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ASARCO (AUSTRALIA) PTY. LTD.

SPECIAL MINING LEASE 521
(PENNESHAW)
FINAL REPORT

by

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Adelaide,
South Australia.
7 May, 1971.

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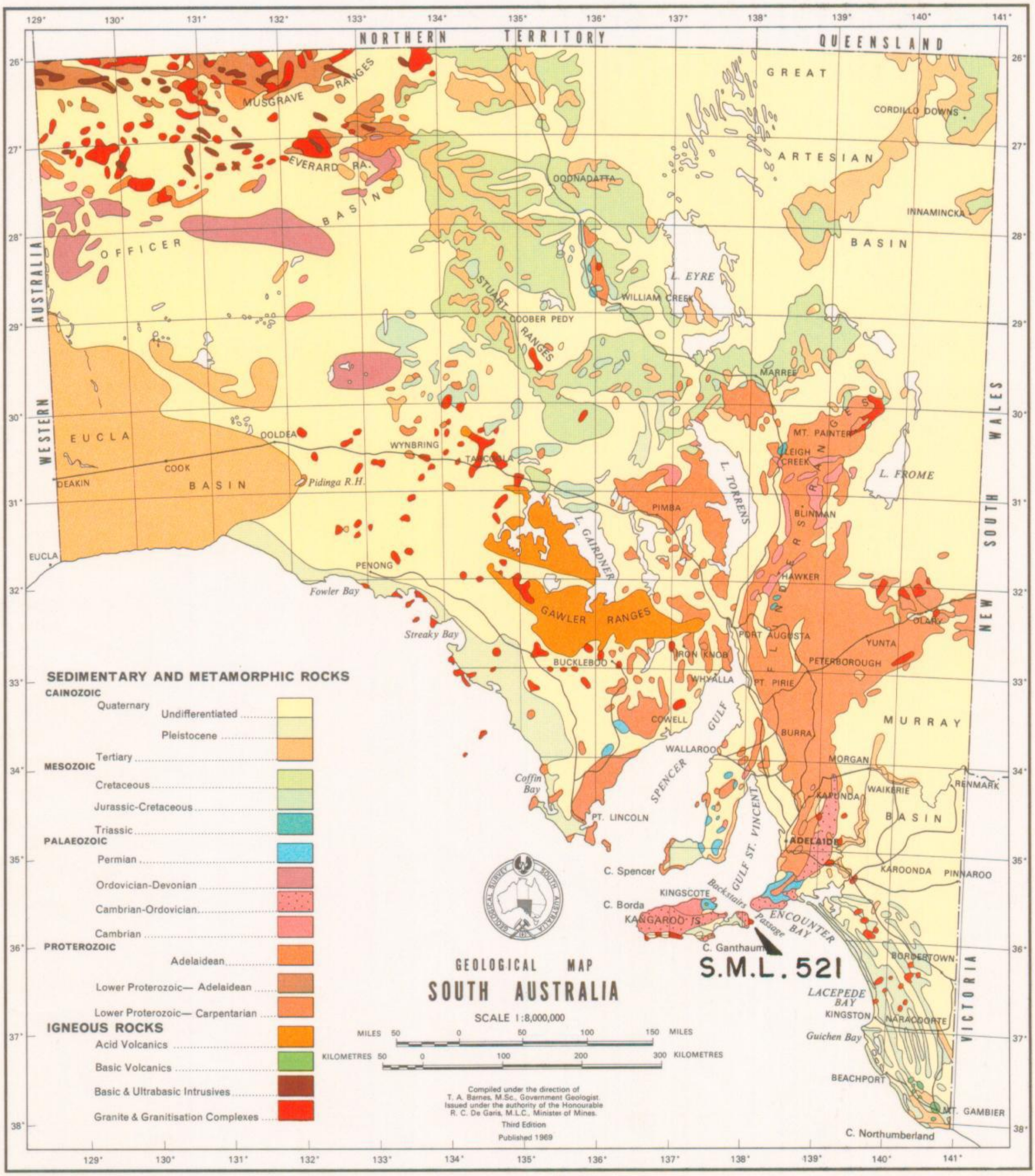
SUMMARY

Geological investigations within S.M.L. 521 involved reconnaissance mapping together with stream sediment and rock chip sampling.

Most attention was directed to Lower Palaeozoic granitic rocks which display the effects of some hydrothermal alteration. Molybdenum and copper were the principal metals sought within these rocks.

Pyritic Cambrian metasediments were also prospected for base and precious metals.



LOCATION MAP, S.M.L. 521 PENNESHAW PROSPECT

FIG. 1

INTRODUCTION

Hydrothermal alteration zones in Lower Palaeozoic granitic rocks which occur on the eastern end of Kangaroo Island were considered to offer potential for base metal mineralization, in particular copper and molybdenum.

Pyritic horizons within Cambrian metasediments of the Kanmantoo Group were also thought prospective.

Special Mining Lease No. 521 covering the eastern end of Kangaroo Island was granted to ASARCO (Australia) Pty. Ltd. by the South Australian Department of Mines (see Fig. 1).

The results of the company's reconnaissance exploration program are contained in this report.

LOCATION AND ACCESS

Special Mining Lease 521 is situated approximately 70 miles from Adelaide (Penneshaw-Adelaide). The shortest direct route from the mainland to the island however lies between Penneshaw and Cape Jervis across the waters of Backstairs Passage, a distance of some 12 miles.

The lease is 90 square miles in area and covers approximately five percent of Kangaroo Island (see Fig. 2). The island itself is elongate in shape with maximum dimensions of 90 miles east-west and 35 miles north-south and an approximate area of 2,000 square miles.

The island is served by daily commercial air services from Adelaide to Kingscote and Adelaide to Penneshaw. A boat sails twice-weekly between Adelaide and Kingscote transporting vehicles, freight and passengers. This service is the principal means of supply for the island. A daily passenger service also exists between Cape Jervis and American River. In addition, vehicles and freight reach the island two or three times weekly by means of a boat service from Adelaide to American River.

The island is well covered by a network of public roads and access to most areas is relatively easy.

PHYSIOGRAPHY

The lease area is mainly a low, lateritic plateau with little overall variation in topography. The coastline however is rugged and in places precipitous cliff faces have formed, particularly in granite and aeolianite.

Most vegetation has been cleared from the flat-topped hills. Thick, low, mallee scrub remains in some areas and particularly in the south-east portion of the lease. Some stream courses are thickly covered.

The principal stream courses are the Willson River, Deep Creek and the drainage into Lashmar Lagoon-Chapman River. Numerous small creeks dissect the near-coastal areas. Stream courses for the most part are poorly defined.

Most of the approximate 23 inch average annual rainfall falls during the winter months.

Average seasonal temperatures tend to be appreciably lower than those experienced by Adelaide.

LEASE TENURE

ASARCO (Australia) Pty. Ltd. was granted S.M.L. 521 for a period of six (6) months commencing 10 December 1970. Two small areas were excluded from the lease, these being National Park Reserves. Also, all land extending one half mile inland from high water mark was excluded.

PREVIOUS EXPLORATION AND MINING ACTIVITY

Elcor Australia Pty. Ltd. held Special Mining Leases 252 and 253 encompassing all of Kangaroo Island, with the exception of the Flinders Chase Fauna & Flora Reserve. Both leases expired on 31 October 1970. This company's work (Ref. 2) was apparently confined to a near-coastal area west of Kingscote where numerous, small, lode-type Pb-Zn deposits occur (Ref. 1).

A narrow quartz-pyrite-arsenopyrite vein has been worked on a very small scale for Au in the past (Ref. 1).

Gem quality chalcedony (var. carnelian), beryl (var. aquamarine), tourmaline (pink, green and blue varieties) and garnet have been obtained from a large pegmatite. Clay and feldspar have also been worked at this particular locality (Ref. 1).

A Mn occurrence is also known (Ref. 1).

Reports of Sn (Ref. 1) and native Cu (personal communication from a local farmer) occurrences ten miles south-east of Hog Bay and at Cape Hart respectively have not been confirmed.

METHODS OF INVESTIGATION

Reconnaissance Geological Mapping

The lease area was mapped at a scale of 1 : 50,000 using vertical aerial photographs and airphoto mosaics. Aeromagnetic map coverage (Fig. 3) of the area was also utilized. Data was transferred to a base map compiled from published 1 : 50,000 topographic sheets. The results of this work are presented in Figure 4.

Lack of outcrop and dense scrub hindered the mapping. Most attention therefore, was directed to the continuous exposure along the coastline. It was hoped initially, to locate areas of interest on the coast and then extend investigations inland from these areas, beyond the half mile limit reserved from the lease.

Stream Sediment Sampling

Stream sediment sampling was carried out in conjunction with the reconnaissance mapping. The poor bedrock outcrop, which is a result of the widespread laterite, calcrete and sand/soil covers in various portions of the lease, together with the poorly incised stream channels, meant that stream loads were rarely representative of the bedrock but rather of the surficial cover.

Most of the stream sampling program was concentrated upon the small creeks which drain directly into the sea and generally dissect bedrock, the Willson River and its tributaries and the drainages into Lashmar Lagoon.

A total of 146 stream samples were collected. The locations of these samples and their Cu, Pb, Zn and Mo values are shown in Figures 5 - 9. Table 2 in Appendix 1 summarizes the Cu, Pb, Zn and Mo contents of four size fractions of a number of samples. Table 3 in Appendix 1 summarizes Cu, Pb, Zn and Mo values for all samples collected.

Rock Chip Sampling

A number of rock chip samples were collected and analysed for various metals. The locations of these samples and their Cu, Pb, Zn and Mo contents are shown on Figures 5 - 9. Tables 4 - 6 in Appendix 2 summarize Cu, Pb, Zn and Mo values, additional metal values and a comparison of analytical techniques respectively.

Petrography

Petrographic descriptions of 15 rock samples were carried out by consultant petrologists. This data is contained in Appendix 3. The sample locations are indicated on Figure 5.

GEOLOGY

General

The regional geologic setting of S.M.L. 521 is shown in Figure 2 (Ref. 4).

