaceous in part, dark grey to pale grey.		NMS 210		NA	SHEARED, partly crushed zone, consisting of seams up to 2ft thick of clay and CW rock.	No water encountered.	DRILLER'S NOTE. "Hole caving below 203 ft." NOT WATER PRESSURE TESTED
Moderate to Complete						Several SHEARED, partly crushed zones up to 0·7 ft. thick.		
			220 AXT			Bedding and cleavage dip 45° to 50°.		
High near Seams.			230			Joints mainly along bedding, dip 45° to 50°, planar, mainly smooth, limonite coated, some clay filled.		
			240			Joints dip 10° to 30° on core, planar, limonite coated.		
						Joints dip 70° to vertical, irregular, limonite coated.		
Moderate to Slight.			250			Several Clay seams up to 0·05 ft thick, along bedding.		
			260					
			270					

END OF HOLE 271 ft.

WATER LEVEL → 7. May 65 CASING

FRACTURE LOG
1 4 16 64 · · · Breaks in core per foot or 1 / Diameter of fragments in feet
12 3 3/4 3/16 · Inches · Equivalent Diameter

WEATHERING
FR — Fresh
SW — Slightly weathered
MW — Moderately "
HW Highly "
CW — Completely "

NA. Not applicable.
Core Recovered
Core Lost
120

ENGINEERING GEOLOGY SECTION

DRILL No.	LOGGED J.P.T.
TYPE	DATE 28 Jan 65
DRILLER THOMPSON	DRAWN J.P.T.
START 30 Nov. 59	TRACED A.M.D.
FINISH 22 Dec. 59	CHECKED L.V.W.
DRG. No. S 5042 b HC 7	

17000 N
13000 E
13500 E
14000 E
14500 E
15000 E
15500 E
16500 N
16000 N
15500 N
15000 N
14500 N

N

A
A'
B
B'
HOLE B

LEGEND

ROCK TYPES.

CAMBRIAN
KANMANTOO GROUP

- SOIL AND ROCK FRAGMENTS.
- BEACH DEPOSITS, SAND, SHINGLE.
- TALUS DEPOSITS, ROCK FRAGMENTS.
- SCHIST.
- GREYWACKE.
- SANDSTONE, QUARTZITIC.

GEOLOGICAL STRUCTURES.

- BEDDING, STRIKE AND DIP.
- CLEAVAGE, STRIKE AND DIP.
- JOINT, STRIKE AND DIP.
- JOINT, VERTICAL.
- VEIN, QUARTZ, STRIKE AND DIP.
- SHEARED OR CRUSHED ZONE.
- LINEATION, TREND AND PLUNGE.

SURFACE FEATURES.

- APPROX. LIMIT OF LANDSLIP.
- CRACKS IN DISTURBED MATERIAL.
- SWAMPY AREA.
- CONTOUR.

SCALE IN FEET

100 0 100 200 300

FIG 2

DEPARTMENT OF MINES — SOUTH AUSTRALIA

SALT CREEK PUMPED STORAGE PROJECT

POWER STATION AREA

GEOLOGICAL PLAN

ENGINEERING GEOLOGY SECTION	GEOLOGIST	Drn. J.P.T.	SCALE: As Shown
		Tcd.	66-162 Hc 7
Director of Mines		Chd.	
		Exd.	DATE: 15 Feb. '66

