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AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

FINAL REPORT

ON

EXPLORATION LICENCE 11/73

TO MAY, 1974

By

R.T. Brandt

July, 1974

AMG REFERENCE POINTS ADDED

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FINAL REPORT ON EXPLORATION LICENCE 11/73.INTRODUCTION

Exploration Licence 11/73, granted to this Company on 14th May, 1973, was acquired with an eye to its possibilities for high grade silica deposits suitable for the production of silicon metal or ferrosilicon. For this purpose material conforming to certain rigid chemical and physical specifications is required. The acceptable chemical purity limits are as follows:

	<u>% SiO₂</u>	<u>% Al₂O₃</u>	<u>% Fe₂O₃</u>	<u>% TiO₂</u>	<u>% CaO</u>	<u>% P</u>
Si metal	99.5+	0.10	0.05	0.003	0.01	0.005
50% FeSi	99.0+	0.40	Not Critical	0.02	0.10	0.005

The physical specifications, which include sizing of lump and resistance to decrepitation, demand fresh unweathered rock capable of standing temperatures up to 1000°C without serious disintegration.

Certain quartzites of Precambrian age in N.W. Tasmania are known to be of sufficient purity for ferrosilicon production, but weathering has usually affected these rocks to a considerable depth and rendered them physically unsuitable for the purpose. Owing to the deep weathering prevalent in inland forest-covered areas, it was decided to concentrate the search for suitable high-silica quartzites in the unforested coastal area west of Marrawah. Prominent and extensive outcrops of fresh quartzite occur in the vicinity of West Point (Plate 1), and these were considered to offer the greatest promise of large tonnages easily accessible for open-pit mining.

Geology of West Point Area ?

Approximately half the area of E.L. 11/73 is underlain by unmetamorphosed Precambrian clastic formations with extensive overlays of Quaternary deposits. The Precambrian rocks have a regional north-westerly strike and comprise a thick succession of siltstones, quartzites, greywackes etc., surmounted by the Bryant Hill formation, a pure quartzite some 2000 feet thick, which is overlain unconformably by the Smithton Dolomite (Plate 1). In the coastal area these formations have not been subdivided, but the quartzites at West Point, which are the subject of this report, constitute a distinct stratigraphic unit which, on lithological and structural grounds could reasonably be correlated with the Bryant Hill formation, occurring further to the south-east (Plate 1).

The West Point quartzites 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. (entirely fresh)

-2-

The quartzites constitute a homogeneous sedimentary unit with a maximum stratigraphic thickness of at least 600 metres. 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 formation, which extends approximately four kilometres inland from West Point, is synclinally folded about an axis running slightly north of east, which could represent a continuation, with change of direction, of the structural trend exhibited by the Bryant Hill formation in the south-east of the area. The structure visible on land appears to be part of a closed basin, much of which is concealed under the sea or under coastal sand dunes. The beds dip consistently towards the central axis of the basin at angles varying from 15° to 55° , with an average of about 30° - 35° .

The land surface in the West Point area is a gently sloping, moderately dissected marine platform formed originally by wave action. The soil cover is thin, vegetation sparse, and chemical weathering is shallow and local. Outcrops of fresh quartzite are very numerous and prominent and in places make up 50% of the land surface. The local drainage pattern is largely a reflection of the pattern of jointing in the quartzites. The stratigraphic limits of the massive quartzite are fairly well defined, being marked by a change to a more subdued type of topography, with fewer rock outcrops and large areas of swamp vegetation.

Sampling

Wherever possible, the quartzites were sampled by means of chips taken every few feet along lines across the strike. Where continuous exposures across the strike were not available, due to soil cover, grab samples were taken from individual outcrops or groups of outcrops.

