DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept.Bk.No. 79/77

MINERAL OCCURRENCES SOUTH OF ARDROSSAN - HILLSIDE PHILLIPS AND HARTS MINES

GEOLOGICAL SURVEY

by

J. DREXEL

MINERAL RESOURCES SECTION

AUGUST 1979

G.S. No. 6195
D.M. No. 331/79

CONTENTS

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept. Bk. No. 79/77
G.S. No. 6195
D.M. No. 331/79

MINERAL OCCURRENCES SOUTH OF ARDROSSAN - HILLSIDE PHILLIPS AND HARTS MINES

ABSTRACT

A small radiation anomaly over mullock heaps of the Hillside mine can be satisfactorily explained by scattered moderately radioactive fragments of pitchblende. These appear to have been mined from calcite-pitchblende veins within rhyolite porphyry of probable Carpentarian age, or from dolomite or dolosiltstone of probable Cambrian age.

Geochemistry of the mullock and host rocks to the mineralisation merely highlighted copper, which was to be expected from the abundant malachite, ?atacamite, and chalcopyrite-pyrite scattered over the surface.

INTRODUCTION

The Hillside mine, which the author had visited along with several other mines in 1977, was reinspected in April, 1979, and the landowner interviewed. The second visit was prompted by a plaint lodged in the name of Pegmin Ltd., holders of Mineral Claim 1115 (registered 13 March, 1979) of 16 ha which covers the Hillside mine.

The plaint lodged in the Warden's Court was seeking an order suspending labour conditions for MC 1115 for 6 months on the following grounds

- the need to develop an exploration programme
- to gather and assess results of previous work.

At a preliminary hearing on 23 March, 1979, the Senior Warden adjourned the matter to 17 April, 1979.

The Director-General decided to enter an appearance and object to suspension being granted. Following discussions between Pegmin Ltd., and the Crown Solicitor, the plaint was withdrawn.

