DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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GEOLOGY OF THE WHIDBEY ISLANDS,
GREENLY ISLAND, ROCKY ISLAND
(NORTH) & ROCKY ISLAND (SOUTH),
LINCOLN 1:250 000 MAP SHEET

GEOLOGICAL SURVEY

by

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GEOLOGY OF THE WHIDBEY ISLANDS, GREENLY ISLAND, ROCKY ISLAND (NORTH) AND ROCKY ISLAND (SOUTH), LINCOLN 1:250 000 MAP SHEET

ABSTRACT

Rocky Island (north), Greenly Island, Rocky Island (south) and Four Hummocks are composed of Late Archaean/Early Proterozoic foliated-massive granites, adamellites and granodiorites of the Dutton Suite (Sleaford Complex) and probably represent Sleafordian Orogeny intrusives. Price Island and Golden Island are composed of meta-siltstone representing Cook Gap Schist of the Hutchison Group. On many islands, these units are overlain by calcarenite associated with Pleistocene Bridgewater Formation.

INTRODUCTION

The islands on the southwestern coast of Eyre Peninsula were discovered by Mathew Flinders in February 1802. Whidbey Isles were named by Flinders after his 'worthy friend the former master attendant at Sheerness' and include Four Hummocks, Perforated Island, Price Island and Golden Island.

There are two Rocky Islands off southwestern Eyre Peninsula (Fig. 1). Rocky Island (north) is located 13 km south of Drummond Point whereas Rocky Island (south) is located 20 km SSE of Greenly Island.

Geological maps of the islands were prepared (at 1:63 360 and 1:253 440 scale) during mapping of LINCOLN 4-mile sheet by Johns (1958). More detailed plans were produced by Kinsman (1973). Investigation was restricted to photo-interpretation with emphasis on joints and foliations.

During January and February 1973, R.B. Major (SADME) visited Four Hummocks and numerous other islands along the southern and western coasts of Eyre Peninsula. Brief geological comments are in Major (1973).

From 3 to 23 February 1974, SADME conducted a geological helicopter survey of all offshore islands along the West Coast of South Australia. Geologists involved were L.C. Barnes, A.H. Blissett, S.J. Daly, R.B. Major and V. Vitols. Numerous samples were collected and follow up work included petrology, geochemistry and geochronology. However much of the data exists only in field note books and various unpublished AMDEL reports. This report collates the geological information for the islands on Coulta and Wangary 1:100 000 map sheet areas and complements those previously compiled for islands along the West Coast on NUYTS, ELLISTON and KIMBA 1:250 000 map sheet areas by Flint and Crooks (1981a, b, c, 1982a and b, and 1984).

The following islands were only observed from the air during the 1974 SADME survey - Rocky Island (south), Perforated Island, Rabbit Island and The Brothers.

Some samples from the islands have been used in Rb-Sr and/or K-Ar radiometric age determinations with data, interpretations and correlations in Webb (1980) and Webb et al. (in prep.).

Table 1

Summary information for Rocky Island (north), Greenly Island, Four Hummocks, Price Island and Golden Island

	Petrology	Analysis	Geochronology	Rock Name
ROCKY ISLAND (north)				
5929 RS 22	P1274/74			Basic rock
23	P1168/74	Ag, As	Rb-Sr	Adamellite
26	P1169/74			Gneiss (granitic)
27	P1316/74			Sheared granite
28	P1226/74			Biotite gneiss
GREENLY ISLAND				
5828 RS 1	P1104/74			Adamellite
2	P1077/74	Ag, As	Rb-Sr	Granite
3	P1231/74		K-Ar	Biotite-epidote-rich rock
4	P1232/74	Ag, As	Rb-Sr, K-Ar	Biotite granite
FOUR HUMMOCKS				
5928 RS 23	P1078/74	Ag, As	Rb-Sr	Adamellite
24	P1187/74	Ag, As	Rb-Sr, K-Ar	Granite
25	P1105/74	Ag, As	Rb-Sr	Granite
26	P1106/74	Ag, As	Rb-Sr, K-Ar	Granite
30	P1107/74	Ag, As	Rb-Sr	Adamellite
32	P1108/74	Ag, As	Rb-Sr	Granite
33	P1188/74	Ag, As	Rb-Sr	Granite
PRICE ISLAND				
5928 RS 34	P1189/74		Rb-Sr, K-Ar	Metasiltstone
GOLDEN ISLAND				
5928 RS 36	P1294/74		Rb-Sr, K-Ar	Siltstone

As - Silicate analysis   Ag - Trace analysis

GEOLOGY

The author did not participate in the 1974 SADME helicopter survey. Geological interpretations are based on data from note books, petrological and geochronological analyses and other unpublished sources. Because of time limitations, visits to each of the islands were short hence some geological relationships were not observed.

The major rock units are the Late Archaean/Early Proterozoic Dutton Suite granitic rocks of Sleaford Complex including foliated granodiorite and adamellite of the Coulta Granodiorite and the even-grained Whidbey Granite. They are commonly intruded by aplitic and mafic dykes and pegmatitic veins. The intensely deformed Greenly Gneiss occurs as shear zones within the Dutton Suite granitoids; the shearing may have occurred during the later stages of the Kimban Orogeny (Parker et al., 1981).

The Early Proterozoic Hutchison Group is a metasedimentary sequence deposited on Sleaford Complex basement. Metasiltstone believed to represent a southern equivalent of Cook Gap Schist outcrops on a few of the islands.

Some of the islands are capped by sequences of calcrete and calcarenite of Pleistocene Bridgewater Formation. No work has been undertaken on these younger sequences.

Table 1 summarises the petrological and analytical work on basement rocks and Tables 2 to 6 summarize the geology and stratigraphy for each island or group of islands.

Dutton Suite

The Coulta Granodiorite and Whidbey Granite form part of the Dutton Suite of intrusive granites, which also includes Kiana Granite, a coarsely porphyritic, tabular feldspar, gneissic granite. This suite of granites outcrops along the southwestern coast of Eyre Peninsula and on the adjacent islands. Extensive geochronological analyses on the Dutton Suite have been carried out by Webb et al. (in prep). These, along with geochemistry (Table 7) indicate that the granites are of similar age and composition, thus a complete sequence of intrusive events is difficult to delineate. Field evidence from Mount Hope shows that Kiana Granite intruded Coulta Granodiorite (Parker et al., 1981), but no field relationships have been established for Whidbey Granite. The rock types have been separated on mineralogical and textural variations viz:-

Whidbey Granite - fine to medium, even-grained granite (to adamellite).

Kiana Granite - coarsely porphyritic, foliated, tabular-feldspar granite.

Coulta Granodiorite - medium to coarse-grained, bluish-grey granodiorite (to adamellite) with abundant mafic clots/xenoliths.

From samples collected, Greenly Island, Four Hummocks and possibly Rocky Island (south) are composed of Whidbey Granite. However it is believed that the geological evolution of these islands, particularly Greenly Island, is much more complex and several Archaean rock units may be present. The samples from Four Hummocks combine to give a Model 2 Rb-Sr isotopic age of 2337±71 Ma (IR = 0.7019 ± 0.0025) which is statistically similar to Model 2 and 3 ages for Kiana Granite respectively 2316±71 Ma (IR = 0.7090 ± 0.0070: Coffin Bay Peninsula) and 2334±109 Ma (IR = 0.7137 ± 0.0084: Marble Range) (Webb et al., in prep.). K-Ar mineral ages on several samples of Whidbey Granite show a range of ages from 1600-1700 Ma indicating the effect of the Kimban Orogeny.

