

**GEOLOGY OF THE FINGAL CONCESSIONS
SPL 333 & 334**

OCTOBER 1958

Electrolytic Zinc Company of Australasia LTD

02-4684

AMG REFERENCE POINTS ADDED

409 1

CONTENTS

Memorandum – Report on the Geology of the Fingal Concessions

Memorandum – Introductory Report on the Fingal Concessions

Report on Geology of Fingal Concession

- Introduction
- Stratigraphy
 - a) Mathinna Group
 - b) Upper Palaeozoic Sediments
 - c) Tertiary and Quaternary
- Igneous Rocks
 - a) Granitic Rocks
 - b) St Marys Porphyrite
 - c) Dolerite
 - d) Basalt
- Structure
- Economic Geology
- References

Enclosures:

1. Location Map – Concession Boundaries
2. Stratigraphic Column
3. General Geology
4. Mineralisation

MEMORANDUM TO -

SUPERINTENDENT:

EXPLORATION - L.E.E. - Fingal
(605-L)

Report on the Geology of the
Fingal Concessions

Submitted herewith is a report by I.M. Paltridge on the above which is a precis of all the information we have been able to collect on the geology of the area.

Most of the information has been obtained from the reports of the Officers of the Tasmanian Mines Department.

A copy has been made for the Managing Director.


V.M. COTTLE

CHIEF GEOLOGIST

ROSEBERY, 3rd July 1959.

M.D. 2.
Geol. 2.
File 2.

ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED

West Coast Department

Rosebery.

9th October, 1958.

Memorandum:

Chief Geologist.

Attached is the first introductory report on the Fingal concessions of N.W. Tasmania. This report is primarily based on a compilation of existing work in the area.



Asst. Chief Geologist

BS/BMS
Encl.

Distribution:

Managing Director
Superintendent
File (2)

GEOLOGY OF FINGAL CONCESSIONS

INTRODUCTION

This report is based on the published and unpublished work of earlier writers, mainly geologists of the Tasmanian Department of Mines, on information freely given by the present staffs of the Department of Mines and the University of Tasmania and on observations made during a reconnaissance of the area. The last are detailed in report No. 75 file 605.

STRATIGRAPHY

A generalised stratigraphic column was given in the earlier report but is repeated here for convenience (Plate 1).

A geological map of the region is presented on Plate 2 although this will doubtless require modifications in the light of a paper by Blissett (in press).

(a) Mathinna Group

According to Hills and Carey (1949) this is a thick succession of slates and quartzites with tuff bands. Mr. M. Banks (pers. comm., March, 1958) observed that, while there are many reports of lavas and tuffs in the Mathinna Group, no specimens of such rocks had been collected. At the same time, Mr. Banks also noted that two sedimentary associations existed within the groups - siltstone and siltstone/greywacke respectively.

The structure of this group is one of complex, tight folding. Finucane (1935) noted that the group was affected by tight folds of relatively small amplitude which tended to be overturned to the east.

Twelvetrees (1907) describes a syncline/anticline structure immediately east of Mangana which is possibly a continuation of the structure described by Hughes (1947) in the Dan Rivulet Field, and in 1911 Twelvetrees noted that, in the Scamander area, westerly dips were generally less steep than easterly ones. This agrees with Walker's (1957) observation that the Mathinna Group had been folded by an easterly directed thrust movement. Similar observations were made in the reconnaissance report.

The age of this group, while generally agreed to be lower Palaeozoic, has been given by various workers as Cambro-Ordovician (Reid & Henderson, 1929), Ordovician (Twelvetrees, 1911) and Silurian (Twelvetrees, 1904 and Hughes, 1947). The most recent age determination is that of Walker (1957) who gave the age of the Scamander Slates and Quartzites, part of the

(a) Mathinna Group (contd.)

Mathinna Group, as probably between middle Silurian and middle Devonian. This writer noted that, although bryozoan, coral and brachiopod remains were present in the formation, they were of little significance in age determination. Mr. M. Banks (loc. cit.) suggested that the Mathinna Group in the east, and the Eldon Group in the west part of Tasmania are coeval.