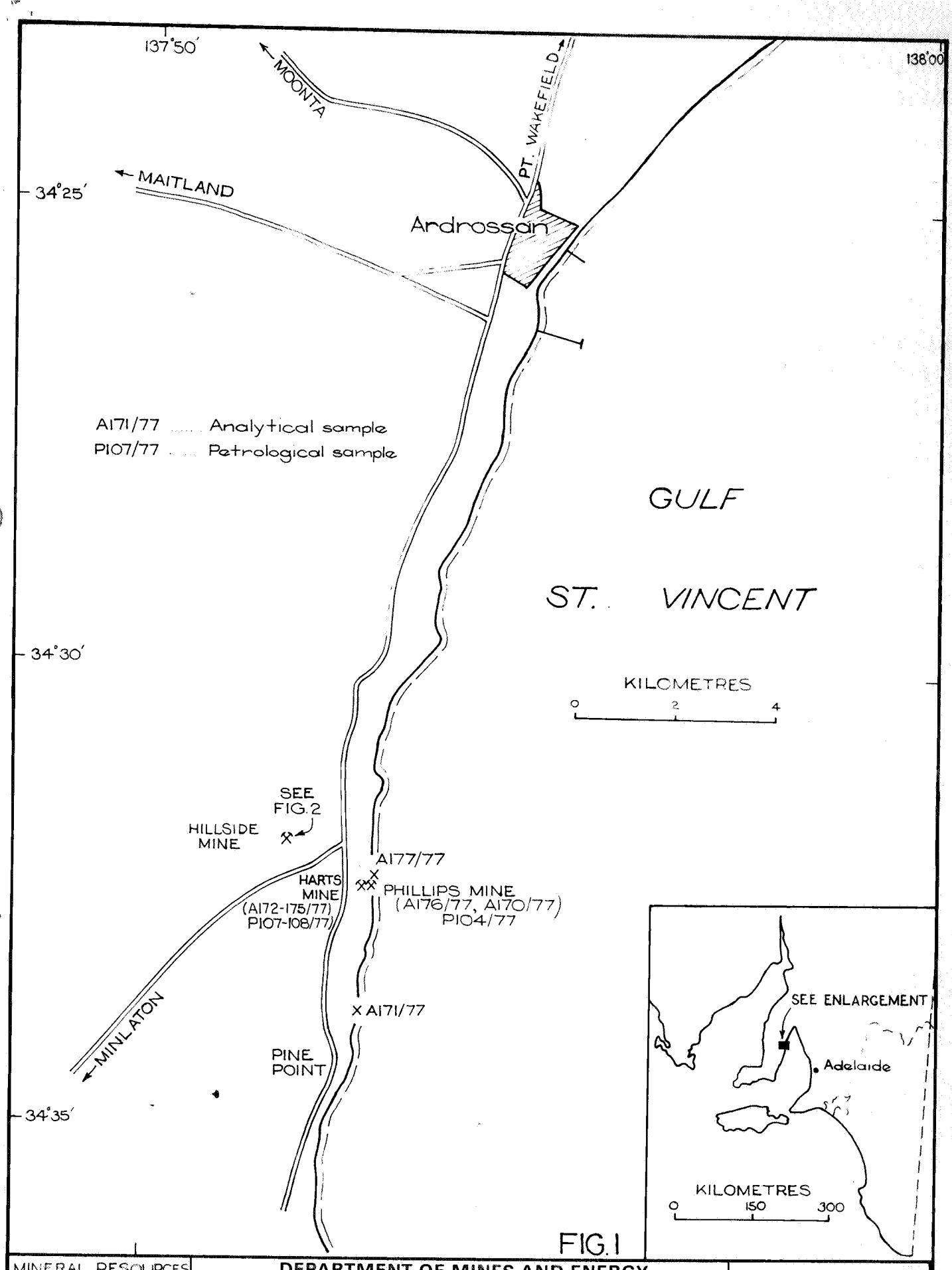


FIG.1

MINERAL RESOURCES SECTION	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1 100,000
COMPILED: J DREXEL	MINE & SAMPLE LOCATIONS - ARDROSSAN AREA YORKE PENINSULA	DATE: July '79
DRN: J W CKD:		PLAN NUMBER S14165

LOCATION

Several small copper and copper-uranium deposits are located approximately 11 km south of Ardrossan, in Hd. of Muloowurtie, Co. Fergusson within the District Council of Central Yorke Peninsula which is part of the Yorke Peninsula Planning Area (Fig. 1).

The Hillside mine is on Section 48, 1½ km inland from Gulf St. Vincent and can be seen from the junction of the Curramulka-Ardrossan and Port Vincent-Ardrossan roads.

Phillips and Harts mines are located in the low coastal cliffs 1½ km southeast of the Hillside mine, and lie within the 800 m wide coastal zone reserved from the operations of parts IV to VIII inclusive of the Mining Act 1971-1978. Both mines are on Mineral Section 17782.

Shafts have been sunk on the Hillside and Phillips mines, but the only indication of the Harts mine is a shallow pit, about 100 m from the beach.

HILLSIDE MINE

(i) Geology

Regional geology is presented in Crawford (1965), but no detailed account of the mine area is available. Host rocks to the mineralisation are brecciated, sheared, ferruginised and chloritised dolomites, dolosiltstones, porphyritic rhyolites and rhyolites. The carbonates probably belong to Cambrian Kulpara Limestone and the volcanics to Carpentarian Moonta Porphyry. Crawford (1965) notes that the mine is at or near the Cambrian-Precambrian unconformity.

Minerals identified in hand specimens of dump material are malachite, ?atacamite and chalcopyrite-pyrite aggregates.

(ii) Previous Investigations

The pre-1954 history of the mine is presented by Wade and Cochrane (1954). In brief, two shafts sunk prior to 1916 were deepened to 26 and 48 m in the period 1929-32. A winze from one

of the lower drives took the total mine depth to 54 m. Total production of ore appears to have been about 57 tonnes hand-picked to 40 tonnes averaging 13% Cu.

An 80 m diamond drill hole was sunk in 1955 by the S.A. Department of Mines, but failed to test the lode because of poor core recovery (Woodmansee, 1955).

Several radiometric surveys were carried out in the Hillside vicinity in the mid-1950's, but only slightly above background anomalies were found (see bibliography).

According to the present landowner, Shaw River Minerals conducted an exploration programme in the early 1970's, sinking two diamond drill holes from the same collar located west of the south shaft (Fig. 2). One hole, of unknown depth, was drilled vertically. The other of 110-120 m total depth was angled eastwards below the shaft, but inclination is unknown.

Much of the core was left on site, the scattered remnants of which could still be found at the time of writing.

