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CONSOLIDATED GOLD FIELDS AUSTRALIA LIMITED

*Q/L 1/3*

REPORT 1975-3

FINAL REPORT

GLOVERS BLUFF QUARTZITE

S.P.L. 122 MINERAL LEASES

**PHOTOFILMED**

APRIL 1975

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## 1. INTRODUCTION

The Glovers Bluff Quartzite deposit was investigated as part of a more general study into the feasibility of ferrosilicon production at Electrona. Ferrosilicon production requires lump silica usually within the size range 10 mm to 100 mm, although the closer the limits of the size range the better. The normal source is quartzite with a purity of greater than 96% SiO<sub>2</sub>. A purity of at least 98% however is preferred. There are additional restrictions on the content of calcium, aluminium and phosphorus (preferably CaO less than 1%, Al<sub>2</sub>O<sub>3</sub> less than 1%, P<sub>2</sub>O<sub>5</sub> less than 0.1%) and the material should not break down when introduced quickly to a high temperature as occurs when charging to the furnace.

S.P.L. 122, originally held by B.R. Forster, was purchased by Consolidated Gold Fields Australia Limited and the transfer of the license was approved by the Minister on 24th July, 1974. This report covers exploration activities by Consolidated Gold Fields Australia Limited in regard to the area of S.P.L. 122.

## 2. LOCATION

Glovers Bluff quartzite deposit is situated on the Weld River, 38 km by road N.W. of Geeveston. It is 95 km from the Electrona plant by road (see Figure 1.1). It consists of several rugged, treeless bluffs, rising to a height of 200 m above the river. Access is by Forestry Department dirt roads from Geeveston. The last 2 km is by rough track only.

## 3. GEOLOGY

The bluffs have been formed from a massive series of vertically dipping quartzites of Precambrian age, that have been faulted into several blocks. Glaciation and erosion have produced a separate bluff from each fault block (see fig 1.2). The quartzites are fine - grained and contain small amounts of clay and feldspar as the only impurities.

The western side of the bluffs are relatively flat and are covered with varying thicknesses of glacial clays and tillites.

Outcrop is confined to what appears to be the central, purest portion of the succession. The faulting is probably more complex than is shown on Figure 1.2 but no other faults are visible in the outcrops.

## 4. DRILLING PROGRAMME

Four diamond drill holes were drilled on Block A (see Figure 1.2)

004  
 to examine the quality of the material at depth. The first hole G.B.1 was drilled to test the material forming the slopes of the ridge. G.B.1 was collared at the foot of the slope and drilled on an azimuth of  $213^{\circ}$  Magnetic at an angle of  $20^{\circ}$  from the horizontal. Assays showed the quartzite to be well below the desired grade. (Average of 89.79 SiO<sub>2</sub> and 5.9% Al<sub>2</sub>O<sub>3</sub>)

Details of the assays were given with Monthly Report S.P.L. 122 July 1974 and the drill log is attached as Appendix 1.

The second hole was drilled from the top of the Bluff and showed consistently pure quartzite for its whole length. The drill log of G.B.2 is given as Appendix 2. This log shows the results of assay for Fe and Al<sub>2</sub>O<sub>3</sub> following fusion on each five foot sample. As the Al<sub>2</sub>O<sub>3</sub> fell below the specified limits, bulk samples were made up for approximately 50 feet lengths and these analyzed for all significant impurities. The results are shown in Table 1.

Hole G.B.3 was collared on the same site as G.B.2 but away from the bluff. It intersected a fault zone followed by relatively impure quartzite containing over 2% Al<sub>2</sub>O<sub>3</sub> and the hole was abandoned at 115'. The drill log and assays are given as Appendix 3.

A fourth hole, G.B.4, was drilled about 100 m from G.B.2. The purpose was to confirm the surface evidence that the high grade quartzite was continuous along strike. Assays for Al and Fe were carried out and indicated similar grades to G.B.2. results are shown in Table 2.

To investigate whether the more southerly bluff, Block B of Fig. 1.2 was of similar material, four percussion drill holes were drilled. Sampling of these holes was relatively crude but the results show that the quality is comparable.

