DEPARTMENT OF MINES

SOUTH AUSTRALIA

Report on

DIAMOND DRILLING FOR ROAD MAKING MATERIALS, SECTION 214, HD. NANGKITA

(Highways & Local Govt. Dept.)

by

E.A. Clothier

ENGINEERING GEOLOGY & MINERAL RESOURCES SECTION

GEOLOGICAL SURVEY

TABLE OF CONTENTS

Plan References	Title	Scale
57-80	Road Metal Deposit Pt. Section 214, Hd. Nangkita	1" = 100'

D.M. 848/56
vide 790/50

H.O. Report Refer 44/19

G.S. Report Refer 635.

18th February, 1957.

D.M. 824/56
Vide 790/50

DEPARTMENT OF MINES

SOUTH AUSTRALIA

DIAMOND DRILLING FOR ROAD MAKING MATERIALS

SECTION 214, HD. GOOLWA

(Highways & Local Govt. Dept.)

1. ABSTRACT

An area of variably banded calc-silicate rock and Houghton 'syenite' of Archean origin forms a sharp hill on Pt. Section 214, Hd. Nangkita. Portion of this hill has been test drilled in a search for bitumen aggregate.

The required 50,000 yards is readily available and the material appears to be of fair to good quality.

The final decision regarding quality awaits the results of specific tests being conducted by the H. & L. G. Dept.

2. INTRODUCTION

The proposed quarry site was first examined by Senior Geologist L.W. Parkin in 1950. A short report (D.M. 790/50) was prepared together with a topographic plan of the area (See plan 50-450).

A further enquiry (2/8/56) was received from the H. & L.G. Dept., following which diamond drilling was recommended by Geologist R.C. Mirams (28/8/56) with a view to "proving the quality of the stone available and in locating a suitable face to work". Two 60' D.D. holes were completed on 30/11/56 (Holes No. 1 & 2 plan 50-450).

The writer considered that the evidence available at this stage was inconclusive and recommended another 100' hole (Hole No. 3). This was completed on 24/1/57.

3. GEOLOGY

From D.M. 790/50 by L.W. Parkin -

"The proposed site is on the southern slope of the Mt. Compass ridge, immediately south of the trigonometric station. The rock exposures are a phase of the Barossian complex which several miles to the east underlies the Adelaide System. The various rock types grouped together as the Barossian complex consists largely of schists, gneisses and basic igneous types, but at the site selected there occurs a fine to medium grained rock very similar in appearance and composition to the Houghton 'syenite'. The texture varies somewhat from being even grained in the main to phases which are finely gneissic or coarsely pegmatitic. The greater part of the outcropping material is sufficiently tough and even grained to serve the purpose in view."

Before metamorphism, the rocks at the site consisted of an interbedded sequence of banded and even-grained calcareous or dolomitic sandstones. With intense metamorphism these beds have been converted to either a banded calc-silicate metasediment or a more massive even-grained metasediment resembling a syenite in composition and appearance.

The sediments have also been severely and tightly folded during several orogenic phases from the Archean onwards. A partial mobilisation or granitisation accompanied the above processes resulting in the concordant and discordant pegmatitic phases which now intersect the beds.

The overall effect of this prolonged tectonism on the Archean sediments is regionally observed as the Barossian complex and locally accounts for the rock types found at the proposed site, viz -

(a) Variably banded calc-silicate metasediment containing felspar, quartz, amphibole, ilmenite in order of abundance.

(b) Even-grained calc-silicate metasediment of syenitic appearance with little or no trace of relict bedding. Felspar, amphibole, quartz, ilmenite.

(c) Coarse-grained, partially mobilised metasediment of gneissic appearance. Felspar, quartz, amphibole, ilmenite. Gneissic band ing parallel to relict bedding.

(d) Leucocratic discordant 'pegmatite'. Quartz, felspar, ilmenite.

In situ outcrop within the area is very limited and geological mapping amounted to taking isolated dip and strike

readings (These have been added to the preliminary map 50-450 prepared by L.W. Parkin). Structural indentification of individual beds was impossible.

From the limited evidence available from the surface geology and that revealed by the boreholes a tentative synclinal structure is proposed. (See Section AA 57-80). This is in accord with regional mapping by Geologist R. Horwitz of the Regional Mapping Section.

4. DRILLING

Two 60' vertical diamond drill holes (Nos. 1 & 2 Plan 50-450) were scheduled and drilled. Another 100' vertical hole (No. 3) was subsequently drilled on the recommendation of the writer to obtain more conclusive evidence within the likely quarry area.

5. DRILLING RESULTS

The material encountered in all three holes can be generally classed as variably banded calc-silicate metasediment randomly intersected by pegmatitic intrusions. (See appended bore hole logs).

