



---

**ANNUAL REPORT – HAMILTON EL 28/2008**

---

A large, light grey graphic element consisting of several curved, overlapping lines that sweep across the page from the bottom left towards the top right, partially overlapping the text.

**Annual Report**  
**Exploration Licence 28/2008**  
**200807 – 200906**  
**N. A. Cull**  
**20091130**

## **Abstract**

Spitfire Resources Limited has formed the view that exploration licence 28/2008 at Hamilton is prospective for coal. A key driver to this view is the Kimbolton Coal Mine which is situated central to the tenement. Spitfire's objective, at this stage, is to add value to the tenement by conducting further exploration via drilling and possibly extend the known resource boundaries.

To expedite this value-adding process Spitfire has taken the initial step of assigning a competent coal group with the task of more fully assessing the project. . Neil Fraser of from Newcastle-headquartered Marston International Pty Ltd has accepted this role.

Large volumes of data were supplied for review by Black Rock Energy Pty Ltd. This data has been examined by Marstons and an initial drill program has been proposed.

A preliminary model was created to investigate the project's economic merit.

## **Contents**

- 1. Introduction**
- 2. Review of Previous Work**
- 3. Exploration Completed During the Report Period**
- 4. Conclusions**
- 5. Environment**

## **Figures**

- Figure 1.** The geology of the Langloh Deposit
- Figure 2.** Plan View of Langloh showing Prospective Pit Areas

## **Tables**

- Table 1.** Preliminary Langloh Mineable Resource Estimates and Strip Ratios

## **Appendices**

- Appendix A.** Marston Contour Plans Outlining Seam Locations and Thicknesses
- Coal Quality Data Summary
- Digital Copy of Historical Drill Hole data
- GIS Plot Coordinates
- Appendix B.** Langloh Drilling Proposal

## 1. Introduction

Spitfire's objective at Hamilton is to gather more detail on the quality of the coal seams and to possibly extend the area of known coal seams by conducting diamond drilling. The historical drilling at Hamilton has defined a known area of coal seams and has provided some basic data on coal quality. It has become obvious upon discussions with prospective coal buyers that more detailed information about the coal quality is needed.

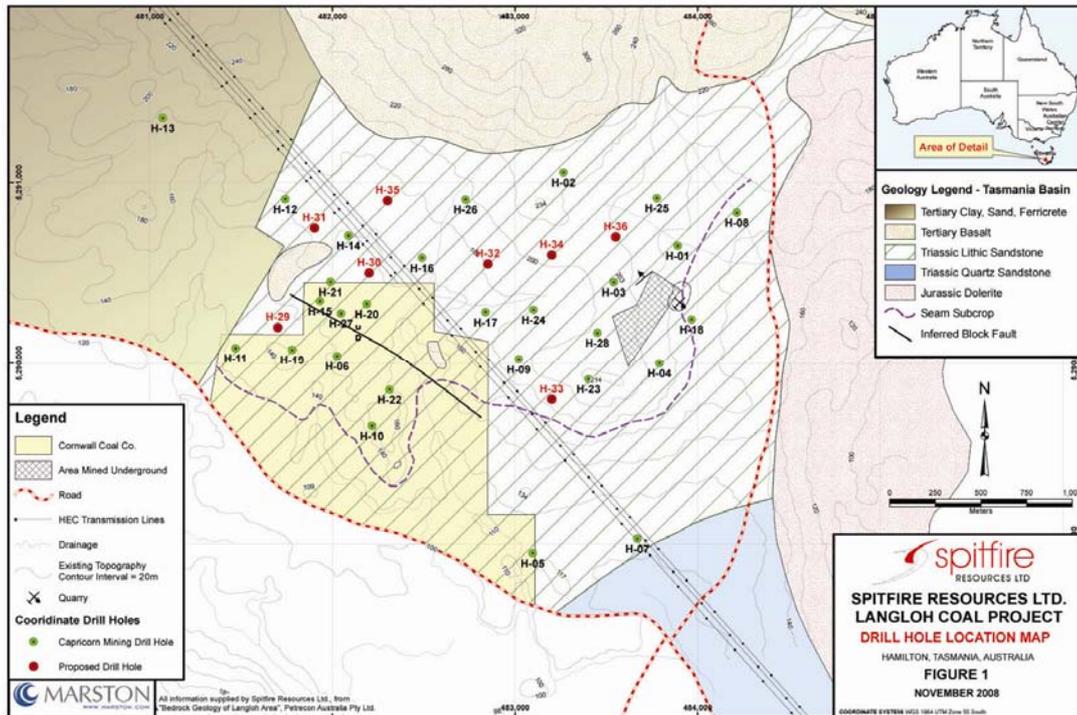
The coal-bearing ground in the Langloh coalfield is part of a dominantly lithic sandstone sequence interbedded with minor mudstone and coal seams. The sequence is of fluviatile origin and is part of the lithic sandstone sequence of the upper Parmeener Super-Group. Examination of the microflora from mudstone associated with the coal seams suggests that the sequence belongs to the *Craterisporites rotundas* zone and hence is Karnian in age (S.M Forsyth, pers. Comm.).

The lithic sandstone sequence is underlain by a quartzose sandstone sequence which is devoid of coal. The sandstones are confined to a wedge-shaped fault block, bounded on the west by a Tertiary graben and to the east and south by a Jurassic dolerite. The geology of the area is shown in Figure 1.

Jurassic dolerite has intruded the sandstone sequence and now forms a 'floor' to the fault block, as drill holes in the coal field have encountered dolerite at depth. The underlying dolerite sill which forms this 'floor' dips at 4° towards the west. Tertiary basalt flows cover the lithic sandstone sequence to the north and a basalt neck occurs on the western margin of the coalfield. This basalt neck or plug is related to a system of faults, the largest of which defines the eastern edge of the Tertiary graben (Morrison and Bacon, 1984).

This report refers to the tenement number EL28/2008 which is in the district of Hamilton, roughly halfway between the townships of Hamilton and Ouse. The current tenement holder is Black Rock Energy Pty Ltd, which is a subsidiary of Spitfire Resources Limited. Spitfire Resources Limited acquired the Hamilton tenement as part of a transaction whereby it purchased all the issued capital of Black Rock Energy Pty Ltd. Full details of this transaction were announced to the Australian Securities Exchange.

The reporting period for this licence report is July 1 2008 to June 30 2009.



**Figure 1. Geology of the Langloh Deposit Area with proposed drill hole locations. (Geology after K.C. Morrison)**

## 2. Review of Previous Work

A full scale data review was undertaken by Spitfire Resources’ personnel and Neil Fraser of Marston International Pty Ltd. This was to gain an understanding of the geology and to ascertain what the next logical step in the exploration process should be.

As part of the review, Marston produced a series of contour plans outlining seam locations and thicknesses. These can be found in Appendix A.

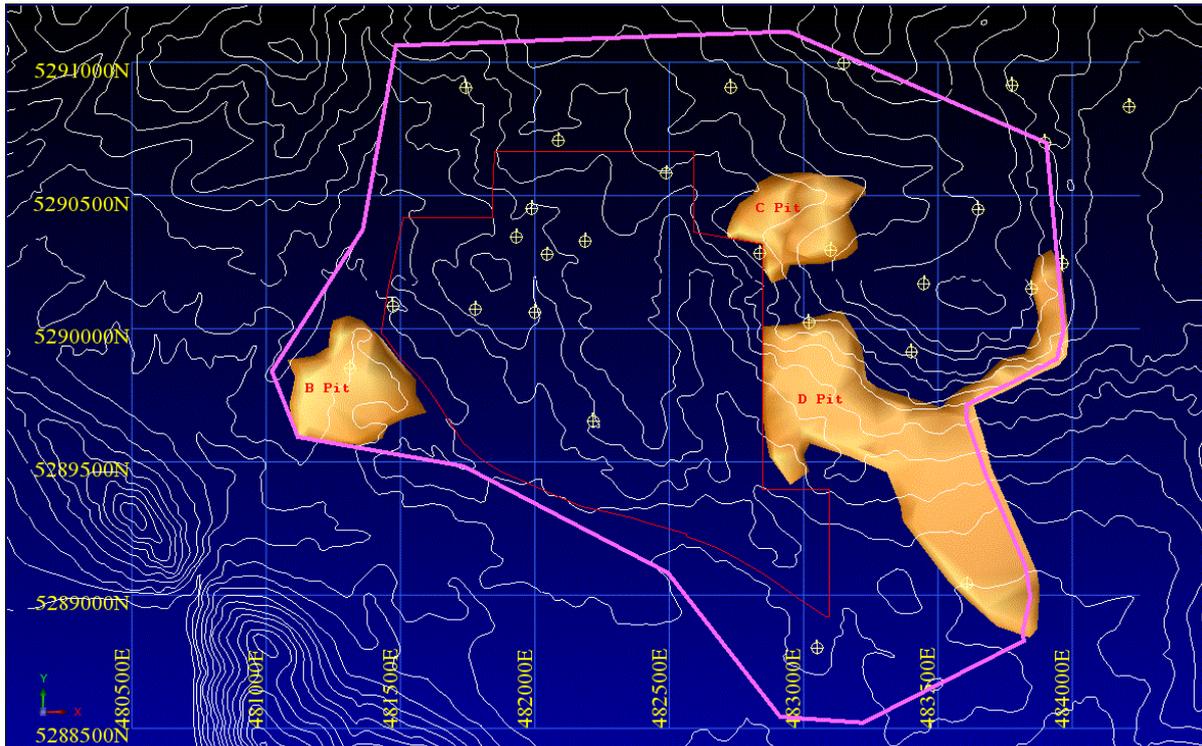
In addition, Marston produced a coal quality data summary that has been collated using all available data. All existing drill hole data has been digitised along with GIS plot coordinates. The digital data is located in Appendix A.

## 3. Exploration Completed During the Report Period

No on-ground exploration was undertaken during the report period.

A number of site visits were conducted during the period in which prospective international investors were shown the deposit area and associated infrastructure.

Spitfire personnel entered existing drill logs into an Access database which were subsequently viewed in Surpac Minex software. Wireframes were constructed to mimic coal seams and topography. Four pit shells were constructed over areas which had obvious low strip ratios, and estimates of mineable tonnages were made as a preliminary scoping study. A Plan View of the Langloh deposit area showing proposed pit areas is shown in Figure 2.



**Figure 2. Plan view of Langloh showing prospective pit areas. (“A” Pit is a subsection of “D” Pit). The red outline depicts the Kimbolton Coal Mine boundary, and the pink line defines the limit of modelled coal seams.**

A summary of these results is shown in Table 1. It should be mentioned that the tonnages and volumes stated below are not in accordance with the JORC Code. They were constructed purely to decide whether the project had merit and deserved further investigation prior to making substantial financial commitment.

**Preliminary Langloh Mineable Resource Estimates and Strip Ratios.**

		BCM	Tonnes	S/R
<b>A Pit</b>	Waste	3,318,438	7,964,250	
	Ore	507,500	710,500	4.67

		BCM	Tonnes	S/R
<b>D Pit</b>	Waste	8,098,750	19,437,000	
	Ore	1,027,500	1,398,250	5.79
<b>B Pit</b>	Waste	2,598,250	6,237,000	
	Ore	339,063	474,688	5.47
<b>C Pit</b>	Waste	3,229,375	7,750,500	
	Ore	322,500	451,500	7.15

<b>Overall Strip Ratio</b>	<b>5.99</b>
<b>Overall Tonnage</b>	<b>2,324,438</b>

<b>Overall Resource Total</b>	<b>12,796,438 t</b>
-------------------------------	---------------------

NB: S/R of 5.71:1 for 1.873Mt can be achieved if C Pit is omitted.

**Table 1. Summary of preliminary strip ratio estimates taken from proposed pits.**

A drilling proposal for the Langloh Deposit was received from Marston. This is shown in Appendix B. Proposed drill hole locations are shown on Figure 1.

#### **4. Conclusions**

Based upon preliminary investigations, the prospect of mining at Langloh appears to be a feasible notion. A number of issues need to be addressed to allow the process to move towards a scoping study. These are:

A far better understanding of the coal quality needs to be achieved. This can only be done by drilling a number of diamond drill holes into the deposit to collect quality samples.

A more detailed and thorough model needs to be created to allow for construction of a proposed mining schedule. A mining “corridor” should be included in this model to allow for the overhead high tension power lines that traverse the deposit.

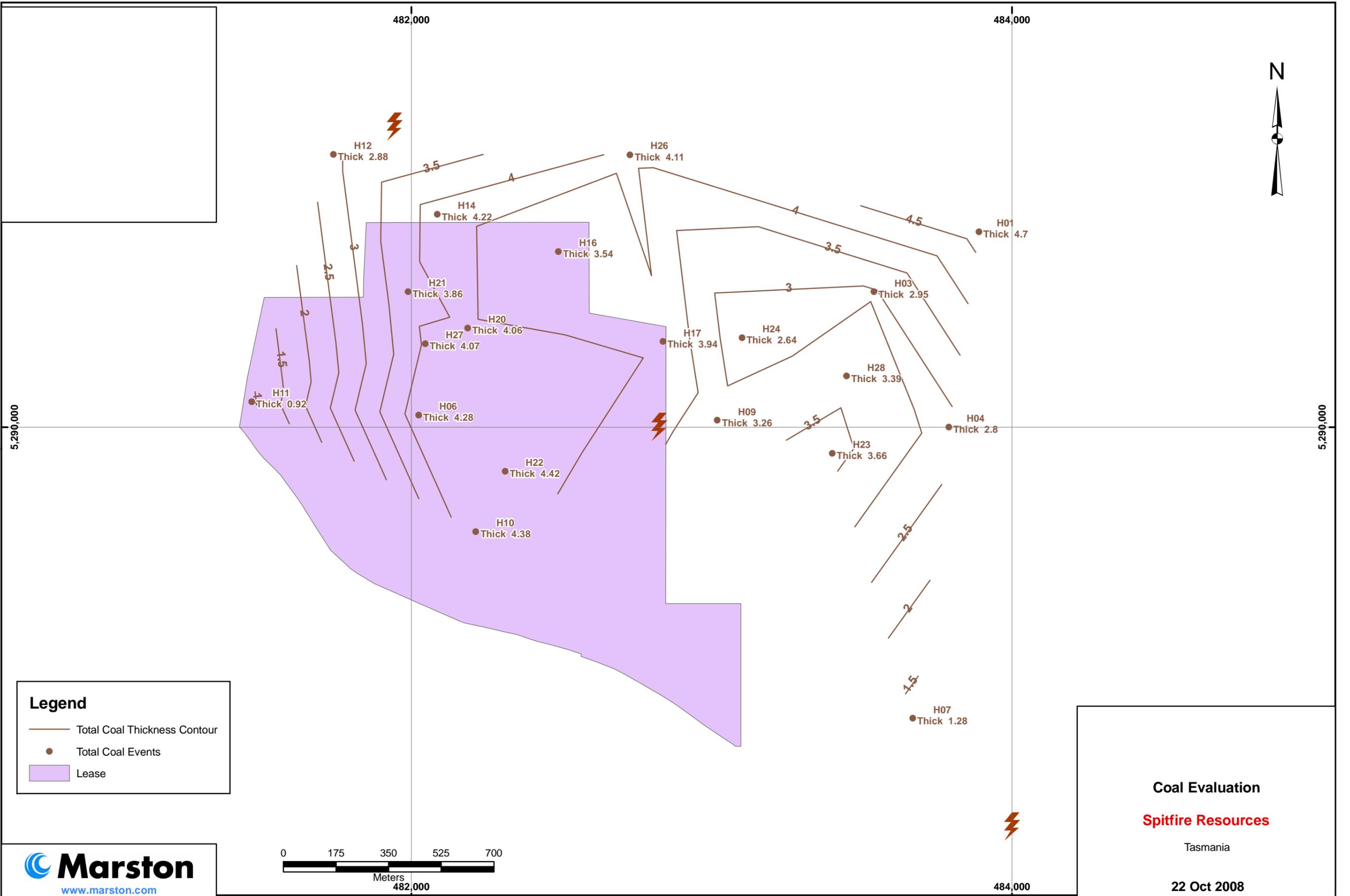
It would be advisable to drill outside the known deposit area in an effort to extend the area of known seams. A suggestion would be to drill a number of holes south-west of the highway.

