Independent Engineer's Report on HolGoun's Eastern Coal Complex in the Springbok Flats Coalfield, Limpopo Province, South Africa

Prepared for

HolGoun Energy (Pty) Ltd

Report No 381289/HolGoun eastern coal IER-02

November 2008

SRK Consulting
Engineers and Scientists

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Abstract

HolGoun Energy (Proprietary) Limited ("HolGoun") has been granted the exclusive prospecting rights for uranium and coal over 62 farms comprising 71,081ha in the Springbok Flats. These prospecting rights lie in two separate areas centred around the Settlers and Roedtan areas on the border of the Limpopo and Mpumalanga Provinces of South Africa. Forty six farms, covering approximately 47,734ha, form a single contiguous area on the Limpopo/Mpumalanga border in the Settlers area with a further 23,347ha around the Roedtan area. The Settlers area has in turn been divided into two broad mining complexes, one in the East and one in the West which are referred to as the East and West complexes respectively. The historical data (and sometimes in the geological section) refer to the East and West complexes as the Tuinplaats and Settlers areas respectively.

Trans Natal Coal Corporation Limited ("TNC") undertook an extensive exploration programme from 1973 to 1984 that was in sufficient detail to then qualify as a feasibility study. The programme comprised a comprehensive drilling programme, core analysis, metallurgical test work, trial mining and the assessment of qualities and extractive techniques. This exploration programme encompassed the whole of the Springbok Flats and was primarily focussed on coal. The programme delineated the coal deposits and found within the coal deposits two areas containing uranium as well as a large coking coal deposit in the Eastern side of the Springbok Flats. All this data is now owned by HolGoun.

Following the granting of the prospecting rights and a full review of the historical data, HolGoun commenced a twin drilling programme to validate the historical data. This programme yielded similar results and consequently HolGoun has full confidence that the historical data can be relied upon for both the delineation of the coking coal deposit in the East complex and the qualities of the coal.

Based on the twin drilling results, HolGoun has upgraded the historical resources on forty two farms within the prospecting rights area and the South African Mineral Resource Committee ("SAMREC") compliant Mineable Tonnes In-Situ ("MTIS") coal resources attributed to the East Complex comprises 60Mt (MTIS) of coking coal.

An Independent Engineers Report ("the 2008 IER"), prepared by SRK Consulting (South Africa) (Proprietary) Limited ("SRK"), reviewed and summarised the historical exploration and evaluation programme previously conducted. The purpose of this 2008 IER was to evaluate the robustness of the project and the viability of a potential uranium and coking coal project. The 2008 IER split the project into separate entities:

- West Complex (Settlers) comprising a uraniferous shale mine, ashing plant, power generation and uranium recovery plant, and
- East Complex (Tuinplaats) comprising a coking coal mine and coking coal beneficiation plant with steam coal by-product.

As the two projects can be developed independently of each other and the coking coal is found only in the East Complex, this IER considers only the development of the coking coal project in the East Complex.

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Independent Engineer's Report on HolGoun's Eastern Coal Complex in the Springbok Flats Coalfield, Limpopo Province, South Africa

1 Introduction

1.1 Background

HolGoun Energy (Pty) Limited ("HolGoun") has been awarded significant prospecting rights for coal and uranium on 62 farms within the Springbok Flats Coalfield situated in the Limpopo Province of South Africa. The prospecting rights cover two broad areas in the Springbok Flats. Forty six farms, comprising approximately 47,734ha, form a single contiguous area on the Limpopo/Mpumalanga border in the Settlers area (the "Settlers Farms") with a further 20 farms comprising 23,347ha around the Roedtan area. The Settlers Farms area has in turn been divided into two broad mining complexes, one in the East and one in the West which are referred to as the East and West complexes respectively. The historical data (and sometimes in the geological section) refer to the East and West complexes as the Tuinplaats and Settlers areas respectively.

Prolific geological data acquired in the 1970s and 1980s by Trans Natal Coal Corporation Ltd ("TNC") is now owned by HolGoun. HolGoun commissioned SRK Consulting (South Africa) (Pty) Limited ("SRK") to collate and summarise the TNC information in the Settlers Farms area into an Independent Engineer's Report ("IER") that could be presented to potential investors. SRK submitted its report entitled *Independent Engineer's Report on the Coal and Uranium Assets of HolGoun Energy in the Springbok Flats Coalfield* to HolGoun in November 2007 (the "2007 IER").

HolGoun completed a verification programme in the Settlers Farms area during 2007 which included the drilling of twinned holes to verify the Mineral Resources for both the coal and uranium and to obtain samples for test work purposes ("Twinning Campaign"). A geological model based on the historical exploration borehole data and results of the Twinning Campaign and consequent Coal and Uranium Resource estimate was prepared by GEMECS (Pty) Limited ("GEMECS"). SRK reviewed the GEMECS' work and submitted its findings from the review and a signed-off Coal and Uranium Resources statement in a report entitled *Independent Geological Review including Coal and Uranium Resource Estimates for the Springbok Flats Project* to HolGoun in June 2008 (the "IGR").

The GEMECS' geological model and Inferred Mineral Resource estimate was used by MRM Mining Services (Pty) Limited ("MRM") as the basis for conceptual mine planning, modelling and scheduling in the X-PAC mine software package.

SRK compiled an updated IER entitled *Independent Engineer's Report on HolGoun's Coal and Uranium Assets in the Springbok Flats Coalfield – updated to include SAMREC-compliant Resources* in August 2008 (the "2008 IER"). The 2008 IER represented an update of the 2007 IER and incorporated the Coal and Uranium Resources presented in the IGR, the conceptual mine model and production schedule developed by MRM and the additional metallurgical testwork and investigation done by Mintek and Bateman.