(b) Upper Palaeozoic Sediments

In this group are included the Permian and Triassic sandstones, conglomerates, etc. in which are found the coal measures of Fingal. The lithologies present are quite variable and include limestones, according to Walker (1957). Banks and Hale (1957) noted that there are various freshwater beds interdigitated with marines beds in the Permian near Hobart indicating that sealevel was, at that time, undergoing considerable fluctuation.

The Permian rests unconformably on the Mathinna Group and the granite (see below), its basal members often containing pebbles of Mathinna Group. The beds are flat lying, but have been affected by faulting which Walker (1957) believed to be of lower Tertiary age. Twelvetrees (1911) noted that the base of the Permian was at a height of about 1,000 feet between Scamander and Mathinna.

(c) Tertiary and Quaternary

These sediments are river gravels and sands in the inland part of the concession, and marine and alluvial gravels and sands nears the coast. The aggrading rivers have formed extensive alluvial deposits which are at least 100 feet thick near Avoca (Nye 1926) and 200 feet thick near Goshen (Nye 1933, in Walker 1957). Near St. Helens and Royal George these river gravels have been worked for cassiterite with some small success, especially near St. Helens. Alluvial gold has been recovered in the valley of the South Esk River and its tributaries.

The coastal Tertiary deposits are believed by Walker (1957) to be a flood plain deposit, although the earlier workers referred to them as marine gravels. They are not apparently affected by faulting and are therefore not older than lower Tertiary, presumably Oligocene.

IGNEOUS ROCKS

At least four types of igneous rock are exposed in the concessions:

- A. Granitic and associated dyke rocks.
- B. Porphyrite.
- C. Dolerite.
- D. Basalt.

A. Granitic Rocks

Exposures and hand specimens of these rocks have been described in many papers. The early workers, such as Twelvetrees (1911), referred to the Coastal Range Quartz Monzonite of Walker (1957) as granite or granitite (a muscovite free granite). However, the distinctive nature of the quartz monzonite, which, at or near the surface, is highly altered to clay decomposition products of feldspar and ferromagnesian minerals with unaltered quartz granules, enables the reader to recognise it in the earlier descriptions of "granite". Twelvetrees (1911) noted that the rocks have dioritic affinities, although they are definitely granite.

Within S.P.L. 334 granite is exposed as two north-south trending lobes between which is situated the Scamander Mineral Field. To the north these lobes coalesce and form the major granite area at Derby and Gladstone.

In the western part of the concession, granite has been described by Reid and Henderson (1929) from Ben Lomond to Royal George. Here, the granite is prophyritic with phenocrysts of sodic orthoclase, in a granular mixture of quartz and feldspar with biotite, presumably accessory. The granite is itself intruded by dykes of related, late stage differentiates, aplite, pegmatite, etc. Waller (1901) recorded the presence of pegmatite veins of quartz, feldspar, mica, tourmaline and beryl. The occurrence of greisen at the granite/Mathinna Group contact has been noted by most workers as a feature of some economic importance. East of Aberfoyle Creek the granite gives places to granodiorite, ferromagnesian and plagioclase become more prominent in the mineral assemblage and quartz less so.

It is generally agreed by most writers that the granitic rocks are of Devonian age. However, Thomas (1943) stated in the Blue Tier area, that there were two separate granitic intrusions both Devonian, but that only the latter was stanniferous.

B. St. Marys Porphyrite

Walker (1957) described the rock as being blue grey in colour, with porphyritic texture at the contact with Mathinna Group but becoming more even grained at the centre, and consisting of quartz, feldspar, pyroxene, biotite and sparse hornblende. It would appear that the pyroxene is mainly hypersthene since Walker terms the rock a quartz-hypersthene porphyrite. The age is put forward as middle Devonian after the emplacement of the granite.

C. Dolerite.

This rock is termed in earlier reports "diabase" and is found capping hills, e.g. Ben Lomond, throughout the area. Walker (1957) described the dolerite as having ophitic and intersertal texture and consisting of plagioclase, composition An 45-60, enstatite and pigeonite. Turner and Verhoogen (1951) noted that the groundmass is of ~~potassic~~ rather than of potassic composition. sodic

According to Edwards (1942), the dolerite intrusion took place during the Jurassic and it forms sills and dykes extending through some 8,000 feet of Permian and Triassic sediments (Turner and Verhoogen, 1951).

