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1984/22. The Denison Rivulet coalfield.

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Abstract

The Denison Rivulet coalfield is located to the south of and adjoining the Douglas River coalfield. Coal seams exposed in the area are thin, and banded with mudstone. Some small scale mining activity occurred during the 1850's, and prospecting activities have been intermittent since that time. An outcrop of air-fall tuff in the Denison Rivulet has been dated using K-Ar geochronology at 214 ± 1 million years. Whilst the area is of interest, the future potential of the field is limited.

LOCATION AND ACCESS

The Denison Rivulet coalfield lies to the south of the Douglas River coalfield, and includes the land for several kilometres on both banks of the Denison Rivulet.

Access to the eastern part of the coalfield is from the Tasman Highway. The central and northern parts of the coalfield are not easily accessible, although a rough track from Ferndale Road around Mt Andrew provides access to the middle reaches of the Denison Rivulet.

GENERAL GEOLOGY

The geology of the Denison Rivulet coalfield has been mapped by Leaman and Richardson (1981) and Sansom (1979).

No rocks older than Triassic in age are known to crop out in the area. However, in Department of Mines Bicheno DDH5, collared at five metres a.s.l., the sequence intersected was 217 m of lithic sandstone, interbedded with mudstone, siltstone and minor coal; followed by 124 m of glaciomarine mudstone. The hole terminated in quartzwacke and slate (Mathinna Beds).

The lithic sandstone sequence belongs to the Upper Division of the Parmeener Super-Group, which elsewhere in the north-east unconformably overlies a glaciomarine sequence, the Lower Division of the Parmeener Super-Group.

The sedimentary sequence has been extensively intruded by Jurassic dolerite, which now caps the plateau country and hills around the Denison Rivulet.

Positive gravity anomalies along the southern side of the Denison Rivulet valley enclose a small pocket of coal measures, although sizeable dolerite dykes are considered to be present in the area (Leaman and Richardson, 1981).

Dolerite talus thickly mantles the valley slopes, obscuring outcrop. The Denison Rivulet has cut a deep channel through the dolerite and talus, exposing the Triassic lithic sandstone sequence which contains occasional coal outcrops.

Alluvial sand and gravel covers the coastal plain at the eastern end of the coalfield.

