SHUMBA COAL

Technical Report on the Mabesekwa Coal Deposit

Compliant with the Australasian Code for Reporting of Exploration Results, Minerals Resources and Ore Reserves, 2012. (the JORC code)

24th March 2015

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Shumba Coal Ltd
Incorporated in Mauritius under Section 24 of the Companies Act 2001, Company Number 111905

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Table of Contents

1 SUMMARY .................................................................................................................. 1
2 INTRODUCTION......................................................................................................... 3
3 RELIANCE ON OTHER EXPERTS........................................................................... 4
4 PROPERTY DESCRIPTION AND LOCATION ................................................................. 5
  4.1 Property Description .............................................................................................. 5
  4.2 Property Location .................................................................................................. 5
  4.3 Surface Rights ....................................................................................................... 6
  4.4 Mineral Rights ..................................................................................................... 7
  4.5 Environmental and Social Liabilities ..................................................................... 7
  4.6 Permits .................................................................................................................. 7
5 ACCESS, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE & PHYSIOGRAPHY. .... 8
  5.1 Topography .......................................................................................................... 8
  5.2 Accessibility ......................................................................................................... 8
  5.3 Climate .................................................................................................................. 8
  5.4 Land Use .............................................................................................................. 10
  5.5 Infrastructure ....................................................................................................... 10
6 HISTORY .................................................................................................................... 11
  6.1 Shell Coal Botswana ............................................................................................ 11
7 GEOLOGICAL SETTING .......................................................................................... 12
  7.1 Regional Setting .................................................................................................. 12
    7.1.1 The Distribution of the Karoo in Botswana ..................................................... 12
    7.1.2 General Geological Succession of the Karoo Supergroup in Botswana .......... 12
    7.1.3 Stratigraphic Nomenclature ........................................................................... 13
    7.1.4 Structural & Sedimentary Environments of Botswana Karoo Deposits ............ 14
  7.2 Local Geology ...................................................................................................... 15
    7.2.1 Lithostratigraphy ......................................................................................... 15
  7.3 Property Geology ................................................................................................. 15
    7.3.1 Surface Geology ........................................................................................... 15
    7.3.2 Sub-surface geology .................................................................................... 17
    7.3.3 Structure ..................................................................................................... 22
    7.3.4 Dolerite Intrusions ....................................................................................... 22
8 DEPOSIT TYPE ......................................................................................................... 40
9 MINERALISATION ..................................................................................................... 42
  9.1 Basal Coal Seam Unit “A” .................................................................................... 42
  9.2 Basal Coal Seam Unit “B” .................................................................................... 42
  9.3 Basal Coal Seam Unit “D” .................................................................................... 42
  9.4 Unit “F” ............................................................................................................... 43
  9.5 Coal Quality ......................................................................................................... 43
9.5.1 Relative Density ......................................................... 43
9.5.2 Calorific Value ......................................................... 43
9.5.3 Inherent Moisture Content ........................................ 44
9.5.4 Ash Content .......................................................... 44
9.5.5 Volatile Matter Content .............................................. 45
9.5.6 Sulphur Content ........................................................ 45

10 EXPLORATION ................................................................. 46

10.1 Data Compilation ......................................................... 46
10.2 Phase 1 Exploration Drilling .......................................... 46
10.3 Phase 2 Exploration Drilling .......................................... 46
10.4 Phase 3 ........................................................................ 47
10.5 Contract Parties and Duties ........................................... 47
10.6 Exploration Results ..................................................... 51

11 DRILLING .................................................................... 52

11.1 Non-cored holes .......................................................... 52
11.2 Cored Holes ............................................................... 52
11.3 Downhole Geophysical Data and Structural Data Integrity .... 52
11.4 Core Logging Procedures .............................................. 53
11.5 Borehole Collar Survey ................................................ 53

12 SAMPLING METHOD AND APPROACH ............................. 55

12.1 Core Sampling Procedures ........................................... 55
12.2 Sample Size ............................................................. 56
12.3 Sample Collection and Transport .................................. 56

13 SAMPLE PREPARATION, COAL ANALYSES AND DATA SECURITY ............ 57

13.1 Sample Security .......................................................... 57
13.2 Sample Preparation ..................................................... 57
13.3 Coal Analyses ............................................................ 57
13.4 Quality Control of Coal Analyses .................................. 58
13.5 Assay Reporting .......................................................... 59

13.6 Selective Testing .......................................................... 59
13.6.1 Ultimate Analysis .................................................... 59
13.6.2 Ash Elemental Analysis .......................................... 59
13.6.3 Trace Elements ........................................................ 59

14 DATA SECURITY ............................................................. 62

14.1 Borehole Data ............................................................ 62
14.2 Coal Quality Data ........................................................ 62
14.3 Geological Database and Model .................................... 62

15 DATA VERIFICATION ......................................................... 63

15.1 Borehole Collar Elevations ............................................ 63
15.2 Lithological Data ........................................................ 63
15.3 Sampling Data .................................................................................................................. 63
15.4 Analytical Data .................................................................................................................. 63
15.5 Statement of Verification .................................................................................................. 63
15.6 Limitation of Verification .................................................................................................. 63
15.7 Failures in Verification ...................................................................................................... 63
16 ADJACENT PROPERTIES .................................................................................................. 64
17 MINERAL PROCESSING AND METALLURGICAL TESTING ........................................ 65
18 MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES ................................. 66
18.1 Geological Modelling Process ......................................................................................... 66
18.2 Data Preparation and Verification .................................................................................. 66
18.3 Physical Coal Model ........................................................................................................ 66
   18.3.1 Grid Definition ........................................................................................................ 66
   18.3.2 Physical Model Interpolators ................................................................................... 66
18.4 Raw Coal Quality Model ................................................................................................. 66
   18.4.1 Quality Model Interpolators .................................................................................... 66
18.5 Washed Coal Quality Model ........................................................................................... 66
   18.5.1 Unit “A” .................................................................................................................. 67
   18.5.2 Unit “B” .................................................................................................................. 67
   18.5.3 Unit “C” .................................................................................................................. 68
   18.5.4 Unit “D” .................................................................................................................. 68
   18.5.5 Unit “E” .................................................................................................................. 68
   18.5.6 Unit “F” .................................................................................................................. 68
18.6 Mineral Resource Estimation and Classification .............................................................. 68
   18.6.1 Loss Factors and Coal Parameter Cut-offs .............................................................. 68
   18.6.2 Mineral Resource Statement .................................................................................. 69
19 INTERPRETATION AND CONCLUSIONS .................................................................... 91
20 RECOMMENDATIONS ....................................................................................................... 92
20.1 Exploration Drilling ........................................................................................................... 92
20.2 Modelling ......................................................................................................................... 92
21 REFERENCES ....................................................................................................................... 93
22 DATE AND SIGNATURE PAGE ......................................................................................... 94
23 CERTIFICATE OF QUALIFIED PERSON ....................................................................... 95
24 CONSENT OF QUALIFIED PERSON .............................................................................. 96
25 GLOSSARY OF TECHNICAL TERMS ............................................................................ 97
26 LIST OF ABBREVIATIONS ............................................................................................... 98
Appendices (on enclosed CD)

1. Borehole Data
2. Composite Analysis Data
3. Geophysical Data
4. Laboratory Reports
5. Survey Data and Report
1 SUMMARY

Analytika Holding ("AH") was requested to prepare a Technical Report for Shumba Coal Limited ("SC"). Shumba Coal Ltd is a company registered in Mauritius on the 28th of August 2012 with Company Number 111905 as a public company. Through its subsidiary Shumba Resources Limited, registered in the British Virgin Islands, it controls the Botswana subsidiary Sechaba Natural Resources (Pty) Limited which owns the right or has an interest in three prospecting licences in Botswana, namely:

- PL 53/2005 Sechaba
- PL308/2014 Lethakeng
- PL428/2009 Mabesekwa

This CPR pertains exclusively to Prospecting Licence 428/2009 (Sechaba Prospecting Assets) which is in the process of being acquired from Mabesekwa Colliery (Pty) Ltd a wholly owned subsidiary of Daheng Group Botswana (Pty) Ltd.

The Mabesekwa Project comprises of the Mabesekwa Exploration Property ("Mabeseka"). It is a large coal asset aimed predominantly to supply the Botswana power and energy suppliers. It has no potential to supply export quality coal.

Analytika Holdings (Pty) Ltd. has reviewed the available information and compiled this technical report with respect to the Mabesekwa Coal Deposit (MCD) on behalf of Shumba Coal. This technical report has been completed in compliance with the requirements of the Australasian Code for Reporting of Mineral Resources and Ore Reserves (the ‘JORC code’ (Joint Ore Resources Committee) of 2012.

The MCD is located in north-eastern Botswana, southern Africa in the Foley Coalfield in the Northern Belt of the Central Kalahari Sub-Basin.

It consists of a single prospecting licence, PL428/2009. The prospecting licence is owned by Mabesekwa Colliery (Pty) Ltd on behalf of Daheng Group Botswana (Pty) Ltd. but is being acquired by Shumba Coal.

The potentially economic coal seams found within the MCD are the A, B and D units of the Basal Seam and the F Seam found within the Tlapana Formation of the Ecca Group of the Karoo Supergroup. The seams had not previously been explored prior to this programme.

Diamond drill boreholes at 500 metre spacing have been completed over the area. Geological modelling has shown the Basal Seam to be laterally persistent and generally gently undulating over the majority of the MCD and to generally maintain constant thickness. Structurally the seams appear to be relatively simple with some gentle open folding and minor disturbance due to faulting. Some dolerite intrusions have been encountered which have removed the coal seams in restricted area. Dolerite has only very rarely been encountered within the coal seams.

Results from this drilling have been used to estimate the mineral resources and form the basis of this technical report. The total mineral resources for the prospecting licence are:

<table>
<thead>
<tr>
<th>Seam</th>
<th>Ave thickness (m)</th>
<th>Volume, m³</th>
<th>RD</th>
<th>Tonnage (tonnes)</th>
<th>Tonnage after 10% geological loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal Seam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Leaf A</td>
<td>7.00</td>
<td>207,078,000</td>
<td>1.72</td>
<td>356,174,000</td>
<td>320,557,000</td>
</tr>
<tr>
<td>Middle Leaf B</td>
<td>6.35</td>
<td>176,477,000</td>
<td>1.77</td>
<td>317,674,000</td>
<td>285,907,000</td>
</tr>
</tbody>
</table>
The coals are of sub bituminous quality with low raw calorific value and high ash content, but the sulphur content can be reduced significantly by washing at 1.90 RD.

Summary of coal quality, Unit “A”

Summary of coal quality, Unit “B”

Summary of coal quality, Unit “D”

Summary of coal quality, Unit “F”

It is concluded that the coal is of sufficiently high quality to be suitable for use in power generation, gasification or conversion to hydrocarbons. Washability studies have shown that beneficiation of the coal will reduce the sulphur levels to acceptable World Health Organization levels without significantly impacting on the product yield.

Seven additional boreholes for specific technical and feasibility studies have been drilled but as yet not analysed and have not been incorporated into the resource calculations.
2 INTRODUCTION

This technical report on the Mabesekwa Coal Deposit, Botswana, has been prepared by Analytika Holdings (Pty) Ltd (“Analytika”) for Shumba Coal (Pty) Ltd (“Shumba”) at the request of Mr Mashale Phumaphi, Director, Shumba.

The Mabesekwa Coal Deposit is located in the Republic of Botswana. The deposit is held by Mabesekwa Colliery (Pty) Ltd under Prospecting Licence 428/2009 issued by the Minister of Mineral, Energy and Water Resources under the Mines and Minerals Act of 1999 (“The Property”). It is currently in the process of transferred to Shumba Coal and is waiting for the Ministers’ approval.

Analytika has prepared this technical report compliant with the requirements of the Australasian Code for Reporting of Mineral Resources and Ore Reserves (the “JORC code” of 2012, with subsequent revisions. The report concisely describes the results of exploration work carried out on the Property up until the effective date of this report.

The following data used in the compilation of this technical report were acquired by Analytika, its subcontractors and service providers:

- Comprehensive borehole information, geological logs, sampling data and survey data.
- Coal quality data from samples collected by Analytika.
- The results of geological modelling done by Analytika.
- Published and unpublished geological maps, literature and reports of historical work.
- Data collected by environmental consultant Ecosurv (Pty) Ltd, engaged by Daheng.

Analytika was appointed by Daheng from November 2010 until December 2014 to manage exploration work on the Property. This report has been prepared by Mr Alan Golding, an employee of Analytika. Mr Golding satisfies the requirements of a Competent Person as defined in JORC. Mr Golding has visited the site on numerous occasions and all issues relating to the geological investigations are his responsibility. Geological interpretations and mineral resource estimates in this technical report have been prepared by Mr Golding.

All units of measurements in this report are metric.

The reader is referred to the Glossary of Technical Terms and List of Abbreviations.
3 RELIANCE ON OTHER EXPERTS

Analytika has utilised data obtained by other service providers in the production of this technical report.

Poseidon Geophysics (Pty) Ltd (“Poseidon”) of Gaborone, Botswana performed the geophysical downhole logging and borehole collar surveying.

Advanced Coal Technology (Pty) Ltd (“ACT”) of Pretoria, South Africa conducted all the analyses of the coal. This laboratory has obtained accreditation with the South African Accreditation Service.

Ecosurv (Pty) Ltd, of Gaborone, have provided environmental data which is incorporated in this report.
4 PROPERTY DESCRIPTION AND LOCATION

4.1 Property Description
The Property is Prospecting Licence 428/2009 originally issued to the Daheng Group Botswana (Pty) Ltd under the Mines and Minerals Act 1999 of the Republic of Botswana (the “Act”). The Licence was first issued in on 01 April 2009 and covered 337 km². The Licence expired on 31 March 2012 and subsequently renewed in January 2013 and transferred to Mabesekwa Colliery (Pty) Ltd, with the area reduced to 145km² to comply with the Act, which requires an area reduction of 50% or more on Licence renewal. A second renewal for two years was applied for and the area reduced to 96.7km². This renewal was granted on 1st January 2015 for a further two years.

4.2 Property Location
The Property is located in the Central District, approximately 52 km west of the town of Tonota and 64km southwest of the city of Francistown (Map 1). The area is centred approximately 15km east of the small village of Mabesekwa from which the project name is derived.