The oldest non-igneous rocks exposed in the area are those of the Kanmantoo Group, these being metamorphosed Cambrian sediments. The metasediments have been intruded by granitic rocks in the vicinity of Cape Willoughby, by small basic dykes at False Cape and by pegmatites in several localities.

Permian sands, gravels and clays are reported from Penneshaw and leaf impressions of this age are recorded from a locality three miles ESE of Penneshaw (Ref. 4).

Early Tertiary bryozoal limestone is reported from Cape Willoughby. A small outcrop of late Cainozoic basalt occurs approximately three miles ESE of Penneshaw. A petrographic description of this rock type is contained in Appendix 3, (ASARCO sample number A9923).

Pleistocene calcareous aeolianite occurs extensively in the southern portion of the lease. Sand dunes have been derived from this tock type and calcrete caps much of its exposure.

A thin veneer of lateritic ironstone gravel and podsolized soils covers much of the lease area.

Major Rock Units

Granite and associated rocks

Coarsely crystalline granite, adamellite and granodiorite occur in the vicinity of Cape Willoughby (henceforth in this report referred to collectively as granite). The granite contains distinctive "eyes" of blue-grey, opalescent quartz, biotite and both potash feldspar and plagioclase. Where exposed, the granite is usually fresh. Xenoliths of Kanmantoo Group metasediments are a conspicuous feature. Finer crystalline varieties of granite, aplitic dykes, pegmatites and occasional thin quartz veins exhibit cross-cutting relationships with the coarse granite. Tourmaline is a common constituent of many of the pegmatites.

Several types of hydrothermally altered rocks have been observed and rock sampling within the granite was concentrated upon alteration zones. In order of significance, muscovite, albite and epidote are the principal alteration products. In places, too, the introduction of potash during alteration has led to the development of distinctive, brick-red Kspar. Greisenisation has resulted in the formation of quartz-muscovite rocks where alteration has been complete. Partially altered granite however, contains varying amounts of biotite and feldspar. The prominent "eyes" of quartz invariably remain in the muscovitized rocks. In extremely albitized rocks, the quartz "eyes" are no longer present and both the biotite and feldspar have undergone complete conversion. Epidote rims muscovite and albite alteration zones in some instances.

The larger exposures of altered granitic rocks lie to the south of Cape Willoughby. In particular, the headlands of Windmill Bay contain good exposures of altered rocks. On the northern headland, an east-west alteration zone approximately 150-200 feet wide is found. The actual volume of altered rock, both greisenised and albitised, within this interval however, is only approximately ten percent. Thin zones of altered rock, usually less than one foot wide, are separated by much larger zones of fresh, unaltered granite. A relatively structureless "pod" of mainly albitized rock, approximately 100 feet in diameter, occurs on the southern headland.

The distribution of the altered zones is largely controlled by a near-vertical joint pattern in the granite. Other joint sets also have associated alteration effects.

Several very thin (less than one foot) alteration zones occur between Cape Willoughby and Pink Bay, but are lacking between Pink Bay and the granite margin, which is exposed further west on the north coast.

The contacts of the granite and the Kanmantoo Group metasediments are sharply defined. The granite near the contacts is strongly fractured and contact metamorphic features are not pronounced. Numerous and frequently large xenoliths of country rock included in the granite near the contacts, are prominent. In many such xenoliths, blue opalescent quartz and feldspar crystals are seen. Indications are that the granite was intruded as a relatively cool and substantially solid mass. The distinctive aeromagnetic anomaly

(Fig. 3) which trends southwest from Cape St. Albans may indicate a partially faulted contact between the granite and the Kanmantoo Group.

Pegmatites, which dissect both the granite and the Kanmantoo Group, contain coarsely crystalline quartz, muscovite and feldspar. Tourmaline is also an extremely common constituent of these bodies.

Kanmantoo Group metasediments

The Kanmantoo Group within S.M.L. 521 consists largely of quartzites, hornfels, phyllites and schists. Throughout much of the lease area the rocks strike approximately northeast-southwest and dip to the southeast at 50°-80°. Sedimentary facings and cleavage-bedding relations indicate that the gross structure of the meta-sedimentary sequence is an overturned anticline. Individual units and detailed structure within the Kanmantoo Group were not mapped, however.

The rocks generally belong to the greenschist facies of regional metamorphism. In addition, metasomatic effects are evident, particularly near Cuttlefish Bay, where most rock sampling of the Kanmantoo Group was concentrated. Here, biotite schists and hornfelses containing actinolite and scapolite occur, together with minor tremolitic marble bands, Calcite-actinolite vein rocks are also found, often highly contorted.

Epidote, zoisite, chlorite and sphene are common minerals in the metasomatized schists and garnet has also been observed. Cordierite and andalusite have been described from one specimen.

Basic dyke rocks

A number of finely-medium crystalline dykes of gabbroic composition occur at False Cape where they intrude Kanmantoo Group quartzites. The dykes, which vary in thickness from four to 25 feet, are perpendicular to the stratification of the quartzites and have sharp contacts with them.

MINERALIZATION

Stream Sediment Sampling

A summary of analyses of the 146 stream sediment samples collected is presented in Table 1. Full details are supplied in Appendix 1.

Variation of Mo content with particle size was observed (Table 2, Appendix 1). Consequently, the -20+40 fraction was utilized for analysis of all samples collected. Molybdenum was not detected in most of the -80 mesh size fractions analysed.

Table 1

Distribution of metal values in stream sediment samples

Cu	Value p.p.m.	-5	5	10	15	20	25	40		
	No. of samples	52	51	19	15	4	4	1		
Pb	Value p.p.m.	-5	5	10	15	20	25	30	35	40
	No. of samples	4	25	29	27	14	14	8	7	5

Pb	Value p.p.m.	45	50	60	65	70			
	No. of samples	3	3	2	4	1			
Zn	Value p.p.m.	-5	5	10	15	20	25	30	
	No. of samples	4	8	9	33	24	34	2	
	Value p.p.m.	35	40	45	50	70	75	80	85
	No. of samples	12	2	9	5	1	1	1	1
Mo	Value p.p.m.	-3	3	4	5	6	7	8	12
	No. of samples	53	41	7	24	14	1	5	1

The results are characterised by low background values which are due to dilution of the drainages by surficial cover. Previous stream sampling by Elcor Australia Pty. Ltd. on the northern side of the island also indicated a similar situation in areas of cover in that region (Ref. 2).

Threshold values of 25, 40, 50 and 6 p.p.m. can be assigned for Cu, Pb, Zn and Mo respectively. However, samples with metal values exceeding these figures and which might be considered anomalous, do not indicate the presence of mineralisation. Rather, they appear to be random higher figures, and not significant departures from the distribution patterns.

Rock Chip Sampling

The results of rock chip sampling are summarised in Tables 4 - 6, Appendix 2.

Altered rocks within the granite have very low metal contents. In particular, analyses for Cu and Mo were disappointing and no evidence of leaching of appreciable quantities of sulphides was observed. Minor disseminated limonite was found in places but is due to the breakdown of pyrite. Fresh pyrite also occurs, sparsely distributed in the granite and the altered rocks. In one sample only, traces of chalcopyrite were seen and this particular sample returned a Cu value of 560 p.p.m. No molybdenite was found in any of the thin quartz veinlets. Values of 18 and 8 p.p.m. Mo were obtained from two samples of one such veinlet in which pyrite was present.

Several higher Pb values, and in particular one of 2400 p.p.m., could not be accounted for. This particular sample was collected across an alteration zone six inches wide. The presence of Pb in greisenised and albitised rocks is unusual and the values may be the result of analytical error.

Tungsten and Sn, which are often associated with hydrothermally altered granitic rocks, were not determined in significant amounts while Ag and Au were not detected.

The base metal contents of the Kanmantoo Group rock types sampled in the lease area are low. Pyritic phyllites, hornfelses and schists were of principal interest.

Pyrite generally is associated with rocks which show the effects of some metasomatism. However, sampling, particularly near Cuttlefish Bay, did not indicate significant base metal concentrations in these rocks. In addition, Ag and Au were not detected. A thin quartz-pyrite-arsenopyrite vein which averages several inches in thickness and occurs at the margin of a pyritic band, gave values of 0.04ozs. per long ton Au, 0.25% Cu and 27.3% As. Arsenic values to 0.4% were found in other samples of the pyritic rocks. One sample containing 0.15% Cu was collected from a thin calcite-actinolite vein. Molybdenum was not detected in the majority of samples, the highest value obtained being 22 p.p.m.

The thin basic dykes at False Cape have no associated base metal mineralisation, although minor pyrite does occur. A narrow quartz-pyrite-arsenopyrite vein which was worked in a minor fashion for Au prior to 1933 (Ref. 3) contains no metal values of note.

CONCLUSIONS

Altered zones in the Lower Palaeozoic granitic rocks of S.M.L. 521 are mostly extremely small and unmineralised.

Pyritic horizons in the Kanmantoo Group within the lease also lack significant metallic mineralisation.

Narrow quartz-pyrite veins offer no potential for further prospecting, for the above reasons.

RECOMMENDATION

It is recommended that S.M.L. 521 be relinquished.

A.J. HOSKING
Geologist.

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APPENDIX 1

STREAM SEDIMENT SAMPLING RESULTS

STREAM SEDIMENT SAMPLING RESULTS

Introduction

The results of analyses of stream sediment samples collected within S.M.L. 521 are presented in Tables 2 and 3.

All analyses were carried out by atomic absorption spectroscopy at the Australian Mineral Development Laboratories, Flemington Street, Frewville, South Australia.

All samples were analysed for Cu, Pb, Zn and Mo, the lower limits of detection being 5, 5, 5 and 3 p.p.m. respectively.

Most samples required drying prior to sieving. The -80 mesh size fraction was utilised in the case of Cu, Pb and Zn and the -20+40 fraction for Mo.

All results are in p.p.m. unless otherwise indicated.

