

# **EAGLE NICKEL LIMITED**

## **Exploration Licence EL 73/2007 Oonah (Takone)**

### **Annual Technical Report for the period 16 June 2009 to 15 June 2010**

**Electronic Versions:**

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## CONTENTS

	Page
1. ABSTRACT	3
2. TENEMENT DETAILS	4
3. LOCATION AND ACCESS	4
4. GEOLOGY	4
5. PREVIOUS EXPLORATION	5
6. WORK DONE DURING THE REPORTING PERIOD	6
7. PROSPECTIVITY	6
8. EXPENDITURE FOR THE YEAR ENDING 18/12/2008	8
9. CONCLUSIONS	8
10. REFERENCES	8
FIGURE 1 Tenement Location Map (Geotech International Pty Ltd, 2009)	9
FIGURE 2 Tenement Location Map showing Oil Shale and Coal Areas (Geotech International Pty Ltd, 2009)	10
FIGURE 3 Diagram of Stratigraphy of the Parmeener Supergroup	11
FIGURE 4 Geology of Tasmania (From Green, 1990)	12
FIGURE 5 Geology of the North of Tasmania (from Green, 1990)	13
Appendix 1	14

## 1. ABSTRACT

This report covers the exploration activities which have taken place on Exploration Licence EL73/2007 at Oonah, also known as Takone (the 'tenement'), for the period 16 June 2009 to 15 June 2010. The tenement holder, Geotech International Limited has recently handed over the operation of this tenement to Eagle Nickel Limited. The tenement includes areas with known coal and oil shale deposits, which are the current exploration targets.

During the period all available previous work was evaluated and the prospectivity has been appraised.

The tenement is close to Burnie and is very accessible with many roads and tracks. The forests covering the identified areas on the tenement where potential resources are to be explored for, are non-sterilised working forest areas.

The two main exploration objectives are:

- The black coal potential of the Preolenna area which appears to be limited by the faulted narrow dipping seams. However, very high oil yields have been reported from the contained cannel coal/oil shale horizons.
- The Oonah oil shale area which has had little exploration but is appears to be large and holds potential for open pittable specialized tasmanite deposits.

Eagle Nickel intends firstly, to find and develop oil shale deposits located close to the surface. The increase in oil prices and the availability of new technology may make known deposits which have been uneconomic to develop in the past, a much more favourable proposition.

Secondly, exploration will be carried out to ascertain if economic amounts of open-pittable coal resources are indeed present on the tenement.

## KEYWORDS

Geology/Mineralisation:	Permian Lower and Upper Parmeener Supergroup, coal, oil shale, tasmanites
Minerals/ Commodities:	Coal; Oil Shale; Tasmanites
Deposits/Occurrences:	Preolenna Coalfield Oonah oil shale
Exploration:	Data review, prospectivity

## 2. TENEMENT DETAILS

Tenement details are shown below:

<b>Exploration Licence</b>	EL73/2007
<b>Area</b>	Oonah (Takone)
<b>Tenement Holder</b>	Geotech International Pty Ltd
<b>Tenement Operator</b>	Eagle Nickel Limited
<b>Date Applied</b>	March 2008
<b>Date Granted</b>	16 June 2008
<b>Area</b>	114sqkm
<b>Annual Expenditure</b>	\$74,200
<b>Tenement Co-ordinates</b>	383 000E, 5439 000N

**Table 1 – Oonah Project Tenement Details**

## 3. LOCATION AND ACCESS

The Tenement surrounds the locality of Takone in NW Tasmania, as shown on Figure 1. The area is very accessible with many roads and tracks, and is about 25km from the port of Burnie. The potential resource area is situated in non-sterilised working forest areas.

## 4. GEOLOGY

Coal seams and an oil shale unit have been found to occur in two stratigraphic intervals within the Permian parts of the Lower and Upper Divisions of the Parmeener Supergroup within the Tasmania Basin. The Parmeener Supergroup is up to two kilometres thick, and has been subdivided into two divisions:

- the Lower Division, being predominantly marine; and
- the Upper Division, being wholly of freshwater origin.