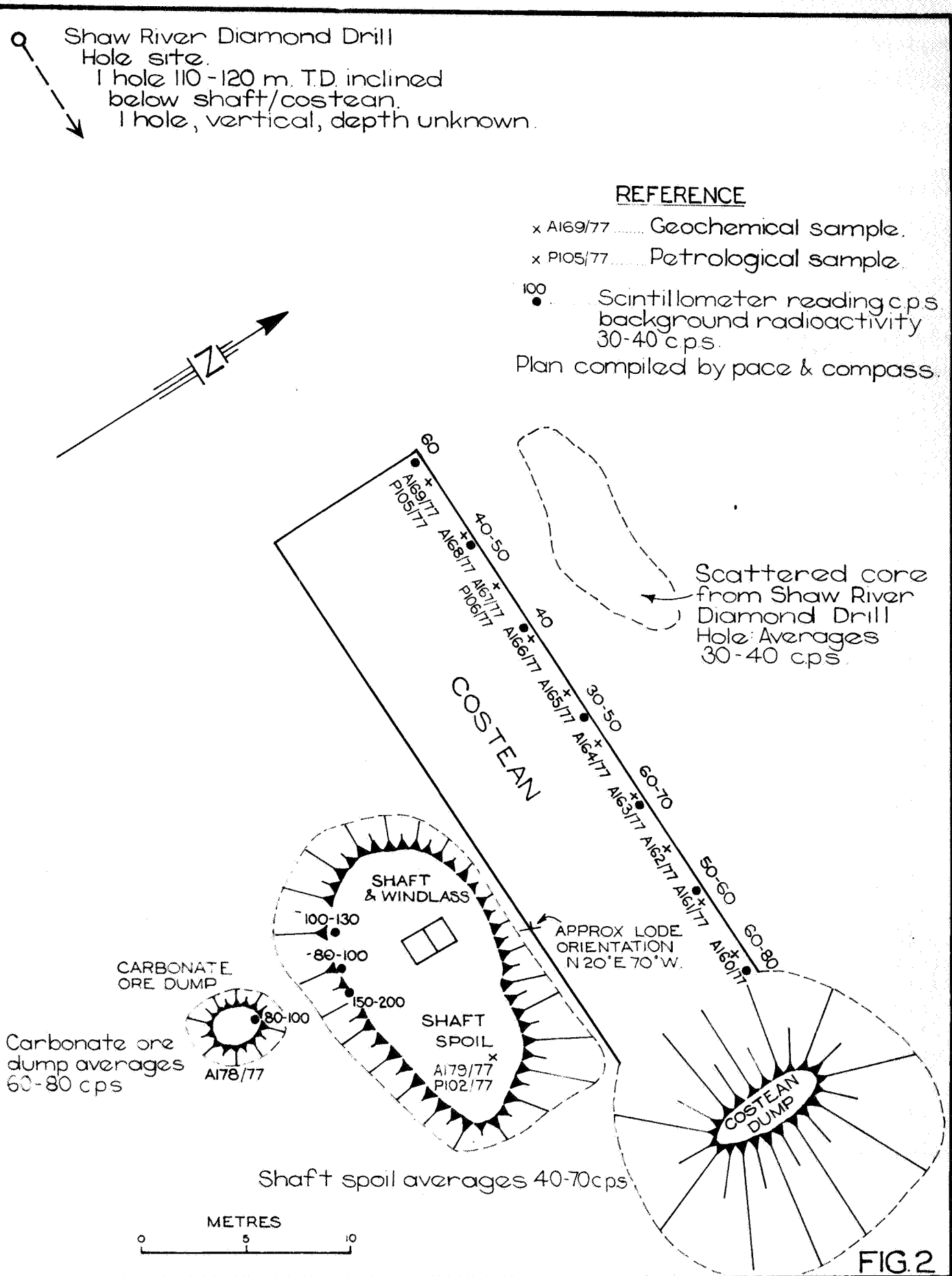
The South shaft was retimbered by Shaw River Minerals, and a windlass placed over the collar. The north shaft was probably filled in at this stage, and a large costean bulldozed over its approximate location (Fig. 2).

(iii) Scintillometer Survey

A brief scintillometer survey was carried out over the mine dumps, costean and scattered core. Spot readings taken are shown on Figure 2. The background of 30-40 cps was determined at several locations 50 m from the shaft.

A traverse along the northern wall of the costean gave readings of 1-2 x background, with the highest (60-80 cps) along lode strike from the shaft.

The carbonate ore dump and shaft spoil averaged 1-2 x background, but several locations gave values of up to 200 cps (5 x



MINERAL RESOURCES SECTION	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1:250
COMPILED: J. DREXEL	HILLSIDE MINE SAMPLE LOCATIONS & SCINTILLOMETER SURVEY	DATE: JULY '79
DRN: J.W. CKD:		PLAN NUMBER S14166

background). Four spot readings on the mullock were taken in 15-20 cm deep holes made during recent prospecting. The 200 cps reading was caused by a thumbnail sized specimen of black radioactive material, probably pitchblende; colloform and spheroidal pitchblende were identified in Hillside mine ore by Whittle (1955). Once this was removed from the hole, the mullock produced only 60 cps. The cause of the low anomaly over the dumps therefore appears to be due to a few nuggets of moderately radioactive material.