In the 2007 IER and 2008 IER, the uranium and coal project in the Settlers Farms area (collectively the "Energy Project") was split into two entities:

- **East Complex (Tuinplaats)**, comprising the coal mine and coking coal beneficiation plant, and sale of coking coal and a middlings steam coal product. A limited administrative facility and a stand-alone discard facility for coarse and fine rejects will be included here;
- **West Complex (Settlers)**, comprising the uraniferous shale mine using a 0.2kg/t U_3O_8 cut-off grade, continuous fluidized bed ("CFB") ashing plant, uranium recovery plant, power generating facility and a stand-alone discard facility for coarse and fine rejects. Revenue is derived from the sale of electricity and uranium oxide (U_3O_8). The main administrative facility will be located in the West Complex.

This IER considers only the coal measures in the East Complex. Reference to the West Complex, the uraniferous shales or other coal measures within the Settlers Farms area that do not form part of the East Complex will be included where relevant, to ensure that the reader gets a balanced view of the context and significance of various technical aspects presented in this IER.

1.2 Purpose of Report

This IER considers only the coal measures within the East Complex, on a stand-alone basis.

1.3 Sources of Data

A comprehensive and detailed database comprising historical information and the results of an extensive exploration and evaluation programme conducted by TNC during the period 1974 to 1983 has been acquired by HolGoun for the Energy Project. A complete list of this data can be found at the end of Section 14. Key reports and data used in preparation of this IER are listed in Section 14.

1.4 Effective Date

The effective date (the "Effective Date") of this IER and the information on which it is based is deemed to be 1 July 2008.

All technical-economic projections incorporated into the Preliminary Economic Assessment and resultant cash flows for the East Complex are taken to commence on 1 January 2011. Any costs associated with prefeasibility and feasibility studies and capital raising exercises are assumed to happen before this date, would be sunk costs for the project and are thus excluded from the economic assessment.

1.5 Limitations, Reliance on Information, Declarations and Consent

1.5.1 Limitations

SRK's opinion contained herein and effective 1 July 2008, is based on information provided to SRK by HolGoun throughout the course of SRK's investigations. The technical information as provided to and taken in good faith by SRK has not been independently verified by means of re-calculation. As far as SRK has been able to ascertain, the information provided by HolGoun was complete and not incorrect, misleading or irrelevant in any material aspect. SRK has no reason to believe that any material facts have been withheld.

The forecasts as reported upon herein are predictions by HolGoun of future events that cannot be assured and are necessarily based on assumptions, many of which are beyond the control of HolGoun or its management. If these conditions did change materially, the information and opinions contained in this report would have to be addressed to reflect these changes. Consequently, actual results may be significantly more or less favourable. Nevertheless, SRK believes that the projections for the East Complex in the preliminary economic assessment ("PEA") constructed by SRK and based on MRM's conceptual mine plan and input from HolGoun's project team, are reasonable given the current state of knowledge of the coal resources in the East Complex and provided that the required management resources and adequate capital necessary to achieve the projections in the PEA for the operation are sustained. The achievability of these projections is not warranted nor guaranteed by SRK. Future cash flows and profits derived from such projections are inherently uncertain owing primarily to the volatility of the commodity prices.

This report includes technical information, which requires subsequent calculations to derive sub-totals, totals and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where such errors occur, SRK does not consider them to be material.

1.5.2 Reliance on Information

SRK believes that its opinion must be considered as a whole and that selecting portions of the analysis or factors considered by it, without considering all factors and analyses together, could create a misleading view of the process underlying the opinions presented in the report. The preparation of such a report is a complex process and does not lend itself to partial analysis or summary.

The net present value ("NPV") from future cash flows for the East Complex is effective at 1 January 2011 and is based on information provided by HolGoun throughout the course of SRK's investigations, which in turn reflect various technical economic conditions prevailing at the date of this report. In particular, the NPV is based on expectations regarding the price projections for various types of coal prevailing at the date of this report.

These can change significantly over relatively short periods of time. Should these change materially, the NPV could be materially different in these changed circumstances. Further, SRK has no obligation or undertaking to advise any person of any change in circumstances which comes to its attention after the date of this IER or to review, revise or update the IER or opinion.

1.5.3 Declarations

SRK will receive a fee for the preparation of this report in accordance with normal professional consulting practice. SRK will receive no other benefit for the preparation of this report. Neither SRK nor any of its employees and associates employed in the preparation of this IER has any pecuniary or beneficial interest in HolGoun or the Energy project. SRK considers itself to be entirely independent.

1.6 Contributors to This Report

The various sections of this IER represent contributions by various individuals from a number of different companies, as set out in Table 1.1. SRK has reviewed these contributions, amended the text and content where deemed necessary and compiled them to create a coherent report as presented here.

Table 1.1: Contributors to the IER

Section of Report	Contributor (Company Affiliation)
Introduction	HG Waldeck (SRK) A McDonald (SRK)
Project Description and Tenure	M Halliday (HolGoun) A McDonald (SRK)
Geology / Exploration	G van Heerden (SRK) M Wanless (SRK) I de Klerk (HolGoun)
Resource Estimates	G van Heerden (SRK) I de Klerk (HolGoun)
Hydrogeology	E de Villiers (HolGoun)
Rock Engineering/Geotechnical	E de Villiers (HolGoun) A Birtles (SRK) HG Waldeck (SRK)
Mining / Underground Infrastructure Production Schedule	MRM E de Villiers (HolGoun) HG Waldeck (SRK)
Metallurgy / Processing	J Parker (Bateman Engineering) J Verster (Bateman Engineering) A Short (Bateman Engineering) M Nell (HolGoun)
Tailings	R McNeill (SRK)
Bulk Services	E de Villiers (HolGoun) A Birtles (SRK) HG Waldeck (SRK)
Environmental Issues	P Theron (Prime Resources)
Capital and Operating Costs	E de Villiers (HolGoun) HG Waldeck (SRK) J Parker (Bateman Engineering) J Verster (Bateman Engineering) A Short (Bateman Engineering) R McNeill (SRK) P Theron (Prime Resources) A McDonald (SRK)
Market Review/Price Forecasts	A McDonald (SRK)
Financial Modelling	A McDonald (SRK)
Conclusions & Recommendations	HG Waldeck (SRK) A McDonald (SRK)
Report Compilation, editing	HG Waldeck (SRK) A McDonald (SRK)
Preparation of Figures and Diagrams	H Stapylton (SRK)

