

## 2 ANGLESEA COAL MINE

### 2.1 Location Geology

Approximately 150 million years ago, stresses developed within the Australo-Antarctic continent led to the Australian land mass moving northwards. Along the southern coastline, a long rift valley stretching from Cape Jaffa (South Australia) to Point Hicks (Victoria) subsequently formed. This rift area gradually evolved into four basins – from the west, the Otways, Torquay, Bass and Gippsland.

The latter is well known for the enormous Latrobe Valley brown coal deposits. The Torquay Basin is of local importance as the rock section of Alcoa's Anglesea mine is formed within.

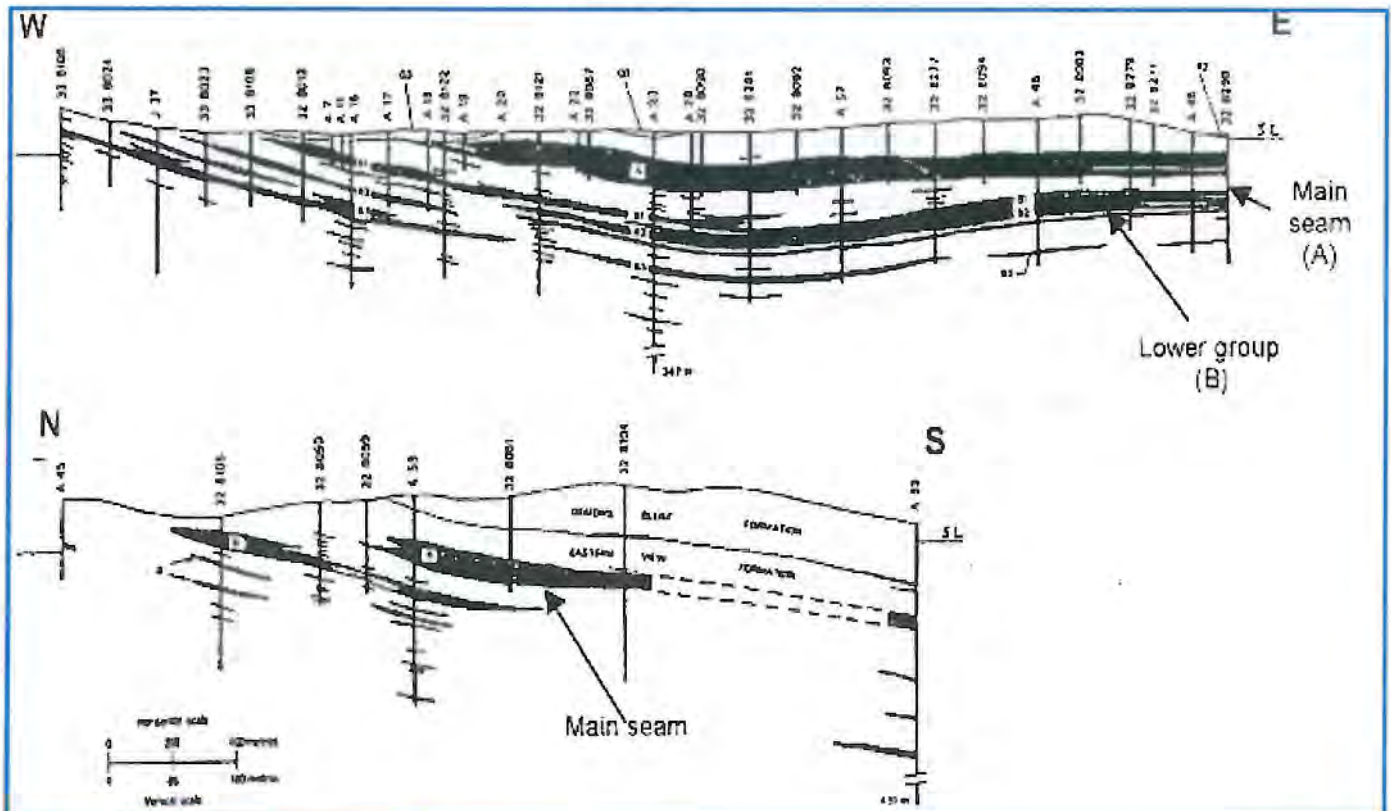
During the formation of these basins along the shorelines of the separating continent, gravels, sands, silts and clays were transported by streams to these areas and deposited within the spreading rift valley.