Results

Table 2

Comparison of metal contents of four size fractions

	-20+40				-40+60				-60+80				-80			
Sample No.	Cu	Pb	Zn	Mo	Cu	Pb	Zn	Mo	Cu	Pb	Zn	Mo	Cu	Pb	Zn	Mo
Penneshaw																
A 8802	5	10	20	3	-5	10	15	3	-5	10	20	3	-5	15	40	3
13	-5	10	5	3	"	10	10	-3	"	5	10	3	"	15	10	-3
34	5	35	10	3	5	20	10	3	10	15	15	5	15	20	35	"
45	5	50	15	3	-5	25	15	11	10	25	15	6	10	35	35	"
50	15	20	20	7	5	-5	10	-3	5	-5	5	4	-5	5	5	"
53	5	20	15	5	5	5	10	"	5	"	5	-3	5	5	10	"
54	25	10	70	4	15	5	55	"	10	5	40	"	15	5	50	"

Sample No.	-20+40 Cu	Pb	Zn	Mo	-40+60 Cu	Pb	Zn	Mo	-60+80 Cu	Pb	Zn	Mo	-80 Cu	Pb	Zn	Mo
Penneshaw																
8858	5	20	20	4	5	5	15	-3	5	5	10	-3	5	5	20	-3
59	5	5	20	-3	5	5	5	-3	5	5	10	"	5	10	15	"
62	15	10	25	4	5	5	15	"	5	5	15	"	10	10	25	"
70	-5	45	15	-3	-5	20	15	"	5	15	15	4	-5	25	15	"
75	5	50	15	6	"	10	15	"	5	5	10	-3	"	10	15	"
87	5	40	15	3	"	20	15	3	10	20	20	6	5	30	25	"
8895	15	35	170	-3	15	25	35	5	15	25	45	5	20	25	70	"
10803	5	15	20	5	-5	5	5	-3	-5	-5	5	3	-5	5	10	"
7	15	15	30	-3	15	20	35	3	20	15	40	5	15	20	50	"
10824	5	15	15	"	-5	10	10	-3	-5	15	15	3	-5	15	15	3
10906	-5	10	5	3	"	10	5	"	"	10	5	5	"	15	10	-3
16	10	40	30	4	10	30	25	3	5	20	35	5	10	20	35	"
36	5	65	15	6	10	45	10	5	5	30	15	6	5	20	10	"
46	10	5	5	12	-5	-5	5	-3	5	-5	-5	3	-5	-5	-5	"
55	-5	15	5	5	"	5	-5	"	5	5	5	8	10	10	25	"
67	5	50	25	-3	5	30	15	3	10	25	5	8	10	30	25	"
73	-5	20	15	"	-5	15	10	-3	10	15	10	5	10	10	30	"
93	20	25	70	3	25	35	70	"	25	25	50	8	20	20	55	"
A10997	30	15	55	3	15	10	40	5	10	10	20	6	20	10	45	"

Table 3

Minus 80 mesh Cu, Pb, Zn and -20+40 mesh Mo values

Sample No.	Cu	Pb	Zn	Mo
A8801	-5	10	45	-3
2	"	20	30	3
3	"	15	20	5
4	"	40	50	-3
5	"	15	15	5
13	"	10	-5	3
15	"	10	"	3
21	"	10	"	3
30	"	40	20	8
31	"	45	15	8
34	5	35	15	3
35	5	40	15	3
36	5	70	15	5
37	5	30	15	8
38	5	50	15	3
39	5	45	20	6
40	5	50	10	6
41	15	20	25	6
44	5	65	20	5
45	5	60	20	3
46	5	65	15	3
47	5	65	20	3
48	5	40	15	3
50	-5	5	5	7

Sample No.	Cu	Pb	Zn	Mo
8853	5	5	10	5
54	15	5	50	4
58	5	5	20	4
59	5	10	15	-3
62	10	10	25	4
67	5	10	15	-3
68	5	5	15	"
69	10	15	25	"
70	5	25	20	"
71	15	10	35	"
72	5	15	20	"
73	5	10	10	8
74	5	10	10	-3
75	5	10	20	6
79	15	15	45	3
81	10	20	20	8
82	10	15	25	3
83	5	15	25	5
84	5	15	25	-3
85	5	15	10	5
86	10	30	20	6
87	10	25	30	3
88	5	30	20	3
89	10	10	10	-3
90	5	20	20	5
91	10	45	20	5
92	5	10	15	3
93	5	20	25	3
95	20	20	70	-3
96	10	10	20	3
97	-5	30	25	-3
98	"	65	25	3
8899	"	15	15	-3
10801	15	10	45	"
2	5	5	15	"
3	-5	5	15	5
4	"	5	25	-3
5	5	5	45	"
6	15	5	35	"
7	20	10	50	"
8	10	5	25	"
9	5	10	25	"
10	15	5	35	"
11	5	5	35	5
12	25	10	45	-3
20	10	5	35	"
21	5	15	25	"
22	-5	25	15	"
24	"	15	10	"
27	5	10	5	3
31	-5	5	-5	-3
32	15	15	45	"
10833	15	20	35	"

Sample No.	Cu	Pb	Zn	Mo
10902	5	15	20	-3
3	5	25	20	"
4	5	20	20	3
5	5	10	15	-3
6	5	5	15	3
8	-5	-5	10	
9	5	5	20	3
10	10	5	20	3
11	5	15	25	4
12	5	30	25	3
13	5	10	25	3
14	20	20	40	3
15	10	15	25	3
16	10	15	35	4
17	5	15	20	5
18	5	10	5	6
19	10	50	10	5
22	10	15	15	6
23	10	10	25	-3
33	-5	20	15	3
34	"	15	20	4
35	5	25	25	3
36	-5	20	15	6
37	"	15	15	6
38	"	10	5	3
39	"	25	15	6
40	"	10	25	6
41	"	35	35	5
42	15	35	35	5
45	40	25	45	5
46	-5	5	5	12
47	20	25	25	6
48	-5	5	5	4
49	"	15	15	-3
50	"	30	25	"
51	15	20	35	5
52	-5	35	35	5
53	"	25	25	5
54	"	35	75	5
55	"	15	80	5
57	"	60	25	3
59	15	40	25	5
61	-5	10	15	-3
62	10	30	20	"
63	-5	25	15	3
64	"	35	25	5
65	"	25	15	-3
66	"	20	15	"
67	"	25	25	"
68	"	35	15	"
69	10	20	45	3
70	-5	5	25	-3

027

Sample No.	Cu	Pb	Zn	Mo
10971	-5	15	25	-3
72	"	30	25	5
73	"	15	85	-3
75	"	-5	15	6
79	25	25	25	-3
80	-5	-5	5	3
81	15	25	15	-3
87	5	10	35	"
90	5	15	25	"
91	5	5	25	3
92	25	10	40	3
93	25	15	50	3
94	15	5	45	3
95	5	5	25	3
97	15	10	50	3
98	-5	-5	5	6
A10999	"	5	15	-3

APPENDIX 2

ROCK CHIP SAMPLING RESULTS

ROCK CHIP SAMPLING RESULTS

Introduction

The results of analyses of rock chip samples collected within S.M.L. 521 are presented in Tables 4, 5 and 6.

Analyses, with the exception of five (5) Au determinations, were carried out at the Australian Mineral Development Laboratories, Flemington Street, Frewville, South Australia. A number of analytical techniques were utilised. The five (5) Au analyses were carried out using atomic absorption spectroscopy by Mc.Phar Geophysics Pty. Ltd., 50 Mary Street, Unley, South Australia. The particular method used had a lower detection limit of 0.5 p.p.m. (value suffixed M).

All samples were analysed for Cu, Pb, Zn and Mo. Selected samples were analysed for Ag, Au, W, Sn, Co, As. The lower limits of detection for the particular methods used were (in p.p.m.) Cu (5), Pb (5), Zn (5), Mo (3), Ag (1), Au (3 - also 0.01 ozs./long ton), W (50), Sn (1), Co (5), As (10).

Gold analyses additional to the above were carried out by semi-quantitative emission spectroscopy (samples in ranges A8806 - A8866, A10814 - A10845).and fire assay (samples in range A9901 - A9923, reported in ozs./long ton and indicated thus *).

Copper, Pb, Zn, Mo and Co were determined by atomic absorption spectroscopy, and W and Sn by semi-quantitative emission spectroscopy. Arsenic was determined by a modified

Gutzheit method.

All results are in p.p.m. unless otherwise indicated.

Results

Table 4

Cu, Pb, Zn, Mo values

Sample No.	Cu	Pb	Zn	Mo
A- 2298	5	120	25	-3
99	10	2400	5	"
2300	10	70	20	"
6229	5	5	5	"
30	5	15	15	"
31	15	40	15	"
32	45	40	10	"
33	10	50	10	"
34	5	85	5	"
35	10	250	20	"
36	10	20	5	4
37	5	95	20	-3
38	5	660	65	"
39	5	20	10	"
40	5	80	20	"
41	5	130	10	"
42	10	80	25	4
43	5	50	10	-3
44	-5	85	10	4
57	"	10	5	
Not located - 58	5	10	5	
59	1500	30	25	
60	15	40	5	
6261	50	45	100	
8806	560	15	5	3
7	5	10	5	-3
8	5	15	10	18
9	55	10	10	8
10	5	10	5	-3
11	-5	10	15	"
12	"	10	45	"
14	"	20	15	"
16	5	10	55	"
18	-5	5	5	"
19	"	-5	5	"
20	15	5	5	"
22	-5	10	-5	"
23	"	10	"	"
24	"	10	5	"
25	"	10	-5	"

Sample No.	Cu	Pb	Zn	Mo
8826	65	20	35	10
27	-5	5	-5	-3
28	10	5	30	"
29	20	5	10	"
32	-5	45	10	"
33	"	55	10	"
42	15	10	130	"
43	-5	5	5	"
49	5	130	10	"
51	5	30	40	"
52	15	450	250	"
55	10	5	20	"
56	150	15	20	"
57	5	10	15	"
60	5	55	10	4
61	5	5	5	-3
63	-5	10	5	"
64	15	5	5	"
65	5	-5	-5	"
66	85	"	60	"
76	-5	10	25	"
77	55	165	25	20
78	25	5	100	-3
94	5	15	85	"
8900	25	20	5	3
9901	15	25	65	3
2	110	15	55	6
3	130	10	35	3
4	60	15	110	3
5	30	25	110	3
6	140	10	40	3
7	100	30	25	3
8	35	15	15	-3
9	70	30	45	4
9923	100	5	60	3
10813	-5	10	20	-3
14	35	35	120	12
15	55	50	190	22
16	40	30	130	12
17	30	15	220	-3
18	50	120	270	12
19	50	20	100	4
23	50	20	60	12
25	60	15	10	4
26	15	10	5	-3
28	15	10	-5	"
29	20	-5	"	"
30	5	5	"	"
34	25	30	95	3
35	10	5	90	-3
36	55	15	20	"