2 HolGoun, Project Description and Tenure

This section gives a brief overview of HolGoun, the property description and location, exploration history and tenure.

2.1 HolGoun

HolGoun is a private company incorporated in accordance with the laws of the Republic of South Africa. The company is a 77.6% Black Economically Empowered ("BEE") entity and only has six shareholders with 97% of the issued equity held by two shareholders, Warrior Coal Investments (Pty) Ltd (20%) and Chieftain Investments 13 (Pty) Ltd (77%). HolGoun Investment Holdings (Pty) Ltd also owns a direct 0.6 % in HolGoun. The balance of the equity (2.4%) is held by three individuals.

The principal activity of HolGoun will be to disseminate data on various coal and uranium resources and reserves, perform feasibility studies on the resources with a view to converting them to reserves, and produce coal and uranium oxide suitable for local and export markets through the management and outsourcing of mining, beneficiation and rehabilitation activities. HolGoun's strategy is to participate in the eventual mining entity.

As the holder of the prospecting rights, HolGoun will develop the project and to this end has sourced and employed the necessary skills for the initial development of the project. The following individuals have been recruited:

- Bruce Jones – Chief Operating Officer, Mining Engineer with 33 years experience;
- Mike Nell – Group Metallurgist, Metallurgist with 30 years experience;
- Danie Pretorius – Geologist with 28 years experience;
- Eugene De Villiers – Mining Engineer with 18 years experience;
- Mike Halliday – New Business Manager, Attorney with 24 years experience in mining industry;
- Chris Viljoen – Mineral Rights Manager with 23 years experience;
- Lindie Niklaas – Group Legal Council, Attorney with 6 years commercial experience;
- Lindiwe Miti – Group Financial Manager with 5 years experience.

Additional skills will be recruited or contractors employed as circumstances dictate.

2.2 Property Description and Location

The Energy Project area is located within the Springbok Flats Basin, which spans an area of approximately 8,000km², located within 28°00'E and 29°30'E longitude and 24°15'S and 25°30'S latitude. The major towns and villages in the area include: Bela-Bela (previously Warmbaths), Modimolle (Nylstroom), Mookgophong (Naboomspruit) and Roedtan (Figure 2.1). HolGoun holds the prospecting rights to a total of 62 farms comprising an area of 71,081ha within the Settlers and Roedtan areas in the Bela-Bela and Mookgopong Magisterial Districts of the Limpopo Province of South Africa (Figure 2.1).

This IER deals with the coking coal resources that are situated within the Eastern portion of the Settlers Farms area and were evaluated as such in the 2008 IER. These prospecting rights cover 10,844ha, comprising six farms (Gegund 679KR, Leeuwaarden 633KR, Parys 631KR, Roodevlakte 632KR, Zamenkomst 635KR and Zoetfontein 630KR) and lie predominantly on the border of the Limpopo and Mpumalanga Provinces. These six farms are denoted by the hashed areas in Figure 2.1 and lie immediately north of the provincial boundary between the Limpopo and Mpumalanga Provinces.

2.2.1 Topography, Elevation and Vegetation

Topographically the Springbok Flats area is characterised by a slightly undulating landscape without perceptible relief (Figure 2.2). Drainage is accomplished by poorly defined watercourses draining mainly towards the south, east and northwest to the drainage basins of the Elands, Olifants, and Nyl rivers respectively.

The average elevation of the Energy Project area is 1,050m above mean sea level.

The Springbok Flats is extensively cultivated and is a large producer of grain crops such as maize and wheat, for which the black turf soil overlying most of the area is ideally suited. Little of the original vegetation of the area remains, except in isolated rocky knolls and along river courses.

2.2.2 Climate

The project falls in a summer rainfall area characterised by hot summers and mild dry winters.

Rainfall in the area is unpredictable, with maximum precipitation occurring during the summer from October to April, peaking during November to January, in the form of thunderstorms. The expected annual rainfall is approximately 634mm.

2.2.3 Access

The Energy Project area is readily accessible from the N1 national road between Johannesburg and Polokwane via a good network of primary tarred roads (the R516 and R33) and abundant secondary all-weather gravel roads and farm access roads. The local community, municipality and farmers ensures that road maintenance are high priorities.

A currently disused railway line, traverses close to the southern extent of the mineral rights area.

2.2.4 Exploration Infrastructure

- **Electricity** - The area is supplied with electricity by Eskom through the national grid system;
- **Water** – Water can be purchased from the farmers with potable boreholes;
- **Communication Systems** - The communication system as provided by Telkom (National Telephone Communication Network – land line) is inadequate, extremely weather sensitive and subject to breakdown or damage. This is a typical “farm-line” system. The cellular telephone system is adequate and covers most of the area;
- **Security facilities** - Adequate security is available. The drillers will provide their own security;
- **Offices and Accommodation** - HolGoun is currently renting a farm house with outbuildings that serves as an exploration office and core handling facility, as well as providing accommodation for the exploration teams.