From approximately 80 million years ago, a series of water born deposits formed along the coastline from south of Aireys Inlet to Torquay. These included coaly materials such as trees and other plants and accumulated until approximately 40 million years ago. These deposits are known as the Eastern View group and as a result of further burial, the plant matter was compressed to form the current brown coal mined at Anglesea.

Two distinctly different major lithotypes are observable in the excavated sites

- the economic coal unit being recovered for the production of power, and
- the overburden coarse quartz sands and yellow clayey silts with prominent wavy structures.
- The coal seams can be divided into two main groups – the main seam (Group A) and the lower seam group (Group B) as shown below.

**Figure 1:** Anglesea Coal Field



### 2.2 Coal Characteristics

The Anglesea brown coal deposits were laid down some 40 million years ago.

Except for the coal at Benwerrin (Victoria) the Anglesea coal is of a higher grade than tertiary brown coal located elsewhere in Victoria. It is classified as a soft brown coal approaching the hard brown coal stage.

Samples of brown coal from more than 140 bores in the Anglesea field have been analysed in the 1950s and 1960s by what was then known as the Victorian Mines Department.

Alcoa also samples coal weekly and composites it into quarterly and monthly samples for analysis. This is represented in table below and is an average of data from 2000 to present.

**Table 1: Anglesea Coal Analysis**

		Mines Department Analysis	Alcoa Analysis
Moisture	% ar	46.2	44.7
Ash	% db	3.0	4.0
Volatiles	% db	49.8	48.3
Fixed carbon	% db	48.3	47.7
Carbon	% db	69.1	67.5
Hydrogen	% db	4.9	4.8
Sulphur	% db	3.9	3.3
Nitrogen	% db	0.7	0.6
Oxygen	% db	21.4	21.3
Calorific value (Gross dry)	MJ/kg	26.9	26.9
Calorific value (Gross Wet)	MJ/kg	14.4	14.9

### 2.3 Coal Reserves

Exploration for brown coal commenced in the later 1950's.

Roche Brothers commenced open-cut mining operations in 1959 with very little exploratory drilling and ended up mining in a seam of the lower group on the western limb of the known reserve. Results of exploratory drilling by the then Victorian Mines Department and Western Mining Corporation, together with additional Roche Brothers data, indicated a large economically viable field in the Salt Creek – Marshy Creek area immediately to the north of Anglesea. The drilling and subsequent interpretation realized a total proven reserve of 120 million tonnes of coal, divided into main and lower group seam formations. Western Mining Corporation then joined with Alcoa Inc. to form Alcoa of Australia Limited to establish an aluminium smelting industry in Australia. In 1961 Alcoa of Australia Limited was granted a long-term lease over the field, including a considerable tract of country to the north and west, referred to as the Mines (Aluminium Agreement ) Act1961 (MAAA)

Alcoa commenced open-cut mining operations in 1969 on a substantially larger basis than the Roche Brothers open cut, where output had dwindled from 169,000 tons in 1959 to 14,300 tons in 1968, largely as a result of falling customer demand.

Since 1969 Alcoa has mined approximately 1.1 million tonnes of brown coal each year from its established coal mine located in the south-east of the lease area. The current mine lies approximately in the center of a proven coal field that contains reserves to last over 100 years at the current rate of extraction from the start date of the mining operations.

Initially, Alcoa commenced open-cut mining in the central-eastern portion of the field and the open cut has progressively advanced west. Back filling and rehabilitation have taken place in areas that have been mined.

Other portions of the lease are known to contain some brown coal, but the extent of these reserves has not yet been fully defined but are thought to be largely uneconomic.

[Reference: Land Conservation Council – Melbourne Area, District 1 Review. Final Recommendations (June 1987)].