63 Samples, numbered RB41-86 and 101-117, were collected in this manner at a number of widely spaced points, and were analysed for silica and minor impurities. The analytical results are listed in Appendix A. The sample locations and the average silica analyses for each chip sample run, or representative group of grab samples, are indicated on the attached map No. 1 (Plate 2). This widespread sampling was designed to give an idea of the average quality of the quartzite formation as a whole, and the results can be summarized as follows:-

	<u>Highest %</u>	<u>Lowest %</u>	<u>Average %</u>	<u>No. of samples</u>
SiO ₂	99.6	98.0	98.9	63
Al ₂ O ₃	1.24	0.09	0.55	63
Fe ₂ O ₃	0.23	0.03	0.11	35
TiO ₂	0.06	0.02	0.03	63
CaO	0.03	0.01	0.01	3
P ₂ O ₅	0.009	0.002	0.004	63
K ₂ O	0.24	0.02	0.13	35
L.O.I.	0.38	0.08	0.18	17
TOTAL			99.91	

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The average figures indicate that, according to specifications for 50% ferrosilicon, these quartzites are fractionally high in alumina and titania and fractionally low in silica.

An effort was then made to delineate local stratigraphic zones of above-average purity and to check these by more intensive sampling. The small area shown in map No. 2 (Plate 3) was selected on account of the high silica values given by samples RB114 and 115 (99.6 and 99.2% SiO2 respectively). 95 chip samples, numbered RB141-235, were taken in this area, on seven lines across the strike, each sample representing a length of 20 feet. The samples were analysed for silica, alumina and L.O.I. and the total impurities were calculated. The analytical results are listed in Appendix B and can be summarized as follows:-

Appendix B
11/02/74

	<u>Highest%</u>	<u>Lowest %</u>	<u>Average %</u>
SiO2	99.6	97.4	99.1
Al2O3	1.75	0.03	0.43
L.O.I.	0.53	0.12	0.20
Total Impurities	2.35	0.15	0.79

These figures indicate a slightly better average value for alumina, almost within the specification limits for 50% ferrosilicon, but the lack of consistency in these values, which vary within wide limits, would make grade control, and the maintenance of a consistently pure and acceptable product, a very difficult problem.

Estimated Tonnage

The potential tonnage of quartzite available in the West Point Area, based on the area of outcrop and a mineable depth of 10-20 metres, would be of the order of 100-150 million tonnes. The small, intensively sampled area shown in Plate 3 would yield approximately 2 million tonnes.

Conclusion

In spite of the large tonnage of easily accessible high-silica material available, the chemical purity does not quite come up to the level desired for ferrosilicon production. This factor, coupled with adverse marketing conditions, makes the proposition unattractive and it is of no further interest to this Company.

Att. Appendix A

Appendix B

Encl. Plate 1: Geological map of E.L. 11/73

Plate 2. Map of part of E.L. 11/73

Plate 3. 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 %	K ₂ O %	TiO ₂ %	CaO % Imp	Total Impurities %	SiO ₂ %	P ₂ O ₅ ppm
33 41	0.12	0.38	0.09	0.04		0.63	99.1 -	<20
42	0.19	0.78	0.09	0.02		1.08	98.6	<20
43	0.18	1.05	0.23	0.05	0.01	1.54	98.2	70
44	1.10	0.60	0.14	0.05		0.89	98.8	30
45	0.06	0.41	0.11	0.06		0.64	99.1 -	<20
46	0.16	0.91	0.20	0.06	<0.01	1.33	98.4	40
47	0.17	0.76	0.16	0.06		1.15	98.5	30
48	0.15	0.98	0.15	0.06		1.36	98.3	95
49	0.23	1.24	0.13	0.05	0.03	1.70	98.0	95
50	0.17	0.43	0.09	0.03		0.72	99.0 -	45
51	0.16	0.43	0.07	0.03		0.69	99.0 -	35
52	0.12	0.23	0.06	0.02		0.43	99.3 -	40
53	0.05	0.17	0.03	0.04		0.29	99.4 -	<20
54	0.14	0.42	0.10	0.03		0.69	99.0 -	50
55	0.12	0.09	0.02	0.04		0.27	99.4 -	<20
56	0.08	0.30	0.06	0.03		0.47	99.2 -	40
57	0.05	0.30	0.13	0.03		0.51	99.2 -	40
58	0.12	0.17	0.03	0.03		0.35	99.3 -	30
59		0.36				0.57	99.1 -	50
60		0.45				0.69	99.0 -	20
61		0.49				0.74	99.0 -	45
62		0.35				0.56	99.1 -	35
63		0.47				0.71	99.0 -	<20
64		0.33				0.53	99.2 -	<20
65		0.38				0.60	99.1 -	<20
66		0.41				0.64	99.1 -	<20
67		0.65				0.95	98.7	25
68		0.55				0.82	98.9	<20
69		0.48				0.73	99.0 -	<20
70		0.49				0.74	99.0 -	<20
71		0.68				0.99	98.7	20
72		0.47				0.72	99.0 -	<20
73		0.52				0.78	98.9	<20
74		0.62				0.91	98.8	<20
75		0.43				0.67	99.0 -	45
76		0.46				0.70	99.0 -	60
77		0.53				0.79	98.9	30
78		0.77				1.11	98.6	25
79		0.37				0.58	99.1 -	40
80		0.64				0.94	98.8	45
81		0.40				0.63	99.1 -	30
82		0.97				1.36	98.3	65
83		0.63				0.92	98.8	30
84		0.58				0.86	98.8	50
85		0.51				0.77	98.9	50
86		0.88				1.25	98.4	65