Sample No.	Cu	Pb	Zn	Mo
10837	40	15	70	-3
38	70	35	35	5
39	30	30	100	3
40	100	10	30	-3
41	50	15	55	3
42	-5	35	10	5
43	190	35	50	3
44	15	15	10	3
10845	20	15	30	3
10901	45	15	60	3
7	15	10	85	3
20	-5	15	-5	-3
21	15	20	120	"
24	5	10	5	3
25	5	140	5	3
26	5	10	15	3
27	45	10	15	-3
28	25	10	25	"
29	25	15	25	3
30	45	5	20	3
31	65	35	40	-3
32	5	5	55	3
44	45	20	100	3
56	25	10	65	-3
58	45	20	55	"
60	5	10	5	"
74	5	25	65	"
76	-5	5	-5	"
77	"	5	"	"
78	"	5	5	"
82	5	10	15	4
83	-5	5	10	-3
84	5	5	5	"
85	-5	5	-5	"
86	120	5	15	3
88	-5	5	50	-3
89	"	10	15	3
A 11000	5	5	65	-3

Table 5

Other metal values

Sample No.	Ag	Au	W	Sn	Co	As
A 2298	-1					
99	"					
2300	"					
6229	"					
30	"					
31	"	-0.5M				
32	"					

Sample No.	Ag	Au	W	Sn	Co	As
6233	-1					
34	"					
35	"	-0.5M				
36	"					
37	"					
38	"					
39	"					
40	"					
41	"					
42	"	"				
43	"					
44	"					
57	"	"				
58	"	"				
59	"					
60	"					
6261	"					
8806	"	-3	-50	5		
7	"	"	"	3		
8	"	"	"	3		
9	"	"	"	2		
10	"	"	"	15		
11	"	"	"	1		
12	"	"	"	1		
14	"	"	"	2		
16	"	"	"	1		
18	"	"	"	2		
19	"	"	"	5		
20	"	"	"	5		
22	"	"	"	10		
23	"	"	"	1		
24	"	"	"	1		
25	"	"	"	1		
26	"	"	"	5		
27	"	"	"	10		
28	"	"	"	1		
29	"	"	"	1		
32	"	"	"	1		
33	"	"	"	1		
42	"	"	"	5		
43	"	"	"	1		
49	1	"	"	1		
51	-1	"	"	1		
52	"	"	"	3		
55	"	"	"	1		
56	"	"	"	5		
57	"	"	"	1		
60	"	"	"	3		
61	"	"	"	5		
63	"	"	"	1		
64	"	"	"	-1		
65	"	"	"	"		
8866	"	"	"	1		

Sample No.	Ag	Au	W	Sn	Co	As
9901	1	0.04*			2500	27.3%
2	-1	-0.01*			40	4000
3	"	"			30	140
4	"	"			40	830
5	"	"			30	100
6	"	"			30	60
7	"	"			35	15
8	"	"			20	30
9	"	"			35	25
9923	"	"			35	90
10814	"	-3	-50	2		
15	"	"	"	5		
16	"	"	"	2		
17	"	"	"	2		
18	"	"	"	5		
19	"	"	"	1		
23	"	"	"	1		
25	"	"	"	10		
26	"	"	"	15		
28	"	"	"	20		
29	"	"	"	2		
30	"	"	"	2		
34	"	"	"	2		
35	"	"	"	2		
36	"	"	"	1		
37	"	"	"	1		
38	"	"	"	-1		
39	"	"	"	1		
40	"	"	"	-1		
41	"	"	"	1		
42	"	"	"	-1		
43	"	"	"	5		
44	"	"	"	1		
A 10845	"	"	"	3		

Note: M - Mc.Phar determination
* - ozs./long ton

035

Table 6

Comparison of analytical methods

Sample No.	Cu 1	Cu 2	Pb 1	Pb 2	Zn 1	Zn 2	Mo 1	Mo 2	Ag 1	Ag 2
	(5)	(0.5)	(5)	(1)	(5)	(20)	(3)	(3)	(1)	(0.1)
A 10814	35	30	35	60	120	100	12	10	-1	0.2
15	55	30	50	100	190	180	22	15	"	0.2
16	40	20	30	50	130	90	12	10	"	0.1
17	30	30	15	30	220	200	-3	-3	"	0.3
18	50	40	120	200	270	200	12	10	"	1.5
19	50	30	20	40	100	100	4	3	"	0.1
23	50	20	20	10	60	50	12	10	"	-0.1
25	60	40	15	10	10	-20	4	3	"	"
26	15	20	10	8	5	"	-3	-3	"	0.1
28	15	20	10	5	-5	"	"	"	"	"
29	20	20	-5	1	"	"	"	"	"	"
30	5	10	5	10	"	"	"	"	"	"
34	25	30	30	50	95	90	3	"	"	0.2
35	10	40	5	5	90	80	-3	"	"	0.1
36	55	30	15	20	20	-20	"	"	"	0.1
37	40	25	15	10	70	40	"	"	"	0.1
38	70	50	35	20	35	20	5	"	"	0.1
39	30	25	30	50	100	120	3	3	"	0.1
40	100	90	10	8	30	20	-3	-3	"	0.1
41	50	40	15	8	55	60	3	3	"	0.1
42	-5	20	35	30	10	-20	5	-3	"	0.1
43	190	120	35	40	50	60	3	3	"	0.2
44	15	25	15	10	10	-20	3	3	"	0.1
A 10845	20	25	15	30	30	30	3	3	"	0.1

Note: 1 - AMDEL atomic absorption spectroscopy

2 - AMDEL semi-quantitative emission spectroscopy

Detection limits in brackets

APPENDIX 3

PETROGRAPHY OF 15 ROCK SAMPLES

PETROGRAPHY OF 15 ROCK SAMPLES

037

Introduction

Specimens were described by H.W. Fander (1-13 inclusive) and I.F. Scott (14-15 inclusive) of Central Mineralogical Services, 231 Magill Road, Maylands, South Australia.

Thin sections are stored at ASARCO (Australia) Pty. Ltd., 323 Wakefield Street, Adelaide, South Australia.

Petrography

1. ASARCO sample no. A9902: C.M.S. section no. 4540

Identification: Metasomatised quartz-mica schist

Hand specimen: Dark, fine-grained, schistose rock with fine, disseminated sulphides.

Microscopic: This is an extensively scapolitised quartz-mica schist.

The original rock, still present as layers and lenses, consists of very fine-grained quartz and parallel flakes of biotite and minor muscovite. Throughout the rock, ovoid poikiloblastic patches of scapolite have formed as a result of metasomatism involving replacement of most of the quartz, with survival of the small biotite flakes. Poikiloblastic patches of actinolite are also common. Granular sphene is present.

The sulphides are almost certainly associated with the metasomatic minerals and with late-stage carbonate-chlorite veins.

2. ASARCO sample no. A9906: C.M.S. section no. 4541

Identification: Metasomatised quartz-biotite schist

Hand specimen: Dark, fine-grained schist with layers or parallel veins of sulphides.

Microscopic: Very similar to A9902 in origin and history and may be termed a metasomatised quartz-biotite schist. It is more distinctly layered than A9902 and with a more obvious association of metasomatic minerals and the sulphide.

The rock consists of contorted layers of very fine quartz biotite schist and poikiloblastic scapolite and layers of coarsely crystalline scapolite, quartz, actinolite, biotite, sphene and opaques (sulphide).

3. ASARCO sample no. A9907: C.M.S. section no. 4542

Identification: Impure marble (tremolitic)

Hand specimen: Pale crystalline rock with ?relicts of schist.

Microscopic: This consists mainly of coarsely crystalline carbonate (not calcite; probably dolomite) and may be termed an impure marble.

The interlocking crystals of carbonate contain sheaves of acicular tremolite, some actinolite flakes of pale biotite or phlogopite, patches of quartz and sulphides. The carbonate crystals show strain extinction due to stress.

Since tremolite is the most abundant silicate, this may be termed a tremolite marble.

4. ASARCO sample no. A9908: C.M.S. section no. 4543

Identification: Actinolite - scapolite rock (metasomatic)

Hand specimen: Medium-grained, green ?amphibolite.

Microscopic: An extensively metasomatized rock; although it contains abundant amphibole, it is not an amphibolite in the normal sense. Very little of the original rock remains; it appears to consist of quartz and feldspar (?albite). Very abundant, prismatic, poikiloblastic actinolite has developed throughout, with random to sub-parallel orientation. Lesser amounts of scapolite, clinozoisite-epidote and sphene also occur. These are all metasomatic, i.e. replacive. They do not appear to be accompanied by sulphides in this rock. Minor carbonate also occurs.

5. ASARCO sample no. A9910: C.M.S. section no. 4544

Identification: Quartz - biotite - garnet schist

Hand specimen: Dark, fine-grained, folded biotite schist

Microscopic: This is a folded quartz - biotite - garnet schist. It consists of fine mosaic quartz and small parallel flakes of brown, biotite. Occasional euhedral porphyroblastic garnet crystals occur sporadically, and there is a garnet-rich layer adjacent to a folded quartz layer. The folding is a post-metamorphic phenomenon, with introduction of quartz-biotite veins or layers cutting across the schistosity; these layers have selvages of recrystallised biotite and may have formed by "lateral secretion" in an immediately post-metamorphic phase. The rock is a metasediment belonging to the greenschist facies of regional metamorphism.

6. ASARCO sample no. A9912: C.M.S. section no. 4545

Identification: Quartz - biotite - garnet schist

Hand specimen: Dark, contorted, fine-grained biotite schist.

Microscopic: A quartz - biotite - garnet schist, very similar to A9910, with only minor differences.