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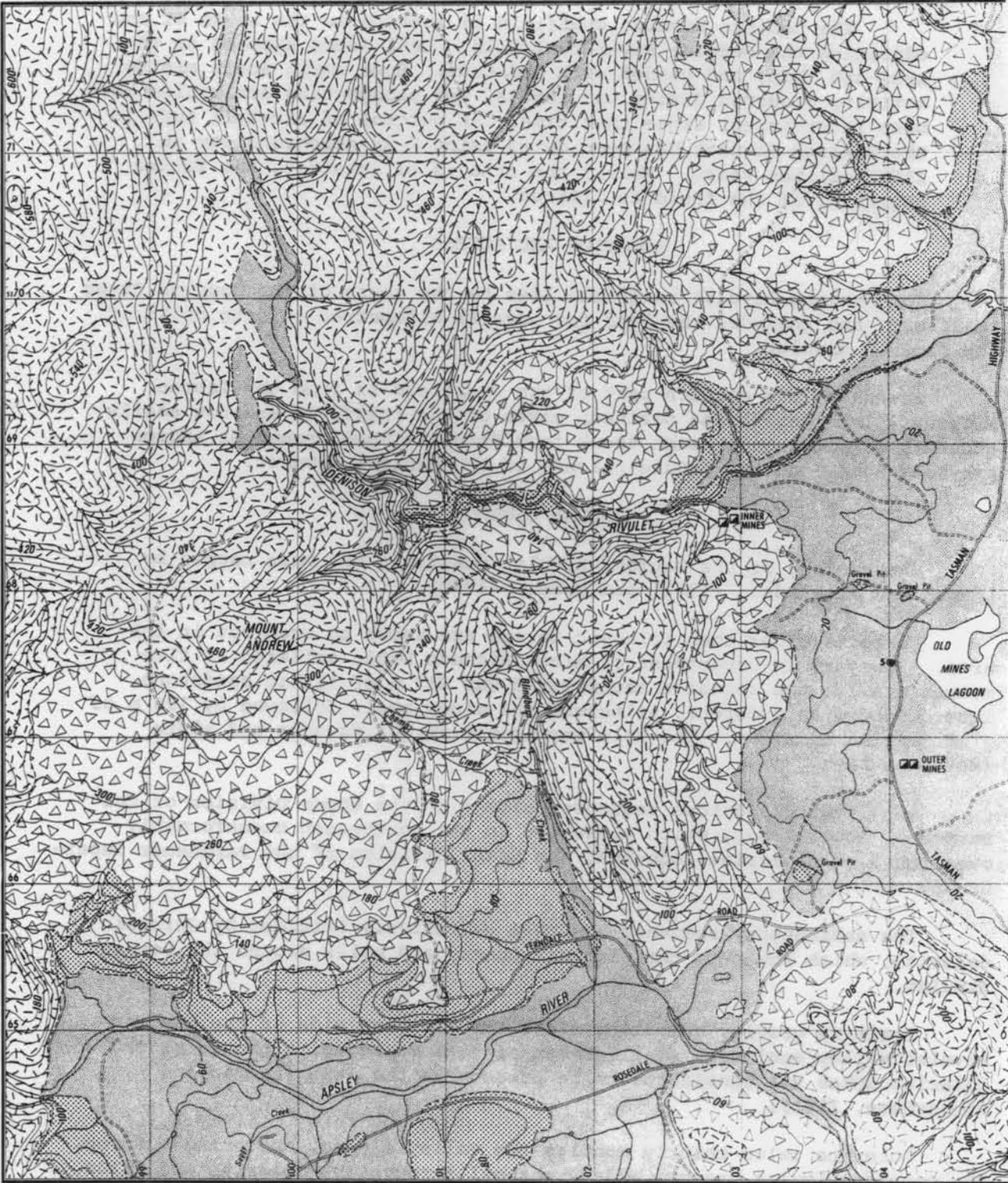
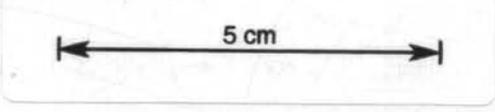
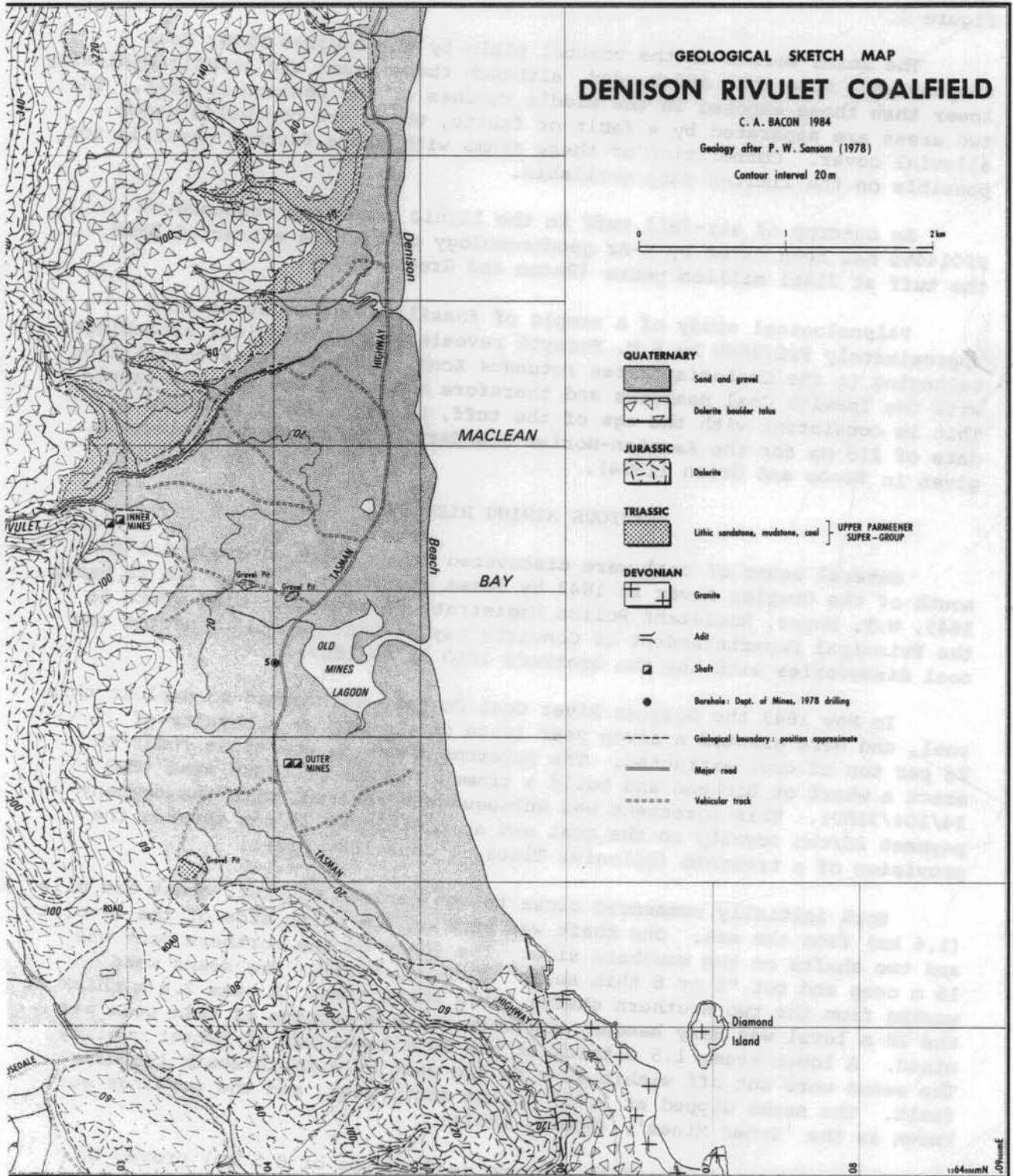


