Open File Envelope No. 1642

SML 542

SOUTHERN FLEURIEU PENINSULA

PROGRESS AND FINAL REPORTS TO LICENCE EXPIRY FOR THE PERIOD 11/2/1971 TO 10/2/1972

Submitted by
Comstock Minerals Ltd
1971

Enquiries: Customer Services Branch
Minerals and Energy Resources
7th Floor
101 Grenfell Street, Adelaide 5000

Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880

Government of South Australia
Primary Industries and Resources SA

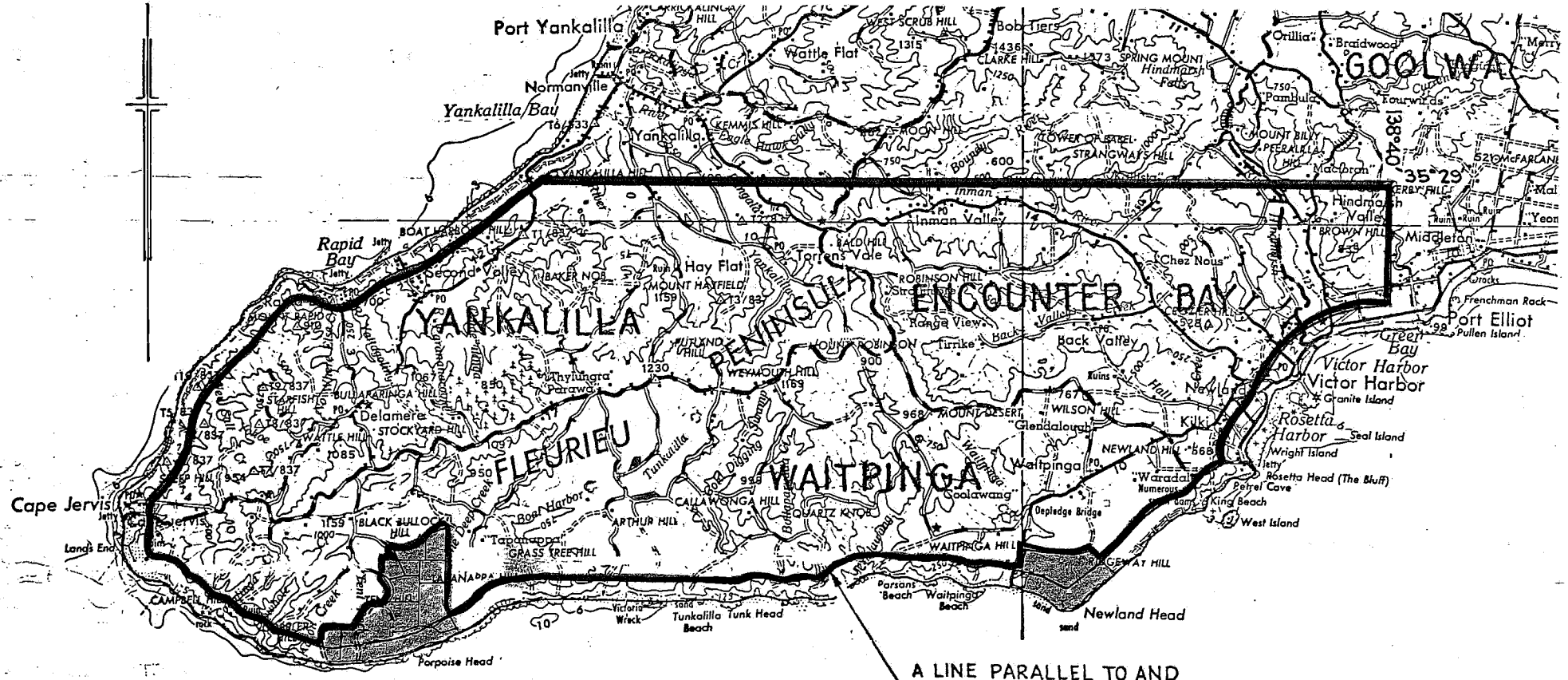
COMSTOCK MINERALS LTD

DOCKET D.M. 1437/70 AREA 258 SQ. MILES

1:250000 PLANS . BARKER

LOCALITY

SMAL. No. 542 EXPIRY DATE 10.2.72.



SCALE 1:250000

A LINE PARALLEL TO AND ONE HALF MILE INLAND FROM HIGH WATER MARK.

EXCLUSIONS

HD. WAITPINGA - SEC. 355.
" - SECS. 356, 357.
" - SECS. 130, 216, 217, 365.
" - SECS. 65, 79, 80, 209, 210, 211, 212, 76, 362.

CONTENTS ENVELOPE 1642

TENEMENT: S.M.L. 542

TENEMENT HOLDER: Comstock Minerals Ltd.

CINNABAR MINING SERVICES PTY. LTD.

7 BARNARD STREET,
NORTH ADELAIDE,
SOUTH AUSTRALIA.
5006
POSTAL ADDRESS,
P.O. BOX 164
NORTH ADELAIDE,
SOUTH AUSTRALIA,
5006
PHONE 671684

INTERIM REPORT ON S.M.L. 542

FLEURIEU PENINSULAR

SOUTH AUSTRALIA

for

Comstock Minerals Limited.

TABLE OF CONTENTS

I LOCATION AND ACCESS

S.M.L. 542, covering an area of 258 square miles, lies approximately 50 miles south of Adelaide.

Most of the area is under pasture and excellent access is provided by a close network of road and tracks, all negotiable by conventional vehicles.

II GEOLOGY

1. Archaean

Archaean rocks in the area of Fleurieu Peninsula under consideration outcrop in the Yankalilla Bay area in the northwest corner of the map area.

These rocks comprise bands of green and pink mottled gneissic rock, intercalated in schists and gneisses similar to microdiorites and seem to be altered sediments (Campana and Wilson 1953). Specimens taken 2 miles southeast of Yankalilla (ibid 1953) show that the main constituents of the rock, feldspar, amphibole and epidote, are present on about equal proportions.

The rock seems to indicate a stage in the feldspathization of a former sediment of a rather basic nature, such as a greywacke or shale, in which chlorite, epidote and ferruginous material were abundant.

Samples from the Archaean south of Yankalilla show that these strongly foliated and schistose rocks have been penetrated by sills of altered microdiorite and of granulitic albite-epidote-pyrobole rock, rich in sphene, ilmenite and apatite.

Evidence suggests that the original rocks of this Archaean complex were sandy argillaceous sediments with zones of greywacke and impure magnesian limestone (Campana and Wilson, op cit) Regional metamorphism produced the various gneissic types, whilst subsequent soda metasomatism selectively affected the calcareous horizons and produced an albitic calc-magnesian silicate rock, namely an albite-diopside rock with accessory sphene, apatite etc. The latter has since degenerated into an albite-actinolite rock.

submarine fault lines and the Great Kanmantoo Trough was formed. This structure which is filled with greywacke type sediments of the Kanmantoo Group, cuts across the southerly trending Adelaide Geosyncline.

Compensating upward movements occurred in the basement areas to the north and west from which the Kanmantoo sediments were derived (Cassinian uplift).

Between the south east of Fleurieu Peninsular and the Ashbourne-Macclesfield area in the Waitpinga Hill-Yanialilla Hill section the two lower formations of the Kanmantoo Group (Strangway Hill and Inman Hill formations), reach a maximum apparent thickness of 37,000 feet. To the north the units are abruptly reduced in thickness as each of three fault hinge zones crossed.

The movement of the enormous volume of sediments now forming the Kanmantoo Group across the Cambrian ocean floor was facilitated by the steep gradient of the margins of the trough during the Waitpingan subsidence and rapid

erosion of the rising source terrain. The sediments were conveyed as a dense slurry assisted by submarine avalanches on the trough flanks, and by turbidity currents which flowed rapidly along the sea floor far to the south and east. Sediments were prograded on the flanks and along the front of the trough. Near the source area some winnowing and sorting of sandy sediments occured. Finer silty fractions and some limestones were deposited between intervals of rapid influx and in areas more distant from the source. Lenticular pyritic deposits were formed in minor basinal areas on the sea floor where the organic content was sufficiently high to provide the appropriate reducing conditions during compaction.

