1983/3. Introductory notes for a survey of the coal resources of Tasmania.

C.A. Bacon

Abstract

A series of unpublished reports on the coal-bearing areas of Tasmania is being produced by the Department. The format of these reports is outlined, together with a history of coal exploration in Tasmania and an outline of the Tasmanian Permo-Triassic stratigraphy.

INTRODUCTION

The last detailed study of the coal resources of Tasmania was that of Hills *et al.* (1922). Since that time, data from the coalfields has accumulated in a variety of forms, not all of which is readily accessible to interested parties. The present study aims to combine all the information gained from each coalfield since 1922 into a brief report on each area. These small reports may eventually be reproduced together as a bulletin on coal in Tasmania.

FORMAT OF REPORTS

Each report will cover a small portion of the State including one or more areas of coal-bearing potential. Information on each coalfield will be given under the following headings:

- Location and access
- General geology
- Previous mining history
- Recent exploration
- Coal quality
- Potential for further exploration

A geological sketch map of each coalfield, locating all known exploration activity (old mine workings, drill holes, costeans, coal outcrops), will accompany each report, along with a list of all known published data relevant to each area.

HISTORY OF COAL EXPLORATION IN TASMANIA

The early history of coal mining in Tasmania has been documented by Besford (1958). The following is mainly a brief summary of his work, but includes some information from other reports.

In 1793 the explorer Labillardiere recorded a horizontal vein of coal, 300 m long and 0.10 m thick in a large cliff face near South Cape, whilst he and a party had set out to climb Mt La Perouse from Rocky Bay, an inlet on Recherche Bay.

Coal was discovered on the banks of the Coal River near Pitt Water between September 1803 and February 1804 when the early settlement of Risdon Cove was under the command of Lieutenant Bowen.

In 1810 Governor Macquarie refused to grant land near the Coal River to a Major Geils, reserving instead the coal-bearing land for the Crown.

Seams at the headwaters of the Coal River, in the district later called Jerusalem (now called Colebrook), were discovered in 1813 and the Hobart Town Gazette of 15 June 1816 notes the discovery of coal on the north shore of Macquarie Harbour by a Dennis McCarthy.

Coal localities on the north shore of Adventure Bay on Bruny Island, the Coal River above Jerusalem, and Macquarie Harbour are marked on a map produced from a survey by a Captain Dixon who visited Tasmania in 1823 in the ship 'Skelton of Whitby'.

Whilst on a 'tour of discovery' around Tasmania with two boats and twelve convicts, J. Hobbs, in 1824 noted three seams of coal in sandstone cliffs at South Cape Bay (Hobbs' report is recorded in House of Assembly Paper 107 of 1881). One of these seams was worked briefly in 1826, but proved to be unprofitable due to the rugged nature of the country and distance from a port. Additional minor prospecting works were carried out in the 1830s on coal seams between Whale Head and South Cape.

The first mine to operate in Tasmania was at Saltwater River near Port Arthur, and convict labour was used. The first shipment of coal arrived in Hobart Town on 10 June 1834. Coal was mined from Slopen Island (now called Sloping Island) in 1836, again with convict labour.

The occurrence of coal in the Colebrook-Richmond area was first noted by Strzelecki (1845), and commented on further by Milligan (1849). Small mining works around the Douglas and Denison Rivers were underway in 1848.

Milligan (1849) commented on virtually all the known coal-bearing areas of the State, including those at Mt Nicholas, Fingal, and the east coast coalfields, and refers to two shafts sunk on the eastern side of Recherche Bay to investigate some 'inferior coal'.

Selwyn (1855) noted the occurrence of coal near Buckland (then called Prosser Plains). A detailed account of the workings in this area is given by Montgomery (1891).

Gould (1861*a*, *b*) recorded the coal occurrences on the east coast, on Mt Nicholas, and at Fingal and notes minor works had commenced in the Mersey coalfield at Tarleton.

The first commercial coal mining enterprise appears to be that of Charles Swanston, who, in 1840 formed a company to mine coal at Southport with some government assistance. The quantity of coal produced was small, the quality poor, and the mine quickly closed.