A more detailed drill program proposal should be completed and submitted to the MRT for comment and approval.

## **5. Environment**

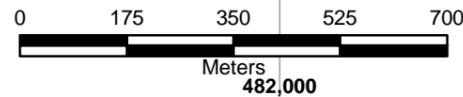
There were no surface-disturbing operations, surveys or rehabilitation activities during the period.

# Appendix A



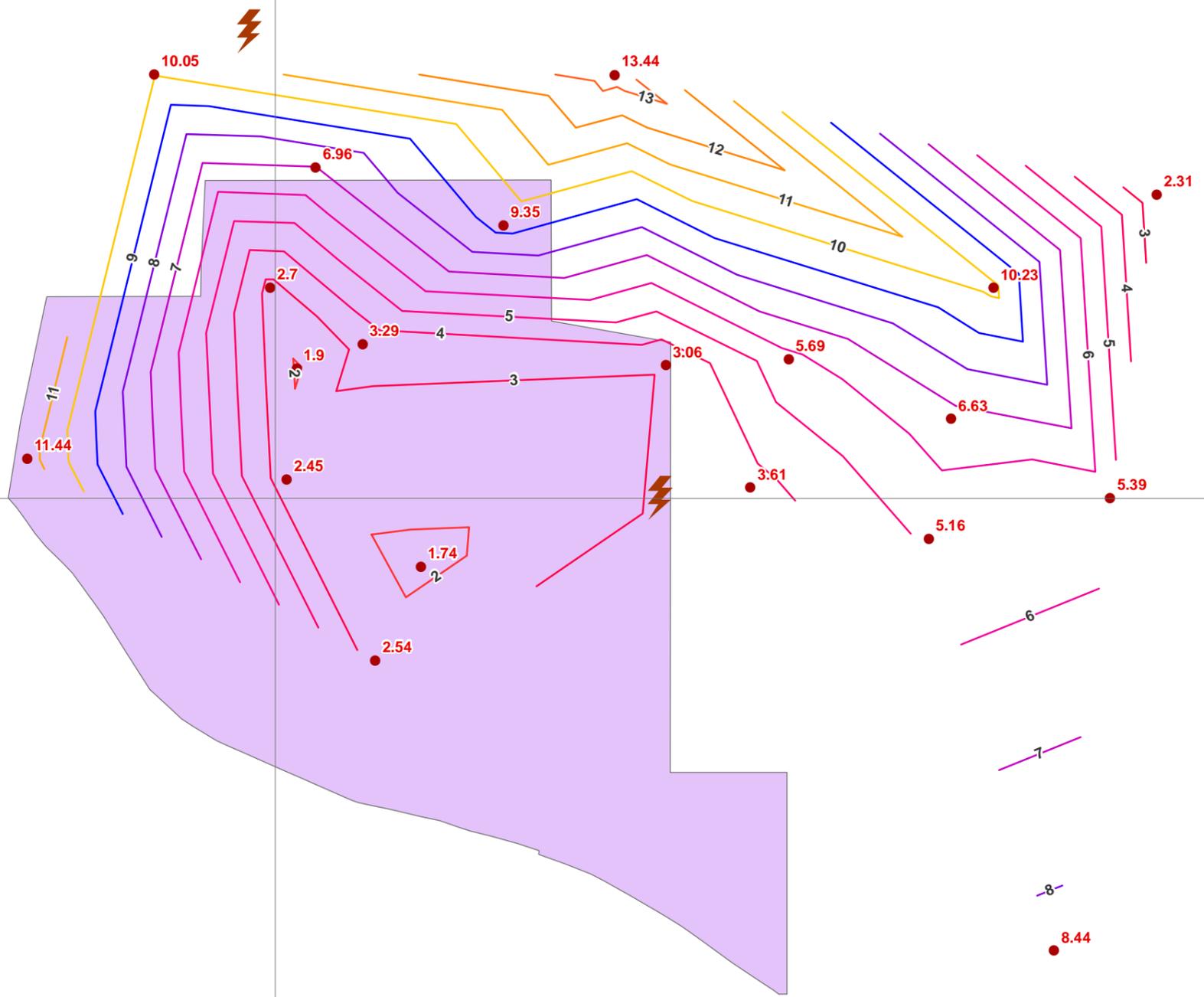
**Legend**

-  Total Coal Thickness Contour
-  Total Coal Events
-  Lease



482,000

484,000



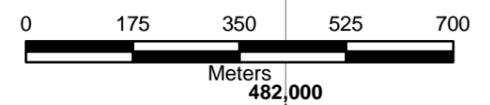
**Legend**  
Strip Ratio Contour  
ANNOTSTR

- 10
- 11
- 12
- 13
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- Strip Ratio Insitu Events
- Lease

