Appendix 1

“A brief review of past exploration in the area covered by EL 25/2008 Melton Mowbray for Midlands Energy Ltd” by John Pemberton.

A brief review of past exploration in the area covered by EL 25/2008 Melton Mowbray

for Midlands Energy Limited

by John Pemberton

29/2/12

Contents

Introduction 4

Summary 6

Past Exploration 7

- Capricorn Mining Ltd 7
- CRA Exploration Pty Ltd 10
- Cornwall Coal Company NL 14

Conclusion 19

Recommendations 20

References 21

Introduction

EL 25/2008 Melton Mowbray covers 203 sq km in the Southern Midlands. The area is currently held by Tiger Coal Pty Ltd with the Operator being Midlands Energy Ltd.

Locality Map EL 25/2008 Melton Mowbray (from MRT)

The geology is dominated by Jurassic dolerite as sills and dykes forming the tiers and hills. Dolerite intrudes the Triassic Upper Parmeener fresh water sequence of interbedded mudstone, siltstone and sandstone. The upper part of this sequence is

lithic sandstone with interbeds of mudstone and coal measures. Tertiary Basalt flows are seen on a number of high areas and valley sides and floors are generally covered by Quaternary alluvium and slope deposits.

The structural history of the area is evident in the North North West trend of valleys related to Tertiary tensional faulting reactivating Triassic basin growth faults (?) with North East trending cross faults forming numerous small graben structures.

This review briefly describes the recent history of exploration from the early eighties onwards, summarises the relevant information and concludes with recommendations of areas of potential interest for further exploration.

Summary

Outcrops of coal have been noted in the Kempton area along road cuts but there is no record of mining. Modern exploration has only taken place since 1980 when Capricorn Mining Ltd was granted EL 28/1979.

Capricorn conducted a regional exploration program over a wider area that included reconnaissance geology, remote sensing, structural interpretation and some scout drilling. One hole was drilled at Jericho within the current EL 25/2008. No coal was intersected.

CRA Exploration Pty Ltd also conducted a widespread program over three licences in the Jericho-Oatlands-Kempton area (EL 18/1982, EL 19/1982 and EL 20/1982). The use of LANDSAT imagery allowed the identification of the structural trends that define the coal bearing grabens. A percussion drilling program was successful in that it confirmed that there was coal present but it also identified the difficulties of exploring in an area that is highly faulted and intruded by dolerite. Four holes were drilled on EL 25/2008 to the south and west of Kempton with some coal being found.