Most of the eastern part of Rocky Island (north) is composed of Coulta Granodiorite which has been dated at ca. 2487 Ma using an assumed IR = 0.700. A Model 3 age was also calculated, using samples from Rocky Island (north) and Point Drummond, at ca 2208 ± 4838 Ma (IR = 0.7103 ± 0.1036) which in view of the error is meaningless. On the western side of the island, a zone of sheared adamellite and granodiorite is probably equivalent to shear zones within Greenly Gneiss near Coles Point and within Kiana Granite at Point Drummond. These are believed to be contemporaneous with the Kalinjala Mylonite Zone on eastern Eyre Peninsula (Parker, 1980).

Syn- and/or post-Sleaford Orogeny aplite dykes intrude Whidbey Granite on Four Hummocks and Greenly Island and Coulta Granodiorite on Rocky Island (north). These dykes have not been dated but are probably all of similar age. There is a later phase of pegmatite intrusion on Four Hummocks and Greenly Island which cross-cuts the aplite dykes. On Rocky Island (north), pegmatite veins intrude Coulta Granodiorite but are deformed in the shear zone. These veins are of a different mineralogy to those that intrude Whidbey Granite (see Tables 2, 3 and 4).

Hutchison Group

Metasiltstone on Price and Golden Islands probably represent the Cook Gap Schist of the Hutchison Group, an Early Proterozoic sedimentary sequence deposited on the Late Archaean/Early Proterozoic basement. The sediments were deformed by the Kimban Orogeny, forming a layer-parallel foliation and tight to isoclinal folding. The siltstone is similar to schist in Lake Wangary DDH 3 and 4 on Coffin Bay Peninsula (Figs. 4 and 5). K-Ar ages of samples from these islands and drillholes indicate that at 1550 Ma the schists finally become closed systems to K and Ar diffusion. Individual K-Ar ages range from 1840-1550 Ma (Webb, 1980). Rb-Sr data give an isochron age of 1784±15 Ma (IR = 0.7023 ± 0.0012) (Webb et al., in prep). The dates indicate that these sediments were metamorphosed ca. 1784 Ma but remained at high temperatures until ca. 1550 Ma.

Table 2 Stratigraphy for Rocky Island (north)

EVENT/ROCK TYPE (↓ increasing age)	SAMPLE	COMMENTS
Sheared Gneiss	5929RS26,27 & 28	Major shear zone trending 000° to 070° on the western and southern sides of the island. Predominantly large, feldspar augen in a strongly biotite-foliated matrix. Foliation commonly contorted. Also minor shear zones in less deformed adamellite. Probably represents deformed adamellite and granodiorite.
Basic dykes	5929RS22	Fine-grained, dark green basic rock which has an indefinite foliation. Dykes up to 0.5m wide trending approximately 030°.
Pegmatite	-	Garnetiferous quartz feldspar pegmatites intrude Coulta Granodiorite and are deformed within shear zones.
Coulta Granodiorite	5929RS23	Grey, medium to coarse-grained adamellite with pale blue feldspar phenocrysts. Massive to weak N-S foliation defined by feldspar euhedra and biotite clots. Using an assumed initial $^{87}Sr/^{86}Sr$ ratio a Rb-Sr age of 2487 Ma has been calculated for this sample.

Table 3 Stratigraphy for Greenly Island (and Rocky Island (south))

EVENT/ROCK TYPE (↓ increasing age)	SAMPLE	COMMENTS
Jointing		Three sets of joints 1. 095/85NE 2. 050°/Vert. and 3. near horizontal set (Plate 1).
Pegmatite veins		Coarse-grained, pink feldspar, quartz, minor biotite pegmatite intrudes Whidbey Granite and cross cuts aplite dykes. (Plate 2).
Aplite dykes	5828RS5	Pink, very fine-grained aplite dykes, locally folded by open to tight folds, intrude Whidbey Granite. (Plate 2).
Whidbey Granite	5828RS1, 2	The dominant rock type on the island is medium-grained pale brown to pink adamellite with light grey bands of medium-grained, more biotite-rich, granite. Using an assumed initial $^{87}Sr/^{86}Sr$ ratio a Rb-Sr age of 2283 Ma has been calculated for sample 5828RS2 (medium-grained granite). (Plates 1 and 2).
Xenoliths	5828RS3	The most common xenoliths in Whidbey Granite are dark coloured, fine to medium-grained biotite+ epidote-rich rock. K-Ar geochronology of biotite gives a metamorphic age of 1698 Ma.
Xenoliths	5828RS4	Massive, coarse-grained, pink and black biotite granitic xenoliths in Whidbey Granite. Rb-Sr geochronology carried out on sample 5828RS4 (using an assumed IR=0.7) gives a whole rock age of 2419 Ma and biotite age of 2313 Ma. K-Ar dating on biotite gives a metamorphic age of 1703 Ma. (Plate 1).

Table 4 Stratigraphy for Four Hummocks

EVENT/ROCK TYPE (↓ increasing age)	SAMPLE	COMMENTS
Bridgewater Fm.		Thin veneer of calcrete on north, west and south islands. Nodular and Ripon type calcrete with numerous weathered granite clasts.
Jointing		Three sets of joints in the granite. 1. 070/vertical 2. 090/vertical 3. 010/10°S.
Pegmatites		Thin pink feldspar, quartz and minor biotite pegmatites intrude Whidbey Granite either along joint planes or parallel to banding.
Whidbey Granite	5928RS23, 24, 25, 26, 30, 32, 33	Predominantly medium to coarse-grained, pink-grey granite to adamellite which shows weak banding defined by biotite and feldspathic layers (1 cm up to several metres). There is also a microgranite phase. The specimens combine to give a Rb-Sr age of 2337±71 Ma. K-Ar biotite geochronology on samples 5928RS24 and 26 give ages of 1681 Ma and 1611 Ma respectively reflecting a later metamorphic event (Plate 5).
Xenoliths		Only a few biotite rich xenoliths found in the more banded zones (Plate 6).

Table 5 Stratigraphy for Perforated Island

EVENT/ROCK TYPE (↓ increasing age)	SAMPLE	COMMENTS
Bridgewater Fm.		The island is composed entirely of Bridgewater Formation which is well crossbedded calcarenite (on a very large scale) (Plate 7).

Table 6 Stratigraphy for Price Island and Golden Island

EVENT/ROCK TYPE (↓ increasing age)	SAMPLE	COMMENTS
Bridgewater Fm.		Both islands are capped by several metres of calcreted Bridgewater Fm. It is generally well bedded but no crossbedding was noted. Clasts of the underlying metasiltstone are incorporated into the base.
Cook Gap Schist	5928RS34, 36	Dark grey, slightly magnetic, very well laminated metasiltstone with some pale brown and yellow interbeds (4-10 mm thick). Foliation generally parallels the layering except in the hinges of tight to isoclinal, NE plunging folds (Plate 8). This unit is similar to that found in Lake Wangary DDH3 (70-183 m) on Coffin Bay Peninsula. K-Ar whole rock geochronological analyses on samples 5928RS34 and 36 give ages of 1598 Ma and 1741 Ma respectively.

GEOCHEMISTRY

Silicate analyses and trace element analyses were carried out on selected samples of Dutton Suite granitoid rocks from the islands visited during the 1974 helicopter survey. The results are tabulated in Table 7.

Silicate analyses show no major deviation from the world-average oxide weight percentages for granite (Le Maitre, 1976). Trace element analyses show no anomalous values for these samples. These results indicate a similar source for all the samples.

PHOTOGRAPHY

From colour slides taken during the 1973 and 1974 SADME surveys of the islands, a representative selection is listed below of the better quality photography, nine of which are illustrated in this report. No colour slides were taken on Rocky Island (north). Additional black and white photographs and colour prints were taken, but have not been listed below.

