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# GEOLOGICAL REPORT ON COUNTRY EAST OF PORT SORELL



## INTRODUCTION:

While investigating a deposit of iron pyrites along Branch Creek near the eastern shore of Port Sorell, it was found that the country between the Beaconsfield District and Port Sorell and north of the Frankford Highway had never been geologically mapped. It was therefore decided to map an area bounded by Port Sorell to the west, Bass Strait to the north, the Asbestos Range to the east, and the Frankford Highway to the south, and occupying some ninety square miles. This task was made particularly easy and the time spent in mapping considerably shortened by two factors. Firstly, the Forestry Department has recently prepared excellent topographical maps of much of this area and these were used as a basis; and secondly, the principal outcropping rock type, the Pre-Cambrian Schist, has such a marked and characteristic topographical expression that much of it can be mapped from the aerial photographs. An additional advantage lies in the fact that, as in other places on the North coast, an excellent section of the strata, at approximately right angles to the strike, can be seen outcropping alongthe sea-coast.

## LOCATION AND ACCESS:

This is an area approximately ten miles from north to south and nine miles east to west, adjacent to the north coast of Tasmania between the Mersey and Tamar Rivers. It contains no towns or villages and but a handful of farms, but several small towns are not far from the fringes - Port Sorell to the West, Harford to the South-west, Frankford to the South-east and Holwell to the East. The Devonport-Exeter Highway bounds the south of the area and at the 16 mile peg from Devonport a road runs eight and a half miles, in a northerly direction to the coast at Addison's farm. From this road, usually in a south-easterly direction run several abandoned roads to former timber mills. These are in various stages of repair, but most are passable, for some distance at any rate by jeeps.

In the south-east, the Frankford-Beaconsfield Road via Holwell is just outside the area, while the Badgers Head Road ends at twelve miles from Beaconsfield, at the north-eastern corner of the area. In the south a road called the Coppermine road, accessible only by jeeps, connects the Frankford Highway with the Holwell Road, passing the old Pandora Mine. At low tide it is possible to drive along Seven Mile Beach approaching it from the extreme western end.

Almost the whole area is covered with rather small eucalypt timber and, except in the creek beds, very thin undergrowth. It is thus extremely easy country in which to move about. Except for a few farms on the fringes, none of the land has been cleared and the Pre-Cambrian rocks in particular provide extremely poor soil.

By an Act of Parliament in 1946, the Tasmanian Paper and Timber Mills Company holds certain concessions over timber, water and tramway rights on all Crown land in this area.

RAINFALL:

There are no recording stations on the actual area examined but to the West, East and South are stations at Northdown, Kelso and Frankford respectively and these are not many miles distant. The figures for these stations taken over the last twenty years are interesting as they show that the two former stations within a few miles of Bass Strait have a much lower rainfall (an average of 30 inches a year) than that at Frankford, some twelve miles inland and several hundred feet above sea-level, where the annual average is 40 inches.

TOPOGRAPHY:

The country rises from sea-level at Bass Strait in the north, and the East Arm of Port Sorell in the west to heights of over 1,300 feet in the Asbestos Range and 1,600 feet at the Dazzler. These two features which are more or less one continuous range conform to the strike of the country rocks and course a little west of north. These Pre-Cambrian hills have been eroded in a characteristic pattern, which shows up very distinctly on the aerial photographs. The drainage pattern looks like the branching veins of a rounded leaf and the hundreds of gullies converge to form about half a dozen permanent creeks. The most important of these, Branch, Brown's, Saxon and Sheepwash find their way to East Arm either directly or via the Franklin River, itself largely outside this area.

In the east are the beginnings of tributaries of Anderson's Creek, and York Town Rivulet.

To the south, country underlain by dolerite forms prominent hills of no fixed direction.

Along the coast, in the north-west, the sand forms a series of parallel ridges behind Seven Mile Beach while in the west, the plateau drops sharply 150 feet to the sea-level at Port Sorell.