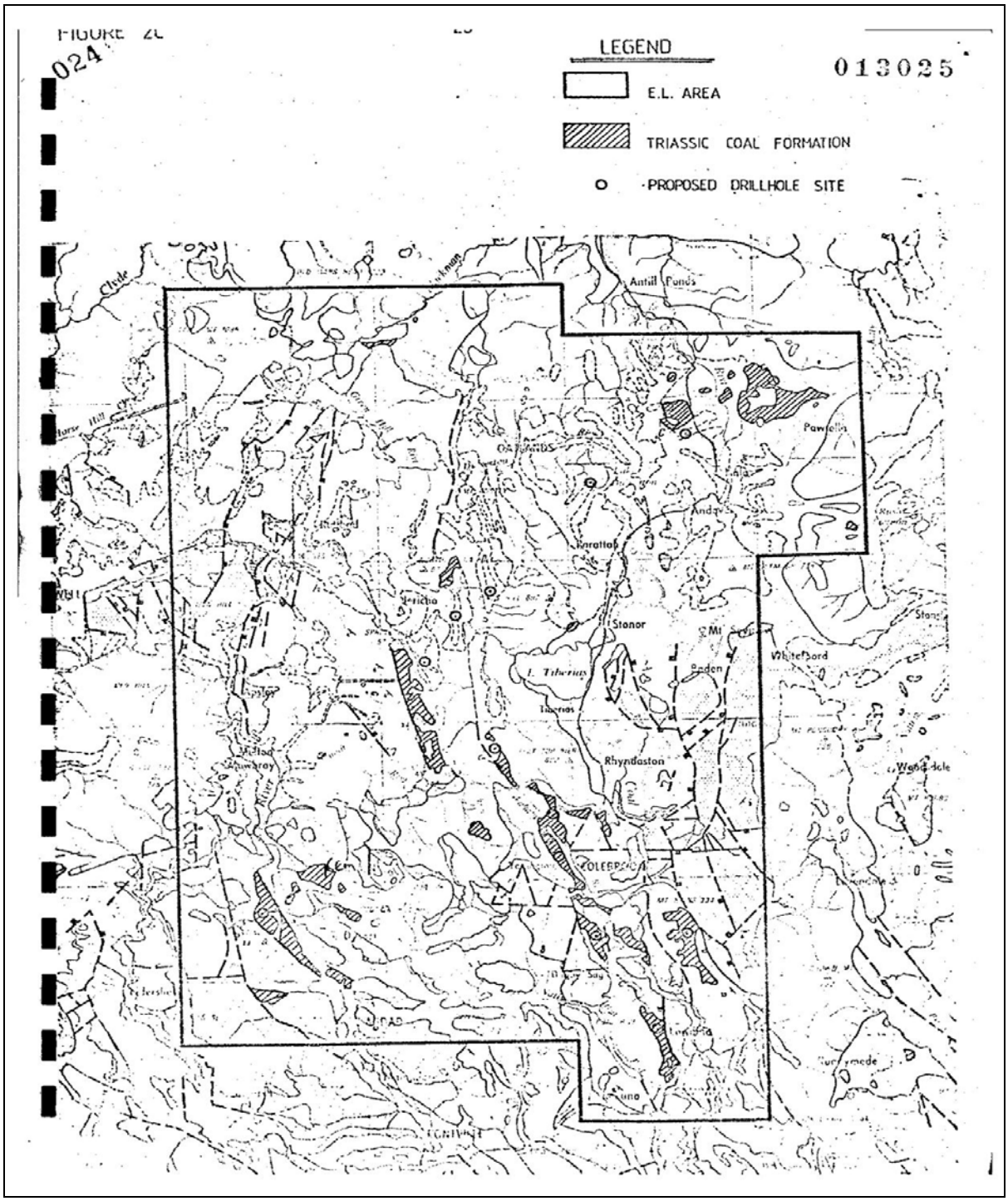
In 1982 the Department of Mines (DOM) drilled a deep hole at Mount Vernon to assist with a gravity survey. The coal measure were intersected over some 300m with a seam of 2.3m from 204.79m proving to be very low in ash and now recognised as the best coal intersection seen in Tasmania (Carol Bacon pers com).

Cornwall Coal Company NL was granted EL 11/91 in 1991 with the express intention of following up the DOM drill hole Mount Vernon DDH1. Cornwall drilled three rotary holes and two diamond holes in the vicinity of Mount Vernon DDH1 with some success but concluded that the risks were too high with the coal measures in a small down faulted block with numerous dolerite intrusions affecting the coal quality.

Past Exploration

Capricorn Mining Ltd

EL 28/1979 was explored by Capricorn Mining Ltd in the early eighties as part of a wider program that looked at four areas prospective for coal in Southern Tasmania (see TCR80_1513).



EL 28/1979 Triassic Coal Formation and proposed drill holes (from TCR80_1513)

The licence covered 1561 sq km and included York Plains, Mike Howes Marsh, Kempton and Campania. Capricorn embarked on a program of reconnaissance geological mapping and sampling, structural interpretation, drilling, geophysical logging and analyses of coal seams. One hole was drilled on EL 25/2008 at Jericho.

Drill hole O-05 Jericho was located on the Drill Hole database at MRT as below.

Map Generated : 28/2/2012

Topographic base image from the LIST

The diamond drill hole was 51m deep and encountered a sequence of lithic sandstone and grey mudstone. Capricorn did not report any coal in this hole but a

reinterpretation by CRA (see TCR84_2213) suggests there might be coal at 24 to 24.5m.

In a report for Capricorn General Geological Services (see TCR81_1682) took a sample in a Kempton road cutting (no exact locality given) and reported an analysis as follows:

Ash%	12.08	
Volatile matter%	26.17	
Fixed carbon%		57.09
Total sulphur%	0.01	

Capricorn joint ventured the ground with Petrecon in 1982 and they decided to drop EL 28/1979 from the larger area for the following reasons (taken from TCR82_1798):

1. *The scout drilling, when, considered together with the regional geology, and topography, has effectively eliminated the Jericho, Colebrook and Mike Howes Marsh areas.*

2. *The scout drilling at York Plains indicates that some encouraging coal-bearing sections exist, however the coal has a low %volatiles and appears to be laterally variable and/or displaced by faulting. The area has not yet been fully tested.*