There appear to be four different areas of prospectivity within the tenement (Figure 2), and are as follows:

### **Oil Shale at Oonah**

The oil shale at Oonah is found to lie above tillites, a restricted marine environment, towards the base of the Lower Parmeener Supergroup. The variety of oil shale is tasmanite, which occurs in only a few places world-wide. The kerogen of tasmanite occurs as particulate amber-colored discs (in reality, flattened sacs), having a distinct structure and clearly defined cell walls. The oil shale is thought to have formed in a quiet ecosystem of shallow bays, inlets and river estuaries in which algae were free to

multiply, resulting in kerogen formation from prodigious algae blooms when conditions were favourable for completion of the life cycle and "spore" build-up in the marginal marine waters. The unit is flat lying and is a window in a larger area of Tertiary basalt, with an intrusive Jurassic dolerite sill to the north.

### **Oil shale at Preolenna**

Preolenna is at a higher stratigraphic level than at Oonah. Bands of 'cannel coal' or torbanite have been found to occur within thin seams of black coal. It has been surmised that these may have been caused by concentrations of the alga *Reinschia*. The torbanite bands are lenticular, 23 to 60cm thick and are very rich in volatiles, in some reports they are referred to as 'oil shale'. Rogers (1934) reported very high oil yields (approximately 590 l/t).

### **Coal at Preolenna**

The Preolenna Coal Measures occur at the base of the Upper Parmeener Supergroup, as shown on the stratigraphic column in Figure 3.

This coalfield was reviewed by Bacon (1991) and correlated with the Mersey Coal Measures further east. The seams are thin, varying from 23 to 60 cm thick, dipping steeply at 14-25°, and are discontinuous as a result of being dislocated by faulting. Seams of coal crop out on the north-western bank of the Jessie Gorge near Preolenna and in the Flowerdale River valley south of Preolenna over a distance of three kilometres. Previous mining activity has taken place in both the Jessie Gorge (Preolenna Coal Mine) and in the Flowerdale River valley (Torbanhill or Meunna Coal Mine). Coal outcrops are also recorded from near Relapse Creek, south-west of Preolenna, and west of West Takone.

### **Oil shale occurrence on Cam River**

MRT maps show an oil shale occurrence on the Cam River near Tewkesbury in the east portion of the tenement, however little information is available, although it is reported as consisting of two areas, one near the point of confluence of the eastern branch with main stream, and the other one four miles west.

## **5. PREVIOUS EXPLORATION**

A substantial amount of work has been done previously on the tenement. In 1991 Bacon summarized past work done in the Preolenna area. She concluded that the potential for the coalfield for further exploration was limited because of the thin, lenticular nature of the seams, which dip steeply at 14-25°, and are dislocated by faulting. The inferred in-situ reserves of black coal are very small.

The Oonah oil shale was discovered by Reid in 1923, as recorded in the Mercury Newspaper. The "reserves" were quoted as 6 million tons. This reserve was repeated by Reid in 1924, and also repeated by Blake in 1928. The basis for the reserve calculation was not stated.

In 1944 Henderson conducted field sampling of the outcropping oil shale. He estimated oil yields of up to 95litres/t were reported from outcrop. However, follow-up work was poorly documented by a so-called extension officer, who reported narrow widths of the seams in trenches and pits. Henderson concluded that no reserves existed and there was no potential for commercial deposits.