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APPENDIX A (Contd).

Sample Description	SiO ₂ %	Fe ₂ O ₃ %	K ₂ O %	Al ₂ O ₃ %	LOI %	TiO ₂ %	P ₂ O ₅ ppm
RB 101	99.0	0.10	0.12	0.54	0.19	0.02	45
2	99.2	0.15	0.08	0.43	0.15	0.03	25
3	98.9	0.11	0.15	0.66	0.16	0.03	<20
4	98.8	0.03	0.19	0.66	0.21	0.03	30
5	98.9	0.09	0.17	0.63	0.22	0.03	65
6	98.7	0.10	0.20	0.74	0.24	0.03	<20
7	99.0	0.04	0.15	0.60	0.18	0.05	<20
8	99.1	0.09	0.14	0.45	0.15	0.02	25
9	98.9	0.13	0.18	0.60	0.11	0.03	<20
10	99.0	0.04	0.17	0.56	0.17	0.04	55
1	98.9	0.06	0.18	0.68	0.17	0.04	<20
2	98.9	0.10	0.15	0.64	0.17	0.04	45
3	98.8	0.09	0.18	0.71	0.15	0.05	<20
4	99.6	0.06	0.04	0.20	0.11	0.02	<20
5	99.2	0.18	0.11	0.41	0.08	0.02	<20
6	98.6	0.10	0.24	0.80	0.19	0.02	35
RB 117	98.5	0.10	0.18	0.82	0.38	0.03	<20

