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GEOPEKO LIMITED  
KING ISLAND GROUP

PROGRESS REPORT  
EXPLORATION LICENCE 23/69

by  
P. Le Messurier & G. Lister

CONTENTSINTRODUCTIONSUMMARYCONCLUSIONPROPOSALTENUREREGIONAL GEOLOGY

1. The Basement
2. Sedimentary Deposits
  - I Shorelines
  - II Dunes
  - III Central Plain

ECONOMIC GEOLOGYREFERENCESMaps

Rocky Cape

Lake Martha Luvinia

The Bertie Lagoon

INTRODUCTION

Exploration Licence 23/69 covers approximately fifty five square miles of north eastern King Island.

Reconnaissance field mapping has been carried out together with a relatively detailed sand distribution study.

This work has indicated that the northern part of King Island is made up of a series of small islands tied to the main plateau area by recent sediments.

The economic potential of the area has been evaluated and a proposal is made for additional auger drilling to test for heavy minerals and to obtain rock chip samples for identification and geochemical analysis.

SUMMARY

Regional mapping and detailed photo-interpretation in the Exploration Licence 23/69 has indicated that very little solid rock exists above sea level in this area. The area can best be considered as a series of small islands tied to the main plateau of the island by a series of recent sediments.

The depositional history of the area and the emergence of the land is clearly documented in two series of strand lines and associated features. The relative positions of the shore, with the development of aeolian dunes of successive ages outline the period of growth. The deposition of marine, then estuarine then lacustrine sediments can be traced as the extending dunes and sand bars tied high points and closed off the area of sedimentation.

Those areas of solid basement observed were chiefly of granitic rocks and appear to be of a style generally regarded as unfavourable for mineral deposition. Further work is required however to probe the supervicial sediments and obtain more information about these underlying rocks.

The study of the sediments has been of considerable interest and the potential of the area for heavy mineral accumulation appears to be quite good. Some previous testing has been done in the area but this was unco-ordinated and many favourable localities are untested.

CONCLUSIONS

North of the escarpment which runs from Whistler Point to Mount Counsel, the solid rock basement is present almost everywhere below the superficial deposits and is probably below sea level over most of the area. The rocky outcrops of Cape Wickham, Rocky Point and Boulder Point represent isolated highs above the basement. The low ridge of probable granite from Disappointment Bay to Martha Lavinia behind the Dunes is probably a warp in the basement.

The lowest country of this northern end of the Island is in the centre where there are extensive flat plains of young estuarine sediments, part of which are covered by the peaty soils of the former shallow lakes and swamps.

This depressed interior is surrounded by a rim of coastal dunes. These dunes can be correlated in two main series associated with the emergent land and the successive shorelines.

The northern part of King Island has all the characteristics of recently emergent land, welded to the plateau area by the tying of a series of Islands by sand spits and bars and the build up of estuarine deposits. The advance of the aeolian dunes contemporaneously with the emergence of bars or barrier islands greatly accelerated the tying process. How many Islands existed off the original coast (the plateau scarp) is not clear but at least four are indicated by rocky outcrops on the north coast.

The potential of the area for orebody formation does not appear good. The granitic rocks are of a type not generally favourable for metal accumulation. Further testing is required to determine if any contact metamorphic rocks occur below the sediments.

The area has a good potential for heavy mineral accumulation. This is a known area of heavy mineral occurrence and many of the features exhibited by the shorelines are those generally associated with heavy mineral accumulation.

PROPOSAL

Further work is required in this area to add to our knowledge of the distribution of rock types in the basement, particularly in the south coast near Mount Counsel, and to more fully evaluate the heavy mineral potential of the sand.

This work will take the form of auger drilling using both Gemco Drills and hand augers. Because of its greater capacity the Gemco will be used whenever access permits.

A series of holes will be drilled across the Old Shorelines and the New Shorelines at positions of accumulation indicated by directional changes. Heavy mineral evaluation will be made. These holes will be drilled to basement where possible, and rock chip samples obtained for identification and geochemical analysis. A series of holes will also be drilled solely for the purpose of obtaining rock chips for identification and analyses.