Table 7

MAJOR AND TRACE ELEMENT ANALYSIS

	5929RS 23	5828RS 2	5828RS 4	5928RS 23	5928RS 24	5928RS 25	5928RS 26	5928RS 30	5928RS 32	5928RS 33
SIO2	71.37	71.20	70.92	74.30	72.10	72.76	75.70	72.17	74.07	69.20
TIO2	.24	.35	.25	.16	.33	.31	.19	.23	.13	.40
AL2O3	14.71	14.86	14.52	13.62	13.99	14.41	12.98	14.46	13.92	14.86
FE2O3	.44	.58	.54	.48	.91	.76	.82	.66	.55	1.03
FEO	1.60	1.80	1.45	.65	1.40	1.00	.45	1.10	.40	1.90
MNO	.04	.06	.05	.03	.04	.04	.01	.03	.02	.04
MGO	.58	.86	.71	.25	.50	.41	.31	.50	.31	1.04
CAO	1.52	2.45	1.56	.97	1.12	1.04	.69	1.95	1.22	2.39
NA2O	4.27	4.71	3.54	3.07	3.02	3.66	2.95	3.42	2.87	3.09
K2O	3.61	1.95	4.92	5.49	5.69	4.72	5.12	4.07	5.54	4.47
P2O5	.10	.08	.13	.03	.06	.08	.12	.07	.05	.19
H2O+	.58	.56	.49	.32	.35	.46	.52	.37	.54	.81
H2O	.04	.04	.03	.04	.01	.04	.04	.05	.08	.05
CO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	99.10	99.50	99.11	99.41	99.52	99.59	99.90	99.08	99.70	99.47
AU	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
AG										
AS										
BA	560.00	240.00	440.00	500.00	540.00	380.00	360.00	880.00	460.00	900.00
BI										
CE										
CO	6.00	8.00	8.00	6.00	8.00	6.00	2.00	6.00	2.00	12.00
CR	5.00	20.00	15.00	5.00	10.00	5.00	5.00	5.00	5.00	25.00
CS										
CU	4.00	4.00	4.00	6.00	6.00	4.00	4.00	4.00	4.00	6.00
LA										
LI	21.00	55.00	112.00	70.00	35.00	32.00	25.00	19.00	7.00	23.00
MO	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	4.00	<4.00	<4.00
NB										
NI	6.00	4.00	12.00	2.00	12.00	6.00	2.00	6.00	6.00	18.00
PB	30.00	30.00	32.00	60.00	52.00	50.00	52.00	20.00	24.00	18.00
RB	180.00	195.00	180.00	145.00	140.00	140.00	120.00	275.00	185.00	365.00
SB										
SN										
SR	110.00	155.00	301.00	170.00	190.00	285.00	245.00	150.00	165.00	155.00
TH	30.00	10.00	12.00	65.00	90.00	36.00	48.00	40.00	28.00	20.00
TI										
U	10.00	12.00	10.00	30.00	16.00	10.00	18.00	<4.00	6.00	<4.00
V	40.00	10.00	30.00	30.00	10.00	20.00	20.00	30.00	20.00	30.00
Y										
ZN	50.00	77.00	66.00	36.00	55.00	56.00	57.00	54.00	32.00	63.00
ZR	205.00	110.00	85.00	140.00	240.00	140.00	155.00	130.00	120.00	215.00

MAJOR ELEMENTS EXPRESSED AS WEIGHT %
TRACE ELEMENTS EXPRESSED AS PPM UNLESS OTHERWISE INDICATED

MAJOR AND TRACE ELEMENT ANALYSIS

GREENLY ISLAND

Photo No.	24921	Light grey granite with xenoliths of dark biotite and epidote - rich rock (RBM-1974).
	24922	Granite with biotite-rich bands and xenoliths, intruded by pegmatites. Eroded joint zone in foreground (RBM-1974) - PLATE 1.
	24923	Pale brown to pink granite with folded biotite-rich layers. Biotite-rich xenolith at hammer. Cut by a very fine-grained aplite dyke. All cut by pegmatite (RBM-1974) - PLATE 2.
	24924	Eroded joint zone with cliffs of grey, medium-grained granite (SJD-1974).
	24928	Eroded joint zone with cliffs of grey, medium-grained granite (LCB-1974).
	24925	View NW of northern part of island (SJD-1974).
	24926	View NW of northern part of island (SJD-1974).
	24927	View east over island (LCB-1974) - PLATE 3.
	24929	View SSW on Greenly Island (LCB-1974).
	24930	View NW of northwestern part of island (LCB-1974).

ROCKY ISLAND (north)

24931	View NW over island (SJD-1974) - PLATE 4.
24932	View W over northern end of island (SJD-1974)

FOUR HUMMOCKS

24933	North island, pink aplitic veins in grey granite (RBM-1974) - PLATE 5.
24934	North island, biotite xenoliths in grey granite (RBM-1974) - PLATE 6.
24935	Northeast island, view south (RBM-1974).
24936	Aerial view WSW (RBM-1974).
24937	South island, view west to winch house (SJD-1974).

PERFORATED ISLAND

24938	Crossbedded Bridgewater Formation, southern end of island (RBM-1974) - PLATE 7.

GOLDEN ISLAND

24939	Monoclinal fold in cleaved siltstone, fold axis 5° 025 (RBM-1974).
24940	Folding with axial plane cleavage in siltstone (RBM-1974) - PLATE 8.
24941	Cleaved siltstone, showing coincidence of cleavage and lamination (RBM-1974).
24942	Quartz (& minor magnetite) veins striking about 300° in siltstone (RBM-1974).
24943	Dark grey laminated siltstone below Bridgewater Formation (SJD-1974).
24944	Monoclinal fold in cleaved siltstone (SJD-1974) - PLATE 9.

ARM:AF

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APPENDIX

PETROGRAPHIC DESCRIPTIONS

extracted from AMDEL report MP 1.1.160
by B.G. Steveson (1974).

ROCKY ISLAND (north)

Sample 5929 RS 23 specimen P1168/74.

Rock name: Partly recrystallized adamellite.
Field observations: Medium-grained, massive grey granite.
Thin section: This rock consists very largely of crystals of felsic (microcline and plagioclase) minerals which are relicts of the original plutonic igneous rock. These crystals are commonly several millimetres in size, show pervasive alteration to clay and sericite and generally have extremely irregular margins. Between this relict igneous material is an aggregate of recrystallized felsic minerals and biotite. Most of the remainder of the material has a grain size of less than 0.2 mm and appears to contain abundant quartz. Micrographic and in some cases myrmekitic intergrowths are particularly abundant in the recrystallized material.

Sample 5929 RS 22 specimen P1274/74

Rock name: Foliated metamophosed basic rock
Field observations: A fine-grained, dark green rock which has an indefinite foliation. Patches of apparently biotite can be seen amongst the prevalent dark green minerals.
Thin section: The rock consists of a fine-grained (<0.1 mm) aggregate of quartz and hornblende and minor biotite which has a granular texture with a preferred orientation defined by aligned hornblende and biotite crystals. Within this finer grained material are large (1 mm), subhedral crystals of hornblende (15-20%) which appear to be pseudomorphs of original ?pyroxene crystals.

Sample 5929 RS 26 specimen P1169/74

Rock name: Gneiss
Field observations: A gneissic rock with an irregular, contorted foliation commonly showing the development of feldspar augen. Similar to gneisses 5929RS27 and 28. Probably deformed granite 5929RS23.
Thin section: The rock consists of large, igneous feldspar augen in a matrix of granular to granoblastic quartz which generally forms in monomineralic mosaics. The micaceous minerals biotite and muscovite, occur in oriented lamellae between the relief igneous phenocrysts.

Sample 5929 RS 28 specimen P1316/74

Rock name: Sheared granitic rock
Thin section: Similar to 5929 RS 26

Sample 5929 RS 27 specimen P1226/74

Rock name: Biotite gneiss
Thin section: Similar to 5929 RS 26, but slightly higher biotite content.