(iv) Petrology

Thin section descriptions for a rhyolite breccia (P105/77) and a dolomitic marble (P106/77) taken from the northern wall of the costean, and a polished section description for a sample of sulphide ore (P102/77) found in the shaft spoil are appended (Appendix A). Sample locations are shown on figure.2.

(v) Geochemistry

Ten rock chip samples (A160-169/77) were taken at 3 m intervals along the northern wall of the costean, and together with a sample of carbonate ore (A178/77) and sulphide ore (A179/77), were analysed for 20 elements. Uranium was not included. Only samples A160-162/77 showed appreciable metal content, this being 200-500 ppm copper. These three samples were taken along lode strike from the shaft. Results of analyses are listed in Appendix B, and the sample locations shown on Figure 2.

OTHER MINES

Several mines along the coast to the southeast of Hillside were visited in 1977. Petrological and analytical samples were taken from Phillips and Harts mines, and two further analytical specimens taken from outcrops on the beach (Fig. 1). All data are recorded in Appendices A and B.

The mines proved to be very small. Harts mine consisted of a shallow pit 100 m from the beach in a small gully. No metallic

mineralisation was obvious, but the skarnaceous country rocks showed a variety of calc-silicate minerals (P108/77). Meta-rhyolite was found at the mouth of the same gully (P107/77).

Phillips mine comprised a series of small pits, adits and a shallow shaft cut back into the 10-20 m high coastal cliffs. Some patchy malachite staining was found in highly weathered metamorphic rocks near the mine. A rock taken from the shaft spoil was found to be a garnet-calcite skarn (P104/77).

None of the six analytical samples (A170/77, A172-176/77) from the two mines showed appreciable metal values. Note that A170/77 ≡ P104/77, A172/77 ≡ P107/77 and A175/77 ≡ P108/77.

The samples from on the beach were (Fig. 1) A177/77 from a quartz "blow" north of Phillips mine, and A171/77 from a ferruginous gossan near an absite occurrence at Dead Horse Bay (Hiern, 1959).

CONCLUSIONS

No potentially economic copper or uranium mineralisation was found at the three mines. Small amounts of copper carbonate and copper sulphide occur at the Hillside mine, and copper carbonate stainings at the Phillips mine. No metallic mineralisation was seen at the Harts mine.

Thumbnail sized nuggets of pitchblende are the probable cause of a low radiation anomaly over the Hillside mine dumps.

J. DREXEL

BIBLIOGRAPHY

Anonymous, 1957. Investigation of radioactive occurrences - Yorke Peninsula. Min. Rev., Adelaide, 102:14-15.

Anonymous, 1957. Hillside Copper Mine - Ardrossan. Min. Rev., Adelaide, 103:34.

Cornelius, H.S., 1932. The Hillside copper mine - Ardrossan. Min. Rev., Adelaide, 55:93-95.

Crawford, A.R., 1965. The geology of Yorke Peninsula. Bull. geol. Surv. S. Aust., 39:96 pp.

Hiern, M.N., 1959. Dead Horse Bay uranium prospect. Min. Rev., Adelaide, 107:80-81.

Jones, H., 1917. Hillside copper mine. Min. Rev., Adelaide, 25:89-90.

Mumme, I.A., 1955. Ground scintillation survey of Dead Horse Bay uranium prospect. S. Aust. Dept. Mines report 39/37 (unpublished).

Mumme, I.A., 1955. Ground scintillation survey at the Hillside, Hart's and Parara copper mines and a copper prospect on section 39 of the hundred of Mooluwurtie, Ardrossan. S. Aust. Dept. Mines report 39/22 (unpublished).

North Broken Hill Ltd., Exploration Division, 1977. Pine Point Area, auger geochemistry. S. Aust. Dept. Mines open file env. 3042 (unpublished).

Pearson, J.L., 1931. The Hillside copper mine, Ardrossan. Min. Rev., Adelaide, 54:120.

Rowley, R., 1955. Uranium occurrence, Hillside copper mine, Ardrossan. S. Aust. Dept. Mines report 39/8 (unpublished).

Wade, M.L. & Cochrane, G.W., 1954. Hillside Copper Mine - Ardrossan. Min. Rev., Adelaide, 97:55-59.