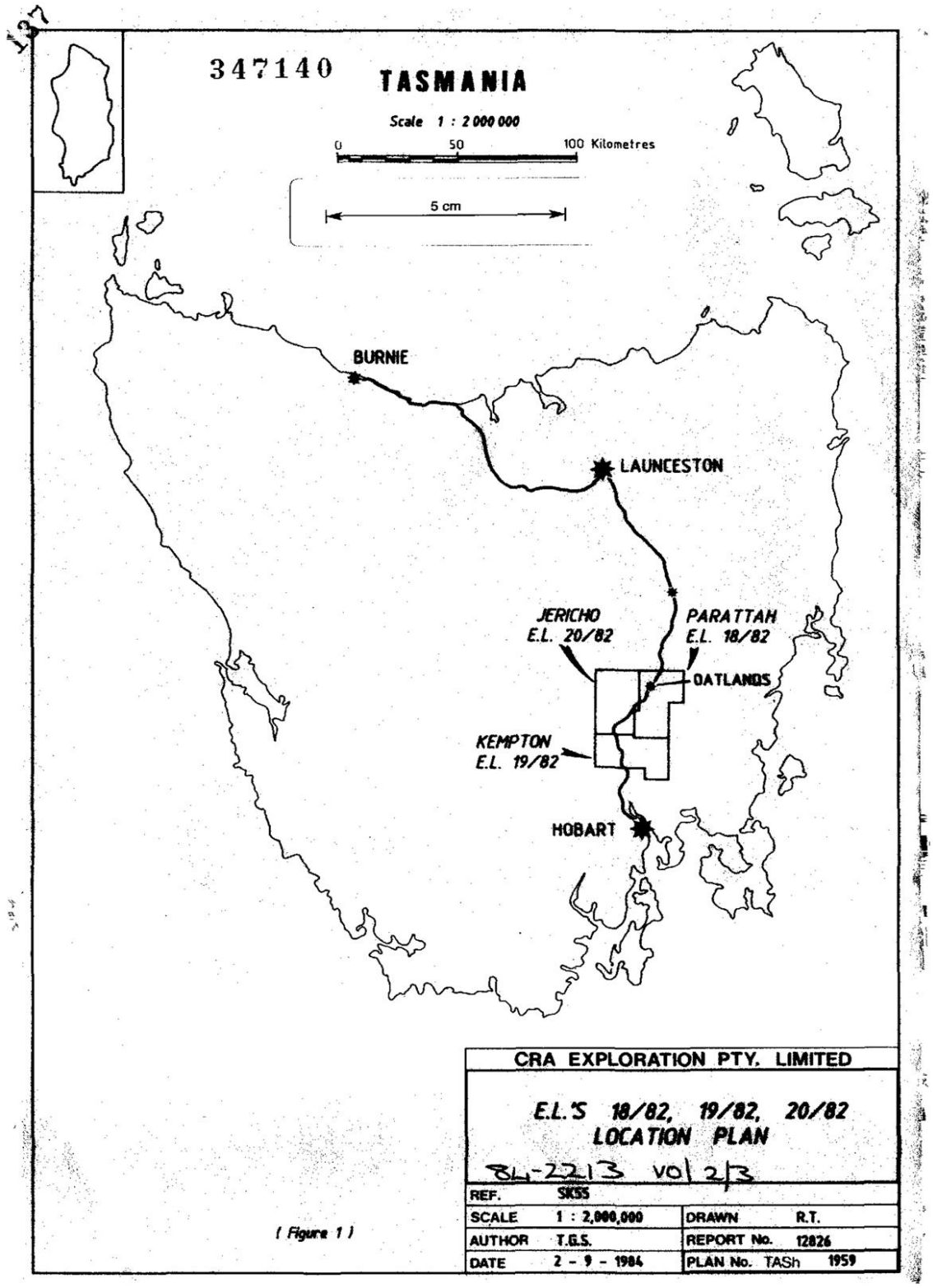
3. *At least one additional body of lithic sandstone sequence, S.W. of Oatlands, remains to be tested by scout drilling.*

4. *It is considered that although the coal potential of the E.L. has not been fully tested, all evidence to date suggests that the chances of finding viable coal are low. A thorough investigation would be costly and Petrecon takes the view that its exploration resources would be more efficiently used if concentrated on one area with an apparently higher chance of success. Consequently, it is recommended that this Licence be relinquished.*