Figure 1





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The coal seams exposed in the Denison Rivulet belong to the upper part of the lithic sandstone sequence. The seams are thin (<1 m thick) and extensively banded. Sections recorded from various outcrops are given in Figure 2.

The seams worked on the coastal plain by the Douglas River Coal Company were also thin and banded, although these seams are stratigraphically lower than those exposed in the middle reaches of the Denison Rivulet. The two areas are separated by a fault or faults, which are concealed under alluvial cover. Correlation of these seams with those further north is not possible on the limited data available.

An outcrop of air-fall tuff in the lithic sandstone sequence at FP014686 has been dated by K-Ar geochronology on biotite extracted from the tuff at 214 ± 1 million years (Bacon and Green, 1984).

Palynological study of a sample of fossiliferous mudstone from approximately FP032688 by S.M. Forsyth revealed a palynological assemblage belonging to the *Craterisporites rotundus* Zone, which suggests correlation with the Ipswich Coal Measures and therefore a Karnian age for the sample. This is consistent with the age of the tuff, as Webb (1981) proposed a date of 215 Ma for the Karnian-Norian boundary. The spore assemblage is given in Bacon and Green (1984).

PREVIOUS MINING HISTORY

Several seams of coal were discovered in a creek bed about 6.5 km south of the Douglas River in 1843 by Jesse and Isaac Garland. On 12 March 1843, W.T. Noyes, Assistant Police Magistrate of Waterloo Point wrote to the Principal Superintendent of Convicts saying that he had inspected the coal discoveries with the two brothers (CSO 22/84/1807).

In May 1849 the Douglas River Coal Company was formed to exploit this coal, and were granted a seven year lease on payment of a royalty of 2d per ton of coal extracted. The government was to use these funds to erect a wharf at Bicheno and build a tramway to the proposed mine (CSO 24/104/3280). This agreement was subsequently altered, with the company payment 2d/ton royalty on the coal and an additional 2d/ton towards the provision of a tramroad (Colonial Times, 1 June 1884, p2).