Whittle, A.W.G., 1955. Pitchblende occurrence at Ardrossan. Amdel report no. 10/55 (unpublished).

Winton, L.J., 1930a. The Hillside copper mine. Min. Rev., Adelaide, 51:67-69.

Winton, L.J., 1930b. The Hillside copper mine, Ardrossan. Min. Rev., Adelaide, 52:66-67.

Woodmansee, W., 1955. Radiometric reconnaissance of copper mine dumps, northern Yorke Peninsula. S. Aust. Dept. Mines report 39/78 (unpublished).

Woodmansee, W., 1955. Diamond drilling at the Hillside copper mine, Ardrossan. S. Aust. Dept. Mines report 41/61 (unpublished).

APPENDIX A

Petrographic Descriptions: Hillside mine
Phillips mine
Harts mine

Extracted from Amdel Report MP 2718/77

By

F. RADKE

Sample: P102/77; PS25462

Location:
Hillside Mine, Yorke Peninsula (float from shaft).

Rock Name:
Massive sulphide.

Hand Specimen:
A sulphide-rich rock consisting mainly of pale yellow chalcopyrite intergrown with grey to reddish-brown areas which appear to represent quartz intergrown with reddish brown iron oxides.

Polished Sections:
An optical estimate of the constituents gives the following:-

	%
Chalcopyrite	45
Pyrite	35
Hematite	1
Magnetite	trace
Non-opaques	20

This sample consists mainly of anhedral pyrite crystals disseminated through a chalcopyrite matrix. The pyrite crystals are generally between 0.03 and 0.3 mm in size and have anhedral, angular shapes. Many of the larger pyrite crystals contain narrow veins and fractures up to 0.5 mm wide which are filled with chalcopyrite. The interstitial matrix through which the pyrite crystals are disseminated has a massive character.

Non-opaque gangue is concentrated in irregularly shaped patches generally up to approximately 1 mm in size. Anhedral granular aggregates of hematite are intergrown with the non-opaque gangue and account for the localized reddish staining noted in hand specimen. Most of the hematite patches are below 0.3 mm in size although locally large patches up to 1 mm in size are present. The hematite has a polycrystalline, granular character most likely produced by recrystallization. A trace of magnetite was noted as small crystals below 0.05 mm in size which are included within the non-opaque gangue.

This sample is a chalcopyrite-rich rock which appears to have suffered some deformation. The general texture of the angular, disseminated pyrite crystals gives the impression of their being fractured while the relatively more ductile chalcopyrite has filled in spaces and fractures around the more brittle pyrite.

Sample: P104/77; TS37549

Location:
Phillips Mine, Yorke Peninsula.

Rock Name:
Garnet-calcite skarn.

Hand Specimen:
A massive rock with a highly variable character. One part consists mainly of a dark brown to black mineral while another portion consists mainly of a dull white mineral.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Garnet	40
Calcite	40
Chlorite	5
Feldspar	5
Clinopyroxene	5
Amphibole	3
Sericite	1
Apatite	trace
Opaques	1

This is a rock with a highly variable mineralogy making the above mineral proportions somewhat meaningless due to the fact that both garnet-rich (dark coloured in hand specimen) and calcite-rich (light coloured in hand specimen) areas are present; thus the proportions of these minerals present in thin section depends largely on where the section was cut. The garnet-rich area consists of subidioblastic garnet crystals which are generally between 0.3 and 1 mm in size but form large granular patches up to several millimetres in size. This garnet has a greenish-brown colour and some evidence of zonation with what appears to be slightly darker coloured cores and paler coloured margins for some crystals. The garnet is extensively fractured and many of the fractures are lined by calcite veins which are below 0.2 mm in width. Calcite also forms irregular polycrystalline aggregates up to 1 mm in size which are intergrown with the granular garnet.

The calcite-rich areas consist of a granular intergrowth of calcite crystals between 0.2 and 0.8 mm in size. Minor garnet is disseminated through the calcite as xenoblastic to subidioblastic crystals up to 0.5 mm in size.

One portion of the thin section contains large clinopyroxene crystals up to 3 mm in size which are generally intergrown with calcite. The clinopyroxene has a pale green colour and, although it has not been positively identified, the general composition of the rock suggests that the clinopyroxene is diopside.

Xenomorphic feldspar crystals and granular aggregates of feldspar up to 1 mm in size are disseminated through the granular calcite. The feldspar shows moderate to alteration to sericite and generally has a turbid brownish colour due to finely divided micron-sized inclusions. These

inclusions most likely represent finely divided iron oxides which have been produced by heating of the feldspar. Most of the feldspar is untwinned and probably represents orthoclase although the altered and turbid character of some of the feldspar makes positive identification somewhat tentative. A pale green, weakly pleochroic amphibole is locally intergrown with the feldspar and also occurs as individual crystals included within the granular calcite.

