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AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

SUMMARY REPORT

ON

EXPLORATION LICENCE 11/73

FOR THE PERIOD

MAY - DECEMBER, 1973

R.T. BRANDT

20th February, 1974.

ANG COORDINATES

Exploration Licence 11/73, granted to this Company on 14th May, 1973, was acquired for the specific purpose of investigating the Precambrian quartzites in the Marrawah district, with a view to their possible exploitation as sources of high-grade silica for the production of ferrosilicon.

Prominent and extensive outcrops of quartzites occur in the vicinity of the Marrawah lighthouse and extend from the coast for approximately three miles inland. All investigations to date have been concentrated in that area, which appeared to offer the greatest promise of large tonnages easily accessible for open-pit mining. A geological map of the area is attached as map No.1.

Since the purity requirements for the production of ferrosilicon are critical, a large number of surface samples were collected from various localities in the area and were analysed for minor impurities as well as for silica. The average silica analyses for each locality are shown on map No.1 and the full analytical results are given in Appendices A and B to this report.

GEOLOGY

The quartzites in the vicinity of the Marrawah lighthouse are designated on the State geological map as unmetamorphosed Precambrian. These rocks are fresh, massive and medium-grained, consisting of sub-rounded quartz grains up to about half a millimetre in size, cemented by silica. No minerals, other than quartz, are detectable in hand specimen. The silica content averages a little less than 99% SiO₂, with alumina as the chief impurity.

The quartzites constitute a homogeneous sedimentary unit with a maximum stratigraphic thickness of at least 2000 feet. The sedimentary bedding is usually visible but is not marked by any conspicuous compositional or textural contrasts, and no interbeds of any other rock types have been observed within the sequence. The whole formation is folded into a structural basin aligned E.N.E. and measuring nearly three miles in length and one and a half miles in width. The beds dip consistently towards the central axis of the basin at angles varying from 15° up to 55°, with an average of about 30°-35°. On the northern limb of the structure, outcrops of fresh quartzite are very numerous and prominent and, in places, make up 50% of the land surface. The underlying formations to the north have not been examined in any detail, but are known to include quartzite horizons of similar character. On the southern limb of the basin, the quartzites are largely concealed by sand dunes. The nature of the formations overlying the quartzites in the basin centre is not known.

SAMPLING

Wherever possible, the quartzites were sampled by means of chips taken every few feet along lines across the strike of the formation. Where continuous exposures across the strike were not available, due to soil

cover, grab samples were taken from individual outcrops or groups of outcrops. The sample locations and the average silica analysis of each chip sample run or representative group of grab samples are shown on map No.1. The individual analyses for silica and minor impurities are given in Appendix A.

The locality most intensively sampled is shown on an enlarged scale in map No.2, and the analytical results for this set of samples are given in Appendix B.

CONCLUSIONS

The amount of quartzite available in the area and accessible for open-pit mining is very large, being of the order of a hundred million tons or more. The analyses of numerous representative samples, however, indicate an average impurity content slightly above the specified limit for ferrosilicon production. Efforts to delineate smaller areas in which the purity is consistently within acceptable limits have not, so far, been successful.

It is considered that a more widespread search is now required, with the object of locating other quartzite occurrences of greater impurity, though possibly of smaller tonnage potential.

R.T. Brandt
Regional Geologist

Attached

- Appendices A and B
- Map No.1 - Map of part of E.L. 11/73
- Map No.2 - Plan of Sampling in part of E.L. 11/73

