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REPORT ON EXPLORATION LICENCES4/69 and 5/69 King Island, Tasmania

for

GEOPEKO LIMITEDSTAGE 1. GEOLOGICAL MAPPING

by

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ANTHONY, MCKENNA & PARTNERS PTY. LTD.

September, 1969.

Accompanying Plans:

Geological Outcrop Plan
Geological Interpretation Plan

Scale

1" = 1 mile
1" = 1 mile

SUMMARY

The Stage 1. geological field mapping programme over two Exploration Licences, E.L. 4/69 and E.L. 5/69, on King Island, Tasmania has been completed.

Precambrian metamorphic schists and quartzites and possibly Cambrian shales have been intruded by granite masses. Some regional structures have been postulated controlling the stratigraphy and appear to be of post granite age.

Two areas of interest, one south of the Reekara road and one on Porky Creek (4 miles north of Currie) warrant further exploratory work. Two other areas, Cape Wickham and Boggy Creek, rate as lower priority areas of interest.

The Exploration Licences contain a large development of sand dunes along the west coast. Traces of heavy minerals are known within these sands and it is suggested that a scout drilling programme test for possible mineral concentrations.

Recommendations for the Stage 2. exploration programme are set out at the end of this report.

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INTRODUCTION:

Application for the two Exploration Licences was made in February, 1969 and granted in March, 1969. Anthony, McKenna and Partners Pty. Ltd. (at that time P.J. Anthony and Partners) consulting geologists, were commissioned to service the areas in April, 1969.

A literature search of previous exploration and field mapping of the areas have been completed during the Stage 1. period.

LOCATION:

The two Exploration Licences are situated on the western side of King Island, Tasmania in Bass Strait (approximately Latitude 40° South and Longitude 144° East).

Exploration Licence 4/69 is located in the north west corner of the island.

Exploration Licence 5/69 covers the central western portion of the island.

The areas are some miles north west and west of the Scheelite mine at Grassy.

TENEMENTS:

King Island Scheelite (1947) Ltd. applied for the two areas in February 1969, and the Exploration Licences were granted in March, 1969. The expiry date of both Exploration Licences after the initial 6 month period is the 14th September, 1969.

Exploration Licence 4/69 covers an area of 35.5 square miles.

Exploration Licence 5/69 covers an area of 116.5 square miles.

The land is predominantly freehold, with some soldier settlement and crown land.

PREVIOUS EXPLORATION:

King Island was reconnaissance mapped by K. J. Callow in 1956 and Exploration Licence 5/69 was partially mapped by New Mount Costigan Mines Ltd., the operator of a joint investigation project, in 1967. At the same time that company performed a limited stream sediment survey and Bouguer gravity survey of the area. This work was followed up by soil geochemistry, magnetics, induced polarization and detailed geological mapping of selected areas, with emphasis on areas of "ironstone" outcrops. Exploratory diamond drilling of the delineated targets failed to reveal economic mineralization.

PREVIOUS EXPLORATION (Cont.)

In 1968 Kenneth McMahon and Partners Pty. Ltd. acting on behalf of the Electrolytic Zinc Company of Australia Limited carried out a preliminary scout drilling programme to test some of the dunal areas for heavy minerals.

Forty-three hand auger holes were put down at an average depth of 12 feet. The areas tested covered Exploration Licence 4/69 and the southern portion of Exploration Licence 5/69.

Only traces of heavy minerals were encountered with slight localized concentrations at Victoria Cove (Exploration Licence 4/69) and Badger Box Creek (Exploration Licence 5/69).

WORK ACCOMPLISHED:

The areas were geologically mapped using aerial photographs at a scale of 1 inch to 1000 feet.

Except along the coastline very few outcrops were found and mapping was based on occasional floaters of rock and rock fragments turned up in dam and drain excavations. Virtually all areas of the Exploration Licences were visited with the exception of some of the thicker "scrub" lands.

The mapping was transferred to 1 inch to $\frac{1}{2}$ mile photographs and traced onto a plan of that scale. (The plan used was a two times enlargement of the previous King Island geological plan). The $\frac{1}{2}$ mile plan was reduced to 1 mile scale and re-drafted.

Some inaccuracies were incurred due to using uncontrolled photographs and in relating the photographs to the previous plan. It will be noted for instance that much of the coastline and some of the rivers have been slightly altered.

A geological interpretation plan has been compiled based on the geological outcrop plan, the aerial magnetics plan and the gravity survey plan.

GEOLOGY:

King Island contains rocks of Pre-Cambrian, Cambrian, Tertiary and recent age with intrusives of probable Devonian age. The older rocks lie to the west of the island becoming younger towards the east. Tertiary and recent deposits are scattered throughout the island and the intrusive rocks are likewise found throughout.