More recently, Petroquest carried out a desktop review of prospectivity of northern Tasmania, including the Oonah area, and generated maps showing target stratigraphy. This was followed by a poorly documented amount of field work. Several areas were drilled, including at Oonah. The Petroquest map of the Oonah area shows that the target stratigraphy occurs over an area roughly 6 x 5km. However, there are no definitive results from the drilling programme, the holes were geologically logged, but MRT did not receive detailed data results

One hole intersected two 0.5m thick tasmanite layers and another intersected 1.0m of tasmanite, although the geophysical logs suggest that more extensive tasmanite layers exist, only a discussion of results is recorded. Unfortunately, a mismatch of geological logs and geophysical logs occurs in a number of holes and although the geophysical consultant recommended holes be re geologically logged, no descriptions or analyses of the intersected tasmanite have been recorded. MRT has no records of drilling in the Oonah area.

In 1984 CRA held part of the area and carried out a semi-academic review of the coal prospectivity.

## **6. WORK CARRIED OUT DURING THE REPORTING PERIOD**

Work during the period has consisted of an office based review of all past exploration data, government reports, drill data.

Eagle Nickel Limited engaged GHD to undertake a public domain literature search relating to material relevant to Tasmanian Oil Shale deposits, including Oonah. The resulting report addresses the initial stage of commercialization (see Appendix 1). In the report it is stated that 'Previous leaseholders have neither undertaken resource estimation nor characterization studies'.

GHD recommended that the path to commercialization includes:

- Acquisition and review of previous work done;
- A drilling programme to determine the extent, characteristics and grade of the resource;
- Identify options available to commercialise the resource, conduct an options selection study;
- Pre-feasibility and feasibility studies of the preferred option or options which will result on whether further exploration or development is viable.

## **7. PROSPECTIVITY**

Prospectivity for only coal and oil shale has been reviewed. The following prospective regions were identified by GHD in their report:

### **Oil Shale at Oonah**

As previously stated, there appears to be a large highly prospective area measuring approximately 6 x 5km, which contains a flat lying tasmanite unit(s), which are potentially open pitable. High oil yields of greater than 95litres/t are recorded for surface samples. From drilling and trenching, the thickness of the oil shale has been found to be between 0.3-1.0m and the area has the potential for open pit mining.

Tasmanite is potentially more valuable than “traditional” types of oil shale because the entire oil shale need not be retorted. The tasmanite spores can be recovered by flotation, thereby producing a higher yielding product, and potentially substantially lowering operating costs.

To date the tasmanite unit has been poorly tested and documented, mainly by means of the Petroquest drill program; which appears to be merely confirming the presence of tasmanite. A new program has been recommended and is under consideration, with emphasis to be placed on careful RL measurement of holes and careful geological logging and sampling.

### **Coal at Preolenna**

From previous reports reviewed, it is thought that due to the steeply dipping thin lenticular nature of the seams, which are distorted by faulting, the coalfield. The coal field is estimated to be 1.6 x 3.2km aligned along a north-east axis with coal seams varying from 23cm to 61cm in thickness. The potential may be limited and that the inferred in-situ reserves of black coal have been reported to be small (Bacon 1991).

Nevertheless the coal measures of the area hold potential for the oil shale as discussed below. Although coalbed methane has not previously been assessed, there may also be potential for its existence.

### **Oil Shale at Preolenna**

The reports reviewed have suggested that the oil shales are cannel coals, which are formed in terrestrial environments, as are the surrounding coal measures. These oil shales do not exist independently of the coal. However, the previously reported, extraordinarily high oil yields exceeding 500litres/t suggest that the oil shale’s original algal content may have been marine. Possibly a marginal marine environment may have occurred here, therefore, restricted lenses in an original marshy estuarine setting could exist.

It is recommended that the next phase of exploration be the collection of relevant material, if possible, from old mining areas or outcrops to confirm its high oil yields and after petrological examination, determine the coal type and origin. Once this has been completed, a suitable follow up exploration program should be undertaken to test the extent and quality of high oil yielding units.

### **Oil Shale at Cam River**

Little information is available regarding the prospectivity of this oil shale and the size of the deposit is thought to be small. The oil shale has been found in two areas: ‘one near the point of confluence of the eastern branch with main stream and the other larger one four miles west of it.’

