APPENDIX 1

Coal Search Great Northern Railway
Internal Memorandum by C.C. Morton

GEOLOGICAL SURVEY OF QUEENSLAND,

BRISBANE, 5th August, 1946.

M E M O -

The Under Secretary for Mines,

B R I S B A N E.

COAL SEARCH - GREAT NORTHERN RAILWAY

46/1235/15

INTRODUCTION: Following an application by Mount Isa Mines Limited, an Authority to Prospect for coal was issued on 1/3/1946 to the Company with respect to a roughly triangular area of some 760 square miles lying to the north of the Great Northern Railway in the Torrens Creek district. In the application it was stated that a diamond drilling campaign was to be carried out involving some 6 holes and 3,600 feet of drilling at an estimated cost of £5,500. In view of the advantage that would also accrue to the State in the event of workable coal being found and developed here, representations were made that the Queensland Geological Survey should assist in preliminary investigations. Accordingly, it was arranged that the District Geologist accompany Mr. Graham Hall, the Company's Senior Geologist, on a reconnaissance survey of the area and confer with him on the selection of bore sites. Field work was commenced by us at Torrens Creek on 2nd May and completed on 24th May, after selecting sites for the first two bores and alternative sites for a third. It was considered that any subsequent locations could best be decided in the light of results from the first three holes.

THE AREA: As shown on the accompanying map, the area of 760 square miles in the Authority to Prospect is bounded on the south by the railway line between Warreah and Burra, 195 and 170 miles respectively from Townsville, thence on the north-east by a line north-westerly from Burra for

about 35 miles to the junction of Scrubby and White Mountain Creeks, thence on the north by a westerly line for 6 miles to the left bank of the Flinders River, thence by that River on the western side to a point opposite Old Glendower Homestead,and finally on the south-west by a line running to the point of commencement at Warreah.

The southern and central parts of this area form a plateau with a remarkably even surface and few natural features. Beyond the plateau to the north-east, north and north-west the country drops away rapidly and the monotonous terrain of the plateau gives place to a strip of the most rugged country, characterised by numerous vertically-walled gorges up to several hundreds of feet in depth where the upper waters of Torrens Creek, White Mountain and Oxley Creeks and other tributaries of the Flinders River have incised deeply into massive sandstones. In elevation the plateau rises at a fairly uniform rate from a minimum height of between 1,400 and 1,500 feet/ abdve sea level on the south-western boundary in both a north-easterly direction towards Burra, where it reaches a height of 1,820 feet, and also northerly, where it attains its maximum height of almost 2,500 feet at the apex some 30 miles N.N.W. of Torrens Creek. Most of the 950 feet rise in elevation recorded by us between Torrens Creek and the uppermost edge was found to occur north of the former Spring Hill homestead, where the average for 21 miles worked out at almost 45 feet per mile. The accompanying sections will convey the general nature of the topography.

Except in the south-western part,where black soils alternate with sandy areas in the region occupied by Cretaceous Marine strata or where basalt occurs towards the Flinders River, the plateau is covered largely by reddish-coloured laterised sandy soil of a very porous nature. This

type of country and the vegetation it carries is well illustrated at Torrens Creek and along the railway from Burra to Burunga. Local variations to light-coloured soils occur sometimes, and a strip of heavy sandy soil was found to extend from 9 to 11 miles north of the Lancewood Creek dam on our northern traverse line (see map). It is of interest to record that only within this strip was messmate found to accompany the normal flora, which consists of small to medium sized trees and shrubs of a fairly wide range with yellow-jack, ironbark of various types, and bloodwood predominating. Useful timber is confined to the few watercourses and this includes scented and other forms of gum, as well as bloodwood and ironbark.

A large proportion of the plateau area is clad solely with spinifex, and this fact, coupled with a fairly wide distribution of "poison bush", has rendered it in the main a worthless "No man's land"; where natural grasses more or less replace spinifex in the southern and south-western portions on Blantyre and Glendower holdings, the country is being utilised for pastoral purposes.