This process of rapid sedimentation has resulted in complex intertonguing of units and rapid facies variations. The sucession appears superficially as a featureless repitition of indistinguishable units but detailed mapping has enabled subdivision into three major formations:-

1. Strangway Hill Formation, consisting of the meta-greywacke siltstones of Cape Jervis.

2. Inman Hill Formation consisting of a course greywacke-arkose with large scale cross-beds, sharply turncated foresets, and numerous "scour and fill" structures. These structures indicate that the sediment was deposited in an environment with quickly moving currents. In the type area in the Inman valley, this formation attains an apparent thickness of 15,000 feet. Further south, where it forms the high cliffs of the southeast coast of Newland Head and west of Yankallilla beach, it is even thicker.

3. Brukunga formation, the uppermost unit of the Kanmantoo Group consisting of 24,000 feet of phyllite and phyllitic greywacke, pyritic beds and minor altered limestone or dolomite members. The basal marker bed of this formation, the Nairne Pyrite Member is exposed in the southeast of the map area. The pyrite is syn-genetic and has been largely recrystallized and in part converted by metamorphism to pyrrhotite.

The uppermost unit in the Brukunga formation is the Brownhill Greywacke Member, exposed in the northeastern part of the exploration area. It is a massive layered greywacke unit about 12,000 feet thick.

Sedimentation in the Kanmantoo trough may have ceased following the deposition of the Brownhill Greywacke Member, in the late Middle to early Upper Cambrian time. The end of the sedimentation can be attributed to the Delamerian orogeny (Daily 1963, Sprigg and Campana 1953). The granites to the east of the area e.g. Victor Harbour, were probably intruded during the closing phases (isotopic age determination, 1966 less than 473 my).

Evidence that the orogeny involved deep seated penetrative movements of the earth's crust is provided by the Cu, Pb, Ba, Zn and Au mineralization which tends to be concentrated in the cover rocks, particularly in the vicinity of old basement shears (Thompson 1965). This metallogenic event introduced numerous small

metallic ore deposits at many stratigraphic levels in the geosynclinal pile of sediments. The structural changes imposed by the Del-Amerian orogeny of the rocks in the Fleurieu part of the Kanmantoo trough are preserved today in the complex old and fault patterns outlined by the prominant range and ridge topography.

In the Fleurieu Peninsula the sediments were subjected to a rise in temperature and underwent regional shearing and in the metamorphic areas the sediments were deformed by flow folding.

The Archaean basement was involved in the folding, and in the western limits of the Trough the folds are overturned and dip eastwards. In places - e.g. Second Valley area, the limbs and hinge lines of the folds dip and plunge flatly to the southeast. The thrust surfaces on which the folds are developed appear to steepen with depth suggesting deep upthrusting from the east. Along the Meadow-Kitchener fault there is steep

reverse faulting of metamorphosed cover rocks against less altered rocks, and east of this the structural pattern is dominantly a right-hand en-echelon system of southerly plunging synclines. These are generally outlined by metamorphosed Kanmantoo group rocks. These folds expose the floor of the Kanmantoo trough and continue seawards into the continental shelf area, to the south.

Detailed structural studies have shown that several phases of folding occurred during metamorphism but the complete unravelling of the deformational history has yet to be achieved.

3. Permian

The next episode to affect the Fleurieu area occurred during the Permian. The rocks are almost horizontally bedded glacial, fluioglacial and glacio-lacustrine (varved) deposits which are dound in all glacial depressions of the area e.g. Inman Valley. These beds consist mainly of unconsolidated sand and boulder clay with marine

shells and mudstones near Second Valley. They rest uncomfortably and indiscriminately on the folded Pre-Cambrian and Cambrian rocks.

4. Quaternary

The Quaternary, exposed in the southeast, southwest and west of the lease area consit of outwash deposits; sands and clays, usually capped by kunkarised surfaces.

III ECONOMIC GEOLOGY

1. Introduction

Scattered patches of silver-lead minerals have been found associated with the Cambrian marbles in the Rapid Bay zone but detailed prospecting and exploration by other companies in this area, in the past, have failed to locate any new deposits of economic significance.

Copper has been won at intervals at Yattagolinga, east of the Rapid Bay quarry, from a crush zone in the limestone. The minerals are chalcopyrite, malachite and azurite, replacing the country rock along the bedding planes. However the mineralization has been proved by other companies to be too poor for present development and the

deposit was abandoned after unsuccessful drilling.

The formations of the Cambrian Kanmantoo Group have proved to be the most interesting economically, this is due to the position of the Kanmantoo group in the Mt. Lofty Range system. They belong to the eugeosyncline element of the geosynclinal area, which has been intruded by plutons of granite, (e.g. Victor Harbour granite), during or just after the early palaeozoic oxegeny. In relation to this magmatic activity, regional metamorphism developed locally and mineral bearing solutions were injected the country rock in various places.

The Callawonga Creek wolfram deposit discovered in 1911, worked till 1918, and temporarily reopened in 1952, is associated with quartz veins of pneumatolitic origin, which intruded the Kanmantoo beds over an area of 1 square mile at least. One of these quartz-feldspar-tourmaline

veins carried ferberite, and to a lesser degree, gold and yttrium. A programme of mapping and diamond drilling has recently been completed in this area.

Another fairly important deposit associated with the Kanmantoo beds in the silver-lead lode of Talisker mine, 3 miles north of Jervis; the environs of this mine are excised from the lease.

The stream sediment sampling programme which is at present being conducted over the area will provide a complete geochemical coverage of the area at a reconnaissance level. The success of this method in locating significant base metal mineralization has been proved in the Cape Jervis area by C.R.A. Exploration Pty. Ltd. (unpublished report, 1969).

Prospecting and field geological investigations should be concentrated on the vicinity of the Callawonga Creek ferberite-bearing deposits and on potential base metal hosts within the

Cambrian, particularly in the coastal area between Victor Harbour and Tunkalilla Beach. However initial mapping and sampling of quartz veins in the vicinity of Callawonga Creek has failed to locate further promising deposits. It is felt that the geochemical stream sediment sampling programme will lead to the discovery of any significant base metal deposits that may occur withing the leases.

2. Stream Sediment Sampling

(i) Introduction

A reconnaissance stream sediment sampling programme over the entire lease, with the exception of the Cape Jervis area which was sampled in 1969 by C.R.A. Exploration Pty. Ltd., is in progress and results from the eastern portion are presented with this report.

(ii) Sampling and Analytical Procedure

To date 63 samples have been collected from all major streams draining the eastern half of the area. All samples were dried, sieved to minus 80 mesh, and analysed by AAS for Cu, Pb and Zn.

(iii) Results

The copper content of all samples collected to date is below 20 ppm; none of these samples requires further investigation.

The lead content varies between the detection limit of 20 ppm and 40 ppm; neither require further investigation.

The zinc content of three samples (F3, F13, F17) lies between 50 and 99 ppm whilst the remaining samples (93%) contain less than 50 ppm. The significance of these three samples can be assessed statistically with more confidence when further data is available after completion of the survey.

IV CONCLUSIONS AND RECOMMENDATIONS

The reconnaissance stream sediment sampling programme which is in progress will indicate the presence of any significant base metal deposits that may occur within the lease. On completion of this programme all results should be examined statistically and related to the geology. A programme of detailed sampling and prospecting should be initiated in any anomalous zones defined by the present phase of exploration.

Yours faithfully,

CINNABAR MINING SERVICES PTY. LTD.

G.H.Lynch, B.Sc.(Hons) M.Ivezich, B.Sc.(Hons) A.S.E.G.

Gerry Lynch.