Hole	Depth (ft)	Al <sub>2</sub> O <sub>3</sub> %	Fe%
1	10 - 11'	0.61	0.038
1	20 - 21'	0.60	0.056
1	30 - 31'	0.76	0.065
1	40 - 41'	0.78	0.129
2	15'	0.99	0.034
2	16'	0.93	0.039
2	19'	1.20	0.043
3	20'	0.80	0.025
4	20'	1.57	0.063

Several surface samples have been taken from each bluff with Al<sub>2</sub>O<sub>3</sub> contents of 0.3% or less but this low figure may be affected by surface leaching.

5. TONNAGE

The purpose of the drilling on this property has been to demonstrate the quality of the material and establish the order of magnitude of the tonnages. It is not an ore resource calculation in the usual sense and, providing there is an adequate safety margin, there is no need to prove up tonnages to a higher degree of accuracy. We are dealing with a rock unit not an orebody. The quality reflects the original composition of the rock and hence variations along strike are not rapid.

Requirements are approximately 1.9 tonnes of sized quartzite per tonne of ferrosilicon (75% grade) produced. This indicates annual requirements of 108,300 tonnes dry weight (115,000 tonnes wet weight) for an output of 57,000 tonnes of ferrosilicon. Thus mining of some 175,000 tonnes per year would be required to provide the crushed and screened material.

Block A - Dimensions established by G.B.2 and G.B.4 are 130 x 100 m<sup>2</sup> (See figures 1.3 and 1.4) With a specific gravity of 2.7, this gives 35,000 tonnes per vertical metre. The total tonnage available is a function of the stripping ratio acceptable. At 100 m depth, the stripping ratio will be approximately 1:1 and the tonnage available is 3,500,000 tonnes. This is adequate for a 15 year life at 200,000 tonnes per year.

Block B - Assuming that the whole bluff represents the same part of the succession as in Block A, the dimensions of 360 x 100m<sup>2</sup> give a tonnage per vertical metre of 97,200. Again accepting a stripping ratio of 1:1 at 100m depth we have a tonnage of 9,700,000 tonnes.

Block C - Outcrop is continuous from Block A to Block C but there is no way of correlating exactly across the observed fault. However it appears a reasonable assumption that the central outcropping ridge of Block C correlates with the centre of Block A. In this case the dimensions of the block are 200x80 m<sup>2</sup> with a tonnage of 43,200 tonnes per vertical metre indicated. Due to the steeply sloping topography, this figure must be halved to give a tonnage of 2,000,000 tonnes to 100 metres depth. As no drilling has been carried out, this figure is less reliable than the other two blocks.

These figures give a total tonnage for the property of 15,000,000 tonnes with a stripping ratio of 1:1. Although these figures are naturally very crude, the margin of safety over our requirements is large enough to accept this inaccuracy. Larger quantities could easily be produced from any of the blocks by accepting a higher stripping ratio as the bluff is approximately 200 metres above the river level. In addition, quartzite that is visually similar

outcrops the northern side of the river on Camel's Back.

It is concluded that the certainty of enough quartzite at a grade less than 1.5%  $Al_2O_3$  to support a ferrosilicon operation for 15 years is great enough to make further expenditure on exploration unjustified at this stage. Potential exists to expand both production and life of project.

#### 6. BULK TESTING

Thermal stability tests were carried out on selected material from split core of diamond drill hole G.B.2. The results are shown in Table 3. However, such tests can give an indication only of possible behaviour under actual smelting conditions.

A bulk sample was therefore taken from the Glovers Bluff site and smelting performance of the quartzite and other raw materials was evaluated in a test run production of ferrosilicon at Electrona, Tasmania. A preliminary report on the testing by Sverre Olsen of Sintef Soutes, Troheim, Norway concludes "The initial performance of the smelting test suggest that the quartzite should be well suitable for the production of 75% ferrosilicon". Minor problems occur more with quartzite containing excessive amounts of fines indicating that attention would need to be given to good screening of the quartzite in any large - scale project.