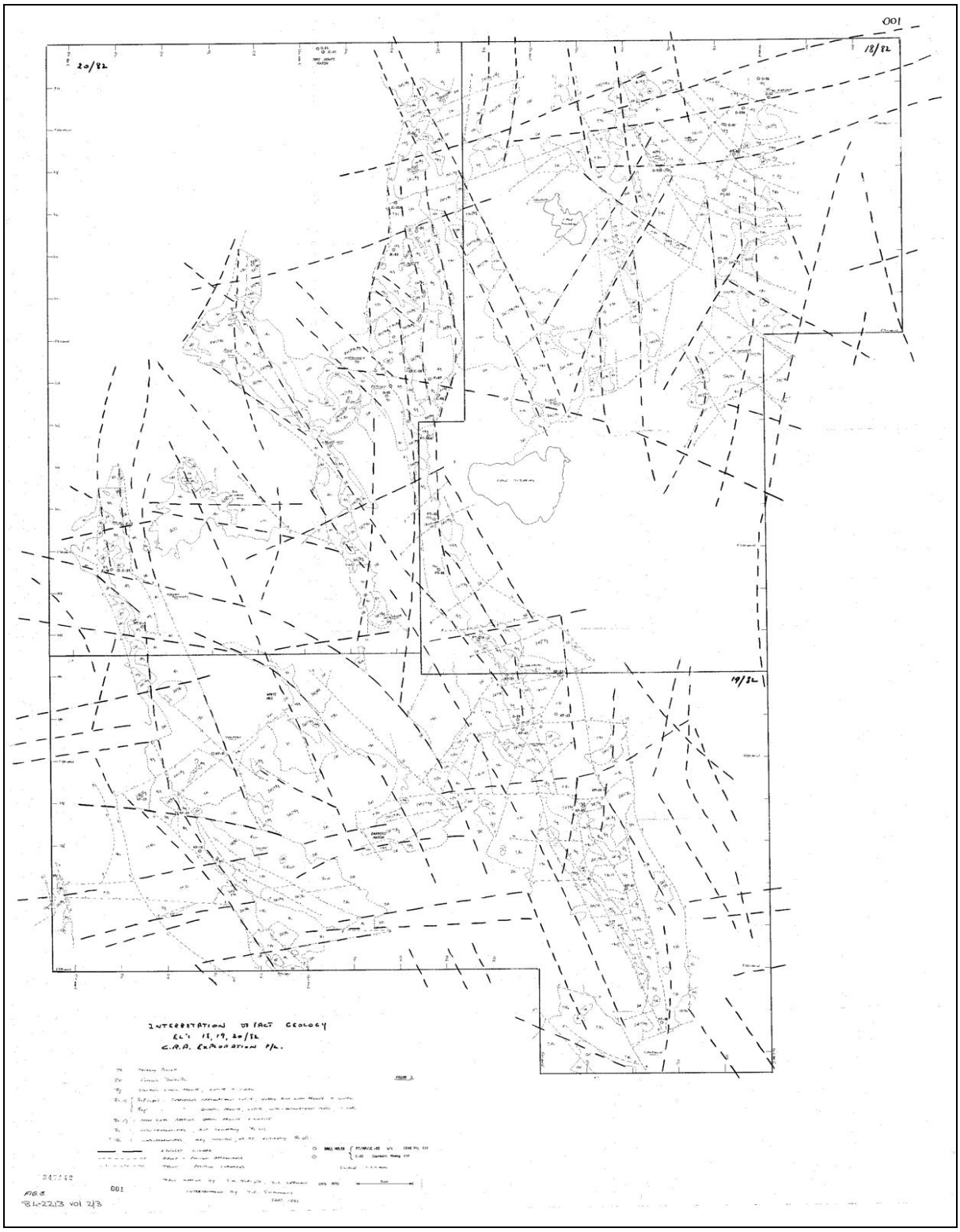
CRA Exploration Pty Ltd

CRAE was granted three ELs in 1982 that cover the current area of EL 25/2008 (EL 19/1982 EL 18/1982 and EL 20/1982).

Locality map of CRA ELs from TCR84_2213



Tim Summons managed and reported on the exploration work of CRAE (see TCR84_2213). The program was thorough and successful in that it identified numerous areas with coal from the scout drilling (percussion) program. The use of LANDSAT imagery to generate a structural trend map was instrumental in the interpretation of the geology.



LANDSAT interpreted structural trends from TCR84_2213

Three graben structures were identified across the three licences. The Melton Mowbray Graben falls within EL 25/2008 and extends for approximately 25km from Apsley to Bagdad. It varies in width from 0.5km to 1.5km. The LANDSAT image clearly shows the easterly aligned fault structures which break the grabens into small blocks with varying vertical displacement.

Four percussion holes were drilled to the south and west of Kempton.

Drill holes from MRT database: KP-08, KP-09, KP-10 and KP-11

KP-08 - 26m of dolerite and was abandoned.
KP-09 - 0 to 9m mudstone and lithic sandstone. 9m to EOH at 25m dolerite.