Sample Description	Cu, ppm	Pb, ppm	Zn, ppm
F 1	<2	<20	15
2	<2	<20	20
3	20	20	90
4	5	<20	10
5	10	<20	40
6	10	<20	20
7	10	<20	40
8	15	<20	40
9	10	20	30
10	10	<20	10
1	10	<20	30
2	5	<20	10
3	15	35	65
4	10	<20	20
5	10	25	40
6	10	<20	10
7	20	40	70
8	10	<20	20
9	10	25	20
20	10	30	40
1	10	40	30
2	10	25	30
3	10	20	20
3 A	5	40	5
4	15	<20	40
5	2	<20	20
6	2	<20	15
7	5	<20	10
8	10	20	30
9	10	<20	30
30	5	20	20
1	10	20	30
2	<2	<20	20
3	<2	20	35
4	10	20	40
5	20	35	45
6	15	30	50
7	10	25	30
8	10	30	30
9	2	<20	20
40	10	20	40
1	5	<20	15
2	<2	<20	20
F 43	<2	<20	10

TICAL METHODS: Cu, Pb, Zn, by AAS following hot 25% HNO_3 leach for 1 hour on 0.25gm sample.

(2 copies to Cinnabar Mining Services)

cription	Cu, ppm	Pb, ppm	Zn, ppm	Mo, ppm			
	<2	<20	20	<2			
	<2	20	20	<2			
	<2	<20	10	<2			
	5	30	30	<2			
	<2	<20	10	<2			
	<2	<20	25	<2			
	<2	<20	20	<2			
	<2	<20	20	<2			
	<2	<20	20	<2			
	<2	<20	10	<2			
	2	<20	10	<2			
	5	<20	5	<2			
	10	20	30	<2			
	10	20	30	<2			
	10	20	40	<2			
	5	20	10	<2			
	10	20	20	<2			

Cu Pb Zn by AAS following conc. $HClO_4$ leach for 1 hour on 0.25gm sample. Mo by modified Dithiol following potassium pyrosulphate fusion on 0.2gm sample.

(2 copies to Mr. C. Ingram, Cinnabar Mining Services)

Signed: S. Kay

138° 30'
35'
40'
35° 30'

Creek
907' INMAN HILL
Ducknest
Sawpit Gully
Inman
Hindmarsh
BROWN HILL 835'
River
PORT ELLIOT
Back Valley Creek
River
Creek
VICTOR HARBOR
Hall
767' WILSON HILL
ROSETTA HARBOR
NEWLAND HILL 568'
Waitpinga Homestead
RIDGEWAY HILL 517'
NEWLAND HEAD

F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19 F20 F21 F22 F23 F24 F25 F26 F27 F28 F29 F30 F31 F32 F33 F34 F35 F36 F37 F38 F39 F40 F41 F42 F43

As
Cu
Pb

LEGEND:

- Boundary of S M L
- Roads (sealed), + Graded Tracks
- Tracks
- F14 Sample Locations
- Mines (abandoned)

COMSTOCK MINERALS LIMITED ~

S.M.L. 542

FLEURIEU PENINSULAR, S.A.

STREAM SEDIMENT SAMPLE LOCATIONS

(EASTERN SECTION)

C.E. JUNE 1971	SCALE: 1 inch = 1 mile	PLAN Nº 1

CINNABAR MINING SERVICES PTY. LTD.

021

CINNABAR MINING SERVICES PTY. LTD.

SUITE 606,
6th FLOOR,
NEWSTEAD HOUSE,
229 CASTLEREAGH STREET,
SYDNEY, 2000
PHONE 61-4549

12th August 1971

Quarterly Report on

S.M.L.542 FLEURIEU PENINSULA

The reconnaissance geochemical stream sediment survey over the western section of the lease has been completed, thus providing a reconnaissance geochemical coverage of the entire lease. The results from the eastern section are discussed in our recent interim report.

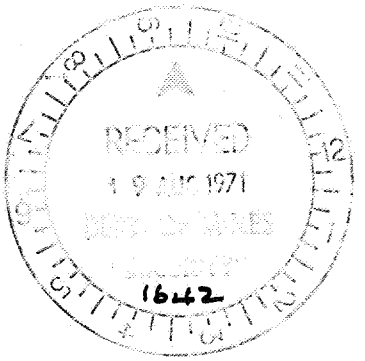
A map is at present being draughted, showing sample locations and values. A preliminary analysis of the results suggests that one new area of base metal mineralization occurs within the area in the vicinity of Mt.Hayfield. However more detailed sampling and geological examination of the environs of this anomaly will be necessary to determine its significance.

A full report on the geological stream sediment survey will be presented when all data is available.

CINNABAR MINING SERVICES PTY.LTD.

p

M.C.Boydell



ENV 1642

022

7 BARNARD STREET,
NORTH ADELAIDE,
SOUTH AUSTRALIA.
5006
POSTAL ADDRESS,
P.O. BOX 164
NORTH ADELAIDE,
SOUTH AUSTRALIA,
5006
PHONE 671684

CINNABAR MINING SERVICES PTY. LTD.

COMSTOCK MINERALS LTD.

FINAL REPORT ON S.M.L.542

FLEURIEU PENINSULAR

SOUTH AUSTRALIA

NOVEMBER 1971

1642

TABLE OF CONTENTS

I LOCATION AND ACCESS

S.M.L.542, covering an area of 258 square miles, lies approximately 50 miles south of Adelaide.

Most of the area is under pasture and excellent access is provided by a close network of road and tracks, all negotiable by conventional vehicles.

II GEOLOGY

1. Archaean

Archaean rocks in the area of Fleurieu Peninsular under consideration outcrop in the Yankalilla Bay area in the north-west corner of the map area. (see Plan1)

These rocks comprise bands of green and

pink mottled gneissic rock, intercalated in schists and gneisses similar to mica-diorites and seem to be altered sedim-ents (Campana and Wilson 1953). Specimens taken 2 miles south-east of Yankalilla (ibid 1953) show that the main constit-uents of the rock, feldspar, amphibole and epidote, are present in about equal proportions.

The rock seems to indicate a stage in the feldspathization of a former sediment of a rather basic nature, such as a grey-wacke or shale, in which chlorite epidote and ferruginous material were abundant.

Samples from the Archaean south of Yank-alilla show that these strongly foliated and schistose rocks have been penetrated

by sills of altered microdiorite and of granulitic albite-epidote-pyrobole rock, rich on sphene, ilmenite and apatite.

Evidence suggests that the original rocks of this Archaean complex were sandy arggillaceous sediments with zones of greywacke and impure magnesian limestone (Campana and Wilson, op cit). Regional metamorphism produced the various gneissic types, whilst subsequent soda metasomatism selectively affected the calcareous horizons and produced an albitic calc-magnesian silicate rock, namely an albite-diopside rock with accessory sphene, apatite etc. The latter has since degenerated into an albite-actinolite rock.

../4

2. Proterozoic

The only Proterozioc rock exposes within S.M.L.542 outcrops north of Second Valley (see Plan 1). This is represented by a glacial tillite, whose age is uncertain.

The reason for the lack of Adeladean sediments within the lease can be attributed to the Duttonian folding which occurred from Minoan to Lower Cambrian times (see Plan 3). This tectonic activity is reflected in unconformable and disconformable relationships between the Pre-Cambrian sediments. In the area under consideration, the erosion of the Duttonian fold belt occurred prior to the deposition of the sediments of the Kanmantoo Group. Proterozoic sediments would therefore have

been removed by the erosion during the Lower Cambrian.

At the end of the Lower Cambrian a tectonic event known as the Waitpingan subsidence occurred. The sea floor, which extended across the area now occupied by Kangaroo Island north-east to the east of Mt.Lofty Ranges, collapsed along submarine fault lines and the Great Katmantoo Trough was formed. This structure which is filled with greywacke type sediments of the Kanmantoo Group, cuts across the southerly trending Adelaide Geosyncline (see Plan 4).

Compensating upward movements occurred in the basement areas to the north and west from which the Kanmantoo sediments

were derived (Cassinian uplift) (see Plan 4).

Between the south-east of Fleurieu Peninsular and the Ashborne-Macclesfield area in the Waitpinga Hill-Yanialilla Hill section the two lower formations of the Kanmantoo Group (Strangway Hill and Inman Hill formations), reach a maximum apparent thickness of 37,000 feet. To the north the units are abruptly reduced in thickness as each of three fault hinge zones crossed (see Plan 4).