5,290,000

5,290,000

File Location

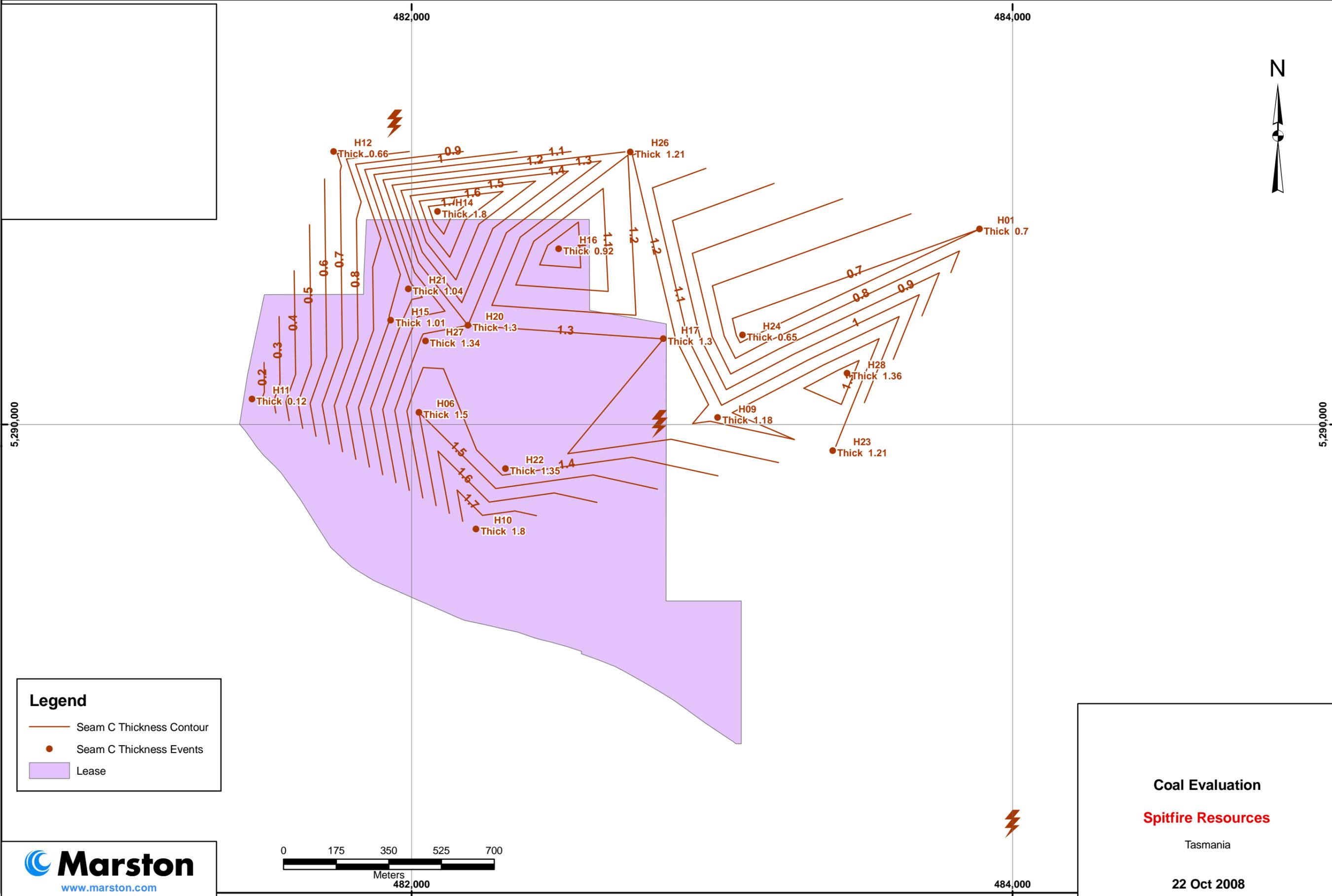


484,000

**Coal Evaluation**  
**Spitfire Resources**

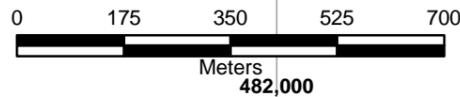
Tasmania

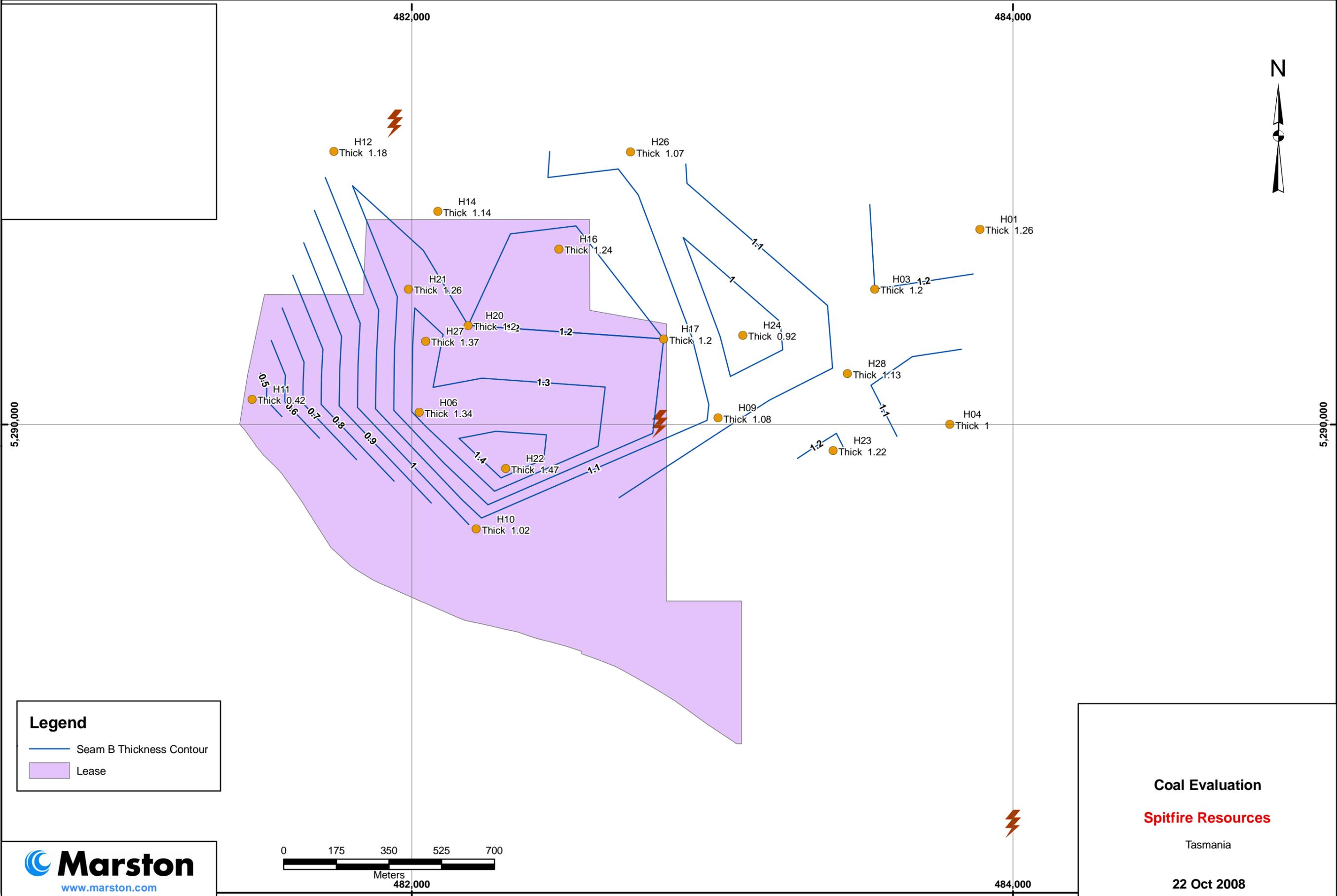
22 Oct 2008



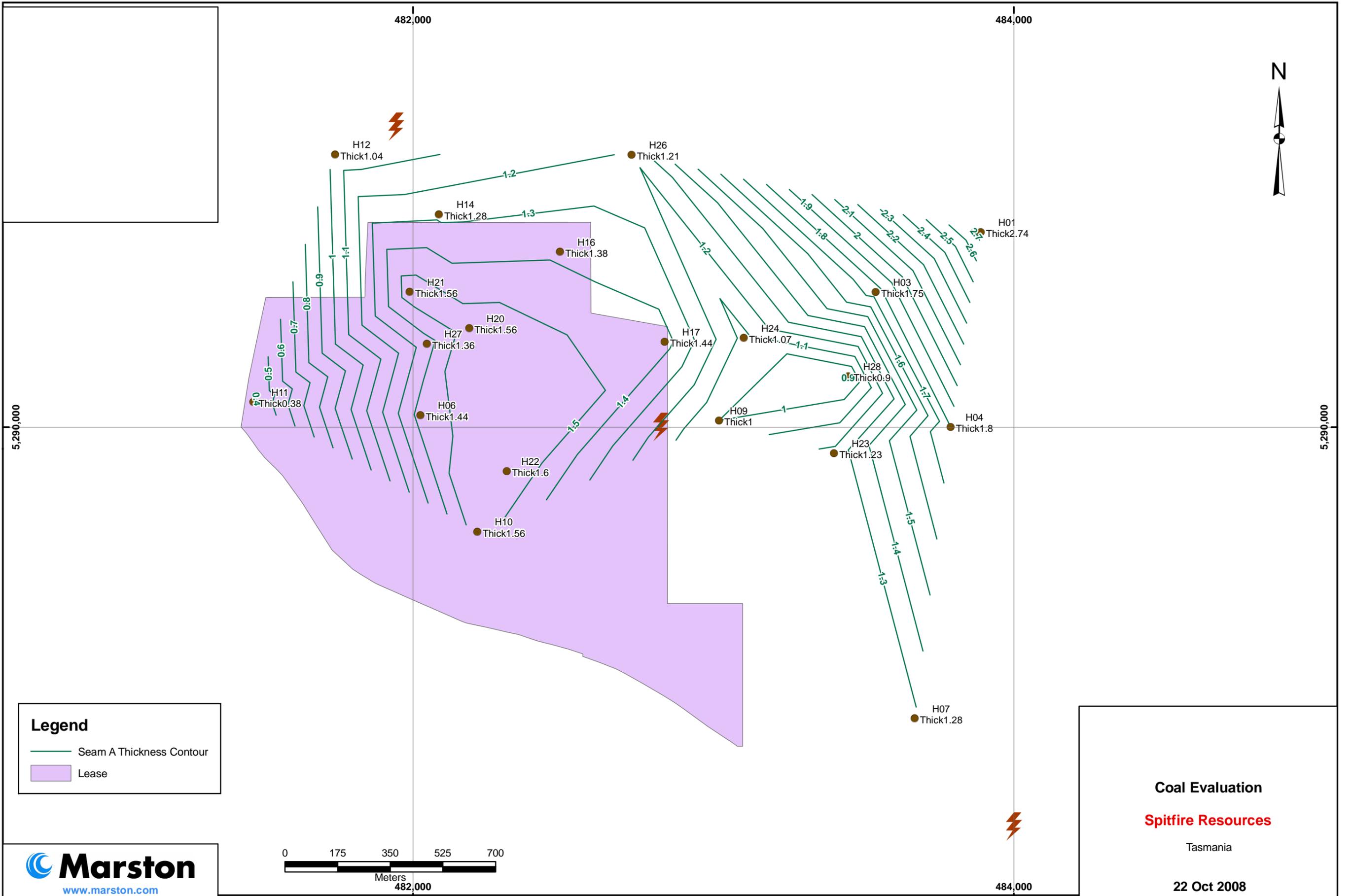
**Legend**

-  Seam C Thickness Contour
-  Seam C Thickness Events
-  Lease





File Location

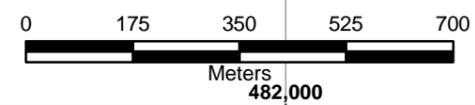


File Location

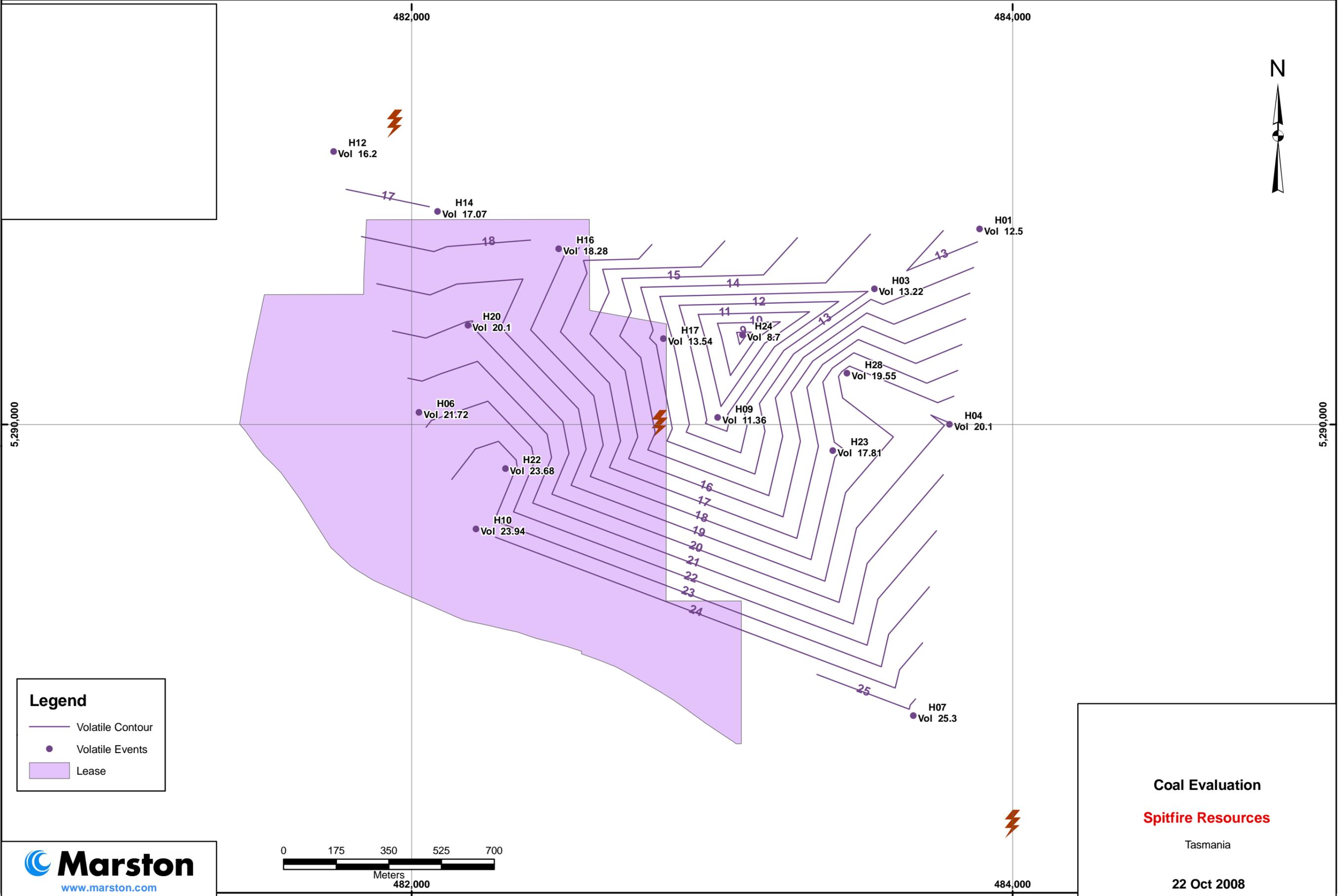
**Legend**

- Seam A Thickness Contour
- Lease

**Marston**  
www.marston.com



**Coal Evaluation**  
**Spitfire Resources**  
Tasmania  
22 Oct 208



File Location

## Langloh Project

Capricorn Mining: April 1981– Oct 1981, scout drilling programme  
Drill holes H01 – H08  
Data: survey, geology logs, proximate, RD

West Hill – box cut & bulk sample, May 1984, 60 t, combustion testing

### **Cadburys Test Firing** - Claremont

2 tonnes, min 7 mm, max 30 mm (ROM)

RD 1.54  
Moist 3.92 %  
Ash 12.36 %  
VM 21.29 %  
SE 23.36 MJ/kg, 5,555 kcal/kg  
TS 0.30 %

Comments – Ignited well, complete combustion, no clinkering

### **APPM test firing** – Burnie

30 t, min 3 mm, max 25 mm (ROM)

Proximate Analysis

Moist 4.8 %  
Ash 2.0 %  
VM 24.5 %  
FC 50.4 %  
TS 0.3 %  
Cl 0.02 %  
P 0.003 %  
SE 23.6% MJ/kg, 5,637 kcal/kg  
AFT 1,310 °C (deformation)

Ultimate Analysis

Carbon 80.4 %  
Hydrogen 4.45 %  
Nitrogen 1.50 %  
Sulphur 0.4 %  
Oxygen 13.25 %

Ash Analysis		
	SiO <sub>2</sub>	54.1 %
	Al <sub>2</sub> O <sub>3</sub>	25.3 %
	Fe <sub>2</sub> O <sub>3</sub>	4.81 %
	CaO	8.79 %
	MgO	1.4 %
	TiO <sub>2</sub>	1.01 %
	Na <sub>2</sub> O	0.18 %
	K <sub>2</sub> O	0.53 %
	P <sub>2</sub> O <sub>5</sub>	0.03 %
	Mn <sub>3</sub> O <sub>4</sub>	0.19 %
	SO <sub>3</sub>	2.90 %

Comments – Ignited easily, good burnout, slight clinkering, very dusty

## Preliminary Data Analysis

### Coal Quality

Moisture	Range	1.7 % - 9.6 % (ad)
	Average	4.6 % (ad)
Ash	Range	13.3% - 55.7 % (ad)
	Average	27 % (ad)
Calorific Value	Range	4,289 - 6,389 kcal/kg (ad)
	Average	5,583 kcal/kg (ad)

Regression Analysis 12 % ash @ 6,560 kcal/kg  
15 % ash @ 6,312 kcal/kg  
18 % ash @ 6,063 kcal/kg

Total Sulphur	Range	0.19 % – 0.43 % (ad)
	Average	0.31 % (ad)

Volatile Matter	Range	3.4 % - 29.3% (ad)
	Average	19.1 % (ad)

Float Sink - Seam Composites	Seam A	Seam B	Seam C	
	12 % Ash	< 50 %	57 %	41 %
	15 % Ash	42 %	79 %	67 %
	18 % Ash	64 %	91 %	87 %

### Australian Export Coal Brands

(adb)	CV kcal/kg	IM %	Ash %	VM %	FC %	TS %
Average	6834	2.6	13.9	31.4	52.9	0.59
Minimum	6100	1.0	8.5	15.0	39.5	0.27
Maximum	7250	7.5	24.0	50.0	71.0	2.10

Hole No.	From	To	Thick	Seam	Total Coal	Total OB	Insitu SR	Source	
H01	13.66	16.40	2.74	A	4.70	15.74	2.31	Geophysics	Seam A may need to be split
H01	17.70	18.96	1.26	B					
H01	19.74	20.44	0.70	C					
H03	42.00	43.75	1.75	A	2.95	43.75	10.23	Geophysics	Poor quality log
H03	45.50	46.70	1.20	B					
H04	21.00	22.80	1.80	A	2.80	21.90	5.39	Geophysics	Poor qual. Log. Correlation uncertain
H04	23.70	24.70	1.00	B					No Seam C?
H05	60.14	60.89	0.75	A	0.75	60.14	55.30		
H06	12.70	14.14	1.44	A	4.28	15.22	2.45	Geophysics	
H06	14.62	15.96	1.34	B					
H06	18.00	19.50	1.50	C					
H07	15.66	16.94	1.28	A	1.28	15.66	8.44	Geology	
H09	15.08	16.08	1.00	A	3.26	17.06	3.61	Geophysics	
H09	16.22	17.30	1.08	B					
H09	19.14	20.32	1.18	C					
H10	13.22	14.78	1.56	A	4.38	16.10	2.54	Geophysics	
H10	15.34	16.36	1.02	B					
H10	18.68	20.48	1.80	C					
H11	10.84	11.22	0.38	A	0.92	15.26	11.44	Geophysics	Seam correlations uncertain
H11	13.50	13.92	0.42	B					
H11	16.06	16.18	0.12	C					
H12	26.80	27.84	1.04	A	2.88	41.98	10.05	Geophysics	Seam correlation uncertain
H12	42.44	43.62	1.18	B					
H12	44.20	44.86	0.66	C					
H14	39.04	40.32	1.28	A	4.22	42.58	6.96	Geophysics	

H14	42.22	43.36	1.14	B				
H14	45.00	46.80	1.80	C				
H15	8.70	9.71	1.01	C	1.01	8.70	5.94	Geology
H16	45.82	47.20	1.38	A	3.54	47.98	9.35	Geophysics
H16	47.48	48.72	1.24	B				
H16	50.60	51.52	0.92	C				Base of Seam C est.from lith. Logs
H17	15.40	16.84	1.44	A	3.94	17.46	3.06	Geophysics
H17	16.96	18.16	1.20	B				
H17	20.10	21.40	1.30	C				
H19	42.08	42.36	0.28	A	0.85	46.53	37.75	
H19	45.12	45.49	0.37	B				
H19	47.18	47.38	0.20	C				
H20	16.92	18.48	1.56	A	4.06	19.37	3.29	Geology
H20	18.99	20.19	1.20	B				
H20	22.13	23.43	1.30	C				
H21	13.33	14.89	1.56	A	3.86	15.13	2.70	Geology
H21	15.56	16.82	1.26	B				
H21	17.95	18.99	1.04	C				
H22	8.96	10.56	1.60	A	4.42	11.14	1.74	Geology
H22	10.90	12.37	1.47	B				
H22	14.21	15.56	1.35	C				
H23	26.69	27.92	1.23	A	3.66	27.37	5.16	Geology
H23	28.06	29.28	1.22	B				
H23	29.82	31.03	1.21	C				
H24	19.20	20.27	1.07	A	2.64	21.77	5.69	Geology
H24	20.44	21.36	0.92	B				
H24	23.76	24.41	0.65	C				

H26	75.60	76.81	1.21	A	4.11	80.09	13.44	Geology
H26	77.55	78.62	1.07	B				
H26	80.82	82.03	1.21	C				
H26	83.58	84.20	0.62	D				
H27	9.04	10.40	1.36	A	4.07	11.19	1.90	Geology
H27	10.99	12.36	1.37	B				
H27	13.92	15.26	1.34	C				
H28	31.90	32.80	0.90	A	3.39	32.61	6.63	Geology
H28	32.85	33.98	1.13	B				
H28	34.64	36.00	1.36	C				