D. Basalt.

Near Avoca, basalt covers quite extensive areas and appears to have partly controlled the courses of the South Esk and St. Pauls Rivers. Reid and Henderson (1929) described it as essentially free of olivine and forming sheets 40 to 100 feet thick resting upon Tertiary gravels.

Olivine basalt is exposed near St. Marys (Twelvetrees, 1911) and north of Mathinna.

STRUCTURE

Folding, which is confined to the Mathinna Group, has already been described adequately.

Faulting is prominent in various parts of the area. Reid and Henderson (1929) noted that the Avoca area was bounded on the west by a north west trending fault, the Avoca Fault, downthrown to west 1,500 to 2,000 feet. Other minor faults in the area are parallel to this. In general there appears to be faulting along three directions.

STRUCTURE (contd.)

A northwest trend seems to be most prominent, but north and northeast trends have been mapped. Within the Mathinna Group, strike faulting associated with small scale folds seems to be quite common.

Several major faults and fault zones, which are apparently related to zones of mineralisation described in the Annual Report have been recognised in the area. The Castle Carey Fault, which has a throw of up to 2,000 feet (Mr. H. Blissett, pers. comm.) is parallel to, and north of the Avoca Fault and is associated with tin/tungsten mineralisation of the Castle Carey Mineralisation Belt. Several smaller faults of northerly trend meet this major fault on its northern side. At Aberfoyle, the three Aberfoyle Faults also trend north-south and are associated with tin mineralisation. Connolly (1953) stated that there was "no great displacement" on the faults. At Mathinna, the faults, again trend north/south according to Twelvetrees (1906).

Near Scamander, Walker (1957) has mapped faults trending north east, north and north west, but mineralisation seems to be associated only with the last.

ECONOMIC GEOLOGY

The area has a long mining history extending back to the earliest days of settlement, but at the present time there are only two metalliferous mines in operation, at Storeys Creek and Rossarden, mining tungsten and tin respectively. The metals which have been mined with greatest success are tungsten, tin and gold.

Gold mineralisation was found in a belt running south from Mt. Victoria to Abbotsford Creek and in a small area at Brilliant Creek, east of Scamander. However, the only significant production came from mines near Mathinna, especially the New Golden Gate. Judging from a cross section of the mine published by Twelvetrees (1906) the gold occurred in saddle reefs associated with the close folding characteristic of the Mathinna Group.

Tin and/or tungsten mineralisation has been found in three areas delineated in the Annual Report; the Castle Carey Belt and Aberfoyle Zone (which Hills and Carey (1949) grouped in the Ben Lomond Province) and the Scamander Mineral Field.

ECONOMIC GEOLOGY (contd.)

In the Castle Carey Belt, Mr. H. Blissett (pers. Comm.) observed minor mineralisation along tension joints associated with the Castle Carey Fault. The mines here were of small size and ore values were very irregular. In the Aberfoyle Zone lie the only producing mines in the concession. This zone probably extends beneath St. Pauls Dome to Royal George where some tin mining was carried out with reasonable success. The ore being won at present comes from veins related to the Aberfoyle Faults, but formerly the major part was taken from greisenised bodies at the granite/Mathinna Group contact, e.g. Roys Hill.

In both these zones a certain very small amount of uranium has been found. This has stimulated prospecting, although investigations by Geologists of the Department of Mines indicate that these occurrences are merely of academic interest. Primary mineralisation, in this case pitchblende, is known only on the Tasmanian United Uranium Lease (Hughes 1957b) but a secondary uranium mineral, torbernite, has been identified at Royal George and Gipps Creek (Hughes 1955 and 1957 a).

In the Scamander Mineral Field, tin/tungsten mineralisation is associated with zoned mineral deposits described by Twelvetrees (1911). This worker has given a full description of ore occurrences in this field and seems to have been the first to recognise the following mineral zones.

- a). Tungsten and tin/tungsten.
- b). Copper/Lead/Zinc.
- c). Silver/Lead.