Work initially commenced close to the Denison Rivulet, about one mile (1.6 km) from the sea. One shaft was sunk on the north side of the rivulet and two shafts on the southern side. The shaft on the northern bank was 15 m deep and cut "5 or 6 thin seams" (Selwyn, 1855). Two seams were worked from the two southern shafts for a short time. A seam 2.4 m thick at the 28 m level was very banded, and only a 1.2 m section of this seam was mined. A lower seam, 1.5 m thick at the 50 m level was of better quality. The seams were cut off within 50 m to the west by a north-south trending fault. The seams dipped at 1.75° to the south-west, and the workings were known as the 'Inner Mines', (Gould, 1861).

Transporting the coal to Bicheno (a distance of 6.5 km) proved to be very costly, and after raising some 800 t of coal, work was transferred to south of the lagoon (now Old Mines Lagoon) where four shafts and a number of bores were sunk. These workings were known as the 'Outer Mines'. Two seams were encountered in the shafts, a minor seam at 27.4 m, and a larger seam 31 m below this, from which the company extracted small quantities

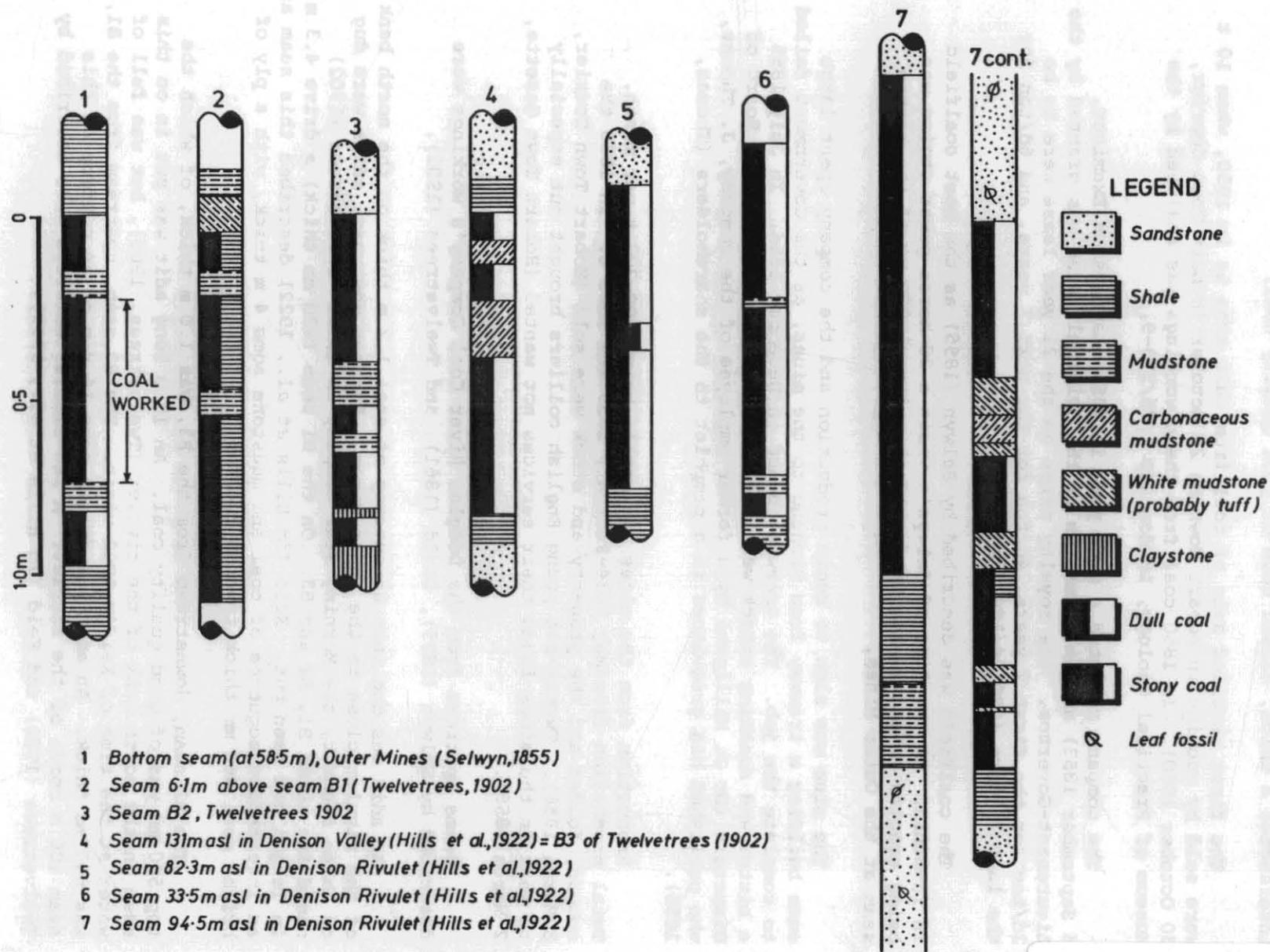


Figure 2. Seam sections, Denison Rivulet.

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of coal (Gould, 1861). The dip of the seams was 3° to the north-east. A wooden tramway was laid from the Outer Mines to Bicheno.

Selwyn (1855) also noted that two shafts in addition to those at the Inner and Outer Mines were dug, one at 'Badger's Bridge' by a Mr Lyne and another in a gully above the first one. The Badger's Bridge shaft intersected a thick, banded seam of poor quality coal.

The first recorded sale of coal from this area is in 1850, when 10 t were sold by auction in Hobart Town on 28 October (Hobart Town Courier, 30 October 1850). In 1850 coal from these workings was analysed by the Museum of Practical Geology, London (GO 1/78/373-9).

The company reported a good year in 1853 (Launceston Examiner, 6 September 1853) and an extension of the original lease was granted by the Lieutenant-Governor. The royalty rates on the 21 year lease were to be 2d/ton for the first 7 years, 4d/ton for the next 7 years, and 6d/ton for the last 7 years (CSO 24/104/3280).

The coalfield was described by Selwyn (1855) as the best coalfield in Tasmania. At the time of Selwyn's visit a 20 horse-power engine was being erected to aid in the mining of the central 500 mm of the bottom seam at the Outer Mines.

The mine was slow to begin production and the company spent large sums building a tramway from Bicheno to the mines, as the Government failed to complete the job. The tramway opened in December 1854. In July 1855 a bitter and scathing attack was launched on the chairman of the Board of Directors (Dr J. Milligan) by a former employee of the company, J. Thomas, who published his grievances in a pamphlet to the shareholders (Thomas, 1855).

Production from the mines was small, being 100-200 t per month. Total production from May 1854-February 1855 was 1800 t. In 1858 the company folded and the property and stock were sold (Hobart Town Courier, 8 March 1858). Twenty-one young English colliers brought out especially to work in the mines found their services not wanted (Hobart Town Gazette, 2 March 1858).

Seams upstream from the Douglas River Coal Company's workings were described by Selwyn (1855), Gould (1861), and Twelvetrees (1902).

An adit was dug into an outcrop of coal 1.2 m thick on the north bank of the rivulet close to the Inner Mines. Further upstream, adits were dug on three seams by the Morning Star Company in 1898. Twelvetrees (1902) named the seams B1, B2 and B3. On the B1 seam (430 mm thick) a drive 4.3 m in length had been cut. Keid (*in Hills et al.*, 1922) described this seam as an interbedded sequence of coal and mudstone some 4 m thick, with a ply of bright coal 460 mm thick towards the top.

The B2 seam, downstream from the B3, was 1.0 m thick, of which the top 500 mm was of good quality coal. An 18 m long adit was put in on this seam on the north bank of the rivulet (Twelvetrees, 1902), but was full of water at the time of Keid's 1922 visit. The B3 seam, upstream from the B1, was 860 mm thick. An adit was driven some 16.8 m on an outcrop of this seam 100 m north of the rivulet. A few smaller outcrops were described by Twelvetrees (1902) and Keid (*in Hills et al.*, 1922).

Two leases for coal were held in the Denison Rivulet area from 1904

to 1908 by N. Weetman, but there is no record of any work being done.

A mining lease covering part of the Denison Rivulet coalfield was held by the Mt John Mining Company from 1916 to 1925. During this time Keid (*in Hills et al.*, 1922) made an inspection and noted the previously dug adits, which he stated were dug by the Mt John Mining Company.

Leases were held from 1930 to 1932 over an area covering the former Inner and Outer Mines but there is no record of any further work being done.

Two adits may be seen in the bed of the Denison Rivulet at FP013686 and FP017687.

COAL QUALITY

The following analyses are for coal samples from the Denison Rivulet coalfield:

Analysis	1	2	3	4	5	6
<i>Proximate analysis</i>						
Moisture (%)		5.6	5.00	6.3	4.9	4.4
Ash (%)	14.50	6.0	6.85	5.6	13.1	17.30
VCM (%)		32.4	33.00	33.5	28.9	24.80
FC (%)		54.8	55.15	54.0	53.1	53.50
<i>Ultimate analysis</i>						
Carbon (%)	70.44					60.66
Hydrogen (%)	4.20					4.36
Oxygen (%)	9.64					16.83
Nitrogen (%)	1.12					1.23
Sulphur (%)	0.70	0.60		0.6		0.62
Specific energy (MJ/kg)						23.8

1. Sample from Inner Mines, analysed at Museum of Practical Geology, London, 26 July 1850.
2. Sample from seam B1 (432 mm thick), analysed by Government Analyst (Twelvetrees, 1902).
3. Sample from seam B1 (432 mm thick), analysed 1898 (Twelvetrees, 1902).
4. Sample from seam B2 (500 mm thick), analysed by Government Analyst (Twelvetrees, 1902).
5. Sample from seam B3 (760 mm thick), analysed by Government Analyst (Twelvetrees, 1902).
6. Sample from face and tunnel at altitude 130 m on northern bank of stream; sample 533 mm thick, from two lowest plies of seam (Hills et al., 1922). Seam = B3 of Twelvetrees (1902).