### 2.4 Mining Area

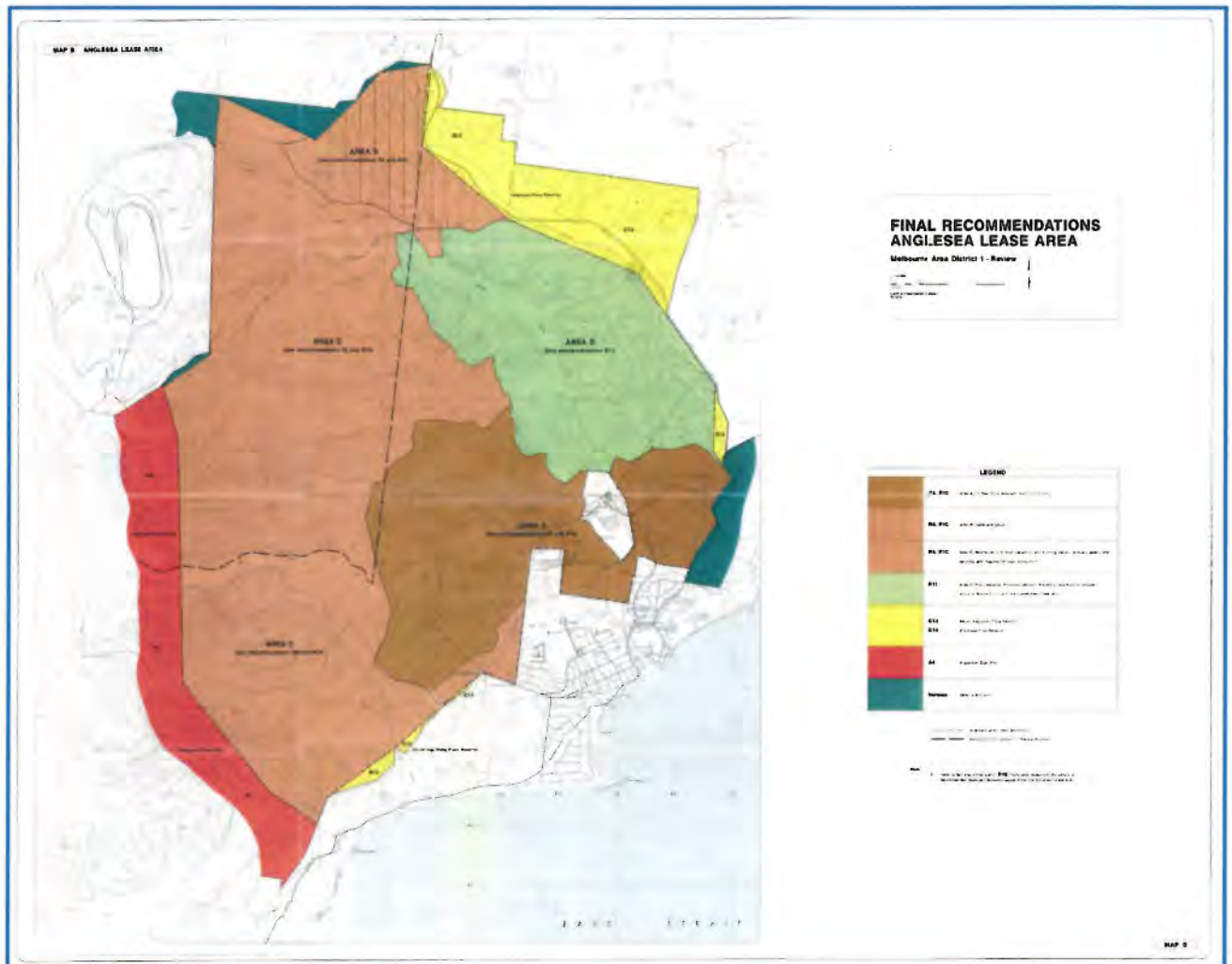
The Land Conservation Council has made numerous recommendations relating to the Anglesea Lease area with the resultant outcomes being documented in the Melbourne Area, District 1 Review (Final Recommendations) in 1987.

The areas referenced below are illustrated in Table 2 below.

**Table 2:** LCC Recommendations

R6	<p>That the area comprising areas A, B and C, continue to be available to Alcoa as specified in the Mines (Aluminium Agreement) Act 1961 for the mining of brown coal, exploration and associated works.</p> <p>Note: The area marked A includes the present work area and is known to contain coal reserves to last some 75 years at the current rate of extraction.</p>
R7	<p>That mining, where it is to proceed on part of the lease area outside the area marked A, should be subject of negotiated conditions between Alcoa and the government in order to minimize the impact on significant conservation values.</p>

The coal reserves and mining activities identified within this Work Plan and those mined before and following 1987, are all in compliance with the LCC recommendations as set out above.



**Figure 2:** LCC Map