Hole No. 1. This hole shows a good core recovery over most of its length, more than half of the material being pegmatitic. An inspection of the core from No. 1 suggests fair to good material for bitumen aggregates over the whole length.

Hole No. 2. The upper 40' of hole shows poor recovery - the material recovered being a poor quality, badly weathered gneissic metasediment of doubtful value. The lower 20' is good material.

Hole No. 3. The material intersected is mainly calc silicate rock. Poor core recovery in the upper 40' suggests questionable material. The lower 60' is in good to excellent material.

6. SUITABILITY OF MATERIAL

The variably banded calc-silicate rock grades from a well banded material to the massive homogeneous 'syenite'.

From the viewpoint of hardness both materials appear to be satisfactory.

However, some trouble may be encountered in obtaining an equi-dimensional product from the banded material due to a tendency to part along the relict bedding planes. This effect is likely in some degree with at least 50% of the product.

A major portion of the material within the tested area is of medium to fine grain size and contains varying amounts of amphibole mineral. Both of these properties are understood to be advantageous in regard to bitumen adhesion.

The final decision of suitability rests on the results of specific tests carried out on the outcrop and core material by officers of the H. & L.G. Dept.

7. POSSIBLE QUARRY SITE

A possible quarry site is indicated on plan 50-450. This site is selected for the following reasons -

(1) Geological evidence points to an adequate tonnage of material similar to that outcropping.

(2) The site is reasonably well removed from the farm dwellings shown on the map. A compromise must be reached between this and the elevation of the quarry floor.

(3) The quarrying can be carried out in an easterly direction the effect of blast then being largely westward.

(4) The overburden of soil and weathered rock is a minimum within the area. The average depth of this material is likely to be about 5'. The greatest thickness of overburden would lie above the 190' contour and could be bulldozed off the site to the east and west.

(5) The available downhill grade from the quarry floor would facilitate an efficient layout of the crushing plant with the storage bins well situated with regard to the access road, viz Bahloo Glen Rd.

(6) At any future date the quarry could be extended to the northwards to supply at least another 100,000 tons of similar material. A deeper overburden could be expected in this case, probably approaching 10' average.

8. CONCLUSIONS

A total of 150,000 yds. of material is available in the quarry as shown on map 50-450. A maximum of 20,000 yds. of this could be expected as soil and 2nd grade weathered rock overburden.

A few pockets of more deeply weathered material probably occur, but would account for only minor tonnages.

Similar tonnages of the same material would become available by extending the quarry northward or by lowering the quarry floor.

Decisions regarding the overall quality of the material at the proposed site should be based on the cores from boreholes No. 1 and No. 3 which can be taken as representative. These cores have been delivered to the H. & L.G. Dept.

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ENG. GEOLOGY & MINERAL RESOURCES SECT.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

DIAMOND DRILL LOG

6627-456 D.M. 848/56

Diamond Drilling for Road Making Materials,
Sec. 214, Hd. Nangkita.
(Highways & Local Govt. Dept.)

Bore No.:	1	Bore Serial No.	D.D. 144/56
Hundred:	Goolwa	Plan Reference:	57-80
Depth:	61' 18.59	R.L. of Collar:	195' approx 59.44
Depression:	Vertical	Driller:	M.E. Kamaruts.
Date Drilling Commenced:	19/11/56	Date Drilling Finished	26/11/56

OBJECT: Search for Material for Bitumen Aggregate.

GEOLOGICAL LOG

From Ft.	From Ins.	To Ft.	To Ins.	Description	Recovery
0		10	0	Weathered coarse-grained 'syenite' type metasediment. Quartz and ilmenite residual. Felspar and amphibole weathering.	60%
10	0	12	0	Pegmatitic phase. Mainly pink coarsely crystalline felspar, sporadic ilmenite and quartz.	80%
10	0	28	0	Variable, banded metasediment akin to Houghton 'diorite'. Bands of felspar and quartz with dark coloured bands of calc-silicate minerals. Relict bedding 65° at 15') 50° at 20') with core axis 50° at 24') Coarse grained partly pegmatic at 20'-28'	20%
28	0	35	0	Fine grained gneissic 'syenite'. High proportion amphibole. Ilmenite in varying proportion throughout. Bedding 70° at 30') with core 75° at 33') axis.	20%
35	0	43	0	Coarse-grained pegmatite type material with clots of amphibole	20%
43	0	50	0	Very hard, banded coarsely crystalline quartz, felspar, ilmenite rock	80%

From Ft.	From Ins.	To Ft.	To Ins.	Description	Recovery
50	0	53	0	Gneissic 'syenite'. Bedding at 55° with core axis	80%
53	0	59	0	Pegmatitic rock. Quartz, felspar.	70%
59	0	61	0	Fine grained well bedded sandy metasediment with gneissic appearance. Grey appearance. Felspar, quartz, mica are major minerals. Bedding at 70° with core axis.	20%

Mainly good material from 10 ft. to 61 ft.

