DEPARTMENT OF MINES

SOUTH AUSTRALIA

Report on

QUARTZITE DEPOSIT

SECS. 1108, 1109, HD. ADELAIDE, CO. ADELAIDE

(WHITE ROCK QUARRIES LTD.)

by

L. G. HIXON
Geologist

CONTENTS

MAP NO.	TITLE	SCALE
57-293	Quartzite Deposit Secs. 1108, 1109, Hd. Adelaide, Co. Adelaide. White Rock Quarries Ltd. Geological Plan and Sections	1" = 100'

H.O. Report Refer 45/54

G.S. Report Refer 781

D.M. 1084/57
Vide 920/51

13th September, 1957

DEPARTMENT OF MINES
SOUTH AUSTRALIA

Report on

QUARRIES PROPOSED

SECS. 1100, 1109, HD. ADELAIDE, CO. ADELAIDE

(WHITE ROCK QUARRIES Ltd.)

1. ABSTRACT

Quartzites, sandstones, phyllitic slates and quartz ankeritic dolomite belonging to the "Stonyfell Quartzite and "upper phyllites" formations of the Torrensian series in the Adelaide System rocks occur in the above sections. Quartzite and sandstone reserves available are estimated at about 50% of the calculated volume of 3½ million cubic yards. Beds exposed in the quarry and in the western part of the section are thought to be overturned to the west.

2. INTRODUCTION

Following instructions from the Director of Mines, a geological survey of the above sections was carried out on five days between 24/6/57 and 1/8/57.

The purpose of the survey was to assess the quality and quantity of stone contained in the above sections, and to aid in the planning of future development of the quarry.

The area surveyed is part of a Hills Range running in an east-west direction, and could briefly be described as rugged, with slopes up to 45° on the flanks and generally covered with dense scrub.

3. REGIONAL GEOLOGY

Sediments in the area belong to the Torrensian series in the Adelaide System rocks of Pre Cambrian age, and consist of quartzites, , sandstones, phyllitic slates and ankeritic quartz dolomite. The quartzites mapped belong to the Stonyfell Quartzite formation. It is thought that the phyllitic slates and ankeritic quartz dolomite are part of the "upper phyllites" formation in which narrow beds of quartzite occur.

4. LOCAL GEOLOGY

Stonyfell Quartzites

(i) Quartzites. Two horizons of good quality stone occur in the area mapped. The most important is that in which the existing quarry is now operating. This horizon is about 100' thick, strikes northerly and has a general easterly dip, being overturned to the east at the top of the hill. The rock is massive, dense, tough, highly siliceous and white to slightly pink in colour. Petrologically it is referred to as "a coarse, highly stressed and recrystallised slightly arkosic quartzite" (See appendix L.C.E/50). The recrystallised material is in optical continuity with the original grains. At the crest of the hill a slightly inferior quality stone is found interbedded in this horizon (See Map No. 57-393). It is thought that the quality of this stone has improved down dip due to secondary silicification, making it practically indistinguishable from the surrounding stone. The other quartzite horizon outcrops near the eastern boundary fence on the southern flank of the hill and can be traced, from creek level for approximately 120' uphill to the north. Above this, bedrock is obscured by a mantle of floaters, soil and humus. Above the obscuring floaters and soil cover, shallow dipping massive quartzites and sandstones outcrop. There is some evidence to suggest a small fault between these outcrops.

Both these horizons outcrop best on the southern slope of the area mapped. On the northern flank exposures are poor and the location of boundaries has been projected from contacts observed elsewhere.

(ii) Sandstones. The term sandstone is used here as a group name for a series of massive to thinly bedded sandstones, sandy mica schists, thin quartzite beds and thin phyllitic slate beds. Since the quartzites vary in thickness from about 1 inch to a few feet in thickness, they could not be selectively quarried, and because of this have been grouped in the sandstones.

Two horizons of sandstone have been mapped as shown on the accompanying plan. In both horizons the stone is of poorer quality than the quartzites. The eastern sandstone horizon is generally of better quality than the western one, which is thought to be too poor to quarry.

In the field, the sandstone is usually identified because of its rougher surface appearance, greater porosity, iron staining and tendency to crumble when struck with a hammer. On the southern flank the sandstone outcrops, and sandstone floaters generally, have peripheries of white sandstone containing kernels of iron stained sandstone; the peripheries where seen varied between 1/10" and ½" thickness. It is suggested that the iron has been leached from the surface of these rocks by organic acid produced from the rotting vegetable matter.

At depth, the quality of the stone in this eastern sandstone horizon appears to improve, suggesting secondary silicification.