TENURE

Exploration Licence 23/69 was granted to King Island Scheelite (1947) Limited for a period of six months from October 16th, 1969. The Licence was renewed for a further period of six months in April, 1970, and is currently in force until 16th October, 1970.

About two-thirds of the land in the Exploration Licence is Crown Land, with the remainder a mixture of freehold and leasehold. The Crown Land is entirely undeveloped scrub and only a portion of the remainder is developed as pasture land.

## REGIONAL GEOLOGY

The greater part of the Licence area is undeveloped scrub land. Sand and swamp cover much of the area and outcrops are sparse. The only definite in situ outcrops occur along the northern coastline. With the sparse outcrop, photo interpretation and float mapping have been used to develop the plans of the area.

### 1. The Basement

Along the north coast the rocks are predominately granitic. The prevalent types are a fine to medium grained granodiorite intermixed with a coarse more acid granitic rock. The coarse porphyritic orthoclase granite is more abundant towards the contacts and in some cases, particularly near Rocky Cape, occurs as blocks in the finer grained rock. These blocks are very angular and have distinct borders suggesting that there has been little interaction between the two phases. In places this porphyritic granite is quite extensive and from observed relationships of the smaller blocks could be considered as major blocks engulfed by the later phase. However, the question of genesis of these two phases is still open.

Where contacts with the metasediments have been observed to the west of the Licence area, the granite appears concordant on a regional scale but not on a local scale, possibly due to minor warpings in the meta sediments in the contact zone.

A number of biotite rich xenoliths occur adjacent to the contact and frequently show a lineation parallel to the contact. At the contact, segregations of finely disseminated sulphides were found in a grey siliceous hornfels. Further away from the contact, quartz "sweats" and quartz feldspar intergrowth in fissures occurred. Traces of scheelite were observed in a pegmatite vein midway between Boulder Point and Lavinia Point.

Areas of float away from the coast have been predominantly of granite or relatively coarse grained quartz, probably representing pegmatite and quartz veins in the granite. One small area of basic rocks, probably derived from a small doleritic dyke, was observed.

### 2. Sedimentary Deposits

A detailed photo interpretation study on photographs of scale 1 inch:1000 feet, together with some field traverses has enabled a sand distribution map to be developed.

Clear indication of land emergence and sea regression is given by the widespread constructional and erosional features of the two sets of shorelines and the two sets of dunes. Other evidence in the form of sea cliffs, raised beaches, shingle terraces are noted elsewhere on the Island.

#### I The Shore Lines

Two distinct sets of shore lines are present in the Exploration Licence area. These represent two stages in the growth of the Island and have been designated the Old and New Shorelines.

(a) Old Shorelines

Two sets of Old Shorelines occur, one in the vicinity of 244,000E and the other near 250,000E. These sets are very similar, except that they exhibit opposite facings indicating land growth outwards in two directions from a central point.

The eastern set of Old Shorelines form a belt as the western boundary of a chain of swamps known as The Nook. The Old Shorelines consist of low sand ridges and berms. They generally rise 2 - 3 feet with a maximum amplitude of 7 feet and in width vary from 30 to 200 feet. Up to seventeen occur, rising steadily from high water mark to about 40 feet above, then remaining level, for 1500 to 2000 feet. Behind the last ridge is a depression. Inland there is a gradual rise into an area of sink holes or solution hollows. These Old Shorelines reach north to the outfall of Egg Lagoon where they are cut across by Old Dunes. They decline in number and width although maintaining the same character. They are interrupted at several places by dune covered projections of higher ground from the west. The recurved pattern of some of the Old Shorelines suggests shallow bays between these dune covered headlands. At the northern end the strandlines are divided into two groups separated by a broad swampy depression. The seaward group is accompanied by Old Dune formation.