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SOUTH AUSTRALIA

DIAMOND DRILL LOG

6627-454 D.M. 848/56

Diamond Drilling for Road Making Materials
Section 214, Hd. Nangkita
(Highways & Local Govt. Dept.)

Bore No.:	2	Bore Serial No.:	D.D. 510/56
Hundred:	Goolwa	Plan Reference:	57-80
Depth:	60'6" 18.44	R.L. of Collar:	200' approx. 60.96
Depression:	Vertical	Driller:	M.E. Kamaruts
Date Drilling Commenced:	27/11/56	Date Drilling Finished:	5/12/56

OBJECT: Search for Material for Bitumen Aggregate

GEOLOGICAL LOG

From Ft.	From Ins.	To Ft.	To Ins.	Description	Recovery
0		3	0	Mainly lumps residual quartz and ilmenite with some weathered gneiss	30%
3	0	7	0	Badly weathered coarse grained gneissic metasediment. Mica bands show considerable shearing. Relict bedding at 45° with core axis	30%
7	0	20	0	Few pieces as above. Weathered mica and felspar content lost in drilling	5%
20	0	37	0	As above but becoming increasingly finer grained.	30%
37	0	42	0	Fine grained, finely banded dark coloured metasediment of gneissic appearance. Felspar, quartz, biotite amphibole. Bedding at 80° at 37' / 70° at 40' } to core axis. Quite good material but would tend to part on bedding planes when crushed.	20%
42	0	53	0	As above but coarser and softer. Some epidote rich bands.	60%
53	0	60	6	As 37'-42' but slightly coarser. Some epidote rich and felspar rich bands throughout	80%

Good material 37' - 60'6".

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DIAMOND DRILL LOG

D.M. 848/56

6627-455

Diamond Drilling for Road Making Materials
Section 214, Hd. Nangkita
(Highways & Local Govt. Dept.)

Bore No.:	3	Bore Serial No.	D.D. 151/56
Hundred:	Goolwa	Plan Reference:	57-80
Depth:	100' 30.48	R.L. of Collar:	202' approx. 61.57
Depression:	Vertical	Driller:	M.E. Kamaruts
Date Drilling Commenced:	7/12/56	Date Drilling Finished:	24/1/57

OBJECT: Search for Material for Bitumen Aggregate

GEOLOGICAL LOG

From Ft.	From Ins.	To Ft.	To Ins.	Description	Recovery
0		3	0	Residual sand. Permian?	
3	0	10	0	Coarse grained metasediment of pegmatitic character - pink felspar, green amphibole, ilmenite	20%
10	0	12	0	As above - finer grained	30%
12	0	15	0	Fine grained, banded metasediment - 'syenite'.	40%
15	0	20	0	Broadly banded, metasediment. Bands pink felspar, quartz and green calc. silicate minerals. Some calc. silicates becoming soft with weathering at 20'	100%
20	0	27	0	As above, but badly weathered calc. silicate	30%
27	0	31	0	As above - little calc. silicate	20%
31	0	37	0	Leucocratic pegmatite phase - quartz, felspar, ilmenite	20%
37	0	45	0	Fine grained banded 'syenite' with some shearing on calc. silicate bedding planes. Bedding at 45° to core axis	15%
45	0	52	6	Fine grained 'syenite'. Good material.	40%

Bore No. 3 (Contd.)

From Ft.	From Ins.	To Ft.	To Ins.	Description	Recovery
52	6	60	0	As above. Pocket residual sand at about 54' caused drilling trouble	30%
60	0	63	0	Banded siliceous metasediment. Quartz, felspar and amphibole, epidote. Bedding 30° with core axis	70%
63	0	66	0	Fine grained banded dense 'syenite'. Bedding at 40° with core axis	100%
66	0	68	0	Very hard interbanded pink felspar and calc.silicate. Bedding 10° with core axis	100%
68	0	76	0	As above - not so dense. Bedding 10°.	75%
76	0	78	0	Pegmatitic phase. Quartz, felspar.	70%
78	0	83	0	Coarsely crystalline phase. Felspar, weathered amphibole, large clots ilmenite.	60%
83	0	90	0	Fine even-grained slightly banded calc.-silicate rock	20%
90	0	100	0	As above. Some leucocratic bands of felspar, quartz. Bedding at 45° with core axis.	60%

Good material from 45' with very good in places.