TABLE 2

## ASSAY RESULTS - GLOVER'S BLUFF GB2

FROM-TO	FOOTAGE	SiO <sub>2</sub>	Fe	Al	Ca	Mg	Na	K	Ti	S	P	H <sub>2</sub> O -ve	H <sub>2</sub> O +ve	L.O.I.
25- 70	45	97.4	0.06	0.65	0.05	0.040	0.02	0.32	0.05	0.01	0.015	0.12	0.08	0.36
70-140	70	98.0	0.06	0.55	0.015	0.035	0.01	0.25	0.045	0.01	0.003	0.09	0.05	0.32
140-215	75	97.9	0.06	0.51	0.01	0.035	0.01	0.22	0.04	0.01	0.001	0.08	0.12	0.33
215-260	45	98.2	0.05	0.40	0.01	0.035	0.01	0.20	0.015	0.01	0.001	0.04	0.21	0.31
260-305	45	98.2	0.05	0.44	0.005	0.045	0.01	0.20	0.015	0.005	0.004	0.05	0.23	0.29
305-345	40	98.2	0.04	0.40	0.01	0.040	0.01	0.21	0.015	0.005	0.002	0.05	0.17	0.29
345-380	35	97.7	0.05	0.57	0.015	0.055	0.01	0.29	0.02	0.005	0.003	0.05	0.16	0.39
<i>Weighted sum =</i>		<i>97.946</i>	<i>0.054</i>	<i>0.5063</i>										
25-380	355	97.9	0.05	0.50*	0.02	0.04	0.01	0.24	0.03	0.008	0.004	0.07	0.15	0.33

$Fe_2O_3$      $Al_2O_3$      $CaO$      $MgO$      $Na_2O$      $K_2O$      $TiO_2$      $P_2O_5$   
 0.07    0.44    0.03    0.07    0.01    0.29    0.05    0.009

Fe and Al were assayed in 5' lengths before compositing.

TOTAL NON SiO<sub>2</sub> = 2.08,  $Al_2O_3 + Fe_2O_3 = 1.01$ .

\* = 0.9484 Al<sub>2</sub>O<sub>3</sub>

762 - 115.8 m

008

ASSAY RESULTS - GLOVER'S BLUFF - G.B. 4

<u>DEPTH</u> (ft)		<u>Al</u>	<u>Fe</u>
0 - 2.2	2.2	0.39	0.06
2.2 - 5.0	2.8	0.51	0.13
5.0 - 8.0	3.0	0.52	0.08
8.0 - 11.0	3	0.50	0.09
11.0 - 14.0	3	0.53	0.08
14.0 - 17.0	3	0.69	0.08
17.0 - 20.0	3	0.53	0.09
20.0 - 21.84	1.84	0.49	0.10
21.84 - 25.0	3.16	0.54	0.078
25.0 - 28.0	3	0.44	0.070
28.0 - 30.37	2.37	0.43	0.070
30.37 - 33.0	2.63	0.66	0.056
33.0 - 36.0	3	0.69	0.079
36.0 - 38.4	2.4	0.59	0.089
38.4 - 41.0	2.6	0.55	0.091
41.0 - 44.0	3	0.56	0.071
44.0 - 46.64	2.64	0.62	0.143
46.64 - 49.0	2.36	0.55	0.10
49.0 - 52.0	3	0.73	0.07
52.0 - 55.0	3	0.56	0.08
55.0 - 58.0	3	0.52	0.07
58.0 - 61.0	3	0.53	0.09
61.0 - 63.30	2.3	0.75	0.10
63.36 - 66.0	2.64	0.63	0.06
66.0 - 69.0	3	0.57	0.11
69.0 - 72.0	3	0.49	0.05
72.0 - 75.0	3	0.62	0.05
75.0 - 78.0	3	0.50	0.06
78.0 - 81.0	3	0.44	0.06
81.0 - 84.0	3	0.42	0.07

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<u>DEPTH</u>		<u>Al</u>	<u>Fe</u>
84.0 - 87.0	3	0.41	0.04
87.0 - 90.0	3	0.39	0.12
90.0 - 93.85	7-85	0.45	0.04
0 - 93.85		0.54 (=1.02% $Al_2O_3$ )	

actually 93.79 ft.