Hole	Easting	Northing	RL	Depth	Open Hole	Core	Date		
H01	484550	5290550	150.00	44.40	2.80	41.60	29/4/81-30/4/81	Checked	Varies from Spitfire Collar file
H02	483360	5290740	150.00	78.40	48.00	30.40	3/5/81-5/5/81	Checked	Varies from Spitfire Collar file
H03	483860	5290410	150.00	84.44	3.00	81.44	6/5/81-8/5/81	Checked	Varies from Spitfire Collar file
H04	483950	5290060	150.00	45.10	21.28	23.82	12/5/81-13/5/81	Checked	Varies from Spitfire Collar file
H05	482820	5289170	150.00	135.47	3.70	131.77	29/5/81-2/6/81	Checked	Varies from Spitfire Collar file
H06	482000	5290060	150.00	157.06			17/4/81-26/5/81	Checked	
H07	483610	5289040	150.00	86.00	53.80	32.20	14/5/81-16/5/81	Checked	
H08	484214	5290833	165.48	20.95				AMG Co-ords	Dolerite intrusion - no coal
H09	483019	5290022	191.93	30.05				AMG Co-ords	
H10	482215	5289652	145.92	27.00				AMG Co-ords	
H11	481469	5290084	124.48	27.00				AMG Co-ords	
H12	481741	5290908	156.17	69.00				AMG Co-ords	
H13				19.00				Not surveyed	Did not reach bedrock - no coal
H14	482087	5290708	157.96	57.39				AMG Co-ords	
H15	481931	5290346	144.89	28.80				AMG Co-ords	
H16	482490	5290584	168.40	57.45				AMG Co-ords	
H17	482838	5290284	166.40	26.10				AMG Co-ords	
H18	483967	5290244	165.18	21.00				AMG Co-ords	
H19	481777.9	5290073	138.80	60.00				Revised Co-ords	
H20	482187.7	5290330	151.42	30.00				Revised Co-ords	
H21	481989.7	5290451	150.90	27.00				Revised Co-ords	
H22	482312.5	5289853	139.12	20.90				Revised Co-ords	
H23	483401.7	5289913	210.36	36.00				Revised Co-ords	
H24	483101.2	5290297	180.34	27.00				Revised Co-ords	
H25	483775.8	5290914	195.38	45.00				Revised Co-ords	
H26	482728.7	5290907	192.30	89.00				Revised Co-ords	
H27	482046.4	5290278	141.73	25.00				Revised Co-ords	
H28	483449.5	5290169	200.11	39.00				Revised Co-ords	

## Lith\_All

Hole	From	To	Lithology	Seam
H01	0.00	0.80	Alluvium	
H01	0.80	1.40	Clay	
H01	1.40	2.80	Sandstone	
H01	2.80	5.70	Arkosic Sandstone	
H01	5.70	5.80	Coreloss	
H01	5.80	7.60	Arkosic Sandstone	
H01	7.60	8.32	Sandstone	
H01	8.32	8.65	Sandstone	
H01	8.65	8.80	Coreloss	
H01	8.80	9.88	Sandstone	
H01	9.88	10.18	Coreloss	
H01	10.18	10.70	Sandstone	
H01	10.70	10.93	Coreloss	
H01	10.93	11.80	Mudstone	
H01	11.80	13.92	Siltstone	
H01	13.92	14.48	0.56 Coal	A
H01	14.48	14.52	0.04 Clod	A
H01	14.52	14.69	0.17 Coal	A
H01	14.69	14.80	0.11 Coreloss	A
H01	14.80	15.07	0.27 Coal	A
H01	15.07	15.11	0.04 Carbonaceous Mudston	A
H01	15.11	15.43	0.32 Coal	A
H01	15.43	15.61	0.18 Mudstone	A
H01	15.61	16.23	0.62 Coal	A
H01	16.23	17.57	1.34 Mudstone	
H01	17.57	17.64	0.07 Coal	B
H01	17.64	17.80	0.16 Coreloss	B
H01	17.80	18.94	1.14 Coal	B
H01	18.94	19.63	0.69 Mudstone	
H01	19.63	19.85	0.22 Coal	C
H01	19.85	19.87	0.02 Clod	C
H01	19.87	20.14	0.27 Coal	C
H01	20.14	20.16	0.02 Carbonaceous Mudston	C
H01	20.16	20.29	0.13 Coal	C
H01	20.29	20.76	Mudstone	
H01	20.76	20.80	Coreloss	
H01	20.80	23.97	Mudstone	
H01	23.97	26.83	Sandstone	
H01	26.83	32.44	Sandstone	
H01	32.44	32.88	Carbonaceous Mudstone	
H01	32.88	33.16	Mudstone	
H01	33.16	34.30	Siltstone	
H01	34.30	34.39	Carbonaceous Mudstone	
H01	34.39	35.51	1.12 Coal	
H01	35.51	35.88	Mudstone	
H01	35.88	38.88	Sandstone	
H01	38.88	40.18	Sandstone	
H01	40.18	40.95	Tuffaceous Sandstone	
H01	40.95	42.66	Tuffaceous Sandstone	
H01	42.66	44.28	Meta calc silicate	
H01	44.28	44.40	Tuffaceous Sandstone	
H02	0.00	1.00	Soil	
H02	1.00	10.50	Sandstone	
H02	10.50	11.00	Sandstone	
H02	11.00	12.00	Sandstone	

Lith\_All

H02	12.00	15.00	Mudstone	
H02	15.00	17.00	Mudstone	
H02	17.00	20.00	Sandstone	
H02	20.00	27.00	Sandstone	
H02	27.00	33.30	Sandstone	
H02	33.30	38.30	Sandstone	
H02	38.30	47.90	Sandstone	
H02	47.90	48.00	Carbonaceous Mudstone	
H02	48.00	50.80	Sandstone	
H02	50.80	50.88	Carbonaceous Mudstone	
H02	50.88	51.98	Sandstone	
H02	51.98	52.32	Sandy siltstone	
H02	52.32	52.75	Mudstone	
H02	52.75	53.88	Sandstone	
H02	53.88	54.01	Mudstone	
H02	54.01	57.08	Sandstone	
H02	57.08	63.18	Sandstone	
H02	63.18	66.28	Sandstone	
H02	66.28	69.35	Sandstone	
H02	69.35	72.35	Sandstone	
H02	72.35	75.40	Sandstone	
H02	75.40	78.00	Sandstone	
H02	78.00	78.40	Coreloss	
H03	0.00	1.00	Soil	
H03	1.00	3.00	Sandstone	
H03	3.00	5.95	Sandstone	
H03	5.95	6.00	Coreloss	
H03	6.00	8.76	Sandstone	
H03	8.76	9.00	Coreloss	
H03	9.00	15.00	Sandstone	
H03	15.00	20.63	Sandstone	
H03	20.63	21.11	Sandstone	
H03	21.11	24.11	Sandstone	
H03	24.11	27.15	Sandstone	
H03	27.15	30.15	Sandstone	
H03	30.15	33.21	Sandstone	
H03	33.21	36.21	Sandstone	
H03	36.21	39.26	Sandstone	
H03	39.26	39.46	Sandstone	
H03	39.46	39.53	Carbonaceous Mudstone	
H03	39.53	42.20	Sandstone	
H03	42.20	42.26	Coreloss	
H03	42.26	42.31	Carbonaceous Mudstone	
H03	42.31	42.49	0.18 Coal	A
H03	42.49	42.51	0.02 Carbonaceous Mudston	A
H03	42.51	42.98	0.47 Coal	A
H03	42.98	43.02	0.04 Carbonaceous Mudston	A
H03	43.02	43.32	0.30 Coal	A
H03	43.32	43.33	0.01 Carbonaceous Mudston	A
H03	43.33	44.19	0.86 Coal	A
H03	44.19	45.19	1.00 Mudstone	
H03	45.19	45.26	0.07 Coreloss	
H03	45.26	45.81	0.55 Mudstone	
H03	45.81	46.20	0.39 Coal	B
H03	46.20	46.24	0.04 Clod	B
H03	46.24	47.05	0.81 Coal	B

Lith\_All

H03	47.05	47.11	Mudstone
H03	47.11	48.26	Mudstone
H03	48.26	51.32	Mudstone
H03	51.32	52.36	Mudstone
H03	52.36	54.16	Sandstone
H03	54.16	54.32	Mudstone
H03	54.32	58.01	Sandstone
H03	58.01	58.33	Mudstone
H03	58.33	60.37	Sandstone
H03	60.37	63.33	Sandstone
H03	63.33	63.37	Coreloss
H03	63.37	63.93	Sandstone
H03	63.93	63.98	Carbonaceous Mudstone
H03	63.98	64.03	Siltstone
H03	64.03	65.37	Mudstone
H03	65.37	65.47	Sandstone
H03	65.47	65.75	Mudstone
H03	65.75	66.62	Mudstone
H03	66.62	68.05	Silty Sandstone
H03	68.05	68.08	Carbonaceous Mudstone
H03	68.08	68.40	0.32 Coal
H03	68.40	68.45	0.05 Carbonaceous Mudstone
H03	68.45	68.47	0.02 Coal
H03	68.47	68.57	Carbonaceous Mudstone
H03	68.57	68.82	Mudstone
H03	68.82	69.02	Sandstone
H03	69.02	69.37	Mudstone
H03	69.37	72.23	Sandstone
H03	72.23	75.35	Sandstone
H03	75.35	78.40	Sandstone
H03	78.40	81.40	Sandstone
H03	81.40	81.44	Tuffaceous Sandstone
H04	0.00	1.00	Soil
H04	1.00	3.00	Sandstone
H04	3.00	17.80	Sandstone
H04	17.80	21.15	Mudstone
H04	21.15	21.28	Carbonaceous Mudstone
H04	21.28	21.46	0.18 Coal A
H04	21.46	21.49	0.03 Mudstone A
H04	21.49	21.82	0.33 Coal A
H04	21.82	21.84	0.02 Carbonaceous Mudston A
H04	21.84	22.98	1.14 Coal A
H04	22.98	23.03	0.05 Mudstone A
H04	23.03	23.53	0.50 Coal A
H04	23.53	23.96	0.43 Coreloss
H04	23.96	24.16	0.20 Coal B
H04	24.16	24.18	0.02 Carbonaceous Mudston B
H04	24.18	24.53	0.35 Coal B
H04	24.53	26.58	Mudstone
H04	26.58	26.85	Sandstone
H04	26.85	26.96	Coreloss
H04	26.96	27.26	Sandstone
H04	27.26	27.80	Mudstone
H04	27.80	29.95	Sandstone
H04	29.95	32.95	Sandstone
H04	32.95	36.04	Sandstone

Lith\_All

H04	36.04	39.04	Sandstone	
H04	39.04	42.04	Sandstone	
H04	42.04	45.10	Sandstone	
H05	0.00	1.00	Soil	
H05	1.00	3.70	Sandstone	
H05	3.70	5.00	Coreloss	
H05	5.00	6.00	Sandstone	
H05	6.00	8.45	Mudstone	
H05	8.45	9.00	Coreloss	
H05	9.00	12.00	Mudstone	
H05	12.00	14.03	Sandstone	
H05	14.03	15.00	Coreloss	
H05	15.00	18.00	Sandstone	
H05	18.00	19.85	Sandstone	
H05	19.85	21.00	Coreloss	
H05	21.00	23.90	Sandstone	
H05	23.90	24.00	Coreloss	
H05	24.00	27.00	Sandstone	
H05	27.00	30.62	Sandstone	
H05	30.62	30.70	Mudstone	
H05	30.70	30.77	Carbonaceous Mudstone	
H05	30.77	30.89	Mudstone	
H05	30.89	31.04	Sandstone	
H05	31.04	31.80	Mudstone	
H05	31.80	32.09	Coreloss	
H05	32.09	33.34	Mudstone	
H05	33.34	33.54	Siltstone	
H05	33.54	34.98	Mudstone	
H05	34.98	35.49	Sandstone	
H05	35.49	36.04	Mudstone	
H05	36.04	39.04	Mudstone	
H05	39.04	42.05	Mudstone	
H05	42.05	42.10	0.05 Coal	
H05	42.10	43.36	Mudstone	
H05	43.36	43.53	Carbonaceous Mudstone	
H05	43.53	45.10	Mudstone	
H05	45.10	47.30	Mudstone	
H05	47.30	47.80	Sandy siltstone	
H05	47.80	48.10	Coreloss	
H05	48.10	48.60	sandstone	
H05	48.60	49.08	Carbonaceous Mudstone	
H05	49.08	49.21	0.13 Coal	
H05	49.21	54.14	Mudstone	
H05	54.14	55.74	Mudstone	
H05	55.74	57.14	Sandy siltstone	
H05	57.14	59.96	Sandy siltstone	
H05	59.96	60.05	Mudstone	
H05	60.05	60.14	Carbonaceous Mudstone	
H05	60.14	60.89	0.75 Coal	A
H05	60.89	62.73	1.84 Mudstone	
H05	62.73	63.14	0.41 Sandstone	
H05	63.14	66.23	3.09 Mudstone	
H05	66.23	66.38	0.15 Coal	B
H05	66.38	69.04	2.66 Mudstone	
H05	69.04	70.16	1.12 Mudstone	
H05	70.16	70.24	0.08 Coal	C