THE PROBLEM AND FIELD WORK: The Company is in search of a dependable source of coal of suitable quality capable of providing up to 100,000 tons per year - the estimated amount, including coke requirements, when the proposed simultaneous production of lead and copper is brought into effect. The belief that boring may lead to the discovery of a suitable seam within the area applied for was based on the knowledge that coal or coaly shales in strata of Permian age outcropped at a number of localities bounding the area on three sides, and that at Blantyre, in the south-western portion of the area itself 2½ feet of clean coal, presumably in strata of the same age, had been cut in a shaft at a depth of 562 feet. By far the most important of the coal outcrops mentioned above were those on Dingo Creek, a tributary of Oxley Creek (commonly known as the Oxley Creek

Coal) where two seams - one up to 16 feet in thickness - had already been opened up some thirty years ago by shallow shafts and prospected by boring over an area of 80 acres. From earlier reports it was known that these productive measures dipped southerly at a very low angle beneath the Torrens Creek plateau and there was some reason for believing that the whole of the tableland under review might be underlain by potentially productive strata of Permian age at a depth which would not be excessive for testing and subsequent development should a suitable seam be found. Consideration of the distance of the Oxley Creek occurrence from the railway and the high cost of constructing a branch line thereto, due to the rough nature of the country, rendered this otherwise logical place for developing a colliery unsuitable; as regards Blantyre, the fact that very heavy water was encountered at the coal horizon made that area also undesirable. On the other hand, the plateau was believed to offer highly suitable terrain for railway construction to almost any part and there was the possibility that suitable coal might be located at no great distance from the main line. These advantages outweighed the possibility that the coal, if present, may occur only at excessive depth or that very heavy water might have to be contended with.

The problem therefore was first to seek evidence as to whether potentially productive coal measures did, in fact, underlie all the plateau area, and, if so, the depth at which they might be expected to come in at any particular locality accessible for boring. In this connection evidence bearing on the relationship between the barren sandstones forming the plateau and the underlying measures in which some coal was known to occur was of the utmost importance. Such evidence could only be gathered by taking elevations and observations as to regional strikes and dips beyond the area.

In view of the unmapped nature of much of the area and a lack of any authentic information about the portions more remote from the railway, the necessity also arose for investigating its accessibility for a boring plant.

For the purposes mentioned the following traverses were made (see plan for locations):

(1) From Torrens Creek, via Pentland, Oakvale, and Gin Creek to the upper end of the Torrens Creek Valley, and then with subsidiary traverses down the valley to Basalt Pocket; thence by way of Dry Swamp and the most direct route from it back to Torrens Creek. This important part of the work was accomplished in eight days, thanks to the assistance of Mr. R. Freeman of Torrens Creek as guide, and to Mr. D. Rebgetz of Ballabay Holding, who assisted greatly with horse transport;

(2) From Torrens Creek to Betts Creek, via the old road on the northern side of the railway, and thence some 6 miles westerly up the Betts Creek valley and return to Torrens Creek, via Pentland and the new road on the southern side of the railway;

(3) From Torrens Creek, via Spring Hill out-station and Lancewood Creek dam to the apex of the plateau 30 miles from Torrens Creek and 5 miles in an air line south of Oxley Creek coal. From this point one of the precipitous gorges was followed (our Currawong Creek) almost to the Flinders River in an unsuccessful attempt to reach the Oxley Creek coal from the plateau; and

(4) From Torrens Creek to Blantyre homestead and thence to Hughenden.

The above traverses necessitated some 460 miles of travelling by car, 30 miles with horses, and 85 miles on foot over some of the more inaccessible parts of the area.

PREVIOUS LITERATURE: Use has been made of the following published official reports which embody most of the information gathered by earlier observers. The Oxley Creek coal outcrops had been visited and reported on at the end of 1939 by Mr. Graham Hall for the Mount Isa Company.

Marks, E.O. - "Coal with Glossopteris Flora, near Hughenden". Records No.3, G.S.Q. Pub. 235 (1911).

Marks, E.O. - "Carbonaceous Glossopteris-bearing Strata near Pentland". Records No. 3, G.S.Q.Pub. 235 (1911).

Reid, J.H. - "The Glossopteris Beds of Bett's Creek". G.S.Q.Pub. 254 (1916). (See also Q.G.M.J. August 1914).

Reid, J.H. - "Coal Measures at Oxley Creek, Hughenden District". G.S.Q. Pub. 258 (1918). (See also Q.G.M.J. January 1917).

GEOLOGY: The rocks of the area under review range in age from pre-Cambrian to Tertiary. The very old rocks in the form of highly altered metamorphics with granitic intrusions make up the Cape River Goldfield to the east and form the basement on which lie the unaltered sedimentary formations occupying a very large proportion of the area. The Tertiary rocks are confined to basaltic flows in three widely scattered areas. Intermediate in age between these are Permain sediments containing coal or coaly shales in several localities on which some hundreds of feet of barren sandstones have been laid down; on the latter, in turn, Cretaceous Marine beds have been deposited in the south-western portion of the area.