The western set of Old Shorelines have a trend NNW-SSE, with a tendency to concavity towards the west. There is up to seven in the set which range from 50 - 65 feet above sea level. They are fully comparable with the eastern set except, of course, that their gradual slope faces west and their steep slopes east. The intervening swales vary from 1 - 3 feet in depression and may have a couple of feet of sandy peat on top of leached quartz sand and well rounded fine gravel. In front of these ridges are low broad clay banks with gradual western slopes and steeper eastern ones. The clay in these banks contains a high proportion of gypsum. The innermost clay bank in the north runs into the outermost strandline.

(b) New Shorelines

A belt of low foredunes constitute the New Shorelines in this area. The one or two ridges of the southern end multiply to over 20 towards Lavinia Point where they reach half a mile inland. The seaward two or three are only partly fixed by vegetation but the others are completely fixed either by bracken or open gum woodland in accordance with the incidence of burning off. The ridges are only a few feet higher than the hollows, though both rise gradually inland so that the innermost depressions lie at 10 - 15 feet above high water.

An active sand cliff forms the coast line on the north of the Island with New Shoreline development restricted to one small area just south of Boulder Point. Here the dune cliffs which rise to 100 feet are separated from the shore by a low terrace with simple sand ridges or low shrubby foredunes. These are more numerous at the wider western end of the terrace, where active accretion and new sand ridge formation has been going on since the time of the earliest aerial photographs. Where the innermost foredune is not banked against the cliff, the swale bottom lies only a few feet above high water.

## II The Dunes

The dunes fall clearly into two major systems designated the Old and New Dunes.

### (a) The New Dunes

These form a near continuous rim around the Island.

Though mainly fixed dunes, they retain a vigour and freshness of relief which suggests little change in their form since fixation. For the most part they consist of parabolic or U dunes in all stages of development, (elongate, windrift and transgressive). The parabolic dunes may occur in open pattern or complexly associated, often nested one within another. Simple conical dunes occur occasionally, probably residuals from parabolic dunes. The axial trend of the parabolic dunes is principally E - W, with variation from NE - SW to SE - NW. This is in accord with the prevailing wind system. The inland margin of the New Dunes, often lobate due to the parabolic dune pattern, is almost universally such a steep and continuous one, that their limit is readily discerned on the ground and in air photographs.

The east coast New Dunes are predominantly of quartz sand, slightly reddish-yellow in colour. Their soils vary from a completely undifferentiated profile to a shallow weakly developed podsal. Hard pans are not strongly developed and A and B Horizons together are rarely deeper than 3 feet. Below is the reddish-yellow unbleached dune sand.

It is possible to divide up the New Dunes of a particular coastal sector into two, sometimes three, separate dune belts, each consisting of parabolic dunes in depth; these belts advanced successively inland, probably with appreciable halts between. Attempts to correlate these belts from one area to another have failed and, therefore, it is not thought that they have any general significance.

From the southern end of Nine Mile Beach the New Dunes broaden and grow higher northwards, as does the belt of low foredunes which constitute the New Shorelines here.

Near Lavinia Point the New Dunes fall into three sets. Behind the full set of New Shorelines there are comparatively low parabolic dunes about half a mile wide. Then a later and higher group reaching well over 100 feet, cut across at least eight of the New Shorelines. They eventually overlap the first set of parabolic dunes completely and cut across the head of the intervening depression to advance on to the Old Dune system. This set constitutes the main body of the New Dunes and significantly post date the oldest of the New Shorelines. At Lavinia Point itself, a very young and small group of parabolic dunes cuts across the ends of nearly all the remaining New Shorelines.

North from Lavinia Point the sandy constructional coast is interrupted by a group of low rock headlands. The coast is of active sand cliff for the most part. The grassy and shrub covered dune cliff of the New Dunes is separated from the shore by a low terrace with simple sand ridges or fore dunes. These are particularly well developed just south of Boulder Point. The normal

parabolic New Dune system is well developed and completely rings the coast. The surface drainage has been completely blocked from the coast by this dune rim with the consequent development of the many lakes and lagoons along the internal scarp of the New Dunes in this area.