Lith\_All

H05	70.24	70.41	Mudstone	
H05	70.41	72.06	Siltstone	
H05	72.06	72.14	Mudstone	
H05	72.14	72.61	Mudstone	
H05	72.61	72.81	Sandstone	
H05	72.81	75.14	Mudstone	
H05	75.14	76.49	Mudstone	
H05	76.49	77.15	Siltstone	
H05	77.15	78.14	Sandstone	
H05	78.14	81.14	Sandstone	
H05	81.14	81.60	Sandstone	
H05	81.60	81.72	0.12 coal	
H05	81.72	83.17	Mudstone	
H05	83.17	83.80	Sandstone	
H05	83.80	84.14	Mudstone	
H05	84.14	89.89	Mudstone	
H05	89.89	90.14	Coreloss	
H05	90.14	92.44	Mudstone	
H05	92.44	93.04	0.60 Coal	B
H05	93.04	93.15	Mudstone	
H05	93.15	96.15	Mudstone	
H05	96.15	97.32	Mudstone	
H05	97.32	97.80	Mudstone	
H05	97.80	99.23	Siltstone	
H05	99.23	100.93	Siltstone	
H05	100.93	102.29	Mudstone	
H05	102.29	105.31	Mudstone	
H05	105.31	106.98	Mudstone	
H05	106.98	108.15	Sandstone	
H05	108.15	108.33	Mudstone	
H05	108.33	110.31	Mudstone	
H05	110.31	111.41	Sandstone	
H05	111.41	113.11	Mudstone	
H05	113.11	116.57	Siltstone	
H05	116.57	117.39	Mudstone	
H05	117.39	119.94	Mudstone	
H05	119.94	120.36	Mudstone	
H05	120.36	122.85	Mudstone	
H05	122.85	122.96	0.11 Coal	
H05	122.96	123.42	Mudstone	
H05	123.42	126.39	Mudstone	
H05	126.39	126.42	Coreloss	
H05	126.42	128.59	Mudstone	
H05	128.59	129.42	Siltstone	
H05	129.42	129.82	Mudstone	
H05	129.82	132.47	Sandstone	
H05	132.47	134.27	Sandstone	
H05	134.27	135.47	Dolerite	
H06	0.00	1.75	Soil	
H06	1.75	11.00	Sandstone	
H06	11.00	13.10	Sandstone	
H06	13.10	13.30	Carbonaceous Mudstone	
H06	13.30	13.74	0.44 Coal	A
H06	13.74	13.77	0.03 Carbonaceous Shale	A
H06	13.77	14.59	0.82 Coal	A
H06	14.59	14.64	0.05 Carbonaceous Mudston	A

Lith\_All

H06	14.64	15.04	0.40	Coal	A
H06	15.04	17.23	2.19	Coreloss	
H06	17.23	18.21	0.98	Coal	B
H06	18.21	18.30	0.09	Mudstone	
H06	18.30	19.32	1.02	Coreloss	
H06	19.32	20.49	1.17	Coal	C
H06	20.49	21.30		Mudstone	
H06	21.30	24.15		Mudstone	
H06	24.15	24.30		Coreloss	
H06	24.30	24.93		Mudstone	
H06	24.93	27.27		Sandstone	
H06	27.27	27.30		Coreloss	
H06	27.30	27.45		Mudstone	
H06	27.45	30.30		Sandstone	
H06	30.30	33.38		Sandstone	
H06	33.38	36.38		Sandstone	
H06	36.38	39.40		Sandstone	
H06	39.40	42.46		Sandstone	
H06	42.46	45.46		Sandstone	
H06	45.46	48.32		Sandstone	
H06	48.32	51.47		Sandstone	
H06	51.47	52.20		Sandstone	
H06	52.20	52.51		Sandstone	
H06	52.51	54.47		Sandstone	
H06	54.47	57.42		Sandstone	
H06	57.42	57.47		Coreloss	
H06	57.47	64.30		Sandstone	
H06	64.30	66.47		Mudstone	
H06	66.47	69.47		Mudstone	
H06	69.47	71.73		Mudstone	
H06	71.73	71.84		Carbonaceous Mudstone	
H06	71.84	72.17	0.33	Coal	
H06	72.17	72.47		Coreloss	
H06	72.47	75.47		Mudstone	
H06	75.47	75.74		Mudstone	
H06	75.74	75.88		Carbonaceous Mudstone	
H06	75.88	78.07		Mudstone	
H06	78.07	81.16		Sandstone	
H06	81.16	84.29		Sandstone	
H06	84.29	88.76		Sandstone	
H06	88.76	89.00	0.24	Coal	
H06	89.00	89.07	0.07	Mudstone	
H06	89.07	89.09	0.02	Coal	
H06	89.09	89.42		Mudstone	
H06	89.42	90.47		Mudstone	
H06	90.47	92.87		Mudstone	
H06	92.87	93.87		Siltstone	
H06	93.87	95.45		Sandy siltstone	
H06	95.45	96.97		Mudstone	
H06	96.97	99.97		Siltstone	
H06	99.97	102.95		Sandy siltstone	
H06	102.95	102.97		Coreloss	
H06	102.97	105.97		Mudstone	
H06	105.97	106.24		Carbonaceous Mudstone	
H06	106.24	106.40	0.16	Coal	
H06	106.40	108.97		Mudstone	

Lith\_All

H06	108.97	111.97	Mudstone	
H06	111.97	113.86	Siltstone	
H06	113.86	113.98	Mudstone	
H06	113.98	114.08	Coreloss	
H06	114.08	114.67	Mudstone	
H06	114.67	117.93	Mudstone	
H06	117.93	117.97	Coreloss	
H06	117.97	120.97	Mudstone	
H06	120.97	123.97	Mudstone	
H06	123.97	127.03	Mudstone	
H06	127.03	130.03	Mudstone	
H06	130.03	132.92	Mudstone	
H06	132.92	133.03	Coreloss	
H06	133.03	133.39	Mudstone	
H06	133.39	133.54	0.15 Coal	
H06	133.54	134.50	Mudstone	
H06	134.50	136.15	Sandy siltstone	
H06	136.15	138.84	Mudstone	
H06	138.84	138.90	Coreloss	
H06	138.90	141.94	Mudstone	
H06	141.94	144.94	Carbonaceous Mudstone	
H06	144.94	146.34	Mudstone	
H06	146.34	146.89	Sandstone	
H06	146.89	147.38	0.49 Coal	
H06	147.38	147.99	Mudstone	
H06	147.99	150.99	Mudstone	
H06	150.99	154.80	Metasediment	
H06	154.80	157.06	Dolerite	
H07	0.00	2.55	Clay	
H07	2.55	5.00	Sandstone	
H07	5.00	6.00	Sandstone	
H07	6.00	10.00	Sandstone	
H07	10.00	15.00	Sandstone	
H07	15.00	15.66	Sandstone	
H07	15.66	15.72	0.06 Coal	A
H07	15.72	15.73	0.01 Clod	A
H07	15.73	16.73	1.00 Coal	A
H07	16.73	16.74	0.01 Carbonaceous Mudston	A
H07	16.74	16.94	0.20 Coal	A
H07	16.94	18.27	1.33 Mudstone	
H07	18.27	19.59	1.32 Mudstone	
H07	19.59	20.58	0.99 Coreloss	
H07	20.58	20.92	0.34 Mudstone	
H07	20.92	22.46	1.54 Mudstone	
H07	22.46	22.60	0.14 Carbonaceous Mudstone	
H07	22.60	22.80	0.20 Coal	B
H07	22.80	23.02	0.22 Carbonaceous Mudstone	
H07	23.02	23.92	0.90 Mudstone	
H07	23.92	26.68	2.76 Mudstone	
H07	26.68	26.75	0.07 Coal	
H07	26.75	26.92	Mudstone	
H07	26.92	29.92	Mudstone	
H07	29.92	30.47	Mudstone	
H07	30.47	31.19	Mudstone	
H07	31.19	31.89	Carbonaceous Mudstone	
H07	31.89	32.09	Mudstone	

Lith\_All

H07	32.09	32.41	Sandstone
H07	32.41	32.73	Mudstone
H07	32.73	32.91	Coreloss
H07	32.91	33.21	Carbonaceous Mudstone
H07	33.21	35.81	Mudstone
H07	35.81	37.06	Mudstone
H07	37.06	37.18	0.12 Coal
H07	37.18	41.92	Mudstone
H07	41.92	44.59	Mudstone
H07	44.59	44.92	Silty Sandstone
H07	44.92	47.44	Silty Sandstone
H07	47.44	47.83	Mudstone
H07	47.83	47.92	Sandstone
H07	47.92	52.00	Sandstone
H07	52.00	56.00	Sandstone
H07	56.00	63.00	Sandstone
H07	63.00	68.00	Sandstone
H07	68.00	73.00	Sandstone
H07	73.00	82.00	Sandstone
H07	82.00	86.00	Sandstone
H08	0.00	6.00	Soil.basalt.dolerite.talus
H08	6.00	6.80	Siltstone
H08	6.80	6.95	Sandstone
H08	6.95	7.55	Mudstone
H08	7.55	8.19	Siltstone
H08	8.19	15.08	Sandstone
H08	15.08	15.43	Mudstone
H08	15.43	16.01	Siltstone
H08	16.01	16.13	Sand
H08	16.13	16.58	Mudstone
H08	16.58	16.70	Mudstone
H08	16.70	16.85	Hornfels
H08	16.85	18.35	Dolerite
H08	18.35	18.55	Hornfels
H08	18.55	19.30	Hornfels
H08	19.30	19.65	Hornfels
H08	19.65	20.95	Dolerite
H09	0.00	3.35	Precollar
H09	3.35	8.27	Sandstone
H09	8.27	8.50	Conglomerate
H09	8.50	14.68	Sandstone
H09	14.68	15.04	Mudstone
H09	15.04	16.04	1.00 Coal
H09	16.04	17.62	Mudstone
H09	17.62	17.94	Sandstone
H09	17.94	18.10	Siltstone
H09	18.10	18.41	Sandstone
H09	18.41	19.12	Siltstone
H09	19.12	20.24	1.12 Coal
H09	20.24	22.91	Mudstone
H09	22.91	23.33	Siltstone
H09	23.33	24.24	Sandstone
H09	24.24	24.73	Sandstone
H09	24.73	25.01	Sandstone
H09	25.01	30.05	Sandstone
H10	0.00	3.40	Precollar

A

B

Lith\_All

H10	3.40	4.70	Conglomerate	
H10	4.70	12.84	Sandstone	
H10	12.84	13.00	0.16 Coal	A
H10	13.00	14.62	1.62 Coal	A
H10	14.62	15.21	0.59 Mudstone	
H10	15.21	16.80	1.59 Coal	B
H10	16.80	16.85	0.05 Mudstone	
H10	16.85	17.44	0.59 Siltstone	
H10	17.44	18.55	1.11 Mudstone	
H10	18.55	20.35	1.80 Coal	C
H10	20.35	21.00	Mudstone	
H10	21.00	21.44	Siltstone	
H10	21.44	23.47	Mudstone	
H10	23.47	25.04	Siltstone	
H10	25.04	25.75	Sandstone	
H10	25.75	27.00	Sandstone	
H11	0.00	3.60	Soil.sandstone	
H11	3.60	8.75	Sandstone	
H11	8.75	9.90	Conglomerate	
H11	9.90	10.50	Sandstone	
H11	10.26	10.80	Mudstone	
H11	10.50	10.26	Mudstone	
H11	10.80	11.16	0.36 Coal	A
H11	11.16	13.60	2.44 Mudstone	
H11	13.60	14.00	0.40 Coal	B
H11	14.00	14.18	0.18 Mudstone	
H11	14.18	14.36	0.18 Siltstone	
H11	14.36	15.97	1.61 Mudstone	
H11	16.02	16.25	0.23 Coal	C
H11	16.25	17.20	0.95 Mudstone	
H11	17.20	17.26	0.06 Coal	D
H11	17.26	17.70	Mudstone	
H11	17.70	18.03	Siltstone	
H11	18.03	18.86	Mudstone	
H11	18.86	19.42	Siltstone	
H11	19.42	20.46	Sandstone	
H11	20.46	20.58	Siltstone	
H11	20.58	20.84	Sandstone	
H11	20.84	21.00	Siltstone	
H11	21.00	21.69	Sandstone	
H11	21.69	22.42	Siltstone	
H11	23.13	23.24	Mudstone	
H11	23.24	23.60	Siltstone	
H11	23.60	25.18	Mudstone	
H11	25.18	25.71	Siltstone	
H11	25.71	27.00	Mudstone	
H12	0.00	4.90	Soil.sandstone	
H12	4.90	25.53	Sandstone	
H12	15.97	16.02	Mudstone	
H12	25.53	25.63	Mudstone	
H12	25.63	26.70	Sandstone	
H12	26.70	27.82	1.12 Coal	A
H12	27.82	28.45	Mudstone	
H12	28.45	28.88	Siltstone	
H12	28.88	30.60	Mudstone	
H12	30.60	30.86	Sandstone	

## Lith\_All

H12	30.86	31.16	Siltstone	
H12	31.16	31.38	Sandstone	
H12	31.38	31.87	Siltstone	
H12	31.87	36.05	sandstone	
H12	36.05	36.30	Siltstone	
H12	36.30	42.43	Sandstone	
H12	42.43	43.62	1.19 Coal	B
H12	43.62	44.20	0.58 Mudstone	
H12	44.20	44.85	0.65 Coal	C
H12	44.85	46.48	Mudstone	
H12	46.48	48.78	Sandstone	
H12	48.78	59.80	Sandstone	
H12	59.80	59.90	Mudstone	
H12	59.90	60.15	Sandstone	
H12	60.15	60.46	0.31 Coal	D
H12	60.46	62.74	Mudstone	
H12	62.74	69.00	Sandstone	
H13	0.00	19.00	Clay	
H14	0.00	4.00	Precollar	
H14	4.00	18.79	Sandstone	
H14	18.79	19.38	Mudstone	
H14	19.38	19.47	Conglomerate	
H14	19.47	26.89	Sandstone	
H14	26.89	27.13	Siltstone	
H14	27.13	29.85	Mudstone	
H14	29.85	39.20	Sandstone	
H14	39.20	40.47	1.27 Coal	A
H14	40.47	42.23	1.76 Mudstone	
H14	42.23	43.47	1.24 Coal	B
H14	43.47	45.09	1.62 Mudstone	
H14	45.09	46.33	1.24 Coal	C
H14	46.33	57.39	Mudstone	
H15	0.00	8.70	Precollar	A.B.C?
H15	8.70	9.71	1.01 Coal	C
H15	9.71	14.72	Mudstone	
H15	14.72	17.14	Sandstone	
H15	17.14	26.80	Sandstone	
H16	0.00	3.20	Precollar	
H16	3.20	28.81	Sandstone	
H16	28.81	29.36	Conglomerate	
H16	29.36	32.44	Sandstone	
H16	32.44	32.90	Conglomerate	
H16	32.90	33.40	Sandstone	
H16	33.40	34.23	Conglomerate	
H16	34.23	34.48	Sandstone	
H16	34.48	34.78	Conglomerate	
H16	34.78	34.90	Sandstone	
H16	34.90	35.35	Conglomerate	
H16	35.35	35.75	Sandstone	
H16	35.75	35.90	Mudstone	
H16	35.90	36.22	Sandstone	
H16	36.22	36.55	Conglomerate	
H16	36.55	45.37	Sandstone	
H16	45.37	45.40	Conglomerate	
H16	45.40	47.10	1.70 Coal	A
H16	47.10	47.22	0.12 Mudstone	