A. Recent

Sand dunes form an almost continuous belt up to 3 miles wide along the whole of the west coast of the island. The dunes reach heights of up to 400 feet above sea level but their maximum thickness is more probably around 200 feet due to the fact that occasional granite outcrops were found even near the tops of some of the dunes.

GEOLOGY: (Cont.)

Heavy mineral occurrences were noted in three locations on the beaches : at the mouth of Badger Box Creek (E.L. 5/69) in Victoria Cove (E.L. 4/69) and near Disappointment Bay (E.L. 4/69).

Inland from the dunal development, low sand hills merge into flat alluvial deposits. In the areas of poor drainage, peat has been formed up to a thickness of about 1 foot.

B. Tertiary

Two types of tertiary deposits occur within the Exploration Licences. Fossiliferous limestone is found mainly around the coastal areas and is reported to directly overlie the older rocks although this was not observed in this programme of mapping.

Laterites occur chiefly in the centre of the island and appear to overlie only the sedimentary older rocks. They are predominantly pisolitic with a goethite-rich matrix and normally containing small quartz, sand and sediment pebbles.

The Laterites had been previously mapped by New Mount Costigan Mines as "ironstones" with the possibility that they were gossans. All the "ironstones" observed in this mapping programme were of the pisolitic laterite type and no boxwork structures were found.

The tertiary deposits were noted during field mapping but were not plotted on the final plans.

C. ? Cambrian

The sediments classed in this group include grey pyritic shales, black carbonaceous shales and slates, and hard grey mudstones. No fossils were observed in any of these sediments and it appears from previous work also that they are totally unfossiliferous.

The shale group covers the eastern edge of the Exploration Licences. No continuing stratigraphic horizons were observed within the group. The textures and colours of the shales vary within the stratigraphic horizons with occasionally the mudstones and black shales containing small pseudomorphs after pyrite as well as the grey shales.

The shale group generally trends north-south dipping steeply to the west in the southern area where much localized folding and faulting has occurred, and to the east in the northern area. In the centre of the island the dips are flatter and the strike has moved further round to the north east.

D. PreCambrian

Quartzites and mica schists comprise most of this metamorphic group. Between these two extremes occur a gradation of micaceous quartzites. More highly metamorphosed rocks such as muscovite - sillimanite - garnet schists occur in the north of the island.

GEOLOGY: (Cont.)

Some muscovite - staurolite - quartz schist with black staurolite crystals up to 1 inch in length was observed in the Reekara road area.

The group has been regionally metamorphosed increasing in metamorphism in a general N.N.W. direction. Strikes are generally north south with variable westerly dips, the variation being due to later granite intrusions. In the centre of the island the strikes trend north easterly and the dips are much more shallow.

E. Intrusives

Much of the west coast area is taken up by a belt of white fine to coarse grain microcline granite which has intruded the Precambrian schists. It has not been observed to intrude the later shale group, making a relative age dating of this granite more difficult. However granites and pegmatites were observed to have intruded the metamorphic group and possibly the shale group further inland and in the north of the island. These rocks are a variation of the microcline granite containing more muscovite and often some tourmaline crystals.

No mineralographic or petrographic study has been made of the granites.

Dolerites and Amphibolites have intruded the metamorphics, shales and granites within the Exploration Licences. They generally occur as sills along the bedding planes but occasionally occur as dykes cutting across the centre of the island.

CONCLUSIONS:

The age of the rock types within the Exploration Licences is still uncertain. It is assumed that the metamorphic rocks are Precambrian due to their similarities elsewhere especially in western Tasmania, however no research has been made to substantiate this.

The shale group is more difficult to place. Its stratigraphy is relatively conformable with the metamorphic group except that the recorded strike directions in the centre of the island appear unconformable. However this may be due to the bulge in the granites to the west which has folded the metamorphic group to a similar degree with comparable dips and strikes. The shale group appears to be unmetamorphosed compared with its underlying rocks and this indicates some break in orogeny. Previous mapping has placed this group in the Cambrian and further evidence is necessary to confirm to which age the rocks belong.

More important with regard to economic geology is the age and type of the granites. Stratigraphically the western belt of granite fails to come into contact with any other rock besides the metamorphic group and may be placed within the Precambrian. The granite bosses inland are shown to lie within the metamorphic group but are also interpreted to intrude the shale group of rocks. New Mount Costigan Mines have age dated some of the granites (they do not state which)

CONCLUSIONS: (Cont.)

as Tabberabberan or Mid-Devonian which would correlate with the granodiorite at Grassy (The Scheelite Mine) in age.

Further work should be performed to correlate the age and mineralogy of the granites over the whole island.