GEOLOGY:

Pre-Cambrian: The principal rock types outcropping in this area are a series of schists, mainly quartz-mica, but with varying percentages of these minerals from micaceous schist to quartz schist. An excellent section of these rocks, generally at right angles to the strike, may be seen along the sea-coast from the eastern end of Seven Mile Beach to east of Badger Head. The strike of the beds is very constant at 330° although the dips vary considerably. The planes of schistocity, although extremely contorted agree generally with the bedding planes. Stringers and bunches of quartz, usually very barren-looking but occasionally containing specks of pyrite and copper pyrite are abundant but very irregular and never make into any definite reef for any real distance. Calcite is sometimes associated with this quartz. Occasionally narrow beds up to 50 feet of dark greasy schist, possibly containing some graphite, may be seen enclosed in the more normal type.

Although they form the main mass of a large anticline, the Pre-Cambrian beds are themselves contorted

and folded into many minor and at least three major folds within the anticline. Because of all this subsiduary folding it is rather difficult to estimate the thickness of these beds but it would appear that it is of the order of 4,000 feet. In age, they correspond to our older Pre-Cambrian rocks and are of the same period as the stretched-pebble conglomerates at Goat Island, further to the west.

Carbine Group: Succeeding the Pre-Cambrian rocks almost imperceptably are a series of slates, quartzites and sheared greywackes. This series has the same general strike as the Pre-Cambrian and indeed forms portion of the same anticline, but they are less contorted and minor folding, although present is less prevalent. Owing to the absence of fossils, it is not possible to assign an exact age to these rocks, but because of the amount of metamorphism they have suffered, and because they closely succeed the Pre-Cambrian rocks, they have been placed in the Carbine Group. This is a group of rocks, fairly common in Tasmania and occurring somewhere between the top of the Pre-Cambrian and the base of the Cambrian.

The base of this series is formed of beds of hard, white to bluish quartzite, but between the quartzites and the schists proper are narrow beds of micaceous slates which appear to grade into the schists. The quartzites are very siliceous and sometimes include cherty members and sometimes irregular seams of quartz and iron oxide. Outcrops on the shore-line weather to white sandstone.

Succeeding the quartzites are a series of black and grey slates, several hundred feet in thickness. They contain much carbonaceous matter and sometimes plentiful pyrite and sometimes mica as well as many irregular seams and bunches of apparently barren quartz. The cleavage is exceptionally well developed and more or less parallel to the bedding. In one place in Branch Creek the bedding was found to be 290° dipping south-west at 70° and the cleavage 310° dipping south-west at 80°. Small local foldings and distortions are common. Good exposures of these slates may be seen in Branch Creek and at low tide round the shores of Port Sorell between Branch and Brown's Creek.

Included in the slates are narrow beds of greywacke which show more intense shearing than the slates. A thin section of this rock was examined by Geologist G. Everard, who describes it as follows. "Light grey, fine grained, foliated rock. The principal minerals are quartz, felspar which is completely sericitised, fine granular pyrite and wisps of graphitic or carbonaceous material. Minute crystals of accessory minerals such as rutile and apatite occur in the sericite masses and quartz grains, which are oriented. There are also occasional small ferromagnesian fragments, probably augite. The quartz contains vesibles enclosing minute crystals of rutile in a fluid. The rock is a schistose greywacke.

Permian: To the south of the area, Permian rocks outcrop. These flat lying beds are in marked contrast to the under-lying folded older rocks and are sometimes separated from them by faulting, and sometimes form shore line deposits round their rims.

The principal rock type is a marine, siliceous, creamy mudstone, sparse in fossils, but some facies are more sandy and even gritty. In cuttings on the Coppermine Road between the Pandora Mine and the Holwell Road may be seen a conglomerate with large ill sorted pebbles. This is at the base of the Permian and occurs near the edge of the old Pre-Cambrian landmass.

These Permian rocks have been intruded by various bodies of Jurassic dolerite which have altered the margins to a greater or less extent. Near the Frankford Highway, west of the Saxon Creek Crossing the mudstones have been baked and changed to hornfels.

