ANNUAL REPORT EL25/2008

Mineral Resources Tasmania

Department of Infrastructure, Energy and Resources

Period Covered: 18th September 2012 to 17th September 2013

Licensee: Tiger Coal Pty Ltd

ACN 130 087 697

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Date of Report: 17 September 2013

Abstract

On the 30th May 2013 an option was entered into for South East Asia Energy Resources Pty Ltd (SEARS) to acquire EL 25/2008 from Tiger Coal Pty Ltd. (TC). As part of the agreement SEARS was to fund an immediate start to a drilling program, which commenced on the 1st June 2013.

During the reporting period, two phases of drilling took place over licence EL25/2008 and EL26/2008. This drilling was designed to investigate the continuity and quality of coal seams intercepted in drilling that took place during the previous reporting period (2011/2012).

A total of 25 holes were drilled over the two licence areas, 6 of these falling within EL25/2008. Out of the 6 holes, 3 were diamond drilled (172.45m) and 3 were open hole (245.65m). All 6 holes were drilled in the Jericho area.

Based on results from OJ002 in Jericho, 4 of the drill holes in the area were designed as proximal step-outs (OJ006, OJ007, OJ009 & OJ010) to the south, north, west and east with 2 additional holes drilled as distal step-outs to the south and north (OJ023 & OJ019) to test the extent and/or existence of the seams previously intercepted. OJ006 and OJ007 were drilled in September of 2012 and as such were not included in the report for that period, and have been included in this report.

OJ006 was drilled roughly 500m to the south of OJ002 using the open-hole method and was sampled at 35m, 48m, 59m and from 70-72m. Samples were not analysed immediately as the sample size and quality were not ideal. Chip logging indicates that these intervals were composed mainly of carbonaceous mudstone and possible heavy, dull coal.

OJ007 was drilled roughly 200m to the north of OJ002 using the open-hole method and was sampled at 63m, 67-69m, 81-85m, and from 95-99m. Again, the samples were sent off for analysis immediately and were composed mainly of carbonaceous mudstone and possible heavy dull coal.

OJ009 was diamond drilled roughly 200m to the west of OJ002. 4 zonally bright coal and carbonaceous mudstone seams were intercepted at 11.08-11.30m, 11.54-11.95m, 22.46-23.1m and 43.65-44.5m.

OJ010 was diamond drilled roughly 500m to the east of OJ002. 5 Dominantly heavy, dull coal seams were intercepted at 16.78-17.34m, 18.54-19.16m, 32.32-33.00m, 33.80-34.50m and 42.15-42.93m with a highly brecciated dolerite contact at 48.80m.

OJ019 was diamond drilled approximately 1km to the north (NNW) of OJ002. 3 coal seams of variable quality, from moderately bright to heavy and dull, were intercepted at 16.30-17.54m, 17.84-18.24m and 31.30-32.38m, with dolerite contact at 54.65m.

OJ023 was drilled approximately 1km to the south-west of OJ002 using the open hole method. No significant intersections were intercepted.

Gamma Ray logging was carried out on OJ006, OJ007 and the upper extents of MTV002 in May 2013, with results analysed by B.R. Senior & Associates. Early indications are that the seams logged in Jericho holes appear to have similar gamma ray depth profiles and a marker zone in common with some possible linkages to seams in the Bowhill Rd area. Further geophysical work is intended on the remaining holes, with all being PVC lined and capped in preparation.

Lab results for all holes are still pending, along with graphic logs for the most recent drilling and overall section work to examine possible correlations between seams but cursory examination appears to indicate localised correlation between holes in some areas. Frequent faulting known to exist in the area, complicates any regional correlation work, but inroads are being made, with plans for data input into three-dimensional viewing software in the future.

Further drilling will likely be required, but will be planned following the return of results and result analysis of drilling to date.

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1 Introduction

1.1.1 Exploration rationale (objective) and geological setting

The operator's (Midlands Energy/South East Asia Resources) principal objective of exploration in the area is to delineate any coal seams within the near surface Triassic coal measures for the purpose of defining one or more resources suitable for open cut mining.

The geology of the area is dominated by the freshwater sequence of mudstones, sandstones and siltstones of the Upper Parmeener of the Triassic intruded by Jurassic Dolerite. Typically the Coal measures are found within a lithic sandstone sequence (dominantly within the grabens) that has been preserved in some areas by Jurassic dolerite capping. Structurally, the Jericho area (and surrounds) is dominated by a series of north to north-north-western troughs/grabens upwards of 50 by 1 kilometres in size and disrupted by numerous north-east trending faults.

1.1.2 Licence details

Tenement number:	EL 25/2008
Tenement name:	Melton Mowbray
Tenement location:	Southern Midlands: Dysart/Melton Mowbray/Jericho
Reporting period:	18 September 2012 – 18 September 2013
Tenement holder:	Tiger Coal Pty Ltd
Exploration Manager:	South East Asia Resources (Tas.) Pty Ltd
Licence area:	203 square km
Licence category:	Category 2 (coal)

1.1.3 Location

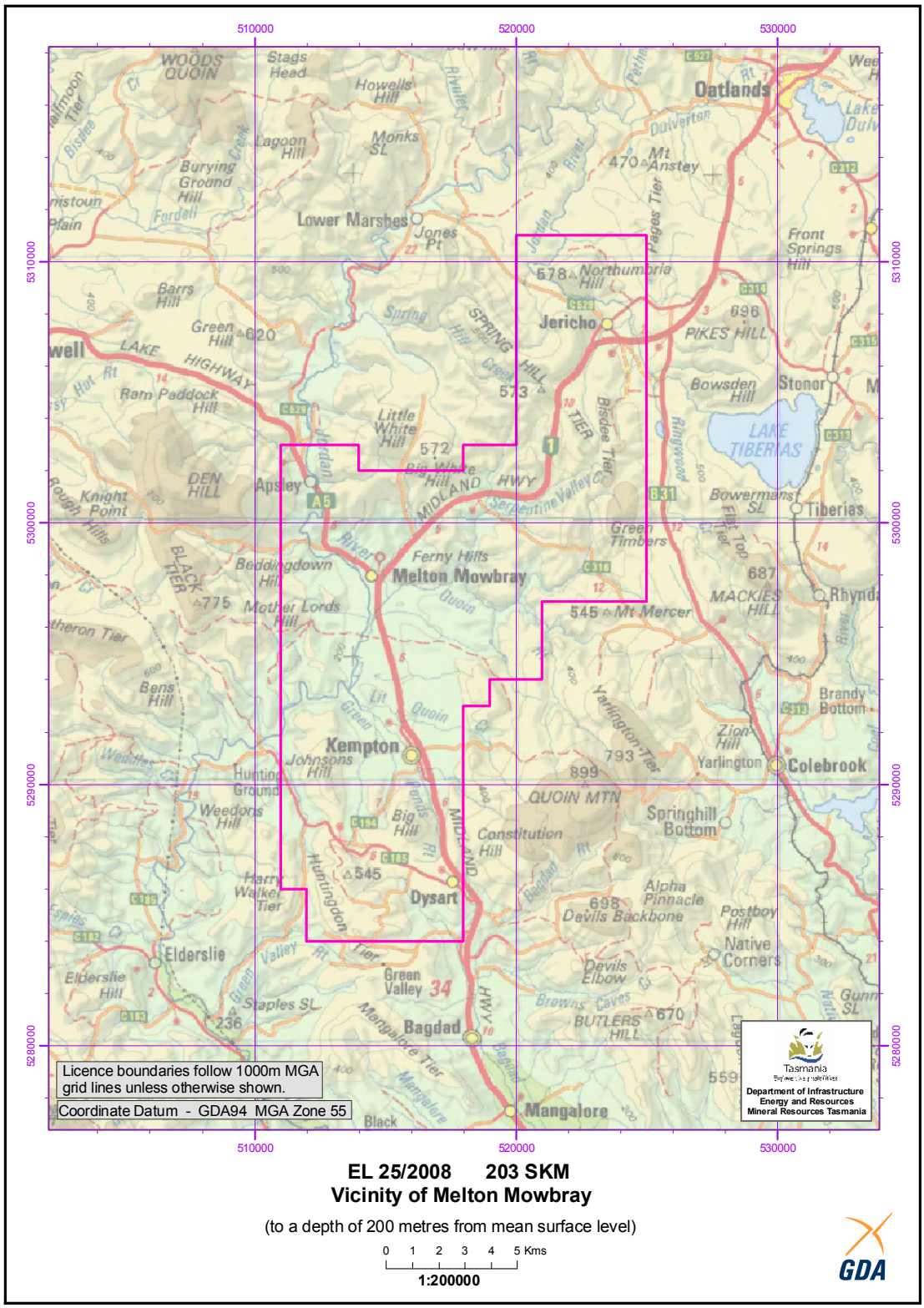


Figure 1. EL25/2008 Location Map

1.1.4 Tenure

Five years from 18 September 2008 to 17 September 2013

2 Review of previous work

2.1.1 Prior to current tenement

A review of past exploration was done in the last reporting year (Pemberton, 2012). A full copy of this review is included in the appendices (Appendix 1). The following are notes from the report.

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 wide area that included reconnaissance geology, remote sensing, structural interpretation and some drilling (reports: TCR80_1513, TCR81_1682 and TCR82_1798).

CRA Exploration Pty Ltd conducted a program over three licences in the Oatlands-Jericho-Kempton area: EL18/1982, EL19/1982 and EL20/1982. CRA used LANDSAT imagery to identify the overall structural trend in the area and followed up with a percussion drilling program to identify if the graben structures were prospective for coal. While the results indicated coal was present, elements of complexity due to the highly faulted nature of the area and the frequent presence of dolerite intrusions were also identified (report TCR84_2213).

Department of Mines drilled a deep diamond hole in 1982 at Mount Vernon (Mount Vernon DDH1). Coal measures were intercepted, the most significant seam observed was 2.3m thick from 204.79m and surprisingly low in ash. Cornwall coal Company NL was granted EL11/91 in 1991 to follow up on this hole with three rotary holes and two diamond holes in the area with limited success attributed to both dolerite intrusions and the nature of the faulting proximal to the coal measures (reports TCR92_3378 and TCR93_3491).

2.1.2 During current tenement

A review of previous work carried out in the area that is now covered by EL25/2008 was undertaken in February 2012 by John Pemberton with the subsequent report produced included in Appendix 1 and briefly summarised in section 2.1.1 Review of previous work: Prior to current tenement.

A brief geological survey of road outcroppings in both EL25/2008 and EL26/2008 was carried out in June 2012 (by Karen Adams). Although carbonaceous mudstone and flacer banding was observed in some outcrops but no areas of outstanding prospectivity were noted, with the dominant geology observed being lithic sandstone, mudstone, some carbonaceous mudstone and dolerite. Minor quartz-rich sandstones were observed in the Dysart area. A brief summary of observations was composed and is included as Appendix 2.

Recommendations formed as a result of this survey include more detailed geological mapping of the entire licence area.

A small diamond drilling program was undertaken from March to April of 2012 comprised of 4 holes, drilled over EL25/2008 and EL26/2008. Only one of these holes was drilled on EL25/2008, OJ002. This hole was drilled in the Jericho area on the Northumbria property. OJ002 was drilled to a depth of 99.65m 6 intervals were sampled, the results for which are listed below. Lithological log for OJ002 are listed as Appendix 3.

Figure 2. OJ002 Results

mFrom	mTo	Interval	Relative Density	Ash%	Total Sulphur	Calories Kcal/Kg	Moisture	Comments
5.58	5.91	0.33	2.05	60	0.05	1808	8.6	Highly degraded coal
17.16	18.35	1.19	1.7	40.8	0.23	4460	3.3	Minor bright coal with calcite cleats
31.07	31.6	0.53	1.74	41.5	0.13	4152	4.1	Moderately bright coal with calcite cleats/veins
31.97	33.7	1.73	1.57	28.1	0.24	5646	2.8	Coal with some calcite veins and vitrinite
50.94	51.88	0.94	1.66	37.7	0.16	4792	4	Grading from heavy to moderately bright coal
62.98	63.63	0.65	2.38	81.9	0.03	832	3	Dull, moderately heavy coal
63.63	64.82	1.19	2.4	79.7	0.48	668	3.8	Dull, moderately heavy coal

A second diamond drill hole (MTV002) was drilled on EL25/2008 in the Mount Vernon area from June to August of 2012. MTV002 was designed to investigate the extent of the coal measures intercepted in the Department of Mines hole drilled in 1982 (Mount Vernon DDH1) and was drilled to a depth of 279.61m at the Mount Vernon Homestead. No significant coal seams were intercepted, and it was determined that the location of this hole was outside the down-thrust block on which Mount Vernon DDH1 was drilled. The Lithological log for MTV002 are listed in Appendix 4.

Mount Vernon DDH1 was also re-logged to 300m and logged for the first time to the end of hole depth: 496m. The re-logging was carried out in order to provide some consistency to the logging of the last 196m. The lithology log is included as Appendix 5.

A review of water borehole data in both licence areas (EL25/2008 & EL26/2008) was carried out in August 2012 and a summary of boreholes containing possible prospective geology was produced (Appendix 6). This data was used to assist in planning further drilling.

3 Exploration completed during the reporting period

3.1.1 Prospect- based exploration activities

A 16 hole drilling program (WPA12/34) was designed to follow up on the initial 4 diamond holes. The initial intention was for all of these holes to be drilled using the open hole method, with four step-outs intended to follow up the intercepts in each diamond hole. As such, of the 16 planned holes, 4 were intended for EL25/2008 to step out to the north, south, east and west of OJ002 by approximately 200m. This follow up program was started in August, 2012. This obviously fell into the previous reporting period, but as it was in progress only minimal initial data was available to be reported on, with the remaining information to be provided during this reporting period.

Of the 4 planned holes for EL25/2008, 2 were drilled before the program was temporarily halted in September 2012; OJ006 and OJ007.

OJ006 was drilled approximately 600m to the south-east of OJ002 (See Figure 14), and encountered approximately 4 potentially prospective intervals (Figure 3) before the hole was ended at 100m. Some difficulties were encountered during drilling, with moisture being encountered from 3.5m requiring foaming (Figure 4) until around 32m when a increased amount of water was encountered. This meant that the overall sample quality and size was reasonably poor, however the intercepts appear to roughly correlate with some seams in OJ002. Lithology log for OJ006 is included as Appendix 8.

Figure 3. OJ006 Sampled Intervals

mFrom	mTo	Description
35	36	Black (with minor grey) carbonaceous mudstone, coal, mudstone and sandstone
48	49	Black to grey carbonaceous mudstone, some sandstone and possible coal
59	60	Grey to black mudstone and carbonaceous mudstone
70	71	Black carbonaceous mudstone and coal with some dark grey mudstone
71	72	Black carbonaceous mudstone and possible coal with some grey mudstone
72	73	Black carbonaceous mudstone and grey mudstone. Small sample size
73	74	Grey mudstone with some dark grey carbonaceous mudstone and sandstone. Small sample size

Figure 4. OJ006 Drilling

OJ007 was drilled approximately 200m to the north of OJ002 (Figure 14), and also encountered 4 potentially prospective intervals (Figure 5) before the hole was ended at 102.6m. Only one of these intercepts appear to roughly correlate with a seam intercepted in OJ002, however detailed examination of all information available is yet to be carried out. Lithology log for OJ007 is included as Appendix 9.

Figure 5. OJ007 Sampled Intervals

mFrom	mTo	Description
63	64	Grey to dark grey-green, medium to fine-grained sandstone and mudstone with patchy and weak silica-sericite alteration
67	68	Black carbonaceous mudstone, coal and some grey, medium-grained sandstone
68	69	Black carbonaceous mudstone and coal
81	82	Black carbonaceous mudstone and coal with minor, medium-grained grey sandstone
82	83	Black carbonaceous mudstone and possible coal with minor grey mudstone
83	84	Grey mudstone
84	85	Grey to dark grey mudstone and carbonaceous mudstone
95	96	Dark grey carbonaceous mudstone with some grey mudsotne
96	97	Dark grey carbonaceous mudstone and grey mudstone
97	98	Dark grey carbonaceous mudstone and minor grey mudstone
98	99	Dark grey carbonaceous mudstone and possible coal with some grey mudstone

Figure 6. OJ007 Drilling

A gamma ray survey was carried out in May 2013 of the initial phase of the holes drilled for WPA12/34 including OJ006 and OJ007. This survey was carried out by B.R. Senior & Associates Pty Ltd and the resulting report written is included as Appendix 10. Dr Senior stated that the gamma ray depth profiles present in OJ006 and OJ007 were similar and that a marker zone was present in both holes. He also identified a similar marker zone in OJ008, (see Figure 14) a hole drilled 7.75km to the north (in EL26/2008) and recommended continued gamma ray logging of future holes to clarify the existing consistencies.

The remaining 2 planned holes for EL25/2008 from WPA12/34 were drilled in June of 2013 after an extension for WPA12/34 was requested and granted. OJ009 and OJ010 were diamond drilled instead of using the initially intended open hole method.

OJ009 was drilled around 200m to the east of OJ002 (see Figure 14) and intercepted 3 (possibly 4) seams of varying coal quality (see Figure 7), which at first glance appear to roughly correlate with some of the seams in OJ002. No dolerite was encountered but towards the end of the hole, green-grey silica-sericite alteration (often associated with proximity to dolerite) was present. OJ009 logs and core photos are included as Appendix 11.

Figure 7. OJ009 Sampled Intervals

mFrom	mTo	Interval	Description
11.08	11.3	0.22	Zonally bright coal & carbonaceous mudstone. 5-10% vitrinite
11.54	11.95	0.41	Carbonaceous mudstone and coal ~1% vitrinite
22.46	23.1	0.64	Zonally bright, heavy dull coal & carbonaceous mudstone
43.65	44.5	0.85	Dominantly heavy dull coal. 1-2% vitrinite downhole

Figure 8. OJ009 Drilling

OJ010 was drilled approximately 300m to the west of OJ002 (see Figure 14) and intercepted 5 seams of dominantly heavy, dull coal (see Figure 9), which have some depth similarities to those in OJ002. Drilling in this area proved particularly difficult, with a great deal of cave in occurring. Dominantly broken ground present with a broken, brecciated contact with dolerite at 48.8m. OJ010 logs and core photos are included as Appendix 12.

Figure 9. OJ010 Sampled Intervals

mFrom	mTo	Interval	Description
16.78	17.34	0.56	Heavy dull coal (+/- carbonaceous mudstone)
18.54	19.16	0.62	Heavy dull coal 5-10% vitrinite & brecciated downhole contact
32.32	33	0.68	Grading from dull to moderately bright coal
33.8	34.5	0.7	Mudstone, carbonaceous mudstone & coal breccia zone
42.15	42.93	0.78	Very broken, heavy dull coal (+/- carbonaceous mudstone)

Figure 10. OJ010 Drilling

A second drilling program (WPA13/24) was designed and executed in conjunction with the WPA12/34 program. This program was intended to be composed of 9 holes (with 11 drilled in the end), drilled using the open hole method, with 2 of these holes to be drilled within EL25/2008. These holes, OJ019 and OJ023, were drilled but OJ019 was diamond drilled instead of open hole.

OJ019 was drilled approximately 1km north-north-west of OJ002 and intercepted 2-3 seams of heavy, dull to moderately bright coal (see Figure 11) and dolerite at 54.65m. Some cave-in was encountered and was also sampled. There would seem to be some possible correlation with these seams and the upper seams of OJ002, but given the distance and the depth at which dolerite was encountered, it seems likely that this correlation is superficial. As previously mentioned, a more detailed analysis is required and is pending. Logs and core photos for OJ019 are included as Appendix 13.

Figure 11. OJ019 Sampled Intervals

mFrom	mTo	Interval	Description
16.3	16.74	0.44	Carbonaceous mudstone and possible heavy, dull coal
16.74	17.2	0.46	Moderately to strongly broken, heavy, dull coal
16.7	17.3	0.6	Cave In
17.2	17.54	0.34	Moderately brittle, bright coal. Calcite cleating/veining
17.84	18.24	0.4	Heavy dull coal & carbonaceous mudstone
31.3	31.95	0.65	Carbonaceous mudstone and heavy dull coal
31.95	32.38	0.43	Moderately broken, heavy dull coal. Some calcite veining

Figure 12. OJ019 Drill Site

OJ023 was drilled around 1km to the south-west of OJ002 (see Figure 14) using the open hole method to a depth of 43m. There were no significant intercepts encountered. The lithology log for OJ023 is included as Appendix 14.

Figure 13. OJ023 Drill Site

All holes drilled have been PVC lined to facilitate further geophysical logging in the area. All hole information is listed in a meta data table (Figure 15). In July 2013, Northern Surveying Services was brought in to survey the holes drilled to date. Holes surveyed were: OJ006-OJ018, OJ021-OJ023 and OJ025-OJ027. The remainder of the holes will be surveyed except for OJ001-OJ004 which have already been rehabilitated completely and are unable to be surveyed.

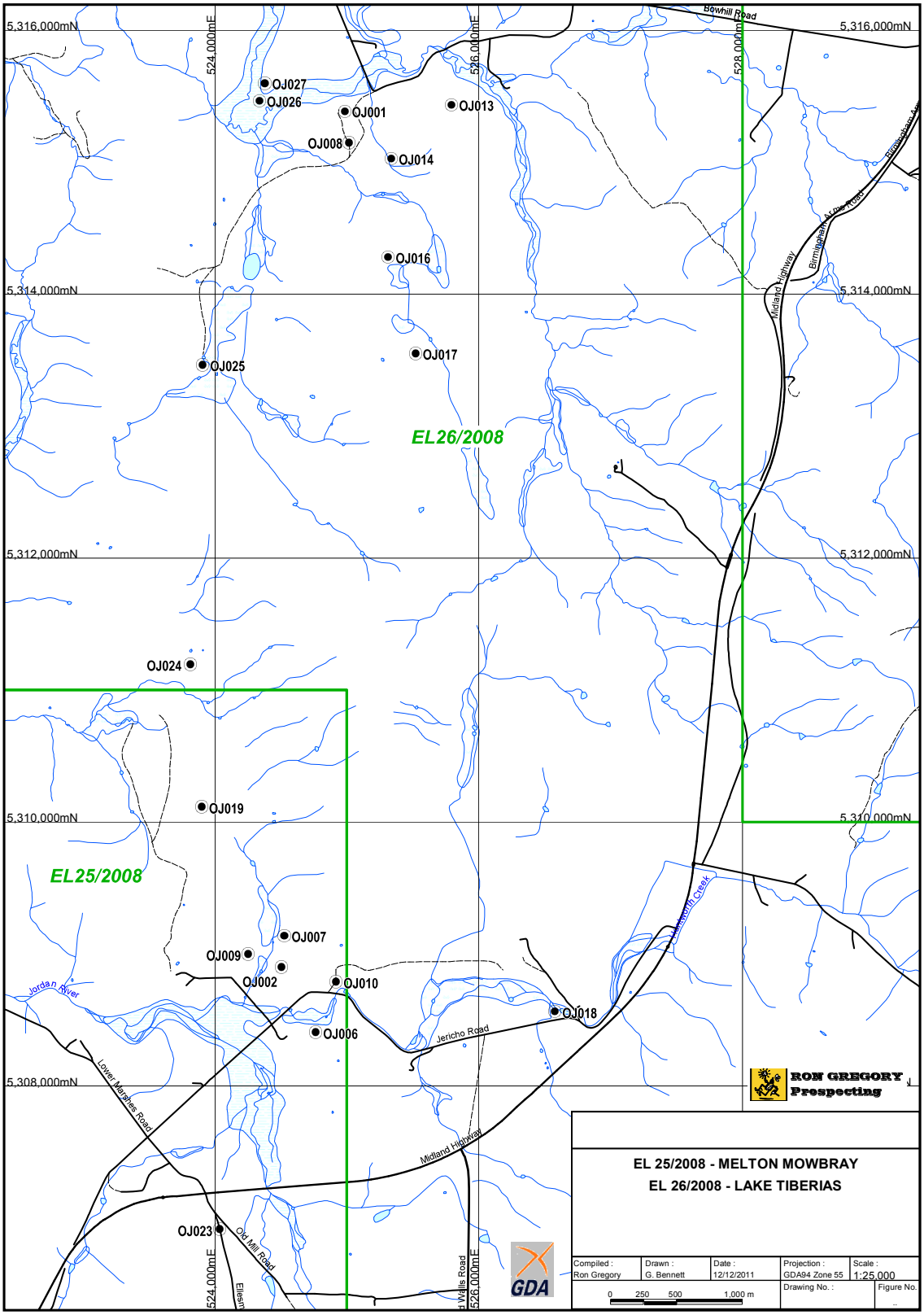


Figure 14. Jericho Drilling Location Map

Figure 15. Jericho Meta Data

Hole ID	Co-ordinates			Licence	Location	Drill Company	Drill Method	Drill Date	Hole Depth	WPA
	Easting	Northing	Elevation							
OJ002	524507	5308900	392	EL25/2008	"Northumbria" Jericho	KMR	DIAMOND	Mar-12	99.65	
OJ006	524763	5308407	383	EL25/2008	"Northumbria" Jericho	KMR	OPEN HOLE	Sep-12	100	WPA12/34
OJ007	524526	5309139	385	EL25/2008	"Northumbria" Jericho	KMR	OPEN HOLE	Sep-12	102.65	WPA12/34
OJ009	524250	5308999	386	EL25/2008	"Northumbria" Jericho	Whole Core	DIAMOND	Jun-13	59.55	WPA12/34
OJ010	524919	5308789	390	EL25/2008	"Northumbria" Jericho	Whole Core	DIAMOND	Jun-13	52.6	WPA12/34
OJ019	523899	5310113	399	EL25/2008	"Northumbria" Jericho	KMR	DIAMOND	Jul-13	60.3	WPA13/24
OJ023	524032	5306914	387	EL25/2008	"Northumbria" Jericho	KMR	OPEN HOLE	Jul-13	43	WPA13/24

4 Discussion of results

Results from samples taken from all holes drilled during this reporting period are still pending, along with work on drill sections and further geophysical surveys. Further drilling has been proposed on a results basis, however until assays, geophysics and further analysis are complete, this has been postponed. A summary of the significant intercepts can be seen in Figure 16.