2.3 Exploration History

The presence of coal in various parts of the Springbok Flats has been discussed on several occasions. Wagner et al (1927) compiled a report dealing primarily with the Karoo Succession in the Springbok Flats. Drilling was done with a jumper drill and therefore no analyses for the coal were reported.

A report by Visser et al (1959) reveals more detail regarding the properties of the coals in the Roedtan area. During this investigation, 27 boreholes were drilled in the north-eastern Springbok Flats Basin.

In 1970 – 1973 a further investigation was conducted by the Geological Survey of South Africa. During this investigation an attempt was made to correlate the various coalfields in the Northern Transvaal (now Limpopo Province). Subsequent investigation proved some of these correlations to be inaccurate.

TNC, a subsidiary of General Mining Corporation Limited, embarked on a large-scale exploration program during 1973, covering the entire Springbok Flats. The program, which included drilling more than 1,400 boreholes and 300 deflections and metallurgical studies, was put on hold in 1982, due to surplus energy capacity in South Africa.

2.4 Regulatory Environment

The regulatory environment in South Africa within which the Project must be operated is summarised below.

2.4.1 South African Law: The Mineral and Petroleum Resources Development Act

The Mineral and Petroleum Resource Development Act No 28 of 2002 ("MPRDA") was promulgated by the South African Parliament in July 2002 and came into effect on 1 May 2004. The MPRDA is the key legislation in governing prospecting and mining activities within South Africa. It details the requirements and processes which need to be followed and adhered to by mining companies. The Department of Minerals and Energy ("DME") is the delegated authority to deal with all mining related applications and the designated authority to administer this act.

Prior to 1 May 2004, mineral rights in South Africa were held privately or in some instances by the State. With the enactment of the MPRDA, all mineral rights are vested in the State. Transitional provisions in the MPRDA allow mining companies to convert their existing 'old order' rights to 'new order' rights. The transitional provisions contemplate three categories of old order rights:

(a) unused old order rights, which are mineral rights in respect of which no prospecting permit or mining authorisation had been issued under the former Minerals Act No 50 of 1991 (South Africa) (the "Minerals Act") or, where such an issue had occurred, no prospecting or mining activities had taken place as of 1 May 2004;

(b) old order prospecting rights, which are rights to prospect in respect of which a prospecting permit had been issued under the Minerals Act and prospecting had taken place prior to 1 May 2004; and

(c) old order mining rights, which are rights to mine in respect of which a mining authorisation had been issued under the Minerals Act and mining had taken place.

Holders of unused old order rights were required to apply for prospecting or mining rights under the MPRDA within one year of 1 May 2004, i.e. before 30 April 2005.

Under the MPRDA, old order prospecting rights and old order mining rights and the related permits and authorisations granted under the Minerals Act will continue to be valid for the period granted under that legislation, subject to a maximum period of two years, in the case of old order prospecting rights, and five years, in the case of old order mining rights. To continue thereafter with prospecting or mining operations, holders of old order prospecting and mining rights are required to apply within these periods to convert their rights to the 'new order' prospecting and mining rights provided for by the MPRDA.

Under the MPRDA, prospecting rights will initially be granted for a maximum period of five years, and can be renewed once upon application for a further period of up to three years. Mining rights will be valid for a maximum period of 30 years and can be renewed on application for further periods, each of which may not exceed 30 years. Provision is made for the granting of retention permits in circumstances where prospecting has been completed but mining is not commercially viable, which will have a maximum term of three years and which are not renewable. A wide range of factors and principles, including proposals relating to black economic empowerment and social responsibility and evidence of an applicant's ability to conduct mining optimally, will be pre-requisites for the approval of such applications.

The MPRDA by definition:

- Recognises that minerals and petroleum are non-renewable natural resources; acknowledges that South Africa's mineral and petroleum resources belong to the nation and that the State is the custodian thereof.

- Affirms the State's obligation to protect the environment for the benefit of present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources and to promote economic and social development.
- Recognises the need to promote local and rural development and the social upliftment of communities affected by mining.
- Reaffirms the State's commitment to reform to bring about equitable access to South Africa's mineral and petroleum resources.

2.4.2 The Mining Charter

In accordance with the provisions of the MPRDA, the Mining Charter was signed on 12 October 2002 by the South African Minister of Minerals and Energy, representatives of the South African mining industry and the South African National Union of Mineworkers. The Mining Charter embraces a range of criteria against which prospecting and mining right applications and conversion applications will be considered. These criteria include issues such as human resources development, employment equity, procurement, community and rural development and ownership of mining assets by historically disadvantaged South Africans ("HDSA's"). On the issue of ownership, the Mining Charter requires that mining companies achieve 15% HDSA ownership of mining assets by 1 May 2009 and 26% HDSA ownership of mining assets by 1 May 2014. The Mining Charter envisages that transactions directed at achieving the required HDSA status will take place in a transparent manner and for fair market value.

Applications for the conversion of old order rights are assessed against a "scorecard" promulgated by the South African Department of Minerals and Energy. The scorecard covers human resources development, employment equity, migrant labour, mine community and rural development, housing and living conditions, ownership and joint ventures, beneficiation and reporting. The scorecard does not indicate the relative significance of each item nor does it provide a particular score which an applicant must achieve to be in compliance with the Mining Charter and be granted new rights under the MPRDA (except with respect to HDSA ownership).

2.4.3 The Royalty Bill

On 11 October 2006, the Mineral and Petroleum Resources Royalty Act 2006 ("2006 Royalty Bill") was released. This is an amended version of the Royalty Bill first released on 10 March 2003 and proposed a revenue-based royalty on South African mining companies. The applicable royalties payable to the South African Government were dependent on the specification of the final energy-related products sold. The royalty would only take effect once the transitional period for conversion of mining rights under the MPRDA had expired, i.e. 1 May 2009 (Section 33(2) of the 2006 Royalty Bill). The South African Chamber of Mines submitted its comments to the National Treasury in mid February 2007 with respect to the 2006 Royalty Bill, reiterating its plea for the royalty to be charged on profits.