Map 1 Location of PL 428/2009

The co-ordinates of the corner points of the Licence as issued, and per the renewal application, are given in Tables 1 and 2 respectively and shown on Map 2. All coordinates are in decimal degrees on datum WGS84.
Table 1  Coordinates of PL 428/2009 as issued

<table>
<thead>
<tr>
<th>Point</th>
<th>Latitude (S)</th>
<th>Longitude (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>21.43019</td>
<td>26.99824</td>
</tr>
<tr>
<td>B</td>
<td>21.39522</td>
<td>27.19227</td>
</tr>
<tr>
<td>C</td>
<td>21.41631</td>
<td>27.25296</td>
</tr>
<tr>
<td>D</td>
<td>21.52389</td>
<td>27.25289</td>
</tr>
<tr>
<td>E</td>
<td>21.54924</td>
<td>27.23646</td>
</tr>
<tr>
<td>F</td>
<td>21.50128</td>
<td>27.16227</td>
</tr>
<tr>
<td>G</td>
<td>21.50115</td>
<td>26.99986</td>
</tr>
</tbody>
</table>

Area = 337 km²

Table 2  Coordinates of PL 428/2009 per current renewal

<table>
<thead>
<tr>
<th>Point</th>
<th>Latitude (South)</th>
<th>Longitude (East)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>S21.43845</td>
<td>E26.99834</td>
</tr>
<tr>
<td>B</td>
<td>S21.41534</td>
<td>E27.07941</td>
</tr>
<tr>
<td>C1</td>
<td>S21.47500</td>
<td>E27.07806</td>
</tr>
<tr>
<td>C3</td>
<td>S21.49900</td>
<td>E27.12112</td>
</tr>
<tr>
<td>D1</td>
<td>S21.49900</td>
<td>E27.16323</td>
</tr>
<tr>
<td>D2</td>
<td>S21.50250</td>
<td>E27.20250</td>
</tr>
<tr>
<td>E</td>
<td>S21.52389</td>
<td>E27.25289</td>
</tr>
<tr>
<td>F</td>
<td>S21.54924</td>
<td>E27.23646</td>
</tr>
<tr>
<td>G</td>
<td>S21.50128</td>
<td>E27.16227</td>
</tr>
<tr>
<td>H</td>
<td>S21.50115</td>
<td>E26.99986</td>
</tr>
<tr>
<td>H1</td>
<td>S21.43845</td>
<td>E26.99834</td>
</tr>
</tbody>
</table>

Area = 96.7 km²

Map 2  Outline of PL 428/2009, as per the renewal

The Property boundaries are not demarcated on the ground, as this is not a requirement under the Act.

4.3 Surface Rights

The Property is entirely within communal tribal land administered by the Tonota Sub-Land Board and the Ngwato Land Board, Serowe. Daheng has at present no surface rights.
4.4 Mineral Rights

All Mineral Rights in Botswana are held by the State. The Prospecting Licence is a concession giving the Mabesekwa Colliery (Pty) Ltd (and ultimately Shumba Coal) exclusive rights to prospect for coal. No other mineral in included. The concession will be 100% held by Shumba Coal and has no encumbrances as of the date of this report.

On completion of a bankable feasibility study Shumba Coal, as Prospecting Licence holder, can apply for a Mining Licence, which may be issued for up to 25 years, renewable.

Should a Mining Licence be granted, the State has the right, under the Act, to purchase 15% of the equity in the mining entity, at fair value.

A royalty of 3% will be payable on payments received from the sale of coal, based on an arms-length transaction at the mine gate, without discounts.

4.5 Environmental and Social Liabilities

The Property carries no environmental or social liabilities as of the date of this report.

Daheng engaged environmental consultant Ecosurv (Pty) Ltd from June 2011. The main role of Ecosurv was to conduct an environmental scoping study for a future coal mining operation and mine-mouth coal fired power station. This scoping study has been completed and was approved by the Department of Environmental Affairs, who set out the Terms of Reference for an environmental impact assessment ("EIA"). An EIA study was commenced by Daheng but not completed due to uncertainties regarding PPA agreements. A full report will be required to support any future application for a Mining Licence.

As part of their scoping study, Ecosurv had collected baseline environmental data from the Property and made recommendations to Daheng for best practise procedures during the drilling program.

4.6 Permits

Shumba Coal holds all permits and permissions necessary for exploration work. Should the project proceed to mining and power generation, a range of permits and permissions will be required, including but by no means limited to a Mining Licence, Power Generation Licence, environmental approvals and awarding of surface rights.
5 ACCESS, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE & PHYSIOGRAPHY.

5.1 Topography
The Property is an almost featureless flat savanna broken by inselbergs in the eastern areas which are underlain by basement rocks. The drainage consists of small NNE – SSW ephemeral streams flowing southwards or southeast into the Motloutse River (Map 3). Topographic contours within PL 428/2009 are given on Map 4. The streams only flow after heavy rain, and there is no perennial surface water. The soils are either transported colluvium or clay.

5.2 Accessibility
The Property is accessed by a 52 km gravel road leading west from the major village of Tonota, which is on the A1 road and the railway line (Map 3). A network of unsurfaced tracks leads off the gravel road.

Within the Property, access can be difficult during the rainy season (November – April) due to the preponderance of clay soils (black "cotton soil") over the area underlain by coal.

![Map 3 Mabesekwa Coal Deposit - Infrastructure](image)

5.3 Climate
Climatic data was obtained from the Department of Meteorological Services, Gaborone. The closest weather station is Francistown. In general the climate is semi arid, with hot, wet summers from November to April and cool, dry winters. The summer average maximum temperature in Francistown is 31.6°C, whilst winter average maximum is 22.9°C. The summer average minimum is 19.8°C, whilst the winter average minimum is 6.0°C.

Rainfall tends to be erratic, unpredictable and highly regional. Showers are often followed by strong sunshine so that large volumes of rainfall do not penetrate the ground but are lost to evapotranspiration. Rainfall occurs between the months of October and March, with the dry season commencing in mid-April and continuing until September. The annual average rainfall (2007 to 2010) recorded for the Francistown area is was 459 mm.
The prevailing wind direction is from the southeast and east with the average monthly wind speed ranging between 7.4 and 31.5 km/hour. High wind speeds usually occur from August to November.

5.4 Land Use

The area is sparsely populated and has few permanent settlements, the nearest village being Mabesekwa some 15 km to the west.

The Property is utilised for cattle ranching and limited arable farming. The small population largely resides on small informal farms (cattle posts) which are seldom fenced.

5.5 Infrastructure

Infrastructure within the Property is very limited, with only the gravel road from Tonota having any proper construction. Basic supplies and fuel can be purchased in Tonota, which has good telecommunications facilities. Most supplies required for exploration work can be obtained in Francistown.

The A1 Francistown – Gaborone road is tarred to a good standard. There is an airport in Francistown which has regular flights to Gaborone and international flights to Johannesburg.
6 HISTORY

6.1 Shell Coal Botswana

The general area of the Property was previously explored by Shell Coal Botswana (Pty) in the 1970s as part of their Foley Coalfield exploration project, Block “N”. Shell defined four coal seams but concluded that the coal was too irregular for exploitation (Clark 1983).

The positions of the Shell boreholes are shown on Map 5 which shows the original prospecting licence outline. None falls within PL 428/2009. The Shell Coal work was compiled by later workers, notably Smith (1984).

Map 5 Position of boreholes by Shell Coal

The Shell Coal records were the reason for the initiation of the coal exploration program by Daheng. However no historical data from Shell has been used in this resource calculation.

No other historical work is known.
7 GEOLOGICAL SETTING

7.1 Regional Setting

7.1.1 The Distribution of the Karoo in Botswana

In Botswana the Karoo Supergroup unconformably overlies Archaean and Proterozoic basement and covers approximately 70% of the area of the country (Map 6). The Karoo is a succession of mainly clastic continental sediments deposited from the Upper Carboniferous to Mid Jurassic (300 to 150 Ma) on the now dispersed Gondwana supercontinent, in a number of major basins which were periodically connected.

The most significant basin in Botswana is the Central Kalahari Basin (Map 7). This basin trended from northeast to southwest along the Central Kalahari Downwarp, across what is now Kalahari Desert region. The eastern margins approximately follow the present pre-Karoo Archean area of Eastern Botswana. Along the eastern margin of the Central Basin a number of embayments, which existed throughout much of the Karoo period, greatly influenced the nature and distribution of sedimentation. A system of WNW trending faults and transverse flexures were active during Karoo sedimentation, although in general sedimentation patterns and types of lithology were controlled by regional subsidence of the main basin to the west. Of significance to coal exploration is the presence of a wide WNW-ESE trending dyke swarm in the northern half of the country which affects coal prospectivity and quality (Map 6). The Shuma Coal Property is however to the south of the main area of dyke emplacement.

The Karoo Supergroup was deposited in and on the margins of the Central Kalahari Basin over a period of some 150 million years during evolution of a contrasting range of palaeo-environments.

The lowermost Karoo strata comprise diverse lithofacies of the Dwyka Group, which was deposited during a major Permo-Carboniferous glaciation. An upward gradation into the Ecca and Beaufort Groups of shallow marine to fluviatile sediments reflects increasing continental conditions and a change to warmer, more arid palaeo-climates. On a regional scale these groupings are partly diachronous as they evolved when the Gondwana supercontinent moved northwards to lower latitudes. Karoo sedimentation ended in the Lower Jurassic (180 Ma) with the eruption of tholeiitic flood basalts (Stormberg Lava Group, also referred to as the Karoo Lava) onto a desert landscape formed of aeolian sands of the Lebung Group. The basalts frequently lie unconformably on the underlying sedimentary rocks. This volcanism heralded a period of crustal instability which terminated the basin and exposed Karoo strata to erosion. It was also a prelude to the formation of the rift systems that eventually fragmented the Gondwana supercontinent and separated the African Craton approximately 140-120 Ma ago.

7.1.2 General Geological Succession of the Karoo Supergroup in Botswana

Within the various areas reviewed, which are not always directly linked, the formation names vary but the sediments and sedimentary environments for the different horizons are, like most of the Karoo in Southern Africa, similar. Smith (1984) divided the Karoo Basins in Botswana
into seven areas (nine if sub areas are included) as indicated in Map 7. The Mabesekwa Property is within the Northern Belt of the Kalahari Sub-Basin of Smith (op cit).

Map 6 Distribution of the Karoo Supergroup in Botswana (Dept. of Geol. Survey)

7.1.3. Stratigraphic Nomenclature

The lithostratigraphic scheme of nomenclature for the Karoo Supergroup in Botswana was formalised by Smith (1984). It was based on correlations between local successions and established for different sub basins of deposition with respect to geological setting and facies changes. The scheme revised and expanded earlier nomenclatures, including that used by Shell Coal in the Dibete – Mmamabula area.

Brief descriptions of the stratigraphy of the areas and their local formation names are given in Map 7 and Figures 1 and 2.
7.1.4 Structural & Sedimentary Environments of Botswana Karoo Deposits

The Karoo sediments of Botswana are the result of cratonic sag forming a stable platform basin. Stable cratonic shelf coalfields are characterised by being relatively uncompressed, lower rank and extend over large areas, as in Botswana. Seams can be traced for many kilometres and between sub-basins. Carbonaceous content tends to be at a maximum towards the basin margins.

In terms of sedimentary environments published research work has been limited and almost exclusively focused on the Morupule Coalfield, being the only area where production occurs. Consequently, descriptions of the likely environment of deposition of the other coalfields are based on generalisations and analogies with the Morupule or Kgaswe Coalfield.

It is considered that the pre-Karoo surface was affected by glaciation which eroded softer areas and left the higher more resistant areas (basement highs). This had a significant influence on the later accumulation of peat, and hence coal formation. The thickness and geometry of the seams is affected by the structural frame work of the region. It is noted that
the Upper Karoo sediments regularly overlap older units to rest directly on to the basement rocks.

Figure 1  Formations in the Karoo Supergroup in Botswana (Smith 1984)

7.2  Local Geology

7.2.1  Lithostratigraphy

MacGregor (1947) was the first to record the occurrence of rocks of Karoo age cropping out east of Sua Pan. Green (1966) constructed the initial stratigraphic correlations with respect to the Karoo of South Africa and Zimbabwe. Coal exploration drilling undertaken by the Department of Geological Survey provided the data for the comprehensive analysis in these correlations. However, Stansfield (1974) reasoned that these correlations could not fully describe stratigraphic relationships as they were not supported by paleontological nor age dating data. Hence he proposed a lithological structure where there was no connotation of chronological assumptions. This lithostratigraphic structure was subsequently refined by Smith (1984) (Figure 2).

Figure 2 shows the correlation of stratigraphy across the Karoo of Botswana, and gives the stratigraphy in the Northern Belt of the Central Kalahari Sub Basin.

7.3  Property Geology

7.3.1  Surface Geology

The Property has been mapped by the Department of Geological Survey and maps published at 1:1,000,000 scale (Map 8) 1:125,000 scale (Map 9). Most of PL 428/2009 is within geological 1:125,000 Sheet 2127A, Shashe (Aldiss 1989).
Figure 2 Stratiographic Correlations of Botswana Coalfields (Smith 1984)
Basement rocks, including banded quartzo-feldspathic gneiss, undifferentiated metasedimentary rocks, undifferentiated migmatite (the Mahalapye Migmatite), porphyritic locally gneissic granite, and undifferentiated greenschist facies metavolcanic rock underlie the northeastern half of the Property (Map 8).

The rocks of the Karoo Supergroup occur in the southwest of the Licence area. The lack of exposure means that the stratigraphy and location of the sub-outcrop of the Karoo is derived from the drilling, mainly undertaken by the Geological Survey Department and Shell Coal Botswana (Pty) Ltd. Aldiss (1989), in his notes on the Shashe Sheet, describes the Karoo geology of the area as consisting of interbedded coal, carbonaceous siltstone and mudstone and white poorly cemented arkosic sandstone and rare tonstein.

Map 8 Property shown on the National Geological Map

7.3.2 Sub-surface geology

The following stratigraphic succession for the Karoo Supergroup on the Property has been established through drilling (Figure 2).

Dwyka Group

The lowermost Dwyka Group is made up of two formations, following the Smith’s model shown in Figure 2 above:

Dukwi Formation

The Dukwi Formation is the basal unit of the Group consisting of tilloid sandstones and varved mudstones of glacial origin.

Tswane Formation

The Tswane Formation generally comprises interbedded non-carbonaceous mudstones, silty mudstones and siltstones.
Ecca Group

Mea Arkose Formation
The Mea Arkose Formation is a thick, massive, white, coarse to medium grained sandstone often carbonaceous in the top half metre. It is relatively thin within the Property.

Tlapana Formation
The Tlapana Formation comprises of massive black carbonaceous mudstones inter-banded with coal seams of variable thickness, and only occasionally inter-banded with siltstones (Figure 3). Vertical and sub-vertical joints have been observed, which may be extensions from the more competent formations below.