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APPENDIX B

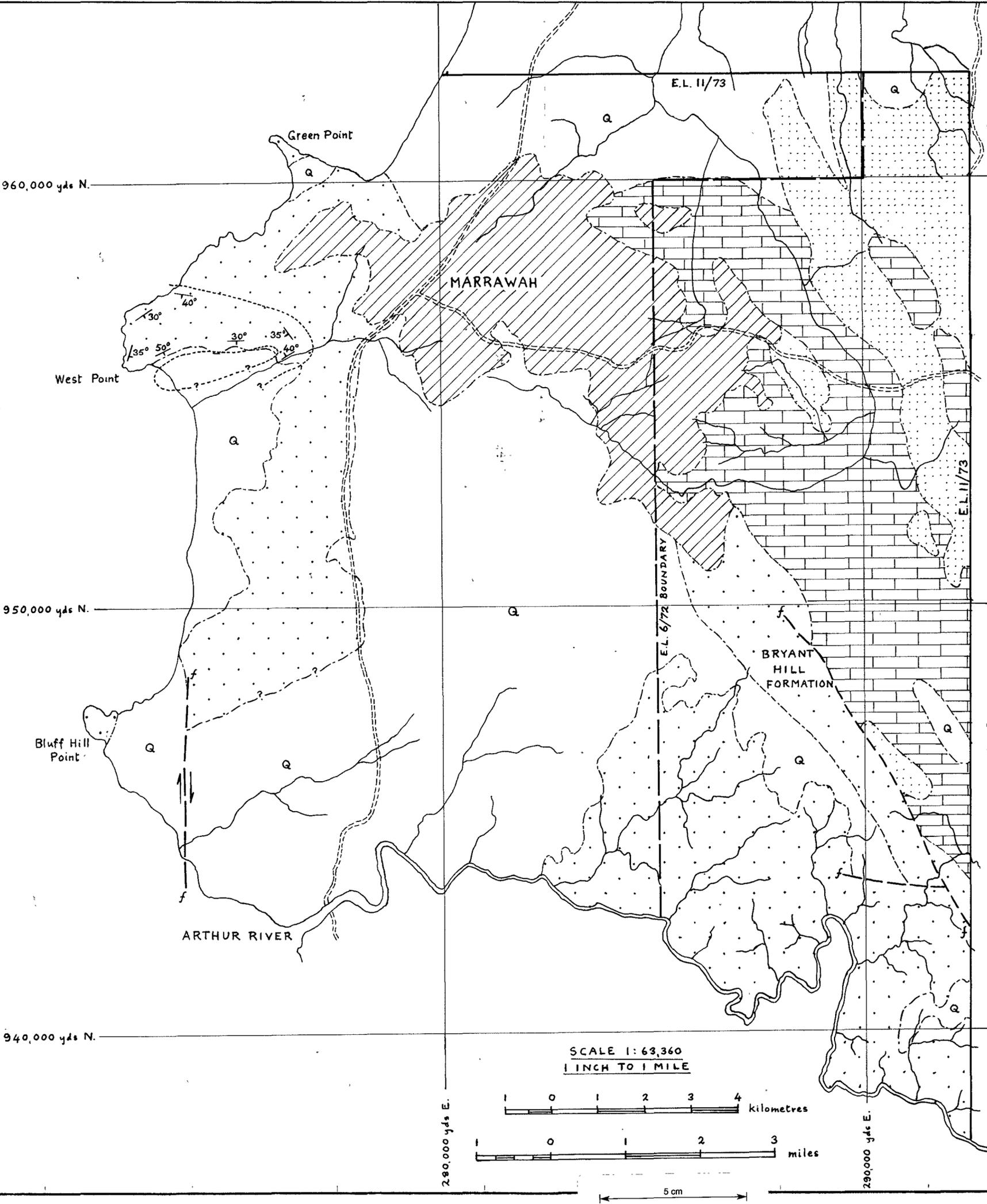
Sample Description	Al ₂ O ₃ %	Calculated Total Impurities	L.O.I. %	SiO ₂ %
141	0.41	0.64	0.14	99.2
2	0.35	0.56	0.18	99.3
3	0.54	0.81	0.17	99.0
4	0.22	0.39	0.16	99.5
5	0.29	0.48	0.29	99.2
6	0.49	0.74	0.25	99.0
7	0.15	0.30	0.15	99.6
8	0.30	0.50	0.13	99.4
9	0.91	1.29	0.18	98.5
50	0.50	0.75	0.17	99.1
1	0.50	0.75	0.14	99.1
2	0.49	0.74	0.13	99.1
3	0.98	1.38	0.22	98.4
4	1.75	2.35	0.27	97.4
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	99.0
3	0.20	0.56	0.15	99.3
4	0.16	0.31	0.23	99.5
5	0.38	0.60	0.12	99.3
6	0.15	0.30	0.21	99.5
7	0.09	0.22	0.30	99.5
8	0.13	0.27	0.38	99.4
9	0.30	0.50	0.22	99.3
70	0.25	0.43	0.53	99.0
1	0.30	0.50	0.18	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	98.9
5	0.73	1.05	0.12	98.8
6	0.52	0.78	0.33	98.9
7	0.50	0.75	0.18	99.1
8	0.43	0.66	0.18	99.2
9	0.03	0.15	0.24	99.6
80	0.15	0.30	0.21	99.5
1	0.48	0.73	0.23	99.0
2	0.46	0.70	0.24	99.1
3	0.64	0.94	0.19	98.9
4	0.48	0.73	0.18	99.1
5	0.34	0.55	0.19	99.2
6	0.11	0.25	0.16	99.6
7	0.11	0.25	0.22	99.5
8	0.39	0.61	0.13	99.3
9	0.21	0.38	0.17	99.5
190	0.32	0.52	0.26	99.2