Weighted ave over 93.79 ft = 0.53812 % Al.  
 = 1.02 %  $Al_2O_3$  90%

and 0.07864 % Fe  
 = 0.11 %  $Fe_2O_3$

ave implied  $SiO_2$  = 100 - 1.13  
 OR < 98.87

But if  $CaO$  - ave non-sol = 2%  
 re. = 98 %  $SiO_2$

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RESULTS THERMAL STABILITY TESTS ON QUARTZITE

<u>NUMBER</u>	<u>+ 3/4 IN</u> <u>AFTER HEATING</u> %	<u>+ 3/16 IN</u> <u>AFTER TUMBLING</u> %
GB2 35-50	67	97
GB2 50-70	75	97
GB2 70-90	47	97
GB2 90-110	72	96
GB2 110-130	85	97
GB2 130-150	80	97
GB2 150-170	78	97
GB2 170-190	86	76
GB2 190-210	83	97
GB2 210-225	99	74
GB2 225-245	90	94
GB2 245-265	0	96
GB2 265-285	64	93
GB2 285-305	81	76
GB2 305-325	90	84
GB2 325-345	86	94
GB2 345-365	96	89
GB2 365-382	54	94

CONSOLIDATED GOLD FIELDS AUST. LTD.DIAMOND DRILLING LOG

PAGE: 1

HOLE  
NUMBER GB1

MINE GLOVERS BLUFF

CO-ORDS 10,000 X, 9,745 Y

COLIAR  
R.L. +30 m

BEARING 213°

INCLINATION -30°

LENGTH

SURVEYED

DATE

DEPTH

ROD SIZE

LOGGED BY N. SHEPHERD

COMMENCED

COMPLETED

## PURPOSE:

Testing Glover's Bluff, drilling from foot  
of ridge.

## COMMENTS:

Proved that the flanks of the ridge are composed  
of low grade impure quartzite.

HOLE NO: GB1

PAGE: 2

CORE RECOVERY				LOGGING	REMARKS	ASSAYS			%
FROM	TO	cm	%			FROM	TO	FT.	
0	95			White brown quartz sand.					
95	270			Coarse medium grained quartzite, massive pink white in colour, some feldspar grains, minor clay. Bedding vertical to subvertical. Evidence of weathering up to 170'.					
270	410			Quartzite, white to pink brown in colour, zones of extensively fractured and broken core probably fault zones. Bedding distinguishable vertical, core fractured across bedding. Clay present in this fracture often green coloured. Small 5mm quartz veins present.					
410	510			Section contains more obvious clay, zones of broken material present.					
510	560			Quartzite greenish colour with small veins of clay.					

Assays given in  
Table I.

CONSOLIDATED GOLD FIELDS AUST. LTD.DIAMOND DRILLING LOG

PAGE: 1

HOLE NUMBER		GB2					
MINE		GLOVER'S BLUFF					
CO-ORDS		10,050 X, 10,000 Y					
COLLAR E.L.		+178.0m					
BEARING		035°					
INCLINATION		-45°					
LENGTH		380'					
SURVEYED	DATE						
	DEPTH						
ROD SIZE		0-12' HQ; 12-40' NQ; 40-380' BQ.					
LOGGED BY		N.P. STEVENS-HOARE					
COMMENCED		11.6.74					
COMPLETED		12.7.74					
PURPOSE: Testing main ridge of Glover's Bluff quartzite.							
COMMENTS: 100' Bearing 067° Inclination 32° 300' - Inclination 37°							

HOLE NO: GB2

PAGE: 2

CORE RECOVERY				LOGGING	REMARKS	ASSAYS			%	
FROM	TO	cm	%			FROM	TO	FT.	Al <sub>2</sub> O <sub>3</sub>	Fe
0	24			<u>Broken ground.</u>		25	30	5	1.30	0.08
24	215			<u>Medium to fine grained quartzite.</u> Grey and white bands sometimes mottled not related to bedding. Small silica veins often grey coloured. Bedding at 45° to 35° to core axis. Quartzite strongly fractured with small quartz veins generally subparallel or orthogonal to the bedding. Brecciated zones occasionally present may contain considerable crust of dark brown? Fe oxides. Clay present in small veins.	Quartzite partially recrystallised.	30	35		1.65	0.08
					Fractures across grains when broken.	35	40		1.15	0.08
						40	45		1.15	0.07
						45	50		1.30	0.09
						50	55		0.59	0.05
						55	60		1.50	0.10
						60	65		1.20	0.06
						65	70		1.20	0.07
						70	75		1.10	0.05
						75	80		1.35	0.06
						80	85		1.03	0.09
						85	90		1.23	0.05
						90	95		0.96	0.08
215	285			<u>Medium to coarse grained quartzite.</u> Pale white cream coloured. Bedding 50° to core axis. Small quartz veins abundant, occasional breccia zones, minor clay vein.		95	100		0.88	0.07
						100	105		0.83	0.08
						105	110		1.14	0.07
						110	115		0.99	0.05
						115	120		0.90	0.08
						120	125		0.93	0.06
285	380			<u>Coarse medium grained quartzite.</u> Pale white colour. Bedding 45° to core axis. Similar to above but bedding is becoming more obvious in the core. Possibly correlated with higher clay content.		125	130		1.13	0.06
						130	135		0.88	0.06
						135	140		0.91	0.06
						140	145		0.95	0.06
						145	150		0.80	0.04
						150	155		0.62	0.05
						155	160		0.91	0.05
						160	165		1.32	0.06
						165	170		1.07	0.06
						170	175		1.22	0.08
						175	180		0.76	0.07
						180	185		0.96	0.05
						185	190		1.42	0.08