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APPENDIX A

Sample Description	Fe ₂ O ₃ %	Al ₂ O ₃ %	SiO ₂ %	TiO ₂ %	CaO % Imp.	Total Impurities %	SiO ₂ % 2
RB 41	0.12	0.38	0.09	0.04		0.63	99.1 -
42	0.19	0.78	0.09	0.02		1.08	98.6
43	0.18	1.05	0.23	0.05	0.01	1.54	98.2
44	1.10	0.60	0.14	0.05		0.89	98.8
45	0.06	0.41	0.11	0.06		0.64	99.1 -
46	0.16	0.91	0.20	0.06	<0.01	1.33	98.4
47	0.17	0.76	0.16	0.06		1.15	98.5
48	0.15	0.98	0.15	0.06		1.36	98.3
49	0.23	1.24	0.13	0.05	0.03	1.70	98.0
50	0.17	0.43	0.09	0.03		0.72	99.0 -
51	0.16	0.43	0.07	0.03		0.69	99.0 -
52	0.12	0.23	0.06	0.02		0.43	99.3 -
53	0.05	0.17	0.03	0.04		0.29	99.4 -
54	0.14	0.42	0.10	0.03		0.69	99.0 -
55	0.12	0.09	0.02	0.04		0.27	99.4 -
56	0.08	0.30	0.06	0.03		0.47	99.2 -
57	0.05	0.30	0.13	0.03		0.51	99.2 -
58	0.12	0.17	0.03	0.03		0.35	99.3 -
59		0.36				0.57	99.1 -
60		0.45				0.69	99.0 -
61		0.49				0.74	99.0 -
62		0.35				0.56	99.1 -
63		0.47				0.71	99.0 -
64		0.33				0.53	99.2 -
65		0.38				0.60	99.1 -
66		0.41				0.64	98.1 -
67		0.65				0.95	98.7
68		0.55				0.82	98.9
69		0.48				0.73	99.0 -
70		0.49				0.74	99.0 -
71		0.68				0.99	98.7
72		0.47				0.72	99.0 -
73		0.52				0.78	98.9
74		0.62				0.91	98.8
75		0.43				0.67	99.0 -
76		0.46				0.70	99.0 -
77		0.53				0.79	98.9
78		0.77				1.11	98.6
79		0.37				0.55	99.1 -
80		0.64				0.94	98.5
81		0.40				0.63	99.1 -
82		0.97				1.35	98.3
83		0.63				0.92	98.8
84		0.58				0.86	98.8
85		0.51				0.77	98.9
86		0.88				1.25	98.4

ANALYTICAL METHODS:

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Sample Description	SiO ₂ %	Fe ₂ O ₃ %	K ₂ O %	Al ₂ O ₃ %	LOI %	616005	
RB 101	99.0	0.10	0.12	0.54	0.19		
2	99.2	0.15	0.08	0.43	0.15		
3	98.9	0.11	0.15	0.66	0.16		
4	98.8	0.03	0.19	0.66	0.21		
5	98.9	0.09	0.17	0.63	0.22		
6	98.7	0.10	0.20	0.74	0.24		
7	99.0	0.04	0.15	0.60	0.18		
8	99.1	0.09	0.14	0.45	0.15		
9	98.9	0.13	0.13	0.60	0.11		
10	99.0	0.04	0.17	0.56	0.17		
1	98.9	0.06	0.18	0.68	0.17		
2	98.9	0.10	0.15	0.64	0.17		
3	98.8	0.09	0.18	0.71	0.15		
4	99.6	0.06	0.04	0.20	0.11		
5	99.2	0.18	0.11	0.41	0.08		
6	98.6	0.10	0.24	0.80	0.19		
RB 117	98.5	0.10	0.18	0.82	0.38		

ANALYTICAL METHODS: Fe₂O₃ K₂O Al₂O₃ by T.F.
 SiO₂ as per CH 4924

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 P.O. D. L. Mathias, Jr. ANZ Exp. Sydney.

Signed: *W. G. G. G.*

105

Sample Description	Al ₂ O ₃ %	Calculated Total Impurities	L.O.I. %	SiO ₂ %
1/1	0.41	0.64	0.14	99.2
2	0.35	0.56	0.18	99.3
3	0.54	0.81	0.17	99.0
4	0.22	0.39	0.16	99.0
5	0.29	0.48	0.29	99.2
6	0.49	0.74	0.25	99.0
7	0.15	0.30	0.15	99.6
8	0.30	0.50	0.13	99.4
9	0.91	1.29	0.18	98.5
50	0.50	0.75	0.17	99.1
1	0.50	0.75	0.14	99.1
2	0.49	0.74	0.13	99.1
3	0.93	1.38	0.22	98.5
4	1.75	2.35	0.27	97.5
5	0.44	0.68	0.13	99.2
6	0.33	0.53	0.18	99.3
7	0.40	0.62	0.17	99.2
8	0.39	0.61	0.19	99.2
9	0.39	0.61	0.18	99.2
60	0.92	1.30	0.25	98.5
1	0.24	0.42	0.38	99.2
2	0.44	0.68	0.29	99.3
3	0.20	0.56	0.15	99.3
4	0.16	0.31	0.23	99.5
5	0.32	0.60	0.12	99.2
6	0.15	0.30	0.21	99.5
7	0.09	0.22	0.30	99.5
8	0.13	0.27	0.30	99.4
9	0.30	0.50	0.22	99.2
70	0.25	0.43	0.53	99.2
1	0.30	0.50	0.13	99.3
2	0.10	0.23	0.15	99.6
3	0.34	0.55	0.12	99.3
4	0.59	0.87	0.19	98.5
5	0.73	1.05	0.12	98.5
6	0.52	0.78	0.33	98.5
7	0.50	0.75	0.18	99.2
8	0.43	0.66	0.18	99.2
9	0.03	0.15	0.24	99.3
80	0.15	0.30	0.21	99.2
1	0.43	0.73	0.23	99.2
2	0.46	0.70	0.24	99.2
3	0.64	0.94	0.10	98.5
4	0.43	0.73	0.18	99.1
5	0.34	0.55	0.19	99.2
6	0.11	0.25	0.16	99.5
7	0.11	0.25	0.22	99.5
8	0.39	0.61	0.18	99.2
9	0.21	0.38	0.17	99.2
100	0.31	0.52	0.26	99.2