The fossiliferous Permian beds and massive barren sandstones above them form marginal beds of the Great Artesian Basin; the latter, in particular, constitute highly effective intake beds as judged by the insignificant amount of run off from them on the Torrens Creek plateau. Where seen by us in the Torrens Creek and Bett's Creek valleys, the Permian strata

and the massive sandstones rising abruptly from them to form the White Mountains appeared to be ~~unconformable~~ conformable and to constitute stages within one series. Our observations were, however, confined to localities where only gentle to very flat dips prevailed and conditions were therefore not favourable for observing whether the relationship was actually one of conformity or only of apparent conformity. At Oxley Creek Coal, some ten miles to the north-west of our nearest observations, Mr. J. H. Reid found that the productive measures and the overlying sandstones in the vicinity of the workings appeared to be conformable, but in a tributary of White Mountain Creek, 3 miles to the south-east, he saw a section where the White Mountain sandstones were resting at a low angle on almost vertical beds of the Permo-Carboniferous system. He was therefore forced to the conclusion that the cliff-and plateau-forming sandstones really belonged to a later age and he provisionally classified them as Jurassic. The late Professor David's Geological Map of the Commonwealth, published in 1931 and embodying later information about the relationship between Permian and overlying barren sandstones elsewhere in Central Queensland, shows them as Triassic, equivalent to the Hawkesbury River sandstones of New South Wales and the Carborough of Queensland. Our search for fossils of diagnostic value in the odd lenses of sandy shale within these massive sandstones was unsuccessful, and thus no fresh light can be thrown on the question of their age.

The relationship between the Permian and overlying sandstones in this region is therefore one ranging from disconformity or overlap where the Permain beds have remained horizontal or nearly so, to one of angular unconformity where they have been tilted by faulting, as in parts of the Oxley Creek area. On field evidence the conclusion was reached that, at most, only disconformity exists under the plateau area to be tested, as illustrated in the accompanying sections.

The geological record of the district may be summarised in the following table :

Tertiary		Basalt Flows
	Disconformity	
Mesozoic	Cretaceous	Marine Sediments
	Disconformity	
	Triassic	Massive sandstones of Torrens Creek plateau
	Disconformity	to angular unconformity
Permian		Coal measures of Oxley Creek, etc.
	Pronounced angular unconformity	
Pre-Cambrian		Metamorphics

TERTIARY: As previously stated, this system is represented by basaltic flows forming cover rocks over some of the sedimentary formations. The largest area occurs between Blantyre and the Flinders River, approximately as shown.

In the extreme north of the area outliers of basalt, made up of several flows once forming part of the large basaltic area to the north of the Flinders River, cap portions of the dissected plateau up to elevations of about 2,200 feet. The presence of billy capping on adjacent mesas shows that they too were once capped by the basalts.

The third occurrence consists of three small hills at Basalt Pocket in the Torrens Creek Valley on the east of the area. The one hill examined consisted of two or more flows totalling some 60 feet.

CRETACEOUS: Marine strata forming part of the Lower Cretaceous series of the Great Artesian Basin transgress the south-western part of the area. They yield few outcrops but give rise to characteristic black soils which begin to come in on the railway line immediately to the west of Bullock Creek between Eurungn and Warreah and then extend northerly and north-westerly, approximately as shown. In the Blantyre shaft Cretaceous Marine shells were reported at 294 feet, but the full depth of the marine shales and sandstones here is not on record.

TRIASSIC: These strata make up the plateau area and the aptly named White Mountains where the plateau breaks down into the canyon belt on the north and north-east. This mountainous belt practically ends at Burra, for on the new road south of the railway almost 500 feet of these horizontally bedded sandstones are ascended between Moocha Creek and Burra without a single steep gradient. This formation reaches its maximum thickness of some 650 feet at the northern end of the area as measured from the summit, to the first big shaley section met in our Currawong Creek traverse. Observations in the Basalt Pocket area indicate that here the present thickness would probably not exceed 300 feet. On the evidence of the Blantyre shaft they are also thinner where they underlie the Cretaceous.

The formation is made up almost entirely of massive beds ranging from light-coloured sandstones to conglomerates in which occur odd thin sections of sandy shales of fine ferruginous flaky sandstones. As a whole the rocks are friable, and in weathering the sandstone faces become notably cavernous. Current bedding is a pronounced feature.