Figure 16. Jericho Significant Intercepts Summary

Hole ID	Intercept 1		Intercept 2		Intercept 3		Intercept 4		Intercept 5		Intercept 6	
	From	To	From	To	From	To	From	To	From	To	From	To
OJ002	5.58	5.91	17.16	18.35	31.07	31.6	31.97	33.7	50.94	51.88	62.98	64.82
OJ006	35	36	48	49	59	60	70	73	-	-	-	-
OJ007	63	64	67	69	81	85	95	99	-	-	-	-
OJ009	11.08	11.3	11.54	11.95	22.46	23.1	43.65	44.5	-	-	-	-
OJ010	16.78	17.34	18.54	19.16	32.32	33	33.8	34.5	42.15	42.93	-	-
OJ019	16.3	17.54	17.84	18.24	31.3	32.38	-	-	-	-	-	-
OJ023	-	-	-	-	-	-	-	-	-	-	-	-

5 Conclusions

Drilling undertaken during this reporting period was designed to both test the proximal extents of the known coal seams encountered in the 4 original diamond holes (OJ001-OJ004), and to investigate possible links between these holes on a more regional scale. While initial signs appear somewhat encouraging, further work is definitely required.

The scope of the down hole geophysical survey was somewhat limited, however the interim results and the extrapolations made from them are also encouraging and warrant the continuation of the survey now that more holes are available.

Pending assay results, further down-hole geophysical surveys and detailed section work, means that drawing distinct conclusions at this stage would be premature, however based on the information available it seems that the coal measures are reasonably consistent locally but on a broader scale, the influence of frequent faulting and dolerite intrusions is significant.

6 Environment

EL25/2008 is dominantly composed of undulating agricultural land with some dry sclerophyll forest. Drilling took place exclusively on agricultural land. This land has been either heavily grazed or cultivated, has little to no native flora remaining and generally contains a number of invasive weed species including gorse and thistles.

Phillip Milner carried out the most recent botanical survey for WPA13/24 and the subsequent report is included as Appendix 15. All recommendations made in this report were followed and the impact on the farmland minimised as much as possible.

Negotiations with land owners for access to their land was carried out in accordance with the Mineral Exploration Code of Practice and relationships with land owners continues to be cordial.

All sites have been rehabilitated (sump filled and ground levelled) except for the grouting of the PVC lined holes. This will take place upon completion of the down-hole geophysical surveys. These holes are PVC lined and capped. Once the geophysics has been completed, the PVC will be cut below ground level and the holes individually grouted up to plough depth (approximately 1m below surface).

Figure 17. OJ006 Rehabilitation

Figure 18. OJ007 Rehabilitation

Figure 19. OJ009 Rehabilitation

Figure 20. OJ010 Rehabilitation

Figure 21. OJ019 Rehabilitation

Figure 22. OJ023 Rehabilitation

7 Expenditure

Full details of the expenditure on recent drilling and the data compilation are not known at this time due to Mr Greg Cox; Project Supervisor on behalf of South East Asia Energy Resources (Tas.) Pty Ltd was required to attend to urgent business overseas. The required SEARS expenditure information is expected to be included in the July – September Quarterly Report.

Value of known exploration works:

Drilling - June - July 2013 (OJ009 & 10)	$41,755
Drilling – June July 2013 (OJ019 & 23)	$23,441
Rehabilitation	$1,000
Geology and drilling logistics -	$26,141
Annual rental	$11,833
SEARS drilling logistics	Unknown
Geophysics	Unknown
SUBTOTAL of known value	$104,170

8 References

Pemberton J., 2012. *A brief review of past exploration in the area covered by EL 25/2008 Melton Mowbray for Midlands Energy Ltd.*

TCR80_1513 *Final report of Tasmanian Coal Prospects for Capricorn Mining Ltd.* General Geological Services. February 1981.

TCR81_1682 *Tasmanian coal prospects. Six month progress report, 17 April to 16 October 1981, for Capricorn Mining Ltd.* General Geological Services.

TCR82_1798 *Capricorn Mining Ltd, Relinquishment Report, Coal EL28/79, Oatlands Tasmania.* May 1982

TCR84_2213 *Parattah EL18/82, Kempton EL19/82, Jericho EL20/82. Exploration report for the year ending 30 September 1984.* CRA Exploration Pty Ltd. Report 12862.

TCR92_3378 *The Cornwall Coal Company NL Coal Exploration Kempton – Report No 1. Year ended 23/8/92. EL11/91.* By Dr JH Bryan.

TCR93_3491 *The Cornwall Coal Company NL Relinquishment Report. Year ended 23/8/1993. EL11/91.* By Dr JH Bryan.

Appendix 1. A Brief Review of Past Exploration in the Area Covered by EL 25/2008 Melton-Mowbray

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

EL 25/2008 Melton Mowbray covers 203 sq km in the Southern Midlands. Tiger Coal Pty Ltd currently holds the area 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 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 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 are that included reconnaissance geology, remote sensing, structural interpretation and some scout drilling. One hole was drilled at Jericho within 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.

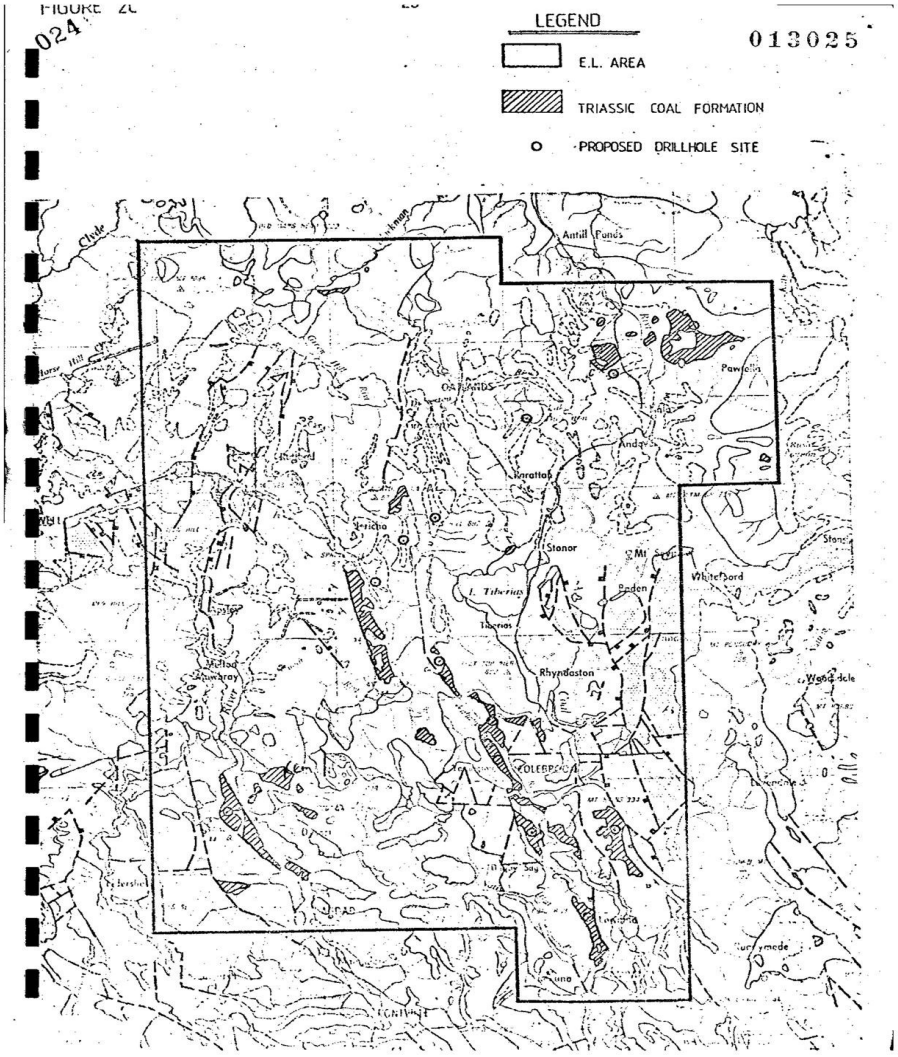
In 1982 the Department of Mines (DOM) drilled a deep hole at Mount Vernon to assist with a gravity survey. The coal measures were intersected over some 300m with a seam of 2.3m from 204.79m proving to be very low in ash and now recognised as the best coal intersection seen in Tasmania (Carol Bacon pers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

Cornwall Coal Company NL was granted EL 11/91 in 1991 with the express intention of following up the DOM drill hole on the Mount Vernon property. 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

Capricorn Mining Ltd explored EL 28/1979 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

Tasmania
Explore the possibilities

GDA

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.

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

Ash%	12.08
Volatile matter%	26.17
Fixed carbon%	57.09
Total sulphur%	00.01

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.*

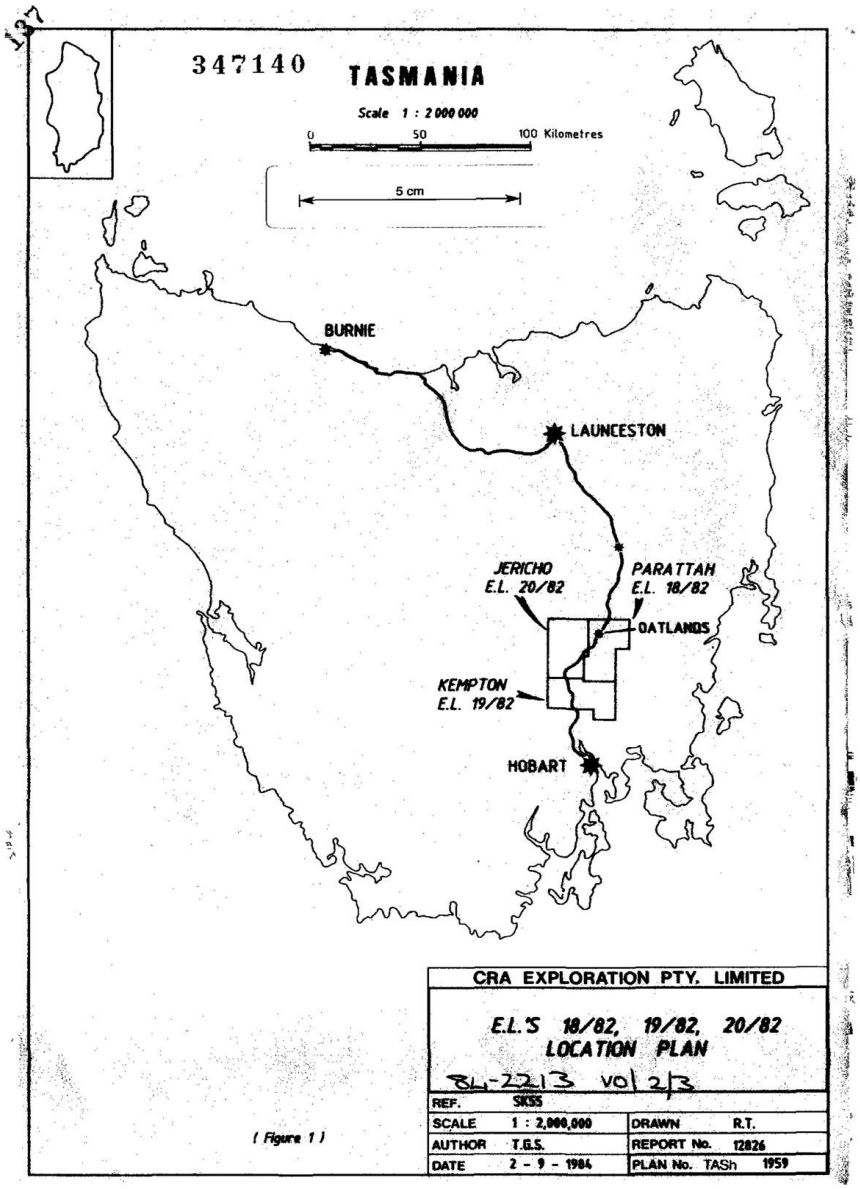
3. *At least one additional body of lithic sandstone sequence, S.W. of Oatlands, remains to be tested by scout drilling.*

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.*

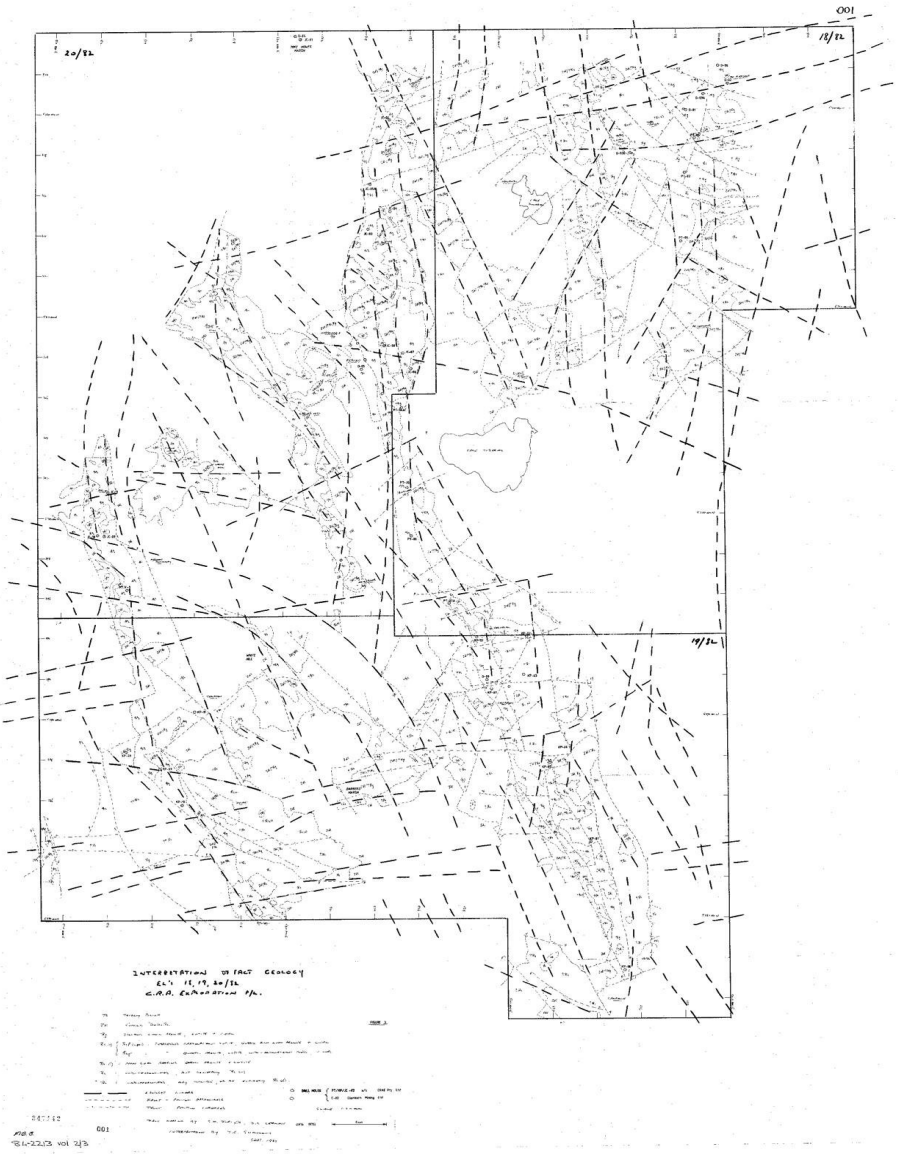
CRA Exploration Pty Ltd

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



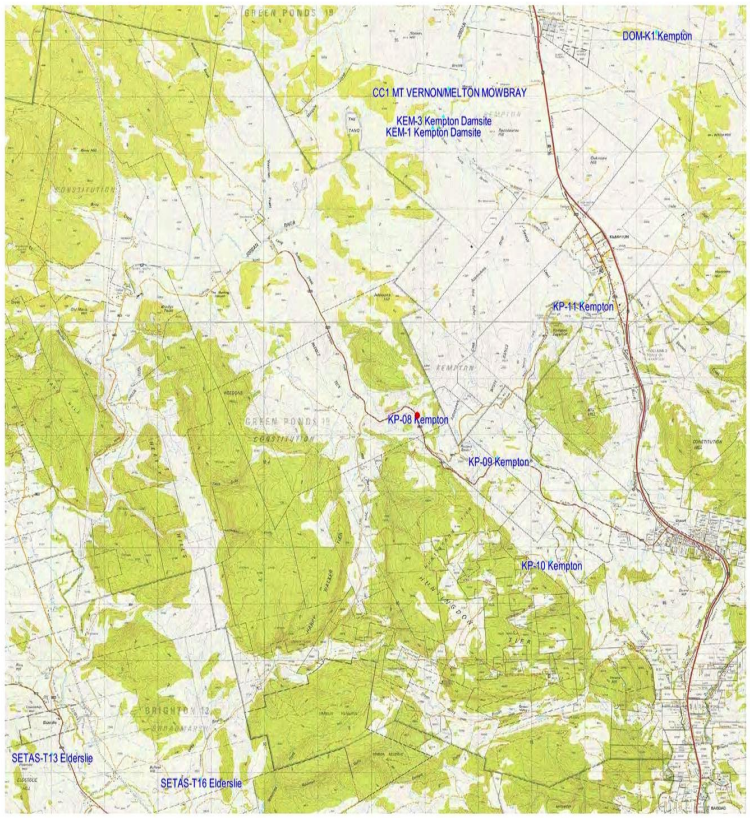
Tim Summons managed and reported on the exploration work of CRAE (see TCR84_2213). The program was thorough and successful in that it identified numerous areas with coal from the scout drilling (percussion) program. The use of LANDSAT imagery to generate a structural trend map was instrumental in the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

Summary of CRAE holes:

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. In 1982 the 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%	7.10
Ash%	14.5
Volatile matter%	27.2
Fixed carbon%	58.3
Total sulphur%	0.43
Specific energy (MJ/kg)	
Dry basis	28.60
Dry ash-free basis	32.94
Carbon dioxide%	00.82

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 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.*

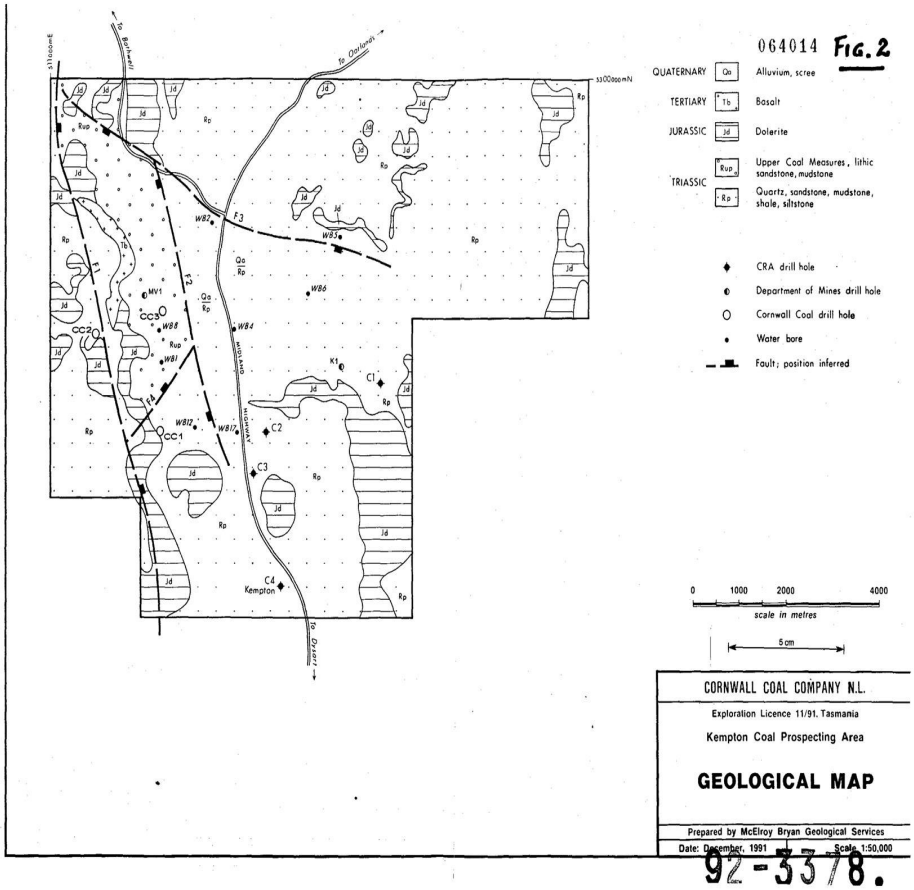
2. *Triassic strata in the vicinity of Melton Mowbray dip at 5^0 to 10^0 to the south west towards the gravity low, and if faulting was not present the coal seam may have been close to the surface some 3kms east of Melton Mowbray. One proposed drill site was east of the Midlands Highway on "The Follies" 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 1km 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 a mudstone/siltstone/sandstone sequence with a narrow coal band of 0.7m at 11.3m.

Cornwall Coal Mount Vernon RDH 2 – EOH 50m - intersected a 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.*

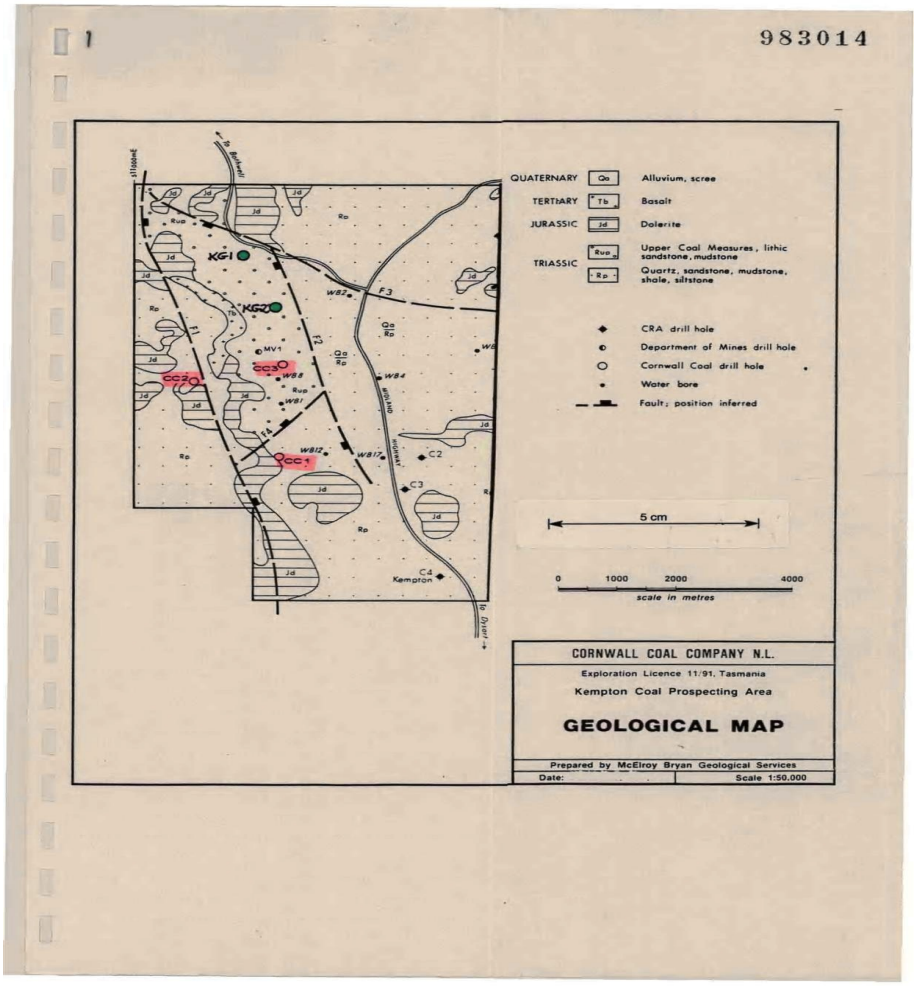
2. *The dip of the strata in Kelvin Grove DDH1 indicates the proximity of a substantial fault zone to the east of that hole. The dip of the seam is too steep for conventional underground mining methods.*

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 that is not standard practice in coal exploration.

References

Bacon C.A. 1983. Coal intersections in a drill hole near Kempton. *Unpub. Rep. Dep. Mines Tasm.* 1983/33

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TCR81_1682 Tasmanian coal prospects. Six monthly progress report, 17 April to 16 October 1981, for Capricorn Mining Ltd. General Geological Services.

TCR82_1798 Capricorn Mining Ltd, Relinquishment Report, Coal EL28/79, Oatlands Tasmania. May 1982.

TCR84_2213 Parattah EL18/82, Kempton EL19/82, Jericho EL20/82. Exploration report for the year ending 30 September 1984. CRA Exploration Pty Ltd. Report 12862.

TCR92_3378 The Cornwall Coal Company NL Coal Exploration Kempton - Report No 1. Year ended 23/8/92. EL 11/91. By Dr JH Bryan.

TCR93_3491 The Cornwall Coal Company NL Relinquishment Report. Year ended 23/8/1993. EL 11/91. By Dr JH Bryan.

Appendix 2. “Geological Road Outcrop Survey” By Karen Adams, June 2012.

“Geological Road Outcrop Survey” By Karen Adams, June 2012.

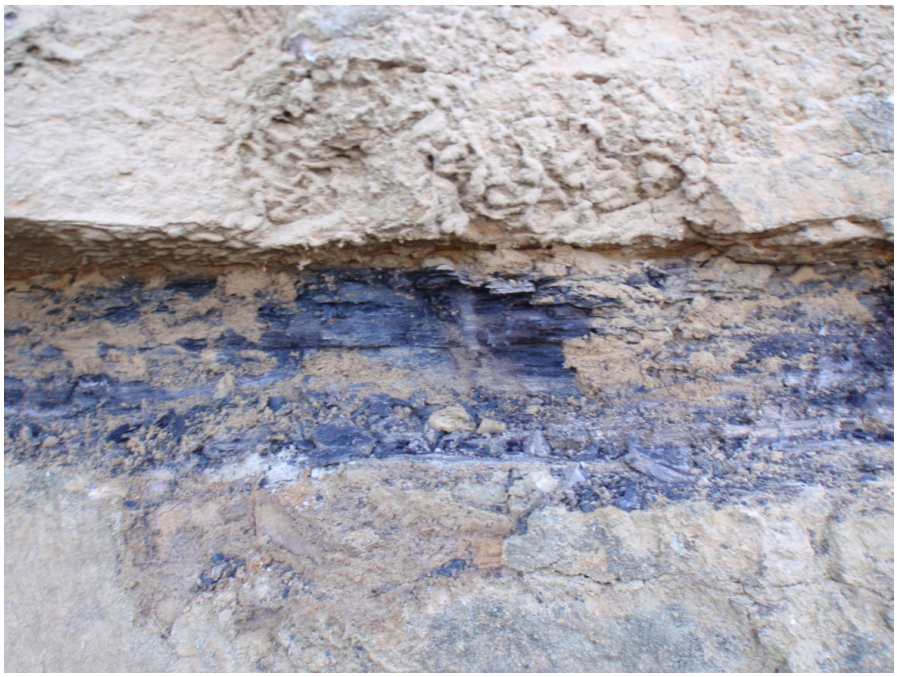
A geological survey of road-side outcrops along the public roads contained within EL25/2008 and EL26/2008, was carried out over two days (6^{th}-7^{th} June, 2012). The survey was intended as a brief visual analysis of the ‘publicly available’ outcrops within the licence for the purpose of identifying areas that might be potentially prospective for coal and as such warrant further exploration.