## Lith\_All

H16	47.22	48.33	1.11	Coal	B
H16	48.33	50.30	1.97	Mudstone	
H16	50.30	51.22	0.92	Coal	C
H16	51.22	57.45		Mudstone	
H17	0.00	3.30		Precollar	
H17	3.30	14.92		Sandstone	
H17	14.92	15.32		Conglomerate	
H17	15.32	15.40		Mudstone	
H17	15.40	16.62	1.22	Coal	A
H17	16.62	16.98	0.36	Mudstone	
H17	16.98	18.07	1.09	Coal	B
H17	18.07	20.04	1.97	Mudstone	
H17	20.04	20.54	0.50	Coal	C
H17	20.54	21.60	1.06	Coal	C
H17	21.60	26.10		Mudstone	
H18	0.00	11.00		Precollar	
H18	11.00	11.27	0.27	Coal	
H18	11.27	11.32		Mudstone	
H18	11.32	12.07		Mudstone	
H18	12.07	21.00		Sandstone	
H19	0.00	3.50		Sandstone	
H19	3.50	6.00		Mudstone	
H19	6.00	6.30		Mudstone	
H19	6.30	7.00		Coreloss	
H19	7.00	7.50		Mudstone	
H19	7.50	7.80	0.30	Coal	
H19	7.80	8.20		Mudstone	
H19	8.20	9.05		Siltstone	
H19	9.05	13.00		Mudstone	
H19	13.00	13.80		Mudstone.Siltstone	
H19	13.80	14.00		Mudstone	
H19	14.00	14.30		Siltstone	
H19	14.30	14.45		Sandstone	
H19	14.45	14.60		Siltstone	
H19	14.60	26.25		Sandstone	
H19	26.25	26.65		Mudstone	
H19	26.65	28.83		Sandstone	
H19	28.83	29.55		Mudstone	
H19	29.55	29.70		Siltstone	
H19	29.70	41.70		Sandstone	
H19	41.70	42.08		Conglomerate	
H19	42.08	42.36	0.28	Coal	A
H19	42.36	42.80	0.44	Mudstone	
H19	42.80	43.60	0.80	Mudstone	
H19	43.60	44.00	0.40	Siltstone	
H19	44.00	45.12	1.12	Mudstone	
H19	45.12	45.49	0.37	Coal	B
H19	45.49	45.64	0.15	Mudstone	
H19	45.64	47.18	1.54	Mudstone	
H19	47.18	47.38	0.20	Coal	C
H19	47.38	48.35		Mudstone	
H19	48.35	48.60		Sandstone	
H19	48.60	49.60		Siltstone	
H19	49.60	49.90		Sandstone	
H19	49.90	51.00		Siltstone	
H19	51.00	52.30		Sandstone	

## Lith\_All

H19	52.30	56.05	Siltstone.Mudstone	
H19	56.05	56.65	Mudstone	
H19	56.65	56.91	Sandstone	
H19	56.91	57.20	Siltstone	
H19	57.20	57.80	Mudstone	
H19	57.80	57.92	Mudstone	
H19	57.92	57.99	0.07 Coal	
H19	57.99	58.30	Mudstone	
H19	58.30	59.60	Siltstone.Sandstone	
H19	59.60	60.00	Sandstone	
H20	0.00	8.00	Sandstone	
H20	8.00	12.00	Sandstone	
H20	12.00	13.71	Sandstone	
H20	13.71	14.02	Conglomerate	
H20	14.02	16.92	Sandstone	
H20	16.92	17.19	0.27 Coal	A
H20	17.19	17.21	0.01 Shale	A
H20	17.21	17.33	0.13 Coal	A
H20	17.33	17.34	0.01 Shale	A
H20	17.34	17.67	0.33 Coal	A
H20	17.67	17.69	0.01 Shale	A
H20	17.69	18.48	0.80 Coal	A
H20	18.48	18.99	0.51 Mudstone	
H20	18.99	20.19	1.20 Coal	B
H20	20.19	22.13	1.94 ?	
H20	22.13	22.26	0.13 Coal	C
H20	22.26	22.27	0.01 Shale	C
H20	22.27	22.56	0.29 Coal	C
H20	22.56	22.58	0.02 Shale	C
H20	22.58	23.18	0.60 Coal	C
H20	23.18	23.21	0.03 Shale	C
H20	23.21	23.43	0.22 Coal	C
H20	23.43	27.00	Mudstone	
H20	27.00	28.25	Mudstone.Siltstone	
H20	28.25	30.00	Sandstone	
H21	0.00	0.50	Soil	
H21	0.50	4.00	Sandstone	
H21	4.00	6.00	Sandstone	
H21	6.00	7.00	Sandstone	
H21	7.00	8.10	Sandstone	
H21	8.10	8.50	Mudstone	
H21	8.50	9.50	Mudstone	
H21	9.50	13.00	Sandstone	
H21	13.00	13.33	Mudstone	
H21	13.33	14.89	1.56 Coal	A
H21	14.89	15.56	0.67 Mudstone	
H21	15.56	16.82	1.26 Coal	B
H21	16.82	17.95	1.13 Mudstone	
H21	17.95	18.47	0.52 Coal	C
H21	18.47	18.49	0.02 Shale	C
H21	18.49	18.96	0.47 Coal	C
H21	18.96	18.99	0.03 Coal	C
H21	18.99	19.19	Shale	
H21	19.19	25.80	Mudstone	
H21	25.80	27.00	Sandstone	
H22	0.00	3.00	Sandstone	

## Lith\_All

H22	3.00	4.81	Sandstone	
H22	4.81	4.89	conglomerate	
H22	4.89	4.98	Siltstone	
H22	4.98	5.20	Conglomerate	
H22	5.20	5.70	Sandstone	
H22	5.70	8.96	Sandstone	
H22	8.96	9.22	0.26 Coal	A
H22	9.22	9.23	0.00 Shale	A
H22	9.23	9.52	0.30 Coal	A
H22	9.52	9.66	0.14 Coal.shale	A
H22	9.66	9.99	0.33 Coal	A
H22	9.99	10.00	0.01 Shale	A
H22	10.00	10.56	0.56 Coal	A
H22	10.56	10.90	0.34 Mudstone	
H22	10.90	11.75	0.85 Coal	B
H22	11.75	12.10	0.35 Coal.shale	B
H22	12.10	12.37	0.27 Coal	B
H22	12.37	14.21	1.84 Mudstone	
H22	14.21	14.68	0.47 Coal	C
H22	14.68	14.72	0.04 Shale	C
H22	14.72	14.83	0.11 Coal	C
H22	14.83	14.84	0.01 Shale	C
H22	14.84	15.34	0.50 Coal	C
H22	15.34	15.36	0.02 Shale	C
H22	15.36	15.56	0.20 Coal	C
H22	15.56	15.80	Mudstone	
H22	15.80	16.40	Siltstone	
H22	16.40	17.50	Siltstone.Mudstone	
H22	17.50	18.97	Mudstone	
H22	18.97	19.98	Mudstone.Siltstone	
H22	19.98	20.90	Sandstone	
H23	0.00	7.00	Sandstone	
H23	7.00	12.00	Sandstone	
H23	12.00	13.70	Sandstone	
H23	13.70	14.10	Mudstone	
H23	14.10	14.75	Sandstone	
H23	14.75	16.80	Sandstone	
H23	16.80	17.60	Sandstone	
H23	17.60	18.00	Conglomerate	
H23	18.00	18.50	Sandstone	
H23	18.50	18.90	Sandstone	
H23	18.90	19.00	Sandstone	
H23	19.00	22.85	Sandstone	
H23	22.85	25.15	Sandstone	
H23	25.15	25.28	Conglomerate	
H23	25.28	25.33	Mudstone	
H23	25.33	25.45	Sandstone	
H23	25.45	26.00	Sandstone	
H23	26.00	26.56	Sandstone	
H23	26.56	26.69	Mudstone	
H23	26.69	26.73	0.04 Coal	A
H23	26.73	26.93	0.20 Mudstone	A
H23	26.93	27.50	0.57 Coal	A
H23	27.50	27.53	0.03 Shale	A
H23	27.53	27.54	0.01 Shale	A
H23	27.54	27.59	0.05 Coal	A

## Lith\_All

H23	27.59	27.92	0.33 Coal	A
H23	27.92	28.06	0.14 Mudstone	
H23	28.06	29.28	1.22 Coal	B
H23	29.28	29.38	0.10 Mudstone	
H23	29.38	29.82	0.44 Mudstone	
H23	29.82	30.32	0.50 Coal	C
H23	30.32	30.34	0.02 Shale	C
H23	30.34	30.77	0.43 Coal	C
H23	30.77	30.79	0.02 Shale	C
H23	30.79	31.03	0.24 Coal	C
H23	31.03	31.10	Shale	
H23	31.10	33.00	Mudstone	
H23	33.00	33.74	Mudstone.Siltstone	
H23	33.74	34.12	Mudstone	
H23	34.12	34.55	Mudstone.Siltstone	
H23	34.55	34.66	Sandstone	
H23	34.66	35.27	Siltstone	
H23	35.27	36.00	Sandstone	
H24	0.00	1.00	Clay	
H24	1.00	8.00	Sandstone	
H24	8.00	15.00	Sandstone	
H24	15.00	18.56	Sandstone	
H24	18.56	18.61	0.05 Coal	
H24	18.61	19.20	0.59 Sandstone	
H24	19.20	19.47	0.27 Coal	A
H24	19.47	19.50	0.03 Shale.Coal	A
H24	19.50	19.91	0.41 Coal	A
H24	19.91	19.93	0.02 Coal	A
H24	19.93	20.27	0.34 Coal	A
H24	20.27	20.44	0.17 Mudstone	
H24	20.44	21.36	0.92 Coal	B
H24	21.36	22.16	0.80 Mudstone	
H24	22.16	22.51	0.35 Sandstone	
H24	22.51	22.71	0.20 Siltstone	
H24	22.71	23.76	1.05 Mudstone	
H24	23.76	24.41	0.65 Coal	C
H24	24.41	24.56	Mudstone	
H24	24.56	25.80	Breccia	
H24	25.80	26.70	Mudstone	
H24	26.70	27.00	Mudstone	
H25	0.00	0.50	Soil	
H25	0.50	7.00	Sandstone	
H25	7.00	7.50	Sandstone	
H25	7.50	8.20	Sandstone	
H25	8.20	8.80	Mudstone	
H25	8.80	12.00	Sandstone	
H25	12.00	15.00	Sandstone	
H25	15.00	18.81	Sandstone	
H25	18.81	20.28	Sandstone	
H25	20.28	20.30	0.02 Coal	
H25	20.30	20.38	0.08 Mudstone	
H25	20.38	20.75	0.37 Sandstone	
H25	20.75	20.77	0.02 Coal	
H25	20.77	22.02	Sandstone	
H25	22.02	24.85	Sandstone	
H25	24.85	26.32	Sandstone	

## Lith\_All

H25	26.32	26.75	Sandstone	
H25	26.75	27.80	Tuff	
H25	27.80	31.84	Sandstone	
H25	31.84	38.75	Conglomerate	
H25	38.75	38.82	Tuff	
H25	38.82	45.00	Sandstone	
H26	0.00	2.00	Clay	
H26	2.00	5.20	Mudstone	
H26	5.20	5.70	Sandstone	
H26	5.70	6.20	Conglomerate	
H26	6.20	8.00	Sandstone	
H26	8.00	20.00	Sandstone	
H26	20.00	20.80	Mudstone	
H26	20.80	23.50	Sandstone	
H26	23.50	23.90	Mudstone	
H26	23.90	43.00	Sandstone	
H26	43.00	44.00	Mudstone	
H26	44.00	72.00	Sandstone	
H26	72.00	72.20	0.20 Coal	
H26	72.20	75.60	3.40 Sandstone	
H26	75.60	75.79	0.19 Coal	A
H26	75.79	75.85	0.06 Shale	A
H26	75.85	76.26	0.41 Coal	A
H26	76.26	76.28	0.02 Shale	A
H26	76.28	76.81	0.53 Coal	A
H26	76.81	77.55	0.74 Mudstone	
H26	77.55	78.62	1.07 Coal	B
H26	78.62	80.82	2.20 Mudstone	
H26	80.82	81.20	0.38 Coal	C
H26	81.20	81.22	0.02 Shale	C
H26	81.22	81.73	0.51 Coal	C
H26	81.73	81.74	0.01 Shale	C
H26	81.74	82.03	0.29 Coal	C
H26	82.03	83.58	1.55 Mudstone	
H26	83.58	83.80	0.22 Coal	D
H26	83.80	83.82	0.02 Shale	D
H26	83.82	84.20	0.38 Coal	D
H26	84.20	89.00	Mudstone	
H27	0.00	2.90	Clay	
H27	2.90	5.10	Sandstone	
H27	5.10	6.00	Sandstone	
H27	6.00	6.80	Sandstone	
H27	6.80	7.50	Conglomerate	
H27	7.50	8.80	Sandstone	
H27	8.80	9.04	Mudstone	
H27	9.04	9.64	0.60 Coal	A
H27	9.64	9.66	0.02 Shale	A
H27	9.66	10.40	0.74 Coal	A
H27	10.40	10.99	0.59 Mudstone	
H27	10.99	12.36	1.37 Coal	B
H27	12.36	13.92	1.56 Mudstone	
H27	13.92	14.36	0.44 Coal	C
H27	14.36	14.39	0.03 Shale	C
H27	14.39	14.49	0.10 Coal	C
H27	14.42	15.00	0.58 Coal	C
H27	14.49	14.52	0.03 Shale	

Lith\_All

H27	15.00	15.02	0.02 Shale	
H27	15.02	15.26	0.24 Coal	D
H27	15.26	21.70	Mudstone	
H27	21.70	25.00	Sandstone	
H28	0.00	1.00	Soil	
H28	1.00	3.90	Sandstone	
H28	3.90	4.20	Sandstone	
H28	4.20	4.80	Sandstone	
H28	4.80	5.90	Sandstone	
H28	5.90	7.90	Sandstone	
H28	7.90	9.90	Sandstone	
H28	9.90	11.90	Sandstone	
H28	11.90	15.00	Sandstone	
H28	15.00	28.40	Sandstone	
H28	28.40	28.80	Mudstone	
H28	28.80	29.95	Siltstone	
H28	29.95	30.05	Sandstone	
H28	30.05	31.00	Sandstone.siltstone	
H28	31.00	31.90	Mudstone	
H28	31.90	31.92	0.02 Coal	A
H28	31.92	31.96	0.04 Shale	A
H28	31.96	31.99	0.03 Coal	A
H28	31.99	32.00	0.01 Shale	A
H28	32.00	32.39	0.39 Coal	A
H28	32.39	32.41	0.02 Shale	A
H28	32.41	32.80	0.39 Coal	A
H28	32.80	32.85	0.05 Mudstone	
H28	32.85	33.98	1.13 Coal	B
H28	33.98	34.64	0.66 Mudstone	
H28	34.64	34.74	0.10 Coal	C
H28	34.74	34.75	0.00 Shale	C
H28	34.75	35.05	0.31 Coal	C
H28	35.05	35.07	0.02 shale	C
H28	35.07	35.70	0.63 Coal	C
H28	35.70	35.75	0.05 Shale.Coal	C
H28	35.75	35.79	0.04 Coal	C
H28	35.79	36.00	0.21 Coal	C
H28	36.00	36.05	Sandstone	
H28	36.05	36.25	Mudstone	
H28	36.25	37.20	Siltstone	
H28	37.20	37.60	Mudstone	
H28	37.60	37.90	Siltstone	
H28	37.90	38.50	Mudstone	
H28	38.50	39.00	Mudstone.Siltstone	