The Tlapana Formation contains the coal seams, and is thus the economically significant unit. The seams are of variable thickness and inter-bedded with carbonaceous and coaly mudstones with lesser amounts of siltstone. The most important seam is the Basal Seam (Units “A” and “B”). There are other dull coal seams of variable thickness above the Basal Seams which also appear to have lateral continuity. (See Maps 12-19 showing cross sections and location plans).

The Basal Seam is essentially dull coal with siderite nodules and rare pyrite nodules. It is nominally divided into four bands by nature of its physical characteristic as follows:

- “Unit A’/Lower Section: dull granular coal with scattered pyrite nodules
- “Unit B’/Middle Section: dull lustrous coal with scattered pyrite nodules, rare calcite on cleats
- “Unit C”: Parting of siltstone or sandstone increasing to the northwest.
- “Unit D’/Upper Section: a dull coal to dull lustrous coal with calcite on cleat and calcite veining, with carbonaceous mudstone partings and rare pyrite nodules.

The depth of floor of Unit “A” varies between 29.0m to 99.84m and averages 59.37m below natural ground level (bngl). Similarly, the depth of roof of Unit “B” varies between 25.9m to 85.60 with average of 44.93m bngl. A statistical analysis of this data is given overleaf in Maps 10 and 11 and Figures 4 and 5.
Figure 3  Generalised Stratigraphic Sequence of the Mabesekwa Area

Overburden: Black cotton Soil, sands and clays

Sandstone roof

Dull coals and carbonaceous mudstones “F”

Carbonaceous mudstones

Dull coals and carbonaceous mudstones Unit “E”

Coal seam Unit “D”
Carbonaceous mudstone or siltstones/sandstone parting Unit “C”

Basal Coal seam Unit “B”

Basal Coal seam Unit “A”

Carbonaceous Mudstone/sandstone
Siltstones and Mudstone
Sandstone

Tlapana Formation

Mea Arkose

Dukwi Formation, laminated siltstones, sandstone beds, tillite, pebbly mudstones
Maps 20 - 23 give the floor contour plans of the Seams A, B, D and F and Maps 24-28 show the isopachs of the seam thickness for the same units.

On the eastern margin of the Property a split develops between the “A” and “B” Units with a siltstone parting separating the units and increasing in thickness eastwards towards the subcrop.

The coal seams above the Basal Seam tend to be dull, heavy, thinly banded coals with enriched sulphide stringers and nodules, and have a rare scattering of coarse and fine siderite grains and nodules and occasional coal bands. These are generally overlain by dark brown to grey, normally broken to crumbled weathered coal.
The upper section of the Tlapana Formation, which is only encountered in the deeper southern parts of the Licence, is cream coloured fine-coarse sandstone. The contact of this unit and the overlying Tlhabala Formation has not been observed within the Property.

Map 11 Roof Depth, Unit "B"

Figure 5 Roof Depth, Unit "B" Statistical Data

Tlhabala Formation
The Tlhabala Formation is part of the Beaufort Group, reflecting Smith’s objective of introducing consistency with similar formations in the Foley, Lechana and Morupule coalfields. It is predominantly composed of massive non-carbonaceous grey silty mudstones, with occasional laminations of poorly sorted, slumped sandstone overlying the Tlapana Formation at Dukwi and the Serowe Formation at the Morupule, Mojabana and Lechana Coalfields. Its top is an unconformity with the Lebung Group, marked by a basal sandstone and conglomerate in the Lebung. The Tlhabala Formation has not been recognised on PL 428/2009 but is present down dip to the southwest.
Kalahari Group

The Karoo Supergroup is overlain by the Tertiary to Recent Kalahari Group comprising sandstones, mudstones, calcareous conglomerates, calcretes and silcretes, up to 30 m thick.

7.3.3 Structure

Structurally, the Karoo appears to gently warp and dip over what are believed to be paleo-highs and lows in the basement with a regional dip of 2-3° to the southwest, see Maps 12-19 and accompanying sections. In cored boreholes the dip of the strata is barely perceivable. A contour map of the seam floor indicates a northeast to southwest trend overlaying the regional trend. Along the southern boundary of the Licence there is a distinct “low” i.e. deepening of the seam floor but the increase can be explained by either a fault or an increase of dip to say 6° over a basement low. The latter explanation is favoured but it may be prudent to explore this feature in more detail.

In some cross sections the presence of a dolerite definitely appears to be associated with faulting on a NE-SW trend.

7.3.4 Dolerite Intrusions

Prospecting Licence 428/2009 is located south of the NW-SE trending post-Karoo dolerite dyke swarm which occupies a significant part of the northern portion of the Northern Belt Central Kalahari Sub-Basin. Dolerite intrusions have been encountered on the Property. These have been variously interpreted as sills and dykes in the geological model.

Four boreholes drilled by Daheng are interpreted as being on dolerite dykes.
Map 12  Stratigraphic Cross Section & Map for E-W line from 428-170 to 428-1
Map 14  Stratigraphic Cross Section & Map for E-W line from 428-125 to 428-9
Map 16  Stratigraphic Cross Section & Map for N-S line from 428-107 to 428-41
Map 17  Stratigraphic Cross Section & Map for N-S line from 428-120 to 428-76

Cross-Section A-A'
Map 18  
Stratigraphic Cross Section & Map for N-S line from 428-125 to 428-148
Map 20  Floor Contour Plan, Unit "A"
Map 24  Isopach Map, Unit "A"
Isopach Map, Units "A" and "B" Combined
Map 26  Isopach Map, Unit "B"
Map 28 Isopach Map, Unit "F"
8 DEPOSIT TYPE

The Mabesekwa Property is a normal, stratiform, multi-seam coal deposit with little structural complexity. The coal seams are thick and very extensive laterally, and are interbedded with carbonaceous mudstones, siltstones and sandstones which form the roof, floor and inter-seam sediments.

3D representations of the geological model are presented below to illustrate this in Figures 6 and 7.
Figure 8 3D View of Unit A and Unit B

Figure 9 Alternative 3D View of Unit A and Unit B
9 MINERALISATION

The mineralisation is sub-bituminous coal with high ash and moderate sulphur. With minor beneficiation it gives a thermal coal suitable for power station use.

The coal seams on the Property are described individually. In general the quality of Basal Coal Seam Unit “A” is better than the other units which have, in terms of CV, a similar value.

9.1 Basal Coal Seam Unit “A”

The Basal Coal Seam, Unit “A”, occurs at the base of the Tlapana Formation, the seam floor being the top of the Mea Arkose Formation. The floor consists of carbonaceous mudstone or sandstone which grades downwards into cream fine-coarse sandstone. The roof is defined by a change in coal type rather than a change in lithology and generally leads into the Unit “B” of the same seam, forming a contiguous seam.

An exception to this occurs in the eastern sub-crop area where the seams split into two units separated by a siltstone parting which increases in thickness eastwards.

Unit “A” consists of uniform dull, granular coal with scattered pyrite nodules. It is massive with no well-developed cleat.

Unit “A” occurs over most of the area, ranging from 0.42 m to 16.42 m and averaging 7 m thick, thinning towards the eastern and northern sub-crop. Thickness contours for this unit are shown in Map 24. In some cases a “B” unit was not identified the thickness of “A” is correspondingly greater.

In practice the mining of the “A” and “B” units as separate distinct units would prove problematic as they would not be readily distinguishable in a working face.

9.2 Basal Coal Seam Unit “B”

As mentioned above the floor of Unit “B” is contiguous with the roof of Unit “A”. The roof is variable, sometimes defined by a sharp contact with a thin siltstone band (Unit “C”) or a less well defined carbonaceous mudstone. The thickness of the parting increases to the northwest.

Unit “B” consists of uniform dull lustrous coal with scattered pyrite nodules, and rare calcite on a poorly defined cleat.

Unit “B” occurs over most of the area, ranging between 0.75 m and 15.25 m and averaging 6.35 m thick thinning towards the eastern and northern sub-crop. Thickness contours of this unit plus a total “A” + “B” thickness are shown in Map 26 and 25 respectively.

9.3 Basal Coal Seam Unit “D”

The floor of Unit “D” is variable, sometimes defined by a sharp contact with a thin siltstone band (Unit “C”) or a less well defined carbonaceous mudstone. In the latter case this may result in contamination of the coal as in practice it will not be easy to differentiate between the two horizons. The roof is also poorly defined, being a carbonaceous mudstone.
Unit “D” consists of uniform heavy, dull, lustrous coal with calcite on cleat and calcite veining, with carbonaceous mudstone partings and rare pyrite nodules. Unit “D” is less well developed and not as extensive as units “A” and “B” being higher up the sequence and more prone to removal by weathering.

Unit “D” ranges between 0.53 m and 14.53 m, averaging 5.40 m thick, thinning towards the eastern and northern sub-crop. The thickness contours of this unit are shown in Map 27.

9.4 Unit “F”
The continuity of Unit “F” is not well established and, being higher up the sequence, it is more affected by weathering than the basal coal units.

The floor of Unit “F” is being a poorly defined carbonaceous mudstone. In the latter case this may result in contamination of the coal as in practice it will not be easy to differentiate between the two horizons. The roof is also poorly defined, being a carbonaceous mudstone.

Unit “F” consists of uniform heavy, dull, lustrous coal with calcite on cleat and calcite veining, with carbonaceous mudstone partings and rare pyrite nodules.

Unit “F” ranges between 0.53 m and 14.53 m, averaging 4.71 m thick. Its development is rather sporadic being best developed in the deeper south western section of the deposit and having a rather lenticular occurrence thinning or sub-cropping towards the north and east. The thickness contours of this unit are shown in Map 28.

9.5 Coal Quality
Only data from unweathered coal within the Mabesekwa Deposit has been used. Where part of the seam is weathered this been excluded from the plans and mineral resource estimations. The text and plans all refer to the in situ raw coal quality composites sink at RD = 2.00 fraction of the entire seam. Any argillaceous or clastic partings within the seam have been included in the analysis; thus the plans show the expected run-of-mine qualities where the full seam is to be extracted. No selective mining horizon is discussed in this document.

9.5.1 Relative Density

Baseline Coal Seam Unit “A”
The thickness weighted raw relative density is between 1.58 and 2.18 over the MCD averaging 1.72 overall.

Baseline Coal Seam Unit “B”
The thickness weighted raw relative density is between 1.54 and 1.98 over the major part of the MCD averaging 1.78 overall.

9.5.2 Calorific Value

Baseline Coal Seam Unit “A”
The thickness weighted raw calorific value ranges from 5.5 megajoules per kilogram (MJ/kg) to up to 21.0 MJ/kg, averaging 17.34 MJ/kg overall.
**Basal Coal Seam Unit “B”**

The thickness weighted raw calorific value of the Basal Coal Seam Unit “B” is lower than Unit “A” reflecting the duller nature of the coal with higher ash content, and ranges from 7.4 MJ/kg to up to 22.4 MJ/kg, averaging 13.03 MJ/kg overall.

**Basal Coal Seam Unit “D”**

The thickness weighted raw calorific value of the Basal Coal Seam Unit “D” is similar to Unit “B” reflecting the duller nature of the coal with higher ash content, and ranges from 5.3 MJ/kg to up to 17.1 MJ/kg, averaging 12.81 MJ/kg overall.

**Coal Seam Unit “F”**

The thickness weighted raw calorific value of the Coal Seam Unit “F” is slightly lower than Unit “D” and ranges from 7.74 MJ/kg to up to 16.9 MJ/kg, averaging 12.61 MJ/kg overall.

**9.5.3 Inherent Moisture Content**

**Basal Coal Seam Unit “A”**

The Inherent Moisture Content of the Basal Coal Seam Unit “A” ranges from 1.8% to 5.7% averaging 5.0% overall.

**Basal Coal Seam Unit “B”**

The Inherent Moisture Content of the Basal Coal Seam Unit “B” ranges from 2.5% to 9.5% averaging 5.5% overall.

**Basal Coal Seam Unit “D”**

The Inherent Moisture Content of the Basal Coal Seam Unit “D” ranges from 3.1% to 9.3% averaging 5.5% overall.

**Coal Seam Unit “F”**

The Inherent Moisture Content of the Basal Coal Seam Unit “F” ranges from 3.6% to 9.3% averaging 5.85% overall.

**9.5.4 Ash Content**

**Basal Coal Seam Unit “A”**

The Ash Content of the Basal Coal Seam Unit “A” ranges from 64.0% to 21.7% averaging 34.3% overall.

**Basal Coal Seam Unit “B”**

The Ash Content of the Basal Coal Seam Unit “B” ranges from 58.7% to 25.0% averaging 43.4% overall.

**Basal Coal Seam Unit “D”**

The Ash Content of the Basal Coal Seam Unit “D” ranges from 33.7% to 69.3% averaging 44.07% overall.
Coal Seam Unit “F”
The Ash Content of the Basal Coal Seam Unit “F” ranges from 34.0% to 59.2% averaging 43.28% overall.

9.5.5 Volatile Matter Content

Basal Coal Seam Unit “A”
The Volatile Matter Content of the Basal Coal Seam Unit “A” ranges from 24.6% to 9.4% averaging 18.2% overall.

Basal Coal Seam Unit “B”
The Volatile Matter Content of the Basal Coal Seam Unit “B” ranges from 10.5% to 25.8% averaging 19.05% overall.

Basal Coal Seam Unit “D”
The Volatile Matter Content of the Basal Coal Seam Unit “D” ranges from 10.3% to 24.0% averaging 19.26% overall.

Coal Seam Unit “F”
The Volatile Matter Content of the Basal Coal Seam Unit “F” ranges from 10.3% to 24.6% averaging 20.01% overall.

9.5.6 Sulphur Content

Basal Coal Seam Unit “A”
The Sulphur Content of the Basal Coal Seam Unit “A” ranges from 0.4% to 8.8% averaging 2.12% overall.

Basal Coal Seam Unit “B”
The Sulphur Content of the Basal Coal Seam Unit “B” ranges from 0.2% to 5.2% averaging 1.61% overall.

Basal Coal Seam Unit “D”
The Sulphur Content of the Basal Coal Seam Unit “D” ranges from 0.13% to 5.34% averaging 1.69% overall.

Coal Seam Unit “F”
The Sulphur Content of the Basal Coal Seam Unit “F” ranges from 0.26% to 4.9% averaging 1.87% overall.

Figures 10 – 25 overleaf display CV and sulphur contents for Units “A” “B”, “D” and “F”.