Of these zones only the copper one has yielded any production, from an oxidised vein in the Orieco Mine. Mineralisation has taken place along veins trending either north west, as at Orieco, or north east as at Gt. Pyramid Mines (Tin).

IMP/BMS

I. Michael Paltridge

I.M. Paltridge
Geologist

September, 1958.

409 10

REFERENCES

- Banks, M.R. & Hale, G.E. 1957 A type section of the Permian System in the Hobart area, Tasmania.
Pap. Proc. Roy. Soc. Tas. 91, 41-64
- Connolly, H.J.C. 1953 Aberfoyle tin wolfram mine.
Fifth Emp. Min. Met. Cong. Vol.1, 1200-1208
- Edwards, A.B. 1942 Differentiation in the dolerites of Tasmania.
Journ. Geol. 50: 451-480 and 579-610
- Finucane, K.J. 1935 Mathinna & Tower Hill Goldfields.
Tas. Dept. Mines. Geol. Surv. Bult. 43
- Hills, C.L. & Carey, S.W. 1949 Geology and mineral industry.
A.N.Z.A.A.S. Handbook for Tasmania, pp. 21-44
- Hughes, T.D. 1947 The Dan Rivulet Goldfield.
Tas. Dept. Mines, unpub. 9/9/35
- " " 1955 Uranium at Royal George Mine.
Rpt. Tas. Dir. Mines. Appendix pp.16-19
- " " 1957a Radioactive material in vicinity of Gt. Republic Mine, Gyps Creek.
Tas. Dept. Mines Tech. Rpt. 1; 11-12
- " " 1957b Chwalczyk's uranium prospect - Storeys Creek (second report)
Tas. Dept. Mines Tech. Rpt. 1; 14-16

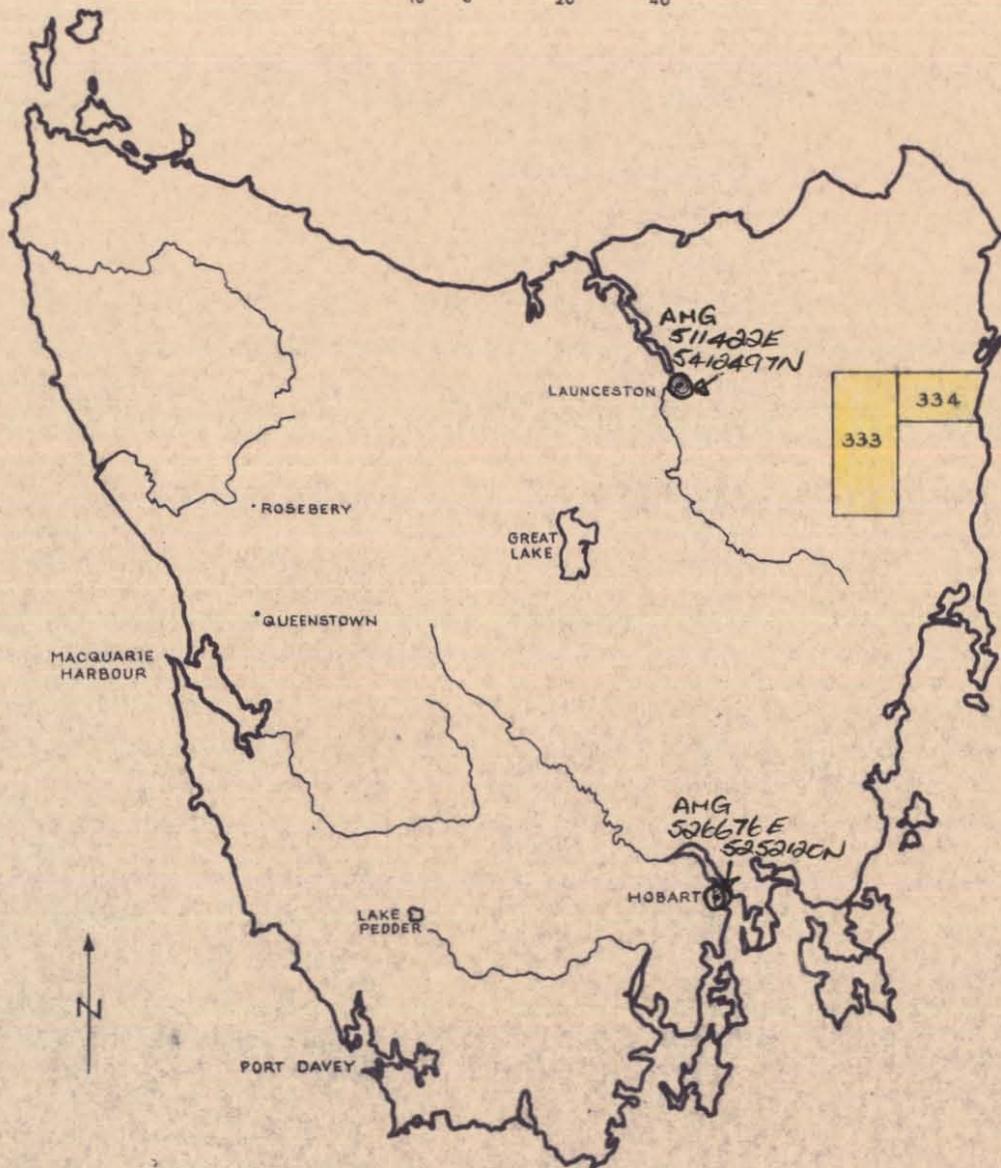
REFERENCES (contd.)