GREENLY ISLAND

Sample 5828 RS 1 specimen P1104/74

Rock name: Adamellite
Field observations: A medium-grained pale brown to pink granite with light grey bands of more biotite rich granite.
Thin section: This rock has a somewhat finer grained texture than is commonly the case in granitic plutonic rocks and most crystals in fact are 0.5 to 1.5 mm in diameter. Rather turbid and altered plagioclase appears to be equally abundant with microcline, and quartz probably represents only about 25 to 30% of the rock. The feldspar crystals are commonly equant anhedra showing extensive sericitic and clay alteration. The quartz occurs in monomineralic aggregates between these feldspar crystals and this mineral is characterised by very irregular crystal shapes and the presence of extreme undulose extinction. This quartz is clearly largely recrystallised material. Biotite constitutes probably about 5% of the rock and is present as small brown pleochroic flakes which are fresh and unaltered.

Sample 5828 RS 2 specimen P1077/74

Rock name: Medium-grained granite
Thin section: Similar to 5828 RS 1 but slightly higher biotite content

Sample 5828 RS 3 specimen P1231/74

Rock name: Metamorphic biotite-epidote-rich rock
Field observations: A compact, somewhat foliated rock which has a very dark colour and a small grain size. The rock is described in the list of samples as a xenolith and one part of the hand specimen does contain a small piece of felsic material.
Thin section: This rock has an essentially even-grained, granular texture and it is clearly a thoroughly recrystallised, metamorphic rock. Felsic minerals, quartz and plagioclase, constitute approximately 60% of the sample and occur as equant anhedra generally less than 0.3 mm in size. Biotite (30%) is present as flakes less than 0.4 mm in size and there is a considerable amount present as knots of more equant crystals. On the whole, the biotite forms a pervasive network throughout the whole rock. Epidote is closely intergrown with the biotite and in some places appears to form a rim around small groups of biotite crystals but overall the epidote generally appears as well-distributed, irregular granules throughout the rock.

Sample 5828 RS 4 specimen P1232/74

Rock name: Biotite granite

Field observations: A massive and coarse-grained, granitic xenolith in adamellite which has an overall pink and black colour. The rock is comparatively melanocratic and appears to contain of the order of 10% biotite.

Thin section: The felsic minerals in the rock occur as equant, anhedral crystals and have a granular texture and a rather variable grain size up to about 2 mm but there do not appear to be any distinctive phenocrysts in the rock. A characteristic of the texture as a whole is the presence of graphic intergrowths, particularly of quartz and K-feldspar (microcline and orthoclase) and between plagioclase and quartz (myrmekitic intergrowth). Apart from its presence in these intergrowths, quartz occurs typically as monomineralic areas with a rather variable crystal size. Individual quartz crystals generally show extreme undulose extinction and they have notably irregular and bulbous crystal boundaries. Biotite comprises about 10% of the rock and it occurs as flakes up to about 1.3 mm in size. Most of these flakes occur in loose clusters randomly distributed through the rock.

FOUR HUMMOCKS

Sample 5928 RS 26 specimen P1106/74

Rock name: Granite

Field observations: The sample is a partially weathered pink relatively coarse grained porphyritic granite in which large phenocrysts of ? potassium feldspar can be seen. The cut surface appears to show a crude foliation with some segregation into biotitic and feldspathic layers.

Thin section: Potassium feldspar (microcline) comprises approximatley 50 to 60% of the rock and is present as anhedral equant crystals up to several millimetres in size and shows a patchy to somewhat irregular ribbon texture. Commonly the edges of the large phenocrysts are marked by a discontinuous zone of fine-grained myrmekite, plagioclase and quartz. Quartz occurs as discrete crystals and monomineralic aggregates and in some places grades outwards into granoblastic-like aggregates of quartz against the feldspar where reaction between quartz and feldspar has been particularly extensive. Biotite constitutes about 5% of the rock's volume and occurs as elongate flakes up to approximately 0.5 mm in length.

Sample 5928 RS 23 specimen P1078/74

Rock name: Porphyritic adamellite

Field observations: Pink, medium-grained, massive adamellite. Similar to the other granitic rocks on the Four Hummocks (including 5928 RS 26).

Thin section: A considerable proportion of this work consists of large subrectangular crystals of microcline perthite. The exsolved albitic material in these crystals has an irregular ribbon pattern. The crystal margins commonly show protrusions of myrmekitic material into the microcline although there are a few places where microcline and adjacent quartz have relatively smooth boundaries also. Plagioclase is somewhat less abundant than microcline but it also occurs partly as rather large crystals up to about 3 mm in size which generally show widespread sericitic alteration. Quartz occurs mostly in monomineralic aggregates with an equigranular texture and an average grain size of approximately 0.5 mm. There are patches in the rock which have a recrystallized almost granoblastic texture and in these parts of the rock the average grain size is generally less than 0.1 mm; it is inferred that these patches represent slightly recrystallized parts of the original granitic rock. Biotite is present in the rock in only accessory amounts and commonly occurs as irregular flakes up to 0.5 mm long. There are small discrete flakes of chlorite in the rock and in some places there are fine-grained intergrowths of chlorite and biotite.

Samples 5928 RS 24, 25, 30 and 33

All these samples are of essentially the same granitic rock as samples 5928 RS 23 and 26. They show only minor compositional and textural variations. With the exception of minor pegmatite dykes all the basement on the Four Hummocks is composed of this granite, the Whidbey Granite.

PRICE ISLAND

Sample 5928 RS 34 specimen P1189/74

Rock name: Metamorphosed siltstone
Field observation: The rock is a dark grey, slightly magnetic, very well laminated metasiltstone.
Thin section: The thin section consists of several lithologies in which there are varying proportions of sericitie, quartz and opaque materials. In some thin bands opaques are present as finely granular material with a grain size of less than 0.2 mm and in some of these bands the opaques constitute as much as 50% of the rock. In other somewhat coarser grained bands more coarsely granular opaques occur with fine mats of sericite or granular quartz. The rock has clearly been metamorphosed and there is some slight evidence of a cleavage at a high angle to the lithology; biotite is present as oriented flakes which are clearly the result of metamorphic crystallization.

GOLDEN ISLAND

Sample 5928 RS 36 specimen P1294/74

Rock name: Siltstone
Field observations: A dark grey to black, slightly magnetic, well cleaved siltstone.
Thin section: The rock is a finely bedded siltstone which consists largely of quartz and muscovite. In some of the coarser bands these minerals appear to be particularly well crystallised and it is possible that the rock has been slightly metamorphosed. Opaques are relatively abundant in the rock and they are commonly present as crystals as much as 0.2 mm across.