PERMIAN: This series has now been proved to extend as an unbroken strip south-easterly from Oxley Creek through the Torrens Creek and Betts Creek valleys and thence across the railway line which the northern boundary crosses 4½ miles from Pentland. Only at Oxley Creek, where the strata have been tilted by a large fault, is it possible to observe any considerable thickness. Here Reid has estimated an exposed thickness of about 1,300 feet from where they abut vertically against the schists to the base of the overlying White Mountain sandstones. This thickness is made up predominantly of sandstones with some shales and a 20 feet bed of conglomerate near the top. The two coal seams on which the prospecting work has been done also occur very high in the section.

The flat to very flat dips prevailing in the areas observed during the recent field work did not permit of seeing anything like the above thickness. No detailed section was made, but the observed thickness was not considered to exceed 200 to 300 feet. Dips ranging from 5° to as much as 12° in directions towards the basin were found to be common near the schist contact, but at no great distance these dips flattened almost, if not entirely, to the horizontal. There was an absence of reversed dips and it is considered likely that the steeper dips of the lower beds, as now exposed, can be accounted for by sagging.

The field evidence as to the attitude of the beds, taken in conjunction with aneroid heights, indicates that the known potentially coal-bearing strata should underlie the plateau at depths nowhere in excess of 1,000 feet.

A large proportion of the sections observed by us is made up of sandstones and conglomeratic beds with only a minor proportion of shales. Beds of the latter rarely exceed 5 feet and are of various colours (white, pink, chocolate, etc.) and for the most part they are porcellanised. Some were found to be fossiliferous, but on the whole they contain little evidence of plant life. Observed exposures of coal, or coaly shales, in the Torrens Creek Valley were limited to the Coal Hole and Freeman's shaft areas, both close to the schist contact. In the Betts Creek area Marks has recorded a thin section of carbonaceous strata and coaly shale near the head of the stream, and 10 inches of coaly material is exposed some 10 miles downstream just above the confluence of Conglomerate Gully.

On the evidence of fossil assemblages from 8 localities, listed elsewhere, the Palaeontologist assigned to the series a position high in the Permian.

PRE-CAMBRIAN : These comprise metamorphics in the form of highly folded and steeply dipping schists and quartzites, which, with intrusive granites, form the basement rocks of the district. Within the area under review they occur only to a minor extent near Oxley Creek.

PALAEONTOLOGY: Fossils were collected at 8 localities, as listed below, within the Permian series to the north-east of the area. Individual specimens, numbered 9 and 10, were submitted from two localities high up in the Triassic sandstones at the northern end of the plateau, and a small collection (No. 11) was obtained from the spoil dump of the old Blantyre shaft. These were submitted to the Consulting Palaeontologist to the Queensland Geological Survey, Mr. O. A. Jones, M.Sc., of the Queensland University, whose report is attached as Appendix 1.

As shown on the map, the localities are as follow :

(1) Freeman's Shaft, Diamond Creek, Upper Torrens Creek Valley;

(2) Coal Hole, Coal Creek, Upper Torrens Creek;

(3) Hut Creek, Basalt Pocket, Torrens Creek Valley;

(4) Basalt Creek, Basalt Pocket;

(5) Betts Creek, Cliff Face, Right Bank 100 yards below Conglomerate Gully;

(6) Betts Creek, Cliff Face, Left Bank immediately above Conglomerate Gully;

(7) Betts Creek, Right Bank about 10 chains above Conglomerate Gully;

(8) Spear Creek, New Road Pentland and Burra on South of Railway, 8½ miles from Pentland;

(9) In Currawong Creek Gorge;

(10) Portage Creek, near top of Plateau;

and (11) Blantyre Shaft, Spoil Dump.

SELECTION OF BORE SITES: Field evidence showed that the best chances of finding workable coal would be by boring at the extreme northern end of the plateau as near as possible to the Oxley Creek outcrops. However, in view of the distance from the railway it was thought desirable first to conduct the search nearer the line, although there the chances of success were, on the available evidence, much less. The western deeper portion of the basin was avoided because of the likelihood of heavy water, as at Blantyre.

Taking these and practical considerations connected with transport and water supplies for the boring plant into account, the first bore site was selected at Dry Swamp, some 9 miles north-north-west from Burra, where surface water was then available.

No.2 site was fixed near the Lancewood Creek dam about 12½ miles north-westerly from Torrens Creek, primarily to ascertain whether the Oxley Creek seams extended that far southerly.

Alternative sites (3a and 3b on plan) were selected for a third bore. In the event of promising results from either No.1 or No.2 bore, ~~xxxxxxxx~~ a site about 5 miles north-westerly from Torrens Creek was agreed upon, while in the event of failure in the earlier holes it was considered advisable to locate the No.3 bore some 9½ miles northwards of No.2.