## 8. EXPENDITURE FOR THE PERIOD

Expenditure for the reporting period is as follows:

Geological consultants	\$3,300
Salaries & Wages	\$13,676
Admin	\$3,150
Previous reported expenditure by Geotech International Pty Ltd	\$14,526
Total	\$34,652

## 9. CONCLUSIONS

The Tasmanian Government has created a reasonable amount of information incorporating previous resource information in relation to oil shale in Tasmania. One of the areas identified by the Report to the Tasmanian Government in 1926 by Nye, was Oonah.

Although GHD have reported from their research that the deposits are spread out and small, there is limited information and reports vary widely on the size and estimated resource potential of the Oonah tenement. It appears that there may well be extremely oil-rich shale present at very shallow depth, over an approximately 30sqkm area. The tenement is well accessed by roads and very close to the port facilities at Burnie.

From reviewing previous reports and as a result of the report commissioned with GHD, Eagle Nickel Limited propose carry out a more detailed exploration programme initially over the identified Oonah and Preolenna oil shale areas. Should the results of exploration indicate viable economic reserves of oil shale, future exploration may be carried out on the Preolenna coal beds.

## 10. REFERENCES

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GHD, January 2010. *Report for Tasmanian oil Shales Resource Review.*

Green, G.R., 1990. Palaeozoic geology and mineral deposits of Tasmania. In Hughes, F.E. (Ed.), *Geology of the Mineral Deposits of Australia and Papua New Guinea*, pp. 1207- 1223, The Australasian Institute of Mining and Metallurgy, Monograph 14, Melbourne.