GIS\_Data

**Drill Hole Collars**

Hole	Easting	Northing	Seam_A_Thick	Seam_B_Thick	Seam_C_Thick	Total_Coal_Thick	Insitu_Strip_Ratio	Volatile_Matter
H01	483890	5290650	2.74	1.26	0.70	4.70	2.31	12.50
H02	483265	5291055						
H03	483540	5290450	1.75	1.20		2.95	10.23	13.22
H04	483790	5290000	1.80	1.00		2.80	5.39	20.10
H05	483095	5288950						
H06	482025	5290040	1.44	1.34	1.50	4.28	2.45	21.72
H07	483670	5289030	1.28			1.28	8.44	25.30
H08	484214	5290833						
H09	483019	5290022	1.00	1.08	1.18	3.26	3.61	11.36
H10	482215	5289652	1.56	1.02	1.80	4.38	2.54	23.94
H11	481469	5290084	0.38	0.42	0.12	0.92	11.44	
H12	481741	5290908	1.04	1.18	0.66	2.88	10.05	16.20
H14	482087	5290708	1.28	1.14	1.80	4.22	6.96	17.07
H15	481931	5290346			1.01			
H16	482490	5290584	1.38	1.24	0.92	3.54	9.35	18.28
H17	482838	5290284	1.44	1.20	1.30	3.94	3.06	13.54
H18	483967	5290244						
H19	481777.9	5290073.26						
H20	482187.66	5290329.69	1.56	1.20	1.30	4.06	3.29	20.10
H21	481989.74	5290450.59	1.56	1.26	1.04	3.86	2.70	
H22	482312.46	5289852.98	1.60	1.47	1.35	4.42	1.74	23.68
H23	483401.72	5289912.69	1.23	1.22	1.21	3.66	5.16	17.81
H24	483101.18	5290297.05	1.07	0.92	0.65	2.64	5.69	8.70
H25	483775.82	5290914						
H26	482728.68	5290907.2	1.21	1.07	1.21	4.11	13.44	
H27	482046.36	5290277.61	1.36	1.37	1.34	4.07	1.90	
H28	483449.45	5290169.05	0.90	1.13	1.36	3.39	6.63	19.55
HEC1	481040	5292000						
HEC2	481945	5291000						
HEC3	482825	5290000						
HEC4	484000	5288670						

0	0.00	0.00	0	0	0	0
1	5289934.02	481466.90	200		1	
1	5289908.56	481485.18	200		1	
1	5289880.26	481508.36	200		1	
1	5289844.28	481545.00	200		1	
1	5289823.23	481565.01	200		1	
1	5289793.17	481587.18	200		1	
1	5289772.82	481602.19	200		1	
1	5289760.83	481611.07	200		1	
1	5289730.67	481631.83	200		1	
1	5289662.72	481674.91	200		1	
1	5289597.73	481716.12	200		1	
1	5289573.32	481731.60	200		1	
1	5289549.91	481756.78	200		1	
1	5289526.91	481781.51	200		1	
1	5289510.83	481798.81	200		1	
1	5289493.76	481824.85	200		1	
1	5289463.36	481874.61	200		1	
1	5289457.73	481887.41	200		1	
1	5289452.81	481898.61	200		1	
1	5289439.84	481928.09	200		1	
1	5289402.02	482014.12	200		1	
1	5289386.12	482050.27	200		1	
1	5289367.27	482093.17	200		1	
1	5289335.73	482164.88	200		1	
1	5289331.35	482178.07	200		1	
1	5289326.24	482200.91	200		1	
1	5289317.73	482238.96	200		1	
1	5289312.94	482260.34	200		1	
1	5289301.83	482309.93	200		1	
1	5289292.34	482352.34	200		1	
1	5289278.37	482394.31	200		1	
1	5289270.34	482418.46	200		1	
1	5289258.83	482461.68	200		1	
1	5289243.13	482518.69	200		1	
1	5289227.84	482565.84	200		1	
1	5289220.34	482564.71	200		1	
1	5289198.02	482625.31	200		1	
1	5289177.34	482677.52	200		1	
1	5289164.34	482703.86	200		1	
1	5289132.84	482759.71	200		1	
1	5289105.34	482807.09	200		1	
1	5289091.34	482830.31	200		1	
1	5289065.35	482871.55	200		1	
1	5289042.34	482905.27	200		1	
1	5288987.34	482980.59	200		1	
1	5288945.85	483042.36	200		1	
1	5288928.85	483068.36	200		1	
1	5288920.53	483080.13	200		1	
1	5288920.68	483097.36	200		1	
1	5289395.67	483097.36	200		1	
1	5289395.67	482847.35	200		1	
1	5290318.35	482847.80	200		1	
1	5290362.82	482592.62	200		1	

1	5290665.82	482591.60	200	1
1	5290664.81	481850.22	200	1
1	5290478.82	481841.06	200	1
1	5290416.35	481840.62	200	1
1	5290415.47	481510.34	200	1
1	5290336.94	481493.42	200	1
1	5290149.22	481453.98	200	1
1	5289983.81	481428.16	200	1
1	5289962.81	481446.22	200	1
1	5289934.02	481466.90	200	1
0	0.00	0.00	0	
1	5289934.02	481466.90	0	1
1	5289908.56	481485.18	0	1
1	5289880.26	481508.36	0	1
1	5289844.28	481545.00	0	1
1	5289823.23	481565.01	0	1
1	5289793.17	481587.18	0	1
1	5289772.82	481602.19	0	1
1	5289760.83	481611.07	0	1
1	5289730.67	481631.83	0	1
1	5289662.72	481674.91	0	1
1	5289597.73	481716.12	0	1
1	5289573.32	481731.60	0	1
1	5289549.91	481756.78	0	1
1	5289526.91	481781.51	0	1
1	5289510.83	481798.81	0	1
1	5289493.76	481824.85	0	1
1	5289463.36	481874.61	0	1
1	5289457.73	481887.41	0	1
1	5289452.81	481898.61	0	1
1	5289439.84	481928.09	0	1
1	5289402.02	482014.12	0	1
1	5289386.12	482050.27	0	1
1	5289367.27	482093.17	0	1
1	5289335.73	482164.88	0	1
1	5289331.35	482178.07	0	1
1	5289326.24	482200.91	0	1
1	5289317.73	482238.96	0	1
1	5289312.94	482260.34	0	1
1	5289301.83	482309.93	0	1
1	5289292.34	482352.34	0	1
1	5289278.37	482394.31	0	1
1	5289270.34	482418.46	0	1
1	5289258.83	482461.68	0	1
1	5289243.13	482518.69	0	1
1	5289227.84	482565.84	0	1
1	5289220.34	482564.71	0	1
1	5289198.02	482625.31	0	1
1	5289177.34	482677.52	0	1
1	5289164.34	482703.86	0	1
1	5289132.84	482759.71	0	1
1	5289105.34	482807.09	0	1
1	5289091.34	482830.31	0	1
1	5289065.35	482871.55	0	1
1	5289042.34	482905.27	0	1
1	5288987.34	482980.59	0	1

1	5288945.85	483042.36	0	1
1	5288928.85	483068.36	0	1
1	5288920.53	483080.13	0	1
1	5288920.68	483097.36	0	1
1	5289395.67	483097.36	0	1
1	5289395.67	482847.35	0	1
1	5290318.35	482847.80	0	1
1	5290362.82	482592.62	0	1
1	5290665.82	482591.60	0	1
1	5290664.81	481850.22	0	1
1	5290478.82	481841.06	0	1
1	5290416.35	481840.62	0	1
1	5290415.47	481510.34	0	1
1	5290336.94	481493.42	0	1
1	5290149.22	481453.98	0	1
1	5289983.81	481428.16	0	1
1	5289962.81	481446.22	0	1
1	5289934.02	481466.90	0	1
0	0.00	0.00	0	
0	0.00	0.00	0	END

# Appendix B

14 November 2008

Mr. Nat Cull  
Exploration Manager  
**SPITFIRE RESOURCES LTD**  
Suite 1, 346 Barker Road  
Subiaco  
West Australia 6008

**RE: Langloh Coal Project, Exploration Proposal and Budget Estimate**

Dear Nat,

Spitfire Resources Ltd (Spitfire) has requested Marston International Pty Ltd (Marston) to provide an exploration programme and budget estimate to complete eight diamond drill holes at the Langloh Coal Project. The objective of the programme is to accurately evaluate the in-situ coal quality and the potential to produce a beneficiated coal product suitable for the export thermal coal market. The requirements for the drilling, sampling, testing and analysis, geophysical logging and other activities are summarized below. Budget estimates for sample testing and analysis, geophysical logging and exploration programme supervision and support have also been prepared.

The proposed scope of work for this project is as follows:

- Plan exploration programme
- Prepare sample testing and analysis programme
- Obtain budget quotations
- Provide training and support for site geologist
- Manage testing and analysis programme
- Analyse coal quality testing and report results

The exploration programme, timing and key personnel, project deliverables and budget estimates are presented below.

**Exploration Programme**

**Drilling**

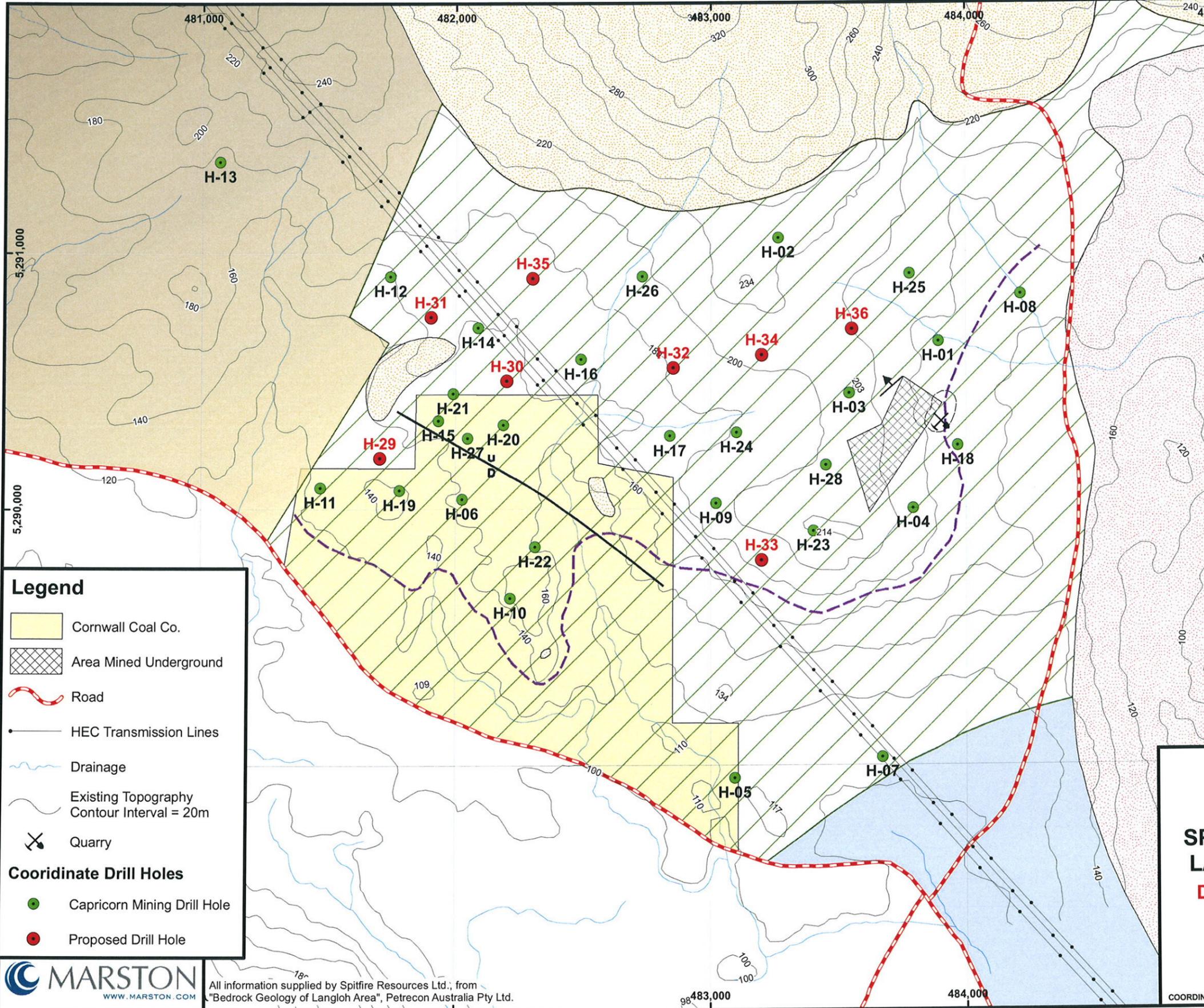
Eight drill holes are proposed to obtain samples for coal quality testing at Langloh. The location of the drill holes is shown on Figure 1, Drill Hole Location Map and drilling details are shown in Table 1, Proposed Drilling Programme. The holes are proposed to be initially open holed and then cored to final depth. Holes are planned to be drilled to sufficient depth to allow for complete logging of the coal bearing sequence. Three coal seams between 0.9 m and 1.8 m thick are planned to be cored and sampled in each hole. Recommended core size is HQ (63.5 mm diameter).

Marston will provide the Spitfire geologist with data recording forms and training in correct coal logging procedures.