KP-10 – 0 to 47.20m mudstone/sandstone with 0.3m coal at 13.30m, 1.09m coal at 14.78m and 0.36m coal from 30.88m. EOH dolerite at 47.50m
KP-11 – 0 to EOH at 50m mudstone/sandstone sequence with minor coal at 13m.

CRAE was not encouraged by this work however in 1982 the then Department of Mines drilled a stratigraphic hole on the Mt Vernon property to assist with a gravity survey and encountered a thick sequence of Triassic coal measures with numerous seams. This hole (DOM Mount Vernon DDH 1) was reported on by Bacon (1983) and the hole was also logged by Summons in TCR84_2213. The hole was 500m deep but only logged to 209.01 by Bacon and 300m by Summons. There were numerous coal seams (11) varying in thickness from 0.10m to 2.3m. The 2.3m seam was from 204.79m to 207.09m and the good quality of the seam is regarded as exceptional for Tasmanian coal:

Analysis basis (AD)	
Relative density	1.37
Moisture%	7.1
Ash%	14.5
Volatile matter%	27.2
Fixed carbon%	58.3
Total sulphur%	0.43
Specific energy (MJ/kg)	
Dry basis	28.6
Dry ash-free basis	32.94
Carbon dioxide%	0.82

CRAE recommended that cored drill holes should be used to follow up the scout percussion drilling in the wider area. At Melton Mowbray it was recommended that the DOM holes should be logged (by wireline) and then the decision to conduct further drilling should be made. CRAE did not follow up on this recommendation and the area was relinquished.

The Cornwall Coal Company NL

Cornwall applied for EL 11/91 in July 1991 to follow up the promising intersection of low ash coal in DOM Mount Vernon DDH1. Cornwall drilled three rotary drill holes in the vicinity of Mount Vernon and in the first annual report (TCR92_3378) Dr JH Bryan concluded that:

1. *Mt. Vernon DDH1 was located at the centre of a small (2sq km) but significant gravity low. This DMMR Drill Hole encountered a low ash (14.5%) coal seam 2.3m thick at 204.79m. The purpose of the recent drilling programme was to attempt to find that coal seam at much shallower depths.*

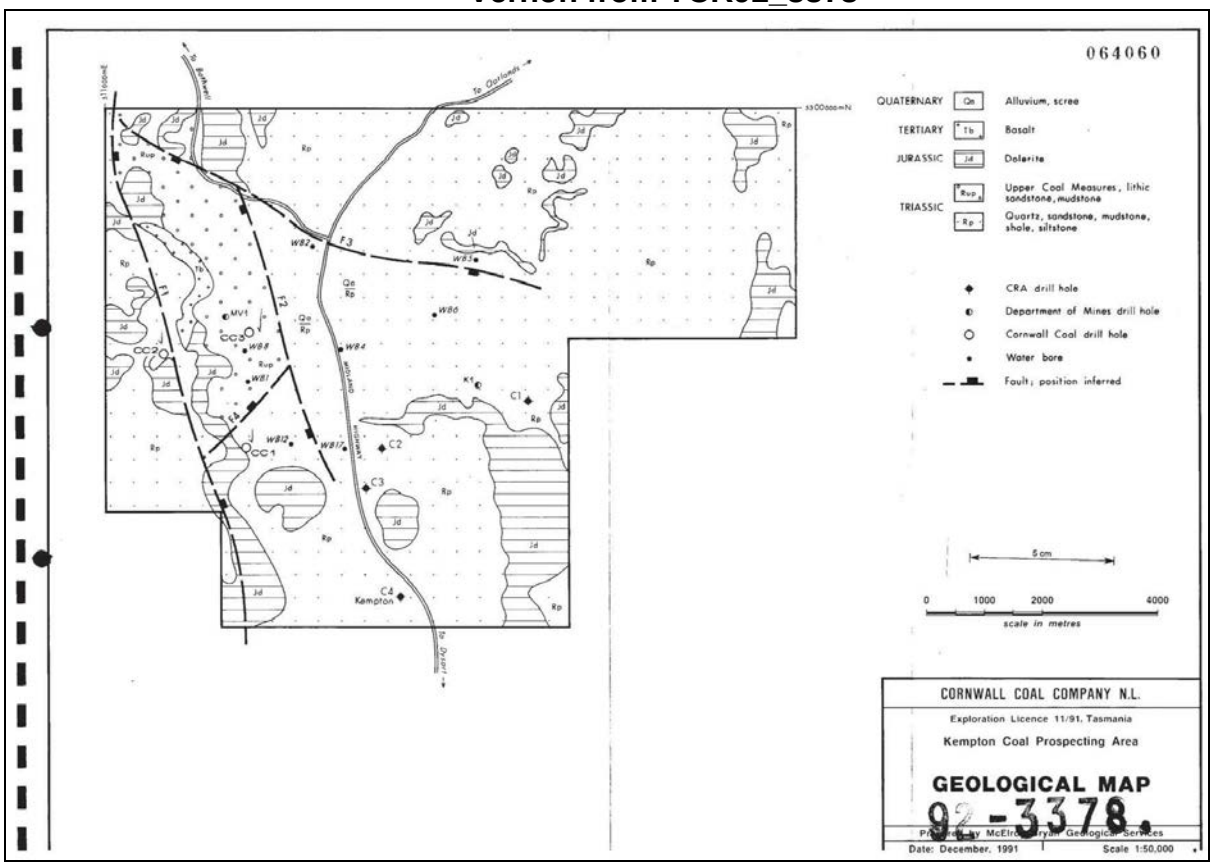
2. *Triassic strata in the vicinity of Melton Mowbray dip at 5^0 to 10^0 to the south west towards the gravity low, and if faulting was not present the coal seam may have been close to the surface some 3kms east of Melton Mowbray. One proposed drill site was east of the Midlands Highway on "The Follies" or "Stockman". While at the DMMR core Library a DMMR fully cored drill hole (Kempton DDH1), which had been drilled in this area was located, but which had not been included in the various information provided by DMMR geologists. The Kempton DDH1 hole intersected middle or lower Triassic strata before encountering dolerite at about 170m. This deeper hole plus 7 shallow water bores and CRA drill holes with no coal, diminished the chances of finding the upper Triassic lithic sandstone coal sequence east of the Midlands Highway.*