ANALYTICAL METHODS: Al₂O₃ by XRF. L.O.I. by Gravimetry. SiO₂ by Difference.

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PLEASE REFER TO LETTER OF 29/5/73

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Signed: *[Signature]*

006

Sample Description	Al ₂ O ₃ %	Calculated Total Impurities	L.O.I. %	
191	0.36	0.57	0.22	99.2
2	0.43	0.66	0.25	99.1
3	0.28	0.47	0.20	99.3
4	0.27	0.45	0.19	99.4
5	0.62	0.91	0.18	98.9
6	0.32	0.52	0.20	99.3
7	0.32	0.52	0.21	99.3
8	0.17	0.32	0.24	99.4
9	0.44	0.68	0.24	99.1
200	0.33	0.53	0.19	99.3
1	0.39	0.61	0.13	99.2
2	0.30	0.50	0.13	99.3
3	0.56	0.83	0.24	98.9
4	0.55	0.82	0.20	99.0
5	0.45	0.69	0.21	99.1
6	0.69	1.00	0.25	98.8
7	0.70	1.02	0.24	98.7
8	0.32	0.52	0.19	99.3
209	Not received			
210	0.45	0.69	0.18	99.1
1	0.31	0.51	0.15	99.3
2	0.30	0.50	0.14	99.4
3	0.42	0.65	0.20	99.2
4	0.48	0.73	0.14	99.1
5	0.17	0.32	0.14	99.5
6	0.32	0.52	0.17	99.3
7	0.39	0.61	0.16	99.2
8	0.32	0.52	0.13	99.4
9	0.49	0.74	0.15	99.1
20	0.64	0.94	0.19	98.9
1	1.04	1.46	0.24	98.8
2	0.35	0.56	0.24	99.2
3	0.55	0.82	0.22	99.0
4	0.50	0.75	0.24	99.0
5	0.45	0.69	0.21	99.1
6	0.35	0.56	0.21	99.2
7	0.55	0.82	0.13	99.3
8	0.63	0.92	0.19	98.9
9	0.19	0.35	0.17	99.3
30	0.45	0.69	0.19	99.1
1	0.19	0.35	0.14	99.4
2	0.76	1.09	0.13	98.7
3	0.50	0.86	0.13	98.7
4	0.76	1.09	0.17	98.7
235	0.63	0.92	0.22	98.9
Total 94		38.15	59.23	18.33
Area 2 ave		0.4265		
			76.2 (99.25)	9022.6
			18.0 (98.47)	49.14