Cont.

HOLE NO: GB

PAGE: 3

CORE RECOVERY				LOGGING	REMARKS	ASSAYS			%	
FROM	TO	cm	%			FROM	TO	FT.	Al <sub>2</sub> O <sub>3</sub>	Fe
				<p>Composite samples made for the following lengths:-</p> <p>25 - 70</p> <p>70 - 140</p> <p>140 - 215</p> <p>215 - 260 Complete assays in Table 2.</p> <p>260 - 305</p> <p>305 - 345</p> <p>345 - 380</p>			5	0.44	0.04	
					190	195		0.57	0.05	
					195	200		0.80	0.05	
					200	205		0.89	0.05	
					205	210		0.53	0.05	
					210	215		0.83	0.065	
					215	220		0.92	0.08	
					220	225		1.36	0.07	
					225	230		1.08	0.075	
					230	235		0.73	0.055	
					235	240		0.81	0.06	
					240	245		0.67	0.045	
					245	250		0.37	0.04	
					250	255		0.40	0.055	
					255	260		1.37	0.085	
					260	265		0.83	0.055	
					265	270		0.87	0.055	
					270	275		0.64	0.055	
					275	280		0.87	0.065	
					280	285		0.70	0.06	
					285	290		0.90	0.06	
					290	295		0.65	0.05	
					295	300		0.93	0.07	
					300	305		0.84	0.08	
					305	310		1.14	0.065	
					310	315		0.68	0.075	
					315	320		0.65	0.085	
					320	325		1.17	0.065	
					325	330		0.84	0.08	
					330	335		0.67	0.05	
					335	340		0.36	0.05	
					340	345		1.06	0.07	
				345	350		0.84	0.065		
				350	355		1.24	0.07		
				355	360					

HOLE NO: GB:

PAGE: 4

CORE RECOVERY				LOGGING	REMARKS	ASSAYS			%	
FROM	TO	cm	%			FROM	TO	FT.	Al <sub>2</sub> O <sub>3</sub>	Fe
						360	365	5	1.27	0.075
						365	370		1.04	0.06
						370	375		1.23	0.15
						375	380		1.11	0.08
				Hole completed at 380'.						