The original sediment must have contained sand-size quartz grains as well as fine quartz and clays. These coarser grains have survived recrystallisation and occur as relict grains embedded in the schistose biotite-quartz matrix. Euhedral, poikiloblastic garnet crystals are sporadically distributed through the rock.

7. ASARCO sample no. A9915: C.M.S. section no. A4546

Identification: Garnet - zoisite - biotite - quartz schist

Hand specimen: Dark, quartz - biotite - garnet schist.

Microscopic: This schist is generally similar to the previous ones but there are mineralogical differences. In addition to quartz, biotite and garnet, zoisite and chlorite are conspicuous. Also, there is more garnet. Areas of poikiloblastic actinolite occur and there is sphene and carbonate. Garnet porphyroblasts are set in a matrix of orientated biotite, mosaic quartz and granular zoisite. A few layers or elongate lenses contain metasomatic carbonate, actinolite and minor opaques (fine suphides). The rock belongs to the greenschist facies.

8. ASARCO sample no. A9916: C.M.S. section no. 4547

Identification: Scapolitised biotite schist.

Hand specimen: Dark, knotted schist.

Microscopic: This is a scapolitised quartz - biotite - actinolite schist.

The rock consists of porphyroblasts ("knots") of pale, actinolitic amphibole in a fine matrix of quartz and lineated biotite. The actinolite evidently formed contemporaneously with metamorphism. The scapolite however, which also occurs as poikiloblastic patches, is a post metamorphic phase since it contains orientated inclusions of biotite parallel to the schistosity. Fine opaques are scattered through the rock.

9. ASARCO sample no. A9917: C.M.S. section no. 4548

Identification: Epidote amphibolite

Hand specimen: Coarsely - crystalline, dark-green, amphibolite with epidote.

Microscopic: May be termed an epidote amphibolite and containing small patches of scapolite.

The epidote occurs as well-formed, small prismatic crystals showing pronounced parallel alignment. The pale hornblende is the major mineral as large, interlocking patches with embedded aligned epidote. Small flakes of green biotite are present, especially in epidote-rich streaks.

Textural relationships suggest that the rock was a scapolitised biotite-epidote schist which was subsequently metasomatised forming the hornblende. Hence, although hornblende is the main mineral, this is not an amphibolite in the normal sense.

10. ASARCO sample no. A9920: C.M.S. section no. 4549

Identification: Quartz - biotite schist with scapolite.

Hand specimen: Finely-laminated, spotted schist.

Microscopic: A fine-grained quartz - biotite schist with small, ovoid "spots" or poikiloblasts of scapolite.

The finely laminated fabric of the rock is due to alternating biotitic and more quartzose layers. The scapolite poikiloblasts are late or post-metamorphic and contain orientated biotite flakes; they are often surrounded by a halo of fine, granular sphene.

A transgressive, quartz-carbonate vein occurs, cutting across the schistosity at a low angle but lacking sharp borders. Detrital heavy minerals are seen e.g. green tourmaline and zircon.

11. ASARCO sample no. A9922: C.M.S. section no. 4550

Identification: Schistose, tremolite marble

Hand specimen: Well-crystallised, streaky, brown mica schist.

Microscopic: This is actually an impure schistose marble. It consists of elongate, parallel grains of carbonate (probably dolomite) with sub-parallel, large, prismatic crystals of tremolite with carbonate inclusions. Wisps of phlogopite are very common throughout, as well as thin flakes of colourless chlorite. Small grains of sulphide (?pyrite) occur sporadically. The paler streaks in the rock are caused by thin layers containing little or no phlogopite.

12. ASARCO sample no. A9923: C.M.S. section no. 4551

Identification: Basalt

Hand specimen: Very fine-grained, dark-grey, igneous rock.

Microscopic: This is a slightly vesicular, porphyritic basalt. It is composed of occasional phenocrysts of augite and microphenocrysts of labradorite set in a groundmass of small labradorite laths, granular pyroxene, opaques and brown glass. The small, spherical vesicles are filled with pale chlorite and yellow chlorite occurs in the groundmass, generally adjacent to the vesicles. However, on the whole the rock is quite fresh.

13. ASARCO sample no. A9924: C.M.S. section no. 4552

Identification: Scapolite - epidote - actinolite rock

Hand specimen: Pale, crystalline rock with amphibolitic streaks.

Microscopic: A scapolite - epidote - actinolite rock. The principal mineral is scapolite as large, interlocking anhedral plated containing sub-parallel lines of small, lineated epidote crystals and large poikiloblastic crystals of actinolite. This mineral also occurs as radiating fibrous groups. Granular sphene is conspicuous in some parts and pale chlorite flakes are seen, interstitial carbonate is rare.

The larger scapolite crystals contain small biotite flakes and the original host rock may have been a biotite schist, now almost completely metasomatised.

14. ASARCO sample no. A10924: C.M.S. section no. 4915

Identification: Pyroxene hornfels assemblage

Hand specimen: A pale-grey, fine-grained, metamorphic rock adjacent to a white buff siliceous portion.

Microscopic: The light-grey portion of the rock contains quartz, potash feldspar and diopside mainly. For the most part, the rock is medium-grained and average grain size is less than 0.5 mm. The texture is granular and rather hornfelsic. Poikiloblasts of diopside occasionally reach dimensions greater than 1 mm. Accessory sphene is present.

The rock is a member of the pyroxene hornfels facies (orthoclase is present rather than microcline) and its composition suggests that the primary rock was a calcareous, feldspathic sandstone.

15. ASARCO sample no. A10944. C.M.S. section no. 4917

Identification: Biotite - quartz schist with poikiloblastic cordierite and andalusite

Hand specimen: Dark-brown biotite - andalusite schist.

Microscopic: This rock is essentially a medium-grained biotite - quartz schist with numerous porphyroblasts developed within it. At least two varieties of porphyroblasts are present namely cordierite with typical quartz and also random mica (muscovite and biotite) inclusions and also andalusite which is also full of similar inclusions. Perhaps both minerals should be described as poikiloblastic.

It appears that the andalusite was first formed and has been partially deformed by the metamorphism. Cordierite has formed as rims on the andalusite or as separate porphyroblasts of a slightly younger age. There is a noticeable presence of minor muscovite replacing biotite adjacent to cordierite as well as inclusions within the cordierite. It appears that magnesium and potash metasomatism of a previously regionally metamorphosed potash deficient rock (hence the andalusite) is responsible for the present assemblage. Pleochroic haloes are abundant in the biotite flakes.

AUSTRALIA 1 : 253,440

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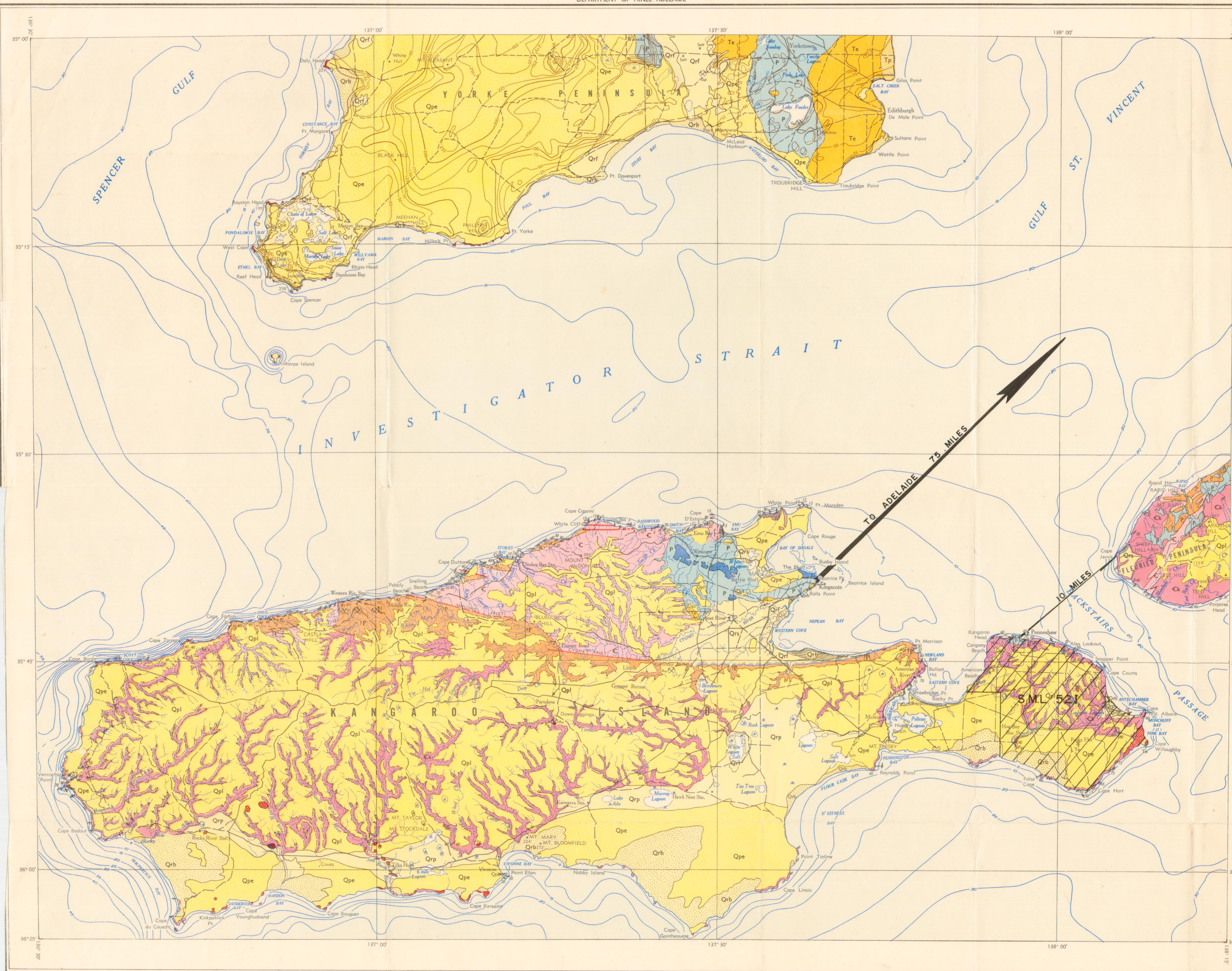