On 6 December 2007, the Draft Mineral and Petroleum Resources Royalty Bill ("2007 Royalty Bill") was released. The 2007 Royalty Bill set out a formula to calculate the royalty rate which was based on a company's earnings before interest, taxes, depreciation and amortisation (commonly referred to as EBITDA) and its aggregate gross sales for the assessment period. The royalty payable was then the calculated royalty rate times the net of the aggregate gross sales and allowable deductions within the assessment period. Management fees, overhead and administration costs and marketing expenses are excluded from the allowable deductions. While this method addressed the Chamber of Mines' request for the royalty to be based on profits, the proposed bill retained the dual tax regime whereby mining companies would pay royalties to traditional communities where they operate and to the state. The Chamber of Mines in a submission to parliament on 11 March 2008 warned that the payment formula in the 2007 Royalty Bill would result in payments of up to three times higher than in previous drafts.

On 3 June 2008, the fourth and final Mineral and Petroleum Resources Royalty Bill ("2008 Royalty Bill") was released, for technical comment only. It is due to be enacted as the Mineral and Petroleum Resources Royalty Act on 1 May 2009. The 2008 Royalty Bill has maintained the formula-derived royalty rate regime, since it provides necessary relief for mines during times of difficulties (low commodity prices or marginal mines) and allows the fiscus to share in the benefits during time of higher commodity prices. As the final product can be either refined or unrefined, two separate formulae are given. Both formulae calculate the royalty rate on the basis of a company's earnings before interest and taxes (referred to as EBIT) and its aggregate gross sales for the assessment period. While the gross sales figure used in the formulae excludes transportation and handling costs, these are taken into account in the determination of the EBIT figure. The mineral royalty percentage rates (Y%) will be based on the following formulae:

- **Refined Minerals:** $$Y(\%) = 0.5 + \frac{EBIT}{\text{Gross Sales} \times 12.5} \times \frac{100\%}{1}$$

- **Unrefined Minerals:** $$Y(\%) = 0.5 + \frac{EBIT}{\text{Gross Sales} \times 9.0} \times \frac{100\%}{1}$$

The maximum percentage rates for refined and unrefined minerals are 5.0% and 7.0% respectively. According to Schedule 2 to the 2008 Royalty Bill, all grades of coal are deemed to be unrefined minerals.

The effects of the 2008 Royalty Bill as proposed have been taken into account in the valuation of the Base Case Energy Project. Should the New Royalty Bill not proceed, or be implemented in a different fashion, the valuation of the Energy Project would have to be re-assessed.

2.4.4 Environmental Legislation

Key environmental legislation, which is applicable to the South African mining industry, is as follows:

- ***National Environmental Management Act (107 of 1998)*** ("NEMA") as regulated by the Department of Environmental Affairs and Tourism ("DEAT") and relevant Provincial departments of environment. This over-arches South African environmental legislation and lays down basic environmental principles including: Duty of Care, Polluter Pays & Sustainability. The construction and operation of a power station would require an Environmental Impact Assessment ("EIA") in terms of the newly promulgated Environmental Impact Assessment Regulations, 2006. The EIA Regulations were promulgated in terms of chapter 5 of the NEMA. The scoping and environmental impact assessment should be carried out in accordance with Sections 27 – 36 of the EIA Regulations.

  In addition NEMA stipulates that the principles of Integrated Environmental Management should be adhered to in all developments in order to ensure sustainable development. Section 2 of NEMA sets out the National Environmental Management Principles, which apply to all developments, where there may be significant affects on the environment. In addition, Section 28(1) states that "every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring". If such pollution cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution.

  The designated authority administrating this act with respect to the ENERGY Project is DEAT's Office in Polokwane (Limpopo).

- **MPRDA as regulated by the DME**. The MPRDA replaces the Minerals Act, 1991 and makes provision for equitable access to, and sustainable development of, South Africa's mineral and petroleum resources. Replacing the Minerals Act 1991, it aims to provide for equitable access to, and sustainable development of, the nation's mineral and petroleum resources. Regulations under the MPRDA set out the procedures for undertaking environmental impact assessments ("EIA") and for developing environmental management programmes ("EMPs") for the construction, operation and closure of mines. The DME must ensure other regulatory authorities with an interest in the environment are consulted. The EMP contains the environmental conditions of authorisation for the development, operation and closure of a mine. Existing mines should have an approved environmental management program report ("EMPR") in terms of the Minerals Act. The MPRDA provides transitional arrangements for converting old order mining rights to new order mining rights by 31 April 2009. A key requirement for new mines or for the conversion process is the need for a social and labour plan ("SLP"), a mine works plan ("MWP"), proof of technical and financial competence as well as an approved EMP.

- ***Mine Health and Safety Act (Act 29 of 1996)*** as regulated by the DME. This Act deals with the protection of the health and safety of persons in the mining industry but has some implications for environmental issues due to the need for environmental health monitoring within mine operations and maintenance of mine residue deposits.
- ***National Water Act (36 of 1998)*** ("NWA") as regulated by the Department of Water Affairs and Forestry ("DWAF"). Chapter 4 stipulates that water uses (abstraction, storage, waste disposal, discharge, removal of underground water and alteration to watercourses) must be licensed. The NWA also has requirements relating to pollution control, protection of water resources on Mines (Regulation GN704), dam safety (for dams with a capacity greater than 50,000m^3 and a dam wall greater than 5m) and water use tariffs. Regulation 704 relates to the use of water for mining and associated activities. According to Regulation 704, any person intending to open a new mine must notify DWAF before commencement of the activity, submit the Environmental Management Programme (undertaken as part of the requirement of the MPRDA), notify DWAF of cessation of activity and report any emergency incident (or potential incident) relating to water to DWAF.