"Upper phyllites". These sediments occur to the west and apparently below (stratigraphically above) the Stonyfell quartzites in the area mapped. They consist mainly of green phyllitic slates with minor interbedded quartzites and dolomitic beds.

Phyllitic slates. These sediments were observed in road cuttings to the operating quarry. Normally they do not outcrop in the mapped area except at the crest of the hill. The beds are usually green in colour weathering to a mustard colour and eventually form a residual red brown clay.

An arkosic quartz dolomite horizon interbedded in the upper phyllites is exposed in the ~~top of the~~ access road to the operating quarry. The rock is weathered to an off white colour which makes it stand out conspicuously from the darker coloured slates around it. Just east of this exposure of arkosic quartz dolomite the sediments are intensely contorted.

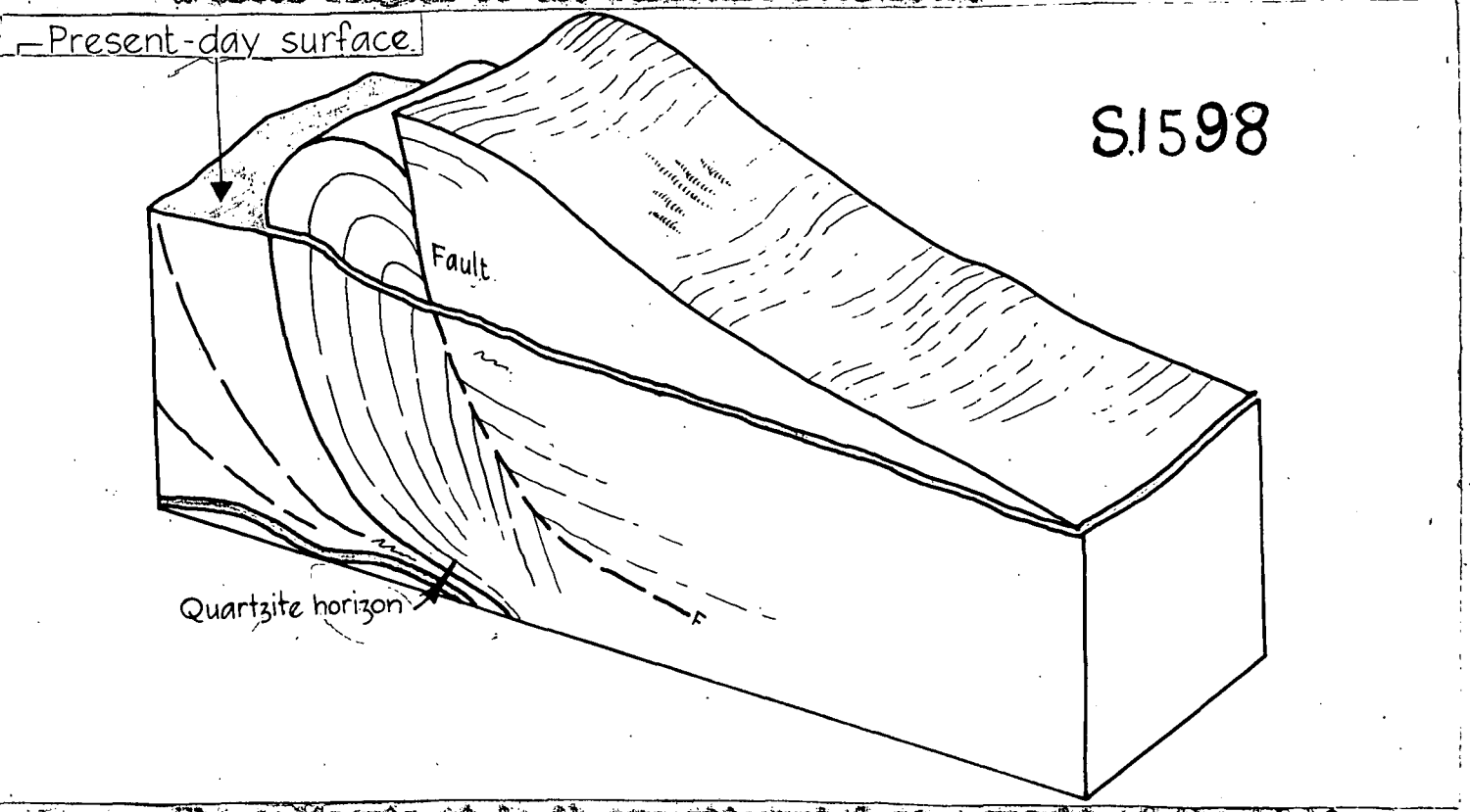
Quartzite. A fairly good quality white quartzite horizon occurs interbedded in the "Upper phyllites", and has been mapped to the eastern boundary fence on the northern flank of the hill. It is expected that this quartzite horizon is the same as that quarried at the original White Rock Quarries at creek level in Horsnells Gully. (See Map No. 57-293). However the rapid thickening of overburden due to the slope of the hill rules it out as a possible source of stone.