Further selections were left in abeyance pending results from the first three holes.

E.C. Dorlin

Acting Chief Geologist

APPENDIX 1

REPORT ON FOSSIL PLANTS FROM THE BLANTYRE-OXLEY CREEK-BETTS CREEK AREA

by

O. A. JONES, M. Sc.

Locality No.1.

Glossopteris indica Schimper.

Scale frond of Glossopteris; this is of the second type described by Walkom (1922, pl. 1, fig. 5) and was associated with G. ampla, G. browniana and G. indica, at Stanwell.

Locality No.2.

Glossopteris indica Schimper

? Ginkgoites sp.; this is not any of the Queensland Mesozoic species but is also unlike any of the group I know from the Palaeozoic. The specimens have been retained for further study.

Locality No.3.

? Phyllotheca sp. This is a pith cast and poorly preserved.

Locality No.4.

Thinnfeldia feistmantelli Johnston

Glossopteris jonesi Walkom

?Phyllotheca sp.; a poorly preserved pith cast, the width of which, more than 3 cms. and the fine striations suggest the possibility of Schizoneura.

Locality No.5.

Glossopteris sp.

Vertebraria indica Royle

Locality No.6.

Glossopteris ampla ? Dana

Locality No.7.

Phyllotheca sp. 1 - pith casts similar to those figured by Walkom (1922, pl.1, fig. 2).

Phyllotheca sp. 2 - pith casts differing from sp. 1. The stems are narrow 0.5 cm., the internodes long, 3 cms., and the striations very fine.

Locality No. 81

Glossopteris indica Schimper

Vertebraria indica Royle

Phyllotheca australis Brongniart

Locality No. 9

No recognisable forms. Mainly woody stems.

Locality No. 10

Woody stems

??Phyllotheca sp.

Locality No. 11

Cladophlebis sp. poorly preserved but could well be C. royloi.

The assemblage at localities 1 - 8 inclusive indicates a high Permian age. Thinnfeldia feistmantelii is typically Mesozoic but has been found with Glossopteris at Jericho. The age of localities 9 - 11 cannot be determined on the fossils, but there is nothing against a Permian age as the two poorly preserved specimens of Cladophlebis are slightly more like C. royloi than C. australis.

I can add from various sources the following items of information on the area:

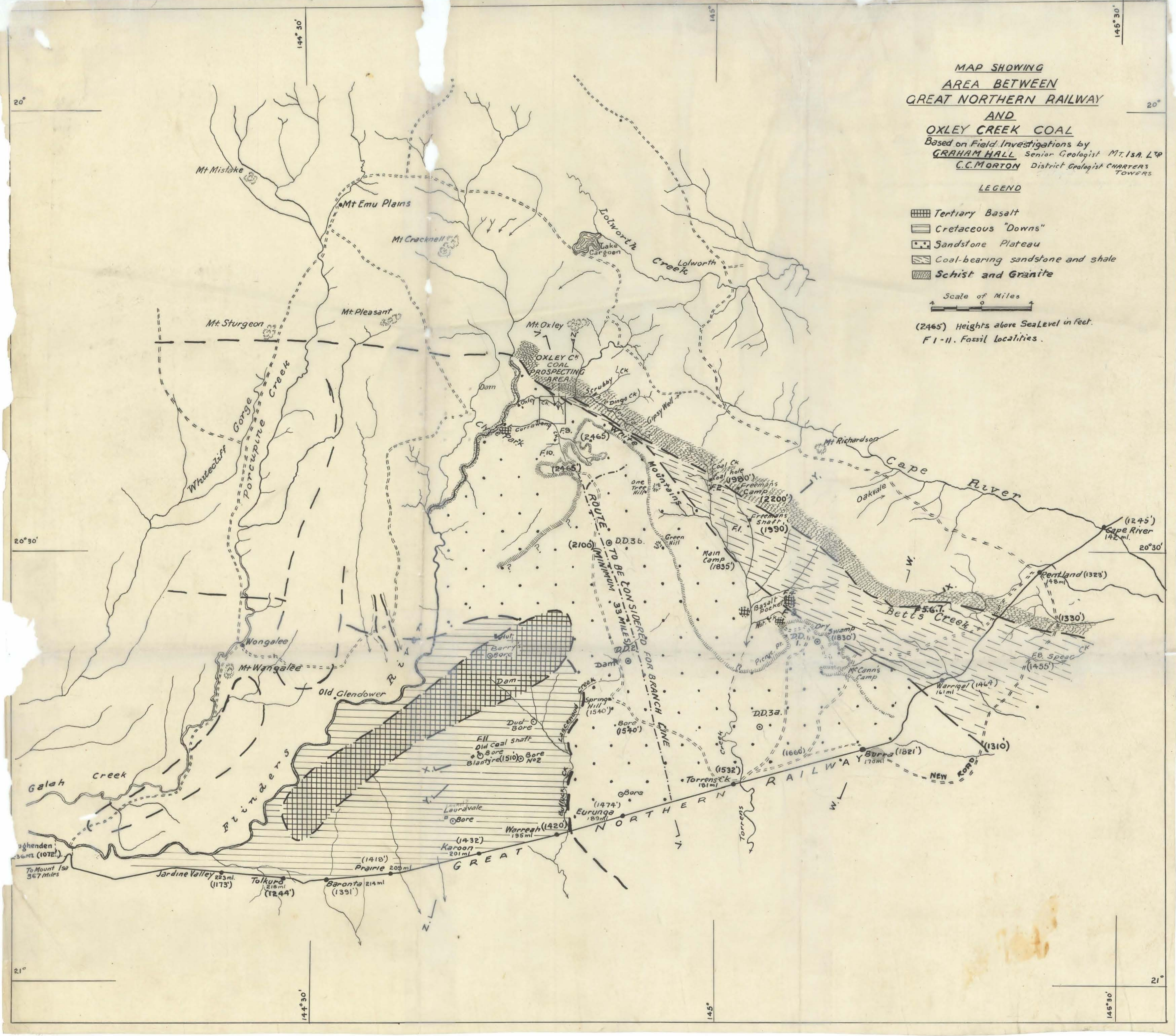
1. In the Galah Gorge in the western part of the area Mr. Ogilvie found Glossopteris associated with Taeniopteris (see Whitehouse, Univ. Qld. Papers Vol. 2 (n.s.), No.1, 1940, p. 59).