45
10 EXPLORATION

The exploration work completed by Daheng on the Mabesekwa Property is as follows:

10.1 Data Compilation

A review of historical data, and reports by the Geological Survey Department, especially Smith (1984).

10.2 Phase 1 Exploration Drilling

A program in which 14 cored boreholes were drilled on a 1 km grid with the object of delineating the extent of the coal and determining if the area has any large scale potential. Coal quality data was obtained to assess the possible uses of the coal. The drilling started on 5 November 2010 and completed on 15 December 2010.

Six phase 1 holes were drilled by Daheng’s own machines, whilst eight were drilled by contractor Discovery Drilling Contractors Africa.

The 14 boreholes were drilled, geologically logged, geophysically logged and some ground magnetic surveys were undertaken to understand the geological structure, especially dolerite intrusions in the area. Map 9 below indicates the location of the phase 1 holes - those marked by blue circles intersected coal whilst those marked by red circles did not.

Map 29 Mabesekwa Phase 1 boreholes. Blue - coal intersected; Red - no coal

The Phase 1 work indicated that the area had significant potential and a second phase of drilling was commenced.

10.3 Phase 2 exploration drilling.

A drilling program was laid out on a 500 m grid (approximately 58 boreholes) within the area now known to contain coal in order to infill the Phase 1 grid and to delineate the sub-crop (limit) of the coal seam, and to thus bring the resource estimate to a measured standard as defined by JORC.

Drilling operations commenced on the 5th of January 2011, with both Daheng Group Botswana and Discovery Drilling Contractors Africa operating two crews. Progress during the first month was slow because of the rains, which made access difficult.
As drilling progressed it became apparent that the coal extended significantly further west and north than anticipated and the grid was continued westwards and northwards until the full extent of the coal was delineated on a drill spacing of 500m. A total of 175 holes were eventually completed by the 14th September 2011 with Daheng Group Botswana having drilled 71 holes and Discovery 104 holes.

In all, during Phases 1 and 2, a total of 189 boreholes were drilled with a total length of 13,395 m. All holes were geologically and geophysically logged and, where coal was intersected, sampled. The geophysical logging, however, did not succeed in producing full logs in some of the holes due to partial collapse before logging.

Map 10 shows the final drilling pattern. Holes marked in blue intersected coal, whilst those marked in red did not.

10.4 Phase 3
Following the first renewal of the prospecting licence, and after consultation with their Consultants (Norconsult Africa) on power generation, Daheng Group commissioned a series of large diameter (160mm) boreholes in an area on the western side of the coal resources to determine bulk coal properties. Seven boreholes 201 to 207 were drilled in this area by Discovery Drilling on an in-fill pattern between the existing 500m grid for this purpose, see Map 31 overleaf.

All holes were geologically and geophysically logged. The core was extruded on to 160mm sewage pipe and geologically, geotechnically logged before being photographed. The coal seam intersections were then placed into nitrogen filled tubes and sealed pending instructions for analysis. To date this analysis has not been undertaken and the results of this programme are not incorporated into this report.

10.5 Contract Parties and Duties
The Daheng Group contracted Analytika as project manager for the Mabesekwa exploration drilling. As lead contractor, Analytika was responsible for coordinating all exploration activities and all related sub-contractors (Table 3)

<table>
<thead>
<tr>
<th>Service</th>
<th>Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract Drilling</td>
<td>Discovery Drill Contractors Africa (Pty) Ltd</td>
</tr>
<tr>
<td></td>
<td>Two / three drilling rigs</td>
</tr>
<tr>
<td></td>
<td>The Daheng Group Botswana also deployed two of its own drilling rigs</td>
</tr>
<tr>
<td>Coal Analysis</td>
<td>Advanced Coal Technology (Pty) Ltd</td>
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<tr>
<td>Geophysical Wireline Logging</td>
<td>Poseidon Geophysics (Pty) Ltd</td>
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<tr>
<td>Data Capture/Field Operational Management</td>
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<td>Core Logging</td>
<td>Analytika Holdings</td>
</tr>
<tr>
<td>Field Geotechnical/Geological services</td>
<td>Analytika Holdings</td>
</tr>
</tbody>
</table>
Map 30  Mabesekwa Phase 1 + Phase 2 Drilling
Map 31  Mabesekwa Phase 3 Drilling Positions of Infill Large Diameter Boreholes
Map 32  Borehole Locations and Numbers
10.6 Exploration Results

The exploration results, consisting of lithological logs, sampling information, and analytical results, were used to estimate the coal resources as described in Section 18 below.

Exploration drilling has been completed within all the area of PL 428/2008 deemed to contain coal resources. The exploration results are of a sufficiently high standard to allow resource estimation compliant with JORC requirements.
11 DRILLING

The two drilling contractors, Daheng Group Botswana and Discovery Drilling Contractors Africa, deployed two or two-three rigs respectively each (whose crews carried out daytime drilling from Monday to Saturday each week), with one of the Discovery rigs occasionally operating a night shift.

Cored exploration boreholes were drilled at an average spacing of 500m across the Mabesekwa deposit.

11.1 Non-cored holes
The only non-cored holes drilled in the area have been for water and these have not been used in this study.

11.2 Cored Holes
Drilling was done using the conventional water flushing diamond bit technique. Tricone bits were used first to penetrate the surficial cover prior to the start of coring. Discovery drilled TNW whilst the Daheng Group Botswana used NQ bits. Casing was put in before coring to avoid collapse before geophysical survey.

The boreholes in Phases 1 and 2 produced a core of 60.5 mm diameter (TNW) or 47.6mm (NQ) and are assumed vertical. No downhole directional surveys were done as the holes are all relatively shallow and deflections are assumed to be minimal and not material to the resource estimation. A total of 189 boreholes were drilled, totalling 13,395 m.

The boreholes in Phase 3 produced a core of 160 mm diameter. A total of 7 boreholes were drilled, totalling 429.17m.

11.3 Downhole Geophysical Data and Structural Data Integrity
Geophysical logging was attempted on all drill holes which intersected coal. The logging was done by Poseidon Geophysics (Pty) Ltd who provided an Auslog logging unit comprising of a DLS5, 600m single conductor winch, dual density and three armed calliper sondes. Five parameters were recorded, namely natural gamma, single arm and three-arm callipers, long and short spaced densities. Plotting of the data was completed using WellCad.

Natural gamma and downhole density profiles were generated on site at 1:100 scale by Poseidon to assist in correlating coal seams, correcting seam depths, confirming logged seam intervals and checking on core recoveries.

Some of the holes were not logged to the bottom as they partially collapsed below the casing.

Poseidon Geophysics (Pty) Ltd provided stand-alone reports on their work for Phases 1 and 2.
11.4 Core Logging Procedures

The geological logging procedure compiled and implemented by Analytika for the Mabesekwa Project is described below:

1. Borehole core was received at site
2. Core recovery were measured and recorded.
3. RQD was measured and recorded.
4. Core depths were compared with geophysical log depths - where necessary, core depths were adjusted to agree with the geophysically recorded depths.
5. Corrected depths were marked on the core at the end of each run and at 1.0m intervals on core in permanent marker.
6. The entire core for each borehole was photographed with digital camera with borehole and box number displayed on white board.
7. Core was lithologically logged.
8. A specially adapted coding system for lithological logging was used.
9. Detailed logging and sampling of the coal section performed in conjunction with the detailed geophysical log to assist with the correlation of the units between boreholes and to maintain consistency in selection of sampling intervals.
10. The coal cores were split with a chisel to assist with visual determination of coal types and estimation of coal qualities for sampling purposes.

For the Large Diameter holes a revised procedure was implemented as described below:

Core extruded into split 160mm sewage pipe core logging table.

1. Measure core recovery, RQD and mark up at 1.0m intervals.
2. Geological description with particular reference to delineating Unit “A” granular coal and Unit “B” massive dull coal.
3. Additional observations must include nature of sulphur occurrence i.e. frequency of pyrite and size of nodules, presence on cleat or joints, disseminated.
4. Subdivide coal section of the core into 1.0m lengths.
5. Label and photograph core in 1m lengths.

11.5 Borehole Collar Survey

The original collar positions of the Daheng Group Botswana boreholes were set out using a hand held Garmin GPS by Analytika Holdings during field work. Comparison of the differential GPS X and Y positions and those expected from the original setting out was slight (less than 10 m), within the expected margin of error for hand held GPS devices.

Poseidon Geophysics used Novatel Millenium L1/L2 receivers. One unit was set up over the master beacon every day and recorded data from visible satellites whilst the rover unit was acquiring positional information onto a data logger at the borehole sites. Satellite data is recorded by both units on a ten second intervals during the day. At each site rover data is recorded for a minimum of 10 minutes so as to ensure standard error is better than 10 cm. On completion of the field day data from the rover and master base are compared and processed to remove variations in satellite orbit, ionospheric perturbations and other sources of error.
Data processing was undertaken by software written by Waypoint of Canada called GraNav and Grafet. All calculations of position using an ellipsoid definition are relative to the ellipsoid surface, which is not necessarily mean sea level (msl). Poseidon used the EGM-96 definition to convert from ellipsoidal to orthometric (msl) heights.

Data was acquired using the WS84 datum in UTM Zone 35, relative to an arbitrary base which was properly marked for future reference, and then tied to the ITRN2005 network. The value of this reference point is obtained by long observations at the reference point, over several days, then reducing this data against know reference points within the ITRN2005 network. The reduction of this long period data and the determination of the tie were completed by Professor C. Merry.

The master base co-ordinates are: Latitude \(-21.28.51.9509\), Longitude \(27.00.00.7292\), Ellipsoidal Height 1003.425
12 SAMPLING METHOD AND APPROACH

12.1 Core Sampling Procedures

The geophysical logs were used to correlate the seams and to determine the sample intervals. Early in the programme it became apparent that the quality of the seams and their thickness lent the deposit to bulk opencast mining rather than selective mining to obtain a high grade product. Sample intervals within the seams were based on this concept and were selected taking coal quality variations within the entire seam into account.

For each sample the entire core is sampled. Samples are numbered sequentially from the base of the seam.

Samples of the floor, roof and inter-burden (when appropriate) of the seams were also taken to provide information for adjusting qualities for contamination if required. The parting between the “B” and “D” units was always sampled separately regardless of thickness.

The various units “A-B”, have been sampled in every exploration borehole. The “D and F” coal units are not always well developed or present but have always been sampled if they occur in a borehole.

All roof, floor and parting samples are sent for relative density and raw analysis.

In addition to the samples taken as indicated above, two further types of samples were taken from within the seams in selected boreholes on an approximate 1 km grid. These are small samples from the same horizon (approximately 50-100mm in length), one of which has been double bagged and sealed for possible thin section work the other sealed in an air tight canister to preserve moisture content for possible unspecified test work. These samples remain with Analytika in storage.

A total of 64 coal samples were taken in Phase 1 drilling and 512 samples were taken during Phase 2 drilling.

For the Phase 3 works a different sampling procedure was implemented as detailed below:

1. Place core into 1.0m pre-cut and capped 160mm sewage pipe tubes. We will retain some un-cut tube to accommodate the last section which could be over or undersize in length.
2. Insert packaging (media to be confirmed).
3. Label in zip-lock bag to be inserted into tube.
5. Replace air in tube with either water or nitrogen (to be confirmed)
6. Mark top and bottom of tube with depths and sample designation i.e. 428/200/A1 using marker pen
7. Using spray paint (different colour for each borehole) mark end caps
8. Sample tubes to be always stored and moved in a horizontal position.
9. Sample tubes to be listed and dispatched to Gaborone at earliest opportunity with record kept at camp.
10. Samples tubes to be checked on arrival, weighed and documentation made ready for dispatch to laboratory.

Daheng and Shumba Coal is satisfied that the above procedures are within accepted industry standards.

12.2 Sample Size

The size of the samples varies according to the unit being sampled. The sample density in two dimensions is related to the spacing of the boreholes, which varies between 350 and 500 m. As the entire core is sampled, sample bias is not a factor.

Analytika strictly monitored the core recoveries, and where they were found to be unacceptable, the contractor was instructed to re-drill the borehole.

12.3 Sample Collection and Transport

All coal seams intersected in the boreholes are placed in core boxes by the drillers and checked for recovery against drillers depths on site. The core trays are transported to the core yard where the core depths reconciled against the wireline geophysics logs and the core logged. Samples are described and marked off on the core using the wireline logs and recorded lithologies. In order to provide sufficient sample mass for analysis the core is not split but the entire core of each sample is bagged in double plastic bags and the bags sealed with cable ties. Samples are numbered so that the sample number reflects the borehole number, seam identifier and the in-seam sample number. One indelibly marked sample label contained in a small plastic bag is placed inside the sample bag and another attached to the outside. Samples were batched for transport and schedules prepared by the on-site geologist and confirmed on receipt at the storage facility in Gaborone.
13 SAMPLE PREPARATION, COAL ANALYSES AND DATA SECURITY

Coal is not a homogeneous material but an irregular mixture of material of various densities, the lower density material having the best calorific value (CV) with the CV decreasing with increasing density. Similarly, the sulphur content is generally lower in the lower density material and slowly increases with density. However, particles of sulphur bearing material e.g. pyrite, is concentrated in high density float fraction. The washing of the coal samples into float (density fractions) is undertaken to determine how the best possible product can be extracted from the raw coal.

Samples of poor quality material such as the roof and floor of the seam and partings were taken and analysed without separating into the float fractions. This is called a raw sample.

Washability test results indicate that the wash curve i.e. yield/CV/S etc plotted against float fraction, is rather flat and that there are only limited percentages of high CV coal.

13.1 Sample Security

During the early stages of Daheng's exploration programme Analytika initiated the current sample preparation, analysis and security procedure. No employee, officer, director or associate of the Daheng Group Botswana conducted any aspect of sample preparation. The following sections summarise those procedures.

13.2 Sample Preparation

Analytika contracted Advanced Coal Technologies (ACT), an independent commercial analytical laboratory specializing in the sampling and analysis of coal, located in Johannesburg, South Africa, to perform the coal analyses.

When the samples arrive at the laboratory, they are checked against the dispatch schedules and placed in the ACT secure store.

The following sample preparation procedure was followed:

1. Weigh sample and determine raw coal relative density (air dried basis).
2. Crush whole sample to -25 mm.
3. Screen out -0.5 mm material and determine yield of -0.5 mm.
4. Perform analyses as described below.
5. Retain all sample residues until further notice.

13.3 Coal Analyses

Washability test results on the Phase 1 samples indicated that the wash curve i.e. yield plotted against CV/S etc, is rather flat and that there are only limited percentages of high CV coal. As a consequence on Phase 2 samples, washing at Float 1.40 was stopped and Float 1.90 was added.