  The EIA requirements for a Water Use Licence ("WUL") are largely similar to the EIA requirements of the MPRDA. The WUL application and Mining Right Application process are therefore largely integrated into a single impact assessment. The submission of the application forms as per the DWAF requirements is however still required.
- ***Atmospheric Pollution Prevention Act (45 of 1965)*** ("APPA") as regulated by DEAT. This Act allows for emissions from scheduled processes to be controlled by means of a registration certificate. Examples of such processes are power generation processes, smelters, furnaces, acid plants or roasters. The Act is outdated and is being replaced in phases with the National Environmental Management: Air Quality Act (39 of 2004). Certain sections of the Act came into effect in September 2005. The new Act aims to change current air quality law and provide national standards regulating the monitoring, management and control of air quality, while at the same time promoting justifiable economic and social development. The APPA requires that a proponent apply for an atmospheric emissions licence. An application for the construction of a scheduled process entails the completion of an application form as well as a detailed impact assessment. However, in the transition, the requirements associated with obtaining a permit for a scheduled process are however still applicable and have not been repealed.
- ***Environment Conservation Act (73 of 1989)*** ("ECA") as regulated by the DEAT, DWAF and relevant Provincial departments. Part V of the ECA states that listed activities cannot be undertaken without an environmental authorisation. The process to obtain approval includes public involvement, and if necessary, an EIA. In most cases the Act's requirements are covered by the MPRDA, however, this must be agreed with the relevant authorities and general legal consensus is that both Acts must be complied with, though a single EIA process can be used. Certain beneficiation operations that are separate from working mines may fall under this Act. Section 24 of NEMA, and associated new regulations, will shortly replace the ECA provisions. Currently, mining is a listed activity in the draft regulations and, as such, new operations or expansions of existing operations would need to comply. The ECA (Section 20) also requires domestic or industrial waste disposal sites to be permitted.
- ***National Heritage Resources Act (25 of 1999)*** as regulated by South African Heritage Resource Agency ("SAHRA") or relevant Provincial departments where established. This Act controls sites of archaeological or cultural significance. Such sites must be investigated and, if necessary, protected for the nation. Procedures for the relocation of graves are also given. Section 38(8) of the Act states that if

heritage considerations are taken into account as part of an application process undertaken in terms of an EIA, there is no need to undertake a separate application in terms of the National Heritage Resources Act.

- ***Hazardous Substances Act (15 of 1973)*** as regulated by the Department of Health. This Act controls the declaration of hazardous substances and control of declared substances. It allows for regulations relating to the manufacturing, modification, importation, storage, transportation and disposal of any grouped hazardous substance.
- ECA, ***Forest Act (84 of 1998),*** Provincial Nature Conservation Acts and other Ordinances as regulated by Provincial conservation authorities. These Acts ensure protection of certain species of animals and plants. Permissions to move protected species are required in certain cases.
- ***National Nuclear Regulator Act (47 of 1999)*** as regulated by the National Nuclear Regulator ("NNR"). Certificates of Registration are required for radiation sources above a certain threshold. In particular from an environmental perspective, the Act specifies the need for a public hazard assessment to determine conservatively the risks to members of the public.

Environmental liability provisioning in the South African mining industry is a requirement of the MPRDA and must be agreed with the relevant regulatory authorities (mainly DME and DWAF). Based on South Africa's environmental and regulatory requirements, existing mines generally accrue funds based on the estimated environmental rehabilitation costs should the mine have to close tomorrow and the operating life of the mine. Annual contributions are made to an environmental trust fund, which provides for the estimated costs of pollution control and rehabilitation. The South African Revenue Service ("SARS") approves such annual contributions to the trust fund and requires that the annual contributions be estimated on the basis of the remaining liability over the expected remaining life of the operation.

In the case of new mines, three alternative funding mechanisms were accepted by the DME:

- Initial contribution into a trust fund registered with SARS, plus annual contributions for the LoM; and/or
- Bank guarantees for part or all of the closure liability, at the start of operations and ongoing contributions into the trust fund; and/or
- Insurance policy to cover the cost of closure.

Recent experience suggests that the DME now requires the estimated cost to rehabilitate a mine site once construction has been completed be provided in full either by cash deposit into a trust fund or a bank guarantee. It appears the DME will no longer accept an insurance policy.

2.5 Energy Project: Current Status

The extent of HolGoun's mineral rights holdings covered by the prospecting right in the Settlers Farms area of the Springbok Flats Coalfield are listed in Table 2.1 and shown in Figure 2.3. The farms that comprise the East Complex are highlighted in Table 2.1 and Figure 2.3. The boundaries of the farms shown in Figure 2.3 are based on information and plans provided by HolGoun.

Prospecting Right: HolGoun holds the prospecting rights in the Settlers Farms area on 46 farms comprising 47,734ha. This excludes the prospecting rights held in the Roedtan area. The prospecting rights over the coking coal resources in the eastern part of the Settlers Farms area cover 10,844ha, comprising the six farms (Gegund 679KR, Leeuwaarden 633KR, Parys 631KR, Roodevlakte 632KR, Zamenkomst 635KR and Zoetfontein 630KR) as denoted by the hashed areas in Figure 2.3. These rights have been granted in terms of Section 17(1) of the MPRDA and have been notarially executed and registered as provided for in the legislation.