(b) The Old Dunes

The Old Dunes are as abundant as the New Dunes, but occur as isolated entities, rather than in a continuous belt.

In the area of Exploration Licence 23/69 they extend from the coast to the middle of the Island usually in small groups and as individuals rather than covering large areas. In form they are usually subdued and rather characterless, ranging from low gentle swells to whaleback mounds and smoothed ridges. Their limits are much less reliably and readily mapped, except where the New Dunes abut upon them. However, the characteristic parabolic dune plan is quite frequently recognisable in the air photos (less frequently on the ground) and, where clear, the inland limit of the Old Dunes shows the same lobate pattern as the New Dunes. It is evident that most of the Old Dune areas are parabolic dune systems modified by weathering and colluviation over a long time. In the centre of the Island the Old Dunes show complex forms associated with wind directions from both west and east, when this area was a narrow isthmus between the two sets of Old Shorelines. In general the Old Dunes advanced inland with a direction closely comparable to that of the New Dunes of the same coastal sector. The wind regime at the time of formation of the Old Dunes cannot have been very different from the present one.

The constitution of the Old Dunes differs from that of the New Dunes. They are much more siliceous and more deeply leached with no unleached yellow quartz sand observed. In several sections many feet of white leached sand overlies "coffee rock" (humus bound sand-rock) and hard pans are fairly well developed. Although in some areas the Old and New Dunes are separated by an intervening strip of country, this is particularly evident where the Old Shorelines occur, the Old Dunes are often overlapped by the New. Particularly good evidence of the existence of the Old Dunes underlying the New along the north coast is seen just north of Penny's Lagoon where the small granite headland occurs. The actively eroding sand cliff, which is as much as 50 feet high on either side of this headland, consists mainly of yellow New Dunes, which appear to have a significant shell sand content from the presence of calcareous root incrustations, but which reveal former podsollic soil horizons up to 2 feet thick undulating laterally. There occurs at the base of the cliff exposures of Old Dune in profile 6 - 15 feet high with red brown sand-rock overlain by, and grading laterally to, deep grey white leached sand. The Old Dunes occur right down to present sea level and it is probable that they underlie the New Dunes quite substantially along the north coast.

The New and Old Dune belts almost completely ring the northern sector of the Island. The few breaks being in the areas of the low granite rise near Disappointment Bay.

Some similar low granite rises lie between Egg Lagoon and the north coast though these are covered by Old Dunes. Numerous lakes occur at the contact of the dunes

and the granite rise, or along the boundary between the two dune systems or within the dune systems, particularly the Old Dunes.

### III Central Plain Area

The former Reedy Lake, Egg Lagoon and South East Lagoon all form part of a plain of young sediments enclosed by the granite rises and dunes to the north, the dune barrier to the west and east, and the northern margin of the metamorphic plateau of the island to the south. Though the former relative proportions of open water and ti-tree swamp cannot now be determined, Egg Lagoon, prior to its drainage was certainly the largest extent of lagoon and swamp in King Island. The surface of this plain lies at from 20 to 50 feet above sea level. The plain consists of young estuarine-marine sediments overlain in part by fresh water and swamp deposits. The log of an old bore in this area indicates -

0	-	2'	Top soil
2'	-	5'	Brown Sand
5'	-	8'	Brown pug
8'	-	24'	Sand
24'	-	60'	Grey sand, abundant sea shells including oyster at 40'.
60'			Granite.

The eastern margin of the plain is marked by a series of ridges. These are fully comparable with the Old Shorelines of the east coast, and are discussed in detail in the section on Old Shoreline.

The interpretation placed on these features is that the sand ridges cannot be lacustrine since they rise higher than anything between them and the sea to the west. Therefore, they are regarded as littoral features at the head of an estuary, when the clays, silts and sands of an estuarine-marine nature below the lagoon floor were being laid down. In the middle of this estuary a sand ridge was built by wave and wind action, as an offshore bar (or barrier island). On emergence the plain behind the ridge becomes a fresh water swamp. Contemporaneously with this emergence the Old Dune system was extending south from the granite ridges at Cape Wickham, towards Lavinia Point to link with the emerging shore line. Foraminifera recovered from this area indicate three main types of conditions.