- Nye, P.B. 1926 The Campbell Town - Conara - St. Marys District.
Tas. Dept. Mines U.G.W.S. Paper 4.
- Reid, A. McI. & Henderson Q.J. 1929 Avoca Mineral District.
Tas. Dept. Mines Geol. Surv. Bult. 40
- Thomas, D.E. 1943 Tin deposits of the Blue Tier District.
Tas. Dep. Mines, unpub. rpt. 21.5.43
- Turner, F.J. & Verhoogen, J. 1951 Igneous and Metamorphic Petrology
McGraw Hill, New York, pp. 602.
- Twelvetrees, W.H. 1904 Report on the South Mt. Victoria Mining Field.
Tas. Dept. Mines Report 9.5.04
- " " 1906 Report on Mathinna Goldfield.
Tas. Dept. Mines Report 29.3.06
- " " 1907 The Mangana Goldfield.
Tas. Dept. Mines Geol. Surv. Bult.
- " " 1911 The Scamander Mineral District.
Tas. Dept. Mines Geol. Surv. Bult, No. 9
- Walker, K.R. 1957 The geology of the St. Helens Scamander area, Tasmania.
Pap. Proc. Roy. Soc. Tas. 91; 25-29
- Waller, G.A. 1901 Report on the tin-mining district of Ben Lomond.
Tas. Dept. Mines Rpt. 30.6.01

5 cm

TASMANIA

Scale in miles



CONCESSION BOUNDARIES

Licence N ^o	333	E. A. Henderson
	334	V. M. Cottle

AMG REFERENCE POINTS ADDED

ENCLOSURE 1.