Pleistocene to Recent: It is rather difficult to present an adequate map of this area because so much of it is covered by Pleistocene or Recent deposits. The Pleistocene deposits consist of fairly large pebbles to boulders and although they appear to have no great thickness cover a large part of the western region. The pebbles are composed of chert, quartzite and West Coast Range Conglomerate and although some are very large and occur on top of present hills, they do not appear to be shed from close at hand because:-

1. They are well rounded and waterworn,

2. No outcrops of the conglomerates could be found,

3. The topography is not that of West Coast Range Conglomerates,

4. Outcrops of the carbine rocks sometimes protrude through the pebbles.

Between Sheepwash Creek and Bass Strait is a large area of country covered by Recent wind-blown sand. Along the shore the sand forms dunes parallel to the coast. The sand is nearly all silica and appears to contain few lime fragments.

IGNEOUS ROCKS:

Cambrian: In this area occur two distinct types of dolerite, which can be distinguished one from the other even in hand specimens. The older, which intrudes the Carbine rocks has been assigned to the Cambrian and is thought to be the intrusive equivalent of the Dundas lavas. Only two small patches of this rock have been found here. The first, which can be seen for a few feet in a road cutting on the Seven Mile Beach Road just beyond the Branch Creek bridge is in a very weathered state. It is well jointed and in the joints may be seen narrow veins of slip-fibre, blue asbestos, crocidolite. A thin section of this rock was examined by Geologist Everard who reports "Greyish green fine grained holocrystalline rock of subophitic texture. The principal minerals are felspar and augite, largely altered to chlorite. Ilmeno-magnetite altered to leucoxene, is the principal accessory. The felspar is labradorite, occurring in large lath-shaped crystals. Alteration to white mica has occurred together with the production of some albite. Augite

is colourless, but has been largely altered to chlorite and a small amount of amphibole of the reibeckite-glaucophane series has developed. A little quartz occurs in irregular grains. Both quartz and felspar contain vesicles filled with fluid and minute crystals of rutile. Ilmeno-magnetite has been converted to leucoxene in the titanous fraction leaving the magnetite as dark lines delineating the crystal structure. The rock is a dolerite, probably of lower Palaeozoic age".

Sixty chains to the west, on the shore of East Arm, is another small intrusion of this rock. No outcrop is visible but plentiful boulders are present along the shore and one hundred feet up the hill. A section cut from one of these pebbles showed "very fine-grained, greyish-green rock. The structure is of the inter-granular dolerite type. The largest crystals are felspars and these sometimes are of almost phenocryst dimensions. The bulk of the felspar, however, is in small lath-shaped crystals. Augite occurs interstitially between the felspars. A little augite occurs in large crystals penetrated by felspar laths. The mineral is largely altered to chlorite. Black opaque iron ore minerals are plentiful. Calcite and green zeolite occur in vesicles."

Many years ago a well was sunk at a farm a mile to the north of the previously mentioned intrusion and local rumour has it that asbestos was found in the rock through which it passed. Unfortunately it is now filled in and no trace of the material passed through exists, but it is probably another small intrusion of this dolerite.

Jurassic: In the south are much larger intrusions of Jurassic dolerite. These intrude the Permian sediments and are sometimes in the form of sills and sometimes of transverse bodies. It is an interesting fact that nowhere can this dolerite be seen actually intruding the older sediments, although there is a small isolated occurrence in the north at the eastern entrance to Port Sorell. The dolerite here however is entirely surrounded by sand. A detailed description of the rock will not be given here as it is the typical Tasmanian Jurassic dolerite that has been described in so many publications.

STRUCTURE:

The axis of a large anticline runs from Badger Head in a south south-easterly direction approximating to the crest of the Asbestos Range. In spite of an excellent section of Pre-Cambrian rocks exposed along the sea coast the exact position of this axis is masked by the complicated minor folding of these rocks. As well as many small folds of the order of less than one hundred feet across, there are three anticlinal axes sixty and one hundred and twenty chains respectively apart. The Carbine Group sediments have also suffered minor folding although in general they form part of the western leg of the anticline.

The Permian sediments to the south are not folded and thus appear in marked contrast to the older contorted rocks. Gentle warping is here and there apparent in the Permian Beds.

Faulting is not noticeably manifest in the area and only two major faults have been noted. One

of these courses at 315° and extends from Saxon Creek in the south to north of Branch Creek where it is cut off by a cross fault extending from East Arm in a north-easterly direction until it appears to become disappated in the Pre-Cambrian rocks. The first fault which separates Permian sediments from Pre-Cambrian has its down faulted block to the south-west.