The coal analyses described below were performed:
- Determine proximate values, calorific value (CV) and total sulphur (TS) on -0.5 mm material.
- Conduct densimetric (float and sink) analyses on -25 mm to +0.5 mm fraction at the following densities: Float 1.40 (Phase 1 only), Float 1.50, Float 1.60, Float 1.70, Float 1.80, Float 1.90 and Sink 1.90 (Phase 2 only).
- On each resultant fraction determine proximate values, CV and TS.

The Analytical Standards shown in Table 4 are those used by ACT to analyse the coal.

### Table 4 Analytical Methods Used

<table>
<thead>
<tr>
<th>Analytical Methods Used</th>
<th>ISO Numbers</th>
</tr>
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<tbody>
<tr>
<td>Sample preparation</td>
<td>ACT-TPM-001 ISO 13909-4:2001</td>
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<tr>
<td>True Relative Density</td>
<td>ACT-TPM-008 AS 1038.21.1.1-2008</td>
</tr>
<tr>
<td>Float and Sinks (%)</td>
<td>ACT-TPM-002 ISO 7936 – 1992</td>
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<tr>
<td>Moisture content (%)</td>
<td>ACT-TPM-010 SANS 5925: 2007</td>
</tr>
<tr>
<td>Ash content (%)</td>
<td>ACT-TPM-011 SABS ISO 1171: 1997</td>
</tr>
<tr>
<td>Volatile matter content (%)</td>
<td>ACT-TPM-012 SABS ISO 562: 1998</td>
</tr>
<tr>
<td>Gross calorific value (MJ/kg)</td>
<td>ACT-TPM-014 SABS ISO 1928: 1995</td>
</tr>
<tr>
<td>Total sulphur via IR spectroscopy (%)</td>
<td>ACT-TPM-013 ISO 19579</td>
</tr>
<tr>
<td>Moisture content (%)</td>
<td>ACT-TPM-010 SANS 5925: 2007</td>
</tr>
<tr>
<td>Ash content (%)</td>
<td>ACT-TPM-011 SABS ISO 1171: 1997</td>
</tr>
<tr>
<td>Volatile matter content (%)</td>
<td>ACT-TPM-012 SABS ISO 562: 1998</td>
</tr>
<tr>
<td>Total sulphur via IR spectroscopy (%)</td>
<td>ACT-TPM-013 based on ISO 19579: 2006</td>
</tr>
<tr>
<td>Ash Fusion Temperature</td>
<td>ACT-TPM-021 based on SABS ISO 540: 2008</td>
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<tr>
<td>Ultimate analysis</td>
<td>ACT-TPM-027 based on ISO 12902</td>
</tr>
<tr>
<td>Ash composition</td>
<td>ASTM D4326 XRF – By fusion bead (Outsourced)</td>
</tr>
<tr>
<td>Trace Elements</td>
<td>ICP method (Outsourced)</td>
</tr>
</tbody>
</table>

13.4 **Quality Control of Coal Analyses**

A system of routine analyses of standard samples is used to maintain the laboratory control of proximate values, calorific value and total sulphur content. ACT is a participant in the Coalspec Proficiency Testing Scheme system that provides an external control against which each laboratory's results for standard and check samples are compared with results from 53 other participating laboratories in South Africa and abroad. The scheme is administered by Coal and Mineral Technologies (Pty) Limited, which is a subsidiary of the South African Bureau of Standards.

ACT has been accepted for accreditation to ISO/IEC 17025:1999 (E) through the South African National Accreditation Service (SANAS). The quality management system is in operation at the laboratory and the quality manual was submitted to SANAS who have assessed and accepted it as part of the accreditation process. ACT is accredited by DECTI, an accreditation system required by most of the major South African mining companies.
ACT participates in recognized “round robin” quality control procedures, both locally and internationally and the results and certificates are available to interested parties. It is the author’s opinion that the above procedures are satisfactory and within accepted industry standards.

13.5 Assay Reporting
ACT reports all results as individual results certificates as fractional and cumulative data on a spreadsheet (MS Excel) and in pdf format.

The coal samples sent to ACT for various analyses, depending on the purpose of the particular sample.

13.6 Selective Testing
Eighteen boreholes were selected for more detailed test work on an approximate 1km spacing across the Mabesekwa deposit. This work included ultimate analysis (C-H-N-O), ash fusion temperature (AFT) reducing and oxidising, ash composition analysis (by XRF) and forty five trace elements plus chlorine and fluorine.

13.6.1 Ultimate Analysis
The arithmetic average of the ultimate analyses along with the best and worst parameter combinations are reported in Table 5 below.

13.6.2 Ash Elemental Analysis
The arithmetic average of the ash elemental analysis along with the highest and lowest individual parameter combinations are shown in Table 5 below.

13.6.3 Trace Elements
The arithmetic average of the trace elements analyses along with the highest and lowest individual parameter combinations are shown in Table 5 below.

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<thead>
<tr>
<th>Sample Identification</th>
<th>All samples</th>
<th>Unit &quot;A&quot;</th>
<th>Unit &quot;B&quot;</th>
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</thead>
<tbody>
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<td>% Moisture (air-dried)</td>
<td>Ave</td>
<td>5.3</td>
<td>Ave</td>
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<td>% Ash (air-dried)</td>
<td>Min</td>
<td>2.6</td>
<td>Min</td>
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<td>% Ash (dry basis)</td>
<td>Max</td>
<td>7.2</td>
<td>Max</td>
</tr>
<tr>
<td>% Volatile Matter</td>
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<td>20.1</td>
<td>Ave</td>
</tr>
<tr>
<td>% Volatile Matter (dry basis)</td>
<td>Min</td>
<td>18.0</td>
<td>Min</td>
</tr>
<tr>
<td>% Fixed Carbon (calculation)</td>
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<td>Max</td>
</tr>
<tr>
<td>% Total Sulphur (air-dried)</td>
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<td>Ave</td>
</tr>
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<td>% Carbon (air-dried)</td>
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<td>0.17</td>
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<tr>
<td>% Hydrogen (air-dried)</td>
<td>Max</td>
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<tr>
<td>% Nitrogen (air-dried)</td>
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</tr>
<tr>
<td>% Oxygen (air-dried)</td>
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<td></td>
<td>Max</td>
<td>58.45</td>
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Table 5 Summary of Ultimate Analyses Results
## Ash Composition Analysis (XRF)

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<td></td>
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<td>Deformation (°C)</td>
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<tr>
<td>Softening (°C)</td>
<td>1205</td>
<td>1158</td>
<td>1478</td>
</tr>
<tr>
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<tr>
<td>Hemispherical (°C)</td>
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<td>Flow (°C)</td>
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### AFT (Reducing)

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### Trace Elements

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<th>Max</th>
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<td>0.02</td>
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<td>8.24</td>
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<td>8.24</td>
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<td>0.05</td>
<td>0.20</td>
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<td>P₂O₅ %</td>
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<td>0.75</td>
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<td>2.14</td>
<td>1.57</td>
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<td>V₂O₅ %</td>
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<td>ZrO₂ %</td>
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<td>B mg/kg</td>
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<td>Ce mg/kg</td>
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<td>84.97</td>
<td>56.03</td>
<td>141.80</td>
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<td>6.17</td>
<td>20.25</td>
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<td>Cr mg/kg</td>
<td>65.30</td>
<td>28.47</td>
<td>108.32</td>
<td>57.25</td>
<td>24.53</td>
<td>108.32</td>
<td>61.03</td>
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<td>Cs mg/kg</td>
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<td>0.89</td>
<td>24.99</td>
<td>6.45</td>
<td>1.18</td>
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<td>Cu mg/kg</td>
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<td>13.96</td>
<td>33.66</td>
<td>19.73</td>
<td>8.28</td>
<td>37.32</td>
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<td>3.93</td>
<td>3.02</td>
<td>6.39</td>
</tr>
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<td>Max</td>
<td>1176</td>
<td>1047</td>
<td>1228</td>
<td>1216</td>
<td>1103</td>
<td>1343</td>
<td>1242</td>
<td>1193</td>
<td>1442</td>
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<td>Unit &quot;A&quot;</td>
<td>Unit &quot;B&quot;</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Ave</td>
<td>Min</td>
<td>Max</td>
<td>Ave</td>
<td>Min</td>
<td>Max</td>
<td>Ave</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>Hg mg/kg</td>
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<td>0.07</td>
<td>0.55</td>
<td>0.13</td>
<td>0.05</td>
<td>0.55</td>
<td>0.12</td>
<td>0.06</td>
<td>0.25</td>
</tr>
<tr>
<td>Ho mg/kg</td>
<td>0.58</td>
<td>0.27</td>
<td>0.69</td>
<td>0.45</td>
<td>0.27</td>
<td>0.60</td>
<td>0.53</td>
<td>0.33</td>
<td>1.16</td>
</tr>
<tr>
<td>In mg/kg</td>
<td>0.08</td>
<td>0.03</td>
<td>0.10</td>
<td>0.07</td>
<td>0.03</td>
<td>0.15</td>
<td>0.07</td>
<td>0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>Ir mg/kg</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>La mg/kg</td>
<td>67.89</td>
<td>23.55</td>
<td>138.34</td>
<td>49.87</td>
<td>23.55</td>
<td>95.23</td>
<td>66.65</td>
<td>35.51</td>
<td>138.34</td>
</tr>
<tr>
<td>Li mg/kg</td>
<td>23.47</td>
<td>9.02</td>
<td>44.42</td>
<td>18.98</td>
<td>9.02</td>
<td>44.42</td>
<td>23.90</td>
<td>9.78</td>
<td>53.71</td>
</tr>
<tr>
<td>Mn mg/kg</td>
<td>223.29</td>
<td>126.76</td>
<td>385.30</td>
<td>232.14</td>
<td>83.44</td>
<td>385.30</td>
<td>183.23</td>
<td>125.83</td>
<td>341.35</td>
</tr>
<tr>
<td>Mo mg/kg</td>
<td>5.62</td>
<td>2.02</td>
<td>17.04</td>
<td>8.17</td>
<td>1.93</td>
<td>23.34</td>
<td>4.16</td>
<td>1.66</td>
<td>13.89</td>
</tr>
<tr>
<td>Nb mg/kg</td>
<td>12.59</td>
<td>7.98</td>
<td>18.22</td>
<td>11.88</td>
<td>7.21</td>
<td>24.05</td>
<td>11.27</td>
<td>8.47</td>
<td>18.22</td>
</tr>
<tr>
<td>Nd mg/kg</td>
<td>1.37</td>
<td>0.51</td>
<td>2.12</td>
<td>1.00</td>
<td>0.51</td>
<td>2.01</td>
<td>1.30</td>
<td>0.74</td>
<td>2.57</td>
</tr>
<tr>
<td>Ni mg/kg</td>
<td>16.16</td>
<td>4.95</td>
<td>29.10</td>
<td>14.78</td>
<td>4.95</td>
<td>29.10</td>
<td>13.73</td>
<td>4.95</td>
<td>25.58</td>
</tr>
<tr>
<td>Pb mg/kg</td>
<td>21.30</td>
<td>8.93</td>
<td>41.96</td>
<td>18.77</td>
<td>8.93</td>
<td>41.96</td>
<td>20.14</td>
<td>12.77</td>
<td>31.08</td>
</tr>
<tr>
<td>Pt mg/kg</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
</tr>
<tr>
<td>Rb mg/kg</td>
<td>8.84</td>
<td>2.15</td>
<td>8.84</td>
<td>8.61</td>
<td>3.98</td>
<td>21.01</td>
<td>7.60</td>
<td>4.69</td>
<td>13.98</td>
</tr>
<tr>
<td>Sb mg/kg</td>
<td>0.18</td>
<td>0.05</td>
<td>0.25</td>
<td>0.12</td>
<td>0.05</td>
<td>0.26</td>
<td>0.15</td>
<td>0.08</td>
<td>0.25</td>
</tr>
<tr>
<td>Sc mg/kg</td>
<td>9.20</td>
<td>3.49</td>
<td>12.82</td>
<td>8.25</td>
<td>3.49</td>
<td>19.39</td>
<td>8.65</td>
<td>4.47</td>
<td>14.56</td>
</tr>
<tr>
<td>Se mg/kg</td>
<td>0.71</td>
<td>0.49</td>
<td>0.94</td>
<td>0.72</td>
<td>0.42</td>
<td>0.91</td>
<td>0.69</td>
<td>0.58</td>
<td>0.99</td>
</tr>
<tr>
<td>Sn mg/kg</td>
<td>3.81</td>
<td>1.47</td>
<td>5.68</td>
<td>2.98</td>
<td>1.37</td>
<td>6.00</td>
<td>3.75</td>
<td>1.77</td>
<td>6.75</td>
</tr>
<tr>
<td>Sr mg/kg</td>
<td>409.48</td>
<td>166.40</td>
<td>622.39</td>
<td>384.64</td>
<td>273.04</td>
<td>605.59</td>
<td>410.94</td>
<td>175.71</td>
<td>1066.15</td>
</tr>
<tr>
<td>Ta mg/kg</td>
<td>0.92</td>
<td>0.57</td>
<td>1.31</td>
<td>0.81</td>
<td>0.57</td>
<td>1.21</td>
<td>0.85</td>
<td>0.71</td>
<td>1.31</td>
</tr>
<tr>
<td>Te mg/kg</td>
<td>0.03</td>
<td>0.01</td>
<td>0.10</td>
<td>0.02</td>
<td>0.00</td>
<td>0.06</td>
<td>0.03</td>
<td>0.00</td>
<td>0.08</td>
</tr>
<tr>
<td>Th mg/kg</td>
<td>24.72</td>
<td>6.92</td>
<td>110.45</td>
<td>33.32</td>
<td>6.07</td>
<td>110.45</td>
<td>21.09</td>
<td>5.99</td>
<td>71.37</td>
</tr>
<tr>
<td>Tl mg/kg</td>
<td>0.11</td>
<td>0.01</td>
<td>0.16</td>
<td>0.10</td>
<td>0.01</td>
<td>0.44</td>
<td>0.09</td>
<td>0.01</td>
<td>0.18</td>
</tr>
<tr>
<td>U mg/kg</td>
<td>29.85</td>
<td>11.69</td>
<td>171.95</td>
<td>34.57</td>
<td>11.69</td>
<td>66.98</td>
<td>29.09</td>
<td>7.32</td>
<td>171.95</td>
</tr>
<tr>
<td>V mg/kg</td>
<td>51.91</td>
<td>18.15</td>
<td>83.79</td>
<td>38.57</td>
<td>20.89</td>
<td>83.06</td>
<td>52.12</td>
<td>18.15</td>
<td>87.20</td>
</tr>
<tr>
<td>W mg/kg</td>
<td>2.52</td>
<td>1.48</td>
<td>4.48</td>
<td>2.84</td>
<td>1.22</td>
<td>6.12</td>
<td>2.22</td>
<td>1.30</td>
<td>4.65</td>
</tr>
<tr>
<td>Y mg/kg</td>
<td>37.00</td>
<td>13.48</td>
<td>59.83</td>
<td>28.89</td>
<td>13.48</td>
<td>48.54</td>
<td>35.20</td>
<td>16.45</td>
<td>76.07</td>
</tr>
<tr>
<td>Zn mg/kg</td>
<td>22.82</td>
<td>8.87</td>
<td>65.50</td>
<td>20.46</td>
<td>6.08</td>
<td>52.50</td>
<td>22.11</td>
<td>3.55</td>
<td>65.50</td>
</tr>
<tr>
<td>Zr mg/kg</td>
<td>168.27</td>
<td>102.23</td>
<td>251.10</td>
<td>135.69</td>
<td>102.23</td>
<td>226.33</td>
<td>140.66</td>
<td>111.89</td>
<td>251.10</td>
</tr>
<tr>
<td>Cl mg/l</td>
<td>761</td>
<td>223</td>
<td>1606</td>
<td>827</td>
<td>294</td>
<td>2745</td>
<td>542</td>
<td>326</td>
<td>1152</td>
</tr>
<tr>
<td>F ppm</td>
<td>269</td>
<td>166</td>
<td>686</td>
<td>258</td>
<td>154</td>
<td>686</td>
<td>236</td>
<td>169</td>
<td>518</td>
</tr>
</tbody>
</table>
14 DATA SECURITY

14.1 Borehole Data
Hard copies of the lithological and geophysical logs are kept on file at Analytika’s office in Gaborone. These comprise all the original hand written logs, annotations and the name of the geologist responsible for the logging. Digital copies of the lithological logs are generated by capturing the data in MS Excel spreadsheet format.