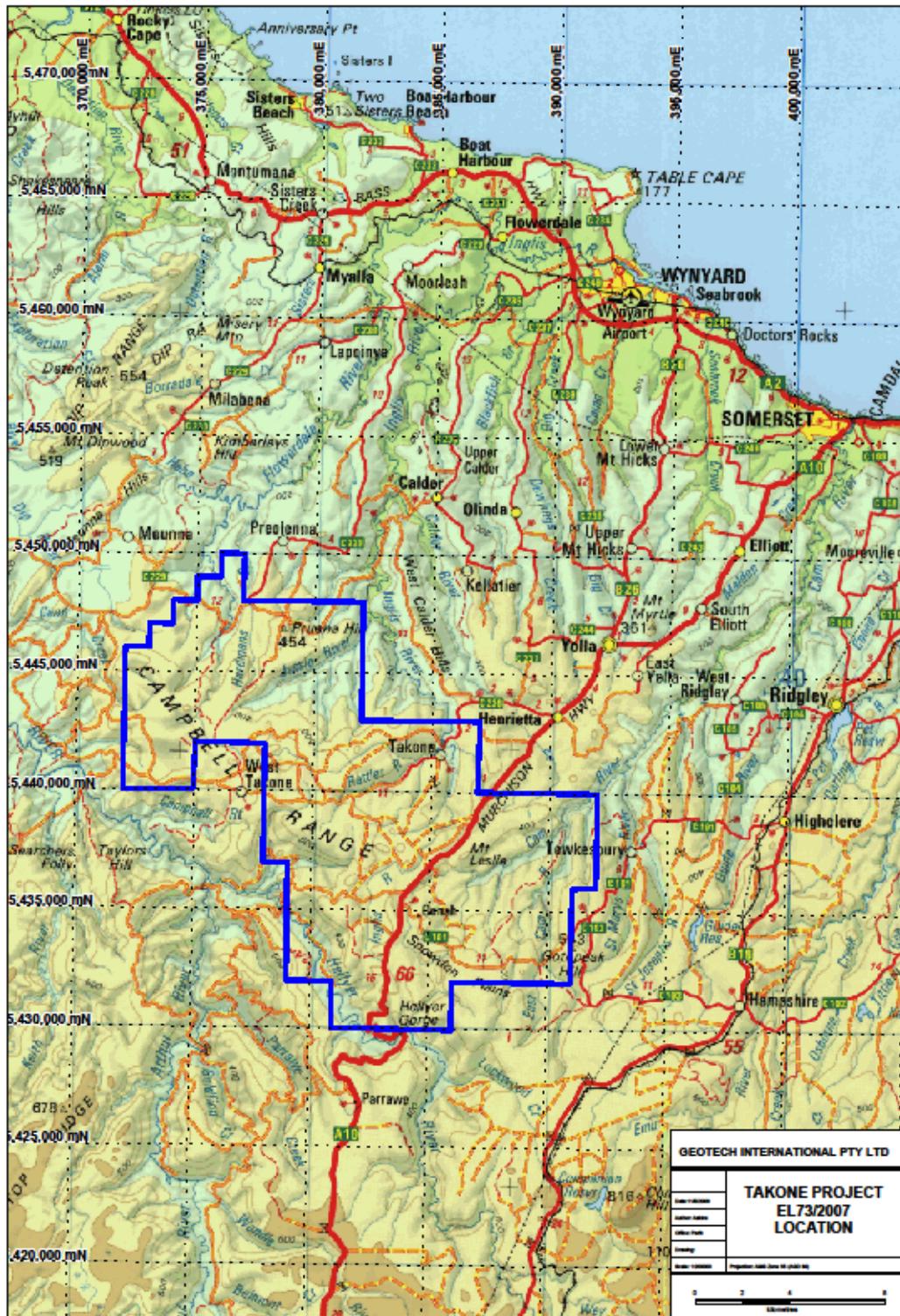


Figure 1. Tenement Location Map (Geotech International Pty Ltd, 2009)