Providing HolGoun conducts the work set out in the prospecting programme that accompanied the prospecting right application and adheres to the conditions of the EMP, the prospecting right can be renewed once on application for a further period of up to three years (Section 18(4) of the MPRDA).

SRK has been informed by HolGoun that some twelve months after the granting to HolGoun of these rights, a third party brought an application to court to set aside the grant to HolGoun of the rights to eight of these farms and that the prospecting rights to these eight farms be re-awarded to this third party. The farms are: Hopefield 675KR, Tuinplaats 676KR, Gegund 679KR, Leeuwaarden 633KR, Parys 631KR, Roodevlakte 632KR, Zamenkomst 635KR and Zoetfontein 630KR. These eight farms cover the coking coal resources allocated to the Upper Middle Seam in this report. It is HolGoun's legal opinion that this application is not only out of time but has been brought by successors in title to the company after acceptance by this company that it had not received these rights. Furthermore, the third party's application was considered by the DME and rejected in terms of the MPRDA, and it now seeks relief contrary to established case law. HolGoun was originally of the opinion that this application would fail and should not present any bar to the further conduct of prospecting or the granting of a Mining Right over the eight farms. The applicant in the matter has responded to the DME's reasons for the rejection of its application and the matter is proceeding. HolGoun remains confident that the application is without substantive merit and will fail.

Surface Rights: In terms of the MPRDA and the prospecting right, HolGoun may utilise the surface of any land over which it holds prospecting rights for the purposes of conducting prospecting operations subject to such prospecting being conducted in accordance with the provisions of its prospecting work programme and approved EMP. As all prospecting should be done with the minimum of interference or prejudice to the occupiers or owners of the surface, HolGoun has consulted with the relevant owners and occupiers and has obtained their formal consent to conduct its prospecting work programme.

EMP: HolGoun undertook the public involvement required in terms of the MPRDA and submitted the EMP for a Prospecting Right on 7 July 2006. The EMP for a Prospecting Right was finally approved on 15 November 2006.

Future Permit Requirements: Timeous application for a Mining Right in terms of the MPRDA will have to be made before formal mining can commence. HolGoun will need to compile a mining work programme ("MWP") and social and labour plan ("SLP") which are required to accompany the application for a mining right.

Land Claims: Other than as disclosed above, SRK has not been informed of any potential claims for the restitution of land rights with respect to the properties indicated here.

Table 2.1: Summary of Mineral Rights held by HolGoun in the Settlers Farms area of the Springbok Flats

Property in Limpopo Province	Mineral Right Title (Prospecting Right No)	Valid To	Mineral Rights granted for	Area of Title (ha)
Ashton 138JR	PR130/2007	14/11/2010	Uranium and coal	434.4016
Athlone 132JR	PR130/2007	14/11/2010	Uranium and coal	404.7057
Avondale 665KR	PR130/2007	14/11/2010	Uranium and coal	404.6757
Bangor 644KR	PR130/2007	14/11/2010	Uranium and coal	405.0554
Benwell 663KR	PR130/2007	14/11/2010	Uranium and coal	404.6857
Berlin 643KR	PR130/2007	14/11/2010	Uranium and coal	1,713.9968
Biesjeskuil 134JR	PR130/2007	14/11/2010	Uranium and coal	2,674.7325
Cardiff 658KR	PR130/2007	14/11/2010	Uranium and coal	438.8155
Chester 666KR	PR130/2007	14/11/2010	Uranium and coal	404.6800
Chudleigh 669KR	PR130/2007	14/11/2010	Uranium and coal	404.6857
Conway 133JR	LP30/5/1/1/1080PR[1]	26/02/2010	Uranium and coal	404.6958
Deeside 656KR	PR130/2007	14/11/2010	Uranium and coal	404.6854
Dublin 668KR	PR130/2007	14/11/2010	Uranium and coal	404.6871
Exeter 137JR	PR130/2007	14/11/2010	Uranium and coal	404.6814
Gegund 679KR [2]	PR130/2007	14/11/2010	Uranium and coal	1,659.8574
Glen More 135JR	PR130/2007	14/11/2010	Uranium and coal	404.6872
Good Hope 645KR	PR130/2007	14/11/2010	Uranium and coal	160.7396
Gretna 660KR	PR130/2007	14/11/2010	Uranium and coal	404.6871
Hamburg 644KR	PR130/2007	14/11/2010	Uranium and coal	1,460.8225
Hanover 642KR	PR130/2007	14/11/2010	Uranium and coal	1,959.8680
Hopefield 675KR	PR130/2007	14/11/2010	Uranium and coal	1,415.5332
Illawara 659KR	LP30/5/1/1/1300PR	29/07/2013	All minerals	406.2846
Kalkbult 139JR	LP30/5/1/1/1080PR[1]	26/02/2010	Uranium only	1,900.5074
Knapbrook 649KR	PR130/2007	14/11/2010	Uranium and coal	403.9562
Knapp 651KR	PR130/2007	14/11/2010	Uranium and coal	412.2289
Leeuwaarden 633KR [2]	PR130/2007	14/11/2010	Uranium and coal	1,416.5612
Leeuwdoorns 607KR	LP30/5/1/1/1300PR	29/07/2013	All minerals	2,516.4226
Lincoln 667KR	PR130/2007	14/11/2010	Uranium and coal	404.6828
Lisbon 610KR	PR130/2007	14/11/2010	Uranium and coal	1,467.5320
Manor 650KR	LP30/5/1/1/1300PR	29/07/2013	All minerals	416.2203
Maple Leaf 657KR	PR130/2007	14/11/2010	Uranium and coal	404.6825
Meisiesvelley 639KR	PR130/2007	14/11/2010	Uranium and coal	1,933.2355
Middelplaats 604KR	LP30/5/1/1/1300PR	29/07/2013	All minerals	2,507.7446
Napier 640KR	PR130/2007	14/11/2010	Uranium and coal	1,501.4583
Parkwoods 655KR	PR130/2007	14/11/2010	Uranium and coal	404.6928
Parys 631KR [2]	PR130/2007	14/11/2010	Uranium and coal	1,632.6414
Petersburg 671KR	PR130/2007	14/11/2010	Uranium and coal	1,699.2014
Roodevlakte 632KR [2]	PR130/2007	14/11/2010	Uranium and coal	1,515.2479
Sydney 136JR	PR130/2007	14/11/2010	Uranium and coal	404.6814
Thorness 652KR	PR130/2007	14/11/2010	Uranium and coal	404.6800
Tuinplaats 678KR	PR130/2007	14/11/2010	Uranium and coal	1959.9325
Wanfield 646KR	PR130/2007	14/11/2010	Uranium and coal	502.9956
Winburg 612KR	PR130/2007	14/11/2010	Uranium and coal	1,718.5371
Winfield 653KR	PR130/2007	14/11/2010	Uranium and coal	404.6828
Zamenkomst 635KR [2]	PR130/2007	14/11/2010	Uranium and coal	1,851.1455
Zoetfontein 630KR [2]	PR130/2007	14/11/2010	Uranium and coal	2,768.4176
Total				**47,733.7522**