These digital copies along with the digital copies of the geophysical logs are archived at Analytika’s office in Gaborone. They are stored on a server which is backed up to a parallel hard drive and also exported to an external drive kept at another location. Original geophysical digital are also kept and backed up Poseidon's office at Gaborone.

14.2 Coal Quality Data
Original assay data received from the laboratory in soft copy are kept at Analytika’s office with back up as outlined above.

14.3 Geological Database and Model
The database and the geological model are stored on the Analytika server.
15  DATA VERIFICATION

15.1  Borehole Collar Elevations
Borehole collar elevations were checked during geological model construction to ensure no transcription errors. A topographical map of the borehole collars produces a regular topographical model and no anomalies were observed.

15.2  Lithological Data
Digital copies of logs have been checked against original hard copies and found to be accurate. Seam correlations and the stratigraphy of all units intersected are validated before creation of the database load files. During geological model construction, the data is rigorously checked (Section 18) and any anomalies investigated and resolved.

15.3  Sampling Data
The geological modelling software checks that sampled intervals correspond to seam intervals. Samples that fall outside of logged seam intervals are discarded; where a sample partially falls outside the seam interval, weighted qualities (weighted on length of sample used against total sample length) are used.

15.4  Analytical Data
ACT is a participant in the Coalspec Proficiency Testing Scheme system that provides an external control against which each laboratory’s results for standard and check samples are compared with results from 53 other participating laboratories in South Africa and abroad. The scheme is administered by Coal and Mineral Technologies (Pty) Limited, which is a subsidiary of the South African Bureau of Standards.

15.5  Statement of Verification
Mr Alan Golding is a competent person as defined by the JORC Code and has undertaken independent checks on and verified both the raw and modelled data utilised and/or relied upon in the preparation of this technical report.

15.6  Limitation of Verification
Neither the author nor the Daheng Group Botswana has performed any additional independent verification of raw coal analyses nor washability analyses as the quality control measures already in place are considered sufficient. No referee samples have been used.

15.7  Failures in Verification
All data was verified, in some cases during more than one verification procedure. No failures in verification occurred. Where errors or anomalies were detected during the verification processes, these were investigated and corrected if necessary before the data was incorporated into the database and before any geological modelling or resource estimation took place.
16 ADJACENT PROPERTIES

The coal deposits on PL 428/2009 extend southwards and eastwards beyond the Licence boundaries. African Energy Resources (AER) holds Prospecting Licence 96/2005 to the south and east of the Mabesekwa deposit. AER has an on-going exploration programme on this Licence which has identified significant coal resources of a very similar nature to those found in PL 428/2009.

The boundaries of AER’s Licence are not always the same as those of PL 428/2009 and there are small, but significant, open areas immediately to the east and south of the PL 28/2009 which are assumed to contain coal.

Map 32 is an extract from the Energy Minerals Prospecting Licence database map from the Department of Geological Survey in April 2012.

Map 33 Prospecting Licences Coal (Energy Minerals). April 2012
No processing or metallurgical testwork has yet been undertaken on the Mabesekwa coal deposit.
18 MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

18.1 Geological Modelling Process
Analytika used Rockworks modelling package (Version 15) using the parameters for modelling tabular mineral resources. This programme is used to create both the physical and quality coal models, interrogate the models, estimate the resources and produce average block coal qualities. The output is in the form of geological sections, contour plots, statistical reports and resource estimation reports. This report is based on the results contained in that output.

18.2 Data Preparation and Verification

Physical Data
Borehole collar co-ordinates, geological logs and sampling information in separate MS Excel spreadsheets were generated internally or obtained from Poseidon and ACT. The data were rigorously checked for correctness. The seam and stratigraphic correlations were created and verified in Rockworks before being used for creating the physical coal model. Once the database was loaded, it was analysed using statistical methods and various contour plots. Any anomalies were investigated and checked with reference to the field data and if necessary, the data modified as required and reloaded. The geophysical logs were used to confirm seam depths and thicknesses. This iterative process continued until the database was correct; thereafter the final physical model was built.

18.3 Physical Coal Model

18.3.1 Grid Definition
The grid cell size was 200 m x 200 m.

18.3.2 Physical Model Interpolators
The interpolators used to create the model were as follows:

- Inverse distance
- Weight exponent = 2
- Number of points = 4 (maximum)
- High Fidelity
- Smoothing Grid
- Maximum Distance with a cut-off distance of 2.8%

18.4 Raw Coal Quality Model

18.4.1 Quality Model Interpolators
All modelled qualities are on an air dry basis. The interpolators used to create the model are as above.

18.5 Washed Coal Quality Model
The individual sample wash tables were composited to one wash table per seam.
These wash tables were then loaded into Rockworks and gridded to form a washed coal quality model. Loading the complete wash tables allows the model to be interrogated for coal products at specific wash densities or particular limits on the qualities (e.g. a product floated at density 1.9 or a product that has a minimum calorific value of 18.0 MJ/kg). Average wash tables were calculated, based on a weighted average basis. The same modelling parameters were used as for the raw coal model. It should be noted that as boreholes 1-14 (Phase 1 drilling) were not washed to 1.90 their values could not be included in this figure.

18.5.1 Unit “A”

Unit A is a sub-bituminous, low CV coal. Raw its CV is 17.3 MJ/kg with a sulphur value of approximately 2.12%. Washing this raw coal improves its CV by some 10-15% and, significantly reduces the Sulphur to less than 1%.

The figures given below in Table 6 are based on value multiplied by seam thickness.

<table>
<thead>
<tr>
<th>Seam ID</th>
<th>Sink/Float Fraction</th>
<th>Cumulative % Yield</th>
<th>Cumulative % Moisture</th>
<th>Cumulative % Ash</th>
<th>Cumulative % Volatile</th>
<th>Cumulative Fixed Carbon</th>
<th>Cumulative % Sulphur</th>
<th>Cumulative CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Float 1.90</td>
<td>82.12</td>
<td>5.22</td>
<td>28.80</td>
<td>18.19</td>
<td>47.79</td>
<td>0.64</td>
<td>19.34</td>
</tr>
<tr>
<td>A</td>
<td>raw</td>
<td>100</td>
<td>4.96</td>
<td>34.28</td>
<td>18.17</td>
<td>42.58</td>
<td>2.12</td>
<td>17.34</td>
</tr>
</tbody>
</table>

Coal of this quality is ideally suited to a mine mouth power station, coal to liquid process or coal gasification. It is not suited to beneficiation for export.

18.5.2 Unit “B”

Unit B is a sub-bituminous, low CV coal. Raw its CV is 13.03 MJ/kg with a sulphur value of approximately 1.61%. Washing this raw coal improves its CV by some 15-20% and, significantly reduces the sulphur to less than 0.5%.

The figures given below in Table 7 are based on value multiplied by seam thickness.

<table>
<thead>
<tr>
<th>Seam ID</th>
<th>Sink/Float Fraction</th>
<th>Cumulative % Yield</th>
<th>Cumulative % Moisture</th>
<th>Cumulative % Ash</th>
<th>Cumulative % Volatile</th>
<th>Cumulative Fixed Carbon</th>
<th>Cumulative % Sulphur</th>
<th>Cumulative CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Float 1.90</td>
<td>70.40</td>
<td>6.10</td>
<td>34.85</td>
<td>19.91</td>
<td>39.14</td>
<td>0.40</td>
<td>15.84</td>
</tr>
<tr>
<td>B</td>
<td>raw</td>
<td>100</td>
<td>5.50</td>
<td>43.25</td>
<td>19.00</td>
<td>32.25</td>
<td>1.61</td>
<td>13.00</td>
</tr>
</tbody>
</table>

Coal of this quality is ideally suited to a mine mouth power station, coal to liquid process or coal gasification. At a Float of 1.90 a yield of 70.4% at a CV of 15.85MJ/kg puts the coal on the lower end of coal quality for power station use.
18.5.3 Unit “C”

Sampling of Unit C varied between sampling of a siltstone parting and, when it was a carbonaceous mudstone, sampling of the parting and overlying dull heavy coal. Results confirm that the parting has no calorific value.

18.5.4 Unit “D”

In the Phase 1 work the “D” samples were essentially sampling of dull heavy coal and its rare carbonaceous mudstone partings. Some samples which were sampled C but were coal samples fall within this unit in terms of the lithological division and were accordingly put within this section to draw the cumulative averages for this seam.

Results confirm that some of the samples may, in some cases warrant mining as a separate unit as indicated by their Float or Raw values. This unit is of poor quality in comparison to Unit A but not so dissimilar to Unit B, due to the presence of carbonaceous mudstone partings.

Table 8  Summary of "D" Seam Coal Quality

<table>
<thead>
<tr>
<th>Seam ID</th>
<th>Fraction</th>
<th>% Yield</th>
<th>% Moisture</th>
<th>% Ash</th>
<th>% Volatile</th>
<th>Fixed Carbon</th>
<th>% Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Float</td>
<td>67.25</td>
<td>6.38</td>
<td>34.19</td>
<td>20.60</td>
<td>38.83</td>
<td>0.34</td>
<td>16.14</td>
</tr>
<tr>
<td>D</td>
<td>Raw</td>
<td>100.00</td>
<td>5.50</td>
<td>44.07</td>
<td>19.26</td>
<td>31.16</td>
<td>1.69</td>
<td>12.81</td>
</tr>
</tbody>
</table>

18.5.5 Unit “E”

The “E” samples were essentially sampling of carbonaceous mudstone. Results confirm that the parting has no calorific value.

18.5.6 Unit “F”

This unit encompasses samples taken as either sample “F” or “G”. This unit has a slightly poorer coal quality than unit “D” being slightly thinner compared to the other seams.

Table 9  Summary of "F" Seam Coal Quality

<table>
<thead>
<tr>
<th>Seam ID</th>
<th>Fraction</th>
<th>% Yield</th>
<th>% Moisture</th>
<th>% Ash</th>
<th>% Volatile</th>
<th>Fixed Carbon</th>
<th>% Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Float</td>
<td>65.37</td>
<td>6.54</td>
<td>32.42</td>
<td>21.42</td>
<td>39.62</td>
<td>0.32</td>
<td>16.37</td>
</tr>
<tr>
<td>F</td>
<td>Raw</td>
<td>100.00</td>
<td>5.85</td>
<td>43.28</td>
<td>20.01</td>
<td>30.87</td>
<td>1.87</td>
<td>12.61</td>
</tr>
</tbody>
</table>

Unit “F” thus has a very slightly inferior quality Unit “D”.

18.6 Mineral Resource Estimation and Classification

18.6.1 Loss Factors and Coal Parameter Cut-offs

The geological loss factors used when estimating the mineral resource are shown in Table 11. A 10% factor has been used.
No cut-offs have been used to estimate the mineral resources for each seam. Only coal seams where the seam roof is below the limit of weathering are included.

18.6.2 Mineral Resource Statement

All coal resource estimates are on a Total Tonnes in-situ basis.

Table 10 shows the global mineral resource estimate for the Mabesekwa Coal Deposit.

Note that due to rounding errors summation of resources may not total exactly; all seam thickness and relative densities are average values.

The drilling programme was designed to established the coal resource at a JORC code Measured level with an average borehole spacing of 500 m.

Drilling has confirmed the presence of a Basal Seam consisting of two distinct coal types designated, from the bottom Unit “A” and Unit “B”. This is commonly followed by a siltstone parting (Unit “C”) and an Upper Leaf Unit “D”.

Above the Basal Seam there is an interval of non-coal bearing material which is followed by a lower grade seam termed Unit “F”.

The drilling has indicated that these seams have continuity with some variations in Units “D” and a greater degree in Unit “F”.

The volumes below were computed by the geological model using coal thicknesses from borehole intersections. An average thickness weighted Relative Density as calculated from laboratory results for each Unit, and an estimated Gross Tonnage in-situ for the seams is given in Tables 10 and 11. The geological loss has been set to 10%.