CONSOLIDATED GOLD FIELDS AUST. LTD.DIAMOND DRILLING LOG

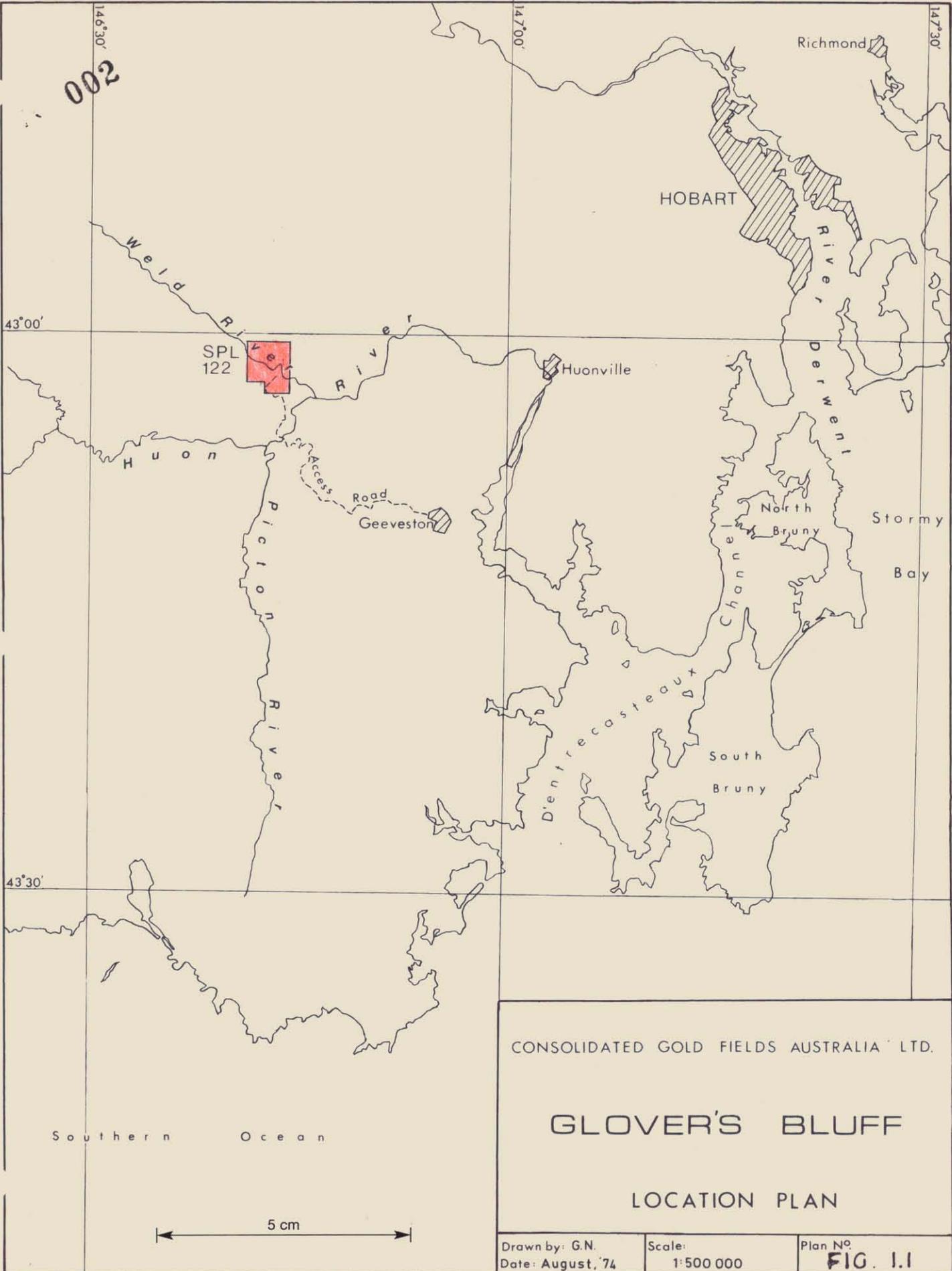
PAGE: 1

HOLE NUMBER		GB3					
MINE		GLOVERS BLUFF					
CG-CRDS		10,050 X, 10,000 Y					
COLLAR R.L.		178.0m					
BEARING		213°					
INCLINATION		-45°					
LENGTH		115'					
SURVEYED	DATE						
	DEPTH						
ROD SIZE		0-20' HQ; 20-70' NQ; 70-115' BQ.					
LOGGED BY		N.P. STEVENS-HOARE					
COMMENCED		16.7.74					
COMPLETED		20.8.74					
<p>PURPOSE:</p> <p>Testing westwards extension of good quality quartzite found in GB2.</p>							
<p>COMMENTS:</p> <p>Faulting between GB2 and 3 brought Permian tillites down. Quartzite below is of sub standard quality for ferro-alloy.</p>							



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CONSOLIDATED GOLD FIELDS AUSTRALIA LTD.