A small mine was worked at Richmond prior to 1841, and coal from Schouten Island was being marketed in 1844.

Coal was discovered between the Mersey and Don Rivers in 1850 and was worked by a series of short-lived small mines.

Gould (1869) records coal from the York Plains area, near Oatlands, where small scale mines were eventually operated.

Railways were opened from Launceston to Deloraine in 1871 and Hobart to Launceston in 1876. Comparative testing of coal from Mt Nicholas and imported Newcastle coal was undertaken on both lines in 1883. The Corners (Conara)-St Marys branch line opened in 1886, allowing the Fingal Valley and Mt Nicholas mines to substantially increase production.

Mining had commenced at Cygnet and at Sandfly by 1881 (Thureau, 1881), and near New Town by 1883 (Thureau, 1883*a*; Krause, 1883). Mining had also commenced in the Upper Derwent coalfield (Ouse-Hamilton-Mt Lloyd) at Lawrenny (now Hamilton) by 1883 (Thureau, 1883*b*).

Mining activity commenced on a small scale at Ida Bay in 1892, and in the same year 'cannel coal' was found in the Mt Pelion-Barn Bluff area. A small adit may still be seen near the Mt Thetis-Mt Ossa saddle.

Coal was found near Catamaran in 1900, near Preolenna in 1901, at George Town in 1904, and workings near Mt Christie and Mt Rex were described by Twelvetrees (1906). The Hastings-Strathblane coalfield was first mined in 1908.

Mining activities in these small coalfields was intermittent and largely disorganised. The Fingal-Mt Nicholas coalfield is the largest and has produced coal from a number of mines since coal was discovered in the area.

The old collieries on Mt Nicholas such as the Silkstone, Cardiff, Jubilee, and Cornwall have all been closed for some time. However one new mine, the Blackwood Mine owned by the Cornwall Coal Company, opened in 1980.

A small mine, the Fenhope, was opened in 1981 in the vicinity of the old Stanhope workings north of Avoca, and is currently worked solely by the owner.

A number of mines have operated in the Fingal area in the past, such as the Valley mine, Barbers Colliery, and Yates mines, which comprised the Cat and Kitten workings. The present Duncan Colliery is adjacent to the old Yates mine.

The three mines currently in production produced 396 000 tonnes of black coal in 1981-82, all of which is used by Tasmanian industry for steam-raising purposes and in the manufacture of cement.

The early explorers were most thorough in their efforts to uncover the mineral and energy resources of the State. No further significant coalfields have been found in recent years, although a good deal of information relating to the extent, coal seam thickness, quality and correlation of some coalfields has been accumulated since 1922.

RESERVE CALCULATION

Where the information is severely limited, no reserve calculation will be made. As far as possible reserve calculations will be made in accordance with Australian Standard 2519-1982. However with inferred reserves, the Department will deviate from the Standard in adding, in some instances, a qualifying factor. The reason for this is that the smallest class of *in situ* inferred reserve given by the Standard is "very small, less than 20 million tonnes".

For most of the smaller Tasmanian coalfields, the *in situ* inferred reserve is in the order of 1-5 million tonnes, significantly less than the maximum of 20 million tonnes envisaged by the Standard. The Department has adopted this practice in order to inform the reader that the reserve is not to be considered "up to 20 million tonnes", but is a very, very small *in situ* inferred reserve.

STRATIGRAPHY

Banks (1973) proposed the term 'Parmeener Super-Group' to include a widespread sequence of Late Palaeozoic to Early Mesozoic Tasmanian rocks. The strata are almost always horizontal or tilted at a low angle, and rest disconformably on folded Siluro-Devonian basement rocks.

Forsyth *et al*. (1974) further divided the Parmeener Super-Group into two broad lithostratigraphic units. These are; (a) a lower division (Lower Parmeener Super-Group) which includes all glacial and glaciomarine beds; and (b) an upper division (Upper Parmeener Super-Group) of essentially freshwater strata with some coal measure sequences.