The majority of outcrops observed were dolerite and/or sandstone-mudstone and all correspond with the available geological data. There were a few noteworthy areas including in the south of EL25/2008, to the west of Kempton, and in the south of EL26/2008 to the north east of Colebrook.

The southern area of EL25/2008 was of particular interest given that a series of holes drilled (‘KP’ holes) by CRAE in the 1980’s to follow up on the Mount Vernon coal seam, ended in dolerite at reasonably shallow depths. Upon examination of the outcrops in the valleys and leading up the hills upon which the holes were drilled, a number of dolerite outcrops separated by sandstone (and some mudstone) were observed and would tend to indicate that these are likely to be sills. In which case, the KP series of drill holes were likely ended too early. There were also two outcrops of highly degraded carbonaceous mudstone observed in the vicinity of the eastern intersection of Clifton Vale Road and Fosters Road (see photo below).

There is a report of coal outcropping in the Kempton area, observed in the 1980's in what was likely to have been a fresh outcrop at the time. It is likely that this outcrop has degraded greatly or has been covered by debris. As such, it has not been re-discovered. It is possible, that the above pictured outcrop once had some associated coal, or was proximal to coal.

A relatively fresh outcrop of mudstone and lithic sandstone with flacer banding and some carbonaceous mudstone was observed along Rhyndaston Road in the southern part of EL26/2008, to the north-east of Colebrook (pictured below).



This survey has identified and/or confirmed areas of potential coal prospectivity, but is just an initial step. Further, more detailed mapping within privately owned land on the licences is probably advisable, and more detailed mapping in the areas identified in this survey is definitely warranted. It may also be advisable to consider continuing where CRAE left off with the KP series drill hole.

Appendix 3. OJ002 Lithology Log

Drill Hole ID: OJ002

Project: Southern Midlands Coal
License: EL 25/2008 (Jericho Road)
Date Drilled: 23/3/12 - 27/3/12

Collar: Easting: 55 524 507
Northing: 5 308 900
Elevation: 392
(GDA - GPS)
Azimuth: n/a
Dip: -90 degrees

mFrom	mTo	Description
0	4.75	Hammer Bit - No Core
4.75	5.58	Core Loss - washed away
5.58	5.63	Weathered mudstone tallus with black mud coating
5.63	5.82	Highly weathered coal 'dirt'
5.82	5.95	Weathered mudstone and sandstone
5.95	9.85	Moderately to highly weathered, cream to orange lithic sandstone with minor flacer banding. Base of oxidation at 9.85m
9.85	11.75	Pale grey, medium to coarse-grained lithic sandstone with very minor flacer banding
11.75	12	Pale orange to cream, oxidised (fault proximal) lithic sandstone
12	12.25	oxidised fault zone
12.25	12.4	Pale orange to cream, oxidised (fault proximal) lithic sandstone
12.4	12.6	Grey, medium grained lithic sandstone with minor carbonaceous mudstone clasts down hole
12.6	13.15	Grey mudstone with minor carbonaceous mudstone
13.15	14.76	Pale grey, medium to coarse-grained lithic sandstone with *dichroidium*fossils and carbonaceous mudstone banding present
14.76	15.5	Cream lithic sandstone with minor oxidation zone proximal to fault
15.5	17.18	Pale grey, medium-grained lithic sandstone with minor zonal oxidation up hole (fault proximal)
17.18	18.37	Minor bright coal with calcite cleats and veining with some mud bands
18.37	22.85	Grey mudstone and fine sandstone with minor carbonaceous mudstone flacer banding. Small upwardly fining cycles. Increasing lithic sandstone abundances increasing down hole with *dichroidium*fossils present
22.85	28.89	Pale grey, medium-grained lithic sandstone with *dichroidium*fossils and carbonaceous mudstone and coal banding at around 23.8m. Flacer banding almost styolitic in appearance and increasing in abundance from 24.9m. Some calcite veining, apparently associated with flacer banding. Series of small upwardly fining cycles of mud and sandstone beginning at 25.9m. Flacer banding at 26.5m at 70 degrees to core axis. Overall sandstone is massive to semi-massive.
28.89	29.19	Interbedded grey sandstone and mudstone with minor carbonaceous mudstone
29.19	29.91	Carbonaceous mudstone interbedded with dark grey sandstone and minor coal in 1mm wide vitric bands at 70-80 degrees to core axis
29.91	31.05	Grey mudstone interbedded with grey, fine-grained lithic sandstone and minor carbonaceous mudstone in an overall upwardly fining cycle

31.05	31.6	Moderately bright coal with calcite veins and cleats
31.6	31.9	Dark grey to grey mudstone interbedded with carbonaceous mudstone
31.9	33.7	Coal with calcite veining and vitric bands
33.7	34.19	Brown to grey mudstone and carbonaceous mudstone
34.19	43.24	Pale grey to grey, medium to coarse-grained lithic sandstone with minor to very minor flacer banding and small (<15cm) intervals of finer grained material
43.24	44.55	Grey, medium to coarse-grained lithic sandstone with abundant irregular coal-calcite 'veins'. Calcite sometimes occuring in tensional, en eschelon orientation within coal.
44.55	50.34	pale grey, medium to coarse-grained lithic sandstone with some flacer banding up hole and bedding at down hole contact at 80 degrees to core axis
50.34	50.94	Dark grey to brown mudstone and carbonaceous mudstone increasing in abundance downhole
50.94	51.88	Coal, grading from dull and moderately heavy to moderately bright with vitric bands and calcite veining (ranging from sub paralell to 20 degrees to core axis)
51.88	53.06	Dark brown to grey carbonaceous mudstone and mudstone with some coal bands (from52.6-52.7m) with calcite cleats
53.06	53.18	Vitric coal bands with calcite veining and cleats. Some carbonaceous mudstone present
53.18	54.03	Dark grey to dark brown mudstone and carbonaceous mudstone with very minor calcite veining
54.03	62.92	Grey, fine to medium grained lithic sandstone with two joint sets from 55.15 to 56.3m at 40 and 20-30 degrees to core axis. Joints were undulose and rough with some calcite alteration. Rip up clasts of coal and carbonaceous mudstone (up to 7cm in size) and flacer banding from 60.35-60.8m
62.92	62.98	Dark grey carbonaceous mudstone
62.98	64.96	Dull, moderately heavy coal with carbonaceous mudstone banding and calcite veining common. Brecciated down hole contact. Pyrite mineralisation at 64.77m
64.96	74.28	Grading from dark grey to light grey, fine to medium-grained sandstone. Pale green alteration from approximately 71.3m
74.28	79.44	Very pale grey, strongly silica-sericite altered, frequently fractured mudstone with increasing abundances of fine to medium-grained sandstone down hole. Alteration likely attributable to contact metamorphism. Bedding still apparent around 77.65 and 78.2m at 70-80 degrees to core axis. Cross-bedding apparent at 78.15. 4.5 joint sets apparent, dominantly planar smooth with some carbonate alteration
79.44	79.85	Intensely banded and altered zone. Likely fluid pathway, partially healed fault. Silica-sericite prominant plus other fine-grained and banded minerals
79.85	80	Pale grey, broken silica-sericite altered mudstone
80	80.42	Pale grey silica-sericite altered mudstone
80.42	82.67	Grey-green, fine to medium grained dolerite with calcite veining common (5mm band of dark red, jasperoidal material at uphole contact)
82.67	84.8	Dark grey-green with rounded xenoliths, up to 4cm in size, at up hole contact. Vesicles, often calcite filled (amygdaloidal), throughout and calcite veins common
84.8	99.65	Dark green-grey dolerite with calcite veins common
	EOH	

Appendix 4. MTV002 Lithology Log

Drill Hole ID: MTV002

Project: Southern Midlands Coal
License: EL 26/2008 (Mount Vernon Homestead)
Date Drilled: 29/07/2012 - 07/08/2012

Collar: Easting: 55 513 651
Northing: 5 295 675
Elevation: 202m
(GDA - GPS)
Azimuth: n/a
Dip: -90 degrees

mFrom	mTo	Description
0	9.6	Cutting Bit - No Core (Dolerite tallus 0-8.6m and sandstone 8.6-9.6m)
9.6	17.47	Dark grey to black carbonaceous mudstone with increasing amounts of medium grained sandstone from approximately 12m. Flacer banding and fossil plants present
17.47	17.91	Core Loss - 0.44m (ground away)
17.91	20.2	Black carbonaceous mudstone and pale grey lithic sandstone with sandstone increasing downhole and strong cross bedding at 18-18.3m, 19m and 20.2m.
20.2	27.92	Pale grey, medium to coarse lithic sandstone with minor carbonaceous mudstone flacer banding and cross-bedding at 20.5m. Plant fossils present throughout (*Dichroidium*?). Darker carbonaceous mudstone zone from 21.55m-22.1m.
27.92	28.3	Coal and carbonaceous mudstone with minor calcite veins (approximately 5 degrees to core axis) and approximately 1% vitrinite.
28.3	28.61	Grey mudstone
28.61	35.5	Grey to pale grey medium grained lithic sandstone and carbonaceous mudstone with minor mudstone that is zonally prominant and increasing downhole. Flame structures and frequent cross-bedding present.
35.5	36.86	Grey soft mudstone with minor carbonaceous mudstone
36.86	37.25	Fault zone in grey mudstone with minor carbonaceous mudstone
37.25	37.93	Grey mudstone with downhole contact approximately 70 degrees to core axis
37.93	38.23	Black dull coal with minor calcite cleats and carbonaceous mudstone
38.23	38.44	Degraded mudstone and carbonaceous mudstone
38.44	38.57	Carbonaceous mudstone grading to grey mudstone downhole. Gradational downhole contact.
38.57	40.09	Grey mudstone with minor pale grey sandstone increasing downhole
40.09	45.49	Pale grey to white, quartz-rich, sub lithic sandstone with zonal carbonaceous mudstone flacer banding decreasing downhole. Rip-up clasts at 41.5m
45.49	45.61	Carbonaceous mudstone (+/- coal?) and minor sandstone
45.61	48.2	Pale grey to white quartz-rich, sub lithic sandstone with zonal carbonaceous mudstone and coal at 46.5 and 46.8-47m. Gradational downhole contact (grading to grey mudstone)
48.2	49.29	Grading from grey to dark grey mudstone and carbonaceous mudstone
49.29	49.66	Dull, heavy coal and carbonaceous mudstone
49.66	51.96	Grading from soft brown mudstone with minor sandstone, to grey interbedded mudstone and sandstone

51.96	54.09	Pale grey medium to coarse grained lithic sandstone with conglomeratic zones containing rounded to sub-rounded mudstone clasts in bands at 52-52.3m, 52.73m and 52.95m
54.09	54.38	Grey mudstone with some fine-grained sandstone
54.38	54.54	Carbonaceous mudstone, grey mudstone and minor, medium-grained sandstone with prominant bedding
54.54	63.7	Grey medium to coarse-grained lithic sandstone with very minor carbonaceous mudstone banding uphole
63.7	64.67	Grey, coarse to very coarse-grained lithic sandstone with conglomeratic zones containing matrix supported, sub-rounded mudstone and carbonaceous mudstone clasts at 63.9-63.95m, 64-64.03m, 64.15-64.24m, 64.35-64.55m and 64.62-64.67m. Thin, 2mm coal band with calcite cleating and proximal coal clast at 63.7m and disrupted 2mm coal band with calcite cleats at 64.45m.
64.67	75.6	Massive grey, medium to coarse-grained lithic sandstone with carbonaceous mudstone clasts and plant fossils from 67.2m. Large, up to 7cm, mudstone and carbonaceous mudstone clasts zonally prominant and sparsely dotted throughout (67.62m, 68.7-69.45m and 73.74-75.4m) decreasing downhole. Some carbonaceous mudstone banding from 74.75 to 75.1m
75.6	76.27	Dark grey fine grained sandstone and mudstone
76.27	77.47	Pale grey, medium grained sandstone with minor flacer banding downhole
77.47	79.1	Grey to pale grey medium-grained lithic sandstone with very minor carbonaceous mudstone
79.1	79.96	Grey, fine to medium-grained lithic sandstone interbedded with minor carbonaceous mudstone
79.96	80.72	Pale grey to grey, fine to medium grained lithic sandstone with very minor carbonaceous mudstone
80.72	81.2	Grey, medium-grained sandstone with minor carbonaceous mudstone and mudstone bands
81.2	81.92	Grey mudstone interbedded with fine-grained sandstone
81.92	82.33	Coal and carbonaceous mudstone
82.33	82.72	Interbedded pale grey, fine to medium-grained sandstone and carbonaceous mudstone with minor mudstone
82.72	83.66	Pale grey to grey, medium-grained lithic sandstone with carbonaceous mudstone and mudstone banding
83.66	84.45	Pale grey, medium-grained lithic sandstone and carbonaceous mudstone
84.45	84.58	Pale grey lithic sandstone and some carbonaceous mudstone
84.58	84.7	Carbonaceous mudstone
84.7	94.32	Interbedded carbonaceous mudstone and pale grey, medium-grained soft, lithic to sub lithic sandstone from around 90m
94.32	97.43	Grey mudstone interbedded with carbonaceous mudstone (increasing downhole) and pale grey, sub lithic sandstone increasing downhole
97.43	100.53	Pale grey medium grained lithic to sub lithic sandstone with conglomeratic zones containing mudstone and carbonaceous mudstone clasts up to 3cm long, most prominant at 97.7-97.76m, 98.46-98.53m
100.53	102.12	Grey mudstone and some zonally dominant carbonaceous mudstone with minor pale grey sandstone increasing downhole
102.12	103.3	Interbedded grey mudstone and pale grey lithic sandstone with minor carbonaceous mudstone
103.3	103.44	Carbonaceous mudstone +/- dull coal
103.44	104.27	Grey mudstone and pale grey, medium-grained sandstone with minor caronaceous mudstone

104.27	104.6	Dull coal and carbonaceous mudstone with sandstone banding
104.6	105.06	Grey mudstone and fine-grained grey sandstone
105.06	105.5	Interbedded pale grey sandstone and grey mudstone with very minor carbonaceous mudstone with rip-up clasts present
105.5	112.46	Medium-grained, pale grey lithic to sub lithic sandstone and carbonaceous mudstone. Plant fossils (*dichroidium*?), appearing as laminae, from 110.7-111.55m
112.46	113.25	Medium-grained, pale grey lithic sandstone with conglomeratic zones composed of carbonaceous mudstone and mudstone clasts of up to 2cm from 112.46-112.8m
113.25	115.3	Green-grey, fine-grained sandstone and mudstone (possibly contact metamorphism related: fine-grained silica-sericite alteration). Vein breccia 115.77-115.9m and gradational downhole contact
115.3	115.79	Dominantly grey, fine-grained sandstone and minor mudstone. 1mm discontinuous vitrinite band/clast with calcite cleating present
115.79	116.85	Green-grey, sericite-silica(?) altered, fine-grained sandstone and mudstone with vein breccia at approximately 116.6m (alteration breccia related? Or contact metamorphism)
116.85	117.62	Grey sandstone and mudstone with very minor carbonaceous mudstone. Thin, disrupted vitrinite bands containing calcite cleating present around 117.5m
117.62	119.03	Grading from grey to dark grey and black mudstone and carbonaceous mudstone
119.03	121.9	Interbedded fine-grained lithic sandstone and mudstone with minor carbonaceous mudstone, displaced bedding downhole and some large clasts
121.9	122	Grey mudstone with minor sandstone
122	122.55	Upwardly fining, grey lithic sandstone with conglomeratic zones downhole composed of mudstone and carbonaceous mudstone clasts up to 10cm in length
122.55	123.02	Grey, medium-grained lithic sandstone with carbonaceous mudstone banding downhole
123.02	123.23	Grey, medium-grained lithic sandstone with some carbonaceous mudstone and mudstone banding
123.23	123.29	Carbonaceous mudstone and mudstone
123.29	123.39	Grey, medium to coarse-grained lithic sandstone with mudstone clasts up to 1cm wide at base
123.39	123.71	Mudstone and carbonaceous mudstone with minor sandstone
123.71	124.05	Grey conglomeratic, lithic sandstone with mudstone clasts up to 3cm, but averaging 3-4mm
124.05	124.3	Dominantly grey, medium to coarse-grained lithic sandstone with conglomeratic zone at the irregular base of the unit composed of 4-5mm mudstone clasts
124.3	124.8	Grey, cross-bedded sandstone with minor carbonaceous mudstone bands and globular flame structures at base
124.8	124.88	Grading from grey mudstone to grey, fine-grained sandstone
124.88	125.79	Brecciated (possibly in situ vein breccia) or moderately to strongly fractured, grey, medium to fine-grained lithic sandstone and minor grey mudstone
125.79	127.47	Interbedded grey, medium-grained sandstone and mudstone with very minor carbonaceous mudstone. Some evidence of semi-ductile deformation: micro faulting/folding
127.47	128.7	Brecciated/fractured, grey, medium to fine-grained sandstone and mudstone
128.7	129.36	Grey mudstone and minor sandstone
129.36	129.61	Very broken grey mudstone
129.61	130	Weak, grey mudstone and medium to coarse-grained lithic sandstone
130	130.38	medium to coarse-grained grey lithic sandstone with conglomeratic clasts of mudstone and sandstone

130.38	132.76	Interbedded grey lithic sandstone and mudstone with minor to very minor carbonaceous mudstone
132.76	133.05	Green-grey, fine to medium-grained sandstone with minor carbonaceous mudstone
133.05	134.15	Dark green-grey, sericite(?) altered mudstone and fine to medium-grained sandstone
134.15	134.57	Grey medium-grained lithic sandstone
134.57	135.02	Grey, with minor zones of green, medium to fine-grained lithic sandstone with minor flacer bading
135.02	135.93	Grey, medium-grained lithic sandstone with minor to very minor flacer banding
135.93	137.65	Upwardly fining sequence of grey mudstones interbedded with grey, fine to medium-grained lithic sandstone with some mudstone clasts at base of unit
137.65	138.87	Grading from grey mudstone to fine-grained sandstone interbeds, beginning around 138.4m and increasing to lower contact
138.87	141.93	Dominantly medium to coarse-grained lithic sandstone with sparse but common mudstone beds and carbonaceous mudstone and mudstone clasts (2-5mm in size) from approximately 140.5-140.66m. More frequent mudstone beginning at around 141m. Some 1-2mm irregular vitric bands at 141.55m
141.93	142.66	Grey to pale grey conglomeritic, coarse-grained lithic sandstone supported,rounded mudstone and carbonaceous mudstone clasts, commonly 20mm in size. Bands of larger clasts downhole at 142.42-142.46m and 142.6-142.66m
142.66	143.2	Grey, dominantly medium-grained lithic sandstone
143.2	143.85	Grading from dark grey to green-grey mudstone and carbonaceous mudstone with some fine-grained sandstone towards gradational downhole contact
143.85	144.08	Green-grey, medium-grained lithic sandstone
144.08	144.48	Green-grey to dark grey silica altered mudstone and carbonaceous mudstone
144.48	146.7	Green-grey fine-grained sandstone and mudstone with gradational downhole contact
146.7	148.15	Grey medium-grained lithic sandstone with some mudstone and carbonaceous mudstone interbedded. Conglomeratic zone from around 147.8m with clasts of up to 10cm in size and irregular, 2mm vitrinite bands with calcite cleating at 147.75m and another vitrinite band with calcite cleats at 147.75m
148.15	148.94	Interbedded fine to medium-grained, grey lithic sandstone, mudstone and carbonaceous mudstone
148.94	151.13	Grey, medium to coarse-grained lithic sandstone with very minor carbonacous mudstone and 2cm clasts sear base of unit
151.13	151.39	Carbonaceous mudstone (with minor dull coal?), grading to dark green (possibly hornfelsed?) proximal to broken zone downhole
151.39	153.3	Dominantly green-grey, silica-sericite altered mudstone and carbonaceous mudstone with minor fine-grained sandstone and zonal dark grey patches
153.3	154.74	Grey, medium-grained sandstone with minor mudstone proximal to gradational uphole contact
154.74	154.82	Silica-sericite altered mudstone with gradational downhole contact
154.82	154.93	Carbonaceous mudstone
154.93	155.19	Pale grey, medium-grained lithic sandstone with 1-2mm mudstone clasts at base
155.19	156.15	Green-grey, silica-sericite altered mudstone and minor sandstone
156.15	156.25	Grey-green medium-grained lithic sandstone with some carbonaceous mudstone bands
156.25	156.63	Carbonaceous mudstone and mudstone with gradational downhole contact

156.63	157.31	Green, silica-sericite altered mudstone
157.31	157.39	Carbonaceous mudstone
157.39	157.44	Green mudstone
157.44	157.49	Carbonaceous mudstone
157.49	159.24	Green sericite-silica altered, carbonaceous mudstone with very minor sandstone
159.24	159.37	Carbonaceous mudstone
159.37	160.7	Green mudstone with gradational up and downhole contact and sandstone increasing downhole
160.7	160.94	Grey with minor green, medium-grained lithic sandstone
160.94	161.74	Grey to dark grey mudstone with minor sandstone and carbonaceous mudstone
161.74	162.44	Carbonaceous mudstone with gradational downhole contact
162.44	162.57	Mudstone and carbonaceous mudstone with thin (dominantly mm sized) irregular vitrinite band, containing calcite cleats at 162.5m and rounded mudstone clasts of up to 5mm at 162.54m
162.57	165.3	Grading from grey-green mudstone to green-grey mudstone with minor dark grey carbonaceous mudstone
165.3	165.6	Grey sandstone and mudstone
165.6	166.17	Grey and black mudstone and carbonaceous mudstone with mm thick, irregular and discontinuous vitrinite bands from 165.75m
166.17	167.88	Green to green-grey, sericite-silica altered mudstone
167.88	168.95	Grey to dark grey mudstone and carbonaceous mudstone and minor sandstone
168.95	170.79	Dominantly green, sericite-silica altered mudstone with minor sandstone (increasing downhole) with zonal grey areas and grading to grey-green downhole
170.79	171.8	Grey (with minor green), medium-grained lithic sandstone with minor mudstone and very minor carbonaceous mudstone. Flacer banding increasing downhole and 2-3mm rounded clasts downhole
171.8	171.88	Grey mudstone
171.88	171.97	Carbonaceous mudstone with very minor dull coal
171.97	172.43	Grey-green mudstone and sandstone
172.43	172.79	Carbonaceous mudstone (+/- dull coal) with irregular base and sub-rounded rip-up clasts
172.79	173.07	Dark grey-green mudstone grading into carbonaceous mudstone downhole and dark acicular 'clasts' throughout
173.07	173.22	Carbonaceous mudstone (+/- dull coal) with irregular downhole contact
173.22	175.4	Grading from brown-grey to green-grey mudstone and sandstone
175.4	175.71	Carbonaceous mudstone with gradational up and downhole contact
175.71	176.05	Green, silica-sericite altered, fine-grained sandstone with gradational uphole and downhole contact
176.05	176.24	Carbonaceous mudstone and grey-green mudstone +/- dull coal(?) gradational downhole contact
176.24	176.91	Upwardly fining, green-grey mudstone and fine to medium-grained lithic sandstone
176.91	177.86	Green-grey mudstone with zonal carbonaceous mudstone
177.86	178.27	Grey-green mudstone interbedded with medium to fine-grained sandstone
178.27	178.94	Grey, medium to fine-grained lithic sandstone with very minor flacer banding
178.94	179.44	Grey to dark grey mudstone and carbonaceous mudstone. Cross bedding common
179.44	182.38	Pale grey to grey, medium to coarse-grained lithic sandstone with minor mudstone and carbonaceous mudstone
182.38	182.48	Grey, fine-grained sandstone with clasts of mudstone and carbonaceous mudstone of mostly 5mm in size and up to 6cm across

182.48	183.4	Grey to pale grey, medium to coarse-grained lithic sandstone
183.4	183.5	Medium to coarse-grained, grey lithic sandstone with mudstone and carbonaceous mudstone clasts and flacer banding
183.5	183.79	Grey to pale grey medium-grained lithic sandstone
183.79	185.18	Interbedded dark grey carbonaceous mudstone and grey mudstone
185.18	193.45	Pale grey fine to medium-grained lithic sandstone grading to coarse to very coarse with beds containing mudstone clasts of up to 3cm at 188.82-189.3m and 187.21-187.3m. Occassional large mudstone clasts (10-15cm clast at 191.32m) and large sub angular clasts from 193.18-193.24m and from 193.32-193.45m. Some clasts exhibit green-grey alteration seen previously
193.45	193.54	Grey-green, sericite-silica altered, medium to coarse-grained sandstone
193.54	193.78	Zonally green, silica-sericite altered mudstone with black band at 193.73m. Brecciated downhole contact
193.78	194.77	Grey, silica altered mudstone and minor fine-grained sandstone with cross-bedding at base
194.77	194.81	Grey, medium-grained lithic sandstone
194.81	195.8	Grading from grey-green to green, fine-grained sandstone to mudstone. Silica-sericite alteration zonal
195.8	196.42	Carbonaceous mudstone uphole, grading to grey, silica altered mudstone with carbonaceous mudstone clasts
196.42	196.56	Grey mudstone
196.56	196.84	Light grey, medium-grained lithic sandstone with plant fossils at 196.83m
196.84	196.99	Dark grey mudstone
196.99	197.11	Carbonaceous mudstone and dull coal(?)
197.11	199.8	Dark grey to grey mudstone with some sandstone interbeds (eg. 199.39m). 2mm vitrinite band at 199.63m
199.8	200.3	Dominantly medium to coarse-grained lithic sandstone with carbonaceous mudstone beds and carbonaceous mudstone clasts
200.3	200.92	Grey, medium-grained lithic sandstone with minor flacer bands
200.92	201.25	Interbedded grey mudstone, lithic sandstone and carbonaceous mudstone
201.25	201.59	carbonaceous mudstone +/- dull coal
201.59	203.73	Grading from carbonaceous mudstone to mudstone
203.73	204.07	Interbedded grey mudstone and fine-grained sandstone
204.07	205.09	Pale grey, sub-lithic medium to fine-grained sandstone and some mudstone with gradational downhole contact
205.09	206.18	Green-grey, sericite-silica altered mudstone and sandstone with fracture zone at 205.42m and clasts of carbonaceous mudstone at the base
206.18	206.6	Grey (green decreasing downhole) mudstone and minor sandstone
206.6	206.77	Carbonaceous mudstone with gradational uphole and downhole contact
206.77	207.76	Grey to dark grey carbonaceous mudstone, mudstone and sandstone
207.76	210.62	Grading from pale grey to cream, quartz-rich, sub-lithic sandstone with minor darker, blue-grey bands and some spots of green-blue alteration (preferential alteration?)
210.62	213.63	Grey to pale grey, medium to coarse-grained lithic sandstone with minor mudstone at 211.74-211.82m and 212.45-212.49m. Conglomeratic zones composed of 2-5mm mudstone and carbonaceous mudstone clasts from 212.72-213.05m. Grading to sub-lithic, quartz-rich sandstone with spotted blue-green alteration downhole