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APPENDIX B (Contd.)

Sample Description	Al ₂ O ₃ %	Calculated Total Impurities	L.O.I. %	SiO ₂ %
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	0.18	99.2
2	0.30	0.50	0.18	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	98.3
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	0.18	99.0
8	0.63	0.92	0.19	98.9
9	0.19	0.35	0.17	99.5
30	0.45	0.69	0.19	99.1
1	0.19	0.35	0.14	99.5
2	0.76	1.09	0.18	98.7
3	0.58	0.86	0.12	99.0
4	0.76	1.09	0.17	98.7
235	0.63	0.92	0.22	98.9



REFERENCE

- River
- Creek
- Road
- Geological boundary
- Fault
- 35° Strike and dip
- Stratigraphic limits of West Point quartzite

GEOLOGY

QUATERNARY		Alluvium, talus, sand dunes
TERTIARY		Basalt
CAMBRIAN		Undifferentiated sediments
PRECAMBRIAN		Smithton Dolomite
		Undifferentiated siltstones, slates and quartzites

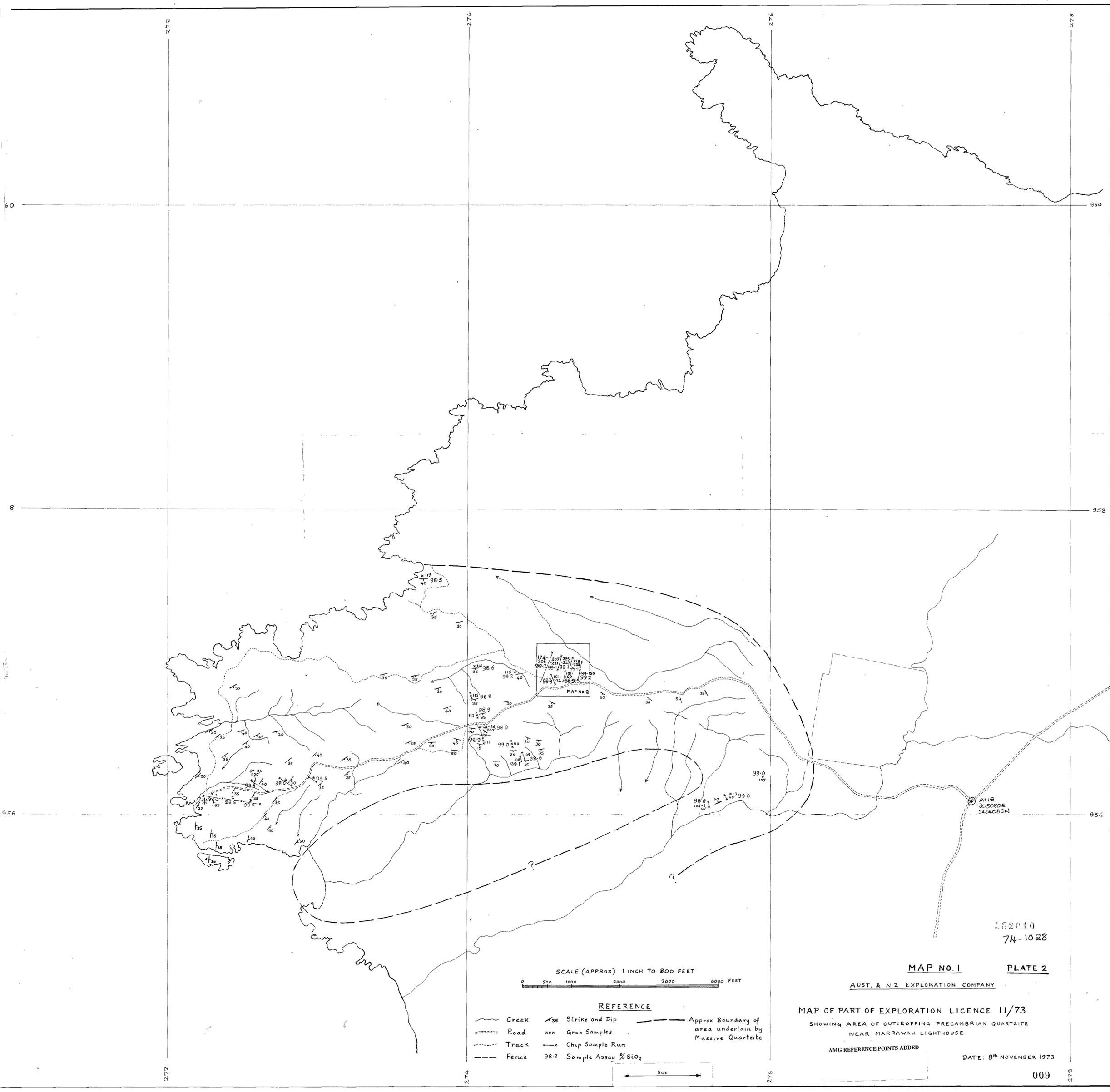
PLATE 1

**AUSTRALIA AND NEW ZEALAND
EXPLORATION COMPANY**

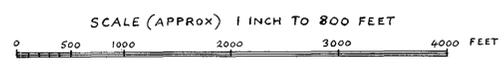
GEOLOGICAL MAP OF 582009
EXPLORATION LICENCE 11/73

N. W. TASMANIA 74-1028

Prepared by, R.T. BRANDT	Drawn by, R.T.B.
Scale, 1:63,360	Date, July 1974
Drawing N ^o	Proj. N ^o X827-020
	Report N ^o
	Lib. N ^o