REFERENCE

CAINOZOIC ERA

QUATERNARY — RECENT

- Qrs — Creek alluvium, flood plain deposits, escarpment outwash, red and mottled clays
- Qrb — Modern beach sands, beach-ridged in low lying sheltered coastal areas
- Qrp — Siliceous sands: Redistributed in part from the "A" horizon of the aeolianite dune system and from the laterite profile
- Qrl — Swamp and lagoon deposits, *Limnea*, and *Coxiella* clays, saline deposits and siliceous sand. Seed and flour gypsum dunes of southern Yorke Peninsula
- Qra — Stranded beach-ridged dunes of the Mid-recent period (Antechamber Bay, Kangaroo Island)
- Qrf — Marshy saline flats of the Mid-recent high sea level. Marginal low marine shell banks deeply travertinised

QUATERNARY — PLEISTOCENE

- Qpl — Pisolitic and massive laterite with siliceous top soil: particularly well developed on plateau surfaces, also on consolidated aeolianite dune surfaces
- Qpe — Consolidated dune limestone (Aeolianite) of the coastal areas; numerous internal unconformities and fossil soil horizons: siliceous white sands and lesser sheet (soil) travertines extend inland
- Qpb — Reef shell beds (*Turbo etc.*) at base of aeolianite system (Vivonne Bay; Stokes Bay) and fossiliferous cobble conglomerate of Kingscote

TERTIARY

- LATE — Tp — Massed oyster beds (*Ostrea*) with overlying mottled clays and sands at Point Giles, Yorke Peninsula
- EARLY — Te — Polyzoal Limestone: Rich in "*Echinoids and Brachiopods*" at Kingscote Cape Willoughby and Edithburgh: Fossil limestone in sink hole at Porky Flat

PALAEOZOIC ERA

- PERMIAN — P — Glacial Till: Boulder beds, chiefly clays with numerous granite, gneiss, and quartzite erratics, frequently several feet in length. Also glaciofluvial deposits: sands, gravels, clays and porcellanized clays with obscure leaf remains at Kingscote and 3 miles E.S.E. Penneshaw
- CAMBRIAN TO ORDOVICIAN — Ꞓk — Kanmantoo Group: Quartzites, argillaceous schistose quartzites and schistose slates: Coarse glaciofluvial conglomerate bands at Penneshaw; ubiquitous slump bedding of Kangaroo Island.
- CAMBRIAN — Ꞓ — Pt. Marsden Conglomerate: Massive sandstones coarsely crossed, bedded, and with numerous conglomerate bands containing pebbles and boulders of limestone, schist and red granite. White Point Limestone: Massive limestone with plentiful boulders containing "*Archaeocyathinae*", and a few gneiss, schist, and red granite boulders at White Point and Point Marsden. Grey and purple shales with Trilobites (*Redlichia Lusatiops*), Brachiopods (*Acrothele*) and Pteropods (*Hyolithes*) at Emu Bay. Stokes Bay Sandstone: Principally massive coarsely current and slump-bedded red and white sandstones and quartzites. Marbles and calcareous slates on Fleurieu Peninsula

PROTEROZOIC ERA

- ADELAIDE SYSTEM — P — Principally massive phyllites; interbedded quartzites near top.

ARCHAEOZOIC ERA

- A — Mica schists of Fleurieu Peninsula, locally injected and migmatized with subordinate kyanite sillimanite schists, injection gneisses, pegmatites and ilmenitic quartz veins.

IGNEOUS ROCKS

- Flow basalts of Kingscote and Penneshaw: columnar in part and with steam vesicles (Late Cainozoic)
- Basic and intermediate dyke rocks (Lower Palaeozoic)
- Pg. — Pegmatite with or without tourmaline; mica and beryl; Kaolinized gem pegmatites of "Daws Diggings" and Penneshaw (Lower Palaeozoic)
- Granite, pegmatitic granite, adamellite and granodiorite of lower Palaeozoic: South coast Kangaroo Island
- Granites, gneissic granites and granite gneisses, with intrusive basic dykes of Southern Yorke Peninsula (Archaeozoic)

GEOLOGICAL BOUNDARIES
- OBSERVED
- APPROXIMATE
- INFERRED

BLOCK FAULT
- OBSERVED
- APPROXIMATE

MEDIUM ANGLED REVERSE FAULT
SYNCLINE
ANTICLINE

BEDDING
- STRIKE AND DIP — 65
- HORIZONTAL
- VERTICAL
- OVERTURNED — 70

"FACE UP" IN SEDIMENTARY STRATA
STRUCTURE LINES IN BEDROCK
Isolated Glacial Erratics (Permian)

MAIN ROAD
SECONDARY ROAD
TRACK
TRIANGULATION STATION
MINE
RIVER OR CREEK
SWAMP
SUBMARINE FORM LINES — 5, 10
FORM LINES — 100, 50

FOSSIL LOCALITY
GOLD — Au
SILVER — Ag
LEAD — Pb
GYPSUM — Gp
GEMSTONE — G

Copies of this map may be obtained from the Geological Survey of South Australia Dept. Mines Adelaide or Bureau of Mineral Resources Geology and Geophysics Canberra A.C.T.

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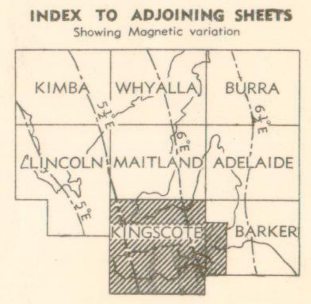
INDEX TO ADJOINING SHEETS
Showing Magnetic variation

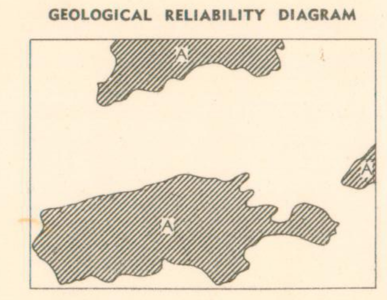


SCALE
4 MILES TO 1 INCH

MILES 2 1 0 2 4 6 8 10 12 14 16 MILES

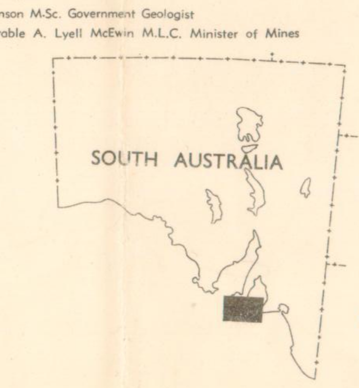
KILOMETRES 5 0 5 10 15 20 KILOMETRES

GEOLOGICAL RELIABILITY DIAGRAM



A Detail geological mapping

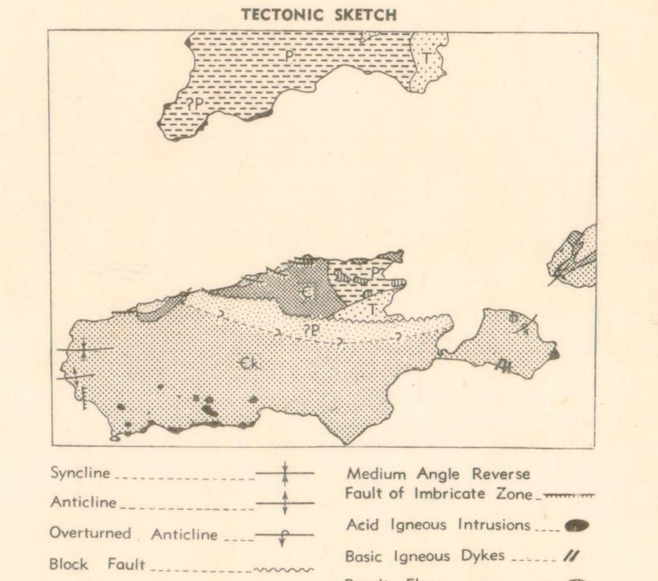
Geology of Kangaroo Island by **R. C. SPRIGG** M.Sc. 1953.
Geology of Fleurieu Peninsula by **B. CAMPANA** D.Sc. 1953.
Geology of Yorke Peninsula by **D. KING** M.Sc. 1953.
R. C. SPRIGG Geologist in charge of Regional Map Preparation
Base map compiled from Photogrammetric Section (Dept Lands) plans of Kangaroo Island.
Cartography by Geological Drafting Section Dept of Mines S.A.
Compiled under the direction of S. B. Dickinson M.Sc. Government Geologist
Issued under the Authority of the Honourable A. Lyell McEwin M.L.C. Minister of Mines
Published 1954



KINGSCOTE
SHEET I 53/16

1608-1

TECTONIC SKETCH



SML 521 PENNESHAW PROSPECT LEASE AREA

FIG 2

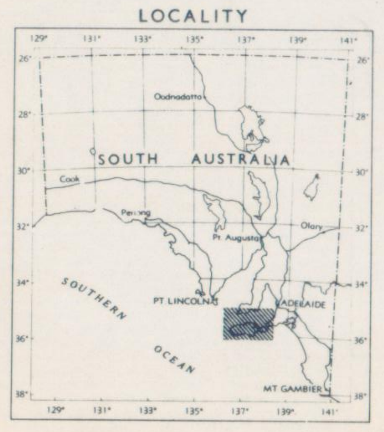
KINGSCOTE

AUSTRALIA 1:253,440
Map Corners from data available at publication

GEOLOGICAL SURVEY OF SOUTH AUSTRAL
DEPARTMENT OF MINES, ADELAIDE

4 MILE GEOPHYSICAL SERIES SHEET I 53-16 ZONE 5

LOCALITY



Base map and Cartography by Geological Drafting Section
S.A. Department of Mines

INDEX TO 1 MILE SHEETS

PONDALOWIE	COONARIE	EDITHBURGH	NOARLUNGA
ALTHORPE	INVESTIGATOR	832	YANKALILLA
BORDA	CASSINI	KINGSCOTE	JERVIS
VENNACHAR	VIVONNE	D'ESTREES	WILLOUGHBY
	DU COUEDIC	KERSAINT	LINOIS

SCALE
4 MILES TO 1 INCH

MILES 2 1 0 2 4 6 8 10 12 14 16 18 20 MILES

KILOMETRES 5 0 5 10 15 20 25 KILOMETRES

AEROMAGNETIC MAP OF TOTAL INTENSITY

FIRST EDITION 1961

Note

This map is compiled from air-borne magnetometer surveys conducted by Adastra Hunting Geophysics Ltd., on behalf of the S.A. Department of Mines. For Kangaroo Island and Fleureiu Peninsula areas, the total magnetic intensity at 500 feet above ground level was recorded continuously. The contours are corrected for normal regional gradient.