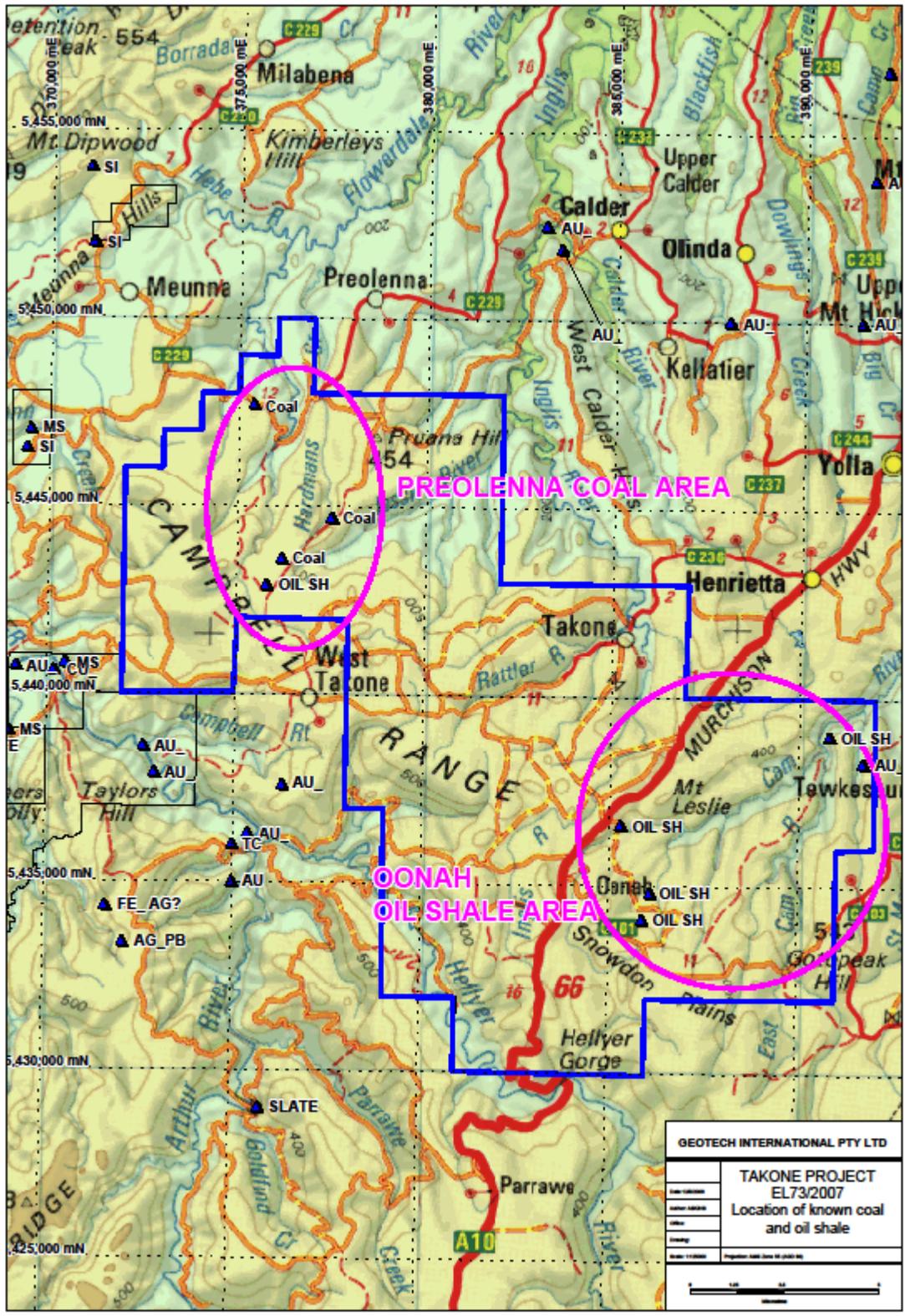


Figure 2. Tenement Location Map showing Oil Shale and Coal Areas (Geotech International Pty Ltd, 2009)