Interpretation of the geology of the western side of King Island has been based chiefly on the mapping programme now completed with some reference to the aerial magnetic plan flown by King Island Scheelite (1947) Ltd. and the gravity survey plan compiled by New Mount Costigan Mines Ltd.

The Stage 1. mapping programme has confirmed in more detail the reconnaissance geological plan compiled by K. J. Callow in 1956. However some alterations have been made and the increased detailed work has produced a slightly more complicated structural environment.

The previously interpreted granitic belt running the whole length of the western side of the island has been divided into a more limited yet similar belt to the west, and probably later intruded granite bosses towards the centre and the north of the island. Confirmation of this should be sought by age dating or petrographic studies.

Interpretation of the stratigraphy of the metamorphic Precambrian belt is basically similar except in the northern area (E.L. 4/69) where the strike is interpreted as being towards the N.N.W. (i.e. west of Cape Wickham) instead of N.N.E. towards Lavinia Point.

The shale sequence appears to be generally conformable with the metamorphic group in its stratigraphy.

Structurally a complex area of interest has arisen south of the Reekara road. Whereas a bulge in the western granite belt had previously been mapped east of Currie on the Grassy Road, the more detailed mapping (and geophysical interpretation) has shown this bulge to occur further to the north, inland from Porky Creek. A granite boss has also been interpreted to outcrop south of the Reekara road (based on limited floaters and area of low magnetic intensity). These two granite occurrences coincide with possible major N.W. - S.E. and N.E. - S.W. cross structures. The former structure (N.W. - S.E.) appears to have faulted the shale and metamorphic groups in the Sea Elephant river area ; the latter structure (N.E. - S.W.) may be associated with the bulge in the western granite belt and possibly extends to the north east to the Mt. Council granite boss. No geological mapping has yet been performed in the eastern side of the island to confirm either of these structures, and much of this interpretation is based on geophysical data.

The areas of interest for further exploration work are summarized as follows:

1. South of Reekara Road (E.L. 5/69)

CONCLUSIONS: (Cont.)

2. Porky Creek area (E.L. 5/69)
3. Cape Wickham area (E.L. 4/69)
Boggy Creek area (E.L. 5/69)
4. Dunal developments (E.L. 4/69 and E.L. 5/69).

In the first area south of Reekara road an interesting structural environment exists about which little is known. The area, as described above, appears to contain a granite boss, two possible fault structures and Tungsten/Tin mineralizations in the old Reekara workings to the north east (these lie in the region of the postulated N.E. - S.W. structure). Limited stream sediment sampling of the Yellow Rock river for Copper, Lead and Zinc by New Mount Costigan Mines Ltd. showed slightly higher geochemical backgrounds for Lead and Zinc than over the rest of the island. Tungsten, Molybdenum and Tin were not analysed in that survey.

The Porky Creek area lies in the "bulge" of the western granite belt, some 4 miles north of Currie. The structural cause of the granite "bulge" is at present unknown, however there may be some association with the N.E. - S.W. structure postulated to run through the Reekara area. Previous stream sediment sampling of Porky Creek has shown anomalous Copper, Lead and Zinc values, and there is a recorded occurrence of Galena in the metamorphic group near the granite contact north of Currie.

From the Cape Wickham area some 16 samples of pegmatites and granites were analysed for Tungsten, Molybdenum and Tin. All the samples were unmineralized. The extent of the granite intrusion towards the south is unknown, and the surrounding country rocks, except on the coast, are all overlain by later recent deposits.

In the Boggy Creek area two granite outcrops were observed to have intruded the presumed metamorphic group (the area is covered by sand dunes). The extent and type of this intrusion could be tested in conjunction with a heavy mineral assessment of the area.

Previous testing of some of the sand dunes found traces of heavy minerals with slight localized concentrations. A hand auger was used to scout drill the areas and the average depth reached was only 12 feet. Possibilities of heavy mineral concentrations still occur throughout the sand dunes since the drilling in the past was widely spaced and rarely reached basement.

RECOMMENDATIONS:

The following recommendations are made for further exploration work on the two Exploration Licences:

1. Stream sediment survey of the Reekara road and Porky Creek areas. Should these prove successful then a further sampling programme should be devised for the whole of the Exploration Licences. The recommended elements to be analysed

RECOMMENDATIONS (Cont.)