For Yorke Peninsula area the total magnetic intensity at 1000 feet above sea level was recorded continuously and contours uncorrected for normal regional gradient.

Uncontrolled photo-mosaic assemblies were used to navigate flight lines at a spacing of one mile and controlled base maps indicate the aircrafts actual flight course as recorded on overlapping photographs taken with a 35mm. Vinten camera during flight.

Results reduced by Geophysical Section, S.A. Dept. of Mines.

J. E. Webb, B.Sc., A.S.A.S.M., Senior Geophysicist.

Compiled under the direction of T. A. Barnes, M.Sc., Government Geologist.

Issued under the authority of the Honourable Sir A. Lyell McEwin, M.L.C.

SML 521
PENNESHAW PROSPECT
REGIONAL AEROMAGNETIC MAP

LEGEND

Magnetic Contours (values in gammas) 2000 2020

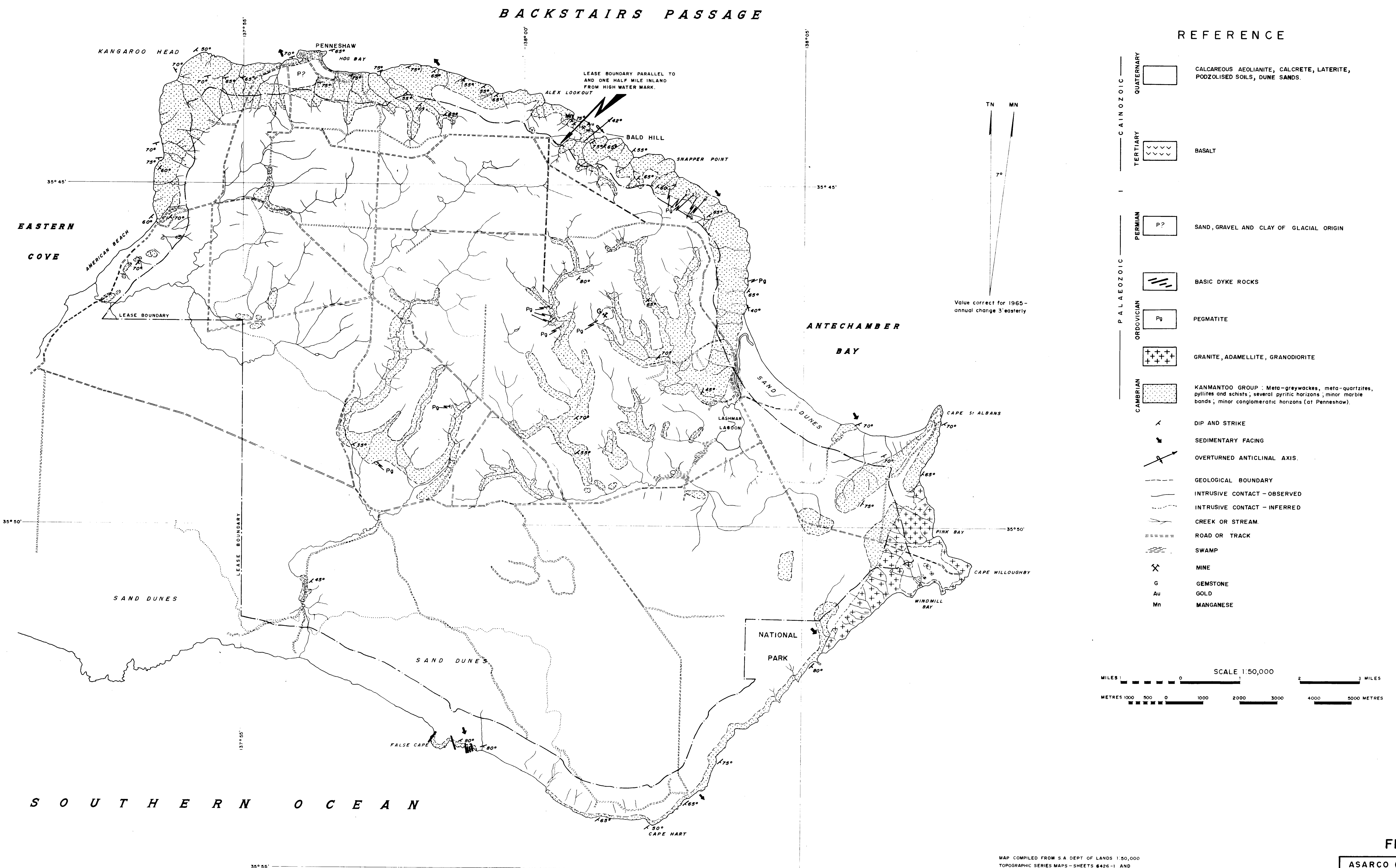
Flight Line (showing photo positions) ....

Magnetic Low 1980

Roads shown thus ....

1608-2

FIG 3
KINGSCOTE

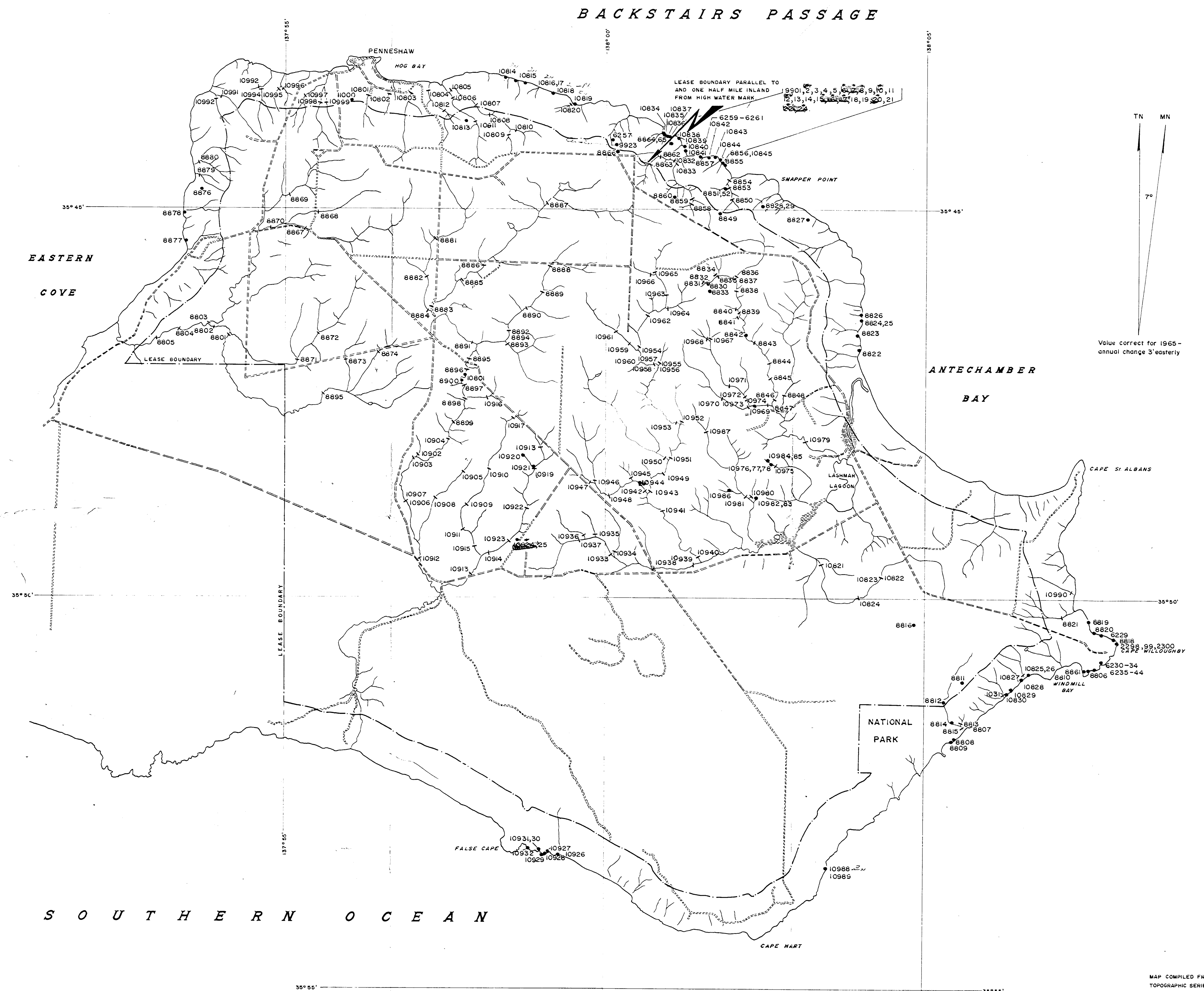


MAP COMPILED FROM S.A. DEPT OF LANDS 1:50,000 TOPOGRAPHIC SERIES MAPS - SHEETS 6426-I AND 6526 Pt. III AND Pt. IV.

FIG. 4

ASARCO (AUSTRALIA) PTY. LTD.		
S. M. L. 521 PENNESHAW PROSPECT GEOLOGICAL MAP OF LEASE AREA		
COMPILED: G.J.D.	CHECKED:	PLAN No
DRAFTED: M.J.U.	DATE: MAY '71	247.

1608-3



LEGEND

STREAM SEDIMENT SAMPLE LOCATION

ROCK CHIP SAMPLE LOCATION

10924 (THIN SECTION)

ROAD OR TRACK

SWAMP

6258

SCALE 1:50,000

MILES 1 0 1 2 3 MILES

METRES 1000 500 0 1000 2000 3000 4000 5000 METRES

MAP COMPILED FROM S.A. DEPT OF LANDS 1:50,000 TOPOGRAPHIC SERIES MAPS - SHEETS 6426-I AND 6526 Pt.III AND Pt. IV.