5. STRUCTURAL GEOLOGY

Faulting. No evidence of a major fault limiting the extension of the Stonyfell Quartzite to the north or west was found. This is at variance with the structure as shown on the geological map of the Adelaide Military Sheet which shows the Stonyfell fault bounding the quartzite to the west and north. A small fault has been inferred near the eastern boundary fence to explain the relationship of the steep dipping underlying beds to the flat lying beds above (see Map No. 57-293 section A-B). Some evidence to support this inferred fault was found in the form of brecciated rock with quartz veinlets shown on the accompanying map.

Folding. The nature of the folding in the area surveyed became evident with fairly detailed mapping. It was found that at the crest of the hill the angle of dip was slightly but persistently to the west, immediately below the crest the beds were vertical or dipped steeply eastwards, and that the angle of dip decreased down hill till at creek level on the southern slope the beds were dipping between 20 - 30° to the east. (See Map 57-293 and section A-B & C-C & E-F). It was noticed that the general direction of strike gradually swung eastwards when going from south to north as the dip of the beds flattened at the base of the hill. This indicated a broad warping in an east-west direction. Minor folding on the shallow dipping beds has been mapped as a number of differently

orientated strike dip directions near the top of the hill, in the road up Horsnells Gully, and on a slightly larger scale in the quartzite horizon within the phyllitic slates. Set out below is a block diagram of the structure described.



The sediments at depth are attenuated as a result of the tight folding. This attenuation together with an increase in the angle of dip of the beds uphill, minor drags and cleavage indicate that the beds in this area are probably overturned forming the western limb of an anticline overturned to the west.

6. RESERVES

The volume of stone in the shaded area is estimated at about three and a half million cubic yards, of this about 35% would not be available because of a 60° batter on the quarry face, and a further 15% would probably be taken up for benches. Other factors which may reduce the volume of stone available would be proximity of houses to the blasting on the northern side of the old Barton Summit road. The better quality stone is estimated to be approximately 30% of the calculated volume.

7. CONCLUSIONS

Quartzite, sandstones, phyllitic slates and dolomite of the Stonyfell Quartzite and "upper phyllite" formations of the Normanton series have been mapped in the above sections. No evidence was found of any major faulting, but a small thrust fault has been inferred in the eastern portion of the sections.

Beds exposed in the quarry and in the western parts of the sections are thought to be overturned, forming the western limb of an anticline overturned to the west.

Reserves available for quarrying are estimated at less than 50% of the calculated volume of 3½ million cubic yards. Good quality quartzite is approximately 50% of the total calculated volume.

L.G. Hixon
GEOLOGIST

LGH:AGK
19/9/57

APPENDIX I

Dept. Sample No. P. 306/57 - P. 308/57

PETROLOGICAL REPORT

Description of Sample(s) L.G.H./48, L.G.H./49, L.G.H./50

Marks or Nos. -

Locality etc. County and Hundred of Adelaide; Section 1108 and 1109.

Submitted by L.G. Nixon, Mineral Resources Section

L.G.H./48 - A uniform fine-grained quartz-dolomite rock.

There is about 25% of quartz, 75% slightly ankeritic dolomite (Re - 1.685 - 1.690), and traces of opaque matter, biotite, muscovite and zircon.

Most of the grains are elongated, the average grain size of both constituents being about 0.01 x 0.04 mm. The largest grain observed (quartz), measured 0.05 x 0.1 mm. Lineation is very highly developed and there is only a slight tendency for quartz to segregate along definite layers. The quartz grains are virtually devoid of any optical effects indicating strain.

L.G.H./50 - A coarse, highly stressed and recrystallised, slightly arkosic quartzite.

There is between 5% and 10% of felspar, mostly microcline, in rounded grains 0.2 - 0.6 mm. in diameter. Many are slightly iron-stained, and a high proportion are shattered perpendicular to the line of elongation of the quartz.

The quartz is usually angular with margins sometimes coronulated and interlocking. A high degree of strain polarization is universal; in addition many of the grains are elongated and even eye-shaped, the interstices having been filled by extensive recrystallisation of the quartz in optical continuity with the original grains. The alignment of the quartz grains is rough but persistent, although locally masked by occurrence of occasional grains which are elongated in a different direction. The cracks in the felspar grains are usually filled with secondary quartz which is often in optical continuity with adjacent quartz grains. Strain polarization affects the entire grain and must have partly post-dated recrystallisation. Sericite is considerably less abundant than in L.G.H./49, and few of the grains are coated with it.