213.63	217.05	Pale grey, quartz-rich, sub-lithic, medium to very-coarse grained sandstone, in a series of upwardly fining cycles. Very minor carbonaceous mudstone banding up-hole. Occasional mudstone clasts up to 4cm across. Bases of sequences include 214.26m, 215.46m, 216.51-216.9m, 217-217.05m
217.05	217.31	Grey to dark grey, medium-grained sandstone with some carbonaceous mudstone
217.31	217.36	Dark grey to black carbonaceous mudstone and sandstone.
217.36	218.15	Grading from grey to grey-green (at 217.83m) then back to grey (at 218.07m), silica-sericite altered mudstone plus or minus carbonaceous mudstone
218.15	221.46	Dark grey to black, carbonaceous mudstone with pale grey, medium to fine-grained sandstone banding. Carbonaceous mudstone clasts in sandstone at 220.58-220.69m
221.46	221.71	Pale grey sandstone and grey mudstone with carbonaceous mudstone clasts
221.71	222.55	Grey, fine-grained lithic sandstone and mudstone with carbonaceous mudstone banding at 222.5m and carbonaceous mudstone clasts from 222.5-222.55m
222.55	223.49	Inter-bedded fine to medium-grained, grey, lithic sandstone with black carbonaceous mudstone and minor to very minor mudstone with conglomeratic zone at the base (from 223.37m) composed of sub-rounded mudstone clasts
223.49	223.57	Black carbonaceous mudstone
223.57	225.68	Grading from grey, silica altered mudstone and fine-grained sandstone to green-grey, silica-sericite altered mudstone and fine-grained sandstone
225.68	226.92	Grey mudstone with some fine-grained sandstone and carbonaceous mudstone interbeds
226.92	227.92	Green-grey, sericite-silica altered, fine-grained sandstone and some mudstone
227.92	228.04	Green-grey to grey, sericite-silica altered mudstone, sandstone and some carbonaceous mudstone
228.04	228.82	Grey silica altered mudstone, grading to sandstone with silica alteration decreasing downhole
228.82	228.97	Dark grey to black, carbonaceous mudstone and mudstone with minor sandstone
228.97	229.16	Pale grey, sub-lithic, medium to coarse-grained sandstone with flacer banding
229.16	229.55	Carbonaceous mudstone with some sandstone banding
229.55	229.84	Grey to pale-grey, medium-grained, lithic to sub-lithic sandstone with carbonaceous mudstone banding
229.84	229.96	Carbonaceous mudstone with sandstone interbeds
229.96	230.23	Carbonaceous mudstone with minor mudstone and sandstone banding
230.23	230.69	Carbonaceous mudstone +/- dull coal?
230.69	230.88	Carbonaceous mudstone interbedded with fine to medium-grained, sub-lithic sandstone
230.88	231.67	Grey, silica altered mudstone and some carbonaceous mudstone with silica alteration decreasing downhole
231.67	233.38	Interbedded grey, fine-grained sandstone and mudstone with minor to very minor carbonaceous mudstone with silica-sericite altered zone from 232.78-233.04m
233.38	235.06	Pale grey, fine to medium-grained, sub lithic sandstone interbedded with carbonaceous mudstone
235.06	236.98	Pale grey, medium to coarse-grained, quartz-rich sandstone with carbonaceous mudstone flacer banding present
236.98	239.4	Silica-sericite altered, green mudstone with some fine-grained sandstone beds present. Pyrite blebs/aggregates present from 237.64-238.02m (<1%). Gradational downhole contact
239.4	239.57	Grey (with green blotches) to dark grey silica altered mudstone and carbonaceous mudstone

239.57	239.77	Grey, speckled, silica altered sandstone
239.77	239.98	Grey (with green blotches), silica altered mudstone and carbonaceous mudstone
239.98	240.13	Grey, speckled, silica altered sandstone
240.13	240.5	Dark grey to black, silica and jasper (??) altered coal(?) and/or carbonaceous mudstone
240.5	240.91	Dark grey-green, sericite-silica altered mudstone
240.91	241.6	Grey, weakly sericite-silica altered mudstone and minor sadstone
241.6	242	Pale grey, fine-grained sandstone with minor flacer banding and cross-bedding
242	242.44	Pale grey, medium to fine-grained sandstone with carbonacoues mudstone interbeds throughout
242.44	242.82	Pale grey to grey, mudstone and sandstone interbeds. Gradational downhole contact
242.82	244.12	Green-grey, sericite-silica altered mudstone and sandstone with gradational downhole contact
244.12	244.77	Grey mudstone and some sandstone increasing downhole
244.77	248.6	Interbedded pale grey sandstone and carbonaceous mudstone. Prominant carbonaceous mudstone from: 245.29-245.35m, 245.43-245.5m, 245.57-245.73m, 245.88-245.92m, 246.03-246.07m, 246.25-246.38m, 246.5-246.67m, 246.7-247.04m, 247.09-247.28m, 247.8-248.03m, 248.19-248.6m
248.6	249.73	Grey, weakly silica altered sandstone and mudstone
249.73	255.9	Pale grey, medium to fine-grained, quartz-rich sandstone with some flacer banding and zonally strong cross bedding. Carbonaceous mudstone zones include: 252.92-252.95m, 253.83-253.94m, 255.7-255.77m. Occasional carbonaceous mudstone and mudstone clasts from approximately 252m onwards. Pyrite on fracture surface at 255.66m
255.9	257	Black carbonaceous mudstone (+/- dull coal?) with zonally prominant, fine-grained, pale grey sandstone from 256.08-256.17m, 256.49-256.57m, 256.66-256.75m and 256.88-256.93m
257	257.72	Grey to dark grey, fine to medium-grained, quartz-rich sandstone with flacer banding throughout
257.72	258.12	Pale grey, quartz-rich sandstone with carbonaceous mudstone beds present
258.12	258.53	Carbonaceous mudstone (+/- dull coal?) with broken zone from 258.28-258.35m, and some thin (2-3mm, maximum 5mm) sandstone bands
258.53	258.61	Pale grey, medium-grained, sub-lithic sandstone
258.61	258.89	Carbonaceous mudstone with some sandstone banding
258.89	258.93	Sandstone with some carbonaceous mudstone
258.93	259.5	Carbonaceous mudstone with some sandstone beds present
259.5	260.16	Grey, medium to coarse-grained, quartz-rich sandstone interbedded with carbonaceous mudstone. Carbonaceous mudstone especially prominant from 259.91-259.98m and 260.05-260.11m
260.16	260.79	Grey mudstone and minor fine-grained sandstone
260.79	261	Grey mudstone finely interbedded with fine-grained sandstone
261	261.3	Grey to pale grey mudstone and very fine grained siltstone
261.3	263.43	Grey mudstone (with minor sericite-silica alteration) with some fine-grained sandstone interbedded and increasing in abundance downhole
263.43	264.79	Pale grey, fine-grained sandstone interbedded with grey mudstone. Cross bedding present
264.79	265.28	Carbonaceous mudstone and mudstone with some sandstone beds
265.28	265.58	Pale grey sandstone with some carbonaceous mudstone banding, decreasing in abundance downhole

265.58	270.31	Grey, fine-grained lithic to sub-lithic sandstone with very minor carbonaceous mudstone. Zone of angular, carbonaceous mudstone rip-up clasts from 265.98-266.08m and cross bedding from 266.08-266.2m. Other zones of carbonaceous mudstone clasts at 267.76m and 269.86-270.31m. Clasts increasing in size and frequency downhole. Zones of carbonaceous mudstone and mudstone banding include 268.11-268.46m and 269.14-269.19m
270.31	271.74	Grey to dark grey, sericite-silica altered mudstone and carbonaceous mudstone(?). Localised green colour, gradational downhole contact and sericite intensity increasing downhole and occurrences of chlorite alteration(?) appearing downhole
271.74	272.94	Grey, fine to medium-grained sandstone with coarse biotite(?) throughout and possible trace amounts of pyrite
272.94	273.3	Dark grey to grey sandstone and mudstone with carbonaceous mudstone begining and increasing in abundance from 273.07m
273.3	273.75	Medium to fine-grained, pale grey sandstone with some carbonaceous mudstone banding and gradational downhole contact
273.75	274.13	Dark grey to grey carbonaceous mudstone and mudstone with some fine-grained sandstone and gradational downhole contact
274.13	274.52	Grey, medium-grained sandstone with carbonaceous mudstone banding (+ biotite?)
274.52	274.69	Dark grey to black carbonaceous mudstone with very minor sandstone banding
274.69	274.92	Dark grey silica-sericite altered mudstone
274.92	275.79	Grey-green to green-grey sericite-silica altered mudstone and sandstone
275.79	276.53	Pervasive, red-brown, phlogopite alteration with minor grey-green patches of silica-sericite alteration or ferrous mudstone with patchy silica sericite alteration (Permian basement???)
276.53	276.62	Pale cream and green-grey altered sandstone and mudstone
276.62	276.8	Green-grey, sericite-silica altered sandstone and mudstone with gradational downhole contact
276.8	277.4	Pale grey, fine-grained lithic to sub-lithic sandstone with some carbonaceous mudstone banding
277.4	278	Grading from black to grey-green silica-sericite altered mudstone and sandstone
278	279	Grading from green-grey with red-brown patches to red-brown with green-grey patches then back to green-grey with red-brown patches. Possibly pervasive sericite-silica and phlogopite alteration or ferrous mudstone with patchy sericite-silica alteration. (Permian basement????????)
279	279.61	Grading from grey to dark grey and black mudstone and carbonaceous mudstone with some sandstone increasing downhole
	EOH	

Appendix 5. Mount Vernon DDH1 Lithology Log (2012 Version)

Drill Hole ID: Mount Vernon DDH1

Project: Department of Mines Drilling
License: EL 26/2008 (Current)
Date Drilled: 1982

Azimuth: n/a
Dip: -90 degrees

mFrom	mTo	Description
0	12	Oxidised, weathered and broken sandstone with minor mudstone. Some core loss near 11.45m
12	17.1	Grey to pale grey, medium to fine-grained lithic sandstone
17.1	19.5	grey to dark grey mudstone
19.5	20.5	Black carbonaceous mudstone
20.5	23.3	Grey to dark grey mudstone with minor carbonaceous mudstone
23.3	59.95	Pale grey to grey medium to coarse-grained lithic sandstone. Vitrinite clasts also present between 31 and 35m and flacer bands. Conglomeratic zones of mudstone clast of up to 10cm between 38.4-39.2m. Mudstone and vitrinite clasts along with flacer banding from 50m. Increasing carbonaceous mudstone downhole
59.95	60.7	carbonaceous mudstone and coal
60.7	67	Grey mudstone. 1m core loss from 62-63m
67	69.1	Grey to cream, fine to medium-grained lithic sandstone
69.1	71.25	Mudstone and minor sandstone
71.25	81.3	Medium to coarse-grained lithic sandstone with some vitrinite clasts
81.3	81.9	Conglomeratic base to lithic sandstone unit. Rounded to sub-rounded, mudstone and minor carbonaceous mudstone clasts up to 4cm accross
81.9	82.9	Mudstone
82.9	121.6	Lithic sandstone with conglomeratic zones from 93.9-96.2m, 107-107.4m and 114.4-115.4m. Minor flacer banding.
121.6	125.3	Mudstone and carbonaceous mudstone
125.3	134.35	Grading from interbedded mudstone and sandstone, to medium-grained lithic sandstone
134.35	137.7	Mudstone
137.7	138.35	Coal with some carbonaceous mudstone
138.35	140.2	Mudstone
140.2	140.6	Lithic sandstone with conglomeratic zones from 93.9-96.2m, 107-107.4m and 114.4-115.4m. Minor flacer banding.
140.6	140.9	Mudstone
140.9	159.2	Medium-grained lithic sandstone
159.2	159.6	Coal with some carbonaceous mudstone
159.6	161.5	Mudstone
161.5	171.4	Medium to coarse-grained lithic sandstone
171.4	172	Coarse-grained lithic sandstone supported, rounded mudstone clasts up to 3cm in size
172	181.7	Medium to coarse-grained lithic sandstone with some conglomeratic clasts uphole and mudstone at 178m

181.7	181.8	Carbonaceous mudstone
181.8	204.3	Medium to coarse-graines lithic sandstone with mudstone and minor vitrinite clasts of up to 3cm from 195m
204.3	204.75	Mudstone with some carbonaceous mudstone
204.75	207.15	Coal (sampled). Left overs appear to be carbonaceous mudstone and coal with some vitrinite present
207.15	212.7	Mudstone with cross bedded sandstone and mudstone in lower 70cm
212.7	216.5	Medium-grained lithic sandstone
216.5	217.1	Mudstone
217.1	217.5	Sandstone with mudstone and vitrinite clasts at around 217.2m
217.5	217.9	Mudstone
217.9	234.25	Fine to medium-grained lithic to sub lithic, quartz-rich sandstone with large (up to 10cm) mudstone clasts uphole and flaver banding downhole
234.25	234.7	Carbonaceous mudstone and coal
234.7	245.85	Mudstone with increasing quartz-rich sandstone downhole
245.85	248.8	Quartz-rich, sub-lithic sandstone
248.8	249	Mudstone and carbonaceous mudstone with minor coal
249	252	Mudstone
252	253.4	Coal and carbonaceous mudstone
253.4	265.4	Mudstone with minor carbonaceous mudstone increasing downhole
265.4	267.3	Fine-grained quartz-rich (sub-lithic) sandstone and minor mudstone
267.3	267.8	Mudstone
267.8	269.4	Mudstone and carbonaceous mudstone with some coal
269.4	281.6	Interbedded mudstone and sandstone
281.6	282.9	Mudstone
282.9	283.6	Carbonaceous mudstone between 2 small coal seams
283.6	293.5	Dominantly mudstone with zonal quartz-rich sandstone
293.5	293.8	carbonaceous mudstone and coal
293.8	295.55	Mudstone and carbonaceous mudstone with minor sandstone downhole
295.55	295.8	Quartz sandstone
295.8	296.4	Coal and some carbonaceous mudstone and mudstone
296.4	299.05	Quartz-rich sandstone with flacer banding
299.05	302.05	Mudstone and carbonaceous mudstone with gradational downhole contact and increasing sandstone downhole
302.05	319.5	Grading from fine to medium-grained lithic to sub-lithic sandstone and some mudstone and occasional mudstone clasts
319.5	323.1	Quartz-rich sandstone with flacer banding
323.1	326.2	Quartz-rich sandstone grading to sub-lithic sandstone downhole with flacer banding
326.2	330	Sub-lithic to lithic, medium to coarse-grained sandstone and some flacer banding
330	332.2	Mudstone and carbonaceous mudstone
332.2	336.1	Quartz sandstone and flacer banding
336.1	337	Sub-lithic sandstone interbedded with mudstone
337	338	Core Loss
338	341.25	Interbedded mudstone and sandstone. Cross bedding present and sandstone increasing downhole
341.25	345.85	Sub-lithic, quartz (and feldspar?) rich sandstone
345.85	350.1	Interbedded and cross-bedded mudstone and fine-grained sandstone

350.1	355	Mudstone and minor very fine grained sandstone. Fault at 353.2m
355	370.3	Interbedded mudstone and fine to medium-grained sandstone (zonally conglomeratic). Sandstone increasing downhole
370.3	402.6	Interbedded mudstone and medium to coarse-grained sandstone
402.6	404.4	Pale, quartz-rich, sub-lithic sandstone
404.4	422.5	Mudstone with faults at 420.1 and 420.6m
422.5	424.2	Interbedded sandstone and mudstone
424.2	426.6	Mudstone with cross-bedding and very minor sandstone
426.6	435.1	Medium to coarse-grained lithic, quartz-rich sandstone and very minor mudstone
435.1	440.9	Mudstone and minor sandstone
440.9	443.04	Coarse to ery coarse-grained lithic sandstone with abundant, rounded quartz clasts (up to approximately 2mm in size)
443.04	447.8	Mudstone
447.8	455.8	Grading from fine to medium-grained, quartz-rich sandstone
455.8	460.2	Interbedded mudstone and quartz sandstone
460.2	462.6	Mudstone interbedded with minor sandstone
462.6	472.9	Interbedded mudstone and sandstone with cross-bedding and rip-up clasts prominant
472.9	479.6	Quartz-rich, medium-grained sandstone with flacer banding
479.6	482.15	Mudstone and minor sandstone
482.15	492.8	Quartz-rich sandstone with flacer banding
492.8	496.19	Mudstone with minor quartz sandstone beds at 494 and 495m
	EOH	

Appendix 6. Water Borehole Summary

Water Borehole Coal Data

Hole ID	Intercept	m From	m To	Width (m)	Collar Co-ordinates		Date Drilled	Company	Depth (m)	Hole type	Area
					Easting	Northing					
2649	coaly shale	25.9	27.1	1.2	531114	5293883	20/07/50	Department of Mines	59.4	Air Percussion	Colebrook
	coaly matter	30.5	32	1.5							
	coaly matter	36.6	38.1	1.5							
	coaly matter	42.1	43.3	1.2							
2698	black mudstone	14.3	17.1	2.8	530314	5291683	24/05/50	Department of Mines	38.1	Air Percussion	Colebrook
	coaly matter	30.5	34.2	3.7							
2726	coaly matter	16.2	17.4	1.2	529674	5291093	4/12/52	Department of Mines	21.3	Air Percussion	Colebrook
3584	coal	15.2	16.1	0.9	530639	5293283	10/01/94	Spaldings	57.9	Air Percussion	Colebrook
4032	black mudstone	1.52	2.7	1.18	523714	5308683	8/09/49	Department of Mines	19.8	Air Percussion	Stonor
	black mudstone	7.3	8.5	1.2							
	coaly matter	10.4	11.6	1.2							
4033	black mudstone	1.83	2.7	0.87	523814	5308783	13/09/49	Department of Mines	17.1	Air Percussion	Stonor
	coaly matter	7.9	12.2	4.3							
4034	black soil	0	0.6	0.6	523814	5308983	15/09/49	Department of Mines	9.8	Air Percussion	Stonor
	coaly matter	8.5	9.2	0.7							
	black mudstone	9.2	9.8	0.6							
4036	black soil	0	0.6	0.6	523514	5310083	6/10/49	Department of Mines	32	Air Percussion	Stonor
	coaly matter	10.7	11.3	0.6							
	black mudstone	25.3	26.5	1.2							
4067	coal	47	47.1	0.1	536314	5300433	1/01/81	RIC	53.3	Downhole Hammer	Stonor
4069	black mudstone	4.3	7.6	3.3	523914	5307783	30/04/52	Department of Mines	32	Air Percussion	Stonor
4073	black sandstone	9.8	14.9	5.1	524214	5305383	5/10/50	Department of Mines	24.4	Air Percussion	Stonor
4088	black mudstone	25.3	26.8	1.5	526514	5308683	3/01/51	Department of Mines	44.2	Air Percussion	Stonor
4096	black mudstone	8.5	9.8	1.3	524814	5306183	27/10/49	Department of Mines	30.5	Air Percussion	Stonor
	black mudstone	12.5	14	1.5							

	black mudstone	22	23.5	1.5							
	coal	27.5	29	1.5							
4103	coal	13	13.5	0.5	533364	5311233	24/11/78	RIC	24	Air Percussion	Oatlands
4106	black shale and coal like matter	2.7	4.6	1.9	522814	5297983	8/03/55	Department of Mines	38.7	Air Percussion	Colebrook
	black shale and coal like matter	5.2	9.8	4.6							
4135	coal	18	18.2	0.2	536014	5300683	9/05/79	RIC	21.5	Air Percussion	Stonor
4165	coaly matter	11.3	13.7	2.4	526214	5298733	20/08/52	Department of Mines	25.9	Air Percussion	Colebrook
4243	mudstone, sandstone and coal	66	150	84	522314	5298933	19/11/85	Department of Mines	150	Air Percussion	Colebrook
4265	coal and mudstone	9	14	5	526614	5296883	6/11/91	Department of Mines	90	Downhole Hammer	Colebrook
	coal and mudstone	59	62	3							
15771	coal and mudstone	9	14	5	526614	5296383	12/11/91	Department of Mines	96		Colebrook
	coal and mudstone	59	62	3							
15775	sandstone with coal bands and mudstone	15	60	45	525214	5299933	19/11/91	Department of Mines	60	Air Percussion	Colebrook
15777	sandstone and coal	13	21	8	525064	5306333	25/11/91	Department of Mines	42	Air Percussion	Stonor
15781	coal	6	7	1	524914	5316083	15/03/95	Spaldings	113	Air Percussion	Oatlands
	coal	10	11	1							
	coal	15	16	1							
	coal	26	27	1							
	black mudstone	52.5	58	5.5							
	hard black mudstone	72	73	1							
15782	coal	13.5	14	0.5	525814	5312983	16/03/95	Spaldings	113	Air Percussion	Oatlands
	coal	16.5	17.5	1							
15783	black clay	0	0.2	0.2	532314	5304883	18/03/95	Spaldings	100	Air Percussion	Stonor
15784	baked carbonaceous mudstone	87	87.5	0.5	530564	5301083		Spaldings	113	Air Percussion	Stonor
15785	black mudstone	15	19.5	4.5	536264	5299233	23/03/95	Spaldings	103	Air Percussion	Colebrook
	hard black mudstone	19.5	42	22.5							

	black fractured mudstone	42	43	1							
	black mudstone	43	99	56							
	hard black mudstone	99	103	4							
17393	grey-black mudstone	9	55	46	531539	5297563	7/09/98	KMR	55	Air Percussion	Colebrook
17968	black clay	0.6	9.2	8.6	518497	5301076	28/01/99	Spaldings	39.7	Air Percussion	Stonor
18785	coal and mudstone	9	14	5	527864	5287983	6/11/91	Department of Mines	90	Air Percussion	Colebrook
	coal and mudstone	59	62	3							
19151	black clay	0.6	9.2	8.6	528244	5308758	28/01/99	Spaldings	39.7		Stonor
19157	sandstone and occasional coal seams	3.7	94.6	90.9	524531	5308350	11/10/00	Spaldings	94.6		Stonor
31283	grey sandstone - occasional coal layers	7	57	50	524531	5308300	11/10/00	Spaldings	75		Stonor
31523	black clay	0	2	2	523764	5309483	17/01/01	Spaldings	60		Stonor
2690	black mudstone and narrow bands of grit	6.1	8.2	2.1	516213	5291683	21/10/54	Department of Mines	27.4	Air Percussion	Kempton
2708	black mudstone	18.3	19.8	1.5	516313	5290883	27/07/53	Department of Mines	19.8	Air Percussion	Kempton
3518	mudstone, sandstone and coal	0	90	90	514463	5294433	30/04/84	Department of Mines	90	Air Percussion	Kempton
4279	mudstone, sandstone and coal	50	85	35	511763	5301233	11/07/84	Department of Mines	86	Air Percussion	Bothwell
14827	black soil	0	0.9	0.9	515313	5292083	30/08/94	Spaldings	57.9	Air Percussion	Kempton
17453	mudstone and coal measures	1	72	71	515213	5286883	24/08/98	KMR	80	Air Percussion	Elderslie
17968	black clay	0.6	9.2	8.6	518497	5301076	28/01/99	Spaldings	39.7	Air Percussion	Stonor
31253	black clay	0	0.5	0.5	511248	5301233	28/03/01	Spaldings	30		Bothwell

Appendix 7. Chip Logging Key

Chip Logging Codes

Rock Type	
Code	**Description**
SS	Sandstone
MS	Mudstone
CMS	Carbonaceous Mudstone
COAL	Coal
DOL	Dolerite
CY	Clay

Alteration	
Code	**Description**
OXI	Oxidised
FR	Fresh
SE	Sericite
SI	Silica
CA	Calcite
CY	Clay

Colour	
Code	**Description**
OR	Orange
BR	Brown
GY	Grey
DKGY	Dark Grey
PLGY	Pale Grey
BK	Black
YE	Yellow
WH	White
GE	Green

Grain Size	
Code	**Description**
VFG	Very Fine Grained
FG	Fine Grained
MG	Medium Grained
CG	Coarse Grained
VCG	Very Coarse Grained

Mineralisation	
Code	**Description**
PY	Pyrite

Appendix 8. OJ006 Lithology Log

OJ006 - Open Hole Logging

mFrom	mTo	Rock Type	Colour	Alteration	Grain Size	Mineralisation	Comments
0	1	MS/CY	OR/BR	OXI	FG	-	(Cutting bit) Small sample, abundant clay present.
1	2	CY	OR	OXI	FG	-	Dominantly clay sample
2	3	MS/SS/CY	OR/BR	OXI	FMG	-	Small sample
3	4	SS/MS	OR/BR	OXI	FMG	-	(Hammer bit - some water at approx. 3.5m)
4	5	MS	GY(BR)	FR(OXI)	FG	-	Small sample
5	6	SS/MS	GY(OR)	FR(OXI)	MG/FG	-	Small sample
6	7	SS(MS)	GY/BR	FR/OXI	MG(FG)	-	(Cyclone attached)
7	8	SS/MS	GY/BR/BK	OXI	MG/FG	-	Hard black rock with white veinlets present. Possibly obsidian?
8	9	SS	BR/BK	OXI	MG	-	Hard black rock with white veinlets present. Possibly obsidian?
9	10	MS/SS	GY/BR/BK	FR/OXI	FG(MG)	-	Hard black rock with white veinlets present. Possibly obsidian?
10	11	SS/MS	GY	FR	FG/MG	-	Degraded lithic sandstone. Poor sample
11	12	SS/MS	GY(BR)	FR(OXI)	MG/FG	-	
12	13	MS/SS	GY/BR	FR(OXI)	FG/MG	-	Small sample
13	14	SS	GY/BR/YE	(OXI)	MCG	-	Small sample
14	15	MS/SS(COAL)	GY/BK/BR	FR(OXI)	FG/MG	-	Small sample
15	16	SS(MS)	BR/GY/BK	OXI(FR)	MG(FG)	-	
16	17	SS	GY	FR	MCG	-	Very small sample
17	18	DOL	GY	FR(OXI)	MG	-	Dolerite. Slightly larger sample.
18	19	DOL/SS/CMS	DKGY(BK)	FR	MG/FG	-	
19	20	SS/CMS/MS	GY/BK(BR)	FR(OXI)	MG/FG	-	
20	21	SS/CMS	GY/BK	FR	MG/FG	-	
21	22	SS	GY(BR)	FR	MG	-	(Cyclone removed, sample size increase)
22	23	CMS/SS(COAL)	BK/GY	FR	FG/MG	-	(black water)
23	24	MS	DKGY(BR)	FR	FG	-	
24	25	SS/MS	GY/BK	FR	MG/FG	-	
25	26	SS(MS)	GY(BK)	FR	MG	-	
26	27	SS	GY	FR	MG	-	(Sample confusion: 26-28m combined)
27	28	SS	GY	FR	MG	-	(Sample confusion: 26-28m combined)
28	29	SS	GY	FR	MG	-	Some quartz present