2. Cretaceous ammonites have been recorded from near Glendower, probably a few miles up the river from Glendower.

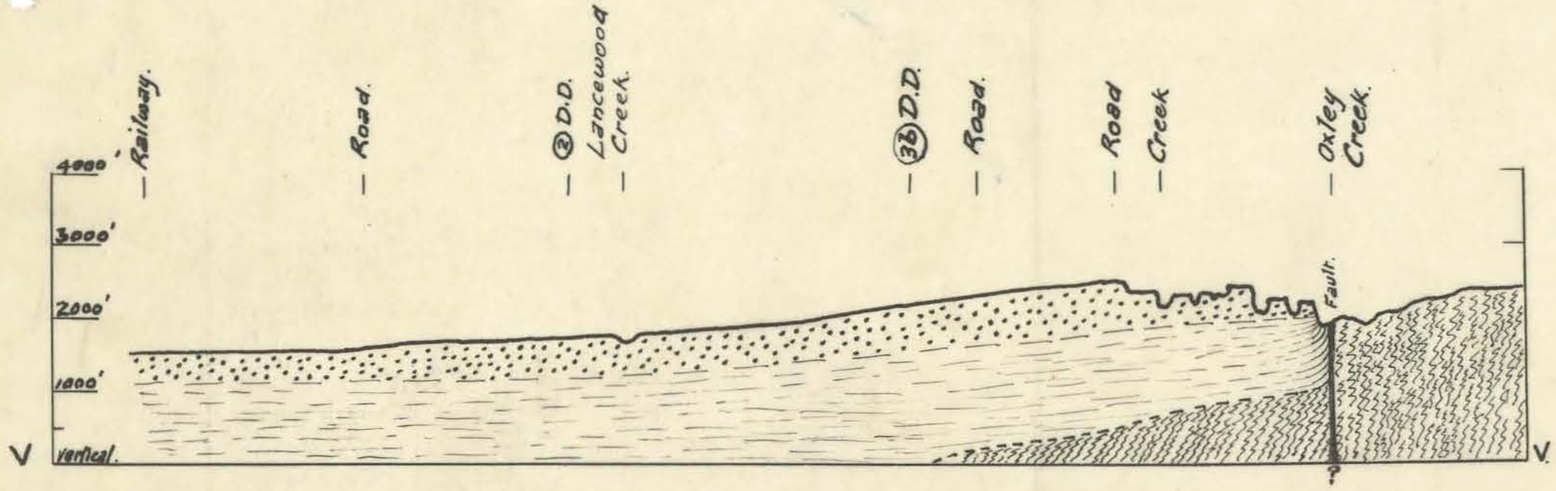
3. Belemnites have been collected at Wongalee.