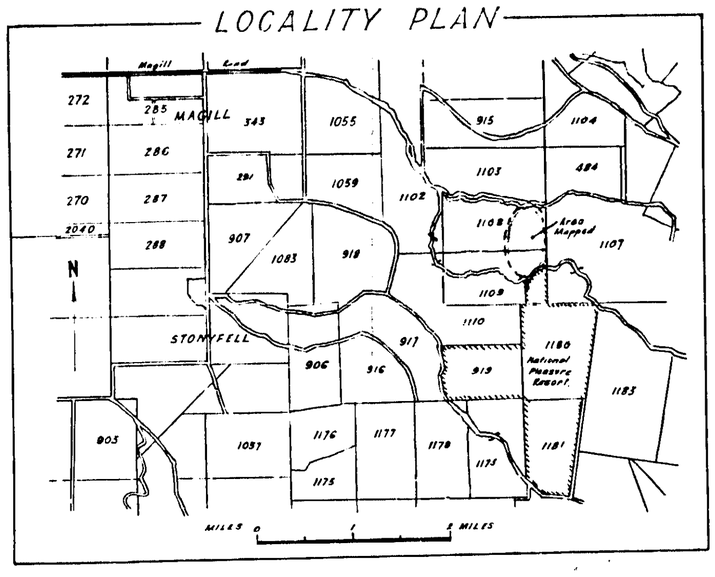
Despite the intense stress, the slight lineation and the cracking of the felspar grains the strength of this material has been greatly enhanced by the extensive recrystallization.