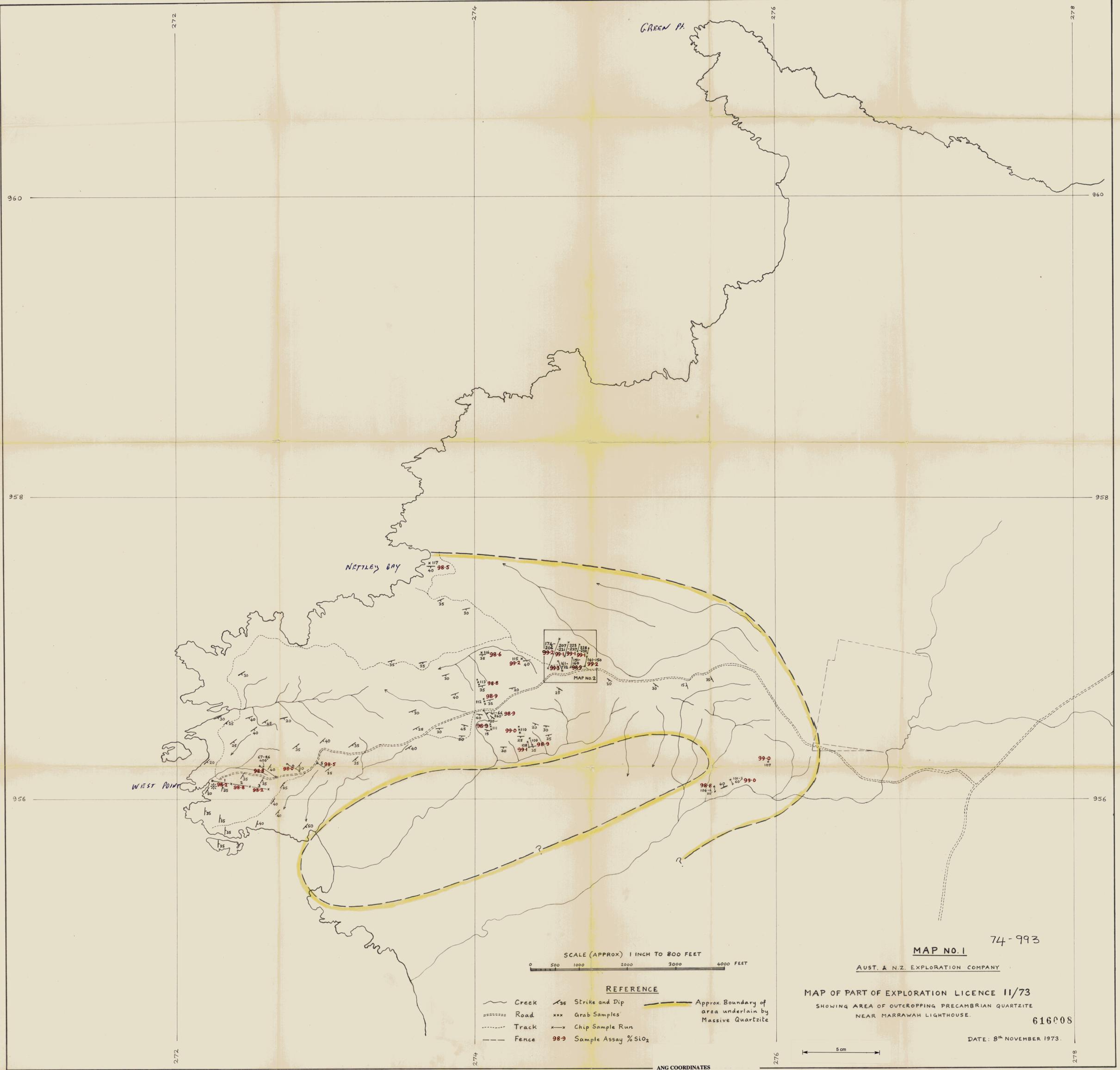
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(?? Method = 98-96 2/102)

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GREEN Pt.

NATLEY BAY

WEST POINT

MAP NO. 2

SCALE (APPROX) 1 INCH TO 800 FEET

- REFERENCE
- ~ Creek
 - ==== Road
 - Track
 - - - Fence
 - ↘35 Strike and Dip
 - xxx Grab Samples
 - x-x Chip Sample Run
 - 98-9 Sample Assay %SiO₂
 - Approx. Boundary of area underlain by Massive Quartzite

MAP NO. 1

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AUST. & N.Z. EXPLORATION COMPANY