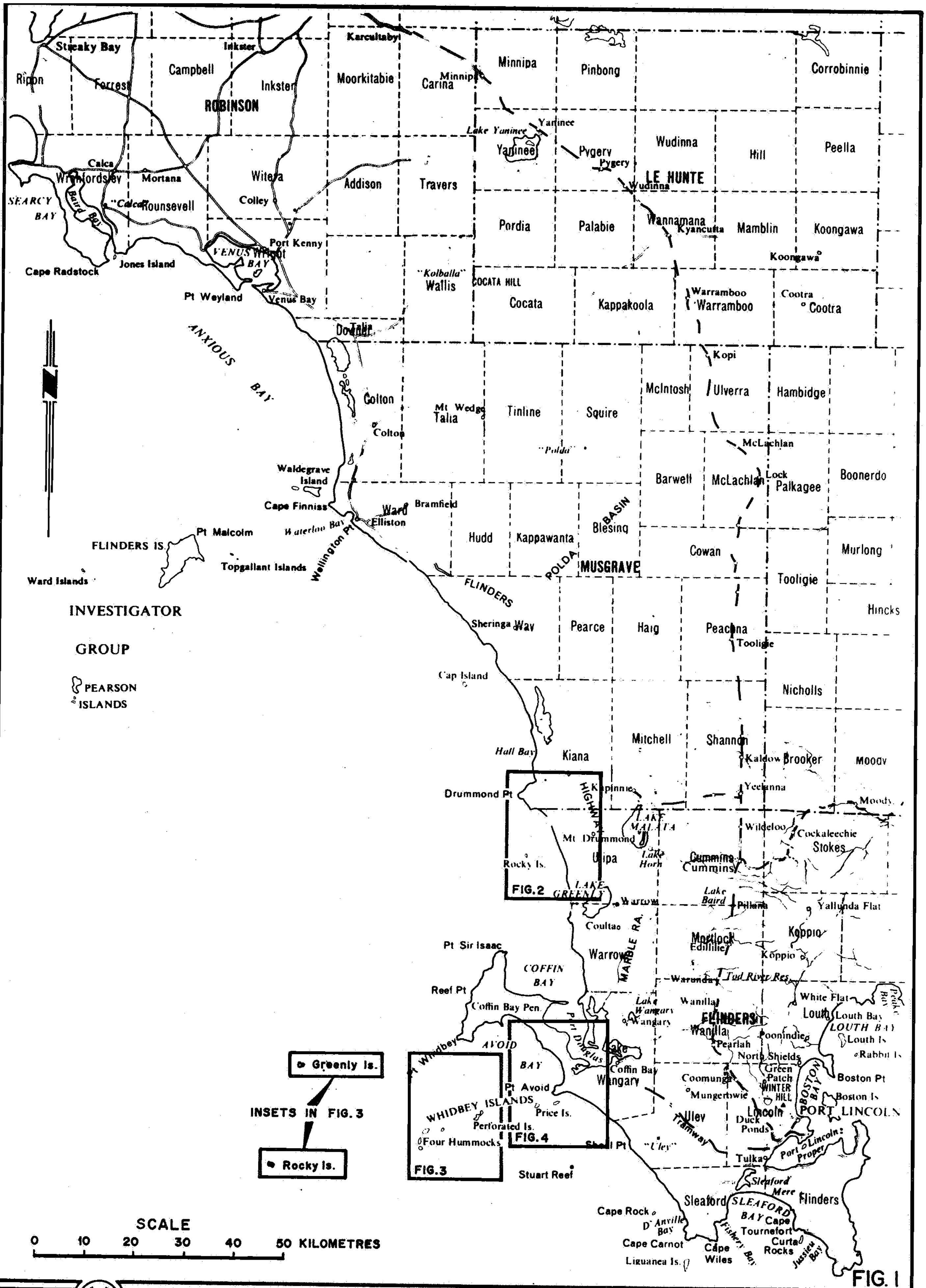


FIG. 1

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

SOUTH WESTERN EYRE PENINSULA ISLAND SURVEY

LOCALITY PLAN

COMPILED A.R.Martin	C.D.O.	DATE
DRAWN S.J.A.	SCALE 1:1000000	
DATE Feb.1985	PLAN NUMBER S18002	
CHECKED		

JOB 3738

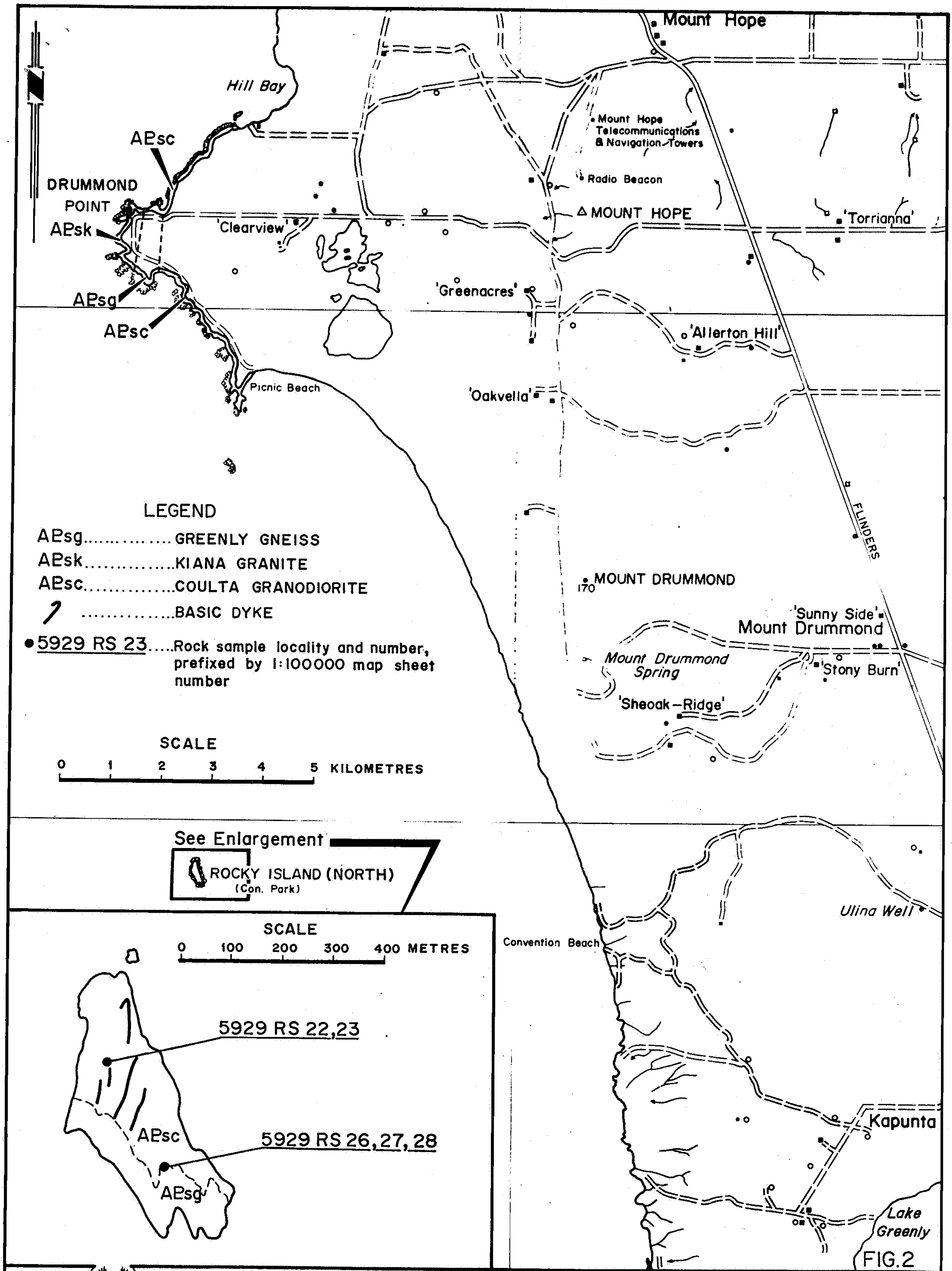


FIG.2

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

SOUTH WESTERN EYRE PENINSULA ISLAND SURVEY ROCKY ISLAND NORTH GEOLOGICAL AND SAMPLE LOCATIONS	COMPILED A.R.Martin	C.D.O. DATE
	DRAWN S.J.A.	SCALE AS SHOWN
	DATE Feb.1985	PLAN NUMBER
	CHECKED	S18003