**Geology Legend - Tasmania Basin**

- Tertiary Clay, Sand, Ferricrete
- Tertiary Basalt
- Triassic Lithic Sandstone
- Triassic Quartz Sandstone
- Jurassic Dolerite
- Seam Subcrop
- Inferred Block Fault



**Legend**

- Cornwall Coal Co.
- Area Mined Underground
- Road
- HEC Transmission Lines
- Drainage
- Existing Topography Contour Interval = 20m
- Quarry

**Coordinate Drill Holes**

- Capricorn Mining Drill Hole
- Proposed Drill Hole

N

0 250 500 750 1,000  
Meters

**spitfire**  
RESOURCES LTD

**SPITFIRE RESOURCES LTD.  
LANGLOH COAL PROJECT  
DRILL HOLE LOCATION MAP**

HAMILTON, TASMANIA, AUSTRALIA

**FIGURE 1**  
NOVEMBER 2008

COORDINATE SYSTEM: WGS 1984 UTM Zone 55 South



All information supplied by Spitfire Resources Ltd.; from "Bedrock Geology of Langloh Area", Petrecon Australia Pty Ltd.

Satellite\_Office\_Work\Australia\Spitfire\_A019001\GIS\MapFiles\Geology\_Geology\_Map.mxd

**Table 1**  
**Proposed Drilling Programme**

Hole No.	Easting	Northing	Open Hole (m)	Core (m)	Total Depth (m)
H-29	481700	5290200	35.0	30.0	65.0
H-30	482200	5290500	10.0	30.0	40.0
H-31	481900	5290750	25.0	30.0	55.0
H-32	482850	5290550	40.0	30.0	70.0
H-33	483200	5289800	10.0	30.0	40.0
H-34	483200	5290600	35.0	30.0	65.0
H-35	482300	5290900	50.0	30.0	80.0
H-36	483550	5290700	35.0	30.0	65.0
<b>Total</b>			<b>240.0</b>	<b>240.0</b>	<b>480.0</b>

Marston recommends that an experienced, reputable local mineral drilling contractor be engaged for this programme as they will be familiar with the requirements of the Tasmanian Mineral Exploration Code of Practice. A truck mounted, hydraulic top drive rig capable of drilling to 100 m is recommended for the programme as it will provide maximum flexibility and mobility. Initial site inspection indicated access would not be difficult. Marston estimates the drilling should be completed within five to six weeks provided no rain delays are experienced.

### **Sampling**

The eight drill holes are planned to provide a total of 24 coal seam intercepts. Each seam intercept is to be sampled as follows:

- 1 x dilution sample of roof strata 10 -15 cm
  - 3 x seam ply samples 30 – 50 cm
  - 1 x dilution sample of floor strata 10 - 15 cm
- Total 120 samples from 8 drill holes, 15 samples per hole

Marston will advise the Spitfire geologist on correct sampling, numbering, bagging and tagging procedures.

### **Coal Sample Testing and Analysis**

The testing and analysis programme and the standards proposed are outlined in Appendix 1. Samples will initially be crushed to a top size of 12 mm and divided. One part will be used to determine relative density, proximate analysis, total sulphur content and calorific value. The results will be used to determine sample composite of the coal seams for further testing. Composite samples will be prepared from the remaining sample portion for float-sink testing at a range of densities, and mass and ash content will be determined for each of the float fractions. A further composite of potential product coal will be prepared from the float

samples for detailed testing. This testing will include proximate analysis, ultimate analysis, total sulphur content, calorific value, Hardgrove index, crucible swell number, ash fusion temperature, ash analysis and chlorine content.

Marston will monitor the testing programme, analyse the results as they become available and nominate the sample composites for ongoing testing and analysis.

Marston requested quotations from three laboratories for the coal testing and analysis. ACIRL and SGS (Newcastle) have provide quotes and HRL Technologies (Melbourne) advised that they would not be able to undertake the work. The quotations are summarized in Table 2 below.

**Table 2**  
**Coal Testing and Analysis Quotations**

<b>Procedure</b>	<b>Samples</b>	<b>SGS</b>	<b>Total</b>	<b>ACIRL</b>	<b>Total</b>
Sample Preparation	120	73.50	8,820.00	150.00	18,000.00
Ply Analysis	120	102.50	12,300.00		
Prepare Seam Composites	24	-	-	65.00	1,560.00
Seam Composite Testing & Analysis	24	850.00	20,400.00	825.00	19,800.00
Clean Coal Composite Analysis	24	515.00	12,360.00	570.00	13,680.00
<b>Total</b>			<b>53,880.00</b>		<b>53,040.00</b>

Both companies are reputable, both have recently built new laboratories and both adopt high standards in their work. Marston recommends ACIRL be used for this work based on a slightly lower price estimate. Quotations from both laboratories are attached.

### **Geophysical Logging**

Marston recommends that all drill holes be logged with down hole geophysical tools. The recommended tools are caliper, natural gamma, long spaced density and short spaced density. Drill holes will be kept open to allow down hole geophysical logging in a single campaign towards the end of the programme. Logging data should be provided in digital and hard copy at 1:200 and 1:20 scales.

Marston has identified only one logging contractor in NSW that is currently able to undertake this work, Groundsearch Australia Pty Ltd, based in Maitland. Other Queensland based contractors could also be asked to quote on the work but mobilization costs would be much higher. Groundsearch has conducted coal logging previously in Tasmania in 2008. Transporting radioactive sources across Bass Strait is logistically very difficult and Groundsearch have experience in obtaining the necessary state and federal permits and approvals. As the holes are relatively shallow Groundsearch would use portable equipment for the project. This option would be considerably less expensive than the cost of mobilizing a fully equipped logging truck to Tasmania. The quotation from Groundsearch is attached.

Based on the assumption that the holes can be logged in a single campaign over three days, Marston estimates the cost of geophysical logging and mobilization to be AUD\$15,000 plus accommodation costs.

### **Other Activities**

Spitfire is obliged to give landholders 14 days written notice of entry onto their properties to conduct exploration activities. Formal access agreements are not required. The Spitfire geologist should contact landholders to ensure the exploration activities will not disrupt any agricultural plans.

A registered surveyor will be required to accurately locate the drill holes and determine elevation once drilling has been completed.

A local contractor will be required to dig sumps for the drill holes and to rehabilitate the sites after drilling and logging has been completed. All drill holes will have to be sealed according to Mineral Exploration Code of Conduct.

### **Key Personnel and Timing**

Marston has suitably qualified and experienced coal exploration and supervisory personnel that are able to undertake this work. Senior Mining Consultant Mr. Neil Fraser (BSc, MAusIMM) will plan the project and provide ongoing management and advice for the coal quality testing and evaluation programme. Mr. Fraser has over 35 years experience in the Australian and Indonesian resource industries and has the necessary qualifications and experience to provide statements of resource and reserve estimates in accordance with the JORC Code requirements. Mr. Fraser will be supported by one of Marston's experienced coal exploration geologists who will provide training and assistance for the Spitfire site geologist.

Mr. Fraser will review testing and analytical results as they are provided and advise the laboratories regarding the ongoing testing programme. The exploration geologist will travel to site at the commencement of the drilling programme and instruct the Spitfire geologist on correct logging, data recording and sampling procedures. Marston anticipates that the exploration geologist services will be required from early January 2009. Marston personnel will be available to provide ongoing advice and support to Spitfire over the course of the project.

The project will be managed from Marston's Newcastle office where oversight and review of the project will be provided by Marston's Australian Managing Director, Mr. Stuart Hides (BSc, MBA). Other Marston personnel will provide support for the project as required. Résumés of key personnel are attached.

### **Deliverables**

The objective of the drilling programme is to fully evaluate the coal quality of the Langloh deposit and assess its potential to produce a thermal coal product suitable for the export market. On completion of the testing and analysis programme Marston will prepare a letter report that will include an evaluation of in-situ coal quality and its export potential. This report will initially be provided in an electronic format for review and comment by Spitfire and the final report will be provided subsequently. Electronic copies of the final versions of any models, database or plans produced by Marston will also be provided.

Timing of completion of the final report will depend on turnaround time from the analytical laboratory. Marston's experience with coal testing laboratories is that due to the current high demand for services, the proposed analytical work will take from two to three months to be completed from the date of receipt of samples.

Marston will also provide recommendations for further assessment of the project, depending on the findings of the above report.

**Marston Costs**

Marston estimates the fees to complete the above scope of work are **AUD\$46,900**. This includes travel time for the Project Geologist to and from Tasmania. The estimate of expenses for travel and accommodation in Tasmania and other support costs is **AUD\$3,000**. These estimates do not include GST. Costs are summarized in the table below.

**Table 3  
 Cost Estimate Summary**

Item	Personnel	Hours	Rate \$/hour	Total A\$
<b>Estimated Fees</b>				
Programme planning	Snr. Consultant	30	210	6,300
Site geologist training and support	Proj. Geologist	90	135	12,150
Analytical programme management	Snr. Consultant	30	210	6,300
Data Analysis	Snr. Consultant	30	210	6,300
Project Oversight and Review	Mng. Director	10	185	1,850
Report preparation	Snr. Consultant	50	210	10,500
Documentation and report production	Support Staff			3,500
		<b>240</b>		<b>46,900</b>
<b>Estimated Expenses</b>				
Travel and accommodation expenses	Proj. Geologist			3,000
<b>Total Fees and Expenses</b>				<b>49,900</b>

Please note that this estimate is based on Marston's previous experience in conducting similar coal exploration projects in Australia. However, unforeseen events such as prolonged periods of wet weather during the drilling programme may produce delays that result in additional costs.

## **Terms**

Marston proposes to charge on a time and reimbursable cost basis. Personnel charge rates will be based on Marston's standard rates for the year 2008. Fees will be invoiced monthly in arrears as the work is performed, and payment is due within 30 days of receipt of the invoice.

Computer usage and data processing costs are included in Marston's standard fee rates. Marston proposes to invoice for reimbursable costs as follows. All airfares, hotel, meals and other travel expenses will be charged to the client at Marston's incurred cost. All air travel over six hours is in Business Class. Plans, copies and other reproductions will be invoiced at Marston's standard unit rates. Telecommunications, courier and postage charges will be billed at cost plus 5%.

In addition to regular client contact throughout the course of the review, Marston will issue a Project Status Report every two weeks to keep Spitfire informed of the progress of the work.

We look forward to working with Spitfire on this project, and await your comments regarding this proposal.

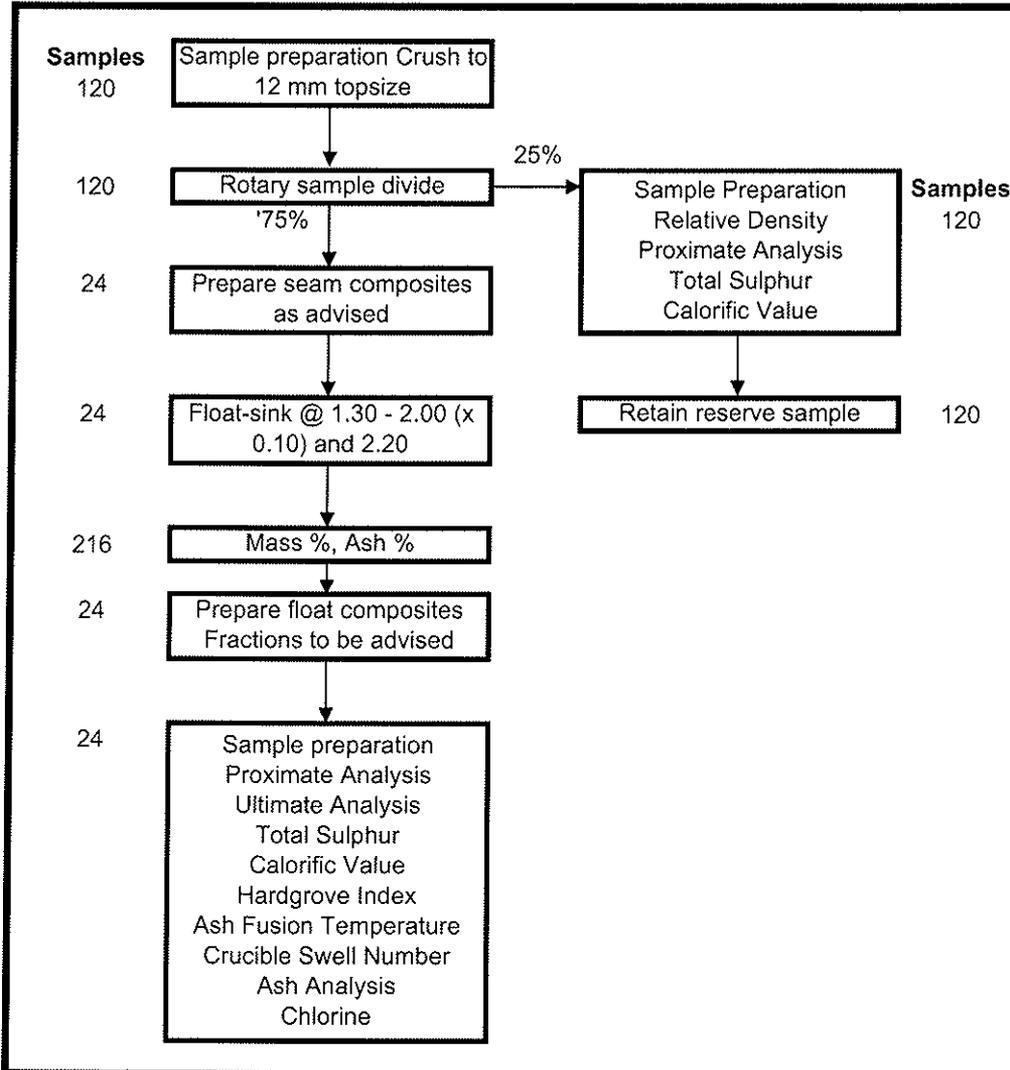
Sincerely,  
**MARSTON INTERNATIONAL PTY. LTD.**

Neil Fraser  
Senior Mining Consultant

Attach.

**APPENDIX**

**Langlooh Coal Project - Testing and Analysis Procedures**



### Langloh Coal Project - Testing and Analysis Standards

Proximate Analysis	AS 1038.3
Gross Calorific Value	AS 1038.5
Carbon & Hydrogen	AS 1038.6
Nitrogen	AS 1038.6
Total Sulfur	AS 1038.6.3.3
Chlorine by XRF	AS 1038.14.3
Crucible Swelling Number	AS 1038.12.1
Ash Fusibility	AS 1038.15
Hardgrove Grindability Index	AS 1038.20
Relative Density	AS 1038.21.1.1
Float & Sink Analysis	AS 4156.1
Ash Analysis by XRF	AS 1038.14.3
Sampling	AS 4264.1