Examined by: M.J. Buchnell

A.B. Whittle,
CHIEF MINERALOGIST AND PETROLOGIST

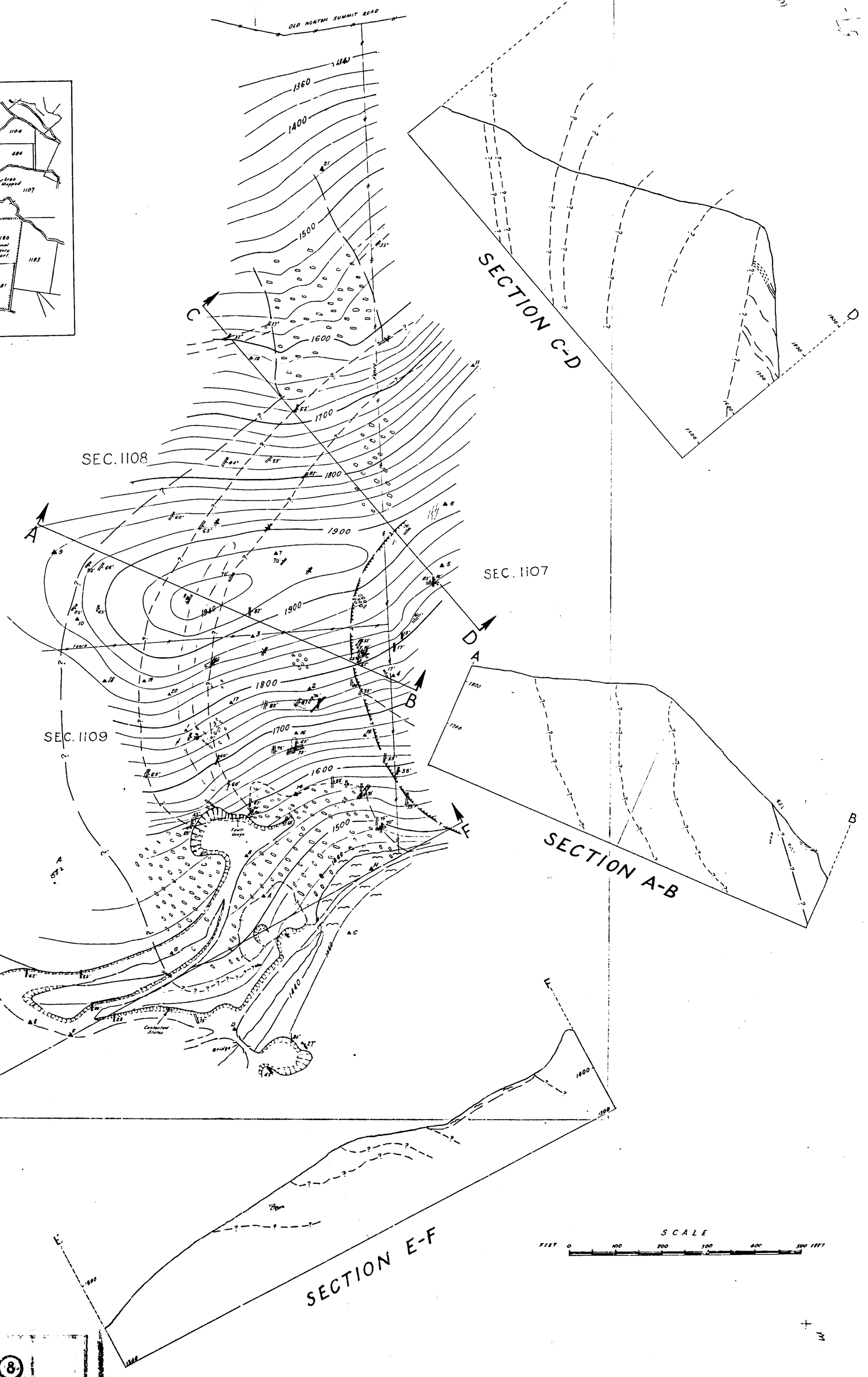
12/3/57

LOCALITY PLAN



LEGEND

- QUARTZITE
- SANDSTONE & SILTY SLATES
- QUARTZ DOLOMITE & DOLOMITIC SLATES
- QUARTZ VEINLETS
- ALLUVIUM — SOIL COVER
- QUARTZITE & SANDSTONE FLOATERS
- STRIKE & DIP OF BEDDING — 60°//
- " " " " JOINTING — 50°//
- " " " " CLEAVAGE — 10°
- " " " " FAULT — 17°
- OVER-TURNED BEDDING
- THRUST FAULT
- QUARRIES
- GEOLOGICAL BOUNDARIES (Inferred) — ---?---?
- CONTOURS - 20' INTERVAL — 1200
- SURVEY STATIONS — ▲ 19
- DRAG FOLD ------ ϟ ROAD ------



SCALE IN FEET 100 0 100 200 300 400 500

SCALE IN METRES 50 0 50 100 150

8

SCALE FEET 0 100 200 300 400 500 FEET

To accompany report by L.G. Nixon, Geologist.

S.A. DEPT. OF MINES

QUARTZITE DEPOSIT
SECS. 1108 & 1109. HD. ADELAIDE. Co ADELAIDE.
(WHITE ROCK QUARRIES LTD.)
GEOLOGICAL PLAN & SECTION.

Reg No.
D.M
Compiled from Stadia Survey by M.B. Longford S.K.S. No 88

Assoc. Drawing | No. | No. | Amendment | Init. | Date

Approved	Passed		Scale 100 feet to 1 inch
		Drn M.B.L.	57 - 293
		Tcd. W.J.T	No 6
Director of Mines	C.D.	Ckd.	
		Exd.	Date 16 · 9 · 57