The movement of the enormous volume of sediments now forming the Kanmantoo Group across the Cambrian ocean floor was facilitated by the steep gradient of the margins of the trough during the Waitpingan

subsidence and rapid erosion of the rising source terrain (see Plans 4 & 5). The sediments were conveyed as a dense slurry assisted by submarine avalanches on the trough flanks, and by turbidity currents which flowed rapidly along the sea floor far to the south and east. Sediments were prograded on the flanks and along the front of the trough. Near the source area some winnowing and sorting of sandy sediments occurred. Finer silty fractions and some limestones were deposited between intervals of rapid influx and in areas more distant from the source. Lenticular pyritic deposits were formed in minor basinal areas on the sea floor where the organic content was sufficiently high to provide the appropriate reducing

conditions during compaction (see Plan 4).

This process of rapid sedimentation has resulted in complex intertonguing of units and rapid facies variations.(see Plan 4) The succession appears superficially as a featureless repetition of indistinguishable units but detailed mapping has enabled subdivision into three major formations:

1. Strangway Hill Formation, consisting of the meta-greywackes siltstones of Cape Jervis.

2. Inman Hill Formation, consisting of a coarse greywacke-arkose with large scale cross beds, sharply truncated foresets, and numerous "scour and fill" structures.

These structures indicate that the sediment was deposited in an environment with quickly moving currents. In the type area in the Inman Valley, this formation attains an apparent thickness of 15,000 feet. Further south, where it forms the high cliffs of the south-east coast of Newland Head and west of Yankalilla beach, it is even thicker.

3. Brukunga Formation, the uppermost unit of the Kanmantoo Group consisting of 24,000 feet of pyllite and pyllitic greywacke, pyritic beds and minor altered limestone or dolmonite members. The basal marker bed of this formation, the Nairne Pyrite Member is exposed in the south-east of the map area. The pyrite is syngenetic and has been largely recrystallized

and in part converted by metamorphism to pyrrhotite.

The uppermost unit in the Brukunga Formation is the Brownhill Greywacke Member, exposed in the north-eastern part of the exploration area. It is a massive layered greywacke unit about 12,000 feet thick.

Sedimentation in the Kanmantoo trough may have ceased following the deposition of the Brownhill Greywacke Member, in the late Middle to Early Upper Cambrian time. The end of the sedimentation can be attributed to the Delamerian orogeny (Daily 1963, Sprigg and Campana 1953). The granites to the east of the area e.g. Victor Harbour, were probably intruded during the closing phases (isotopic age determination, 1966

less than 473 my).

Evidence that the orogeny deep seated penetrative movements of the earth's crust is provided by the Cu, Pb, Ba, Zn and Au mineralization which tends to be concentrated in the cover rocks, particularly in the vicinity of older basement shears (Thompson 1965). This metallogenic event introduced numerous small metallic ore deposits at many stratigraphic levels in the geosynclinal pile of sediments. The structural changes imposed by the Del-Amerian orogeny of the rocks are preserved today in the complex old and fault patterns outlined by the prominent range and ridge topography (see Plan 3).

../12

035

In the Fleurieu Peninsular the sediments were subjected to a rise in temperature and underwent regional shearing and in the metamorphic areas the sediments were deformed by flow folding.

The Archaean basement was involved in the folding, and in the western limits of the Trough the folds are overturned and dip eastwards. In places e.g. Second Valley area, the limbs and hinge lines of the folds dip and plunge flatly to the south-east. The thrust surfaces on which the folds are developed appear to steepen with depth suggesting deep upthrusting from the east. Along the Meadow-Kitchener fault there is steep reverse faulting of metamorphosed cover rocks against less altered rocks, and east of this the

../13

structural pattern is dominantly a right-hand en-echelon system of southerly plunging synclines. These are generally outlined by metamorphosed Kanmantoo group rocks. These folds expose the floor of the Kanmantoo trough and continue seawards into the continental shelf area, to the south.

Detailed structural studies have shown that several phases of folding occurred during metamorphism but the complete unravelling of the deformational history has yet to be achieved.

3. Permian

The next episode to affect the Fleurieu area occurred during the Permian. The rocks are almost horizontally bedded

glacial, fluioglacial and glacio-lacustrine (varved) deposits which are found in all glacial depressions of the area e.g. Inman Valley. These beds consist mainly of unconsolidated sand and boulder clay with marine shells and mudstones near Second Valley. They rest uncomfortably and indiscriminately on the folded Pre-Cambrian and Cambrian rocks.

4. Quaternary

The Quaternary, exposed in the south-east, south-west and west of the lease area consist of outwash deposits; sands and clays, usually capped by kunkarised surfaces.

III ECONOMIC GEOLOGY

1. Introduction

Scattered patches of silver-lead minerals have been found associated with the Cambrian marbles in the Rapid Bay zone but detailed prospecting and exploration by other companies in this area, in the past, have failed to locate any new deposits of economic significance.

Copper has been won at intervals at Yattagolinga, east of the Rapid Bay quarry, from a crush zone in the limestone. The minerals are chalcopyrite, malachite and azurite, replacing the country rock along the bedding planes. However the mineralization has been proved by other companies to be too poor for present development

../16

and the deposit was abandoned after unsuccessful drilling.

The formations of the Cambrian Kanmantoo Group have proved to be the most interesting economically, this is due to the position of the Kanmantoo Group in the Mt.Lofty Range system. They belong to the eugeosyncline element of the geosynclinal area, which has been intruded by plutons of granite, (e.g.Victor Harbour granite) during or just after the early palaeozoic orogeny). In relation to this magmatic activity, regional metamorphism developed locally and mineral bearing solutions were injected into the country rock in various places.

The Callawonga Creek wolfram deposit

discovered in 1911, worked till 1918, and temporarily re-opened in 1952, is associated with quartz veins of pneumatolitic origin, which intruded the Kanmantoo beds over an area of 1 square mile at least. One of these quartz-feldspar-tourmaline veins carried ferberite, and to a lesser degree, gold and yttrium. A programme of mapping and diamond drilling has recently been completed in this area.

Another fairly important deposit associated with the Kanmantoo beds in the silver-lead lode of Talisker mine, 3 miles north of Jervis; the environs of this mine are exercised from the lease.

The stream sediment sampling programme which is at present being conducted over

the area will provide a complete geochemical coverage of the area at a reconnaissance level. The success of this method in locating significant base metal mineralization has been proved in the Cape Jervis area by C.R.A.Exploration Pty.Ltd. (unpublished report, 1969).

Prospecting and field geological investigations should be concentrated on the vicinity of the Callawonga Creek ferberite-bearing deposits and on potential base metal hosts within the Cambrian, particularly in the coastal area between Victor Harbour and Tunkalilla Beach. However initial mapping and sampling of quartz veins in the vicinity of Callawonga Creek has failed to locate further promising deposits. It is felt that the geochemical

stream sediment sampling programme will lead to the discovery of any significant base metal deposits that may occur within the lease.

2. Stream Sediment Sampling

(i) Introduction One hundred and twenty four samples were collected during the reconnaissance programme which covered the entire lease with the exception of the Cape Jervis area which was sampled in 1969 by C.R.A.Exploration Pty.Ltd. A further 9 samples were collected during subsequent more detailed sampling of areas defined by the reconnaissance sampling programme; all samples were dried, seived to minus 80 mesh, and analysed by AAS for Cu, Pb, and Zn.

(ii) Results The copper content of the majority of the samples is below 20 ppm; one sample, F128, contains 70 ppm Cu but this is not of sufficient interest to warrant further investigation. The lead content varies between the detection limit of 20 ppm and 50 ppm; no lead values require further investigation. The zinc content of the majority of the samples is below 50 ppm. One sample, F117, which was collected during the reconnaissance sampling programme contains 320 ppm Zn, but subsequent more detailed sampling upstream failed to confirm the presence of an anomaly.

IV CONCLUSIONS AND RECOMMENDATIONS

The stream sediment sampling programme

failed to locate any anomalies that might by related to a significant base metal deposit. No further work is recommended.

Yours faithfully,

CINNABAR MINING SERVICES PTY.LTD.