STRATIGRAPHIC COLUMN

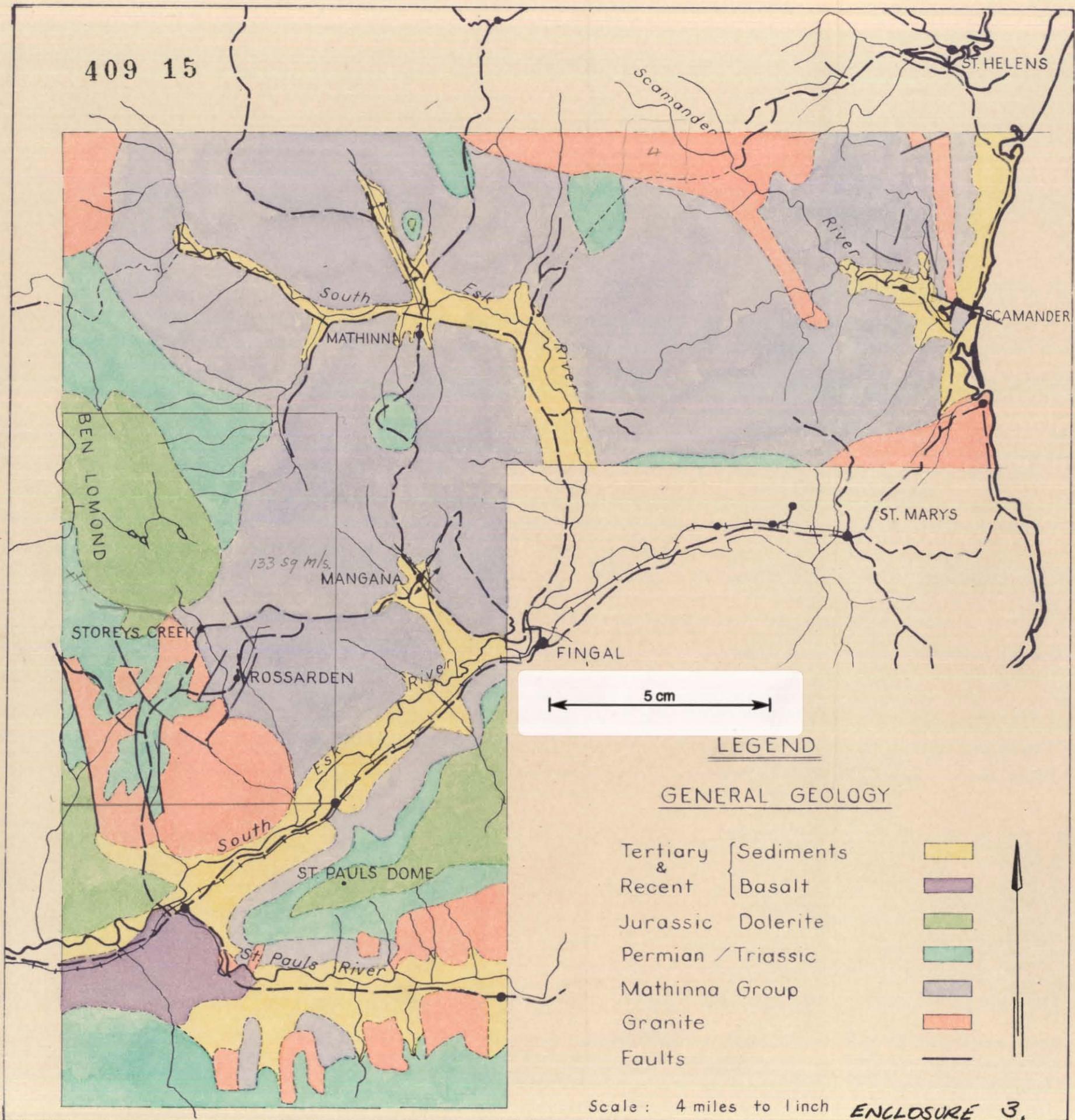
409 14

FINGAL CONCESSION

SYSTEM	ROCK UNIT	GENERAL DESCRIPTION
<u>SEDIMENTARY ROCKS</u>		
Quaternary		Dune sands and alluvial sands, gravels etc.
Tertiary	Diana Basin sands & gravels	Sands and gravels of marine origin. River sands and gravels, stanniferous and auriferous at different localities.
UNCONFORMITY		
Triassic Permian		Assorted sandstone, conglomerate and mudstone with coals
UNCONFORMITY		
Silurian	Mathinna Group	Geosynclinal sediments; quartzites, shales and siltstones. These sediments have been mineralised.
<u>IGNEOUS ROCKS</u>		
Tertiary		Basalt, sometimes olivine type.
Jurassic		Dolerite sills, generally olivine free, intruded into Permo-Triassic.
Devonian		St. Mary's Porphyry Granitic rocks - source of mineralizing fluids.

ENCLOSURE 2.