LEGEND

Alluvium

Quartzite

Sandstone & silty slates

Slates

Quartz dolomite & dolomitic slates

Quartzite & sandstone floaters

Quartz veinlets

REFERENCE TO SIGNS

Strike & dip of bedding 44

" " " " Vertical

" " " " Horizontal

Strike & dip of cleavage 70

Strike & dip of jointing

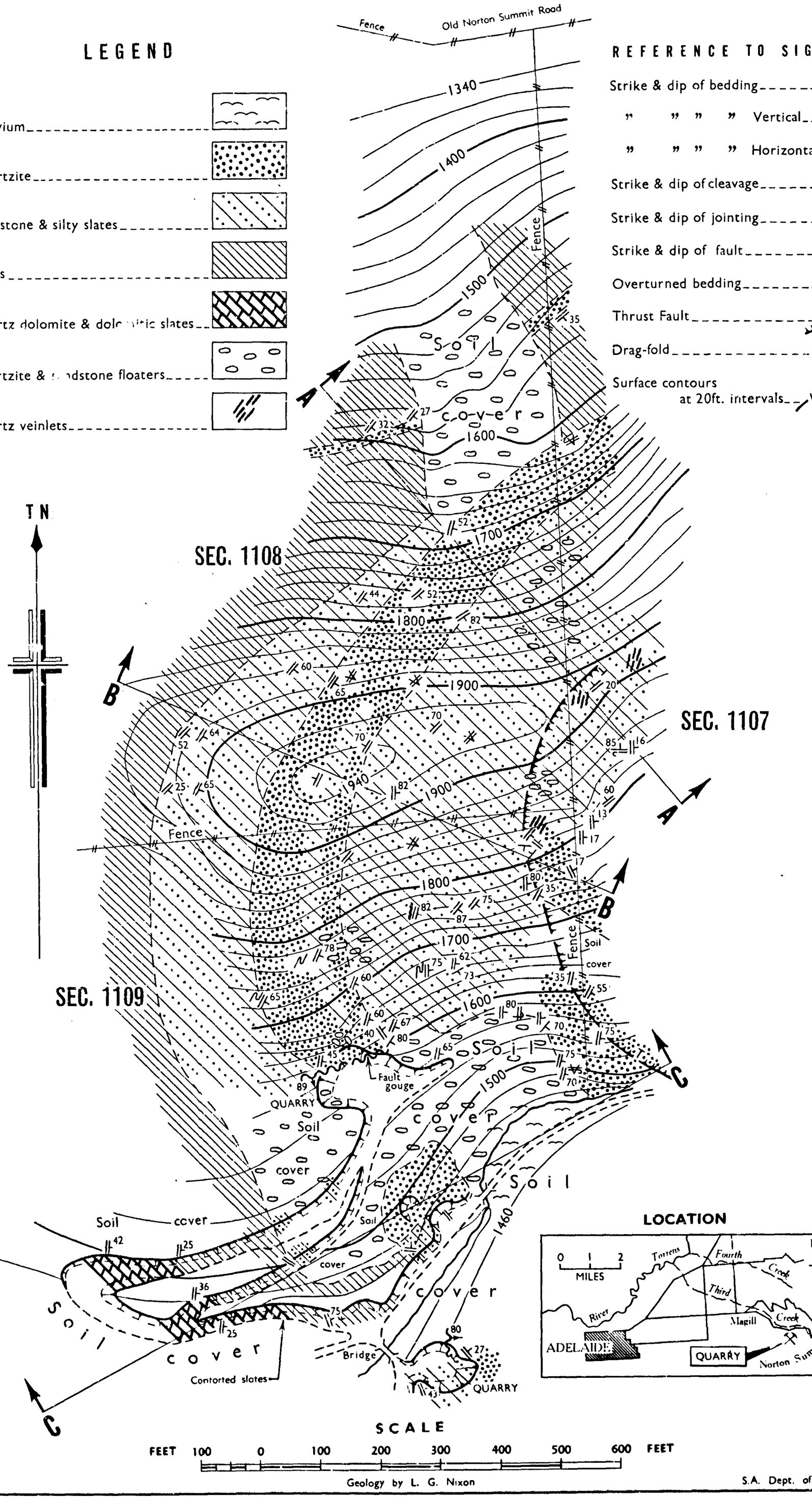
Strike & dip of fault 80

Overturned bedding

Thrust Fault

Drag-fold

Surface contours at 20ft. intervals 1500



LOCATION

SCALE

FEET 100 0 100 200 300 400 500 600 FEET