The Lower Parmeener Super-Group is traditionally subdivided into three parts. From the base these are: a glaciomarine sequence (Lower Marine Sequence); a minor freshwater sequence (Lower Freshwater Sequence); followed by more glaciomarine sediments (Upper Marine Sequence).

The Upper Parmeener Super-Group is also traditionally divided into three parts. The lowest division is a coal measure sequence of variable thickness, consisting of massively bedded lithic arenite with interbedded minor mudstone, claystone, shale and thin workable coal. A Permian age has been established for this part of the sequence by finds of *Glossopteris* plant remains and a *Dulhuntyspora* microflora (Lewis, 1940; Banks and Naqvi, 1967; Balme, 1962; Farmer, 1979).

The middle division of the Upper Parmeener Super-Group consists of well sorted, clean, sparkling, massively bedded quartz sandstone which commonly displays a variety of fluvial structures. Spores from some of these rocks give a Triassic age but the exact stratigraphic position of the Permo-Trias boundary is not known (Farmer, 1979).

The upper division of the Upper Parmeener Super-Group consists of interbedded massive lithic sandstone, mudstone, shale, claystone, siltstone, coal and rare tuff. The sandstone comprises the bulk of the sequence, and frequently shows evidence of a fluvial origin such as crossbedding, ripple marks, lag deposits *etc*. Coal reaches sub-anthracite grade where affected by dolerite. All but a few small coalfields (*e.g*. Mersey, Cygnet) are found in this coal-bearing sequence.

Plant fossils are very common, especially in the shale beds accompanying the coal seams. A Triassic age for these rocks has been established from studies of both plant macrofossil and microfossil remains (Townrow, 1962) and vertebrate remains (Hills, 1958; Cosgriff, 1974; Banks *et al*., 1978).

The two lithostratigraphic divisions of the Parmeener Super-Group give two broad mappable units in the field not related to the chronostratigraphic boundary which passes through the lower part of the Upper Parmeener Super-Group. Some confusion exists in the literature, with earlier workers deciding rocks were either 'Permian' or 'Triassic' in the field.

The coal seam stratigraphy envisaged by Hills *et al*. (1922) is far too simple to be useful. The notion of eight coal seams stretching over the State from north to south in a 'layer cake' fashion is known to be incorrect. Hills *et al*. (1922) named the seams alpha, beta, gamma, delta, eta, theta, iota, and kappa, and supposed the same seams could be seen in many coalfields.

The Parmeener Super-Group sediments have been extensively intruded by Jurassic dolerite in the form of dykes, sills, and transgressive and concordant sheets, with most dolerite bodies taking the form of concordant or near-concordant sill-like sheets (McDougall, 1962), which may be up to 500 m in thickness. Structural features of dolerite intrusion are given in Leaman (1972; 1975).

Most of the intrusive activity has been into sediments of the Upper Parmeener Super-Group, where a number of intrusions occur in some stratigraphic sequences (eight intersections of dolerite were recorded in DOM DDH 64 on Fingal Tier). Dolerite caps large areas of Upper Parmeener Super-Group sediments, causing exploratory drilling to be an expensive, but necessary procedure. Chilled margins on sediments adjacent to dolerite bodies seldom extend more than 1-2 m into the host rock.

CALORIFIC VALUE - SPECIFIC ENERGY

Most historical analyses record the energy value of coal samples as 'calorific value', measured in British Thermal Units per pound of coal (BTU/lb). Modern analyses record the energy value as 'specific energy' (SE), measured in megajoules per kilogram (MJ/kg). To convert BTU/lb to MJ/kg, multiply by 0.00232. A coal with a calorific value of 11240 BTU/lb has a specific energy of 26.1 MJ/kg.

REFERENCES

BALME, B.E. 1962. Some palynological evidence bearing on the development of the *Glossopteris* flora, *in* LEEPER, G.W. (ed.). *The evolution of living organisms:* 269-280. Melbourne University Press.

BANKS, M.R. 1973. General geology, *in* BANKS, M.R. (ed.). *The Lake Country of Tasmania:* 25-34. Royal Society of Tasmania : Hobart.

BANKS, M.R.; COSGRIFF, J.W.; KEMP, N.R. 1978. A Tasmanian Triassic stream community. *Aust.nat.Hist.* 19:150-157.