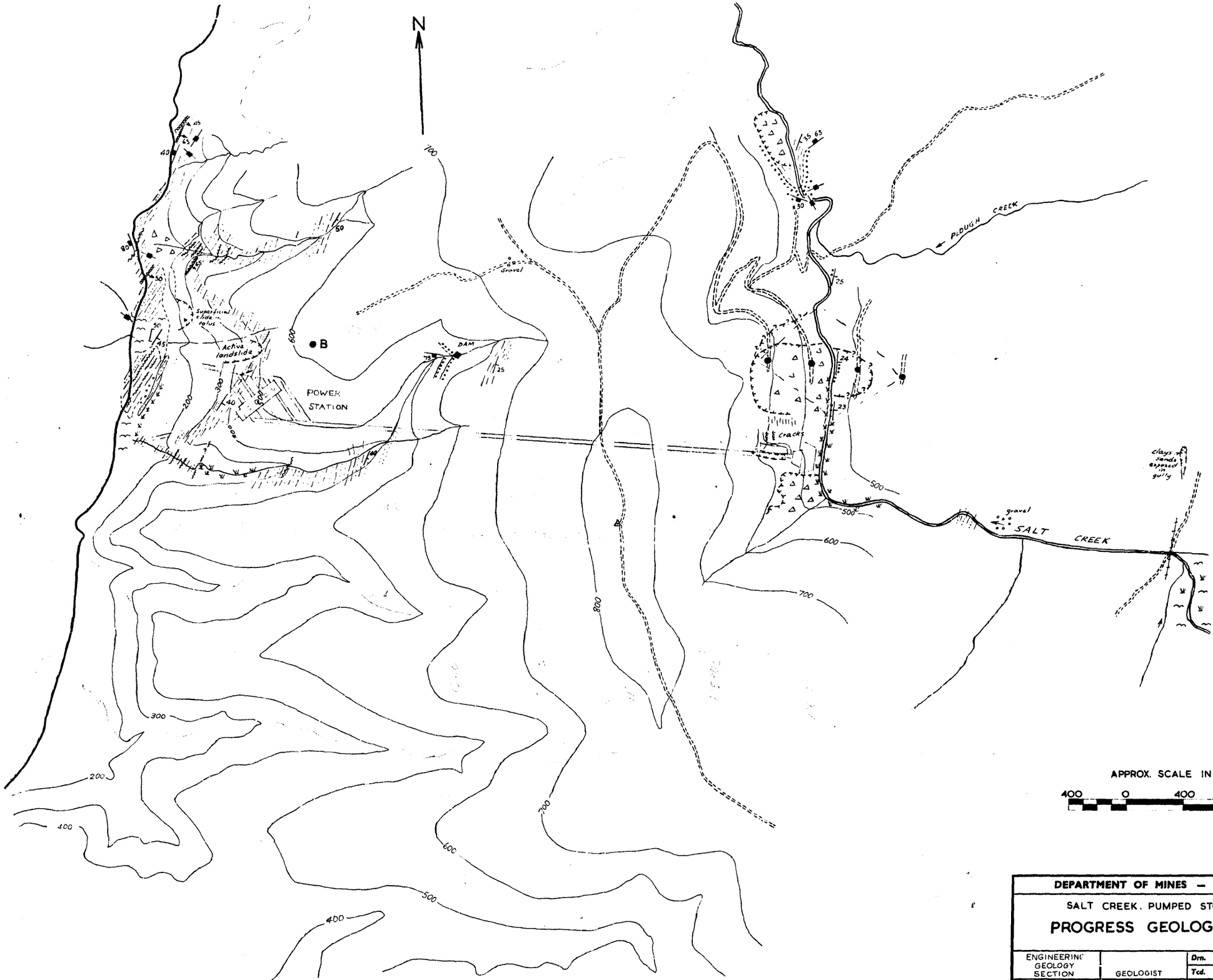


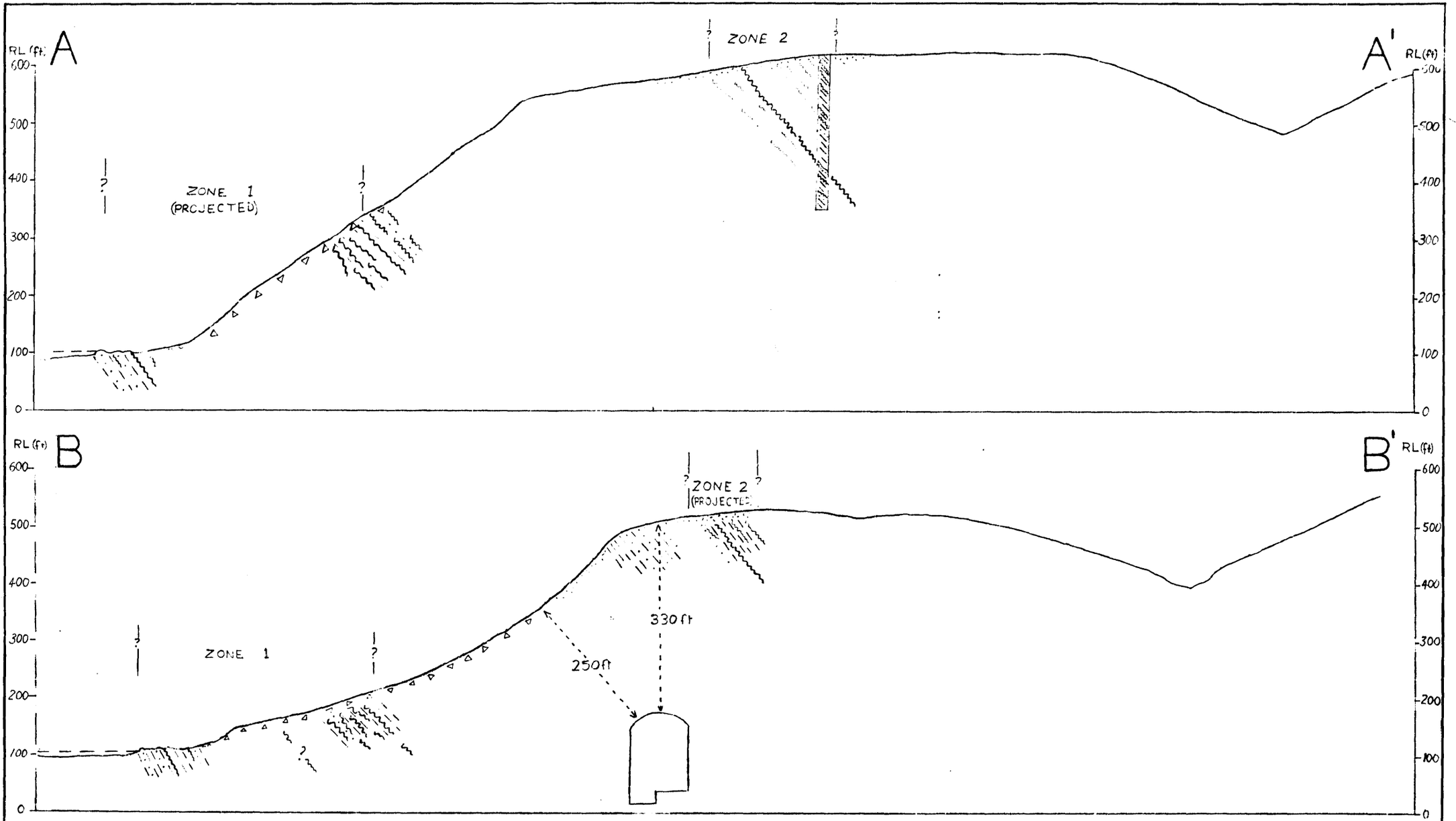
FIG.1

DEPARTMENT OF MINES — SOUTH AUSTRALIA

SALT CREEK. PUMPED STORAGE SITE.

PROGRESS GEOLOGICAL PLAN

ENGINEERING GEOLOGY SECTION	GEOLOGIST	Drn.	SCALE: As Shown
		Tcd.	65-1312 Hc7
Director of Mines		Ckd.	
		Exd.	DATE:



LEGEND

- SOIL and rock fragments
- TALUS.
- GREYWACKE.
- SCHIST.
- QUARTZITE.
- ZONE OF SHEARING

SCALE IN FEET

100 0 100 200 300

FIG. 3

DEPARTMENT OF MINES — SOUTH AUSTRALIA

SALT CREEK PUMPED STORAGE PROJECT

POWER STATION AREA

GEOLOGICAL SECTIONS

		Drn. JPT	SCALE: As Shown
		Tcd.	66-163 Hc 7
		Chd.	
Director of Mines		Encl.	DATE: 15 Feb '66