JOB 3738

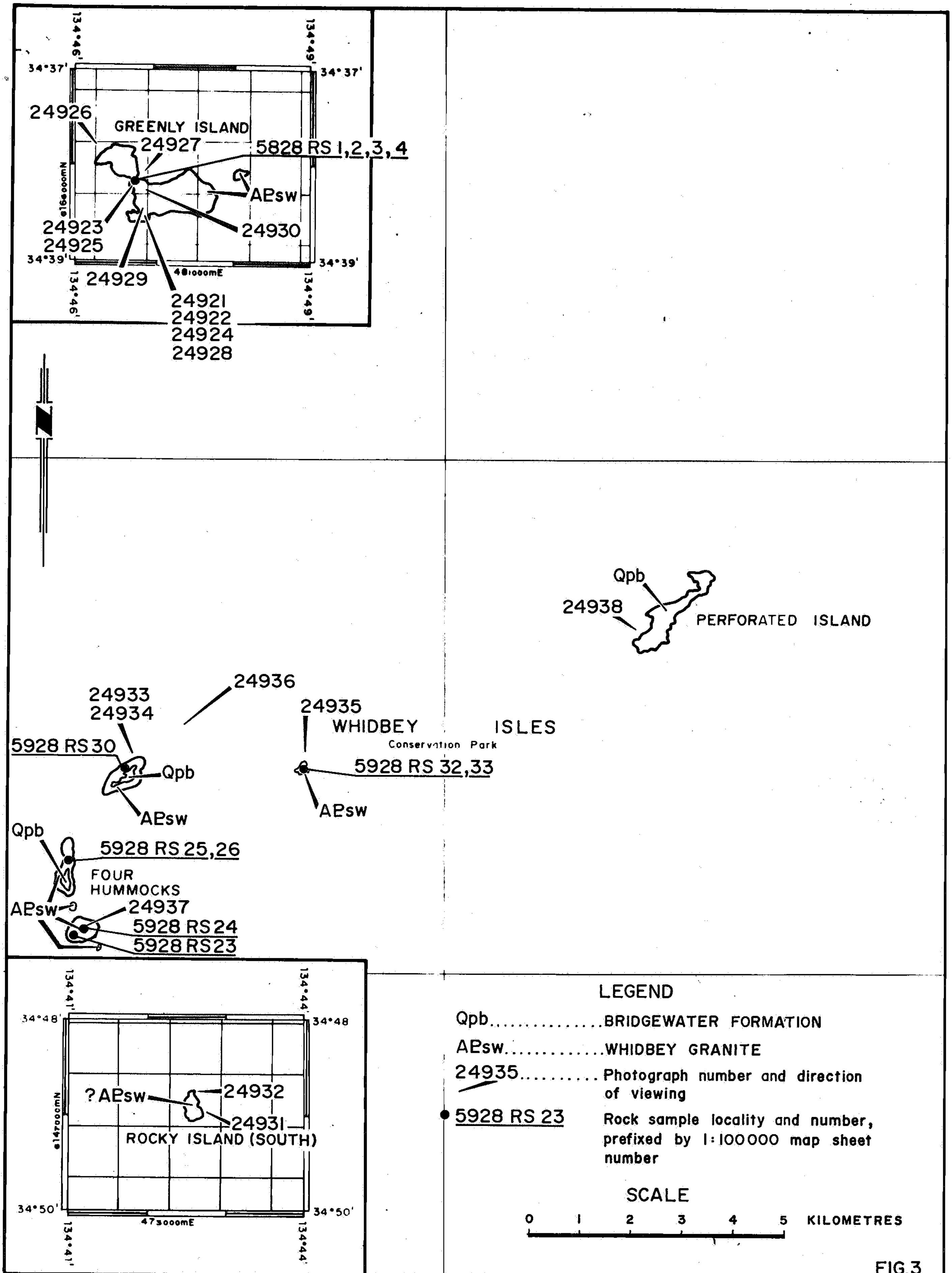


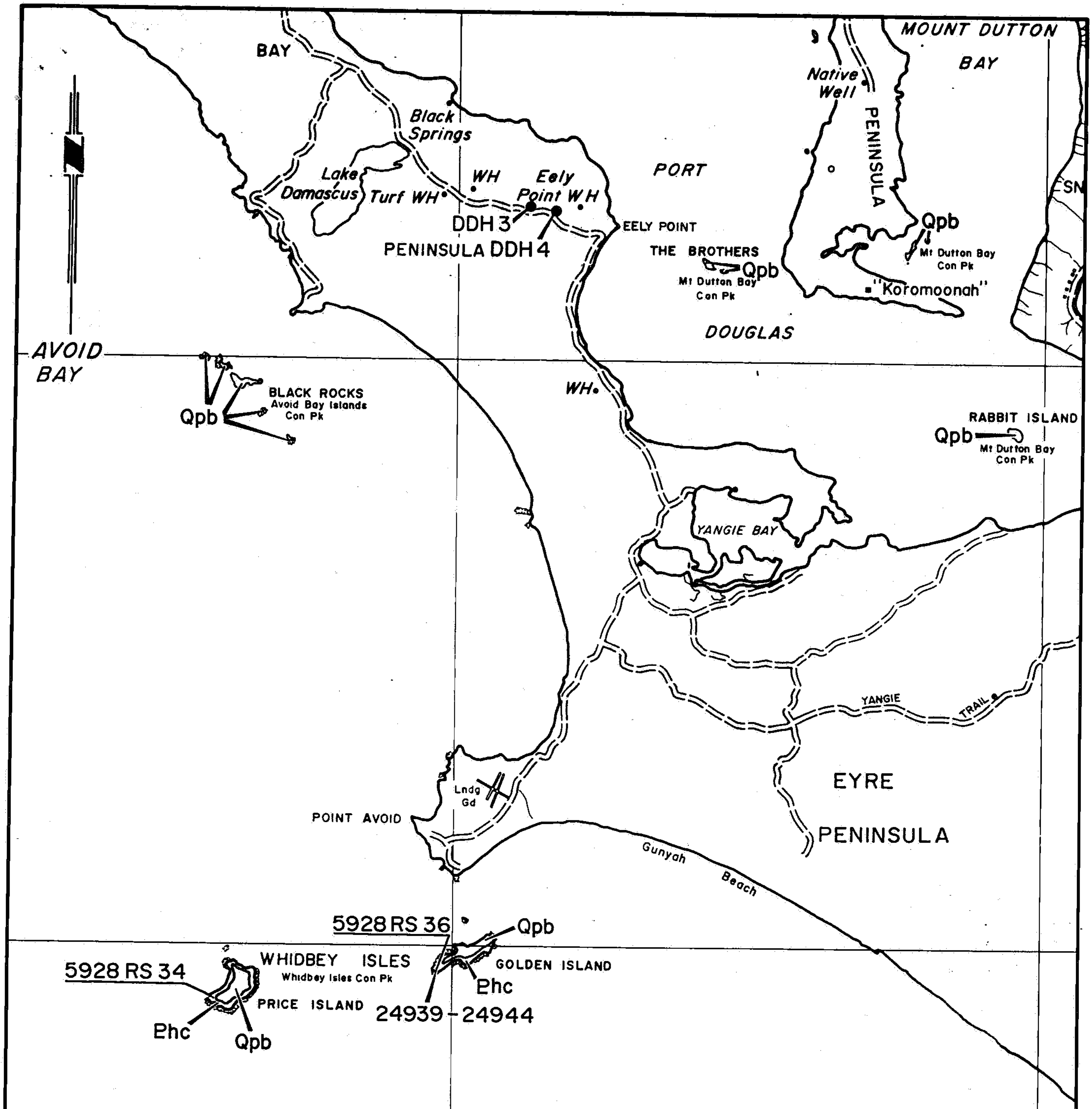
FIG.3

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

SOUTH WESTERN EYRE PENINSULA ISLAND SURVEY
GREENLY ISLAND, ROCKY ISLAND SOUTH AND PERFORATED ISLAND
GEOLOGY, SAMPLE AND PHOTOGRAPHY LOCATIONS

COMPILED A.R.Martin	C.D.O. DATE
DRAWN S.J.A.	SCALE 1 : 100000
DATE Feb. 1985	PLAN NUMBER
CHECKED	S18004

JOB 3738



LEGEND

Qpb................ BRIDGEWATER FORMATION
Ꞓhc................ COOK GAP SCHIST
● DDH 3.......... Lake Wangary drill hole locations
24939............ Photograph number
5928 RS 34......Rock sample locality and number, prefixed by 1 : 100000 map sheet number