N

Pegmatitic

Even grained

Gneissic

Even grained

Even grained

No. 1

No. 2

No. 3

A

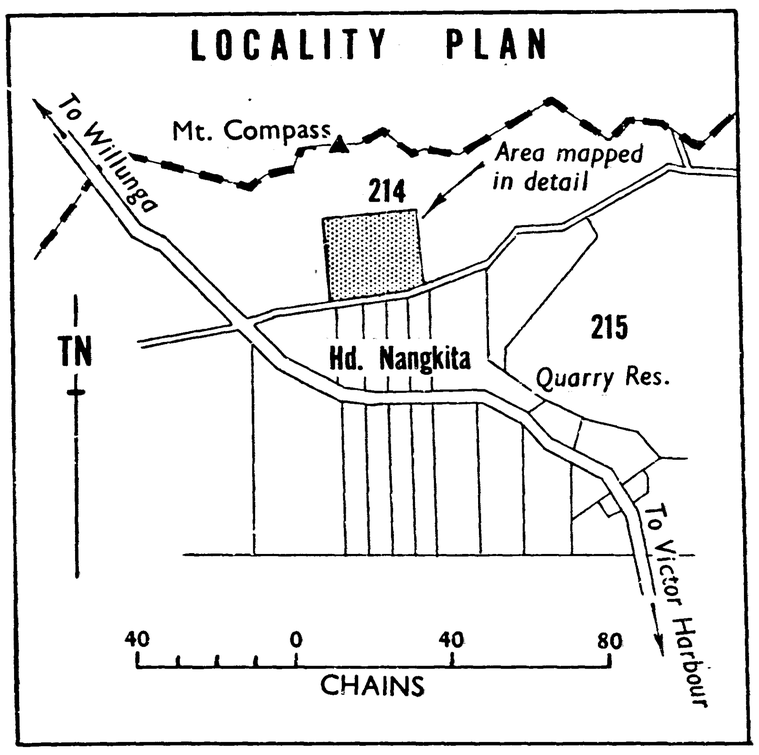
A

Occupied area

Occupied area

BAHLOO GLEN ROAD

LOCALITY PLAN



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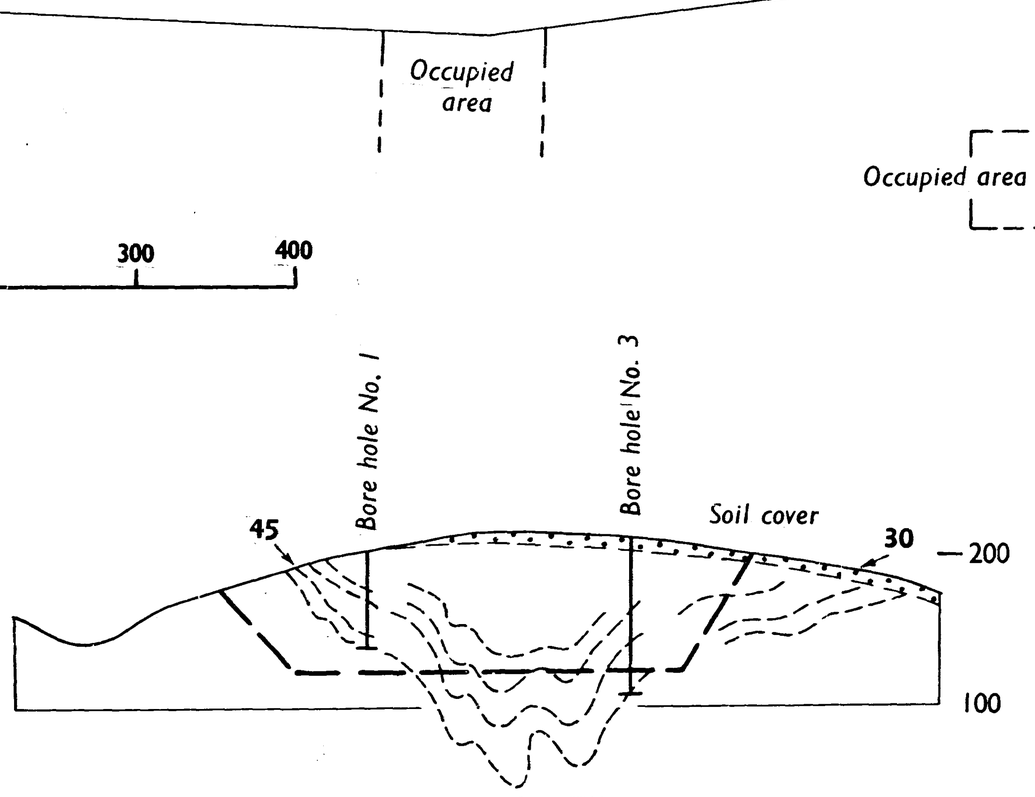

SECTION A—A

LEGEND

Outcrop

Areas of very thin soil cover

Proposed quarry

Bore holes No. 2

Contour interval 10 feet

57•80