3. *Cornwall Coal Mt. Vernon RDH1 (CCMVRDH1) was terminated at 100m in a mudstone sequence that was not similar to that above the coal in Mt. Vernon DDH1. Some coaly and carbonaceous sediments near the top of that hole indicate that those two drill holes are separated by a fault. The coal at 200m is inferred to be a down faulted block to the north of CCMVRDH1.*

4. *Mapping by the DMMR (Oatlands and Brighton 1:50,000 sheets) shows a major fault to the west of Mt. Vernon DDH1 with the upthrown block to the west. The coal bearing sequence may have been nearer the surface in this block west of the fault. The fine grained quartz rich sandstones and siltstones with interbedded mudstones and claystones were unlike those in the coal bearing sequence and the hole was terminated at 50m. At this time it appears as though the fault has a displacement exceeding 350m and the drilled strata are considered to be below the coal measures, and the coal sequence therefore has been eroded off this area.*

5. *Drill Hole CCMRVDH3, locate only 800m away from Mt. Vernon DOH 1, encountered coal measures and lithic sandstone indicating a reasonably flat dip of the coal measures in this area. Thus the 2.3m low ash coal seam could have been expected at about 200m if the drill hole (CCMVRDH3) had proceeded to that depth. The hole was terminated at 94m and was geophysically logged because of poor sample return in the hole due to water. Three coaly intervals occur in the top of 60m of that hole, but all are less than 1m thick.*

Locality map of Cornwall, DOM and CRAE drill holes in the area around Mount Vernon from TCR92_3378



This map clearly shows that Cornwall incorrectly placed the CRAE holes to the north and east of Kempton. The DOM Kempton DDH 1 indicates that the quartz rich middle to lower Triassic outcrops in the eastern area but the incorrect location of the CRAE holes does require further investigation of the geology to the east of the Midlands Highway. Cornwall relinquished the eastern half of the licence on the basis of this interpretation.

In his second report in TCR92_3378 Dr JH Bryan noted:

1. *The thin coaly interval in CCMVRDH1 at 11.3m may be near the base of the coal measures. The strata below were not the same as those encountered in CCMVRDH3 and Mt. Vernon DDH1, although with open hole drilling such comparisons are not so reliable.*

2. *The coaly interval at 50.4m in CCMVRDH3 seems to correlate well with the interval at 59.85m in Mt. Vernon DDH1, indicating a very flat dip between these holes.*

3. *The map shows a down faulted block of coal measures covering about 8sq km'. The sandstone outcrops north of Mt. Vernon DDH1, towards the Bothwell road, suggest that the area is flat up to where Fault F3 is shown on the map. That fault and the others are all inferred to be present on the basis of the geology as interpreted from the drilling and field observations. Further drilling,*

north of MV1 on the map, would almost certainly intersect coal measures, and possibly the 2.3m thick low ash seam at about 200m.