29	30	SS	GY	FR	MG	-	
30	31	SS	GY	FR	MG	PY	
31	32	SS	GY	FR	MG	-	
32	33	SS	GY(BR)	FR	MG	-	(More water)
33	34	CMS/COAL(SS)	BK/DKGY(GY)	FR	FG	-	
34	35	MS/CMS	GY/BK	FR	FG	-	
35	36	CMS(COAL/MS/SS)	BK(GY)	FR	FG	-	
36	37	SS(CMS/MS)	GY(BK/DKGY)	FR	MG(FG)	-	
37	38	SS(MS)	GY(BK)	FR	MG(FG)	-	
38	39	SS	GY	FR	MG	-	
39	40	SS	GY	FR	MG	-	
40	41	SS(MS)	GY	FR	MG(FG)	-	
41	42	SS(MS)	GY	FR	MG(FG)	-	
42	43	SS/CMS(COAL?)	GY/BK	FR	MCG/FG	-	
43	44	SS	GY	FR	MG	-	
44	45	SS(MS)	GY	FR	MG(FG)	-	
45	46	SS/MS/CMS	GY/BK	FR	MCG/FG	-	
46	47	SS/MS	GY	FR	MG/FG	-	
47	48	SS	GY	FR	MG	-	
48	49	CMS/SS(COAL?)	BK/GY	FR	FG/MG	-	
49	50	SS/MS(CMS)	GY(BK)	FR	MG/FG	-	
50	51	SS(CMS/MS)	GY(BK)	FR	MCG(FG)	-	
51	52	SS(CMS)	GY(BK)	FR	MG(FG)	-	Some quartz (vein?). Smaller sample size
52	53	SS(CMS)	GY(BK)	FR	MG(FG)	-	Smaller sample size
53	54	SS/MS(CMS)	GY/DKGY	FR	MG/FG	-	Smaller sample size
54	55	MS(SS)	DKGY	FR	FG(MG)	-	
55	56	SS	DKGY(GY)	FR	MG	-	
56	57	SS	GY/DKGY	FR	MG	-	
57	58	SS	DKGY/GY	FR	MG	-	
58	59	MS	DKGY	FR	FG	-	
59	60	MS/CMS	GY/BK	FR	FG	-	
60	61	MS(SS)	GY/DKGY	FR	FG(MG)	-	Smaller sample size
61	62	SS(MS)	GY	FR	MG(FG)	-	Smaller sample size
62	63	SS(MS)	GY	FR	MG(FG)	-	Smaller sample size
63	64	SS	GY	FR	MG	-	Smaller sample size
64	65	SS	GY	FR	MG	-	
65	66	SS	GY(WH)	FR	MG	PY	Quartz veining
66	67	SS(MS)	GY	FR	MG(FG)	-	
67	68	SS(MS)	GY/DKGY	FR	MG(FG)	-	Small sample size
68	69	SS	GY	FR	MG	-	Small sample size
69	70	SS	GY	FR	MCG	-	Smaller sample size
70	71	CMS/COAL(MS)	BK(DKGY)	FR	FG	-	
71	72	CMS/COAL(?)(MS)	BK(GY)	FR	FG	-	
72	73	CMS/MS	BK/GY	FR	FG	-	Smaller sample size

73	74	MS(CMS/SS)	GY(DKGY)	FR	FG(MG)	-	Smaller sample size
74	75	SS/CMS/MS	GY/DKGY	FR	MG/FG	-	Smaller sample size
75	76	SS/MS(CMS)	GY(DKGY)	FR	MG/FG	-	Smaller sample size
76	77	SS/CMS	GY(DKGY)	FR	MG/FG	-	Smaller sample size
77	78	SS(CMS)	GY(BK)	FR	MCG(FG)	-	Smaller sample size
78	79	SS(MS/CMS)	GY(DKGY/BK)	FR	MG(FG)	-	
79	80	SS	GY	FR	MCG	-	
80	81	SS(CMS)	GY(DKGY)	FR	MG(FG)	-	
81	82	SS(CMS)	GY(DKGY)	FR	MG(FG)	-	
82	83	SS(CMS)	GY(DKGY)	FR	MG(FG)	-	Small sample
83	84	SS(CMS)	GY(DKGY)	FR	MCG(FG)	-	Small sample
84	85	SS(CMS/MS)	GY(DKGY)	FR	MG(FG)	-	
85	86	MS/CMS/SS	DKGY/BK(GY)	FR	FG/MG	-	
86	87	MS/CMS	DKGY/GY/BK	FR	FG	-	
87	88	MS/CMS	DKGY/BK	FR	FG	-	
88	89	MS(CMS/SS)	DKGY(BK/GY)	FR	FG(MG)	-	
89	90	MS(CMS/SS)	GY/DKGY	FR	FG(MG)	-	
90	91	MS/CMS	DKGY/BK(WH)	FR	FG	-	
91	92	MS(SS)	DKGY(GY)	FR	FG(MG)	-	
92	93	MS/SS(CMS)	GY/BK	FR	FG/MG	-	
93	94	SS(CMS/MS)	DKGY/BK(GY)	FR	MG(FG)	-	
94	95	SS(MS)	GY/DKGY	FR	MG(FG)	-	
95	96	MS/SS	DKGY/GY	FR	FG/MG	-	
96	97	MS/CMS	GY/DKGY	FR	FG	-	
97	98	MS	GY/GYGE	SE/SI	FG	-	Pervasive pale green tinge. Sericite-silica alteration. Proximity to dolerite?
98	99	MS	PLGYGE	SE/SI	FG	-	Pervasive pale green tinge. Sericite-silica alteration. Proximity to dolerite?
99	100	MS/CMS	PLGYGE(DKGY/WH)	SE/SI	FG	-	Pervasive pale green tinge. Sericite-silica alteration. Proximity to dolerite? Fine-grained silica veining

Appendix 9. OJ007 Lithology Log

OJ007 - Open Hole Logging

mFrom	mTo	Rock Type	Colour	Alteration	Grain Size	Mineralisation	Comments
0	1	SS(MS)	WH/BR(GY)	OXI	MG(FG)	-	Very small sample. (Cutting bit)
1	2	SS	PLBR(CM)	OXI	MG	-	(Cutting bit)
2	3	SS	PLBR	OXI	MG	-	(Hammer bit, cyclone attached)
3	4	MS(SS)	BR	OXI	FG(MG)	-	
4	5	SS(MS)	PLBR	OXI	MG(FG)	-	
5	6	SS(MS)	BR/CM	OXI	MG(FG)	-	
6	7	MS/SS	GY/BR	OXI	FG/MG	-	
7	8	SS(MS)	GY(PLOR)	OXI	MG(FG)	-	
8	9	SS(MS)	GYBR(PLOR)	OXI	MG(FG)	-	Smaller sample
9	10	SS	GY	FR(WK)	MG	-	Small sample
10	11	SS(MS)	GY(DKGY)	FR	MG	-	
11	12	MS(CMS)	DKGY	FR	FG	-	
12	13	MS(SS/CMS)	GY	FR	FG(MG)	-	Smaller sample
13	14	SS/MS	GY	FR	FMG	-	Smaller sample
14	15	SS(MS)	GY	FR(WK)	MG(FG)	-	Soft sandstone, almost clay. Small sample
15	16	SS	PLGY	FR(WK)	MG	-	Soft sandstone, almost clay. Small sample
16	17	SS/MS/CMS	GY/DKGY	FR	MG/FG	-	Smaller sample
17	18	SS(MS)	GY/PLGY	FR	MG(FG)	-	Small sample
18	19	SS/CMS	GY/BK	FR	MG/FG	-	
19	20	SS	GY	FR(WK)	MFG	-	Soft sandstone, almost clay
20	21	SS/MS	GY(DKGY)	FR(WK)	MG/FG	-	Soft sandstone, almost clay. Smaller sample
21	22	SS/MS	GY	FR(WK)	MG/FG	-	Soft sandstone, almost clay. Small sample
22	23	CMS/MS(SS)	DKGY/BK(GY)	FR	FG(MG)	-	Smaller sample
23	24	MS/SS	GY(DKGY)	FR(WK)	FG/MG	-	Soft sandstone, almost clay. Small sample
24	25	SS(CMS)	GY(DKGY)	FR(WK)	MG(FG)	-	Soft sandstone, almost clay. Small sample
25	26	SS	GY	FR(WK)	MG	-	Soft sandstone, almost clay. Small sample
26	27	SS	GY	FR(WK)	MG	-	Soft sandstone, almost clay. Small sample
27	28	SS	GY	FR(WK)	MG	-	Soft sandstone, almost clay. Smaller sample
28	29	SS	GY	FR(WK)	MG	-	Soft sandstone, almost clay. Smaller sample

29	30	SS	GY	FR(WK)	MG	-	Soft sandstone, almost clay. Smaller sample
30	31	SS	GY	FR(WK)	MG	-	Soft sandstone, almost clay. Smaller sample
31	32	CMS/MS(SS)	DKGY/BK(GY)	FR	FG(MG)	-	(Moisture present)
32	33	MS/CMS	DKGY/BK	FR	FG	-	(Increase in moisture - sticky) Smaller sample
33	34	MS(CMS)	DKGY(BK)	FR	FG	-	(Very sticky sample)
34	35	SS/MS	GY/DKGY	FR	MG/FG	-	(Started 'foaming')
35	36	SS/MS(CMS)	GY(BK)	FR	MG/FG	-	(Cyclone removed)
36	37	SS(CMS)	GY(BK)	FR	MG(FG)	-	
37	38	SS(CMS)	GY(BK)	FR	MG(FG)	-	Small sample
38	39	SS(CMS)	GY(BK)	FR	MG(FG)	-	
39	40	SS	GY	FR	MG	-	
40	41	SS(CMS)	GY	FR	MG(FG)	-	Small sample
41	42	SS	GY	FR	MG	-	
42	43	SS(CMS)	GY	FR	MG(FG)	-	
43	44	SS/CMS/MS	DKGY(BK)	FR	MG/FG	-	Very small sample
44	45	CMS/COAL(?)/SS	BK/DKGY	FR	FG/MG	-	
45	46	CMS/COAL(?)/MS	BK/DKGY	FR	FG	-	
46	47	SS/CMS	GY/BK	FR	MG/FG	-	Small sample
47	48	CMS/SS	GY/BK	FR	FG/MG	-	Small sample
48	49	SS(CMS)	GY(BK)	FR	MG(FG)	-	Smaller sample
49	50	SS(CMS)	GY(BK)	FR	MG(FG)	-	Smaller sample
50	51	MS/CMS	GYGE(BK)	SE/SI	FG	-	Small sample. Weak pervasive sericite-silica alteration
51	52	SS/MS	GYGE(BK)	SE/SI	MG/FG	-	Smaller sample. Pervasive, weak sericite-silica alteration
52	53	MS/SS	GYGE	SE/SI	FG/MG	-	Pervasive, weak, sericite-silica alteration. Smaller sample
53	54	MS(SS)	GYGE	SE/SI	FG(MG)	-	Pervasive sericite-silica alteration
54	55	SS/MS	GYGE	SE/SI	MG/FG	-	Pervasively silica sericite altered. Smaller sample
55	56	SS(MS)	GYGE	SE/SI	MG(FG)	-	Pervasively silica-sericite alteration. Small sample
56	57	SS(MS)	GYGE	SE/SI	MG(FG)	-	Pervasively silica-sericite alteration. Small sample
57	58	SS(MS)	GYGE(BK)	SE/SI	MG(FG)	-	Pervasively silica-sericite alteration. Small sample
58	59	SS	PLGYGE	SE/SI	MG	-	Weak, pervasive silica-sericite alteration

59	60	SS/CMS	GYGE/BK	SE/SI	MG/FG	-	(Very black water return). Weak silica sericite alteration
60	61	SS	DKGYGE	SE/SI	MG	-	Pervasive silica-sericite alteration
61	62	SS	DKGYGE	SE/SI	MG	-	Pervasive silica-sericite alteration
62	63	SS	DKGYGE/GY	SE/SI	MG	-	Patchy and weak silica-sericite alteration
63	64	SS/MS	GY/DKGYGE	FR	MG(FG)	-	Patchy and weak silica-sericite alteration
64	65	SS	GY	FR	MG	-	
65	66	SS	GY	FR	MG	-	
66	67	SS	GY	FR	MG	-	
67	68	CMS/COAL(?)(SS)	BK/GY	FR	FG(MG)	-	
68	69	CMS/COAL	BK(GY)	FR	FG	-	
69	70	MS(SS)	DKGY	FR	FG(MG)	-	(Black water return)
70	71	SS(CMS)	GY(BK)	FR	MG(FG)	-	(Black water return)
71	72	SS	GY	FR	MG	-	
72	73	SS	GY	FR	MG	-	
73	74	SS	GY	FR	MG	-	
74	75	SS	GY	FR	MG	-	
75	76	SS	GY	FR	MG	-	
76	77	SS	GY	FR	MG	-	
77	78	SS	GY	FR	MG	-	
78	79	SS(CMS)	GY(BK)	FR	MG(FG)	-	
79	80	SS	GY(WH)	FR	MG	-	Quartz present: veining?
80	81	SS	GY	FR	MG	-	Quartz present: veining? Small sample
81	82	CMS/COAL(SS)	BK(GY)	FR	FG(MG)	-	
82	83	CMS/COAL(?)(MS)	BK(GY)	FR	FG	-	
83	84	MS	GY	FR	FG	-	
84	85	MS/CMS	GY/DKGY	FR	FG	-	
85	86	MS(CMS)	GY(DKGY)	FR	FG	-	
86	87	MS(CMS)	GY(DKGY)	FR	FG	-	
87	88	MS	GY	FR	FG	-	
88	89	MS(CMS)	GY(DKGY)	FR	FG	-	
89	90	MS/SS(CMS)	DKGY(BK)	FR	FG/MG	-	Small sample
90	91	MS(CMS)	GY(DKGY)	FR	FG	-	Small sample
91	92	MS(CMS)	GY(DKGY)	FR	FG	-	
92	93	SS(CMS)	GY(DKGY)	FR	MG(FG)	PY	Large piece of pyrite
93	94	MS(CMS)	GY(DKGY)	FR	FG	-	
94	95	CMS(MS)	DKGY(GY)	FR	FG	PY	Small pyrite crystals
95	96	CMS(MS)	DKGY(GY)	FR	FG	-	
96	97	CMS/MS	DKGY/GY	FR	FG	-	
97	98	CMS(MS)	DKGY/GY	FR	FG	-	
98	99	CMS/COAL(?)/MS	DKGY/GY	FR	FG	-	

99	100	MS/CMS	GY/DKGY	FR	FG	-	
100	101	CMS/SS	BK/GY	FR	FG/MG	-	Smaller sample
101	102	SS(CMS/MS)	GY(DKGY/GY)	FR	MG(FG)	-	
102	102.6	CMS/SS(MS)	BK/GY	FR	FG/MG	-	Small sample

Appendix 10. Gamma Ray Logging of Coal Exploration Drill Holes in the Woodbury, Jericho and Mount Vernon Areas, Tasmania.

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24.5.2013

GAMMA RAY LOGGING OF COAL EXPLORATION DRILL HOLES IN THE WOODBURY, JERICHO AND MOUNT VERNON AREAS, TASMANIA.

Introduction.

Gamma ray logging of eight PVC cased coal exploration drill holes were undertaken on the 15th and 16th of May 2013 in the Woodbury, Jericho and Mount Vernon coal exploration areas in northern Tasmania. This program was implemented to see if systematic gamma ray logging of future exploration drill holes would provide an efficacious method to assist identification and lateral continuity of coal measure sequences. The gamma ray logging showed that provided the drill holes in the Woodbury area are spaced at about 1 kilometre centres it is possible to correlate individual seams. In the Jericho area it seems likely that correlation between the coal measure sequences can be made over distances of about 7km or more and may indicate an extensive area of coal linking two adjacent valley systems.

1. The Woodbury Area.

Drill holes W69, 70, 71 & 72 were gamma ray logged in the Woodbury area and all show good gamma ray signatures indicating variation of rock types with depth. Unfortunately these holes were not logged to total depths of 100m because the casing has collapsed at depths between 65 and 75m.

Good lateral continuity of gamma ray logs occurs between W70 & W71 that are separated by a horizontal distance of about 750m. Although the distinctive coal measure sequences can be seen, only Seam B appears to continue to W70 and the remaining seams (Seams A, C, & D) appear to have 'wedged out' due to lateral facies changes at some point between these two drill holes.

Drill holes W69 & W72 appear to be too widely separated to show any certain correlation characteristics. From the examples of drill holes W70 & W71 which also show quite rapid lateral changes, it seems likely that drill holes in this coal basin will need to be spaced at 1km centres to provide reliable correlation between individual coal seams.

2. The Jericho Area.

The gamma ray logs of the Jericho area are distinctly different from those of the Woodbury area indicating that the sequence may represent an older or younger sequence within the coal basin. Drill holes OJ006 & OJ007 are approximately 1km apart and exhibit similar gamma ray depth profile characteristics and a gamma ray marker zone is shown on each log. This marker zone appears to persist for a further 7.75km to the north and is identified in OJ008. If this correlation is correct, it seems likely that this coal basin extends from the Midland Highway area, north-westwards through OJ006 & OJ007 and occupies the valley delineated in the topographic contour map. These coal measures probably lie at shallow depths and may continue across the drainage divide and connect with the north-trending valley where OJ008 is situated. This correlation indicates that a large area of shallow coal exists and may persist under the dolerite capped hills that separate these two valley systems. Gamma ray logging of drill holes spaced on a grid with 1km centres would appear to be a very good means for future exploration of this area.

3. The Mount Vernon Area.

An attempt was made to gamma ray log MTV002 which is PVC lined drill hole drilled to a depth of 242m. Unfortunately this hole has collapsed at a depth of about 90m and no information was obtained through the deeper-lying coal measure sequence.

Conclusions.

Although this gamma ray logging program was fairly limited to just eight drill holes situated in three different coal sub-basins, the results obtained show that this type of logging would form a useful adjunct to future coal exploration drilling. The positive correlation between W70 & W71 in the Woodbury area shows that drill holes approximately 1km apart are likely to assist in correlation of coal seams within this basin which appears to have sudden lateral changes in continuity of individual coal seams.

The gamma ray logs of the Jericho area show different characteristics to those in the Woodbury area. The coal seams are apparently more continuous and relate to a gamma ray marker zone which is identified in the three drill holes. The lateral continuity of the gamma ray marker zone indicates that the coal measure sequence is continuous from the Midland Highway area, northwards and may underlie two valley systems. If the correlation is correct a broad area of flat-lying coal is anticipated in this otherwise little-explored coal sub-basin.

B.R.Senior (Dr)

Attachments

Drill logs of the Woodbury area, W69, W70, W71 & W72.

Drill hole location map of the Woodbury area.

Drill hole logs of the Jericho area, OJ006, OJ007 & OJ008.

Drill hole location map of the Jericho area.

Drill hole log from the Mount Vernon area, MTV002.

Appendix 11. OJ009 Lithology Logs and Core Photos

Hole ID: **OJ009**

Collar:	Northing:	5308999	mN	Datum:	GDA	
	Easting:	524250	mE	Locating Method:	Survey	
	Elevation:	386	m	Accuracy:		mm
	Tenement:	EL25/2008 Melton Mowbray				
	Location:	Northumbria, Jericho				

Surveys:

Depth	Dip	Azimuth

Company: South East Asia Resources (Tasmania)

Depth: 59.55 m
Azimuth: n/a degrees
Dip -90 degrees

Drilling Method: Diamond (HQ3)
Date Drilled: 8/6/2013 - 11/6/2013
Drilling Company: Whole Core

Site Geologist: Karen Adams
Logging Geologist: Karen Adams

Sampled:	11.08	m to	11.3	m	Zonally bright coal & carbonaceous mudstone. 5-10% vitrinite
	11.54	m to	11.95	m	Carbonaceous mudstone and coal ~1% vitrinite
	22.46	m to	23.1	m	Zonally bright, heavy dull coal & carbonaceous mudstone
	43.65	m to	44.5	m	Dominantly heavy dull coal. 1-2% vitrinite downhole

Results:

mFrom	mTo	Interval	Relative Density	Ash%	Total Sulphur	Calories Kcal/Kg	Moisture
11.08	11.3	0.22					
11.54	11.95	0.41					
22.46	23.1	0.64					
43.65	44.5	0.85					

Notes: PVC lined to

Drill Hole ID: OJ009

Project: Southern Midlands Coal

License: EL25/2008

Date Drilled: 8/6/2013 - 11/6/2013

Collar: Easting: 55 524250
Northing: 5 308999
Elevation: 386
(GDA - Survey)
Azimuth: n/a
Dip: -90 degrees

mFrom	mTo	Description
0	3.2	Core Loss - Broken ground
3.2	5.95	Orange to pale cream, medium to coarse-grained lithic sandstone with frequent fracturing and some low angle jointing
5.95	6.11	Core Loss
6.11	7.9	Zonally grey but dominantly pale orange/cream medium to coarse-grained lithic sandstone
7.9	7.98	Core Loss - Ground away
7.98	9.28	Pale grey (with zonal pale orange) medium to coarse-grained lithic sandstone
9.28	9.35	Core Loss - Broken ground
9.35	10.11	Pale orange, medium to fine-grained lithic sandstone with low angle jointing around 10m
10.11	10.13	Clay
10.13	10.27	Pale orange to brown, fine-grained lithic sandstone
10.27	11.08	Carbonaceous mudstone with minor mudstone
11.08	11.3	Zonally bright coal with some carbonaceous mudstone and approximately 5-10% vitrinite
11.3	11.56	Grey mudstone and some clay
11.56	11.95	Zonally bright coal with carbonaceous mudstone and approximately 10% vitrinite
11.95	12.6	Grey mudstone with minor fine-grained sandstone bands
12.6	12.88	Carbonaceous mudstone with minor coal and minor mudstone downhole
12.88	13	Broken, brittle coal
13	13.66	Grey to light grey, interbedded mudstones and fine to medium-grained sandstone
13.66	21.69	Medium to coarse-grained, grey lithic sandstone with flacer banding present around 17m and minor large mudstone clasts at 15.8m. Appears to be a series of upwardly fining sequences with minor small clasts of mudstone, carbonaceous mudstone and coal occasionally present.
21.69	21.94	Mud from cave in and broken mudstone
21.94	22.12	Carbonaceous mudstone and heavy, dull coal with some mudstone
22.12	22.46	Mudstone and carbonaceous mudstone with minor vitrinite bands (less than 1%)
22.46	23.1	Moderately heavy, dull coal with approximately 1% vitrinite and minor calcite veining uphole
23.1	29.29	Grading from dark grey to grey, upwardly fining sequence of fine to coarse-grained lithic sandstones

29.29	29.79	Grey to pale grey, coarse to very coarse-grained lithic sandstone with clasts of mudstone around 29.72m
29.79	31.5	Fine to medium-grained, pale grey lithic sandstone with discontinuous flacer banding downhole
31.5	32.15	Coarse to very coarse-grained, pale grey lithic sandstone with 2-5mm clasts of mudstone and coal from 31.62-31.7m and 15mm clasts at 31.84m. Possibly an upwardly fining sequence
32.15	33.66	Grey, fine to medium-grained lithic sandstone with angular 2-4mm coal/carbonaceous mudstone clasts around 33.1m
33.66	34.74	Medium-grained, grey lithic sandstone
34.74	35.03	Medium to very coarse-grained, grey lithic sandstone with elongated mudstone clasts up to 3cm by 1cm in size
35.03	43.65	Grey, medium to coarse-grained lithic sandstone (appears to be upwardly fining) with minor flacer banding from 36.7-37m and coal/carbonaceous mudstone clasts, approximately 2mm in size at 37.27m. Minor to very minor flacer banding.
43.65	44.5	Moderately heavy, dull coal and carbonaceous mudstone with calcite veining (some along remnant bedding planes) and approximately 1% vitrinite
44.5	44.86	Carbonaceous mudstone with some coal and minor mudstone downhole
44.86	45.1	Grey to dark grey silicious mudstone (or pyroclastic ash zone)
45.1	46.28	Pale grey, medium to fine-grained lithic sandstone with occasional coal clasts from 45.77-45.82m
46.28	46.62	Interbedded grey to pale grey mudstone and lithic sandstone with minor carbonaceous mudstone
46.62	46.74	Fine-grained, grey lithic sandstone
46.74	46.8	Grey mudstone with minor fine-grained grey sandstone beds
46.8	50.62	Medium to fine-grained, pale grey lithic sandstone with flacer banding from 48.9-49m
50.62	52.19	Grey-green, silica-sericite(?) altered, medium to coarse-grained lithic sandstone
52.19	52.33	Dark green-grey, sericite-silica altered mudstone and carbonaceous mudstone
52.33	54.35	Green-grey, medium-grained, silica-sericite altered lithic sandstone
54.35	54.67	Black, altered carbonaceous sandstone (possibly 'meta-coal' and sandstone)
54.67	54.9	Grey mudstone and clay (fault zone?)
54.9	55.58	Interbedded grey sandstone and mudstone
55.58	59.55	Grey, medium grained lithic sandstone with tensional calcite veining uphole and flacer banding downhole
	EOH	