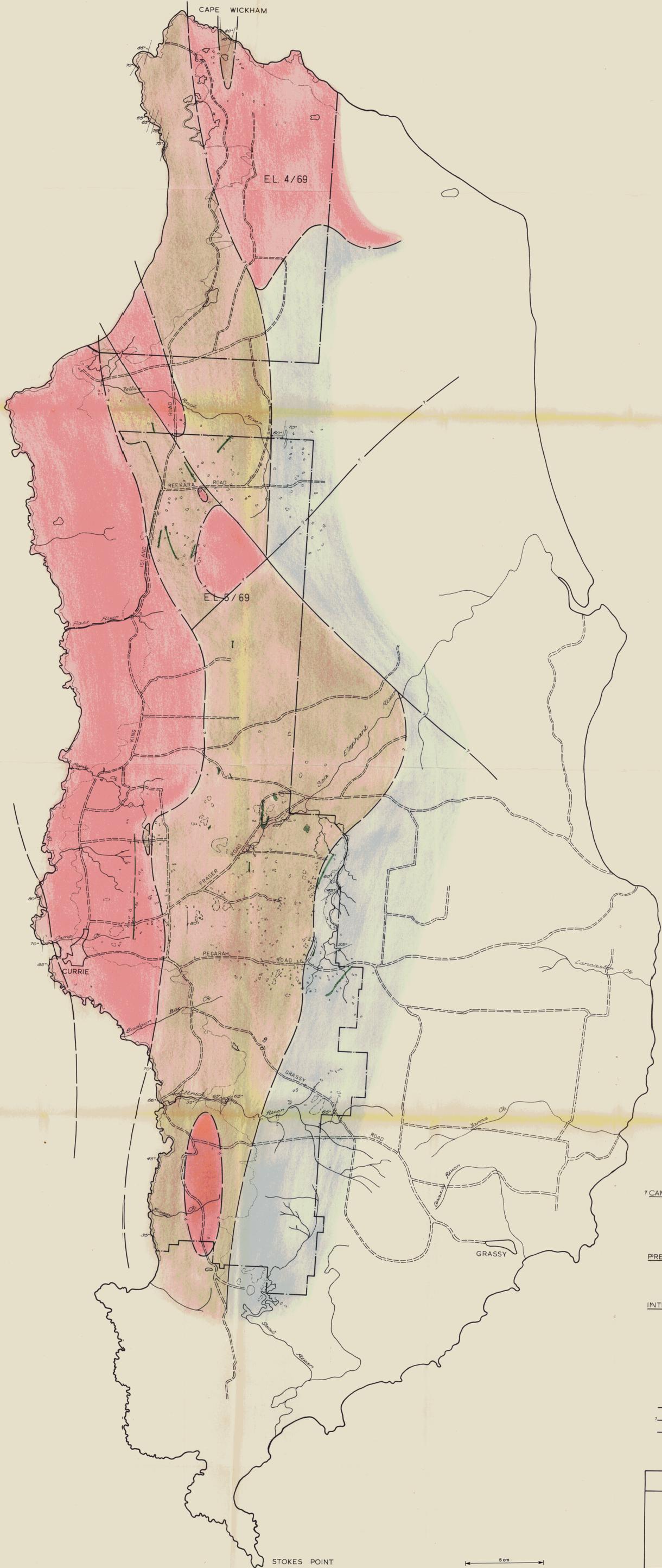
are:

Copper, Lead, Zinc, Tungsten, Molybdenum and Tin.

2. A geophysical interpretation of the area south of the Reekara road by Geopeko Ltd.'s consultant geophysicist relating known magnetic and gravity results to the geological mapping programme.
3. A scout sub-soil geochemical survey (using a hand auger) over the Reekara road area and possibly the Porky Creek area. This should be done in conjunction with a similar survey over the known mineralization at Bold Head. Should it be found that no geochemical anomalies are encountered with this type of sampling, then a Gemco auger drill from the Scheelite Mine at Grassy should be used.
4. More detailed geological mapping of the Reekara road and Porky Creek areas using the information obtained in recommendation 3 above.
5. Mineralogical and Petrological studies of the various granite outcrops in order to correlate the ages and textures of the granites with the granite at Grassy.
6. Scout auger drilling, using a Gemco auger drill, of the sand dunes throughout the dunal development areas of the Exploration Licences. If basement can be reached in the Cape Wickham and Boggy Creek areas then further interpretation of the geology of the areas can be made.

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LEGEND

- ? CAMBRIAN**
 - Black Shales and Slates.
 - Grey Pyritic Shales.
 - Grey Mudstones.
- PRECAMBRIAN**
 - Mica Schists (and Muscovite, Sillimanite Schists)
 - Quartzites.
- INTRUSIVES**
 - Amphibolites and Basic Dykes
 - Granites and Pegmatites
 - Quartz
- Boundary of Sand Dune Development.
- Outcrop Boundary.
- Float Boundary and Dam Excavations.
- Exploration Licence Boundary.
- Inferred Geological Contacts.
- Inferred Fault Structure.

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KING ISLAND

063012 TASMANIA

GEOLOGICAL INTERPRETATION PLAN

Compiled: A. JANNINK & P.J. ANTHONY Drg No: 7002 - 2

Scale: 1" = 1 mile Date: September, 69

STOKES POINT

5 km