4. *To the north of EL 11/91 a series of water bores has delineated a very narrow down faulted graben (less than lkm wide) with coal measures and it seems that several structures of this type exist in this region. With displacements on the faults that appear to exceed 200m of the structural setting around Melton Mowbray is unlikely to be favourable for coal mining. The ever present Jurassic dolerites are also likely to create problems in any part of this region.*

Cornwall drilled three holes summarised as follows:

Cornwall Coal Mount Vernon RDH 1 – EOH 100m – intersected mudstone/siltstone/sandstone sequence with a narrow coal band of 0.7m at 11.3m.

Cornwall Coal Mount Vernon RDH 2 – EOH 50m - intersected mudstone/siltstone/sandstone sequence – no coal.

Cornwall Coal Mount Vernon RDH 3 – EOH 94m - intersected mudstone/siltstone/sandstone sequence – with 1.1m of coal and carbonaceous mudstone from 50.4m.

In the second year of the licence Dr JH Bryan reported as follows and recommended that the area be relinquished (see TCR93_3491):

1. *The coal seam at 43.45m in Kelvin Grove DDH1 was heat affected to the extent that the "coal" would not be suitable for use as a steaming coal.*

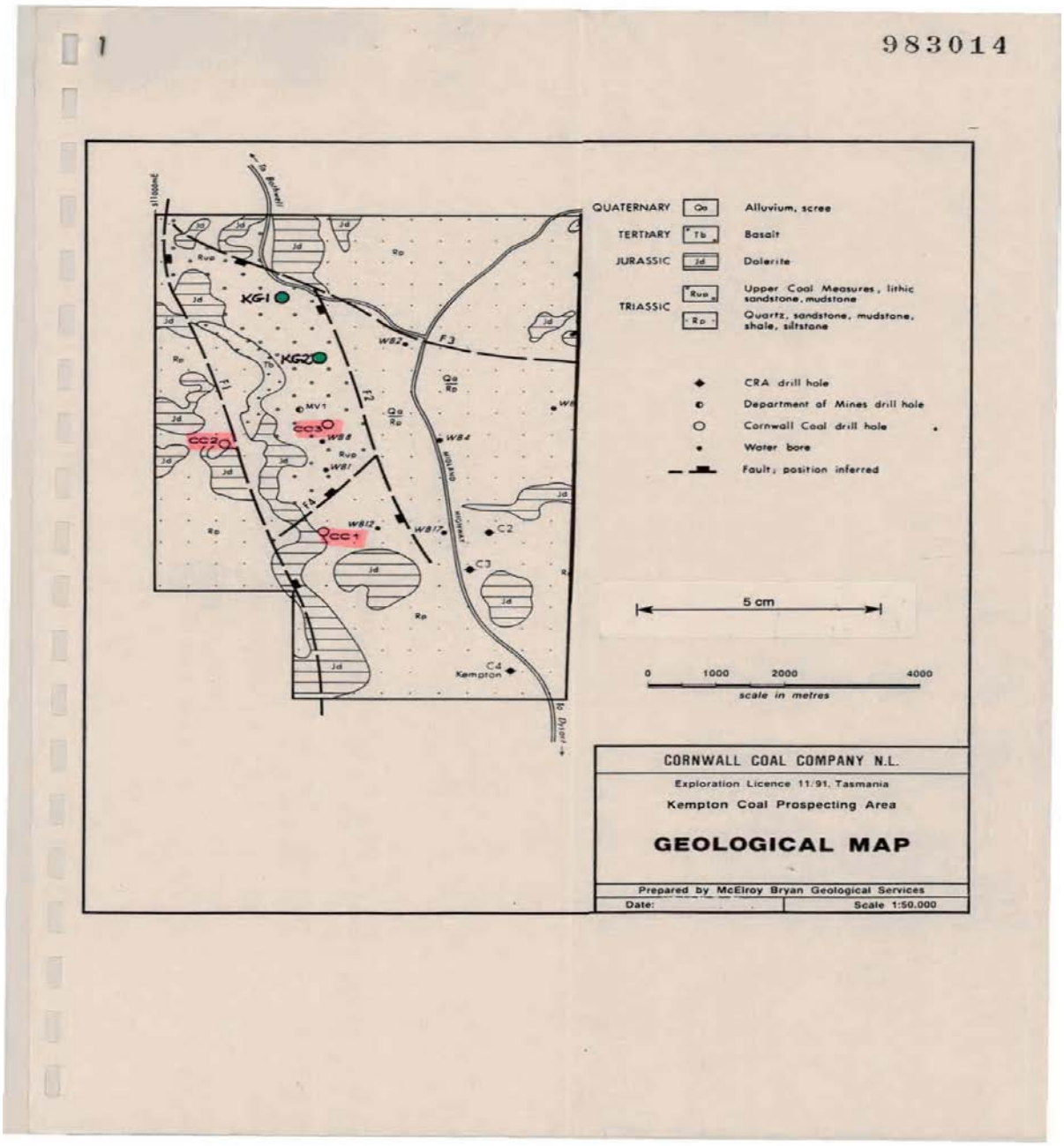
2. *The dip of the strata in Kelvin Grove DDH1 indicates the proximity of a substantial fault zone to the east of that hole. The dip of the seam is too steep for conventional underground mining methods.*