409 15



5 cm

LEGEND

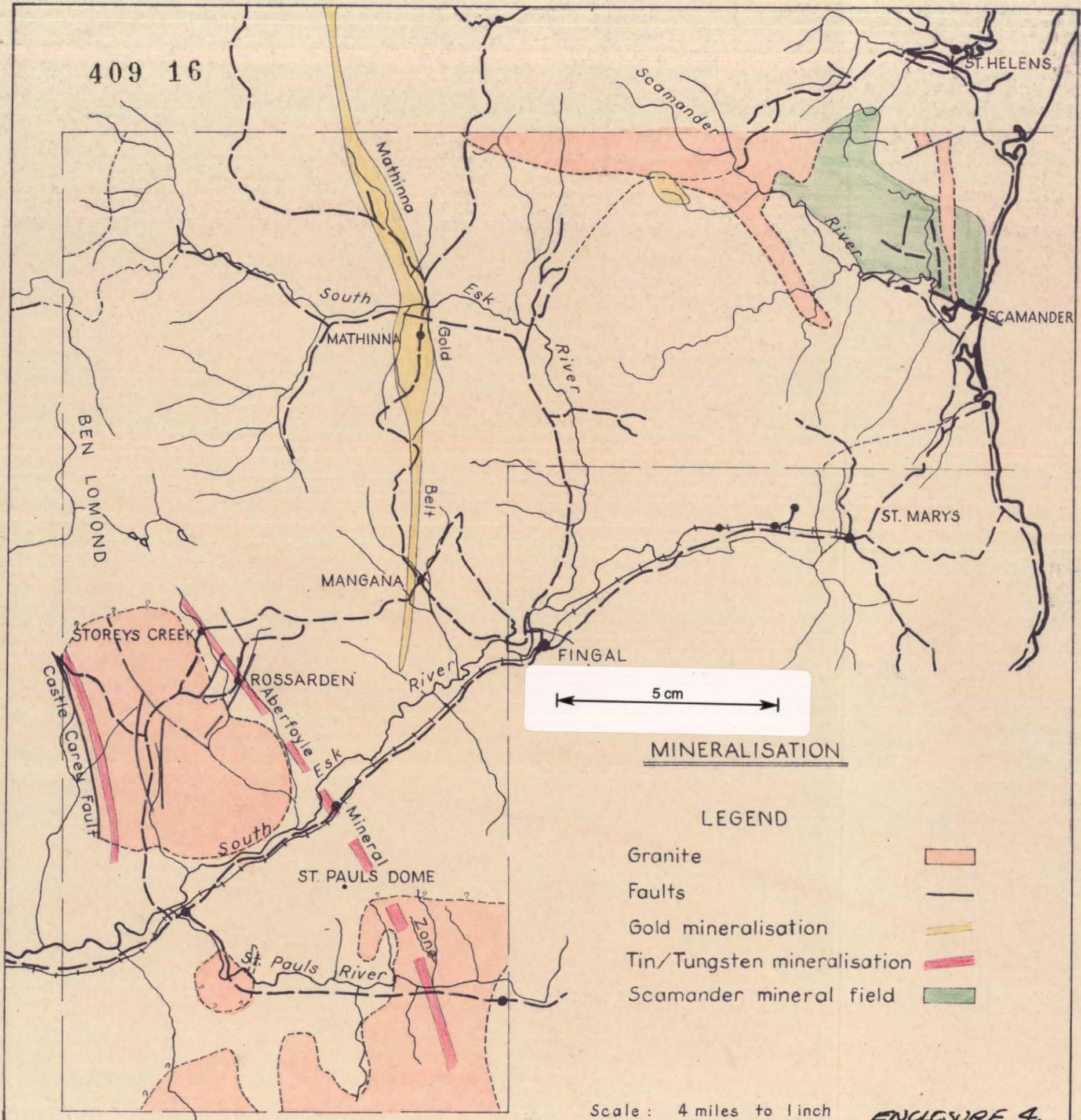
GENERAL GEOLOGY

- Tertiary & Recent { Sediments
- { Basalt
- Jurassic Dolerite
- Permian / Triassic
- Mathinna Group
- Granite
- Faults

Scale: 4 miles to inch

ENCLOSURE 3.

409 16



5 cm

MINERALISATION

LEGEND

- Granite
- Faults
- Gold mineralisation
- Tin/Tungsten mineralisation
- Scamander mineral field

Scale: 4 miles to 1 inch

ENCLOSURE 4.