Detailed Logs

mFrom	mTo	Description
10.13	10.27	Pale orange/brown, fine-grained lithic sandstone
10.27	10.5	Dark grey to black carbonaceous mudstone
10.5	10.55	Very broken black carbonaceous mdstone and coal with iron-rich alteration
10.55	10.62	Dark grey to black carbonaceous mudstone with multiple clay seams
10.62	11.08	Grey mudstone and minor arbonaceous mudstone
11.08	11.2	Coal and carbonaceous mudstone with 5-10% vitrinite banding
11.2	11.3	Bright coal: 70-80% vitrinite
11.3	11.54	Grey mudstone
11.54	11.56	Mudstone and clay fault(?)
11.56	11.65	Carbonaceous mudstone and coal with less than 1% vitrinite
11.65	11.67	Vitrinite
11.67	11.71	Dull coal and carbonaceous mudstone
11.71	11.9	Bright coal with minor calcite cleating and approximately 60% vitrinite. Very broken from around 11.87m
11.9	11.95	Very broken, brittle vitrinite and black clay
11.95	12	Broken grey mudstone
12	12.6	Grey mudstone with minor fine-grained sandstone bands
12.6	12.8	Broken, dark grey to black carbonaceous mudstone and coal with minor mudstone and clay
12.8	12.88	Dark grey mudstone and carbonaceous mudstone
12.88	13	Very broken, brittle coal
13	13.66	Grey to light grey interbedded mudstones and fine to medium-grained sandstones
21.69	21.94	Mudstone and cave-in from faulting (?)
21.94	22.01	Black carbonaceous mudstone +/- heavy, dull coal
22.01	22.03	Clay/mudstone band
22.03	22.12	Black carbonaceous mudstone and heavy, dull coal with approximately 1% vitrinite
22.12	22.43	Mudstone and carbonaceous mudstone with minor, less than 1% vitrinite banding
22.43	22.46	Clay band
22.46	22.58	Moderately heavy, dull coal with 2-5% vitrinite and 2% calcite veining
22.58	23.1	Heavy, dull coal and carbonaceous mudstone with minor calcite veining uphole and very minor vitrinite banding (<1%)
23.1	23.65	Grading from black to dark grey medium to fine-grained lithic sandstone
23.65	29.29	Grading from dark grey to grey, medium to coarse-grained lithic sandstone
40	43.65	Grey, medium to coarse-grained lithic sandstone
43.65	43.74	Dull, heavy coal
43.74	43.76	Dull, heavy coal with frequent calcite veining along remnant bedding
43.76	44.5	Moderately dull, heavy coal (+/- carbonaceous mudstone) with 1-2% vitrinite (increasing downhole) and approximately 1% calcite veining
44.5	44.7	Broken, dark grey carbonaceous mudstone
44.7	44.74	Dull, heavy coal with approximately 1% vitrinite (+/- carbonaceous mudstone)
44.74	44.84	Dark grey to grey mudstone with minor carbonaceous mudstone
44.84	44.86	Carbonaceous mudstone (+/- coal)
44.86	45.1	Sericite altered(?) grey to dark grey mudstone or ash/pyroclastic zone
45.1	46.28	Pale grey, medium to fine-grained lithic sandstone with occasional coal clasts from 45.77-45.82m

OJ009 - Structure

m From	m To	Structure	Angle to Core Axis	Alteration	Form	Comments
5.12	5.13	jt	80		PR	No alteration
5.17	5.7	jt	7	Fe	UR	Minor iron alteration
9.93	10.06	jt	30		UR	
10.5	10.62	fx				fault(?)
11.9	12	fx				fault(?) in coal
12.88	13	fx				fault(?) in coal
13.3	13.37	bd	85			
17.1	17.15	bn	70			Flacer banding
17.3	17.6	fx	2		UR	
17.94	17.96	bd	75			bedding and flacer banding
18.64	18.74	bd	80			
20.65	20.99	jt	15	Cy	UR	minor clay
22.43	22.46	ft	80	Cy		clay seam or fault(?)
28.1	28.26	fx	0		UR	
30.22	30.32	jt	35	Ca	UR	
31.2	31.5	bn	75			discontinuous flacer banding
32.98	33	jt	70		PR	
34.38	34.64	jt	80		PS	
35.2	35.3	jt	25		UR	
36.7	37	bn	70			Flacer banding
38.91	39.1	jt	25		UR	
39.39	39.48	jt	30	Ca	UR	
40.12	40.46	jt	30		UR	joint set
40.12	40.46	jt	60		UR	
40.12	40.46	jt	10		UR	
40.94	40.94	bd	90			
43.65	43.65	bd	85			contact - bedding
45	45.1	jt	40		PS	
45.1	45.33	jt	15		PR	
45.73	45.86	jt	20		PR	
46.28	46.43	bd	75			
46.62	46.62	bd	65			
47.05	47.15	jt	40		PS	
47.65	47.67	jt	70		PS	
47.73	47.77	jt	70		PS	opposite to previous set
48.44	48.49	jt	30		PR	
48.8	49	bn	75			flacer banding
52	52.1	jt	30		PR	

52.3	52.6	jt	20		PR	
53	53.2	jt	20		PR	
54.2	54.4	jt	10		UR	
55.4	55.65	jt	40		PR	
55.4	55.65	jt	70		PR	
55.4	55.65	jt	60		PR	
58.85	59.05	jt	20		UR	
59.2	59.55	jt	20		UR	

RQD - OJ009

m From	m To	Recovery	RQD	m From	m To	Recovery	RQD
0	1	0	0	30	31	100	100
1	2	0	0	31	32	100	100
2	3	0	0	32	33	100	100
3	4	80	6	33	34	100	100
4	5	100	89	34	35	100	88
5	6	95	37	35	36	100	100
6	7	89	45	36	37	100	100
7	8	92	91	37	38	100	100
8	9	100	92	38	39	100	100
9	10	93	83	39	40	100	100
10	11	100	14	40	41	100	64
11	12	100	23	41	42	100	80
12	13	100	40	42	43	100	100
13	14	100	100	43	44	100	88
14	15	100	91	44	45	100	49
15	16	100	100	45	46	100	53
16	17	100	100	46	47	100	100
17	18	100	30	47	48	100	71
18	19	100	36	48	49	100	78
19	20	100	100	49	50	100	100
20	21	100	63	50	51	100	100
21	22	100	69	51	52	100	88
22	23	100	85	52	53	100	48
23	24	100	69	53	54	100	80
24	25	100	99	54	55	100	10
25	26	100	100	55	56	100	47
26	27	100	91	56	57	100	91
27	28	100	100	57	58	100	100
28	29	100	53	58	59	100	85
29	30	100	99	59	59.5	100	8


START
0.00-6.80
CORE LOSS ~1.2'
3.90
4
4.80
OJ009 #1
5
5.50
CORE LOSS ~0.1'
6.00'
6.80
START
6.80-10.27
7
8
8.50
OJ009: TRAY #2
9
9.20
10
10.10
10.40

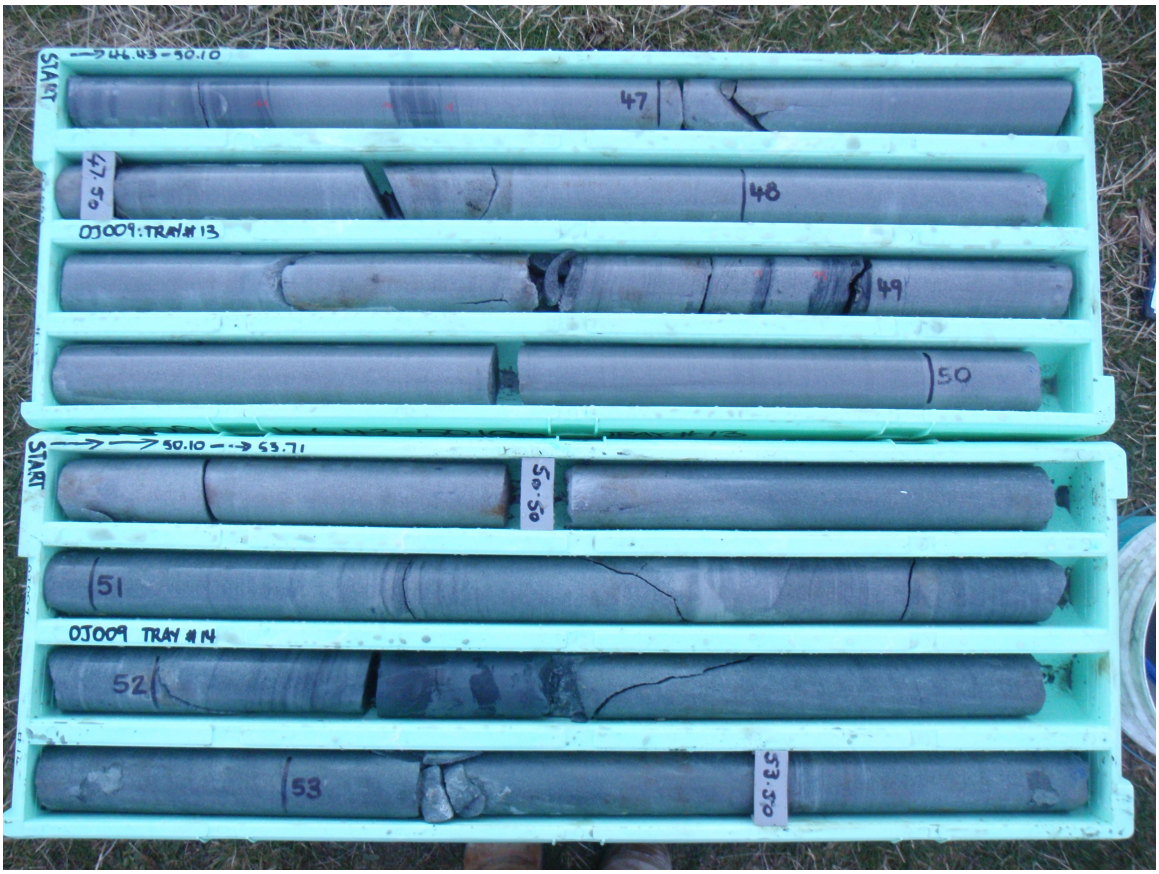

START
10.27-13.66
11
11.50
11.95
OJ009: TRAY #3
12
13.00
START
13.66
17.30
14
14.50
15
OJ009: TRAY #4
16
17
17.35


START
17.50
21.06
OJ009 · TRAY#5
20
20.40
START
21.06 – 24.50
21.80
22.10
OJ009 : TRAY # 6
23
23.35
24.00


START
24.50
28.26
25
26
OJ009: TRAY #7
27
28
START
28.26
31.97
29
29.40
30
OJ009 : TRAY#8
31


START
31.97 --> 35.59
32
32.70
33
OJ009: TRAY #9
34
35
35.30
START
35.59 --> 39.21
36
37
OJ009 TRAY #10
38
38.80
39


START
37.21 --> 42.93
40
41
OJ009: TRAY #11
44.30
42
START
42.93 --> 44.43
43
44
44.30
44.70
OJ009: TRAY #12
45
46


START
46.43 - 50.10
47
47.50
48
OJ009: TRAY #13
49
50
START
50.10 - 53.71
50.50
51
OJ009 TRAY #14
52
53
53.50


START
53.71 - 57.38
54
55
OJ009 TRAY #15
56
55.25
57
START
57.38 - 59.55
58
59
OJ009 TRAY #16
59.65

Appendix 12. OJ010 Logs and Photos

Hole ID: **OJ010**

Collar:	Northing:	5308789	mN	Datum:	GDA	
	Easting:	524919	mE	Locating Method:	Survey	
	Elevation:	390	m	Accuracy:		mm
	Tenement:	EL25/2008 Melton Mowbray				
	Location:	Northumbria, Jericho				

Surveys:	Depth	Dip	Azimuth

Company:	South East Asia Resources (Tasmania)
Depth:	52.6 m
Azimuth:	n/a degrees
Dip	-90 degrees
Drilling Method:	Diamond (HQ3)
Date Drilled:	14/6/2013 - 15/6/2013
Drilling Company:	Whole Core
Site Geologist:	Karen Adams
Logging Geologist:	Karen Adams

Sampled:				
16.78 m	to	17.34 m	Heavy dull coal (+/- carbonaceous mudstone)
18.54 m	to	19.16 m	Heavy dull coal 5-10% vitrinite & brecciated downhole contact
32.32 m	to	33 m	Grading from dull to moderately bright coal
33.8 m	to	34.5 m	Mudstone, carbonaceous mudstone & coal breccia zone
42.15 m	to	42.93 m	Very broken, heavy dull coal (+/- carbonaceous mudstone)

Results:	mFrom	mTo	Interval	Relative Density	Ash%	Total Sulphur	Calories Kcal/Kg	Moisture
	16.78	17.34	0.56					
	18.54	19.16	0.62					
	32.32	33	0.68					
	33.8	34.5	0.7					
	42.15	42.93	0.78					

Notes: PVC lined to 33m
Dolerite at 48.8m
Frequent cave-ins including in coal seam (sent for assay?)

Drill Hole ID: OJ010

Project: Southern Midlands Coal

License: EL25/2008

Date Drilled: 14th to the 15th June, 2013

Collar: Easting: 55 524 919
Northing: 5 308 789
Elevation: 390
(GDA - Surveyed)

Azimuth: n/a

Dip: -90 degrees

mFrom	mTo	Description
0	1.22	Core Loss
1.22	2.7	Soft, pale brown/cream, highly degraded medium-grained lithic sandstone
2.7	4.7	Core Loss
4.7	5.8	Soft, pale brown/orange/cream, highly degraded medium-grained lithic sandstone
5.8	7	Soft, iron altered, pale cream/brown weathered/degraded lithic sandstone
7	7.1	Core Loss - Ground away
7.1	8.5	Soft, iron altered, pale cream/brown weathered/degraded lithic sandstone
8.5	8.61	Core Loss - Ground away
8.61	10.7	Soft, iron altered, pale cream/brown weathered/degraded lithic sandstone
10.7	10.8	Core Loss - Washed away
10.8	11.5	Very soft, pale orange, medium-grained lithic sandstone
11.5	11.96	Soft grey, medium-grained lithic sandstone
11.96	12.8	Grey, medium-grained lithic sandstone with frequent flacer banding
12.8	13.51	Grey to dark grey, medium to coarse-grained lithic sandstone with calcite veining, irregular flacer banding and coal clasts
13.51	14.53	Grey to pale grey, medium to coarse-grained lithic sandstone with some irregular flacer banding, coal clasts, and mudstone clasts up to 3cm in size
14.53	15.8	Frequently fractured grey mudstone with minor carbonaceous mudstone
15.8	15.9	Core Loss - Broken ground
15.9	16.78	Frequently fractured grey mudstone with minor carbonaceous mudstone
16.78	17.4	Heavy, dull coal (+/- carbonaceous mudstone). Moderately frequent jointing
17.4	17.45	Core Loss - Ground away
17.45	17.78	Dark grey to grey mudstone and carbonaceous mudstone
17.78	18.24	Grey mudstone (tuffaceous?) with minor darker carbonaceous mudstone layer
18.24	18.54	Carbonaceous mudstone and grey mudstone
18.54	19.16	Heavy, dull coal (+/- carbonaceous mudstone) with 5-10% vitrinite and brecciated downhole contact
19.16	20.2	Very broken grey mudstone. (sericite-silica altered?)
20.2	21.44	Moderately to heavily broken, pale grey, sericite-silica altered interbedded mudstone and fine to medium-grained sandstone with calcite vein at 20.7m and minor cross-bedding downhole
21.44	21.7	Dark grey to grey, flacer banded, fine-grained lithic sandstone
21.7	23.5	Pale grey, upwardly fining, coarse to fine-grained lithic sandstone
23.5	23.6	Core Loss - Ground away
23.6	27.14	Medium to coarse-grained, poorly consolidated, grey lithic sandstone with minor flacer banding and large, low angle calcite vein at around 27m

27.14	27.4	Core Loss - Broken ground
27.4	27.5	Calcite pieces from vuggy veining (passage of water)
27.5	27.65	Core Loss - Broken ground
27.65	29.35	Medium to coarse-grained, grey lithic sandstone (with a slight green tinge). Overall soft and poorly consolidated with zones of broken ground
29.35	29.4	Core Loss - Broken ground
29.4	30.45	Soft grey, frequently fractured, medium-grained lithic sandstone
30.45	30.6	Core Loss - Ground away
30.6	31.26	Grey, soft, medium to coarse-grained lithic sandstone with frequent coal rip-up clasts containing minor calcite downhole
31.26	31.9	Grey coarse-grained lithic sandstone with rounded mudstone clasts of up to 2cm at 31.3m
31.9	32.32	Grey, fine-grained lithic sandstone with 1mm coal clasts uphole
32.32	33	Dull, heavy coal (+/- carbonaceous mudatone) grading to brittle, moderately bright coal with some calcite cleating and approximately 10% vitrinite
33	34.43	Very broken grey mudstone and carbonaceous mudstone with coal breccia zone and large calcite veining at around 33.9m. Significant amounts of cave-in
34.43	34.7	Coal, approximately 1% vitrinite, zonally heavy and dull with some carbonaceous mudstone and mudstone. (Possibly some cave-in material present)
34.7	38.35	Interbedded grey mudstone, pale grey to dark grey medium-grained lithic sandstone with some carbonaceous material contained downhole
38.35	38.4	Core Loss
38.4	40.65	Dark grey to black, medium to fine-grained lithic sandstone with some carbonaceous mudstone. Coal/calcite clast at approximately 39.6m.
40.65	40.7	Core Loss
40.7	42.15	Dark grey to black, medium to fine-grained lithic sandstone with coarse, blebby, disseminated pyrite
42.15	42.93	Dominantly moderately to strongly broken, heavy, dull coal +/- carbonaceous mudstone
42.93	44.44	Dark grey to grey mudstone with some interbedded fine-grained lithic sandstone. Mudstone rip-up clasts around 44m
44.44	45.9	Pale grey, coarse to medium-grained lithic sandstone with minor flacer banding uphole and mudstone bedding at 44.85m and gradational downhole alteration contact
45.9	48.8	Green-grey, sericite-silica-chlorite altered, medium to coarse-grained lithic sandstone with irregular uphole contact. Chlorite spotting from 47.5m and 2-3cm thick calcite vein at 46.4m
48.8	51.45	Strongly fractured, dark green-grey brecciated dolerite with zonally strong calcite veining and infill
51.45	51.95	Core Loss
51.95	52.6	Strongly fractured, dark green-grey brecciated dolerite with zonally strong calcite veining and infill
	EOH	

OJ010

Detailed Logs

mFrom	mTo	Description
14	14.53	Grey to pale grey, medium to coarse-grained lithic sandstone with large (up to 3cm) mudstone clasts and 2-8mm coal bands with calcite cleats from 14.4-14.53m
14.53	15.8	Frequently fractured grey mudstone minor carbonaceous mudstone
15.8	15.9	Core Loss
15.9	16.78	Frequently fractured grey mudstone minor carbonaceous mudstone
16.78	17.34	Moderately to frequently jointed heavy dull coal
17.34	17.4	Dark grey to brown mudstone and carbonaceous mudstone
17.4	17.45	Core Loss - Ground away
17.45	17.59	Grey to dark grey mudstone
17.59	17.64	Dark grey carbonaceous mudstone and mudstone
17.64	17.73	Grey mudstone
17.73	17.78	Dark grey silica-sericite altered carbonaceous mudstone
17.78	18.16	Tuffaceous (?) grey mudstone
18.16	18.22	Carbonaceous mudstone
18.22	18.24	Grey (tuffaceous?) mudstone
18.24	18.3	Carbonaceous mudstone
18.3	18.4	Grey mudstone
18.4	18.54	Very broken, grey to dark grey mudstone and carbonaceous mudstone
18.54	19.16	Heavy dull coal with approximately 5-10% vitrinite bands and mm mudstone bands present from 19.01m and brecciated downhole contact
19.16	20.2	Very broken, grey mudstone
20.2	21.44	Pale grey, silica-sericite altered, interbedded mudstone and fine to medium-grained sandstone
31.05	31.26	Grey, soft medium to coarse-grained lithic sandstone with frequent coal rip-up clasts containing minor calcite
31.26	31.9	Grey, coarse-grained lithic sandstone with rounded mudstone clasts up to 2cm in size at 31.3m
31.9	32.32	Grey, fine-grained lithic sandstone with 1mm coal clasts uphole
32.32	32.37	Dull heavy coal
32.37	32.38	Vitrinite
32.38	33	Very broken, brittle, moderately bright coal with some calcite cleating. Approximately 10% vitrinite
33	33.8	Very broken grey mudstone (with some cave-in material)
33.8	34.43	Very broken mudstone, carbonaceous mudstone and coal breccia zone with large calcite vein at 33.9m and calcite cleating in large coal fragment at approximately 34.3m
34.43	34.5	Coal with calcite veining and cleating and approximately 5% vitrinite
34.5	34.7	Coal, carbonaceous mudstone and mudstone
34.7	35.44	Grey, silica-sericite altered mudstone
35.44	37.53	Grey to pale grey medium to fine-grained lithic sandstone
37.53	38.35	Dark grey to black medium to fine-grained lithic sandstone
38.35	38.4	Core Loss
38.4	40.65	Dark grey to black medium to fine-grained lithic sandstone with coal and calcite clast at 39.6m

40.65	40.7	Core Loss
40.7	42.15	Dark grey to black medium to fine-grained lithic sandstone with disseminated coarse, blebby pyrite throughout
42.15	42.93	Dominantly moderate to strongly broken heavy dull coal and some carbonaceous mudstone
42.93	44	Dark grey to grey mudstone with some interbedded fine-grained lithic sandstone

OJ010 Structure

m From	m To	Structure	Angle to Core Axis	Alteration	Form	Comments
8.77	8.84	jt	40		PS	
9.18	9.2	bn	65			flacer banding
12	12.4	bn	90			flacer banding
12.05	12.1	jt	60		PS	
12.3	12.4	jt	30		PS	
13.2	13.22	jt	70		US	
14.6	14.6	bd	85			
16	16.1	bd	70			
16.77	16.8	bd	70			contact
16.9	17.3	jt	70		PR	along bedding plane
18.4	20.6	ft				fault? With in situ breccia 19.16-19.14m
20.6	20.9	vn	20	Ca		
21.44	21.7	bn	80			flacer banding
23.6	23.8	jt	45		PS	
23.6	23.8	jt	30		PS	
24.38	24.47	jt	30		PS	
26	26.2	jt	70		PS	
26.3	26.5	ft				fault?
27.14	27.65	ft		Ca		fault zone? Calcite veining with open space infil. Water passage
29.4	30.1	fx				fracture zone in soft sandstone
31.06	31.12	jt	60		PS	
31.35	31.44	jt	40		US	
32.38	35.4	fx				very broken ground fault?
35.4	35.42	bd	70			
36.4	36.45	jt	30		PS	
36.7	36.8	jt	70		PS	multiple
38.12	38.45	fx				fracture zone
39.16	39.33	jt	70		PS	
39.16	39.33	jt	30		PR	
39.16	39.33	jt	20		UR	
39.44	41.3	fx	70			moderately fractured zone, dominantly 70 degrees but some 30.
39	39.4	bd	70			
42.15	45	ft				Very broken, fault zone.
46	46.65	jt	60		PR	

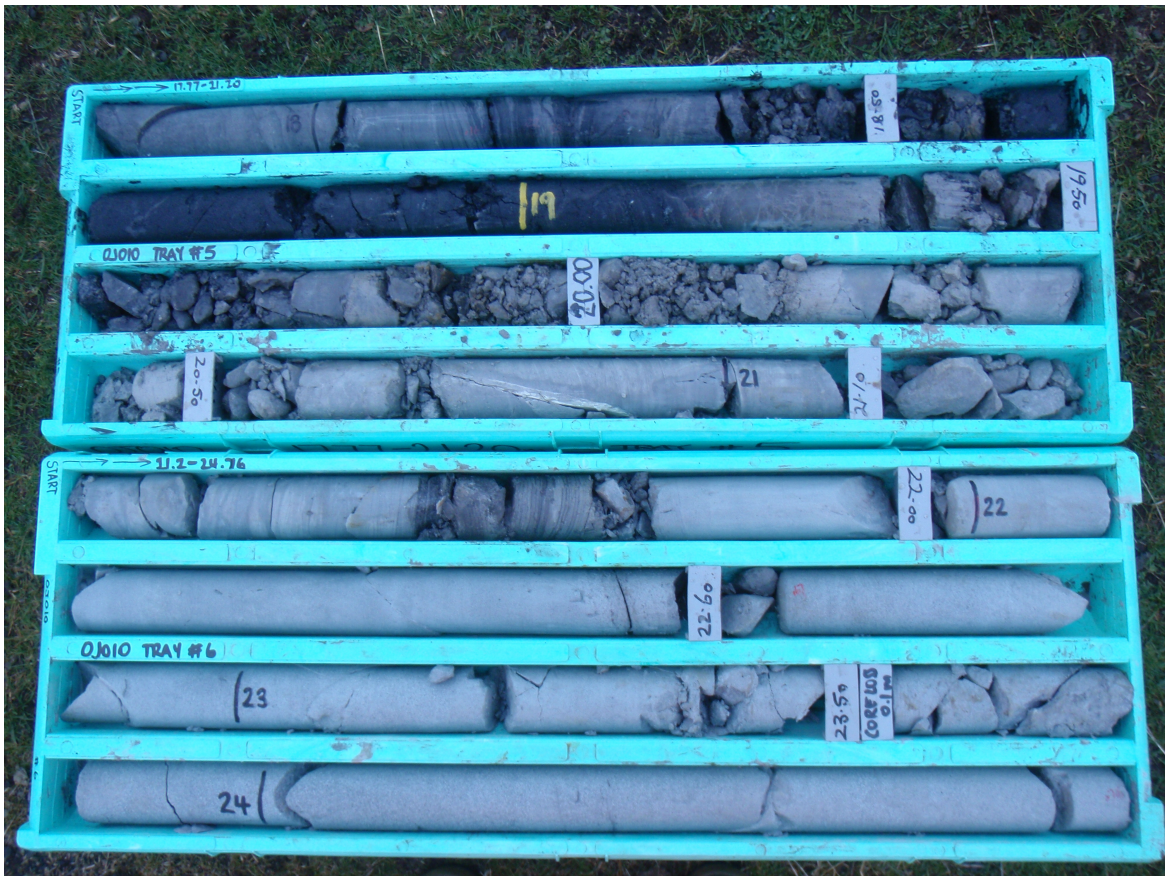
46.48	46.52	vn	40	Ca		
46.8	47	fx				fracture zone
47.5	47.5	jt	40		PR	
47.7	47.9	jt	25		PS	
48.7	49	ft	20	Ca-Ch		vein fill, annealed fault?
48.8	52.6	ft				zonally brecciated fault zone