Chlorite is present mainly as flaky aggregates up to 1 mm in size which consist of small chlorite flakes below 0.1 mm in size which generally have a radial structure. Minor chlorite also forms well developed flakes up to 0.2 mm in size which are intergrown with the feldspar and amphibole. Most of the chlorite in this rock has a pale green, pleochroic colour and anomalous blue to brown interference colours.

Traces of apatite were noted as small crystals below 0.2 mm in size which are disseminated through the rock. Opaques occur mainly as narrow fracture and vein fillings below 0.05 mm wide and as anhedral disseminated grains up to 0.2 mm in size. Opaque and translucent, reddish-brown semi-opaque material is also locally intergrown with the altered feldspar and amphibole.

This sample is a calc-silicate skarn most likely produced by contact metamorphism and probable metasomatism of a calcareous sediment.

The mineralogy as well as the highly variable nature of the rock are all typical of skarns.

Sample: P105/77; TS37550

Location:
Hillside Mine, Yorke Peninsula.

Rock Name:
Rhyolitic breccia.

Hand Specimen:
A massive, purple coloured rock with an aphanitic character. Staining with sodium cobaltinitrite after a hydrofluoric acid etch shows that the rock is rich in potash feldspar.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Feldspathic matrix	70
Quartz	20
Sericite-clay	5
Limonite	1
Rutile	trace
Opaques	5

This sample consists mainly of a somewhat turbid feldspar-rich matrix which has an extensively fractured and brecciated character. The matrix consists mainly of microcrystalline intergrowths of feldspar which generally have a grain size below 0.1 mm and an interlocking granular, cherty texture. Most of the crystals are very fine-grained and show little or no twinning although some of the crystals (particularly the larger ones) show grid-iron twinning typical of microcline and a few crystals with polysynthetic twinning typical of plagioclase were also noted. Although the fine grain size of the feldspar makes positive identification difficult it is belived that the feldspathic matrix consists mainly of microcline with a relatively smaller proportion of plagioclase and minor granular quartz. All of the feldspar in this rock has a turbid character produced by finely divided micron-sized inclusions of opaque material most likely produced by heating of the feldspar, possibly under contact metamorphic conditions.

The fragmental, brecciated texture is produced mainly by an interlocking network of veins typically below 0.1 mm in width which are filled with clear, non-turbid material in the form of sericite-clay and microcrystalline quartz. The quartz has a finely granular texture and rarely exceeds 0.1 mm in grain size although locally polycrystalline aggregates of quartz with a grain size up to 0.3 mm are present. The sericite has a very fine, fibrous character and in some cases is intergrown around the margins of granular quartz veins. Translucent, reddish-brown limonite also occurs as narrow fracture and vein fillings which are locally intergrown with granular quartz.

A few disseminated rutile grains up to 0.1 mm in size which exhibit a translucent, yellow colour were also noted. The bulk of the opaques in this rock form narrow fracture and vein fillings generally below 0.05 mm in width which have an irregular, undulose character. A significant proportion of opaques also form anhedral disseminated grains below 0.1 mm in size.

This is a highly brecciated feldspar-rich rock which most likely represents a rhyolite which has undergone extensive deformation. Some silicification has occurred in the form of microcrystalline silica which lines narrow fractures. The turbid nature of the finely granular feldspathic matrix indicates that the rock has suffered thermal metamorphism.

Sample: P106/77; TS37551

Location:
Hillside Mine, Yorke Peninsula.

Rock Name:
Dolomitic marble.

Hand Specimen:
An essentially monomineralic rock consisting of a finely granular intergrowth of pink to reddish coloured dolomite. The carbonate in this rock was positively identified as dolomite by X-ray diffraction.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Dolomite	90
Quartz	7
Opaques and semi-opaques	3

This rock consists mainly of a granular intergrowth of dolomite which exhibits a typical grain size between 0.3 and 3 mm. Most of the dolomite contains very finely divided inclusions of opaque to translucent reddish-brown semi-opaque material which most likely represent limonite or hematite and would account for the reddish colour of the dolomite in hand specimen. Locally around void spaces the dolomite shows well developed crystal faces as well as concentric growth rings defined by concentrations of translucent brownish iron oxides.