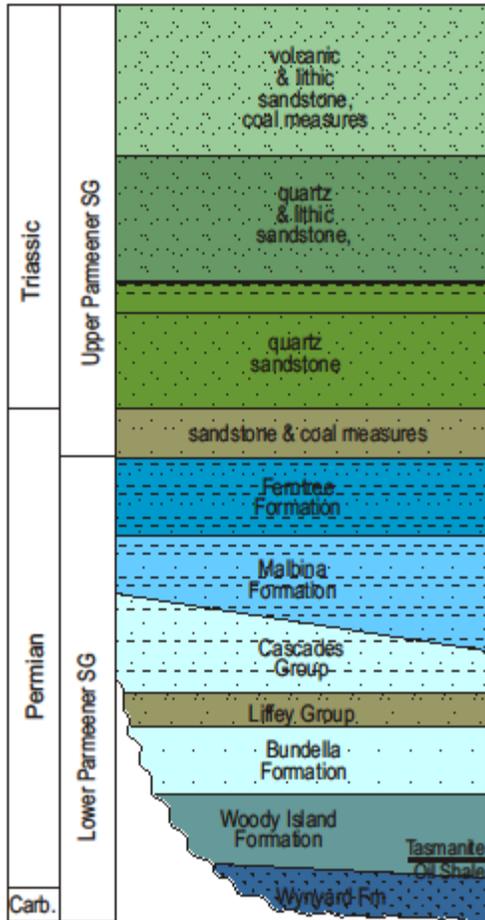
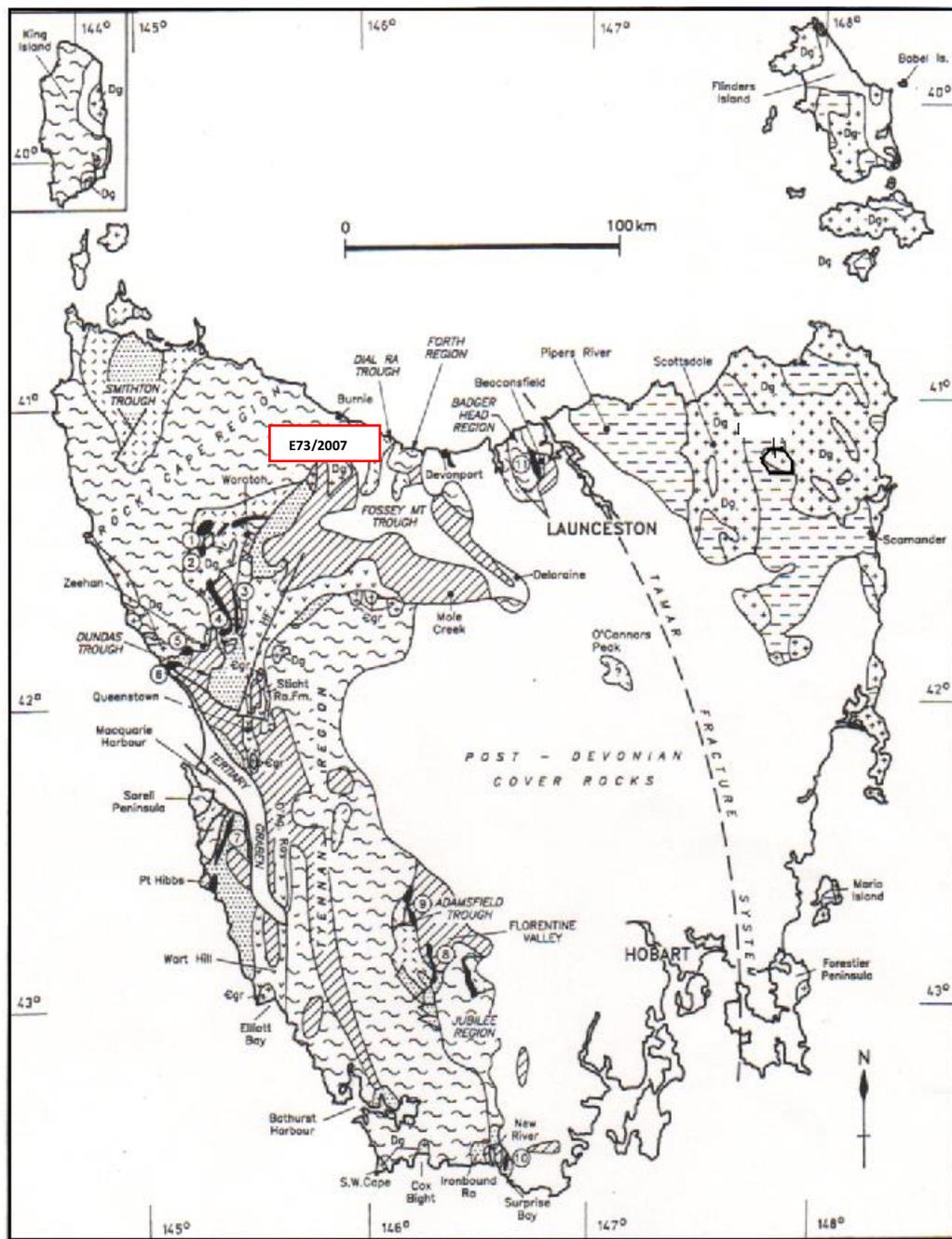


Figure 3. A generalised stratigraphic column and nomenclature for the Parmeener Supergroup. The Lower Parmeener Supergroup is divided into many local units (see Clarke, 1989), but is simplified here to broad units recognisable basin wide. The Upper Parmeener Supergroup nomenclature follows Forsyth (1989). FROM Raid & Burrett, (2004).