(a) Fully marine, with open sea forms, swept in to mingle with local quiet water species.

(b) Brackish water, but with open sea access to allow certain forms. A tidal estuary.

(c) Brackish water, with only occasional incursions of salt water. A brackish lake.

## ECONOMIC GEOLOGY

### 1. The Basement

The metalliferous potential of the basement rocks does not appear to be very high except possibly on the south-eastern margin of the Exploration Licence. There the northern edge of the Mount Counsel pluton exhibits some contact metamorphic phenomena which are compatible with metal deposits. No detailed work has been done in the area yet, although tungsten and tin are known to occur in quartz vein type deposits to the south west.

Some minor scheelite was noted in a quartz tourmaline pegmatite on the coast north of Penny's Lagoon and sulphides (chiefly pyrite) were observed on the granite contact in the Rocky Cape area. Both these occurrences appear to be indicative of local late stage segregations in the granite melt rather than any major metal accumulation.

### 2. Sediments

Previous workers in this Licence area have looked at various portions of the sediments for possible heavy mineral (rutile - zircon) accumulation. This work has been rather disjointed and no attempt has previously been made at a total study of the geomorphology and sand movement and distribution.

Results of most of the previous boring are not promising although some economic values were obtained. The location of the high values suggest, however, that favourable areas do exist when the mineral distribution is correlated with shoreline forms.

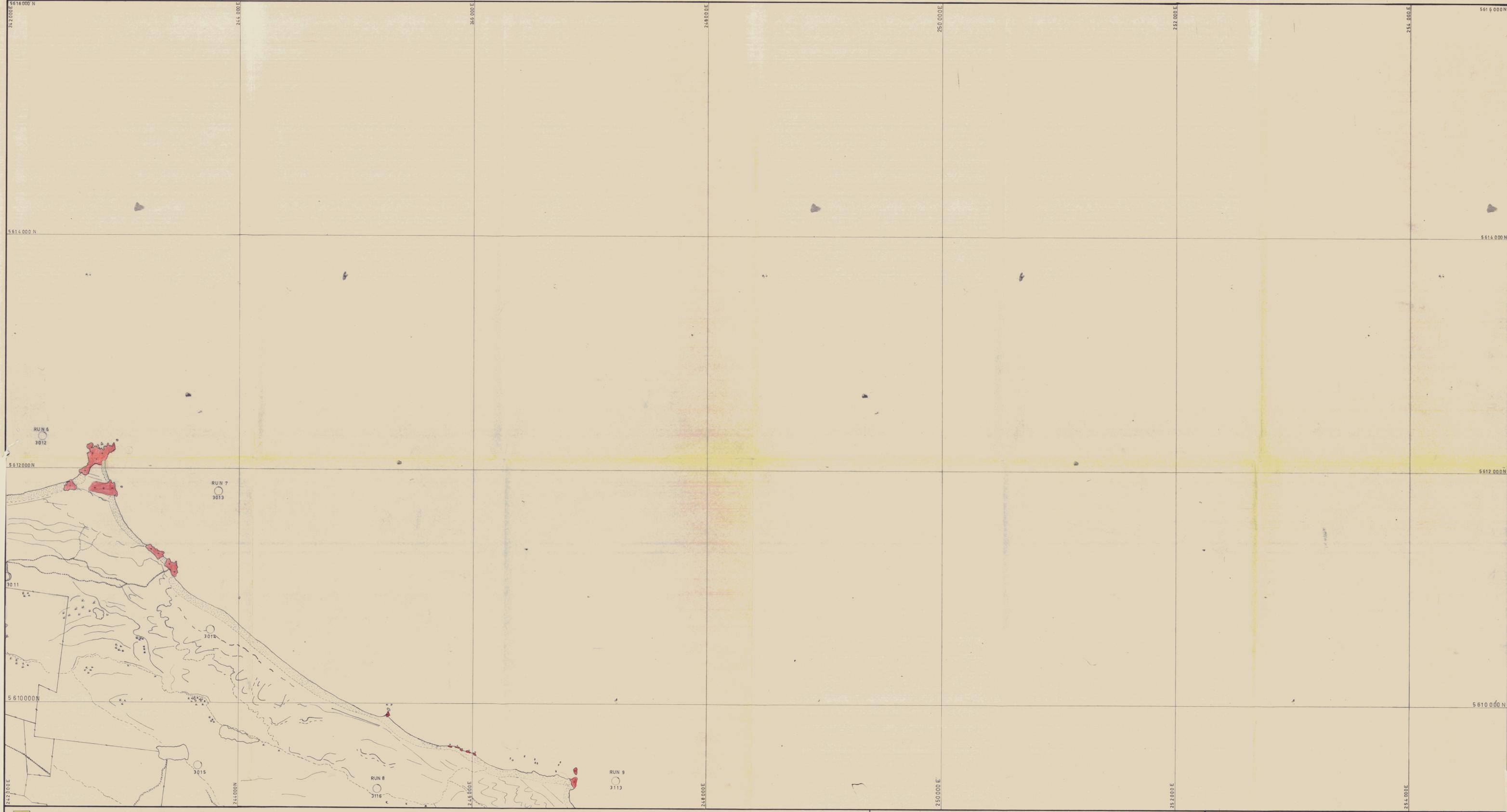
Western Titanium drilled a large number of holes in the area of the Old Shorelines. These were based on a main north-south line just west of the Nook with various cross traverses. No information is available as to depths of many holes or methods and intervals of samples. Results were in general less than 0.5% heavy mineral, however, one area of average 2.5% and maximum 11.1% was recorded. This area shows a good correlation with a bend in the shorelines indicative of an old headland. Further testing in such areas selected from the sand distribution plan should prove of interest.