<table>
<thead>
<tr>
<th>Seam</th>
<th>Ave thickness (m)</th>
<th>Volume, m³</th>
<th>RD</th>
<th>Tonnage (tonnes)</th>
<th>Tonnage after 10% geological loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal Seam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Leaf A</td>
<td>7.00</td>
<td>207,078,000</td>
<td>1.72</td>
<td>356,174,000</td>
<td>320,557,000</td>
</tr>
<tr>
<td>Middle Leaf B</td>
<td>6.35</td>
<td>176,477,000</td>
<td>1.77</td>
<td>317,674,000</td>
<td>285,907,000</td>
</tr>
<tr>
<td>Upper Leaf D</td>
<td>5.04</td>
<td>96,205,000</td>
<td>1.86</td>
<td>178,941,000</td>
<td>161,047,000</td>
</tr>
<tr>
<td><strong>Total Coal</strong></td>
<td><strong>18.39</strong></td>
<td><strong>479,760,000</strong></td>
<td></td>
<td><strong>852,789,000</strong></td>
<td><strong>767,511,000</strong></td>
</tr>
<tr>
<td>Seam</td>
<td>Ave thickness (m)</td>
<td>Volume, m³</td>
<td>(RD)</td>
<td>Tonnage (tonnes)</td>
<td>Tonnage after 10% geological loss</td>
</tr>
<tr>
<td>--------</td>
<td>------------------</td>
<td>------------</td>
<td>------</td>
<td>-----------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Seam F</td>
<td>4.71</td>
<td>47,760,000</td>
<td>1.86</td>
<td>88,834,000</td>
<td>79,951,000</td>
</tr>
<tr>
<td>Total Coal</td>
<td>4.71</td>
<td>47,760,000</td>
<td></td>
<td>88,834,000</td>
<td>79,951,000</td>
</tr>
</tbody>
</table>

No formal calculations of ratio (overburden thickness to coal tonnage) have been undertaken. An arithmetic calculation of all coal intersections in all boreholes with an average RD of 1.78 which applies to coal thickness results in a figure of approximately 1:1.2.

Overburden is likely to be rip-able in most cases except where the roof of the coals is greater than approximately 40 m where a sandstone might require blasting.
Map 34  Lower Leaf "A" 2D Isopach Grid Map
Map 35  Lower Leaf "A" 3D Isopach Grid Map
Grid Model Statistics

Dimensions:

X-Minimum (western-most node) .......... 500,000.0
X-Maximum (eastern-most node) .......... 510,400.0
X-Spacing (east/west node spacing) .... 200.0
X-Nodes (east/west points) .......... 53

Y-Minimum (southern-most node) ........ 7,622,250.0
Y-Maximum (northern-most node) ........ 7,628,250.0
Y-Spacing (north/south node spacing) ... 200.0
Y-Nodes (north/south points) .......... 31

Node Statistics:

Total Nodes ......................... 1,643
Minimum node value .................. 0.0
Maximum node value ................. 17.75
Minimum node value > 0 ............. 0.343421
Mean node value ..................... 6.199945
Standard deviation of node values ... 1.866213
Non-zero and non-null nodes ......... 821
Sum of all node values .............. 503,953.662177 7,623,968.268313
Null Values (z = -1.0e27) .......... 808

Area/Volume:

Cell Area ......................... 40,000.0
Map Area (X*Y) .................... 62,400,000.0
Grid Area (Sum(Cell Area)) ........... 65,720,000.0
Model Volume (Sum(Cell Area*Z)) .... 207,078,169.28743
Non-Zero node area ................... 32,840,000.0

Slope:

Minimum ....................... 0.0
Maximum ......................... 3.6
Mean ................................ 0.5
Standard Deviation ............... 0.5
Median ........................... 0.4
Skewness ......................... 2.17
Kurtosis ........................ 7.19

Aspect:

Minimum ...................... 0.8
Maximum ....................... 359.9
Mean ............................ 177.2
Standard Deviation .............. 109.0
Median ......................... 178.9
Skewness ...................... -0.01
Kurtosis ..................... -1.31

Strike:

Minimum ...................... 0.4
Maximum ....................... 179.8
Mean ........................... 96.0
Standard Deviation ............ 50.5
Median ......................... 100.4
Skewness ...................... -0.17
Kurtosis .................... -1.0
Figure 10  Unit "A" Cumulative Sulphur at 1.90 Float

Cumulative % Sulphur

<table>
<thead>
<tr>
<th></th>
<th>Yield</th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>95.9</td>
<td>10.0</td>
<td>47.5</td>
<td>25.5</td>
<td>58.5</td>
<td>1.21</td>
<td>23.4</td>
</tr>
<tr>
<td>Min</td>
<td>21.0</td>
<td>1.8</td>
<td>17.5</td>
<td>8.6</td>
<td>29.4</td>
<td>0.13</td>
<td>11.9</td>
</tr>
<tr>
<td>Ave</td>
<td>82.2</td>
<td>5.2</td>
<td>28.8</td>
<td>18.2</td>
<td>47.8</td>
<td>0.64</td>
<td>19.3</td>
</tr>
</tbody>
</table>

Figure 11  Unit "A" Cumulative Sulphur at 1.90 Sink (Raw)

Cumulative % Sulphur

<table>
<thead>
<tr>
<th></th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>9.7</td>
<td>64.0</td>
<td>24.6</td>
<td>54.7</td>
<td>3.8</td>
<td>21.9</td>
</tr>
<tr>
<td>Min</td>
<td>1.8</td>
<td>21.7</td>
<td>9.4</td>
<td>16.2</td>
<td>0.4</td>
<td>5.5</td>
</tr>
<tr>
<td>Ave</td>
<td>5.0</td>
<td>34.3</td>
<td>18.2</td>
<td>42.6</td>
<td>2.12</td>
<td>17.3</td>
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</table>
**Figure 12**  Unit "A" Cumulative CV at 1.90 Float

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<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>95.9</td>
<td>10.0</td>
<td>47.5</td>
<td>25.5</td>
<td>58.5</td>
<td>1.21</td>
<td>23.4</td>
</tr>
<tr>
<td>Min</td>
<td>21.0</td>
<td>1.8</td>
<td>17.5</td>
<td>8.6</td>
<td>29.4</td>
<td>0.13</td>
<td>11.9</td>
</tr>
<tr>
<td>Ave</td>
<td>82.2</td>
<td>5.2</td>
<td>28.8</td>
<td>18.2</td>
<td>47.8</td>
<td>0.64</td>
<td>19.3</td>
</tr>
</tbody>
</table>

**Figure 13**  Unit "A" Cumulative CV at 1.90 Sink (Raw)

<table>
<thead>
<tr>
<th></th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>9.7</td>
<td>64.0</td>
<td>24.6</td>
<td>54.7</td>
<td>3.8</td>
<td>21.9</td>
</tr>
<tr>
<td>Min</td>
<td>1.8</td>
<td>21.7</td>
<td>9.4</td>
<td>16.2</td>
<td>0.4</td>
<td>5.5</td>
</tr>
<tr>
<td>Ave</td>
<td>5.0</td>
<td>34.3</td>
<td>18.2</td>
<td>42.6</td>
<td>2.12</td>
<td>17.3</td>
</tr>
</tbody>
</table>
Map 36  Middle Leaf "B", 2D Isopach Grid Map
Map 37 Middle Leaf "B" Isopach Grid Map

Top

N

E

W

S

Base

Color Index

16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
### Grid Model Statistics

**Dimensions:**
- X-Minimum (western-most node) .......... 500,000.0
- X-Maximum (eastern-most node) .......... 510,400.0
- X-Spacing (east/west node spacing) ..... 200.0
- X-Nodes (east/west points) ............. 53
- Y-Minimum (southern-most node) ......... 7,622,250.0
- Y-Maximum (northern-most node) ........ 7,628,250.0
- Y-Spacing (north/south node spacing) ... 200.0
- Y-Nodes (north/south points) .......... 31

**Node Statistics:**
- Total Nodes ............................ 1,643
- Minimum node value .................... -0.053909
- Maximum node value .................... 15.25
- Minimum node value > 0 ............... 0.045524
- Mean node value ...................... 5.283744
- Standard deviation of node values ..... 1.875207
- Non-zero and non-null nodes .......... 805
- Sum of all node values ............... 4,411.925932
- Center of Mass (x,y) .................. 504,068.545955 7,623,851.94436
- Null Values (z = -1.0e27) .......... 808

**Area/Volume:**
- Cell Area .................. 40,000.0
- Map Area (X*Y) .................... 62,400,000.0
- Grid Area (Sum(Cell Area)) .......... 65,720,000.0
- Model Volume (Sum(Cell Area*Z)) .... 176,477,037.29521
- Non-Zero node area .............. 32,200,000.0

**Slope:**
- Minimum ................... 0.0
- Maximum ................... 3.5
- Mean .................... 0.5
- Standard Deviation ........... 0.4
- Median ................... 0.4
- Skewness ................... 2.16
- Kurtosis .................. 8.2

**Aspect:**
- Minimum ................... 0.2
- Maximum ................... 359.9
- Mean ..................... 170.1
- Standard Deviation ........... 110.8
- Median ................... 164.6
- Skewness ................... 0.12
- Kurtosis .................. -1.35

**Strike:**
- Minimum ................... 0.2
- Maximum ................... 179.8
- Mean ..................... 92.9
- Standard Deviation ........... 52.2
- Median ................... 97.6
- Skewness ................... -0.13
- Kurtosis .................. -1.18
Figure 14  Unit "B" Cumulative Sulphur at 1.90 Float

Cumulative % Sulphur

<table>
<thead>
<tr>
<th></th>
<th>Yield</th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>95.2</td>
<td>10.0</td>
<td>51.3</td>
<td>26.3</td>
<td>59.7</td>
<td>2.20</td>
<td>23.5</td>
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<tr>
<td>Min</td>
<td>50.2</td>
<td>2.5</td>
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<td>10.2</td>
<td>27.6</td>
<td>0.15</td>
<td>10.6</td>
</tr>
<tr>
<td>Ave</td>
<td>70.40</td>
<td>6.10</td>
<td>34.85</td>
<td>19.91</td>
<td>39.14</td>
<td>0.40</td>
<td>15.84</td>
</tr>
</tbody>
</table>

Figure 15  Unit "B" Cumulative Sulphur at 1.90 Sink (Raw)

% Sulphur

<table>
<thead>
<tr>
<th></th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>9.6</td>
<td>58.7</td>
<td>25.8</td>
<td>56.8</td>
<td>5.2</td>
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<td>Min</td>
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<td>10.5</td>
<td>20.3</td>
<td>0.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Ave</td>
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<td>43.25</td>
<td>19.00</td>
<td>32.25</td>
<td>1.61</td>
<td>13.00</td>
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</tbody>
</table>
### Figure 16

**Unit "B" Cumulative CV at 1.90 Float**

<table>
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<tr>
<th></th>
<th>Yield</th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>95.2</td>
<td>10.0</td>
<td>51.3</td>
<td>26.3</td>
<td>59.7</td>
<td>2.20</td>
<td>23.5</td>
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<tr>
<td>Min</td>
<td>50.2</td>
<td>2.5</td>
<td>20.3</td>
<td>10.2</td>
<td>27.6</td>
<td>0.15</td>
<td>10.6</td>
</tr>
<tr>
<td>Ave</td>
<td>70.40</td>
<td>6.10</td>
<td>34.85</td>
<td>19.91</td>
<td>39.14</td>
<td>0.40</td>
<td>15.84</td>
</tr>
</tbody>
</table>

### Figure 17

**Unit "B" Cumulative CV at 1.90 Sink (Raw)**

<table>
<thead>
<tr>
<th></th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>9.6</td>
<td>58.7</td>
<td>25.8</td>
<td>56.8</td>
<td>5.2</td>
<td>22.4</td>
</tr>
<tr>
<td>Min</td>
<td>2.5</td>
<td>25.0</td>
<td>10.5</td>
<td>20.3</td>
<td>0.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Ave</td>
<td>5.50</td>
<td>43.25</td>
<td>19.00</td>
<td>32.25</td>
<td>1.61</td>
<td>13.00</td>
</tr>
</tbody>
</table>
Map 39 Upper Leaf "D" 3D Isopach Grid Map

Top

N E S W

Base

Color Index

16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Grid Model Statistics

Dimensions:

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<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>X-Minimum (western-most node)</td>
<td>500,000.0</td>
</tr>
<tr>
<td>X-Maximum (eastern-most node)</td>
<td>510,400.0</td>
</tr>
<tr>
<td>X-Spacing (east/west node spacing)</td>
<td>200.0</td>
</tr>
<tr>
<td>X-Nodes (east/west points)</td>
<td>53</td>
</tr>
<tr>
<td>Y-Minimum (southern-most node)</td>
<td>7,622,250.0</td>
</tr>
<tr>
<td>Y-Maximum (northern-most node)</td>
<td>7,628,250.0</td>
</tr>
<tr>
<td>Y-Spacing (north/south node spacing)</td>
<td>200.0</td>
</tr>
<tr>
<td>Y-Nodes (north/south points)</td>
<td>31</td>
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</tbody>
</table>

Node Statistics:

<table>
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<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nodes</td>
<td>1,643</td>
</tr>
<tr>
<td>Minimum node value</td>
<td>-0.10413</td>
</tr>
<tr>
<td>Maximum node value</td>
<td>14.5</td>
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<tr>
<td>Minimum node value &gt; 0</td>
<td>0.013304</td>
</tr>
<tr>
<td>Mean node value</td>
<td>2.880382</td>
</tr>
<tr>
<td>Standard deviation of node values</td>
<td>1.969346</td>
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<tr>
<td>Non-zero and non-null nodes</td>
<td>765</td>
</tr>
<tr>
<td>Sum of all node values</td>
<td>2,405.11883</td>
</tr>
<tr>
<td>Center of Mass (x,y)</td>
<td>504,295.775357 7,624,094.667348</td>
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<tr>
<td>Null Values (z = -1.0e27)</td>
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Area/Volume:

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<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Cell Area</td>
<td>40,000.0</td>
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<tr>
<td>Map Area (X*Y)</td>
<td>62,400,000.0</td>
</tr>
<tr>
<td>Grid Area (Sum(Cell Area))</td>
<td>65,720,000.0</td>
</tr>
<tr>
<td>Model Volume (Sum(Cell Area*Z))</td>
<td>96,204,753.194787</td>
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<tr>
<td>Non-Zero node area</td>
<td>30,600,000.0</td>
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</tbody>
</table>

Slope:

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<th>Value</th>
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</thead>
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<td>Minimum</td>
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<tr>
<td>Maximum</td>
<td>2.7</td>
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<tr>
<td>Mean</td>
<td>0.5</td>
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<tr>
<td>Standard Deviation</td>
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<tr>
<td>Median</td>
<td>0.4</td>
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<tr>
<td>Skewness</td>
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<tr>
<td>Kurtosis</td>
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</table>

Aspect:

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<tr>
<td>Maximum</td>
<td>359.1</td>
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<tr>
<td>Mean</td>
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<tr>
<td>Standard Deviation</td>
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<tr>
<td>Median</td>
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<td>-0.07</td>
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<tr>
<td>Kurtosis</td>
<td>-1.33</td>
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</table>

Strike:

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<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Minimum</td>
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<tr>
<td>Maximum</td>
<td>180.0</td>
</tr>
<tr>
<td>Mean</td>
<td>95.6</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>50.7</td>
</tr>
<tr>
<td>Median</td>
<td>97.5</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.14</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-1.17</td>
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</tbody>
</table>
Figure 18  Unit "D" Cumulative Sulphur at 1.90 Float

Cumulative % Sulphur

<table>
<thead>
<tr>
<th>Yield</th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>92.0</td>
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<td>44.7</td>
<td>26.2</td>
<td>46.8</td>
<td>1.10</td>
</tr>
<tr>
<td>Min</td>
<td>17.2</td>
<td>3.7</td>
<td>23.5</td>
<td>9.3</td>
<td>24.6</td>
<td>0.11</td>
</tr>
<tr>
<td>Ave</td>
<td>67.3</td>
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<td>34.2</td>
<td>20.6</td>
<td>38.8</td>
<td>0.34</td>
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</table>

Figure 19  Unit "D" Cumulative Sulphur at 1.90 Sink (Raw)

Cumulative CV

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<tr>
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<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
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</thead>
<tbody>
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<td>9.3</td>
<td>69.3</td>
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<td>5.34</td>
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<tr>
<td>Min</td>
<td>3.1</td>
<td>33.7</td>
<td>10.3</td>
<td>13.1</td>
<td>0.13</td>
</tr>
<tr>
<td>Ave</td>
<td>5.5</td>
<td>44.1</td>
<td>19.3</td>
<td>31.2</td>
<td>1.69</td>
</tr>
</tbody>
</table>
Figure 20  
Unit "D" Cumulative CV at 1.90 Float

Cumulative % Sulphur

Max  
Yield 92.0  
Moisture 10.3  
Ash 44.7  
Volatile 26.2  
Fixed Carbon 46.8  
Sulphur 1.10  
CV 19.7

Min  
Yield 17.2  
Moisture 3.7  
Ash 23.5  
Volatile 9.3  
Fixed Carbon 24.6  
Sulphur 0.11  
CV 9.6

Ave  
Yield 67.3  
Moisture 6.4  
Ash 34.2  
Volatile 20.6  
Fixed Carbon 38.8  
Sulphur 0.34  
CV 16.1

Figure 21  
Unit "D" Cumulative CV at 1.90 Sink (Raw)

Cumulative CV

Max  
Moisture 9.3  
Ash 69.3  
Volatile 24.0  
Fixed Carbon 40.4  
Sulphur 5.34  
CV 17.1

Min  
Moisture 3.1  
Ash 33.7  
Volatile 10.3  
Fixed Carbon 13.1  
Sulphur 0.13  
CV 5.3

Ave  
Moisture 5.5  
Ash 44.1  
Volatile 19.3  
Fixed Carbon 31.2  
Sulphur 1.69  
CV 12.8
Map 40
Seam "F" 3D Isopach Grid Map

Top

N

E

W

S

Base

Color Index

12.0
10.0
8.0
6.0
4.0
2.0
0.0
Grid Model Statistics

Dimensions:
X-Minimum (western-most node) .......... 500,000.0
X-Maximum (eastern-most node) .......... 510,400.0
X-Spacing (east/west node spacing) .... 200.0
X-Nodes (east/west points) .......... 53

Y-Minimum (southern-most node) ...... 7,622,250.0
Y-Maximum (northern-most node) ...... 7,628,250.0
Y-Spacing (north/south node spacing) ... 200.0
Y-Nodes (north/south points) ........ 31

Node Statistics:
Total Nodes ............................ 1,643
Minimum node value ..................... -0.059221
Maximum node value ................... 11.82
Minimum node value > 0 ................. 0.000115
Mean node value ......................... 1.429935
Standard deviation of node values ...... 1.4351
Non-zero and non-null nodes .......... 725
Sum of all node values ................. 1,193.995652
Center of Mass (x,y) .................. 503,921.522886 7,623,446.734644
Null Values (z = -1.0e27) .......... 808

Area/Volume:
Cell Area ............................. 40,000.0
Map Area (X*Y) ........................ 62,400,000.0
Grid Area (Sum(Cell Area)).......... 65,720,000.0
Model Volume (Sum(Cell Area*Z)) ...... 47,759,826.064628
Non-Zero node area ................... 29,000,000.0

Slope:
Minimum .............................. 0.0
Maximum .............................. 3.0
Mean ................................... 0.4
Standard Deviation .................. 0.4
Median .................................. 0.2
Skewness .............................. 1.82
Kurtosis .............................. 4.58

Aspect:
Minimum .............................. 0.5
Maximum .............................. 359.5
Mean .................................. 174.9
Standard Deviation ............ 110.5
Median ................................. 183.9
Skewness ........................... -0.03
Kurtosis ........................... -1.39

Strike:
Minimum ............................... 0.1
Maximum ............................... 180.0
Mean .................................. 96.8
Standard Deviation .............. 52.1
Median ................................. 103.9
Skewness ............................. 0.22
Kurtosis ............................. -1.
Figure 22  Unit "F" Cumulative Sulphur at 1.90 Float

<table>
<thead>
<tr>
<th>Yield</th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
</tr>
</thead>
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<tr>
<td>Max</td>
<td>95.6</td>
<td>10.1</td>
<td>42.8</td>
<td>27.7</td>
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<tr>
<td>Min</td>
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<td>10.0</td>
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<td>0.15</td>
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<tr>
<td>Ave</td>
<td>65.37</td>
<td>6.54</td>
<td>32.42</td>
<td>21.42</td>
<td>39.62</td>
<td>0.32</td>
</tr>
</tbody>
</table>

Figure 23  Unit "F" Cumulative Sulphur at 1.90 Sink (Raw)

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
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</thead>
<tbody>
<tr>
<td>Max</td>
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<td>59.2</td>
<td>24.6</td>
<td>38.7</td>
<td>4.90</td>
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<tr>
<td>Min</td>
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<td>19.6</td>
<td>0.26</td>
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<tr>
<td>Ave</td>
<td>5.85</td>
<td>43.28</td>
<td>20.01</td>
<td>30.87</td>
<td>1.87</td>
</tr>
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</table>
Figure 24  Unit "F" Cumulative CV at 1.90 Float

<table>
<thead>
<tr>
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<th>Yield</th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
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</thead>
<tbody>
<tr>
<td>Max</td>
<td>95.6</td>
<td>10.1</td>
<td>42.8</td>
<td>27.7</td>
<td>44.4</td>
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<td>20.0</td>
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<tr>
<td>Min</td>
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<td>3.4</td>
<td>24.8</td>
<td>10.0</td>
<td>33.5</td>
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<td>13.9</td>
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<td>Ave</td>
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<td>6.54</td>
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<td>21.42</td>
<td>39.62</td>
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<td>16.37</td>
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Figure 25  Unit "F" Cumulative CV at 1.90 Sink (Raw)

<table>
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<tr>
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<th>Moisture</th>
<th>Ash</th>
<th>Volatiles</th>
<th>Fixed Carbon</th>
<th>Sulphur</th>
<th>CV</th>
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<tbody>
<tr>
<td>Max</td>
<td>9.3</td>
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<tr>
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<td>30.87</td>
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<td>12.61</td>
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</table>

Cumulative CV
19 INTERPRETATION AND CONCLUSIONS

Review and analysis of all borehole and analytical data to date confirms that Units “A”, “B” and “D” of the basal seam of the Mabesekwa Coal Deposit are potentially economic and constitute a mineral resource.

The data density is sufficient to confirm continuity of both physical and quality parameters. Rigorous data verification, along with the geological modelling, has shown that the data are reliable.

Geological modelling has shown the seams to be laterally persistent and consistently horizontal over the majority of the Mabesekwa Deposit and to generally maintain constant thickness.

Structurally the seams appear to be relatively simple with some gentle open folding and minor disturbance due to faulting limited to well defined areas. Dolerite intrusions have been encountered in three areas but generally the seam is not greatly affected by the intrusions.

Three target seams have been identified: the Basal Seam consisting of two contiguous Units “A” and “B” and an upper Unit “D”. The “A” Unit has an average thickness of 7.0 m while Unit “B” has an average thickness of 6.35 m. Unit “D” has an average thickness of 5.04 m but its continuity and thickness are slightly more variable than that of the other Units of the Basal Seam.

The results from the drilling have been used to estimate the mineral resources in accordance with the guidelines referred to in JORC code, as follows:

- The Basal Seam Units “A”, “B” and “D” constitute a Measured resource of 767.5 mt.
- Unit “F” being more irregular constitutes an Indicated resource of 80.0 mt.

The coal is of sufficiently high quality to be suitable for use in power generation, gasification or conversion to hydrocarbons. Washability studies have shown that beneficiation of the coal will reduce the sulphur levels to acceptable World Health Organization levels without significantly impacting on the product yield.

The coal is not regarded as being amenable to washing to an export quality.
20 RECOMMENDATIONS

20.1 Exploration Drilling
At this point in time no further exploration drilling is proposed. However it is considered likely that addition drilling for specific items such as geotechnical data and detailed coal metallurgy and quality studies will be required at some time.

20.2 Modelling
Further modelling should be undertaken on Unit F to confirm its viability for extraction.
21 REFERENCES


Analytika Holdings, Proposed exploration programme and budget for coal and Coalbed Methane on four prospecting licences PL425, 426, 428 and 429(A and B)/2008 held by Daheng Group, Botswana.

Analytika Holdings. A Review of the Coal and Coalbed Methane potential of seven licences held by Daheng Group, Botswana. Analytika Holdings


22 DATE AND SIGNATURE PAGE

This technical report has been prepared under the supervision of Mr Alan Golding. Mr Golding is a qualified person as defined by the JORC Code. No other qualified person was responsible for preparing or supervising the preparation of any part of this report.

The effective date of this technical report is 24 March 2015.

Signed this 24 day of March 2015.

A. Golding
B.Sc. Hons Geology
Pr. Nat. Sci.
M.S.A.I.E.G., F.G.S., M.G.S.SA
23 CERTIFICATE OF QUALIFIED PERSON

I, Alan Golding, BSc (Geology) (Hons.) of Plot 64516, Unit 106, Fairgrounds, Gaborone, Botswana

Do hereby certify that:

I graduated with a BSc Hons. (Geology) from the University College of Wales, Aberystwyth, Great Britain in 1971.

I am a registered Professional Natural Scientist (Registration number: 400036/96) with the South African Council for Natural Scientific Professions, a Member of the Geological Society of South Africa (Membership number: 57063), a Member of the South African Institute of Engineering Geologists (Membership number: 95/171), a Fellow of the Geological Society of London (Membership number: 1015188) and a Member of the Fossil Fuel Foundation of Africa.

I have worked as a geologist for over thirty seven years since graduation, of which 15 have been in coal specializing in exploration, geological modelling and resource estimation.

I am an employee of Analytika Holdings, with the designation of Direction/Principal Exploration Geologist. I have had no prior involvement with the property that is the subject of the technical report.

I have read the JORC guidelines, including the definition of “qualified person” set out therein and certify that by reason of my qualifications, professional affiliations and past relevant work experience; I fulfil the requirements of a qualified person for the purposes of the Code.


I have personally visited the Mabesekwa site on multiple occasions during the exploration works.

As of the date of this certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading. The technical report has been prepared in compliance with the JORC Code 2012 amended 2009.

I consent to the filing of the technical report with any stock exchange and any other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public.

Signed at Gaborone this 24th day of March 2015.

Alan Golding
24 CONSENT OF QUALIFIED PERSON

Alan Golding, BSc Hons. (Geology) of

Unit 106, Plot 64516,
Fairgrounds
Gaborone
Botswana

To whom it may concern:

I, Alan Golding, BSc (Hons) (Geology) hereby consent to the public filing of the Technical Report:


[Signature]
25 GLOSSARY OF TECHNICAL TERMS

Ash
The altered remains after combustion of the mineral matter present in the coal.

Basement
Rocks of Pre-Karoo age that lie unconformably below the coal bearing Karoo age sediments.

Clastic
Rock or rocks composed of fragments or particles of older rocks or previously existing solid matter.

Coal
Carbonaceous sedimentary rock largely derived from plant remains with an associated mineral content corresponding to an ash yield less than or equal to 50 per cent.

Craton
The stable interior of a continental plate.

Cut point density
The specific gravity of the dense medium, usually magnetite and water, used to separate the product coal from the raw coal by means of floatation in a dense medium circuit.

Dolerite
A medium grained basic intrusive rock composed mostly of pyroxenes and sodium calcium feldspar.

Dyke
A body of intruding igneous rock that cross cuts the host strata at a high angle.

Fault
A fracture in rocks along which rocks on one side have been moved relative to the rocks on the other.

Intracratonic
Within the boundaries of the craton.

Intrusion/Intrusive
A body of igneous rock that invades older rock.

Karoo Supergroup
Succession of sedimentary and volcanic rocks which span a time period from 300 to 140 million years ago covering much of southern Africa.

Lithology
A term pertaining to the general characteristics of a rock based on hand sized specimens and outcrops rather than microscopic or chemical features.

Palaeohigh
A geographic area of raised topography that was present during sediment deposition.

Polymictic
A clastic sedimentary rock type composed of more than one clast type.

Raw Coal
*In situ* coal.

Washed Coal
Coal that has been beneficiated by means of removing the low quality high density constituents by means of a dense medium separation plant.

Yield
The mass percentage of the coal product compared with the raw coal mass after beneficiation.
### LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
<th>Unit</th>
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<tr>
<td>A</td>
<td>Ash Content</td>
<td>%</td>
</tr>
<tr>
<td>AFT</td>
<td>Ash Fusion Temperatures</td>
<td>C</td>
</tr>
<tr>
<td>CI</td>
<td>Chlorine</td>
<td>%</td>
</tr>
<tr>
<td>CTL</td>
<td>Coal to Liquids Hydrocarbons</td>
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<tr>
<td>CV</td>
<td>Calorific Value</td>
<td>MJ/kg</td>
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<tr>
<td>IM</td>
<td>Inherent Moisture Content</td>
<td>%</td>
</tr>
<tr>
<td>LD</td>
<td>Large Diameter</td>
<td></td>
</tr>
<tr>
<td>Mt</td>
<td>Million tonnes</td>
<td></td>
</tr>
<tr>
<td>Ph</td>
<td>Phosphorus in Coal</td>
<td>%</td>
</tr>
<tr>
<td>RD</td>
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<td></td>
</tr>
<tr>
<td>S</td>
<td>Sulphur</td>
<td>%</td>
</tr>
<tr>
<td>VM</td>
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