BANKS, M.R.; NAQVI, I.H. 1967. Some formations close to the Permo-Triassic boundary in Tasmania. *Pap.Proc.R.Soc.Tasm.* 101:17-30.

BESFORD, D. 1958. Coal in Tasmania. *Tech.Rep.Dep.Mines Tasm.* 2:127-143.

COSGRIFF, J.W. 1974. Lower Triassic Temnospondyli of Tasmania. *Spec.Pap. geol.Soc.Am.* 149.

FARMER, N. 1979. Geological atlas 1:250 000 series. Sheet SK-55/8. Hobart. *Explan.Rep.geol.Surv.Tasm.*

FORSYTH, S.M.; FARMER, N.; GULLINE, A.B.; BANKS, M.R.; WILLIAMS, E.; CLARKE, M.J. 1974. Status and subdivision of the Parmeener Super-Group. *Pap.Proc.R.Soc.Tasm.* 108:107-109.

GOULD, C. 1861*a*. Report on Mersey coalfield. *House of Assembly Paper Tasmania.* 1861 (135).

GOULD, C. 1861*b*. Coalfields (Fingal and East Coast), report of Government Geologist. *House of Assembly Paper Tasmania.* 1861 (9).

GOULD, C. 1869. Coal south of Oatlands. *House of Assembly Paper Tasmania.* 1869 (18).

HILLS, E.S. 1958. A brief review of Australian fossil vertebrates, *in* WESTOLL, T.S. (ed.). *Studies on fossil vertebrates;* 86-107. Athlone Press : London.

HILLS, L.; REID, A.M.; NYE, P.B.; KEID, H.G.W.; REID, W.D. 1922. The coal resources of Tasmania. *Miner.Resour.geol.Surv.Tasm.* 7.

KRAUSE, F. 1883. Report on the New Town coal deposits. *House of Assembly Paper Tasmania*. 1884 (59).

LEAMAN, D.E. 1972. Gravity survey of the Hobart district. *Bull.geol. Surv.Tasm.* 52.

LEAMAN, D.E. 1975. Form, mechanism, and control of dolerite intrusion near Hobart, Tasmania. *J.geol.Soc.Aust.* 22:175-186.

LEWIS, A.N. 1940. Record of *Glossopteris* from Cygnet. *Pap.Proc.R.Soc. Tasm.* 1939:95-96.

McDOUGALL, I. 1962. Differentiation of Tasmanian dolerites: Red Hill dolerite-granophyre association. *Bull.geol.Soc.Amer.* 73:279-315.

MILLIGAN, J. 1849. Reports on the coal basins of Van Diemen's Land. *Proc.R.Soc.V.D.L.* 1:1-81.

MONTGOMERY, A. 1891. Report on the proposal to bore for coal in the township of Triabunna, Spring Bay, and its neighbourhood. *Rep.Sec. Mines Tasm.* 1890-91:15-22.

SELWYN, A.R.C. 1855. Report on the geological relations of some of the coal seams of Van Diemen's Land, their probable extent and relative economic value. *Pap.Proc.R.Soc.V.D.L.* 3:116-114.

STRZELECKI, P.E. 1845. *Physical description of New South Wales and Van Diemen's Land*. Longmans : London.

THUREAU, G. 1881. Report on the southern coal measures at Sandfly. *House of Assembly Paper Tasmania*. 1881 (109).

THUREAU, G. 1883*a*. The carboniferous deposits near New Town. *House of Assembly Paper Tasmania*. 1883 (3).

THUREAU, G. 1883*b*. Hamilton and Ouse coal deposits. *House of Assembly Paper Tasmania*. 1883 (111).

TOWNROW, J.A. 1962. Triassic palaeontology, *in* SPRY, A.H.; BANKS, M.R. (ed.). The geology of Tasmania. *J.geol.Soc.Aust.* 9(2):224-226.

TWELVETREES, W.H. 1906. On coal at Mt Rex. *Rep.Sec.Mines Tasm.* 1905:1-8.

[1 February 1983]