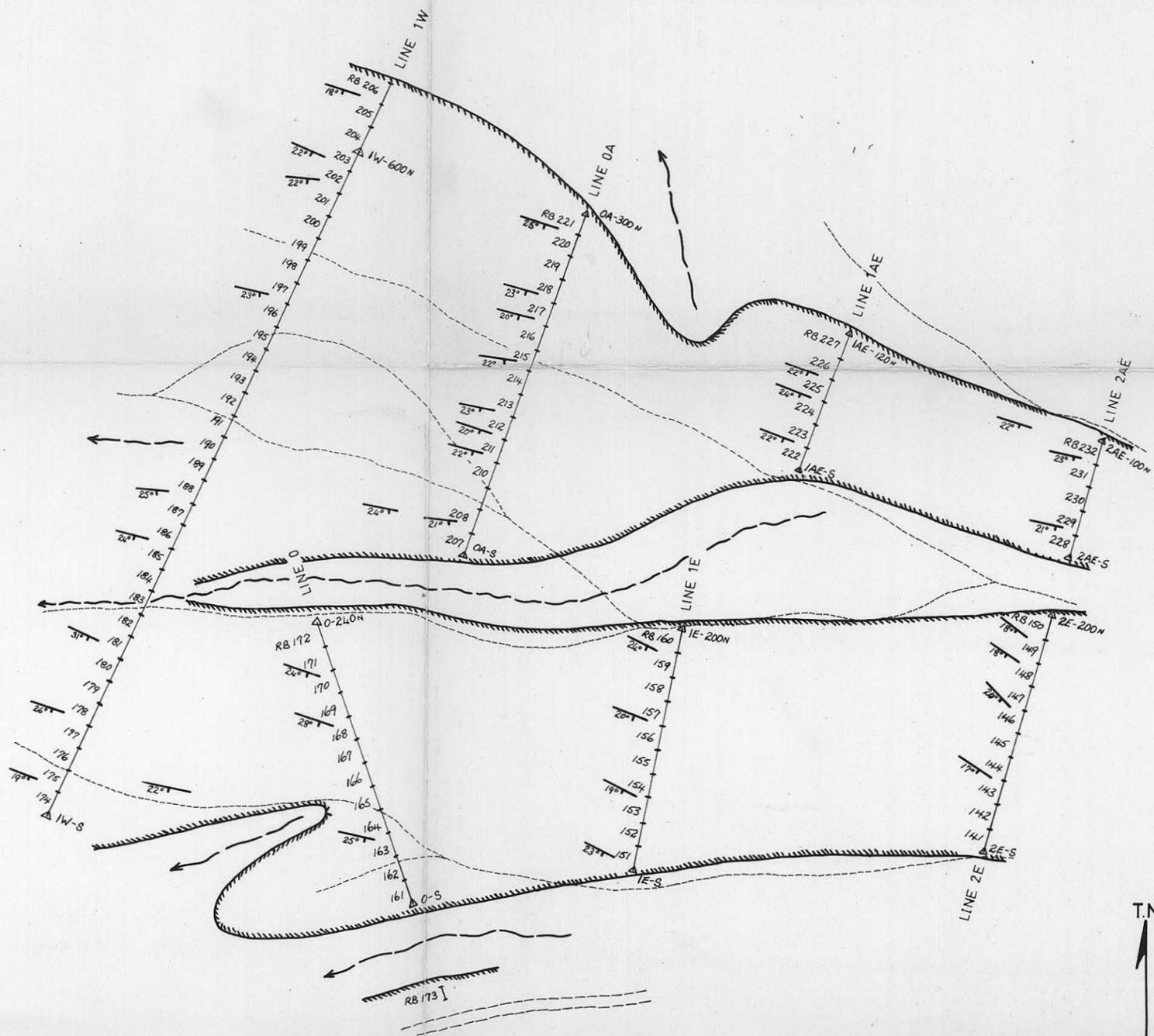
MAP OF PART OF EXPLORATION LICENCE 11/73
 SHOWING AREA OF OUTCROPPING PRECAMBRIAN QUARTZITE
 NEAR MARRAWAH LIGHTHOUSE.

616008

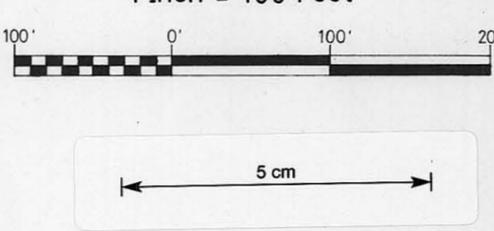
DATE: 8th NOVEMBER 1973.

5 cm

ANG COORDINATES



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SCALE	REFERENCE	MAP NO. 2.
<p>1 Inch = 100 Feet</p> 	<ul style="list-style-type: none">  = EDGE OF QUARTZITE OUTCROP  = STRIKE AND DIP OF QUARTZITE  = CREEK  = TRACK  = ROAD  = CHIP SAMPLE RUN RB 232 = SAMPLE NUMBER △ = SURVEY PEG 	<p>PLAN OF SAMPLING IN PART OF E.L. 11/73</p> <p style="text-align: right;">616009 008</p>

20/4