SCALE
0 1 2 3 4 5 KILOMETRES

FIG. 4

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

SOUTH WESTERN EYRE PENINSULA ISLAND SURVEY
PRICE ISLAND AND GOLDEN ISLAND
GEOLOGY, SAMPLE AND PHOTOGRAPHY LOCATIONS

COMPILED A.R.Martin	C.D.O.	DATE
DRAWN S.J.A.	SCALE 1 : 100000	
DATE Feb.1985	PLAN NUMBER	
CHECKED	S18005	

JOB 3738

DEPARTMENT OF MINES AND ENERGY—SOUTH AUSTRALIA

LAKE WANGARY 3

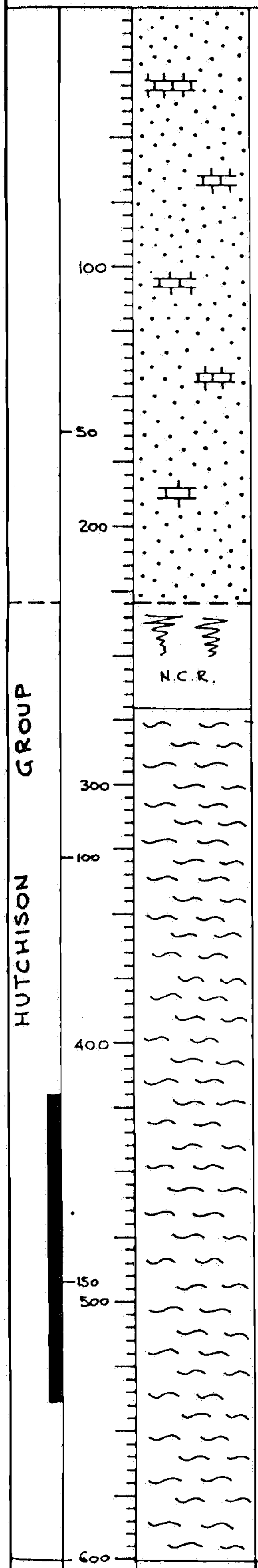
CORE DESCRIPTION

DEPTH 600 ft. INCLINATION Vertical

LOGGED BY J.E. Lewis DATE DRILLED 1970

REFERENCE Envelope 1170 and Parker and Daly, 1982

DEPTH (m) (feet)	GRAPHIC LOG		DESCRIPTION



Quaternary and (?) Tertiary fine grained lime sand with coarse shell fragments.

(?) Weathered basement schist.

SCHIST (probably equivalent to Cook Gap Schist): Banded, fine grained, grey schists consisting of quartz muscovite biotite and minor plagioclase with variable magnetite and garnet. Accessory minerals consist of hematite, epidote, tourmaline, chlorite, apatite and zircon. Locally there is evidence of both sedimentary and metamorphic banding.

N.B. folding (probably D_2 of the Kimban Orogeny) of the primary layering and overprinting of a strong axial planar schistosity (S_2). Quartz veins locally parallel S_2 and locally S_2 has developed into a segreation schistosity or differentiated layering at a high angle to primary layering. (EG. 431-436 ft, 451 ft, 485-486 ft, 510-512 ft.).

FIG.5

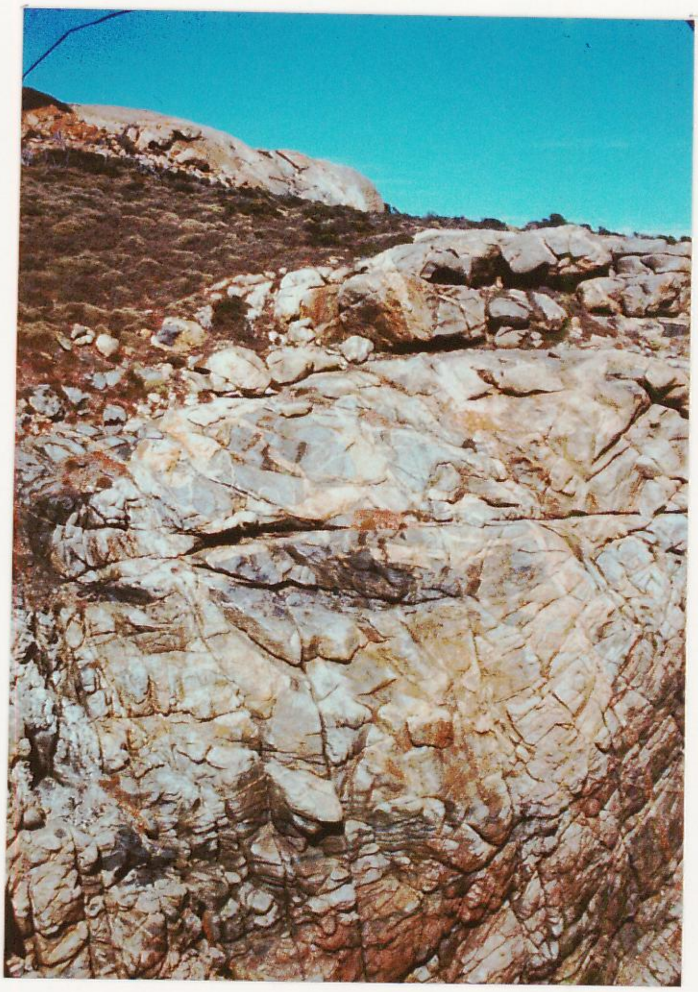


Plate 1: Greenly Island - Granite with biotite-rich bands and xenoliths, intruded by pegmatites. Eroded joint zone in foreground.

Photo 24922, Feb. 1974

Plate 2: Greenly Island - Pale brown to pink granite with folded biotite-rich layers. Biotite rich xenolith at hammer. Cut by very fine-grained aplite dyke. All cut by pegmatite. Photo 24923, Feb. 1974.

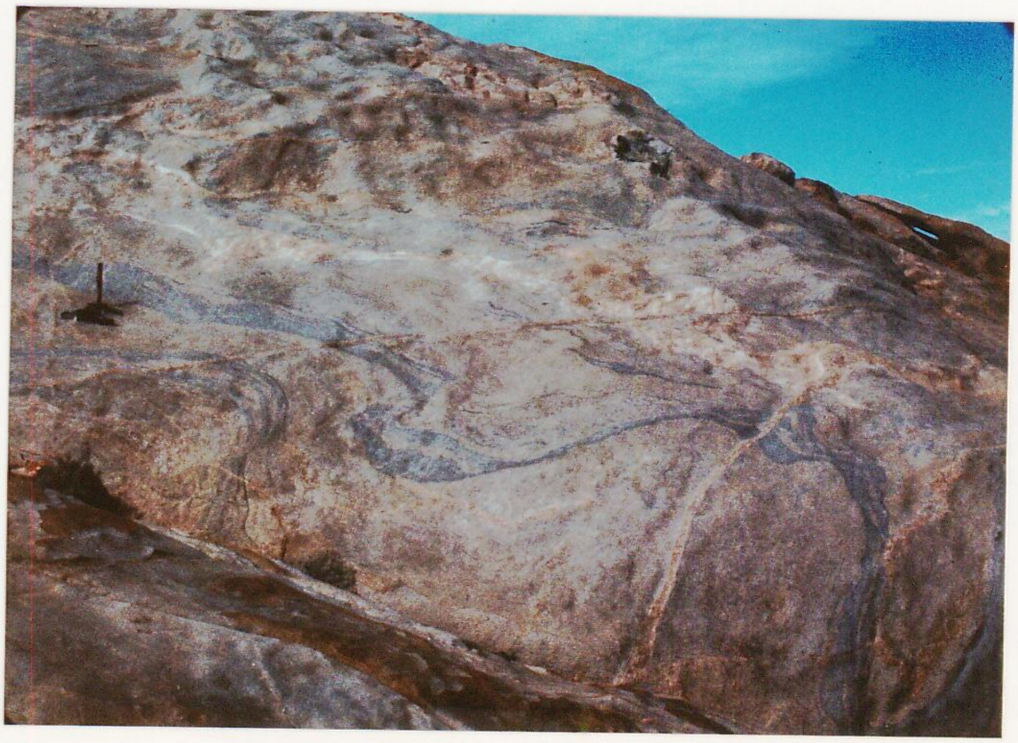


Plate 3: View east over Greenly Island. Photo 24927, Feb. 1974.