Quest Exploration tested the New Shorelines in a series of short traverses perpendicular to the trend. Samples were taken in 5 feet intervals to a depth of 30 feet. Results show in all but three samples, less than 1% heavy mineral with the majority less than 0.5%. Again these lines appear to be arbitrarily located and no attention has been paid to possible favourable areas of accumulation.

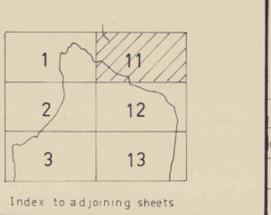
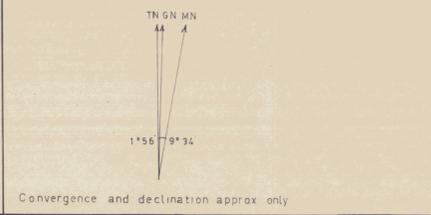
Although these results are not promising, the vast volume of sand involved and the existence of untested, favourable areas makes the area still one of promise.

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	Sandstone		Black Shale		Porphyry and Basic Dyke		Unformed Roads		Inclined Dip and Strike		Old dunes
	Limestone		Slate		Tillite		Geological boundary observed		Scout bore for mineral beach sands		Lagoon stream
	Laterite or Ironstone		Breccia		Quartzite		" " " inferred		Submarine bar		Intermittent stream
	Volcanics		Actinolite Hornfels		Mica Shists and muscovite sillimanite shists		Fault observed		Sand beach shore reef		Swamp
	Altered Volcanics		Biotite Actinolite Hornfels		Siltstone		" " " inferred		Sand cliff		Slope in bedrock
	Agglomerate and Tuffs		Biotite Hornfels		Aplite		Anticlinal axis		Vegetated sand cliff		Conical dunes
	Shale		Pyroxene Hornfels		Granite		Synclinal axis		New stranded shorelines		Direction of younging
	Spotted Shale		Pyroxene Garnet Hornfels		Sand dune development boundary		Horizontal Dip and Strike		New dunes		Sandhills
	Grey mudstone		Quartz		Formed Roads		Vertical " " "		Old stranded shorelines		Drains