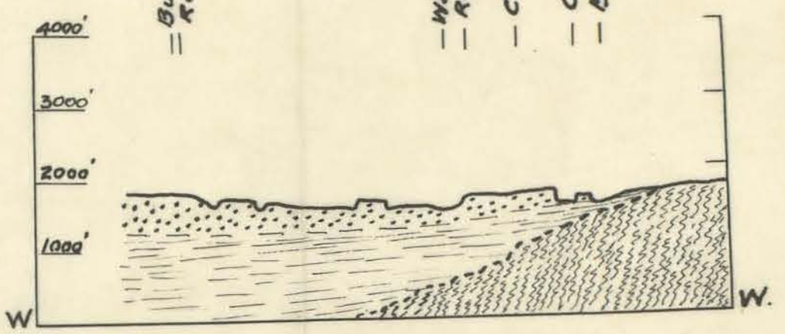
4. Whitehouse's Glendower Series (See Revised Glossary of Q'ld. Stratigraphy, p. 35) is in the Flinders Valley to the south of Glendower.

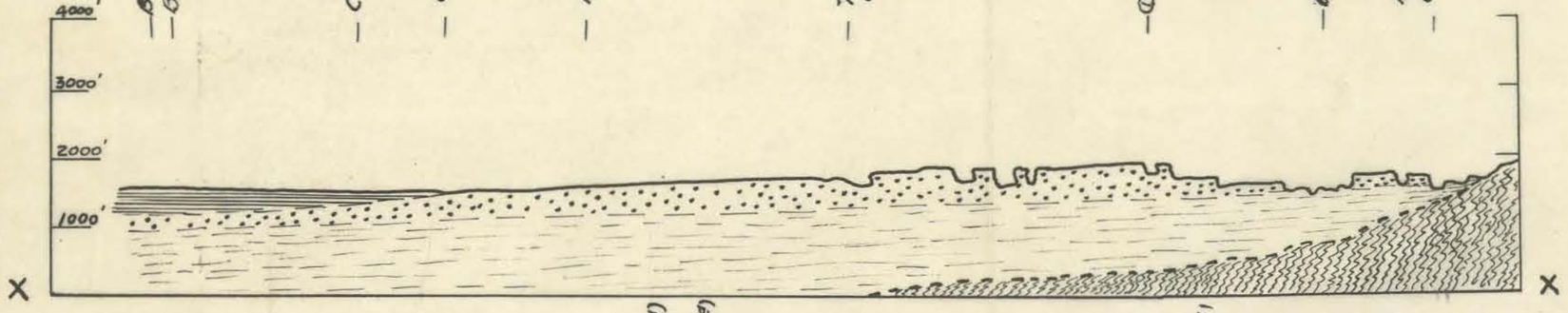
2nd July, 1946.