Plate 4: View northwest over Rocky Island (south).
Photo 24931, Feb. 1974.

Plate 5: North island, Four Hummocks, pink aplitic veins in grey granite.
Photo 24933, Feb. 1974.

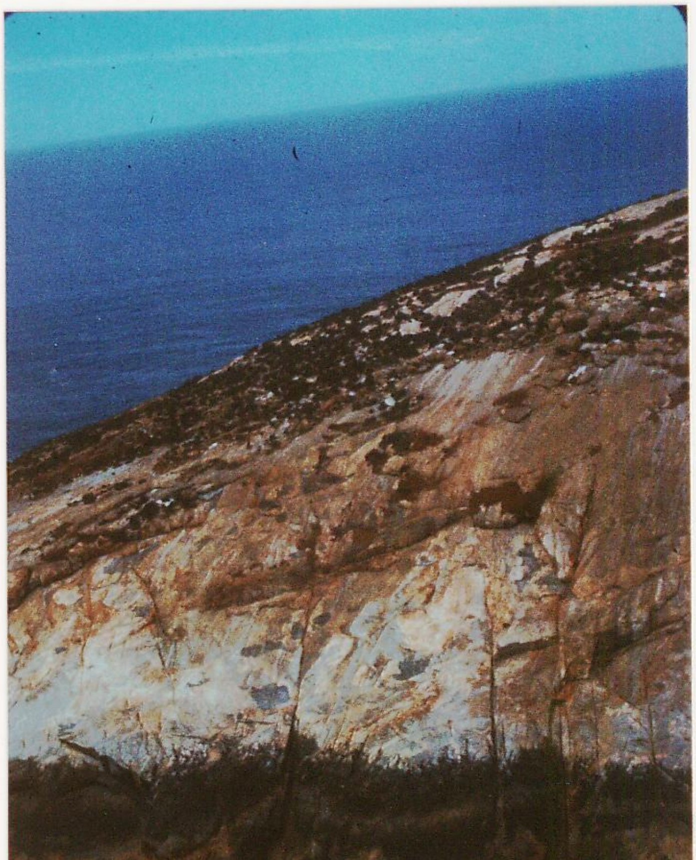


Plate 6: North island, Four Hummocks, biotite xenoliths in grey granite.
Photo 24934, Feb. 1974.

Plate 7: Perforated Island-Crossbedded Bridgewater Formation on southern end.
Photo 24938, Feb. 1974.

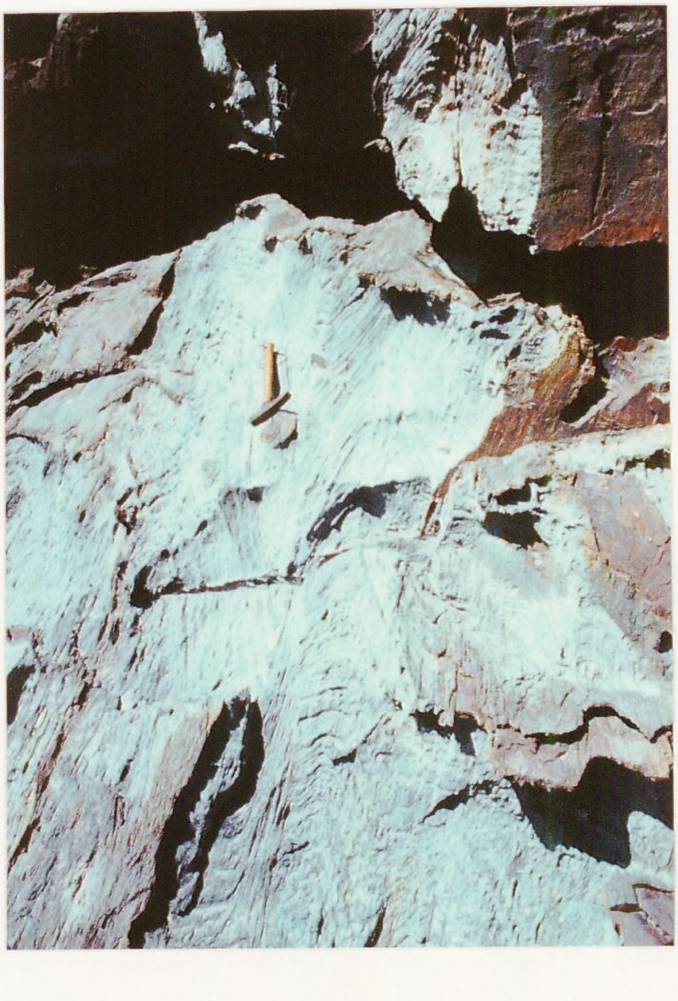


Plate 8: Golden Island - Folding with axial planar cleavage development in siltstone.
Photo 24940, Feb. 1974.

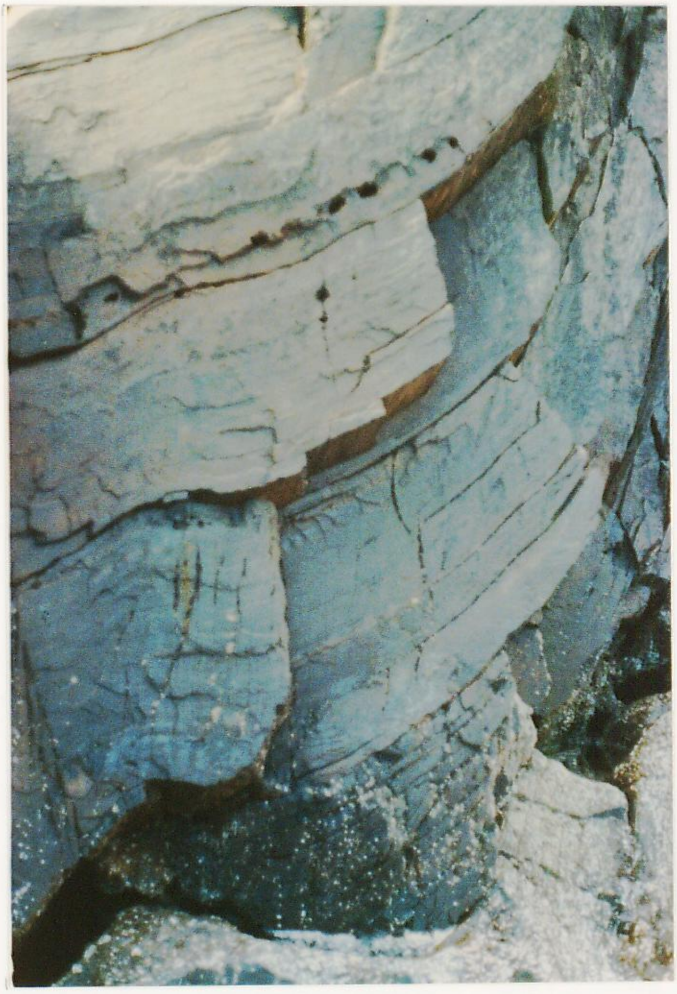


Plate 9: Golden Island - Monoclinal fold in cleaved siltstone. Photo 24940, Feb. 1974.