# GLOVER'S BLUFF

## LOCATION PLAN

Drawn by: G.N.  
Date: August, '74

Scale:  
1:500 000

Plan No.  
**FIG. 1.1**

531020

019

FIG. 2

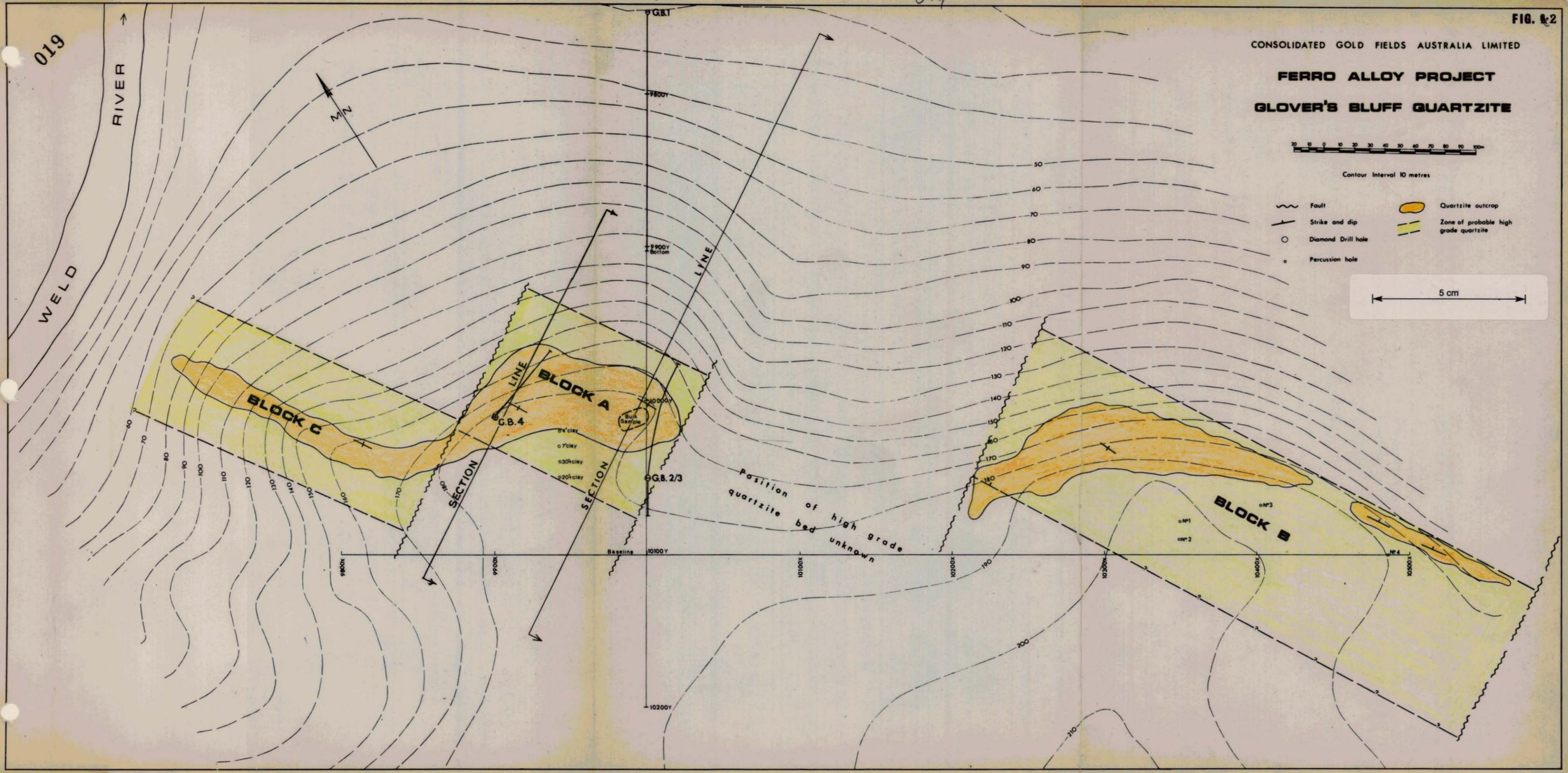
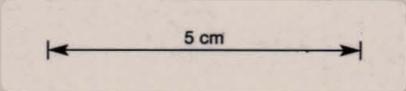
CONSOLIDATED GOLD FIELDS AUSTRALIA LIMITED

# FERRO ALLOY PROJECT GLOVER'S BLUFF QUARTZITE



Contour Interval 10 metres

- Fault
- Strike and dip
- Diamond Drill hole
- Percussion hole
- Quartzite outcrop
- Zone of probable high grade quartzite