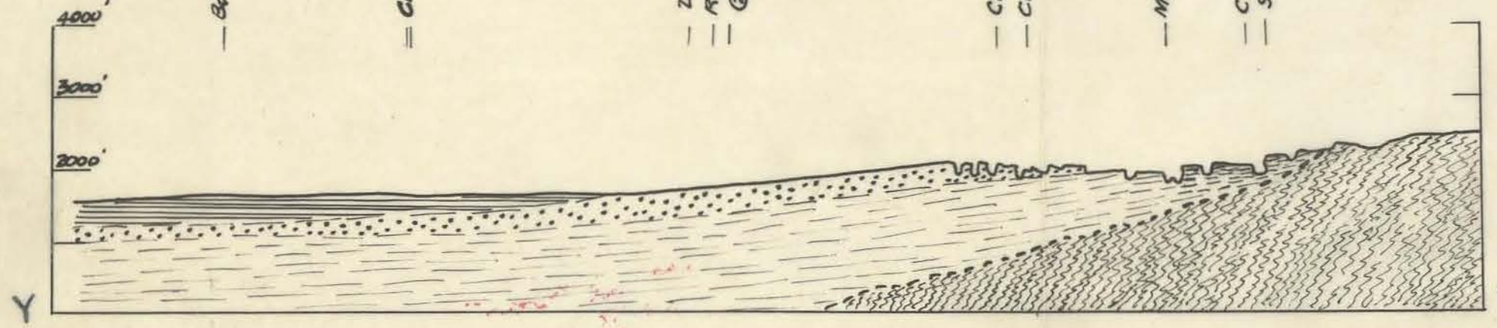


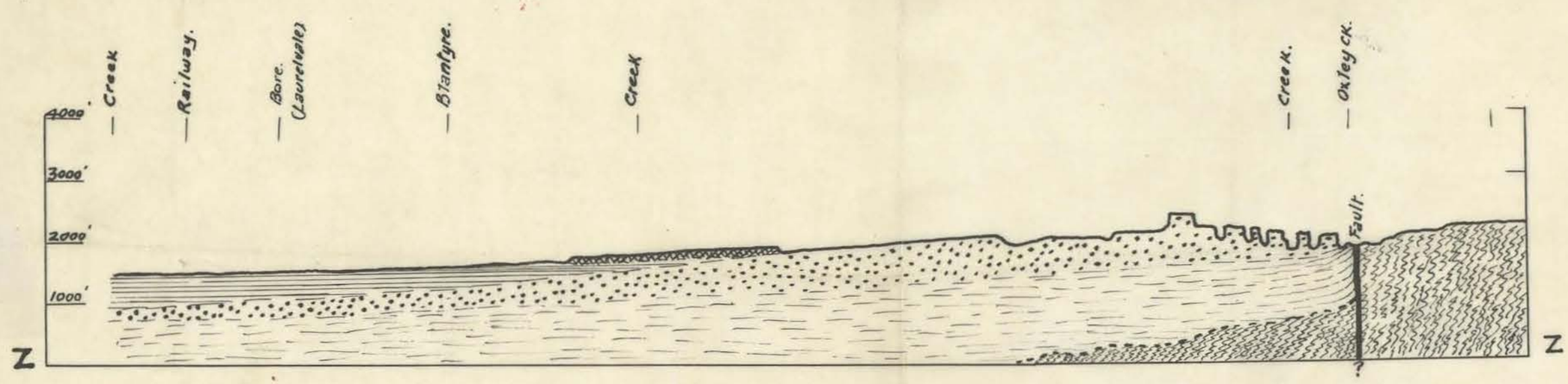
MAP SHOWING
AREA BETWEEN
GREAT NORTHERN RAILWAY
AND
OXLEY CREEK COAL
Based on Field Investigations by
GRAHAM HALL Senior Geologist MT. ISA. LTD
C.C. MORTON District Geologist CHARTERS TOWERS
LEGEND
Tertiary Basalt
Cretaceous "Downs"
Sandstone Plateau
Coal-bearing sandstone and shale
Schist and Granite
Scale of Miles
(2465) Heights above Sea Level in Feet.
F 1-11. Fossil Localities.
OXLEY Ck COAL PROSPECTING AREA
ROUTE (MINIMUM 33 MILES) TO BE CONSIDERED FOR BRANCH LINE
GREAT NORTHERN RAILWAY
Cape River
Betts Creek
Lolworth Creek
Porcupine Creek
Whitecliff Gorge
Flinders River
Galah Creek
White Mountains
Mt Mistake
Mt Emu Plains
Mt Cracknell
Mt Sturgeon
Mt Pleasant
Mt Oxley
Lake Cargoon
Lolworth
Mt Richardson
Oakvale
Mt Wongalee
Wongalee
Old Glendower
Hughenden 236ml (1072')
To Mount Isa 367 Miles
Jardine Valley 223ml (1173')
Tolkura 218ml (1244')
Baronta 214ml (1391')
Prairie 209ml (1418')
Karoon 201ml (1432')
Warreah 195ml (1420)
Eurunga 189ml (1474')
Torrens Ck 181ml (1532')
Burra 170ml (1821')
Warrigal 161ml (1464')
Pentland 148ml (1323')
Cape River 142ml (1245')
NEW ROAD
Freemans Camp (2200')
Freemans Shaft (1990)
Main Camp (1835')
Dry Swamp (1830')
McCann's Camp
Basalt Pocket
Green Hill
One Tree Hill
Berry's Bore
Dud Bore
Old Coal Shaft
Blantyre (1510)
Bore No 2
Lauravale Bore
Spring Hill (1540')
Lascelmod Creek
Torrens Creek
F.8. Spear Ck (1455')











SECTIONS — V-V, W-W, X-X, Y-Y, Z-Z.

AS MARKED ON MAP SHOWING

AREA BETWEEN GREAT NORTHERN RAILWAY AND OXLEY CREEK COAL.

Horizontal Scale
4 miles 0 4 miles

2000' Vertical Scale 2000'

LEGEND

Basalt	Tertiary	
Shales (Marine)	Cretaceous	
Sandstone	Triassic	
Shale and Sandstone	Permian	
Schists etc.	Pre-Cambrian	