Quartz is disseminated through the dolomite as xenomorphic grains which are generally below 0.3 mm in size but locally form granular aggregates up to 1 mm in size. Most of the granular quartz aggregates have a deformed texture with sutured grain margins and strongly developed strained extinction. The individual quartz grains generally show only weakly developed strained extinction and some exhibit well developed crystal shapes although locally modification of these shapes by marginal replacement of quartz with dolomite has occurred. The disseminated quartz grains also generally contain very small (below 0.01 mm in size) inclusions of dolomite.

Opaques are disseminated through the rock as anhedral grains and granular aggregates up to 0.3 mm in size. Minor opaques are also locally present as narrow fracture and vein fillings or intergranular fillings between the quartz and dolomite.

This sample most likely represents a dolomitic sediment which has undergone recrystallization in response to thermal metamorphism. Some remobilization and deposition of dolomite within void spaces has occurred to produce well developed crystal shapes with a concentric growth band defined by translucent iron oxides.

Sample: P107/77; TS37552; PS25463

Location:
Harts Mine, Yorke Peninsula.

Rock Name:
Meta-rhyolite.

Hand Specimen:
A dark grey rock with a well developed banded texture consisting mainly of bands up to approximately 1 mm wide. Staining with sodium cobaltinitrite after a hydrofluoric acid etch shows that most of the bands are rich in potash feldspar although some bands contain little or no potash feldspar.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Potash feldspar	50
Quartz	20
Plagioclase	20
Opaques	10

This sample consists mainly of a finely granular intergrowth of feldspar and quartz with a typical grain size between 0.05 and 0.8 mm. The banded character noted in hand specimen is reflected in variations of grain size, with some bands consisting mainly of very fine-grained feldspar-quartz quartz intergrowths with grain size below 0.1 mm and other bands consisting mainly of coarser grained (typical grain size above 0.3 mm) feldspar-quartz intergrowths. Most of the feldspar in this rock is untwinned although locally some grid-iron twinned microcline and polysynthetically twinned plagioclase crystals were noted. The lack of twinning of the bulk of the feldspar as well as its fine grain size and probable variability in mineralogy of the different bands as reflected in the staining of the hand specimen all make the estimation of felsic mineral proportions given above somewhat tentative. The feldspar in this rock is very fresh, showing no alteration to sericite, although locally the feldspar has a very weakly developed turbid character produced by finely divided micron-sized inclusions.

Opaques are disseminated through the rock as anhedral grains and interstitial fillings up to 0.5 mm wide. There is a tendency for the opaques to be concentrated in bands up to 1 mm wide which further adds to the general banded character of the rock.

Polished Section:
In polished section the only opaque mineral noted is hematite, which is disseminated through the rock as anhedral grains and granular aggregates and to a lesser extent as elongate, somewhat prismatic-shaped crystals generally below 0.3 mm in size.

Conclusions:
This sample is a fine-grained felsic rock and most likely represents a rhyolite which has undergone recrystallization under metamorphic conditions. The abundance of contact metamorphic rocks in this suite of samples as well as the lack of foliation suggests that this is a

contact metamorphic rock. The rock has a well developed banded texture produced both by variations in grain size and mineralogy between bands. A moderate proportion of hematite has been introduced into the rock mainly as intergranular fillings between felsic mineral grains.

Sample: P108/77; TS37553

Location:
Harts Mine, Yorke Peninsula.

Rock Name:
Marble (calcite skarn).

Hand Specimen:
A massive pale grey to white coloured rock with disseminated pale green to yellowish green crystals up to several millimetres in size. Locally the rock has a deep reddish-brown colour due to iron staining.

Thin Section:
An optical estimate of the constituents gives the following:-

	%
Calcite	70
Potash feldspar (microcline)	10
Clinopyroxene	5
Quartz	5
Epidote	3
Chlorite	2
Amphibole	2
Sphene	2
Biotite	trace
Apatite	trace
Opaques and semi-opaques	1

Most of this sample consists of a granular mosaic intergrowth of calcite crystals with a grain size between 0.1 and 0.5 mm.

Skeletal crystals of clinopyroxene up to several millimetres in size are disseminated through the rock and would represent the green to yellowish green patches noted in hand specimen. These crystals are highly altered and extensively veined by carbonate leaving only remnants which are generally below 0.3 mm in size separated by alteration products. This clinopyroxene also shows alteration to other mafic minerals such as chlorite, amphibole and biotite. Chlorite is the most common alteration product and generally forms fibrous-appearing flakes. The amphibole is a pale green, weakly pleochroic variety which forms small crystals generally below 0.3 mm in size. The biotite occurs only as very small flakes below 0.1 mm in size which exhibit a pale brown, weakly pleochroic colour.