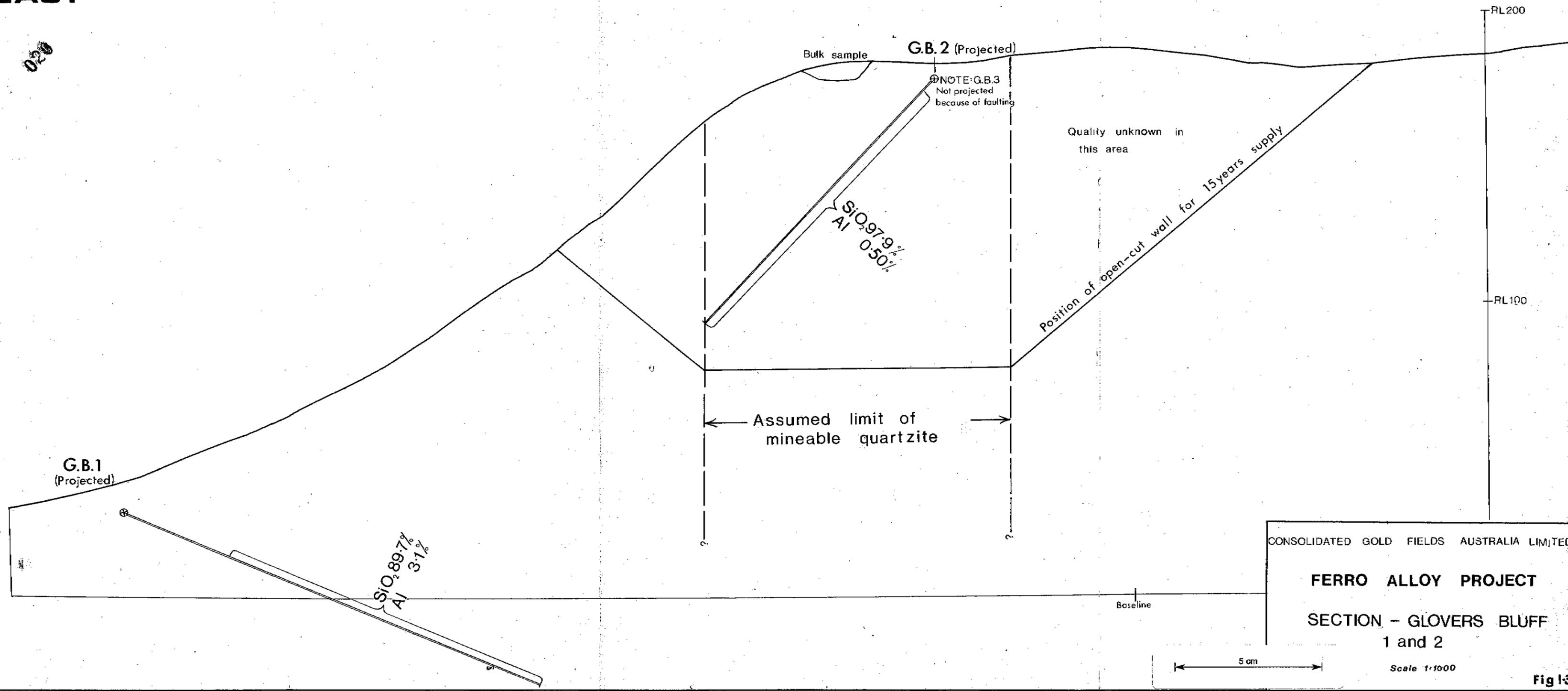
EAST

WEST

531021

020

020



CONSOLIDATED GOLD FIELDS AUSTRALIA LIMITED

**FERRO ALLOY PROJECT**

**SECTION - GLOVERS BLUFF  
1 and 2**

**Fig 1-3**

EAST

WEST

531022

RL 200

G.B.4

AI 0.54%

Position of open-cut wall for 15 years supply

Assumed limit of mineable quartzite

5 cm

RL 100

RL 0

Baseline

CONSOLIDATED GOLD FIELDS AUSTRALIA LIMITED

FERRO ALLOY PROJECT

SECTION - GLOVERS BLUFF 4

Scale 1:1000

Fig. 14

021