G.H.Lynch B.Sc(Hons)

M.C.Boydell B.A.(Mod)

Sample Description	Cu, ppm	Pb, ppm	Zn, ppm
F 1	<2	<20	15
2	<2	<20	20
3	20	20	90
4	5	<20	10
5	10	<20	40
6	10	<20	20
7	10	<20	40
8	15	<20	40
9	10	20	30
10	10	<20	10
1	10	<20	30
2	5	<20	10
3	15	35	65
4	10	<20	20
5	10	25	40
6	10	<20	10
7	20	40	70
8	10	<20	20
9	10	25	20
20	10	30	40
1	10	40	30
2	10	25	30
3	10	20	20
3 A	5	40	5
4	15	<20	40
5	2	<20	20
6	2	<20	15
7	5	<20	10
8	10	20	30
9	10	<20	30
30	5	20	20
1	10	20	30
2	<2	<20	20
3	<2	20	35
4	10	20	40
5	20	35	45
6	15	30	50
7	10	25	30
8	10	30	30
9	2	<20	20
40	10	20	40
1	5	<20	15
2	<2	<20	20
F 43	<2	<20	10

ANALYTICAL METHODS: Cu, Pb, Zn, by AAS following hot 25% HNO_3 leach for 1 hour on 0.25gm sample.

(2 copies to Cinnabar Mining Services)

B.H.C.

Sample Description	Cu, ppm	Pb, ppm	Zn, ppm	Mo, ppm
F 45	<2	<20	20	<2
46	<2	20	20	<2
47	<2	<20	10	<2
48	5	30	30	<2
49	<2	<20	10	<2
50	<2	<20	25	<2
51	<2	<20	20	<2
52	<2	<20	20	<2
53	<2	<20	20	<2
54	<2	<20	10	<2
55	2	<20	10	<2
56	5	<20	5	<2
57	10	20	30	<2
58	10	20	30	<2
59	10	20	40	<2
60	5	20	10	<2
F 61	10	20	20	<2

ANALYTICAL METHODS: Cu Pb Zn by AAS following conc. $HClO_4$ leach for 1 hour on 0.25gm sample. Mo by modified Dithiol following potassium pyrosulphate fusion on 0.2gm sample.

(2 copies to Mr. C. Ingram, Cinnabar Mining Services)

Signed: S Kay

★36161

McPHAR

GEOCHEMICAL RESULTS

Fleurieu Peninsula 047

50-52 MARY STREET
UNLEY, S.A. 5061
PHONE: 72 2133
CABLE: "PHARGEO"
ADELAIDE
TELEX: "PHARGEO"
AA82623

Samples from: CENTAURI MINING SERVICES PTY. LTD.

Area:

Samples of: SEDIMENT/ROCK

Sheet No.:

Batch No.: CH 1379

Date: 22/7/82

SAMPLES DISPOSED OF AFTER TWO MONTHS UNLESS WE ARE OTHERWISE ADVISED

	Sample Description	Cu, ppm	Pb, ppm	Zn, ppm				
1	62	35	30	55				
2	3	30	<20	40				
3	4	25	20	85				
4	5	15	<20	30				
5	6	5	<20	20				
6	7		<20	25				
7	8	15	25	30				
8	9		<20	10				
9	10		25	25				
10	1		<20	15				
11	2	15	<20	30				
12	3A	15	<20	20				
13	5	15	20	30				
14	6		<20	40				
15	7		20	30				
16	8		<20	40				
17	9		40	40				
18	20	20	35	30				
19				25				
20	30	10	<20	30				
21	1		<20	20				
22	2		<20	25				
23	3		<20	30				
24	4		<20	30				
25	5		<20	30				
26	6		<20	30				
27	7		<20	30				
28	8		<20	30				
29	9	25	<20	30				
30	40	15	30	30				
31	1	10	30	35				
32	2			35				
33	3			25				
34	4			30				
35	5		<20	30				
36	6		30	40				
37	7		20	30				
38	8		30	30				
39	9			30				
40	50			30				
41	1		<20	30				
42	2		<20	30				
43	3		<20	30				
44	4		<20	30				
45	5		<20	30				
46	6		<20	30				
47	7		<20	30				
48	8		<20	30				
49	9		<20	30				
50	60		<20	30				

ANALYTICAL METHODS:

Signed:

★37907

McPHAR

GEOCHEMICAL RESULTS

048

50-52 MARY STREE
UNLEY, S.A. 506
PHONE: 72 213
CABLE: "PHARGEO ADELAID
TELEX: "PHARGEO AA8262

Samples from: CINNABAR MINING SERVICES
Area:
Samples of: ROCK & SEDIMENT
Batch No.: CH 2929

Sheet No.: 1
Date: 1/10/71

SAMPLES DISPOSED OF AFTER TWO MONTHS UNLESS WE ARE OTHERWISE ADVISED

Sample	Description	Cu, ppm	Pb, ppm	Zn, ppm
F	125	5	45	20
F	126	5	25	25
F	126A	15	65	20
F	127	40	45	30
F	128	70	50	50
F	129	10	35	40
F	130	10	30	35
F	130A	40	160	50
F	130B	20	120	45
F	131	10	45	35
F	132	5	25	55
F	133	10	50	30

ANALYTICAL METHODS: Cu Pb Zn by AAS following conc. $HClO_4$ leach for 1 hour 0.25 g sample.
PREPARATION: F 126A,130A,130B pulverized
DISTRIBUTION: 2 copies to Cinnabar Mining Services.

Signed:

★37907

McPHAR

GEOCHEMICAL RESULTS

50-52 MARY STREET
UNLEY, S.A. 5061
PHONE: 72 2133
CABLE: "PHARGEO"
ADELAIDE
TELEX: "PHARGEO"
AA82623

[illegible] 049

Samples from: CIN[illegible]ABAR MINING SERVICES PTY. LTD.

Area:

Samples of: [illegible]/ROCK

Batch No.: CH 2379

Sheet No.: [illegible]

Date: 22[illegible]