Figure 3. Diagram of Stratigraphy of the Parmeener Supergroup



Sketch geological map showing the distribution of major stratotectonic elements of the Lower to Middle Palaeozoic of Tasmania. Ultramafic-mafic complexes referred to in text are: 1. Heazlewood River; 2. Mount Stewart; 3. Huskisson River; 4. Serpentine Hill; 5. Melvros Hill; 6. Trial Harbour; 7. Cape Sorell; 8. Adamsfield; 9. Boyes River; 10. Rocky Boat Harbour; 11. Andersons Creek. The King Island scheelite deposits occur adjacent to the small granitoid plutons in the SE of the island. HF = Henty Fault; D'Ag. Ra. = D'Aguliar Range. After Corbett and Turner (1989), Williams (1978) and Brown (1986).

Figure 4 . Geology of Tasmania (From Green, 1990)

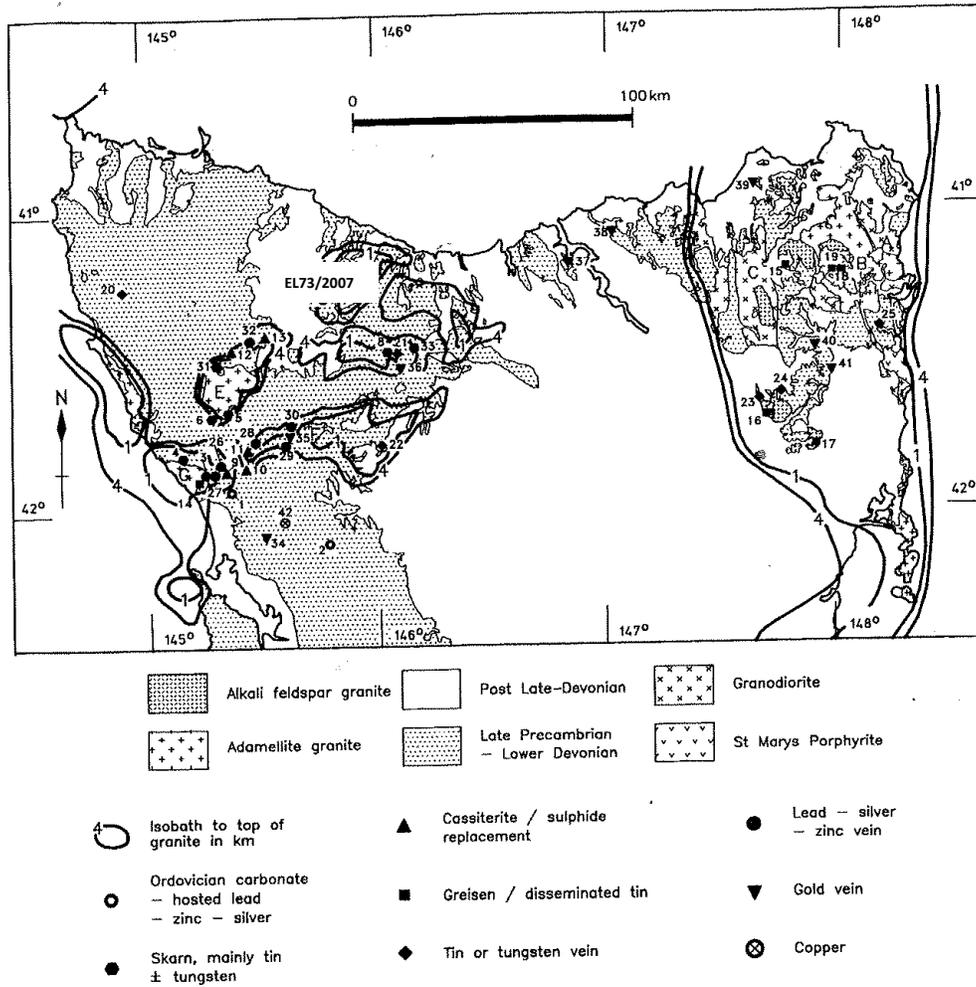


Figure 5. Geology of the North of Tasmania (from Green, 1990)

# **APPENDIX 1**

## **Report for Tasmanian Oil Shales Resource Review**