Geology by L. G. Nixon

S.A. Dept. of Mines

Reduce this line to 7½ inches

SCALE IN FEET
100 0 100 200 300 400 500

SCALE IN METRES
50 0 50 100 150

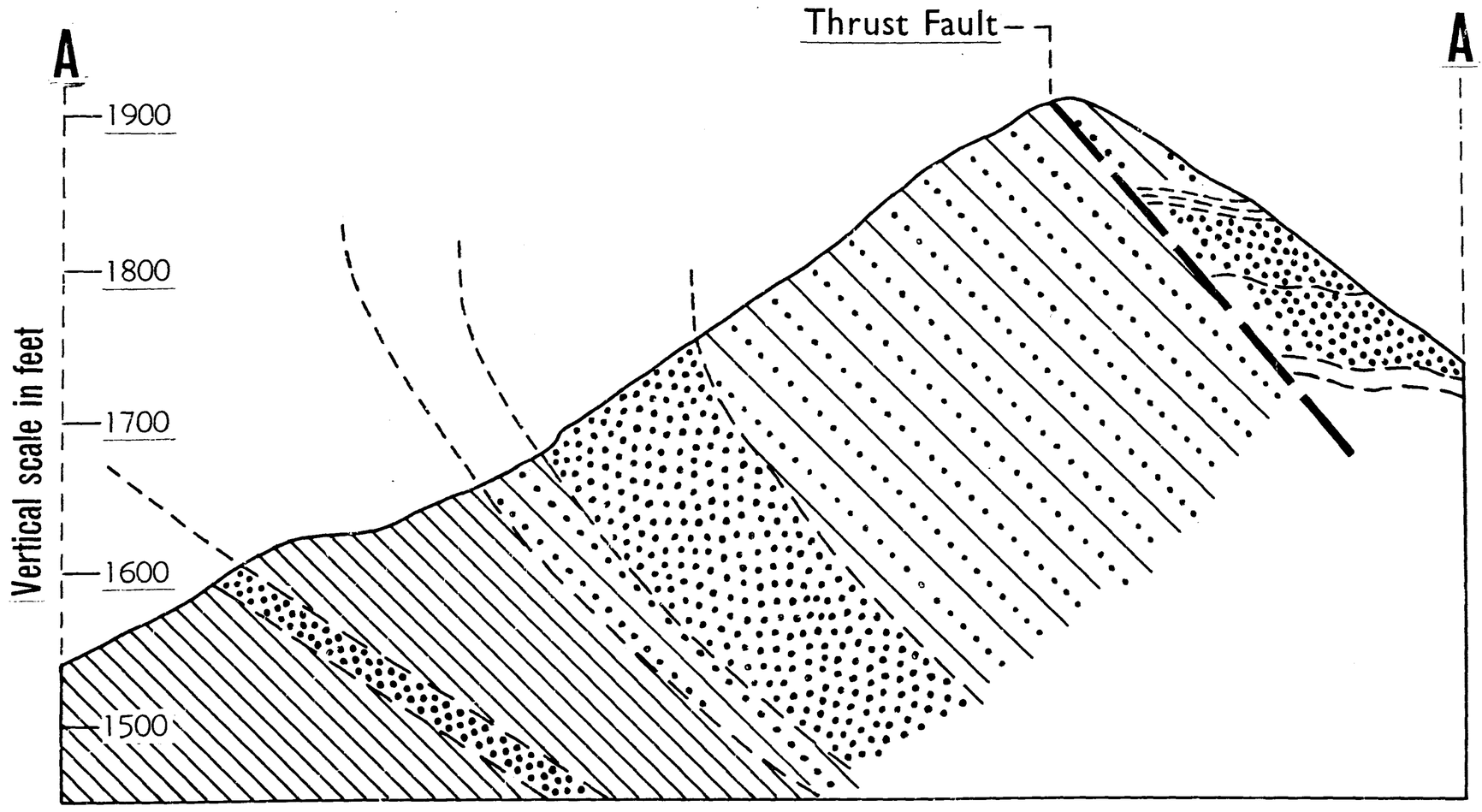
8 GEOLOGICAL PLAN OF QUARTZITE DEPOSIT (WHITE ROCK QUARRIES LTD.)

SECS. 1108, 1109 HD. ADELAIDE CO. ADELAIDE

Rev.107

Director of Mines	Drn. B.T.	57-293/4
	Chd.	Ha6
	Passed	Date: 8-5-59

2400



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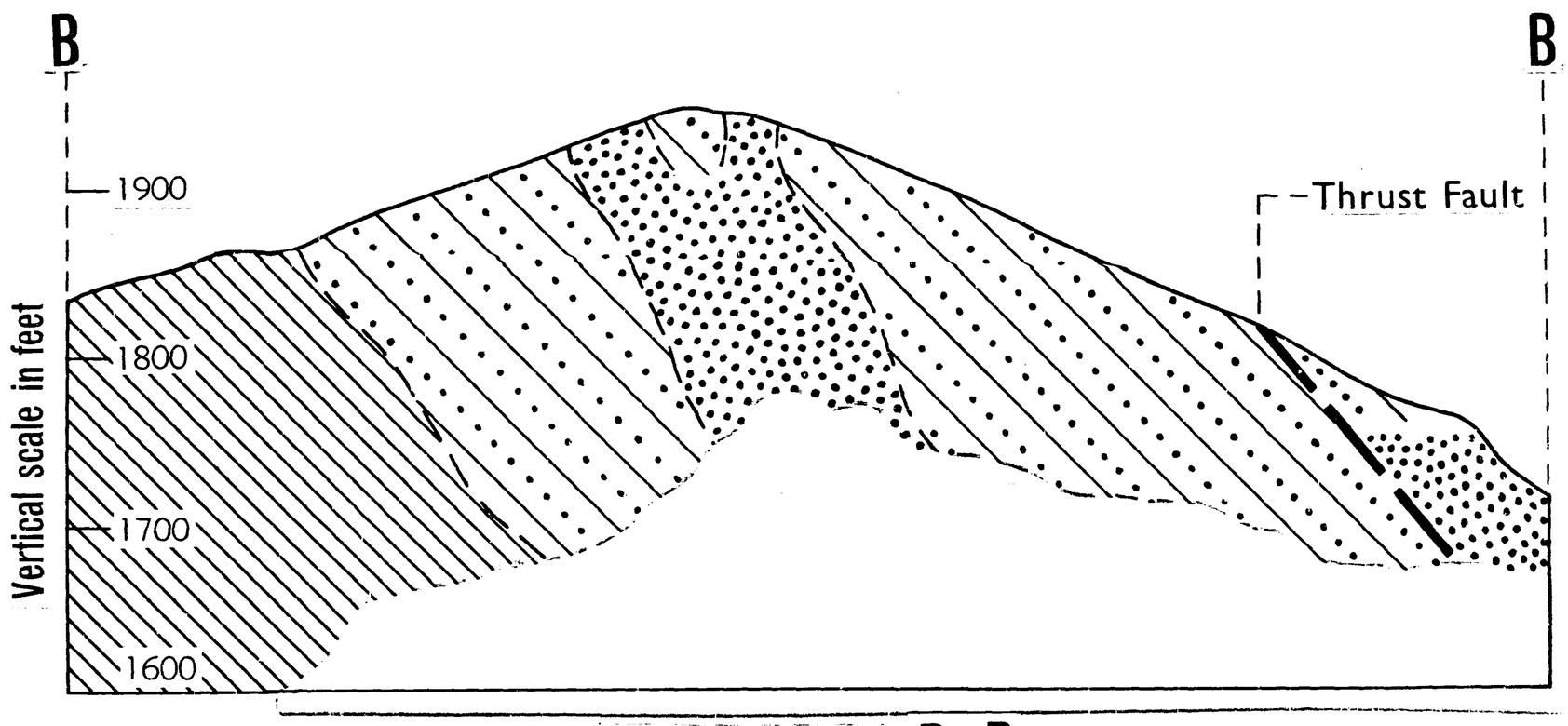