1608-4

FIG. 5

ASARCO (AUSTRALIA) PTY. LTD.		
S.M.L. 521 PENNESHAW PROSPECT STREAM SEDIMENT & ROCK CHIP SAMPLE LOCATION MAP		
COMPILED: G.J.D.	CHECKED:	PLAN Nº
DRAFTED: M.J.U.	DATE: MAY '71	246

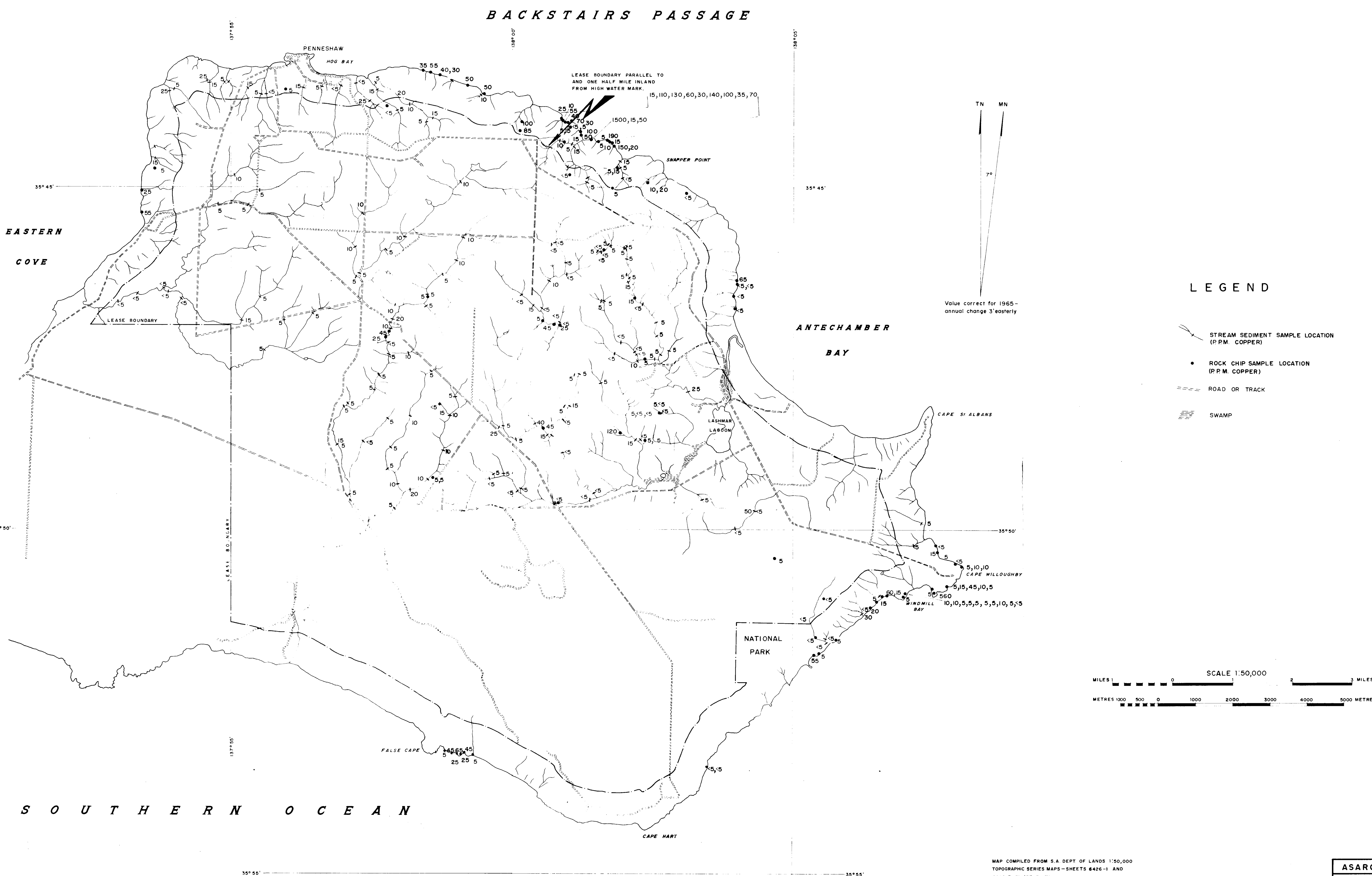


FIG. 6

ASARCO (AUSTRALIA) PTY. LTD.		
S.M.L. 521 PENNESHAW PROSPECT STREAM SEDIMENT & ROCK CHIP SAMPLING. COPPER VALUES		
COMPILED: G.J.O.	CHECKED:	PLAN Nº
DRAFTED: M.J.U.	DATE: MAY '71	248.

1608-5

FIG. 7

MAP COMPILED FROM S.A DEPT OF LANDS 1:50,000 TOPOGRAPHIC SERIES MAPS - SHEETS 6426-I AND 6526 Pt. III AND Pt. IV.

ASARCO (AUSTRALIA) PTY. LTD.

S.M.L. 521
PENNESHAW PROSPECT
STREAM SEDIMENT & ROCK CHIP SAMPLING. LEAD VALUES

COMPILED: G.J.D.	CHECKED:	PLAN Nº
DRAFTED: M.J.U.	DATE: MAY '71	249.

16086

MAP COMPILED FROM S.A. DEPT OF LANDS 1:50,000 TOPOGRAPHIC SERIES MAPS—SHEETS 6426-I AND 6526 Pt. III AND Pt. IV.

FIG. 8

ASARCO (AUSTRALIA) PTY. LTD.

S.M.L. 521
PENNESHAW PROSPECT
STREAM SEDIMENT & ROCK CHIP SAMPLING. ZINC VALUES

COMPILED: G.J.D.	CHECKED:	PLAN Nº
DRAFTED: M.J.U.	DATE: MAY '71	250.

1608-7

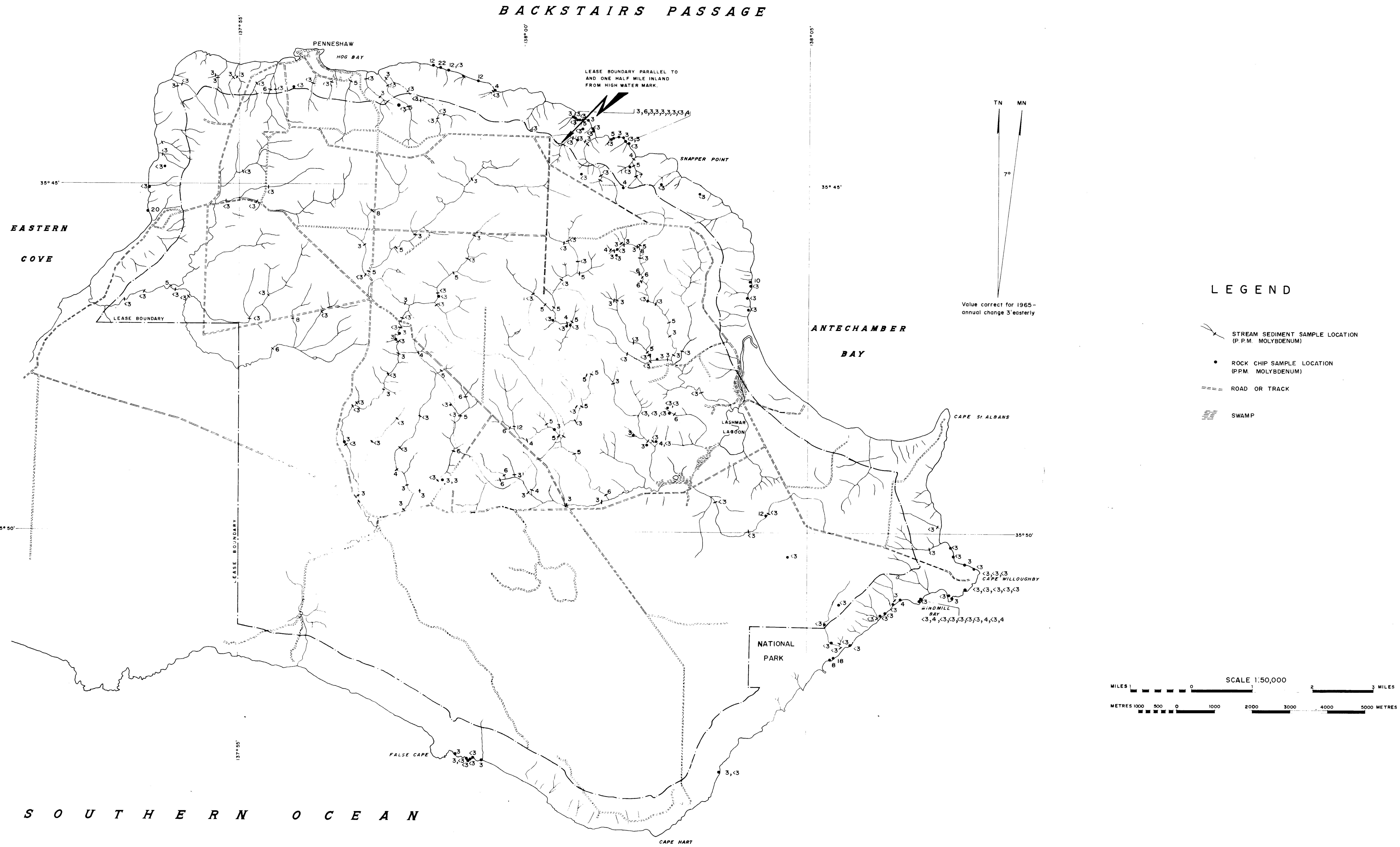


FIG. 9

ASARCO (AUSTRALIA) PTY. LTD.

S.M.L. 520
PENNESHAW PROSPECT
STREAM SEDIMENT & ROCK CHIP SAMPLING. MOLYBDENUM VALUES

COMPILED: G.J.D.	CHECKED:	PLAN Nº
DRAFTED: M.J.U.	DATE: MAY '71	251.

1608-8