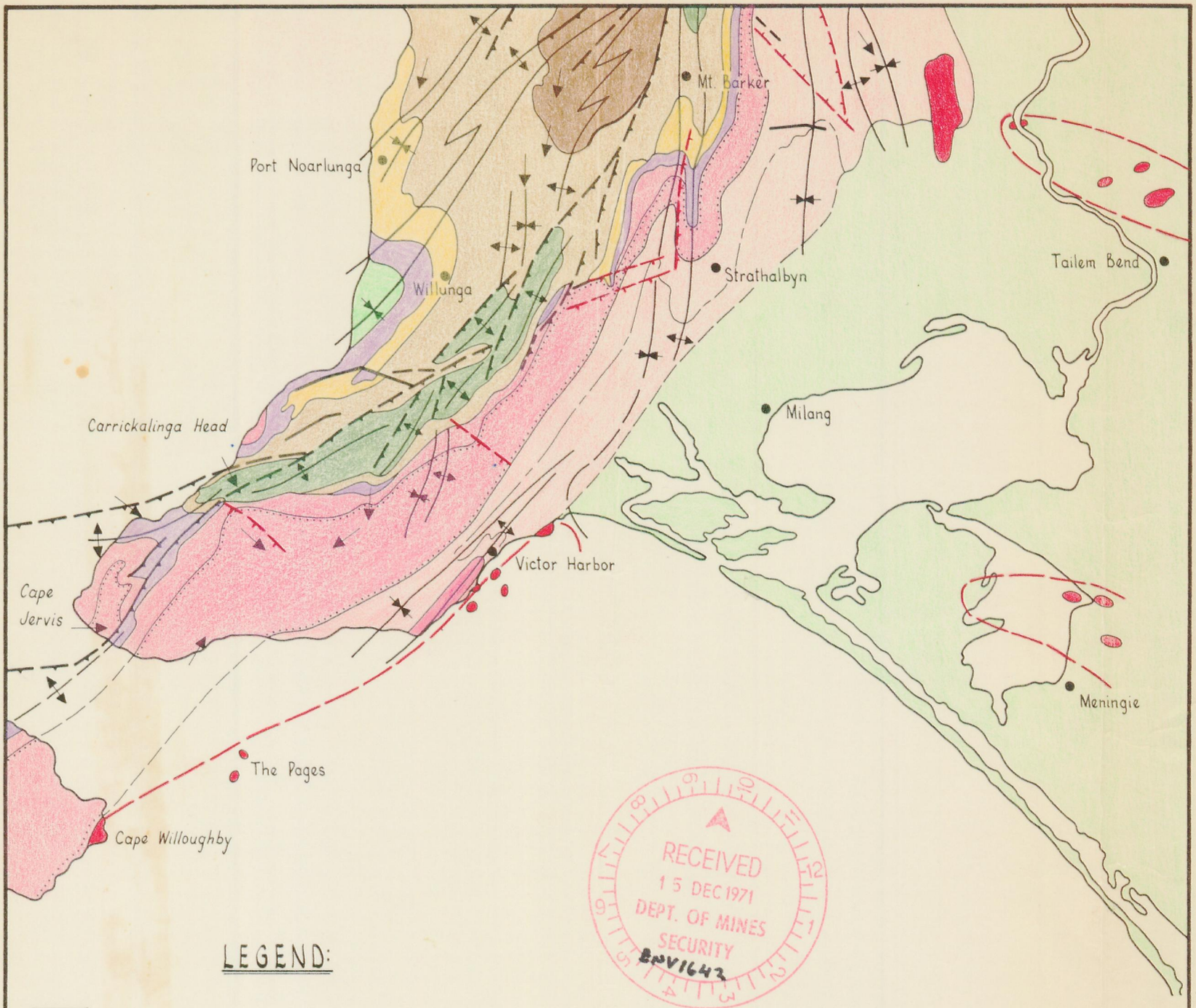
SAMPLES DISPOSED OF AFTER TWO MONTHS UNLESS WE ARE OTHERWISE ADVISED

	Sample Description	Cu, ppm	Pb, ppm	Zn, ppm				
	F 112	5	<20	[illegible]				
	[illegible]	5	<20	[illegible]				
	3	5	<20	[illegible]				
	[illegible]	5	<20	[illegible]				
	5	[illegible]	[illegible]	[illegible]				
	[illegible]	[illegible]	<20	[illegible]				
	7	[illegible]	25	[illegible] X				
	[illegible]	3	[illegible]	[illegible]				
	9	[illegible]	25	[illegible]				
	20	[illegible]	<20	[illegible]				
	1	[illegible]	20	[illegible]5				
	2	[illegible]	<20	[illegible]				
	3	[illegible]	<20	[illegible]				
	F 124	[illegible]	<20	[illegible]				

ANALYTICAL METHODS:

Signed: ....

★37907



LEGEND:

- Quaternary
- Proterozoic
- Archaean
- Cambrian
- Palaeozoic granite
- Inferred granite boundary
- Hinge line
- Lineation plunge direction
- Thrust fault
- Undifferentiated high angle fault
- Anticline
- Syncline

PLAN 3

LOWER PALAEOZOIC TECTONIC SKETCH

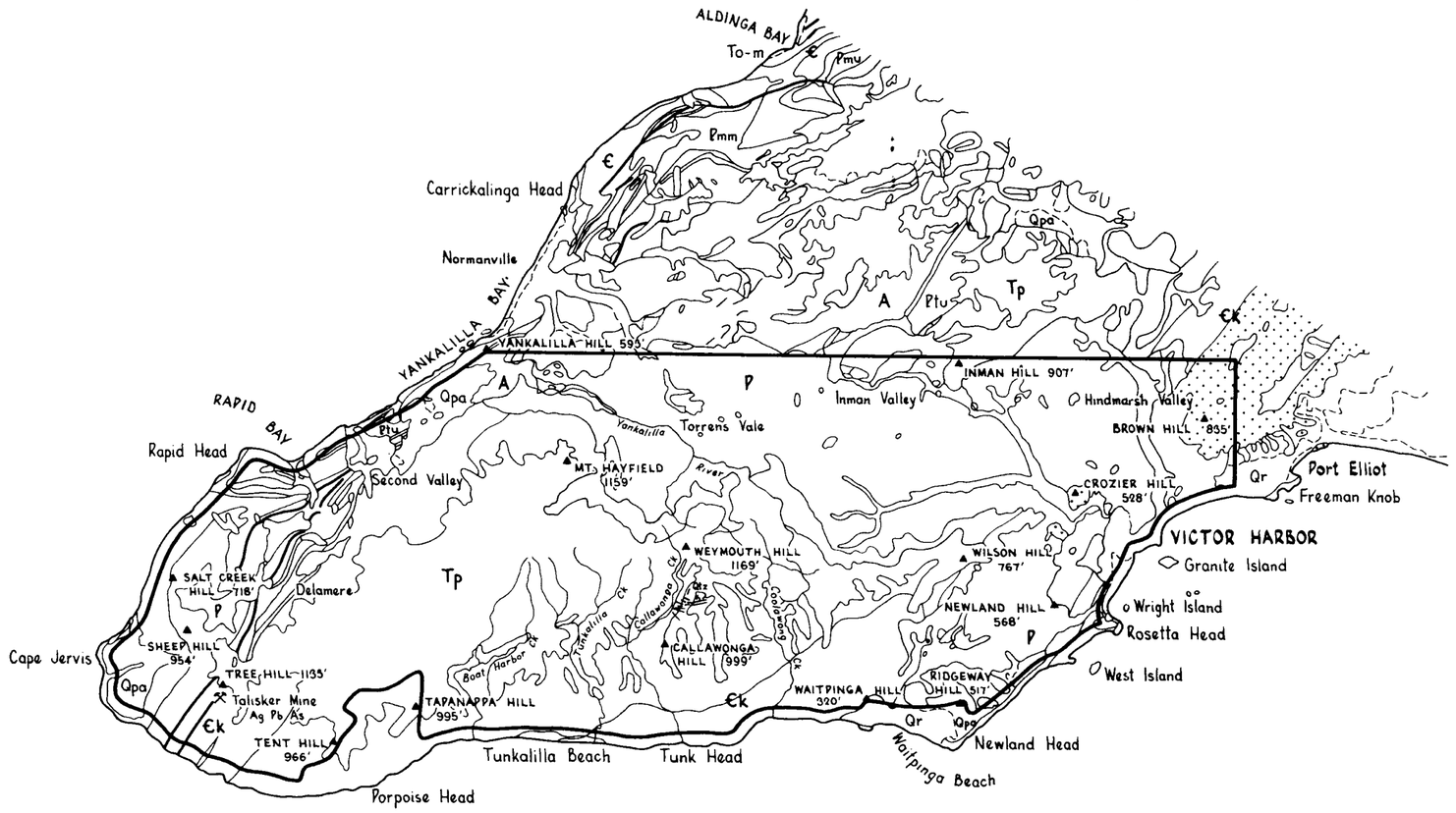
SCALE: ½" = 4 miles

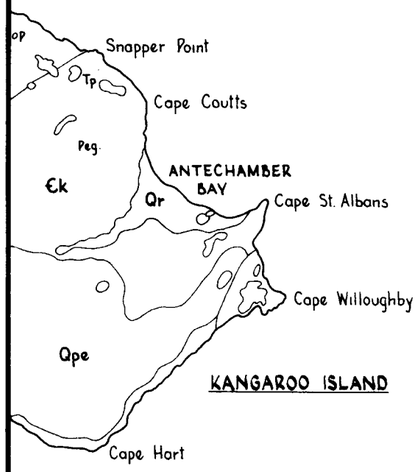
AUGUST 1971

CINNABAR MINING SERVICES PTY. LTD.

Appendix 2

ENV 1642-1





GEOLOGICAL MAP OF

S.M.L. 542, FLEURIEU PENINSULAR

(after GSSA)

SCALE: 1:250,000

AUGUST 1971

CINNABAR MINING SERVICES PTY. LTD.

LEGEND:

CAINOZOIC

QUATERNARY — RECENT
- Qr — Alluvial flat deposits.
- Qr — Scree, alluvial slope deposits.
- Qr — Aeolian sands.