**GEORPEKO LIMITED**  
KING ISLAND GROUP

SCALE 1:12,000 METRIC GRID N° K

**ROCKY CAPE** 018015

**SHEET 11**

5cm

DATE: 14-4-70  
GEOLOGIST: G. L. ...  
DRAWN: G. L. ...  
CHECKED:



	Sandstone		Black Shale		Porphyry and Basic Dyke		Unformed Roads		Inclined Dip and Strike		Old dunes
	Limestone		Slate		Tillite		Geological boundary observed		Scout bore for mineral beach sands		Lagoon stream
	Laterite or Ironstone		Breccia		Quartzite		Geological boundary inferred		Submarine bar		Intermittent stream
	Volcanics		Actinolite Hornfels		Mica Shists and muscovite sillimanite shists		Fault observed		Sand beach shore reef		Swamp
	Altered Volcanics		Biotite Actinolite Hornfels		Siltstone		Fault inferred		Sand cliff		Slope in bedrock
	Agglomerate and Tufts		Biotite Hornfels		Aplite		Anticlinal axis		Vegetated sand cliff		Conical dunes
	Shale		Pyroxene Hornfels		Granite		Synclinal axis		New stranded shorelines		Direction of younging
	Spotted Shale		Pyroxene Garnet Hornfels		Sand dune development boundary		Horizontal Dip and Strike		New dunes		Sandhills
	Grey mudstone		Quartz		Formed Roads		Vertical		Old stranded shorelines		Drains

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115°56' 9" E  
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2	12
3	13

Index to adjoining sheets

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KING ISLAND GROUP

SCALE 1:12,000 METRIC GRID N°K

**LAKE MARTHA LAVINIA**

SHEET 12

DATE 14-4-70  
GEOLOGIST: Lister  
DRAWN: J.S.L.  
CHECKED:

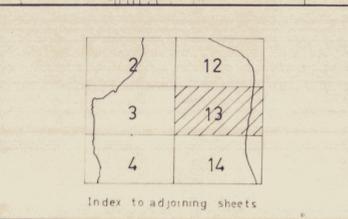
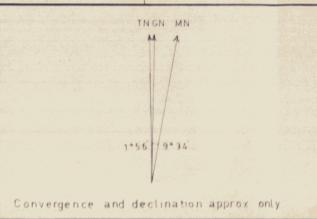
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5cm



	Sand stone		Black Shale		Phorphyry and Basic Dyke
	Limestone		Slate		Tillite
	Laterite or Ironstone		Breccia		Quartzite
	Volcanics		Actinolite Hornfels		Mica Shists and muscovite Sillimanite shists
	Altered Volcanics		Biotite Actinolite Hornfels		Siltstone
	Agglomerate and Tuffs		Biotite Hornfels		Aplite
	Shale		Pyroxene Hornfels		Granite
	Spotted Shale		Pyroxene Garnet Hornfels		Sand dune development boundary
	Grey mudstone		Quartz		Formed Roads

	Unformed Roads		Inclined Dip and Strike		Old dunes
	Geological boundary observed		Scout bore for mineral beach sands		Lagoon, stream
	Geological boundary inferred		Submarine bar		Intermittent stream
	Fault observed		Sand beach, shore reef		Swamp
	Fault inferred		Sand cliff		Slope in bedrock
	Anticlinal axis		Vegetated sand cliff		Conical dunes
	Synclinal dip		New stranded shorelines		Direction of younging
	Horizontal Dip and Strike		New dunes		Sandhills
	Vertical		Old stranded shorelines		Drains



GEOPEKO LIMITED  
KING ISLAND GROUP

SCALE: 1:12,000 METRIC GRID N° K

018017

THE BERTIE LAGOON

SHEET 13

5 cm

DATE: 9-16-1970  
GEOLOGIST: Graham Clarke  
DRAWN: J.S.L.  
CHECKED: