# BURNT RIVER AREA
## (93P/4, 5)

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## INTRODUCTION

During the 1978 field season detailed mapping of coal measures and associated strata was conducted on the area bounded by Hasler Creek in the north and the Sukunka River in the south. However this discussion will be confined to the area from Brazion Creek south to the Sukunka River. All coal-bearing strata were examined. It was discovered that not only were the quartzites of the Monach Formation present but coal-bearing rocks lying stratigraphically below the Cadomin conglomerate were also present. Hughes (1964) had designated these beds the Brenot Formation. Coal seams were sampled and analysed in both the Brenot and Gething Formations.

## STRATIGRAPHY

### BRENOT FORMATION

All coal measures lying above the quartzites of the Monach Formation and below the conglomerate of the Cadomin Formation have been mapped as the Brenot Formation. Hughes (1964) defined the top of the Brenot at the first appearance of coarser sediments, but as the conglomerate of the Cadomin is continuous as far north as Brazion Creek it is felt that the base of the conglomerate is a more readily mappable contact. North of the Brazion, Hughes' definition is more applicable. Just north of Mount Merrick the formation has a thickness of about 150 metres. Strata are composed of siltstone, fine-grained sandstone, coal, and lesser amounts of claystone and mudstone. It is very similar in composition and character to the Lower Gething.

Coals are present throughout the Brenot, but the thickest seam development is in the upper part. It is believed to underlie most of the relatively flat areas east of Mount Jilg, from the Sukunka River north to Brazion Creek. It is also present in much of the high country between Mount Merrick and Mount Jilg and immediately west of Goodrich Peak. Whether the Brenot Formation contains thick (>2 metres) coal seams throughout these areas is not established.

### CADOMIN FORMATION

McLean's (1977) working definition of the Cadomin, namely 'all conglomerate and medium- to coarse-grained sand units are included unless they are separated from the main body of the formation by a unit of finer sediments greater than 1.5 times the thickness of the overlying unit,' has been found to be useful in the map-area although with some exceptions. The nature of the Cadomin conglomerate is such that when found in relatively gently dipping strata, the conglomerate-derived scree effectively covers all strata below the conglomerate unit itself. Hence if medium or coarse sandstones exist below the

conglomerate they are usually not observable. Even in other attitudes, often only the conglomerate outcrops and thus serves effectively as a mapping unit. North of Brazion Creek continuous well-developed conglomerates in the formation are not present. In fact a diamond-drill hole drilled by Pan Ocean Petroleums Ltd. just north of Brazion Creek and believed to be spudded somewhere in the Lower Gething did not intersect any conglomerate, nor any significant amount of medium or coarse-grained sandstones.

Throughout the map-area the Cadomin Formation varies from as little as a 3-metre band of conglomerate to as much as 12 metres in a single band. In the Mount Jilg area almost 75 metres of conglomerate and sandstones is included in the Cadomin. Clast-size range is generally 0.5 to 5 centimetres and varies little over the area. Matrix usually forms 20 to 30 per cent of the conglomerate and is generally medium to coarse-grained non-calcareous sandstone. Clasts are predominantly white, grey, or black chert with very small amounts of green and red chert, and minor quartzite.

### GETHING FORMATION

The Gething Formation appears to conformably overlie the Cadomin Formation. Medium and coarse-grained sandstones, both calcareous and non-calcareous, still appear in the first 15 or 20 metres of the formation. Above these sandstones, the Gething becomes much finer and is essentially composed of siltstones and mudstones. Thick coal seam development occurs approximately 150 metres from the base of the formation. Coarsening of the sediments becomes apparent again above the second thick coal seam, about 200 metres above the base.

Although no Moosebar Formation is present, the coals and major sandstones high on the 1 500-metre hill 1.5 kilometres due north of Mount Jilg are probably Upper Gething. The top of the hill would lie approximately 270 metres above the Cadomin.

The area between Burnt River and Brazion Creek must also have Upper Gething strata as flat-lying strata of the Cadomin Formation are found over 300 metres from the crest of the hill. However, areal extent of Upper Gething in both areas is most likely quite limited.

## STRUCTURE

The area can be divided into two distinct structural domains: a broad open syncline east of Mount Jilg and a more complex system of tight parallel folds and faults west of Mount Jilg. The area is bounded on the west by a thrust fault bringing older strata over the coal measures.

The open syncline appears to have an axial fault with little displacement, but is continuous throughout most of the area. Relatively flat Cadomin conglomerate outlines the general form of the syncline but lower in the section mudstones and siltstones outcropping on Rocky Creek have been compressed into a system of lambdate ($\lambda$-shaped) folds. South of Rocky Creek a small subsidiary syncline is developed on the western limb of the major syncline and exposed on the highest hill. This too is dissected by a fault of perhaps 25 metres displacement. North of Rocky Creek as far as Brazion Creek the western limb of the major syncline is steep, up to 60 degrees, but flattens quickly to the east in box-fold fashion.

A tight faulted anticline is formed immediately to the west of the major syncline and is followed by over half a dozen parallel lambdate folds westwards to the thrust fault underneath the east scarp of Mount Merrick. Except for a single exposure just east of the thrust, the Cadomin has been eroded in this area, but a number of exposures of Brenot Formation (location D) as well as the lower Monach quartzites occur in this area. Strata are inclined from 30 degrees to vertical.

## COAL

Coal occurs in the Brenot and Gething Formations within the map-area. Sixteen trenches were dug exposing relatively thick (>2-metre) seams as well as several smaller seams in both formations. All significant seams were described and sampled. Descriptions of the major seams (with significant coal intervals designated by a letter for reference to the accompanying table) are given in the following paragraphs.

### BRENOT FORMATION

Two coal seams 0.85 metre and 0.9 metre thick and lying 9 and 18 metres respectively above the Monach–Brenot contact were exposed at location A. The lower seam (A-1) had a fine-grained flaggy sandstone roof and a carbonaceous mudstone roof. The upper seam (A-2) had a carbonaceous mudstone roof and a mudstone floor.

Approximately 16 kilometres to the south at location B, a coal seam (B-1) lying 120 metres below the Brenot–Cadomin contact was trenched. The description is summarized as follows: floor – carbonaceous mudstone with bands of vitrain, 0.5 metre sheared bright coal with 2 centimetres mudstone bands (a), 1.4 metres mudstone with vitrain bands (b), 1 metre bright coal (c), 4 metres mudstone with thin (1 to 3 centimetre) vitrain bands; roof – calcareous, medium-grained siltstone.

Seventy metres up section lies a 3.2-metre coal seam (B-2); however the upper metre of the seam contains several claystone bands. Approximately 1.5 kilometres southwest at location C the same seam was trenched but here 3.2 metres (C-1) of coal with no partings were recorded. The logs of the seams are as follows: location B, floor – claystone, 2.06 metres bright banded coal (a), 0.15 metre claystone, 0.38 metre bright coal (b), 0.28 metre carbonaceous claystone, 0.10 metre bright coal (c), 0.10 metre carbonaceous claystone, 0.10 metre bright coal; roof – siltstone (with plant rootlets); location C, floor – claystone, 0.1 metre coal (a), 0.5 metre mudstone, 1.5 metres bright coal (b), 1.7 metres dull coal (c); roof – mudstone. Strata at locations B and C dip to the southwest at approximately 65 degrees.

At location D three coal seams all less than 1 metre and one seam 2.3 metres thick occur in what is believed to be Upper Brenot. Due to structural complexity no direct measurement to either upper or lower contacts can be made, but the coals are believed to occur in the upper 50 metres of the Brenot Formation. The thick seam (D-1) has a carbonaceous claystone floor overlain by 0.7 metre dull and bright banded coal (a), 1.0 metre dull and bright blocky coal (b), 13 centimetres carbonaceous mudstone with coaly streaks, and 0.5 metre bright banded coal (c), overlain by a claystone roof. The seam dips 30 degrees to the southwest.

## GETHING FORMATION

Coal within this formation was exposed in several trenches all lying just north of Mount Jilg (location E). Trenches were made on gently dipping strata on a steep hillside and hence measurements may be distorted by mass movement. A lower seam, lying a minimum of 150 metres above the Cadomin, was trenched in two locations (E-1 and E-2) approximately 300 metres apart. They were logged as follows: E-1, floor – carbonaceous claystone, 1.3 metres dull-banded, dirty coal (a), 0.4 metre claystone, 0.2 metre dull-banded coal (b), 0.4 metre carbonaceous claystone, 0.3 metre carbonaceous weathered claystone, 0.01 metre yellow-brown mudstone, 1.2 metres bright hard coal (c), overburden; E-2, floor – claystone, 0.45 metres dull and bright coal (a), 1 metre carbonaceous claystone, 0.4 metre bright, blocky coal (b), 1.35 metres claystone with vitrain bands, 0.4 metre dull-banded coal (c), 1.1 metres bright-banded coal (d), 0.12 metre carbonaceous claystone with vitrain bands (e), 0.03 metre bright-banded coal (f), 0.75 metre dull-banded coal (g); roof – carbonaceous claystone with occasional thin coal bands.

An upper seam (E-3), lying approximately 30 metres above the lower, was exposed in an area of minor but severe folding and faulting. The seam was estimated to be 2.3 metres thick and lies at least 180 metres above the Cadomin Formation. It is overlain by carbonaceous mudstone and underlain by siltstone, mudstone, and fine-grained sandstone in turn.

## COAL QUALITY

Results of analyses of raw coal from trench samples taken during the 1978 field season are shown in the accompanying table. Trench locations and sample intervals are referenced to the map and text respectively. Volatile matter has been shown on a dry mineral matter-free basis for ease of comparison. Analyses have been given for all coal-bearing intervals, even if they are only thin vitrain bands in mudstone. Results on the higher ash samples can be expected to be less accurate. Trench E-1 was in an area subject to mass movement and it is believed that the very high ash contents are due to the mixture of clays with the coal at outcrop only.

Volatiles are anomalously high for coals of their stratigraphic position in this region. The samples from the Gething Formation ranged from 30 to 33.5 per cent (dmmf), at last 6 to 8 per cent higher than Gething coals from south of the Sukunka River. The Brenot coals had even higher volatiles on the average, ranging up to 38 per cent for low ash coal. Compositional differences in the coal could account for the difference in volatiles between the Brenot and Gething coal. There are wide variations in volatiles even within the same seam in the Brenot coals. The generally high volatiles in this area may indicate a shallower depth of burial than for adjoining areas.

Gething coals are not as clean as the Brenot coals; ash on raw coal samples is never below 12 per cent. On the other hand, the Brenot coals have ash contents below 4 per cent on some intervals.

RAW COAL TRENCH SAMPLE ANALYSES

| LOCATION AND SEAM | INTERVAL | ASH % | FIXED CARBON (DRY) % | VOLATILE MATTER (DRY) % | VOLATILE MATTER (DMMF) % |
|---|---|---|---|---|---|
| BRENOT COALS | | | | | |
| A – 1 | | 6.96 | 65.08 | 27.96 | 30.05 |
| A – 2 | | 8.37 | 62.85 | 28.78 | 31.41 |
| B – 1 | (a) | 18.66 | 47.96 | 33.38 | 41.78 |
| | (b) | 71.92 | 13.14 | 14.94 | ---- |
| | (c) | 10.88 | 59.08 | 30.04 | 33.71 |
| B – 2* | (a) | 5.25 | 61.38 | 33.37 | 35.22 |
| | (b) | 13.20 | 51.59 | 35.21 | 40.56 |
| | (c) | 18.86 | 50.48 | 30.66 | 37.79 |
| C – 1* | (a) | 72.37 | 12.48 | 15.15 | ---- |
| | (b) | 16.44 | 48.13 | 35.43 | 42.40 |
| | (c) | 10.30 | 55.56 | 34.14 | 37.95 |
| D – 1† | (a) | 3.87 | 57.03 | 33.96 | 37.32 |
| | (b) | 6.88 | 59.60 | 33.52 | 36.00 |
| | (c) | 9.01 | 61.87 | 34.26 | 35.64 |
| D – 2† | (a) | 4.09 | 63.48 | 32.43 | 33.81 |
| GETHING COALS | | | | | |
| E – 1** | (a) | 57.11 | 25.77 | 17.12 | 39.92 |
| | (b) | 58.79 | 24.60 | 16.61 | 40.03 |
| | (c) | 34.97 | 43.47 | 21.56 | 33.15 |
| E – 2** | (a) | 28.37 | 49.12 | 22.51 | 31.42 |
| | (b) | 17.43 | 57.70 | 24.87 | 30.12 |
| | (c) | 35.62 | 43.17 | 21.21 | 32.95 |
| | (d) | 12.39 | 59.85 | 27.76 | 31.69 |
| | (e) | 48.53 | 32.21 | 19.26 | 37.42 |
| | (f) | 28.72 | 47.29 | 23.99 | 33.66 |
| | (g) | 12.31 | 58.37 | 29.32 | 33.44 |
| E – 3 | | 17.84 | 55.02 | 27.14 | 33.03 |

*NOTE: Same seams marked with same asterisk.*

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