Anhedral grains and granular patches of quartz and microcline-feldspar up to 0.5 mm in size are also disseminated through the rock. Most of the microcline shows grid-iron twinning but some untwinned potash feldspar is also present. Minor plagioclase could also be present but none could be positively identified.

Epidote occurs mainly as well developed prismatic crystals up to 0.3 mm in size although a small proportion of the epidote forms xenomorphic crystals. Sphene is disseminated through the rock as anhedral to subhedral crystals up to 0.5 mm in size. Traces of apatite were also noted as small prismatic crystals below 0.1 mm in size. Opaques occur mainly as anhedral disseminated grains and narrow fracture and vein fillings. A significant proportion of translucent, reddish-brown limonitic material is intergrown with some altered clinopyroxene crystals.

This sample is a contact metamorphic rock very similar to the calcite-rich portion of sample P104/77 (TS37549). The presence of disseminated microcline and quartz grains which most likely represent remnants from the original rock which has been almost completely replaced by calcite suggest that the original rock had a felsic composition.

APPENDIX B

Chemical Analyses

Amdel Report AN 2719/77

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

DATA LAYOUT FOR METALSCAN

METALLIC RESOURCES
FORM DP 29

AMDEL PROJECT NO 2719/77 . . . SADM PROJECT NO . . . APPENDIX B . . . . . SHEET . . . . OF . . . . .

AMDEL REPORT NO . . . . . SADM PROJECT NAME . . . YORKE PENINSULA . . . . . DATE . . . . . .

PHILLIPS + HARTS MINES + COASTAL SAMPLES

Detection Limit	200	5	20	10	3	5	100	50	100	10	0.1	50	1	1	1	30	1	20	3	100		
A-G NUMBER	Ba	Co	Cr	Mn	Mo	Ni	V	W	La	Y	Ag	As	Bi	Cu	Pb	Sb	Sn	Zn	Au	P		
A1610/7171	150	30	150	170	X	120	150	X	X	300	X	X	X	1500	3	X	1	1100	X	X		
16171	X	10	20	80	X	110	110	X	X	X	X	X	X	2100	5	X	X	X	X	X		
16172	X	150	X	3100	120	120	80	X	X	300	0.1	X	X	2100	10	X	30	80	X	X		
16173	Y	80	30	8100	X	120	30	X	X	300	X	X	X	1100	10	X	2	1100	X	X		
16174	2100	80	80	15100	X	120	70	X	X	30	X	X	X	70	5	X	2	1100	X	X		
16175	X	70	30	8100	X	10	50	X	X	120	X	X	X	1100	5	X	2	1100	X	3100		
16176	5100	120	20	3100	X	10	10	X	X	110	X	X	X	130	1	X	1	X	X	3100		
16177	10100	110	30	21000	X	5	70	X	X	510	X	X	X	110	1	X	1	X	X	3100		
16178	10100	10	30	10100	X	5	50	X	X	30	X	X	X	1100	2	X	X	X	X	3100		
16179	30100	120	12100	80	X	1100	12100	X	5100	70	X	X	X	110	2	X	1	X	X	5100		
17170	X	110	3100	31000	X	5	50	X	X	500	X	X	X	170	5	X	X	210	X	X		
17171	51000	11000	3100	9999	5	1100	500	X	X	110	0.3	X	X	13100	1200	X	X	110	X	X		
17172	8100	200	500	21000	X	1200	21000	X	X	110	X	X	X	1200	3	X	X	1	X	X		
17173	21000	200	80	11000	X	1200	1500	X	X	300	X	X	X	1200	2	X	X	1	X	3100		
17174	X	200	300	7100	X	5	300	X	X	300	0.1	X	X	15100	5	X	X	5	X	2100		
17175	7100	110	500	15100	X	1100	500	X	X	200	X	X	X	1200	3	X	X	X	X	3100		
17176	X	300	500	7100	300	1500	800	X	X	800	X	X	X	500	110	X	X	1100	X	X		
17177	X	300	200	15100	X	1100	300	X	X	X	X	X	X	11000	X	X	X	X	X	5100		
17178	21000	11500	500	71000	X	11000	700	X	X	1100	0.3	X	15	9999	15	X	1100	16100	X	5100		
17179	31000	31000	500	31000	X	21000	700	X	X	1200	1100	X	1100	9999	300	X	700	81000	X	X		

NOTE: 9997 : 10000 ppm 9998 : > 10000 ppm 9999 : >> 10000 ppm