ECONOMIC GEOLOGY:

This is not a very promising metallogenetic province in spite of the plentiful quartz, sometimes containing pyrite and chalcopyrite, occurring in the Pre-Cambrian and to a lesser degree Carbine rocks. The fact is that in Tasmania, these are not good host rocks, and although they nearly always contain abundant quartz it is rarely, if ever, found in persistent veins or lodes. The rocks themselves are so sheared and twisted that the quartz forms irregular bunches and stringers that make and fade out continuously. More over so much of this quartz is quite barren of metallic minerals.

However a certain amount of prospecting and development has taken place here.

THE PANDORA MINE:

This mine was visited and reported on by A. Montgomery in 1893, L. Hills in 1913, and P.B. Nye in 1923, but none of these geologists were enthusiastic of its prospects.

The workings are situated on the east bank of a tributary of Saxon Creek and within a few chains of the Coppermine Road, a jeep track connecting the Frankford Highway and the Holwell Road. They are about two and a half miles from the Highway and rather less from the Holwell Road.

The Pre-Cambrian schists here contain plentiful white quartz in the form of large irregular flat veins and smaller vertical stringers containing varying amounts of chalcopyrite and pyrite. Near the surface, much of the pyrite has apparently been leached out leaving cavities on the quartz. These deposits occur near the present boundary of the older rocks and the base of the Permian, a conglomerate series that can be seen in road cuttings not far above the mine.

The workings are all now inaccessible but they have been described by Montgomery and again quoted by Nye. The principal development is an adit driven from near the east bank of the creek in a north-easterly direction but branching at various points in many other directions indicative of the extremely irregular nature of the deposits. Winzes have been sunk at various places and a small outside shaft put down to the south-east of the adit.

A dump of material showing plentiful chalcopyrite may be seen on the side of the road and Montgomery mentions a parcel of five tons of the best material which assayed over 7% copper; but all this is hand picked material and the deposit could not be regarded as an ore of copper. It was hoped by both Geologists that

appreciable quantities of gold and silver might be present in the quartz, pyrite and chalcopyrite but Montgomery's sample showed only traces of both and Nye's no gold and trace of silver.

BADGER HEAD:

Ever since 1876 when copper was discovered along the sea-coast intermittent prospecting for copper and gold has taken place in the Badger Head District. The most important development was the sinking of a shaft within half a mile of Little Badger Head. This was said to be 70 feet in depth and to have passed through some copper bearing material but in the dump can only be seen quartz and calcite with a little iron pyrites. The quartz here in the Pre-Cambrian schists, is very irregular and barren-looking and does not appear to contain as much copper as at the Pandora.

GRAPHITE:

In 1920, a small lease was taken up on the shores of Port Sorell, near Marshall Creek for "Plumbago"; a company at present operating is interested in the black pyrite slates of Branch Creek as a source of graphite; and local report has it that some of the slaty material has been used in the past as a lubricant. In spite of all this, it is very doubtful if any graphite exists in these rocks at all and the greasiness is due to some other mineral. Carbon is present in these slates, but a sample sent to the Chief Chemist for the determination of graphite evoked the following comments. "Graphite absent". The black carbonaceous matter in these samples was cleaned by suitable treatment and tested for graphite by treatment to form graphitic acid. The test was negative, hence the material was not graphite. (Note: Testing a known sample of flake graphite in a similar manner, as a check, graphitic acid was obtained).

SULPHUR:

The black slates in Branch Creek contain varying amounts of iron pyrite and the Ben Lomond Mining Company has become interested in these as a source of sulphur. A description of these deposits is contained in a separate report. Suffice to say that the amount of pyrite present was found to be sufficiently encouraging to suggest that the Company undertake some minor development work so that adequate samples could be taken.

CLAY:

Round the shores of Port Sorell, near the mouth of Sheepwash Creek, and overlain by a few inches of sand and mud are beds of a fine white clay, probably Tertiary in age. No investigation of these has been made so far, but they may have some use in the future.

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