QUATERNARY — ? PLEISTOCENE
- Qpe — Kunkarised dunes and sand spreads, and kunkar (in sheets) related to calcareous bedrock
- Qpa — Outwash deposits; sands and clays

TERTIARY — MIO-PLIOCENE
- Tp — Laterised deposits and ferruginised sands and gravels, of uplifted plateau areas Mottled sands, clays of western coastal regions, underlain by HALLETT COVE SANDSTONE marine sands, sandy limestones. NORWEST BEND FORMATION marine sandy limestone of Murray River area.
- To-m — PORT WILLUNGA BEDS: marine sandy limestones and clays.

UPPER PALAEOZOIC

PERMIAN
- P — Glacial and fluvioglacial deposits cross-bedded silts and sands with boulders, green clays. Marine shales and mudstones near Second Valley.

CAMBRIAN SUCCESSION EAST AND SOUTH OF ARCHAEAN ANTICLINAL CORES

LOWER PALAEOZOIC

CAMBRIAN — KANMANTOO GROUP
- Ek — BRUKUNGA FORMATION interbedded phyllites and greywacke with lenticular pyritic and calc-silicate lenses.
- Ek — BROWN HILL GREYWACKE MEMBER Pyritic phyllite and low grade schist, in part carbonaceous, including
- Ek — NAIRNE PYRITE MEMBER
- Ek — INMAN HILL FORMATION: coarse-grained impure arkose.
- Ek — Greywacke with siltstones and phyllitic shales, quartzites
- Ek — Marble lens.
- E — Phyllitic shales and siltstones, locally pyritic, phosphatic or carbonaceous
- E — Quartzites

CAMBRIAN SUCCESSION WEST OF ARCHAEAN ANTICLINAL CORES

LOWER PALAEOZOIC

LOWER CAMBRIAN — KANMANTOO GROUP
- Ek — Chloritic greywacke. HEATHERDALE SHALES: carbonaceous shales with phosphate nodule bands
- E — FORK TREE LIMESTONE. Banded limestone, calcareous shales and siltstones with sandstones and oolitic dolomite, (SELLICKS HILL LIMESTONE AND WANGKONDA FORMATION).

UPPER PROTEROZOIC

ADELAIDE SYSTEM — MARINOAN — UPPER GLACIAL
- Pmu — Quartzites and siltstones
- Pmu — Siltstones and shales with greywacke and coarse siltstones
- Pml — Pmm — Felspathic quartzites, tillitic grit and grey pebbly mudstones with massive greywacke lenses.

STURTIAN — INTER GLACIAL
- Psu — TAPLEY HILL SLATES blue-grey laminated, alternating siltstones and slates locally phyllitic Blue ferruginous slates at the base

STURTIAN — LOWER GLACIAL
- Psl — STURT TILLITE: boulder tillite
- Psl — Quartzites and arkoses
- Ptu — Laminated, blue-grey alternating siltstones and slates, arkose bands
- Ptu — Tillite north of Second Valley
- Ptu — Calcareous occurrences
- Ptu — STONYFELL QUARTZITE.

ARCHAEAN
- A — Felspathic schists and gneisses and quartz felspar augen gneisses with zones of sericite schists. Local leucocratic granitic units. Epidote gneiss and epidote metaquartzite

IGNEOUS ROCKS OF LOWER PALAEOZOIC AGE

- VICTOR HARBOR GRANITE, CAPE WILLOUGHBY GRANITE: porphyritic, coarse-grained adamellite with large zoned felspar phenocrysts.

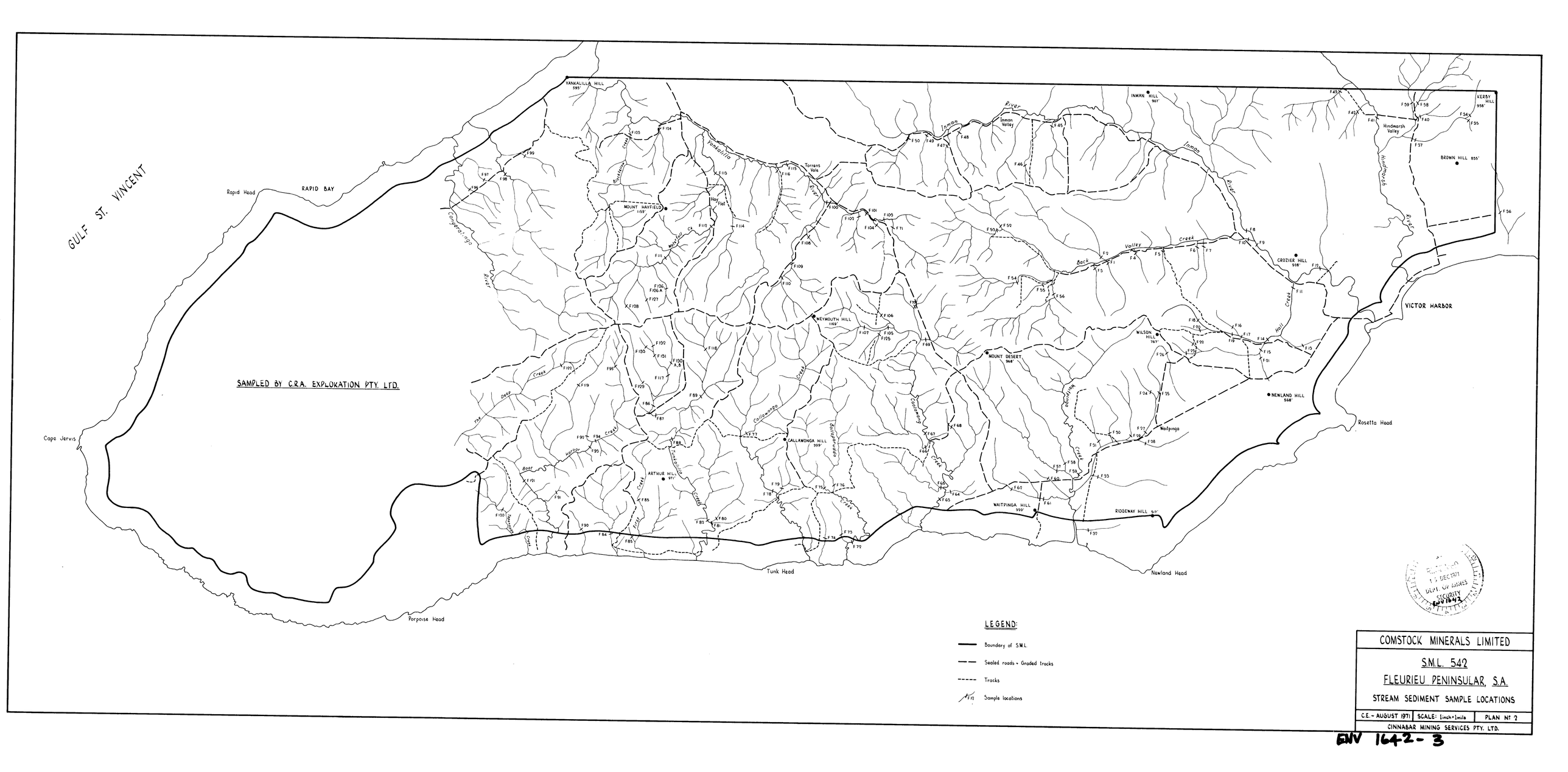
VEIN AND DYKE ROCKS OF VARIOUS AGES

- Diorite dykes and plugs
- Qtz — Quartz
- Peg. — Pegmatite

ZONES OF MORE PRONOUNCED METAMORPHISM

Plan 1

ENV 1642-2



LEGEND:

- Boundary of S.M.L.
- Sealed roads + Graded tracks
- Tracks
- F71 Sample locations

COMSTOCK MINERALS LIMITED

S.M.L. 542

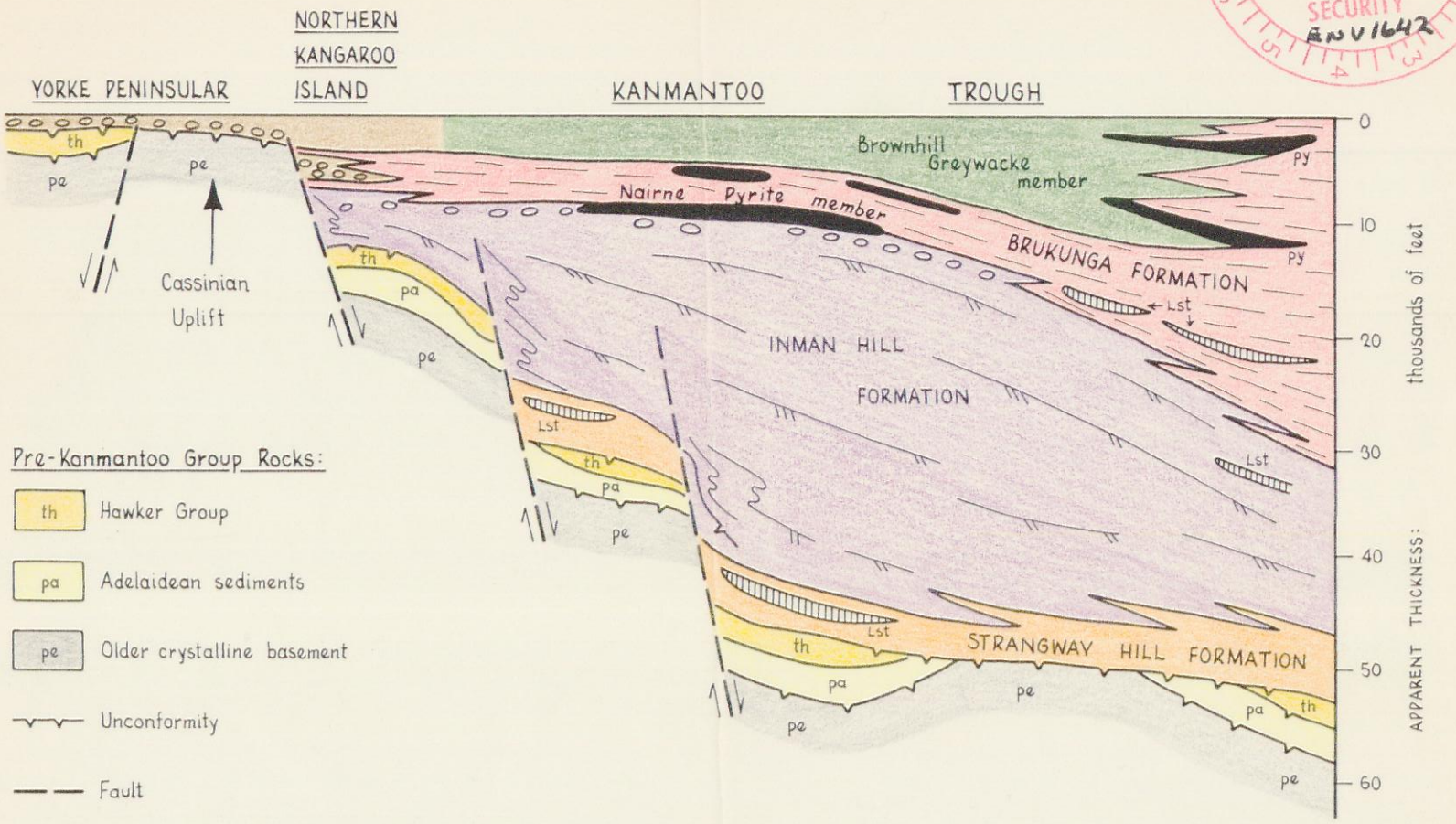
FLEURIEU PENINSULAR, S.A.

STREAM SEDIMENT SAMPLE LOCATIONS

C.E. - AUGUST 1971	SCALE: 1inch=1mile	PLAN No 2

CINNABAR MINING SERVICES PTY. LTD.

ENV 1642-3

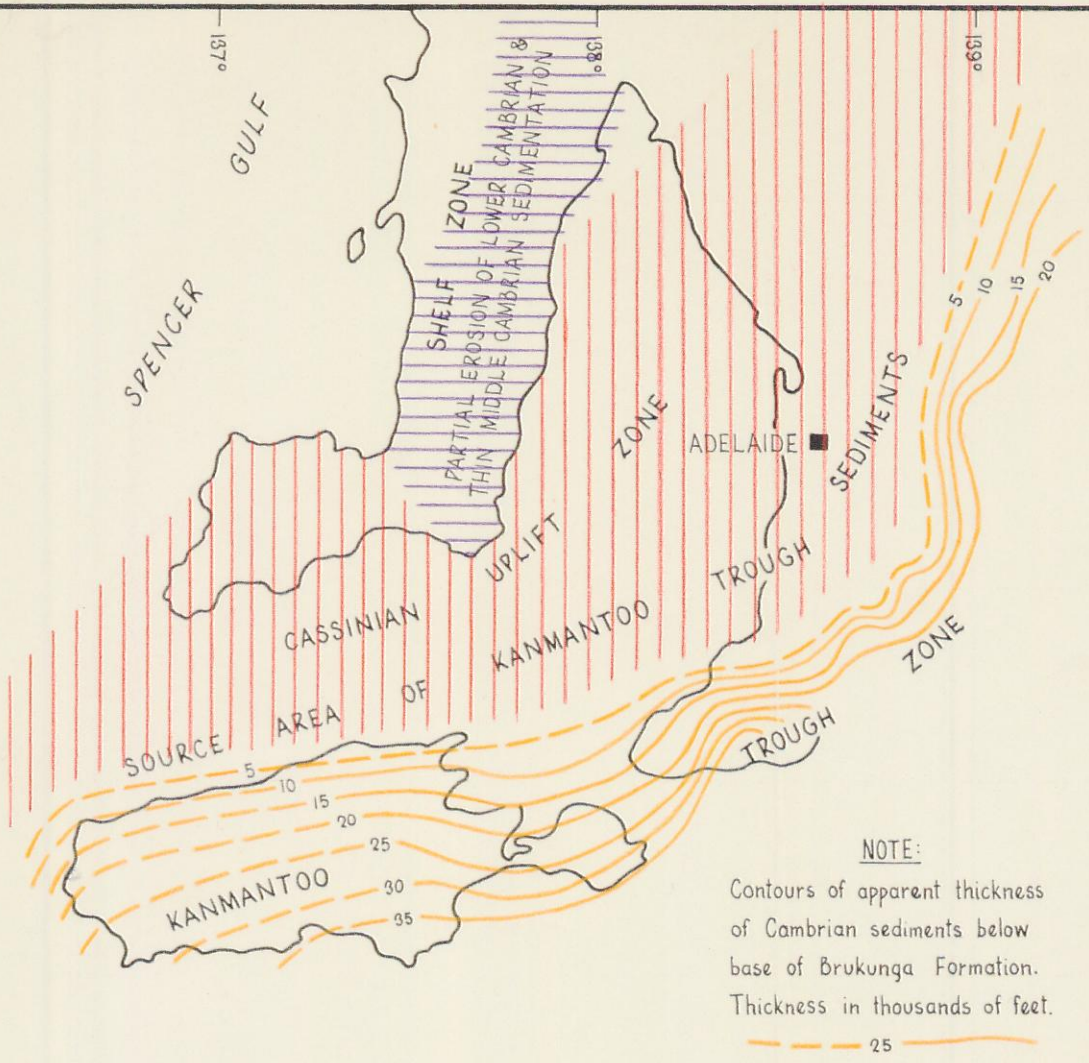


PLAN 4

KANMANTOO GROUP SEDIMENTATION IN LOWER - MIDDLE CAMBRIAN SHOWING CONTEMPORANEOUS FAULTING & SLUMPING DURING THE WAITPINGAN SUBSIDENCE. (after B.P. Thompson, 1968)

JULY 1971

CINNABAR MINING SERVICES PTY. LTD.



Plan 5

LOWER CAMBRIAN SEDIMENTATION AND TECTONISM IN THE KANMANTOO TROUGH AND ADJOINING AREAS. (after B.P. Thompson, 1969)

SCALE: 1inch = 30 miles

JULY 1971

CINNABAR MINING SERVICES PTY. LTD.