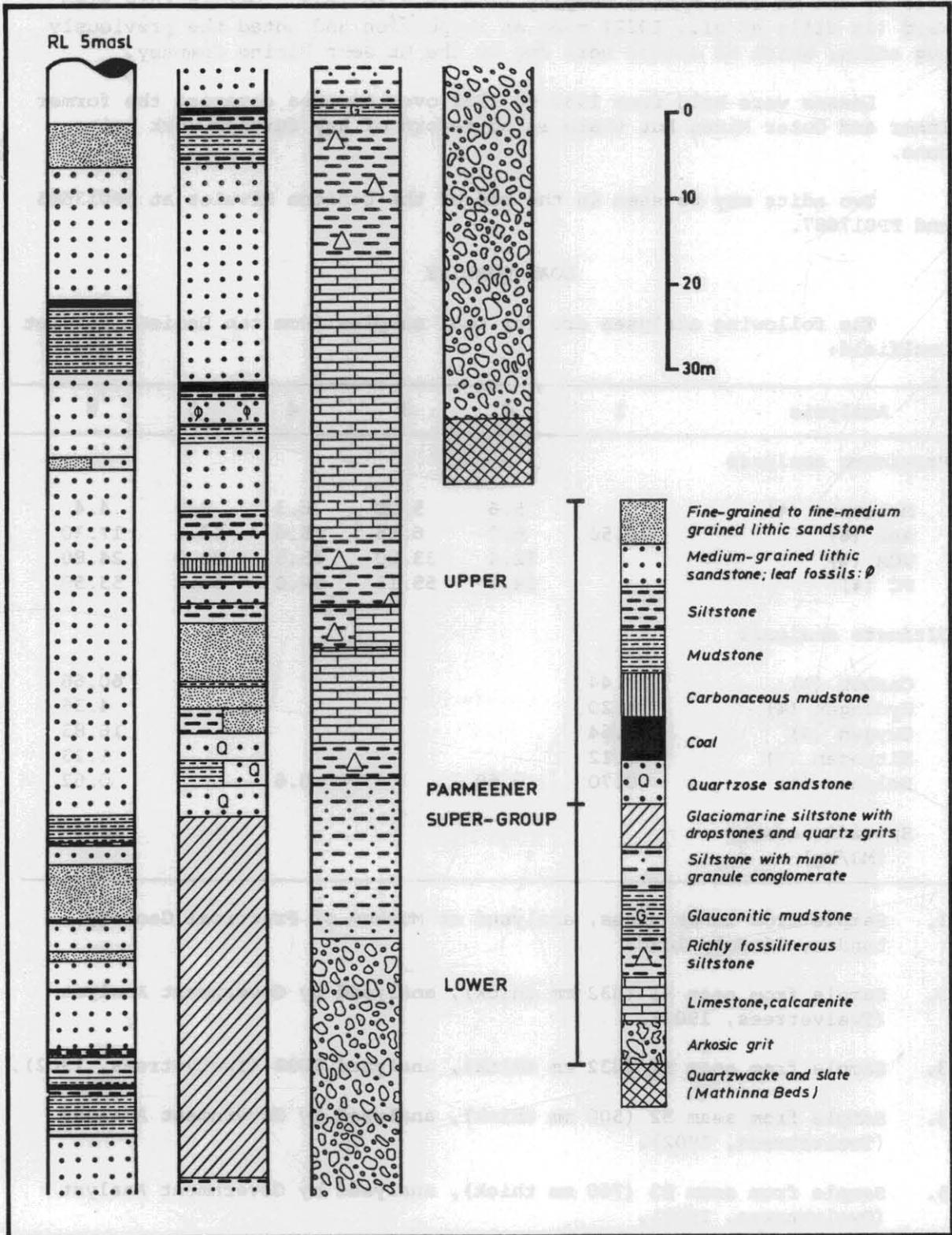


Figure 3. Lithological log, Department of Mines Bicheno DDH5.

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RECENT EXPLORATION

Although a number of drill holes were sunk by the Douglas River Coal Company in the 1850s, no records of these are available. A drilling programme for the area was suggested by Nye (1927). More recently, in 1979, a hole (DOM Bicheno DDH5) was drilled by the Department of Mines near Old Mines Lagoon. This hole was one of several drilled to provide control points for an extensive gravity survey of the East Coast coalfields (Leaman and Richardson, 1981). The graphic log of this hole is given in Figure 3. Historical accounts of the early discovery and mining in the area are given by Milligan (1849), Selwyn (1855), Gould (1861), Twelvetrees (1902), and Keid (*in Hills et al.*, 1922).

The coalfield has been mapped by Sansom (1979) and currently forms part of Exploration Licence 5/61, held by the Shell Company of Australia.

POTENTIAL FOR FUTURE EXPLORATION

Combined with the Douglas River and Dalmayne coalfields to the north, the area is of interest for further exploration. The inferred coal reserve of the coalfield cannot be calculated on the information available.

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CSO = records of the Colonial Secretary's Office.
GO = records of the Governor's Office.

[6 April 1984]

APPENDIX 1

AMG references of boreholes and workings in the Denison Rivulet coalfield.

INNER MINES (DOUGLAS RIVER COAL COMPANY'S WORKINGS)

AMG reference	Working	Elevation (m)
FP030685	Shaft	≈45
FP029685	Shaft	≈55

OUTER MINES (DOUGLAS RIVER COAL COMPANY'S WORKINGS)

AMG reference	Working	Elevation (m)
FP041668	Shaft	≈10
FP042668	Shaft	≈10

ADITS (MORNING STAR COMPANY'S WORKINGS)

AMG reference	Elevation (m)
FP013686	≈100
FP017687	≈100

DOM 1978 BICHENO DDH5

AMG reference	Elevation (m)
FP040677	≈5

APPENDIX 2

Coal intersections in DOM Bicheno DDH5

From (m)	To (m)	Interval (m)	Description
27.88	28.72	0.84	Dull coal, interbedded with carbonaceous mudstone; minor bright bands.
106.26	106.45	0.29	Dull coal, interbedded with carbonaceous mudstone.
117.24	117.79	0.55	Dull coal.
134.64	135.06	0.42	Dull coal.
166.46	167.06	0.60	Dull coal interbedded with carbonaceous mudstone (60:40).
171.03	171.33	0.28	Dull coal.