MAP NO 2



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

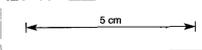
102010
74-1028

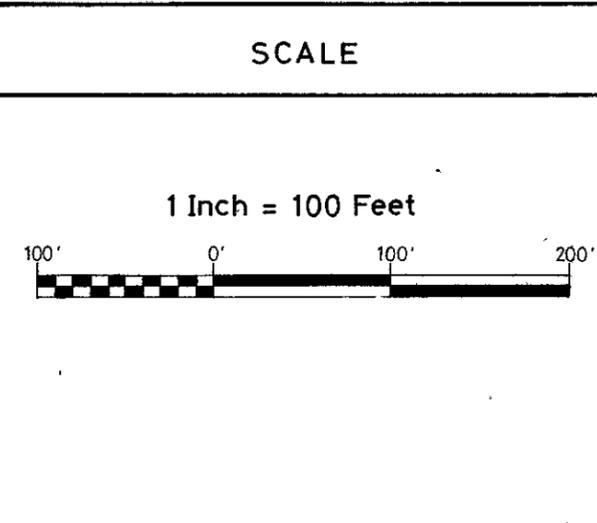
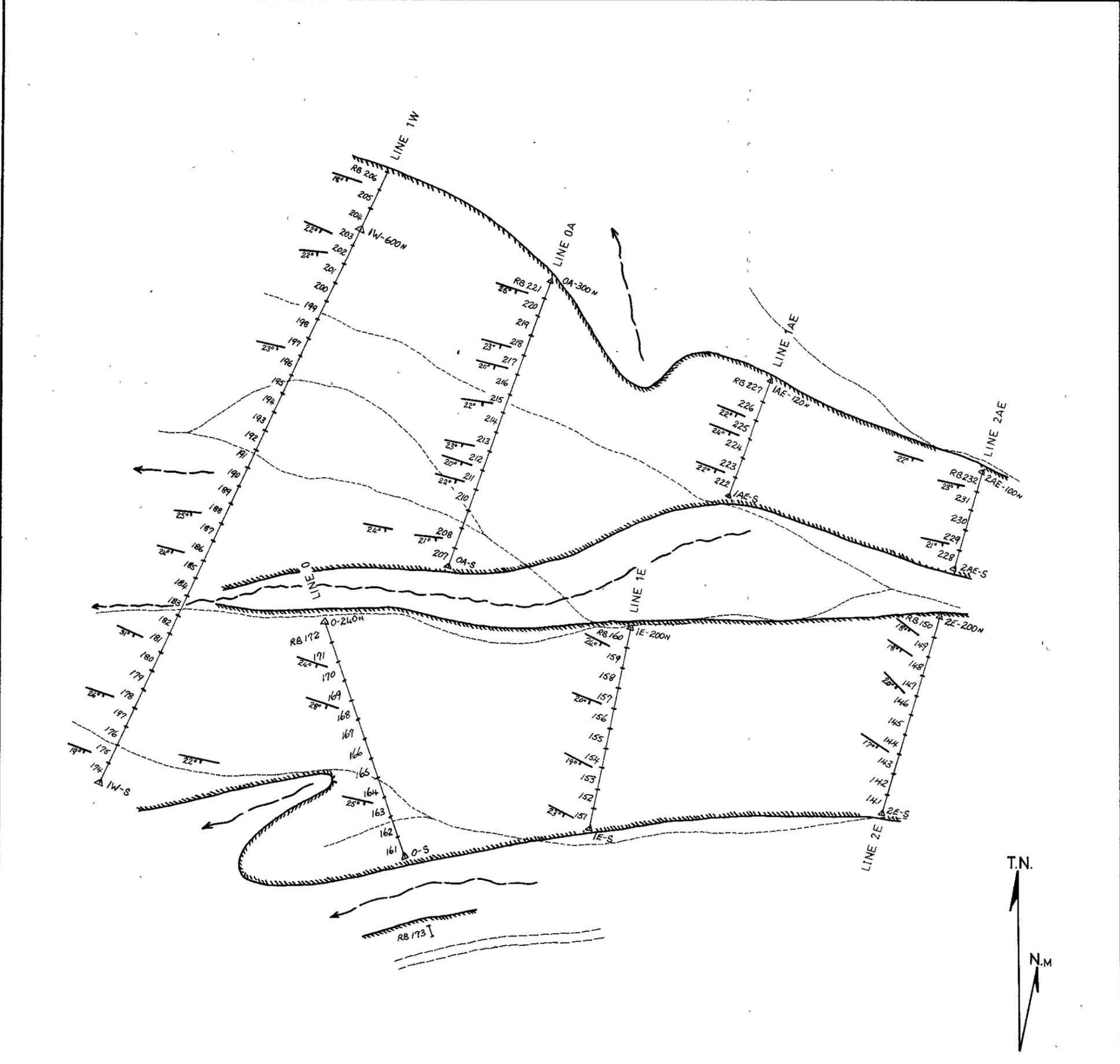
MAP NO. 1 PLATE 2
AUST. & NZ EXPLORATION COMPANY

MAP OF PART OF EXPLORATION LICENCE 11/73
SHOWING AREA OF OUTCROPPING PRECAMBRIAN QUARTZITE
NEAR MARRAWAH LIGHTHOUSE
AMG REFERENCE POINTS ADDED

DATE: 8th NOVEMBER 1973

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REFERENCE

- = EDGE OF QUARTZITE OUTCROP
- = STRIKE AND DIP OF QUARTZITE
- = CREEK
- = TRACK
- = ROAD
- = CHIP SAMPLE RUN
- RB 232 = SAMPLE NUMBER
- Δ = SURVEY PEG

PLATE 3

MAP N° 2.

PLAN OF SAMPLING IN PART OF E.L. 11/73

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