3. *The dolerite sill encountered in Kelvin Grove DDH2 is of unknown thickness and extent.*

4. *The recent cored diamond drill holes have revealed the presence of geological hazards that are likely to prevent the economic mining of coal in the graben structure that exists west of Melton Mowbray.*

5. *Further exploration for coal is not warranted in EL11/91 and it is recommended that the area be relinquished on 23/8/93.*

Updated map showing diamond drill holes Kelvin Grove 1 and 2



The two diamond holes are summarised as follows:
Kelvin Grove DDH 1 – EOH 91.3m. Mudstone/siltstone/sandstone with 2.55m of heat affected coal from 40.9m and 0.07m of heat affected coal from 67.40.
Dolerite from 87.3m.
Analysis of coal (air dried basis) from 40.9m:

Relative Density	1. 65
Inherent Moisture	4.0%
Ash	29.5%
Volatile Matter	18.0%
Fixed Carbon	48.5%
Specific Energy	21. 78 MJ/kg

Kelvin Grove DDH 2 – EOH 103m Mudstone/siltstone/sandstone with dolerite from 83.95m.

The work was summarised as follows:

1. *Cornwall Coal Kelvin Grove DDH1 was terminated at 93.l0m in dolerite. A westerly dipping fault zone is interpreted to affect the strata near the contact with the dolerite. The coal seam at 43.45m was broken and badly heat affected, destroying its normal physical properties. The 2.55m coaly interval included a core loss of O.6lm and the heat affected coal had a high ash content (29.5%). It is possible that this dipping seam correlates with the 2.3m thick seam in Mt. Vernon DDH1 at 294.79m, but it is equally possible that it does not.*

2. *Cornwall Coal Kelvin Grove DDH2 was terminated at 103m after encountering a dolerite sill at 83.95m. The sill may cover a large area at depth and is of unknown thickness.*

Conclusion

- The exploration work clearly demonstrates that the area has late Triassic coal measures as seen to the north at Jericho, York Plains, Woodbury and in the Fingal – Avoca area.
- DOM Mount Vernon DDH1 intersected a 2.3m thick seam with good quality low ash coal that is regarded as the best coal intersection seen in Tasmania.
- The structural setting of the prospective sequences in long and narrow north west trending grabens that are cut by east west faulting provides challenges to further exploration.
- The area is intruded by numerous dolerite dykes and sills.
- The degree of difficulty in defining a mineable coal deposit is high because of the structural complexity and the dolerite intrusions.

Recommendations

- The Mount Vernon intersection has not been repeated in the relatively sparse Cornwall drilling program. Close spaced step out drilling from Mount Vernon DDH1 will allow a better understanding of that intersection and of the structural controls on the coal measures.
- Regional geophysics (magnetics and gravity) and remote sensing surveys would provide useful information on the graben structures and the dolerite intrusions. This would allow the more prospective areas to be targeted for future drilling.
- The northern extension of the Melton Mowbray graben from Mount Vernon has not been explored and should be included in any reconnaissance work.
- The area to the north east of Kempton was dismissed by Cornwall as being too low in the sequence and this is supported by the Kempton DDH1 and the Oatlands 1:50 000 regional map. Cornwall did however incorrectly plot the CRAE Kempton drill holes in this area and it should not be dismissed without further investigation.
- The CRAE drilling did suggest that the coal measures were present and that further work in the southern part of the Melton Mowbray graben is warranted.
- It appears that the grabens are disrupted by east west faults and intruded by dolerite. To define a coal deposit will require detailed exploration on a small scale which is not standard practice in coal exploration.

References

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