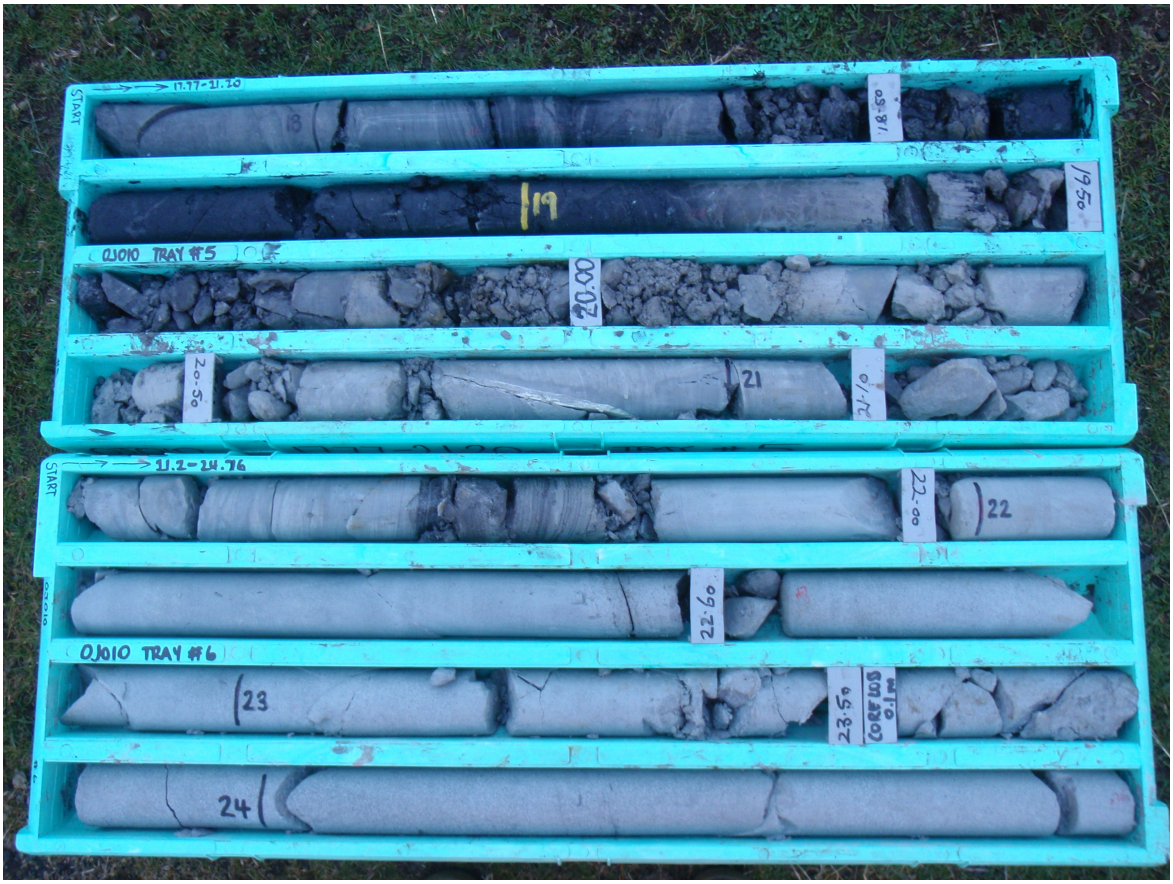
RQD - OJ010

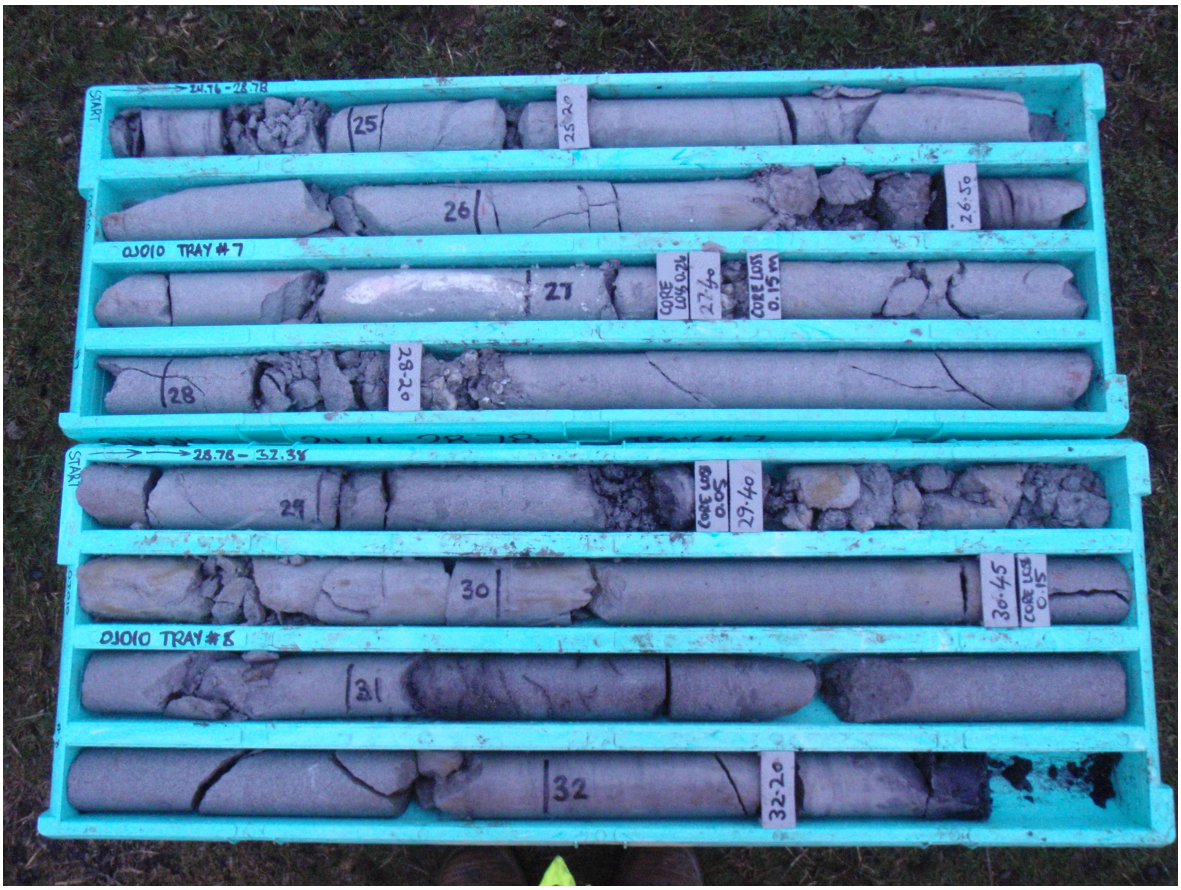
m From	m To	Recovery	RQD	m From	m To	Recovery	RQD
0	1	0	0	27	28	59	0
1	2	78	0	28	29	100	0
2	3	70	0	29	30	95	14
3	4	0	0	30	31	85	30
4	5	40	0	31	32	100	50
5	6	100	0	32	33	100	0
6	7	100	0	33	34	100	0
7	8	90	100	34	35	100	0
8	9	89	91	35	36	100	58
9	10	100	100	36	37	100	47
10	11	90	60	37	38	100	14
11	12	100	0	38	39	95	32
12	13	100	34	39	40	100	28
13	14	100	94	40	41	95	0
14	15	100	66	41	42	100	71
15	16	90	15	42	43	100	0
16	17	100	12	43	44	100	0
17	18	90	11	44	45	100	0
18	19	100	0	45	46	100	100
19	20	100	0	46	47	100	13
20	21	100	0	47	48	100	57
21	22	100	16	48	49	100	0
22	23	100	90	49	50	100	0
23	24	90	0	50	51	100	0
24	25	100	47	51	52	50	0
25	26	100	19	52	52.6	100	0
26	27	100	0				

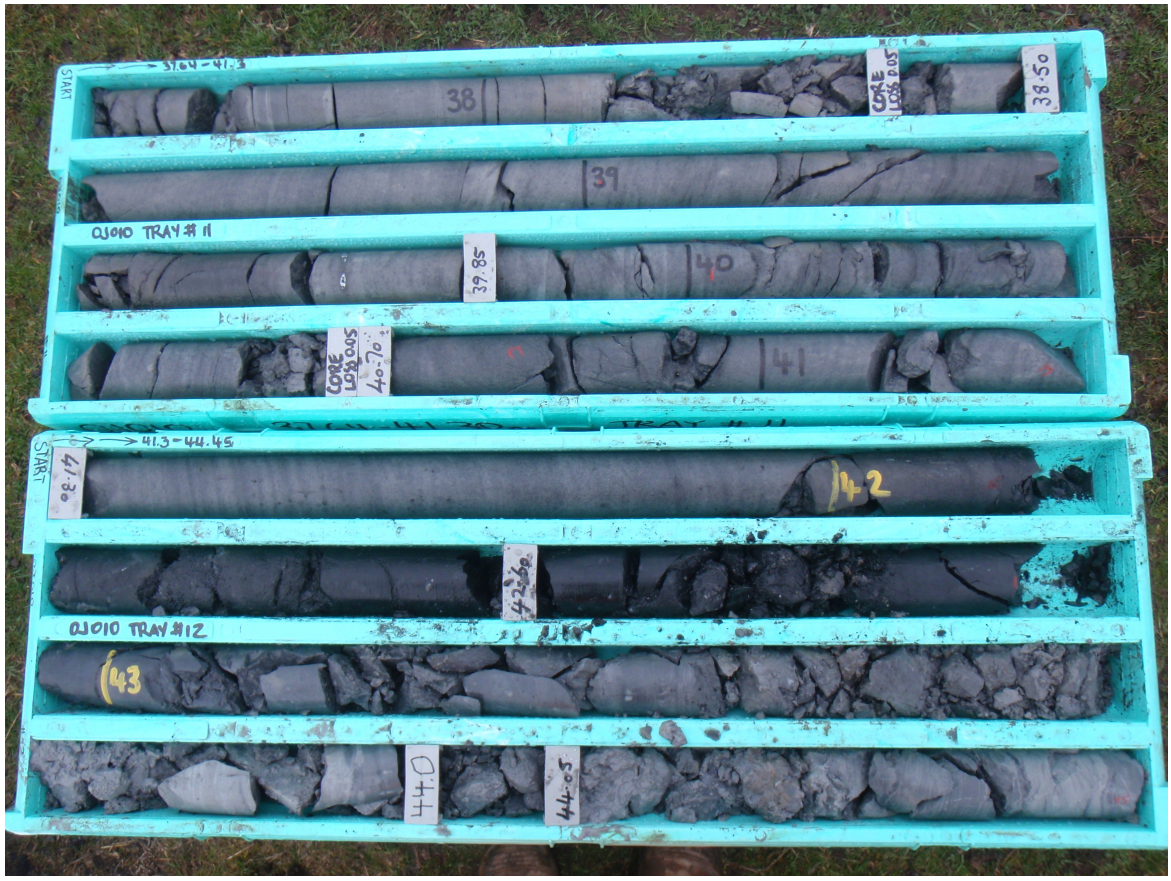

START
0.00 - 6.73
CORE LOSS 1.22m
1.00m
2.00
2.30
CORE LOSS 2m
3.00
4.00
OJ010 TRAY # 1
5
6
START
6.73 - 10.54
7.00
CORE LOSS 0.1
8
8.50
CORE LOSS 0.1
OJ010 TRAY # 2
9
10

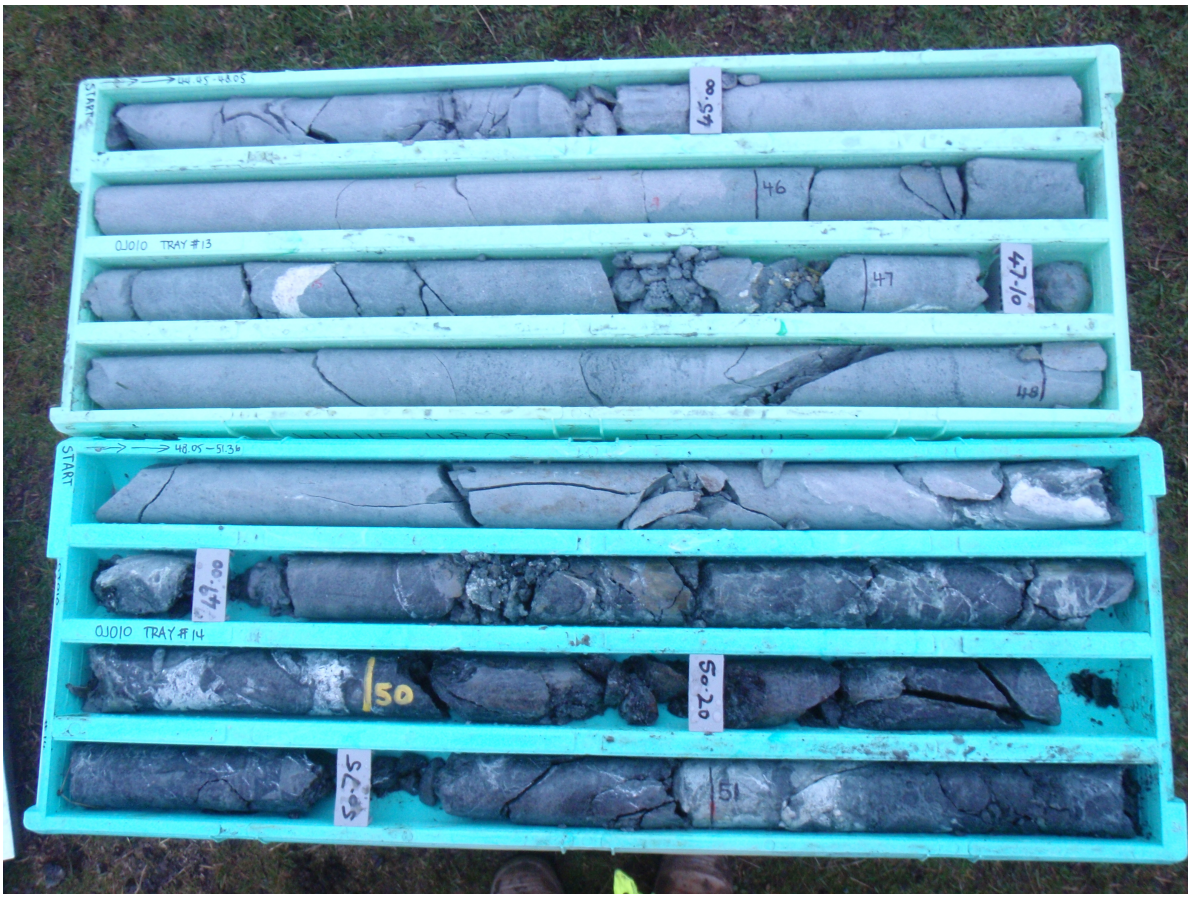

START
10.54 - 14.16
11.00
CORE LOSS 0.1
11.50
12
OJ010: TRAY #3
13.00
14
START
14.16 - 17.77
14.50
15
15.90
16
OJ010 TRAY # 4
16.65
17
17.40

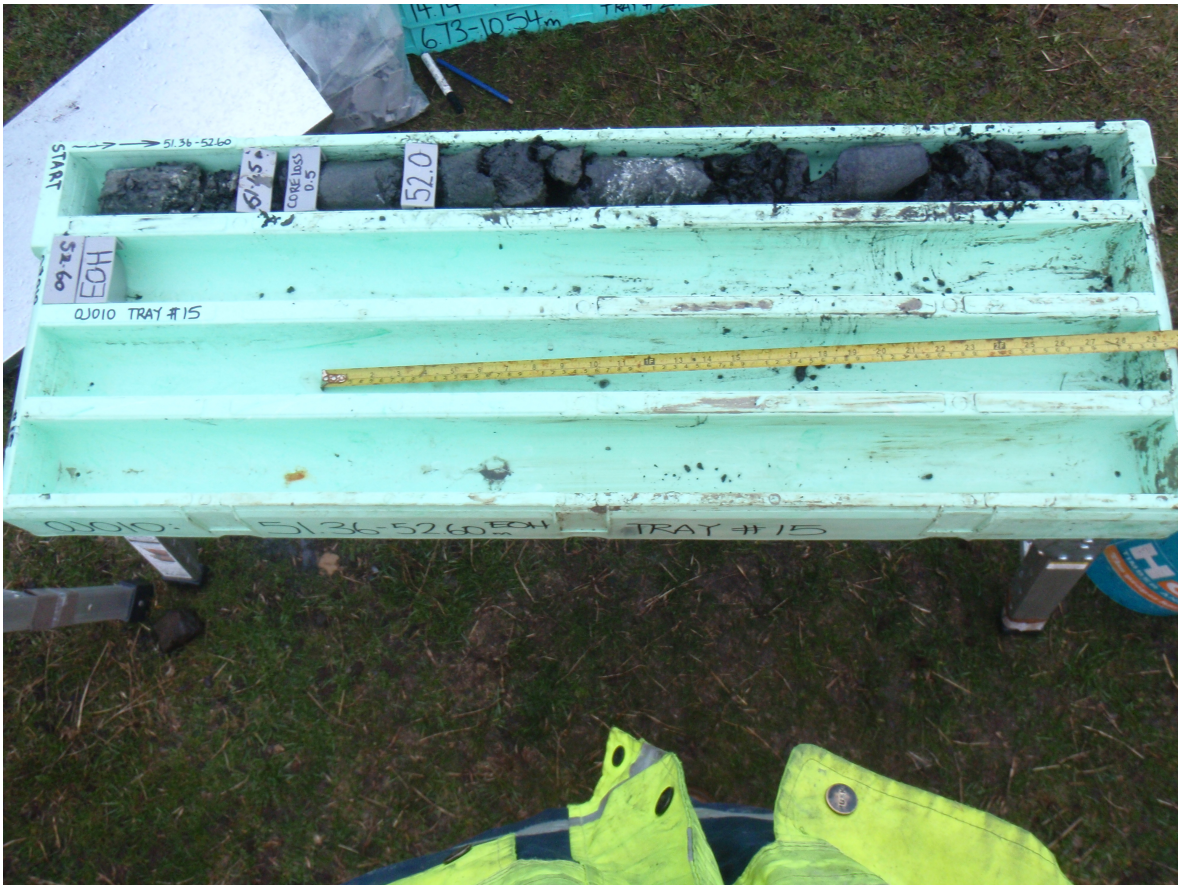

START
17.77-21.20
18
18.50
19
19.50
OJ010 TRAY #5
20.00
20.50
21
21.10
START
21.2-24.76
22.00
22
22.60
OJ010 TRAY #6
23
23.50
CORE LOSS 0.1m
24


START
17.77-21.20
18
18.50
19
19.50
OJ010 TRAY #5
20.00
20.50
21
21.10
START
21.2-24.76
22.00
22
22.60
OJ010 TRAY #6
23
23.50
CORE LOSS 0.1m
24


25
25.20
26
26.50
OJ010 TRAY #7
27
CORE LOSS 0.24
27.40
CORE LOSS 0.15 m
28
28.20
28.78 - 32.38
29
CORE LOSS 0.05
29.40
30
30.45
CORE LOSS 0.15
OJ010 TRAY #8
31
32
32.20


37.64 - 41.3
38
CORE LOSS 0.05
38.50
39
OJ010 TRAY # 11
39.85
40
CORE LOSS 0.05
40.70
41
41.3 - 44.45
41.30
42
42.50
OJ010 TRAY #12
43
44.0
44.05


START
48.05 - 48.05
45.50
46
QJ010 TRAY #13
47
47.10
48
START
48.05 - 51.36
49.00
QJ010 TRAY #14
50
50.20
50.75
51


START
51.36 - 52.60
51.45
CORE LOSS 0.5
52.0
52.60
EOH
QJ010 TRAY #15
QJ010: 51.36 - 52.60 EOH TRAY #15

Appendix 13. OJ019 Logs and Core Photos

Hole ID: **OJ019**

Collar:	Northing:	5310113	mN	Datum:	GDA	
	Easting:	523899	mE	Locating Method:	GPS	
	Elevation:	399	m	Accuracy:	5	m
	Tenement:	EL25/2008 Melton Mowbray				
	Location:	Northumbria, Jericho				

Surveys:	Depth	Dip	Azimuth

Company: South East Asia Resources (Tasmania)

Depth: 60.3 m
Azimuth: n/a degrees
Dip -90 degrees

Drilling Method: Diamond (HQ3)
Date Drilled: 16/7/13 - 18/7/13
Drilling Company: KMR Drilling

Site Geologist: Karen Adams
Logging Geologist: Karen Adams (Claire Thomas)

Sampled:				
16.3	to	16.74	m	Carbonaceous mudstone and possible heavy, dull coal
16.74	to	17.2	m	Moderately to strongly broken, heavy, dull coal
16.7	to	17.3	m	Cave In
17.2	to	17.54	m	Moderately brittle, bright coal. Calcite cleating/veining
17.84	to	18.24	m	Heavy dull coal & carbonaceous mudstone
31.3	to	31.95	m	Carbonaceous mudstone and heavy dull coal
31.95	to	32.38	m	Moderately broken, heavy dull coal. Some calcite veining

Results:	mFrom	mTo	Interval	Relative Density	Ash%	Total Sulphur	Calories Kcal/Kg	Moisture
	16.3	16.74	0.44					
	16.74	17.2	0.46					
	16.7	17.3	0.6					
	17.2	17.54	0.34					
	17.84	18.24	0.4					
	31.3	31.95	0.65					
	31.95	32.38	0.43					

Notes: Dolerite at 54.65m
PVC lined

Drill Hole ID: OJ019

Project: Southern Midlands Coal

License: EL25/2008

Date Drilled: 16th to the 18th of July, 2013

Collar: Easting: 55 523 899

Northing: 5 310 113

Elevation: 399

(GDA - GPS)

Azimuth: n/a

Dip: -90 degrees

mFrom	mTo	Description
0	4.1	No Core - Cutting bit
4.1	5.7	Brown, weathered, moderately clay-richcoarse to very coarse-grained lithic sandstone with zonal mudstone with large (up to 5cm) mudstone and carbonaceous mudstone clasts uphole
5.7	6	Core Loss
6	11.8	Orange (with some black) weathered, coarse-grained lithic sandstone with zonally prominent, irregular flacer banding and minor mudstone downhole
11.8	12	Core Loss
12	12.64	Orange to grey weathered, moderately clay-rich mudstone
12.64	14.7	Grey mudstone and minor carbonaceous mudstone with minor flacer banded fine-grained sandstone uphole
14.7	14.8	Core Loss
14.8	16.3	Strongly laminated grey mudstone with minor carbonaceous mudstone
16.3	16.74	Carbonaceous mudstone and possible heavy, dull coal
16.74	17.2	Moderately to strongly broken, heavy, dull coal
17.2	17.54	Moderately brittle, bright coal with frequent calcite cleating and veining and approximately 2% vitrinite
17.54	17.84	Grey mudstone with irregular ash banding
17.84	18	Heavy, dull coal with minor calcite cleating
18	18.13	Mudstone and carbonaceous mudstone
18.13	18.24	Moderately heavy, dull coal with calcite veining
18.24	18.45	Carbonaceous mudstone
18.45	18.7	Strongly bedded, grey mudstone with very minor fine-grained sandstone and possible eroded flame structures
18.7	19.14	Dark grey mudstone and carbonaceous mudstone
19.14	20.1	Soapy grey, sericite altered mudstone
20.1	20.24	Strongly weathered carbonaceous mudstone and possibly coal. Fault (?)
20.24	20.78	Soapy grey, sericite altered mudstone
20.78	31.3	Grey, zonally green, medium-grained lithic sandstone with chlorite spotting from approximately 27.8m, coal/calcite clasts at 28.3m and flacer banding from approximately 30m
31.3	31.45	Stongly laminated carbonaceous mudstone and mudstone
31.45	31.68	Carbonaceous mudstone and heavy dull coal with approximately 1% vitrinite and some calcite cleating
31.68	31.76	Very broken, heavy dull coal with possible carbonaceous mudstone
31.76	31.95	Strongly laminated, heavy dull coal and carbonaceous mudstone
31.95	32.38	Moderately broken, heavy dull coal with some calcite veining and

		approximately 1% vitrinite
32.38	33.46	Moderately to strongly broken, interbedded grey mudstone and carbonaceous mudstone
33.46	37.94	Grey-green medium to fine-grained lithic sandstone with cross-bedding at 33.7m and minor discontinuous coal banding with calcite cleating at approximately 36m
37.94	41.54	Pale grey-green (and zonally dark grey), medium to coarse-grained lithic sandstone with some flacer banding and weak sericite-silica alteration and minor chlorite spotting
41.54	45.22	Somewhat leached, pale grey to white, chlorite spotted medium-grained lithic sandstone
45.22	45.59	Green-grey, sericite-silica altered mudstone
45.59	47.5	Pale grey-green, sericite-silica altered, medium to fine-grained lithic sandstone
47.5	47.56	Core Loss
47.56	47.8	Grey mudstone with calcite veining
47.8	54.36	Soapy grey, silica-sericite altered mudstone and fine-grained sandstone with calcite veining and zones of mottled chlorite alteration at 49.1-49.25m
54.36	54.65	Strongly altered/annealed fault with colloform-like texture
54.65	60.3	Green-grey, fine to medium-grained dolerite with moderately frequent calcite veining uphole and calcite filled vessicles from approximately 57m to 59m
	EOH	

OJ019

Detailed Logs

mFrom	mTo	Description
14.8	16.3	Strongly laminated grey mudstone with minor carbonaceous mudstone
16.3	16.74	Carbonaceous mudstone and possible heavy, dull coal
16.74	17.2	Moderately to strongly broken, heavy, dull coal
17.2	17.54	Moderately brittle, bright coal with frequent calcite cleating and veining and approximately 2% vitrinite
17.54	17.84	Grey mudstone with irregular ash banding
17.84	18	Heavy, dull coal with minor calcite cleating
18	18.13	Mudstone and carbonaceous mudstone
18.13	18.24	Moderately heavy, dull coal with calcite veining
18.24	18.45	Carbonaceous mudstone
18.45	18.7	Strongly bedded, grey mudstone with very minor fine-grained sandstone and possible eroded flame structures
18.7	19.14	Dark grey mudstone and carbonaceous mudstone
30	31.3	Grey, zonally green, medium-grained lithic sandstone with chlorite spotting and flacer banding
31.3	31.45	Stongly laminated carbonaceous mudstone and mudstone
31.45	31.68	Carbonaceous mudstone and heavy dull coal with approximately 1% vitrinite and some calcite cleating
31.68	31.76	Very broken, heavy dull coal with possible carbonaceous mudstone
31.76	31.95	Strongly laminated, heavy dull coal and carbonaceous mudstone
31.95	32.38	Moderately broken, heavy dull coal with some calcite veining and approximately 1% vitrinite
32.38	33.46	Moderately to strongly broken, interbedded grey mudstone and carbonaceous mudstone