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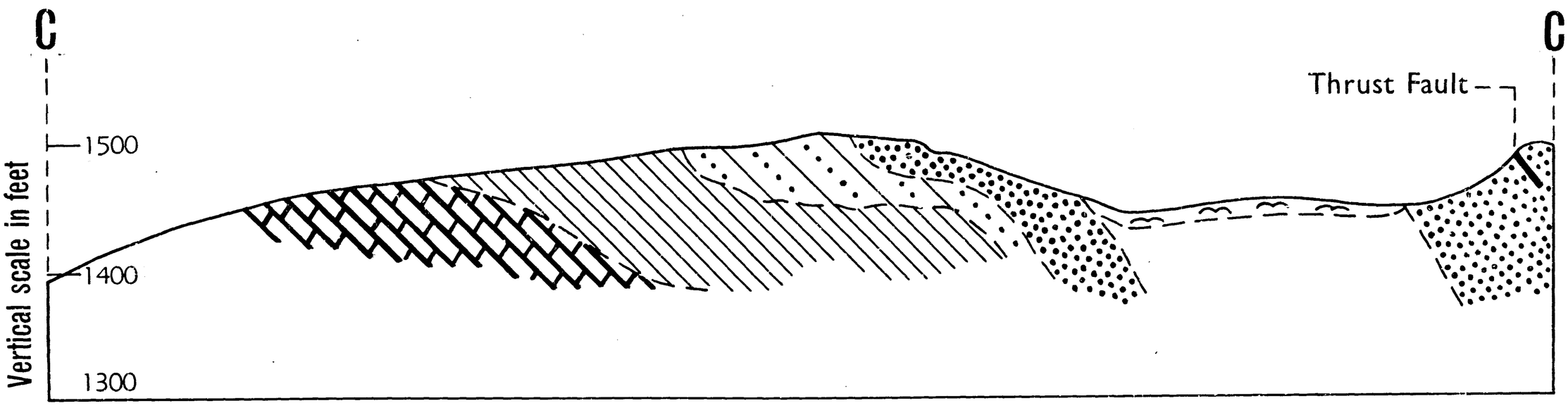

SECTION C C

SCALE

FEET 100 0 100 200 300 400 500 FEET

LEGEND

Alluvium

Quartzite

Sandstone & silty slates

Slates

Quartz dolomite & dolomitic slates

Geology by L. G. Nixon

S.A. Dept. of Mines

Reduce to 5 inches

GEOLOGICAL SECTIONS OF QUARTZITE DEPOSIT (WHITE ROCK QUARRIES LTD)

SECS. 1108, 1109 HD. ADELAIDE CO. ADELAIDE

Rev. 107

Director of Mines	Drn. B.T. / Ckd. / Passed	57-293A/4 Ha6
		Date: 11-5-59