OJ019 Structure

m From	m To	Structure	Angle to Core Axis	Alteration	Form	Comments
4.1	4.6	fx			UR	
4.6	4.57	bd	50			
4.77	5.53	fx		Fe	UR	
5.57	5.65	jt	45		UR	
6.12	6.94	jt	60		UR	
6.4	7.31	jt	45			
6.17	6.9	bd	60			
7.75	9.85	fx	60			
8.8	10.38	fx	60		UR	
10.84	11.36	bd	60		PR	
11.64	11.8	fx			UR	
12.28	12.46	jt	90	Cy	PS	
12.58	13.02	fx	60			
13.32	13.42	fx	50			
13.67	13.72	fx	70		UR	
16.66	16.8	jt	45		UR	
17.37	18.5	jt	70		UR	
18.03	18.93	jt	45		UR	
19.73	19.82	fx				
20.44	21.7	fx	80		PS	
21.15	21.18	fx	85		UR	
21.17	21.23	fx	70		UR	
22.18	22.56	jt	70		UR	
22.66	22.7	fx			UR	
23.72	22.97	fx	80		US	
23.02	23.7	fx	60		UR	
24.24	24.73	jt	70		UR	
24.57	24.7	fx				
25.35	25.43	fx	70		PS	
25.61	25.69	fx				
26.17	26.4	jt	70		UR	
27.02	27.04	fx				
27.04	27.66	fx	70		UR	
28.47	28.56	fx			UR	
28.22	28.88	fx			PS	
28.96	28.94	jt	70		PS	
29.1	29.94	jt	75		UR	
30.05	30.9	jt	70		UR	
30.98	31.14	jt	60		UR	
31.2	31.48	fx				

31.78	32.13	fx	70		PS	
33.24	32.8	fx				
32.94	33.42	fx				
33.7	33.75	fx	70			
34.16	34.2	fx	70			
34.52	34.55	jt	85		US	
35.58	35.72	jt	30		UR	
35.1	35.72	fx				
35.57	35.6	jt	70		US	
35.77	35.94	fx				
36.06	36.62	jt	70		UR	
37.14	37.7	jt	70			
37.57	37.8	jt	80		UR	
38.52	38.55	fx	80		UR	
38.8	38.85	jt	85		UR	
38.9	39	jt	45		UR	
39.06	39.16	fx				
39.22	39.27	jt	70		UR	
39.41	39.56	fx				
39.77	39.96	jt	45		PS	
40.15	42.33	jt	50		UR	
40.24	41.49	jt	85		UR	
41.96	44.8	fx	80		PR	
44.64	45.72	fx	45		UR	
45.65	45.87	jt	45		UR	
45.73	45.87	jt	30		UR	
46.27	46.53	jt	80		UR	
46.34	46.52	jt	45		UR	
46.8	47.1	fx				
47.7	49.15	fx				
48.05	48.36	fx	10		UR	
49.27	49.38	jt	45		PS	
49.4	49.6	fx				
49.6	49.74	jt	45		PS	
49.98	54.45	jt	70		PS	
52.02	52.2	jt	45		PS	
52.66	52.72	jt	40		PS	
53.7	54.22	fx		Ca		
54.64	55.27	vn	70	Ca		
55.15	55.36	jt	70	Ca	UR	
55.46	55.48	jt	85		UR	
55.86	55.88	jt	80		UR	
56.18	56.2	jt	60	Ca	UR	
56.8	56.9	jt	45	Ca	UR	
57.38	57.95	jt	70	Ca	UR	

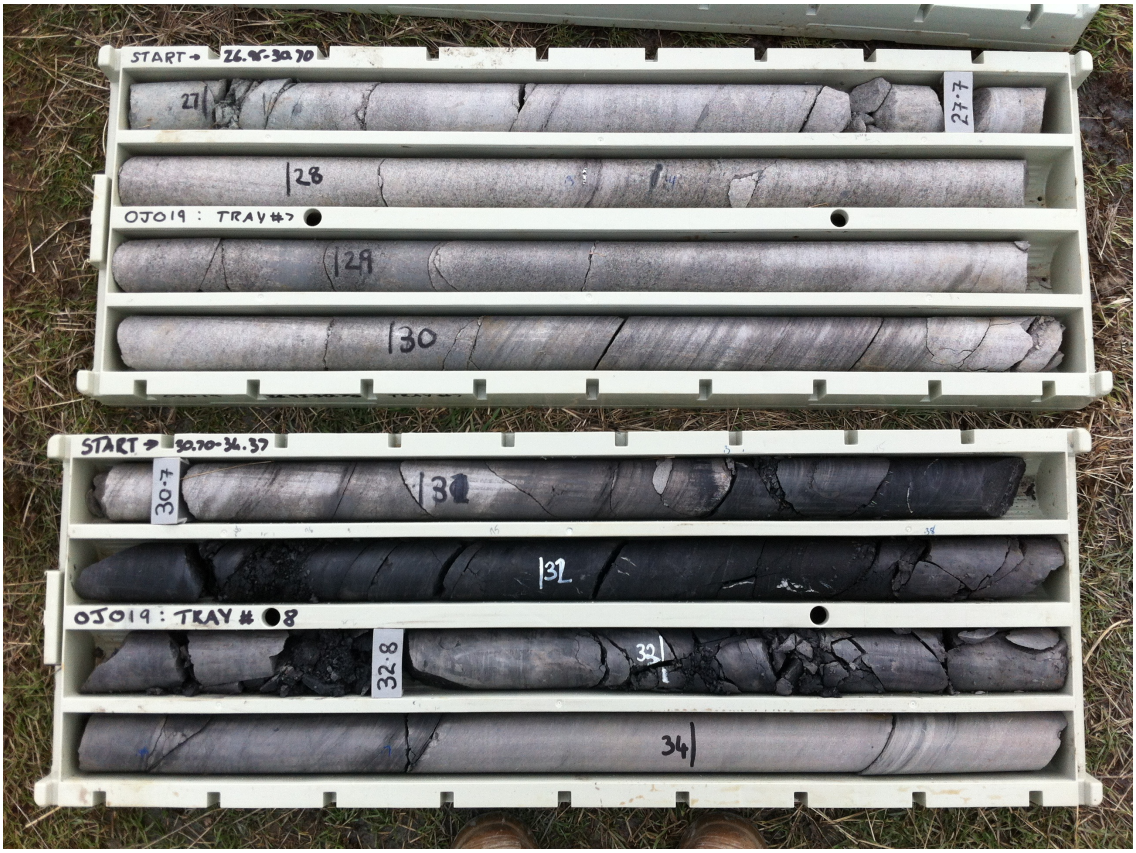
OJ019 RQD

m From	m To	Recovery	RQD	m From	m To	Recovery	RQD
0	1	0	0	31	32	100	
1	2	0	0	32	33	100	0
2	3	0	0	33	34	100	0
3	4	0	0	34	35	100	48
4	5	90	45	35	36	100	64
5	6	65	0	36	37	100	87
6	7	100	0	37	38	100	46
7	8	100	75	38	39	100	40
8	9	100	76	39	40	100	18
9	10	100	71	40	41	100	34
10	11	100	79	41	42	100	47
11	12	80	42	42	43	100	59
12	13	100	62	43	44	100	72
13	14	100	49	44	45	100	50
14	15	90	61	45	46	100	29
15	16	100	100	46	47	100	43
16	17	100	31	47	48	94	33
17	18	100	12	48	49	100	0
18	19	100	34	49	50	100	27
19	20	100	86	50	51	100	74
20	21	100	81	51	52	100	15
21	22	100	94	52	53	100	57
22	23	100	28	53	54	100	28
23	24	100	77	54	55	100	83
24	25	100	46	55	56	100	68
25	26	100	71	56	57	100	90
26	27	100	64	57	58	100	89
27	28	100	65	58	59	100	100
28	29	100	85	59	60	100	100
29	30	100	87	60	60.3	100	100
30	31	100	65	NB: Cutting Bit from 0-4.1m			


START→ 6.1-7.85
4.1
5.m
0.3m
OJO 19 : TRAY #1
6.0
7
8.2.85
START→ 7.85-11.62
8
9
7.6
OJO 19 : TRAY #2
10
11


START→ 11.62-15.48
0.2m
12.0
13
OJO 19 : TRAY # 3
14
14.2
0.1m
15
START→ 15.48-19.14
16
17.m
17.2
OJO 19 TRAY # 4
18.m
18.7


START → 19.14-23.04
20
21
OJO 19 : TRAY # 5
21.7
22
23
START → 23.04-26.95
24
24.7
25
OJO 19 TRAY # 6
26


START → 26.95-30.70
27
27.7
28
OJO19 : TRAY #7
29
30
START → 30.70-36.37
30.7
31
32
OJO19 : TRAY # 8
32.8
33
34


START → 34.57-38.28
35
35·2
36
OJ019 TRAY-9
37
38
38·2
START → 38.28-42.08
39
40
OJ019 TRAY-10
41
41·1
42


START 42.08-45.84
43m
OJ019 TRAY# 11
44
44·15
45
START 45.84-49.62
46
47
47·2
0.06
47·7
OJ019 TRAY# 12
48
48·7
49


START→ 49.62-53.32
50
51
51.2
OJO19 TRAY # 13
52
53
START→ 53.32-56.95
53.5
54
55
OJO19 TRAY #14
56
56.2


56
56.2
START→ 56.95-60.3
57
58
OJO19 TRAY #19
59
59.2
60
60.3
EOH

Appendix 14. OJ023 Lithology Log

Hole ID: **OJ023**

Collar:	Northing:	5306914	mN	Datum:	GDA	
	Easting:	524032	mE	Locating Method:	Survey	
	Elevation:	387	m	Accuracy:		mm
	Tenement:	EL25/2008 Melton Mowbray				
	Location:	Northumbria, Jericho				

Surveys:

Depth	Dip	Azimuth

Company: South East Asia Resources (Tasmania)

Depth: 43 m
Azimuth: n/a degrees
Dip -90 degrees

Drilling Method: Open Hole
Date Drilled: 4/07/13
Drilling Company: KMR Drilling

Site Geologist: Karen Adams (Claire Thomas)
Logging Geologist: Karen Adams

Sampled:

	m to		m	
	m to		m	
	m to		m	
	m to		m	

Results:

mFrom	mTo	Interval	Relative Density	Ash%	Total Sulphur	Calories Kcal/Kg	Moisture

Notes: Water at 16m
PVC lined to 43m

Drill Hole ID: OJ023

Project: Southern Midlands Coal
License: EL25/2008
Date Drilled: 4th July, 2013

Collar: Easting: 55 524 914
Northing: 5 306 914
Elevation: 387
(GDA - Survey)
Azimuth: n/a
Dip: -90 degrees

mFrom	mTo	Description
0	1	Brown-orange weathered mudstones and fine-grained sandstone
1	2	Orange-grey, fine to medium-grained sandstone
2	3	Orange-grey, fine-grained sandstone and mudstone
3	5	Light-brown mudstone and fine-grained sandstone
5	7	Light-brown to grey mudstone and fine-grained sandstone
7	8	Pale-grey to cream mudstone
8	10	Pale-grey fine to medium-grained sandstone
10	12	Pale-grey mudstone
12	13	Pale-grey to orange mudstone
13	14	Pale-grey fine-grained sandstone and mudstone
14	15	Grey mudsotne and fine-grained sandstone
15	16	Grey fine-grained sandstone and mudstone
16	17	Grey mudstone and minor fine-grained sandstone with minor pale orange pieces
17	18	Grey to dark-grey mudstone
18	20	Grey mudstone
20	21	Pale-grey, fine-grained sandstone and mudstone
21	23	Grey mudstone and minor pale-grey, fine-grained sandstone
23	24	Grey mudstone and some paler grey fine-grained sandstone
24	25	Grey mudstone and fine-grained sandstone
25	26	Grey fine-grained sandstone and mudstone
26	27	Pale-grey fine-grained sandstone and mudstone
27	28	Grey mudstone and some fine-grained sandstone
28	29	Pale-grey medium to fine-grained lithic sandstone, grey mudstone and minor to very minor carbonaceous mudstone
29	30	Pale-grey, fine to medium-grained lithic sandstone and some grey mudstone
30	31	Pale-grey to pale-orange-cream, fine-grained sandstone and some grey mudstone
31	32	Pale-grey to grey mudstone with some pink, altered mudstone
32	33	Pink, grey, pale-grey and pale-yellow-cream mudstone
33	34	Pale-grey and pink mudstone
34	35	Pale-brown, pink and minor grey mudstone
35	36	Pale-yellow-orange, grey and minor pink mudstone
36	37	Pale-yellow-orange, pink and minor dark grey mudstone
37	38	Orange-brown, pink, yellow and pale-grey mudstone
38	40	Pale-pink, pale-orange and pale grey mudstone and fine-grained sandstone
40	41	Pale-pink, pale-orange and pale grey mudstone
41	42	Pink-red, white-cream, pale-yellow and grey mudstone
42	43	Pink-red, grey, pale-green-yellow and white mudstone

Appendix 15. Oatlands – Jericho Areas, EL 25/2008 & EL 26/2008 Flora & Fauna Habitat Survey Report Summary.

OATLANDS – JERICHO AREAS, EL 25/2008 & EL 26/2008

FLORA & FAUNA HABITAT SURVEY

REPORT SUMMARY

A summary of the flora and fauna habitat survey of the proposed exploratory drill sites in the Jericho and Oatlands area undertaken for Ron Gregory Prospecting on the 29th May 2013 is as follows.

Tiger Coal/ Southeast Asia Resources (Tas) Pty Ltd are exploring for coal resources within their two exploration licences EL 25/2008 Melton Mowbray and EL 26/2008 Lake Tiberias.

The exploration targets are located over the properties "Ellesmere" in the Jericho area and "Northumbria" in the Jericho/Oatlands area, and "Strathburn" in the Oatlands area. All sites are located on faming properties typical of the midlands, which includes arable paddocks utilized for cropping, including irrigated crops, exotic pastures for mainly sheep but some cattle, remnant vegetation on some of the hills and infestations of gorse.

The following proposed drill sites and their immediate surrounds were surveyed.

SEARS A. "Strathburn" property Oatlands GRID REF: 524319E – 5315458N

SEARS B. "Strathburn" property Oatlands GRID REF: 523898E – 5313456N

SEARS C. Oatlands property GRID REF: 525520E – 5313554N

SEARS D. "Northumbria" property GRID REF: 522041E – 5311732N

SEARS E. "Northumbria" property GRID REF: 523818E – 5311193N

SEARS F." Northumbria" property Jericho GRID REF: 523936E – 5310111N

SEARS G. "Northumbria" property Jericho GRID REF: 526018E – 5309231N

SEARS H. "Ellesmere" Jericho GRID REF: 525411E – 5302564N

SEARS I. "Ellesmere" Jericho GRID REF: 524020E – 5306974N

SEARS-A: The proposed drill site is located on the "Strathburn" property in a relatively flat and low lying arable paddock on the flood plain of the Dulverton Rivulet which is located about 100 metres to the south-east of the site. Another smaller tributary, Petherton Creek is

located about 100 metres to the north-west. There is a small dam (waterhole) on Dulverton Rivulet nearby. The paddocks in the location are composed of exotic grasses with patches of *Juncus spp.* and would have been ploughed and cultivated in the past although not in recent years. The paddock and the site have been heavily grazed by sheep.

There was very limited potential for any threatened species or other remnant vegetation in the vicinity of the proposed drill site. Care will need to be taken to contain any run-off and drainage from the site to ensure there is no siltation or contamination of the nearby creeks.

SEARS-B: This site is also located on the "Strathburn" property about 2,000 metres south of Sears A in a broad valley with a very small creek-line and a number of small waterholes. The site is located on the western side of the valley and about 1,000 metres to the south-west of the hill known as Mt Anstey at 470 metres altitude. The vegetation in the location consists of exotic pasture although it does not appear to have been ploughed or cultivated in the past so there is some potential for native grasses to be present however they were not observable at this time of the year and the area has been heavily grazed by sheep.

There was a small outcrop of rocks adjacent to the site where a few plants of the small native saltbush *Einadia nutans* was observed although it too had been heavily grazed.

There was very limited potential for any species of threatened flora to be present in the location.

SEARS-C: This site is located about 1,800 metres to the east of SEARS-B and about 600 metres east south-east of Mt Anstey and is accessed from Bowhill Road. The site is also within a broad valley surrounded by undulating hills and with a minor creek-line and a number of small waterholes including one about 150 metres to the north-east. The location is an arable paddock with exotic grasses and has been well cultivated and grazed by sheep. There is little potential for any remnant vegetation or threatened species to be present.

SEARS-D: This site is located about 2,500 metres to the south-west of SEARS-B on the "Northumbria" property near the Jordan River which is located about 200 metres to the west. The site is located in exotic pasture next to a small dry creek-line which is infested with gorse. No remnant native vegetation was observed in the vicinity of the site however the adjacent hill and slopes to the north were covered in open Eucalypt forest although the understorey was totally infested with gorse. No remnant vegetation was evident in the vicinity of the proposed drill site and there was little potential for any threatened species to be present. Run-off and drainage from the drilling operation will need to be managed to ensure there is no impact on the adjacent creek and downstream to the nearby Jordan River.

SEARS-E: This site is located about 2,000 metres to the east south-east of SEARS-D on the "Northumbria" property north of Jericho. The site is within an arable paddock consisting of exotic grasses and agricultural weeds. A large dam was also adjacent to the site.

No remnant native vegetation was evident in the vicinity of the proposed drill site. Run-off and drainage will need to be managed to avoid siltation or contamination of the adjacent dam and associated creek-lines.

SEARS-F: This site is located about 1,000 metres to the south of SEARS-E on the "Northumbria" property and is also located in a paddock with exotic pasture and grazed by sheep and adjacent to cultivated and irrigated cropping paddocks. No remnant native vegetation was evident.

SEARS-G: This site is located about 2,200 metres to the east south-east of SEARS-F and is located on the headland of a very large paddock currently under the plough in preparation for an irrigated crop. A narrow shelter belt which extended along the adjacent boundary was fenced on both sides to exclude stock. The trees within the shelter belt were a mixture of conifers and native species and the ground layer appeared to be predominantly exotic grasses although there was some potential for remnant native grassland species to be present but were not observable at this time of the year.

No remnant native vegetation will be impacted by this drill site located on the paddock headland.

SEARS-H: This site is located on the "Ellesmere" property within an arable paddock adjacent to the Mud Walls Road, road B31, between the Midlands Highway and Cranbrook and about 5 kilometres south of the Midlands Highway junction. The paddock has been cultivated and now consists of exotic pasture grasses and grazed by sheep. No remnant vegetation was evident in the vicinity of the site.

SEARS-I: This site is located on the "Ellesmere" property near the junction of Old Mill Road and Ellesmere Road on the southern side of the Midlands Highway. It is also a paddock of exotic pasture grasses across a low lying valley floor which is being grazed by cattle. A small localised soak was observed within 20 metres of the proposed drill site which included some remnant *Juncus sp.* and *Poa labillardierei.* The soak had been impacted by cattle and no other remnant native species were evident although there is some potential for ephemeral species to appear under favourable conditions.

The drilling operation should keep clear this soak and to avoid run-off or siltation from the drill site.

VEGETATION COMMUNITIES:

None of the proposed drill sites were located within areas of remnant native vegetation.

THREATENED VEGETATION COMMUNITIES:

No vegetation community listed as threatened under the Tasmanian *Nature Conservation Act 2002* was present in the areas surveyed.

THREATENED FLORA:

No species of flora listed under the Tasmanian *Threatened Species Protection Act 1995* or the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* were observed in the vicinity of any of the proposed drill sites during the survey

The following species of threatened flora are recorded on the "Natural Values Atlas" database from within 2,000 metres of certain drill sites but were not observed during the field survey.

Austrostipa scabra subsp *falcata* Sickle Spear Grass, rare in Tasmania. Locations A & H.

Austrostipa nodosa Knotty Spear Grass, rare in Tasmania. Locations A & H.

Asperula scoparia subsp *scoparia* Prickly Woodruff, rare in Tasmania, Location H.

Arthropodium strictum Chocolate Lily. Rare in Tasmania. Location H.

Scleranthus fascicularis Spreading Knawell. Vulnerable in Tasmania. Locations A,B,D,H & E.

Glycine latrobeana Clover Glycine. Vulnerable in Tasmania and Nationally. Location H.

Ranunculus pumilio var. *pumilio* Ferny Buttercup. Rare in Tasmania. Location E.

THREATENED FAUNA: One species of threatened fauna was observed during the field survey.

- Three Wedge-tailed eagles were observed together in the vicinity of location SEARS-B. The birds were mainly on the wing and their behaviour was observed to be in foraging/hunting/territorial mode. There were no suitable nesting trees or vegetation suitable as breeding habitat observed in the vicinity. There is a known nest tree adjacent to the Jordan River and two north of Lake Tiberias, see note below.

No evidence of the presence of threatened species such as scats of Tasmanian Devils or Spotted-tailed Quolls, or soil scratching of Bandicoots were observed in the field.

The Spotted-tailed Quoll, Tasmanian Devil and the Eastern-barred Bandicoot have all been recorded on the NVA database in the past from the wider locality.

The following species of threatened fauna are recorded on the NVA database from the wider locality.

Tasmanian Devil, *Sarcophilus harrisii.* Endangered in Tasmania and nationally.

Spotted-tailed Quoll *Dasyurus maculatus* subsp *maculatus* Rare in Tasmania and vulnerable nationally.

Wedge-tailed Eagle *Aquila audax* subsp *fleayi* the Tasmanian subspecies is endangered in Tasmania and nationally.

There is a known nest tree near the Jordan River Nest ID No.947 about 3,300 metre north-west of SEARS-B. The last survey and confirmed use of the nest was in 2001.

There are also two nest trees in close proximity to each other about 4,000 metres north of Lake Tiberias. Nest Id. Nos 1076 and 1097 and were last surveyed in 2002.

Eastern-barred Bandicoot *Parameles gunnii* is relatively widespread in Tasmania but vulnerable nationally.

Tasmanian Azure Kingfisher *Alcedo azurea* subsp *diemenensis* The Tasmanian subspecies in endangered in Tasmania and nationally.

Swift Parrot *Lathamus discolour* is endangered in Tasmania and nationally.

Tussock Skink *Pseudomoia pagenstecheri* is vulnerable in Tasmania.

Ptunarra Brown Butterfly *Oreixenica ptunarra* subsp. *roonina* is vulnerable in Tasmania.

THREATENED FAUNA HABITAT: No specific habitat was observed during the field survey for any of the threatened species of fauna listed above.

ENVIRONMENTAL WEEDS: Gorse is widespread in the wider locality and was observed in close proximity only to one surveyed location, SEARS-D.

RECOMMENDATIONS:

- Manage and contain all drainage and run-off from drill sites in proximity to creek-lines, waterholes and dams to avoid siltation and risk of contamination.
  Locations SEARS-A,-B,-D,-E and - I.
- Site the drill hole clear of the localised soak at location SEARS-I.
- No threatened species of flora were observed and no specific action is required.
- No threatened vegetation communities were present in the target areas and no specific action is required.
- No threatened fauna or specific habitat for any of the threatened species of fauna known to be present in the wider area was observed during the survey and no specific action is required.
- Undertake the drilling of SEARS-D last in the program to ensure that soil-borne seed of gorse is not translocated to other clean sites.

Philip Milner

Vegetation Consultant

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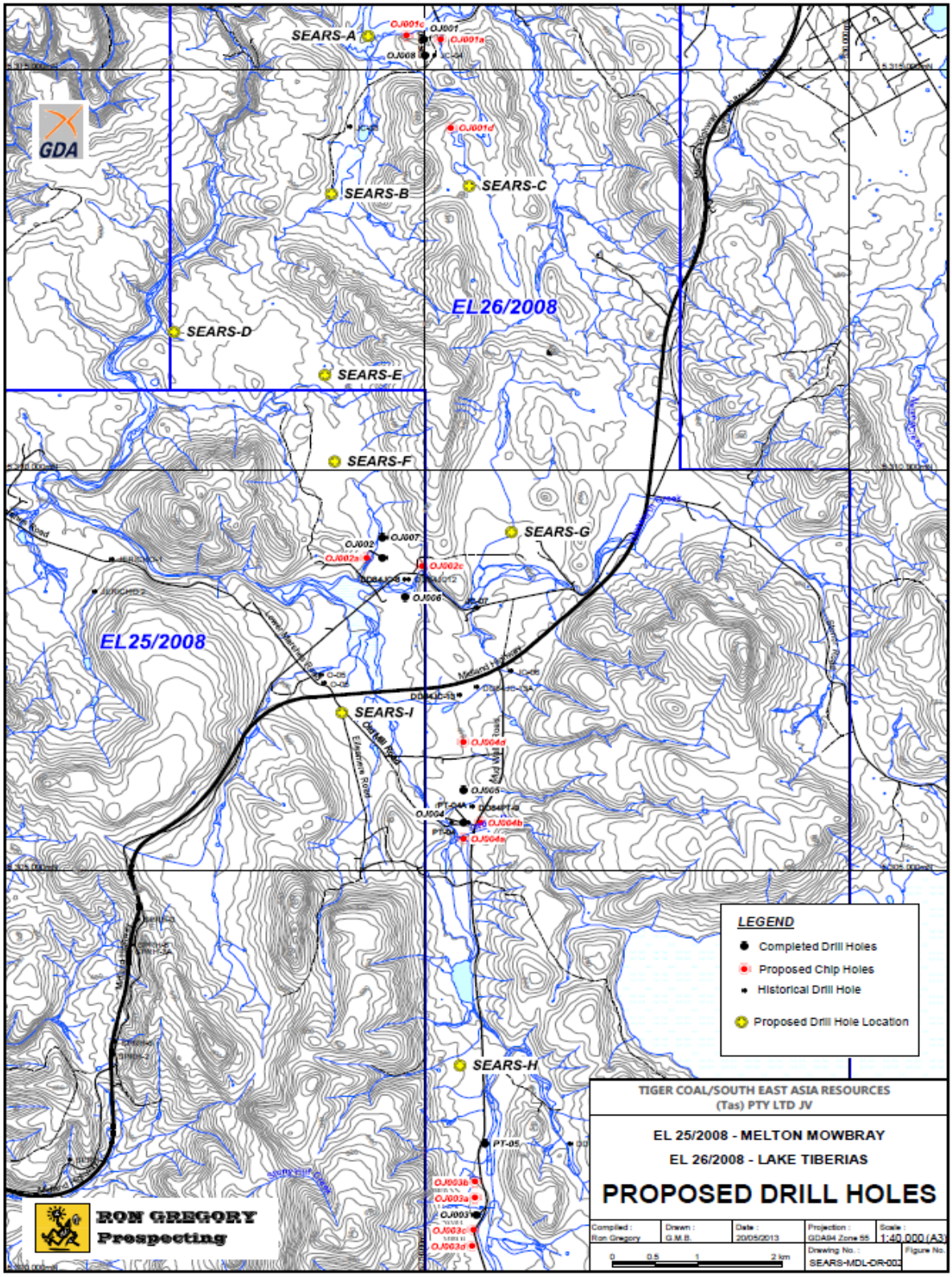

MAP No.1: EL 25/2008 & EL 26/2008
with Survey Sites marked in Yellow SEARS-A, -B, -C, -D, -E, -F, -G, -H, -I.