1 Awaiting final PR Number following notarial execution.

2 These farms comprise the East Complex.

Figure 2.1: HolGoun Energy - General location and extent of the HolGoun Prospecting Rights

Figure 2.2: HolGoun Energy – General Views of the Springbok Flats area

Figure 2.3: HolGoun Energy –Prospecting Rights for the Settlers farms area and the East Complex in the Springbok Flats Project

3 Geology

This section describes the geology of the Springbok Flats Coal Field, the nature and geometry of the coal seams and uraniferous shales within the area covered by HolGoun's prospecting right and any structural complexities.

3.1 Stratigraphy and Lithological Description

The Springbok Flats Coalfield is one of several coalfields that have been identified in South Africa, as shown in Figure 3.1. No previous mining has taken place in the Springbok Flats.

The Springbok Flats Coalfield is an elongate basin extending 175km in an northeast-southwest direction and is approximately 50km wide. The host basement rocks comprise primarily granites and felsites of the Bushveld Igneous Complex ("BIC") as well as older sediments of the Pretoria Group. Several distinct sub-basins are developed within the Coalfield, with the Settlers and Tuinplaats sub-basins being of economic interest to this report.

The South African Committee for Stratigraphy (SACS, 1980) acknowledges the development of all the formations of the Karoo Supergroup in the Springbok Flats, although these formations have been found to exist in a markedly attenuated form. A typical stratigraphic column of the Karoo Supergroup in the Springbok Flats is presented in Figure 3.2.

A brief description of the Karoo Supergroup stratigraphy is presented below, commencing with the basal unit.

3.1.1 Dwyka Group

In several areas of the Springbok Flats, the Dwyka Group forms the basal part of the Karoo Supergroup. The thickness of this group varies from a few centimetres to a maximum of 34m and consists mainly of diamictites.

The diamictites represent poorly sorted re-worked glacial tillite. The coarse material is matrix supported by an argillaceous or arenaceous matrix. In certain areas, these deposits are stratified and accompanied by rythmites.

Diamictites occurring in the Springbok Flats contain rock fragments and pebbles varying from a few millimetres to as much as 1.5m in diameter. The pebbles comprise fragments of angular felsite, granite and quartzite that originated from pre-Karoo rocks in the vicinity.

3.1.2 Ecca Group (Coal Measures)

The Ecca Group was deposited unconformably on an uneven pre-Karoo or Dwyka Group surface. The Ecca Group can be sub-divided into three main lithological units:

- Upper Coal Bearing Unit, Upper Ecca (Warmbad Formation, expanded in Figure 3.2);
- Upward Coarsening Unit, Middle Ecca (Turfpan Formation, Figure 3.2);
- Lower Coal Bearing Unit, Middle Ecca (Merinovlakte Formation, Figure 3.2).

<u>Lower Coal Bearing Unit</u>:

Directly overlying the Dwyka Group is a thin arkosic conglomerate. A sporadically developed coal seam (recorded maximum thickness of 7m) occurs directly above the conglomerate. This coal seam (Lower Coal Bearing Unit) is enclosed by a medium grained sandstone which comprises quartz, quartzite and feldspar grains in a grey argillaceous matrix, and is of no economic interest.

<u>Upward Coarsening Unit</u>:

Conformably overlying the Lower Coal Bearing Unit is an Upward Coarsening Unit (approximately 20m thick) which comprises grey shale at the base. The shale is often carbonaceous with disseminated pyrite. The only well developed sedimentary structure observed is a laterally continuous horizontal lamination. With increasing grain size the grey shale grades into a heterogeneous assemblage of silty shales, siltstones and very fine grained sandstone. These sediments are ripple crossbedded and intensively burrowed (bioturbation). Minor deformational structures such as slumping occur in several horizons, indicative of basin subsidence and de-watering.

The top portion of this upward coarsening unit comprises medium to fine grained, micaceous sandstone. The sandstone is characterised by sedimentary structures such as ripple crossbedding, ripple drift crosslamination and lamination. Minor upward fining cycles occur in the sandstone. Interlaminated coal and rootlet beds occur in the top portion of the sandstone directly underlying the Upper Coal Bearing Unit. Intense bioturbation occurs throughout the sandstone.

Upper Coal Bearing Unit (the "Coal Zone"):

The Upper Coal Bearing Unit, known as the Upper Ecca or Warmbad Formation and often referred to as the Coal Zone, comprises the coal measures of interest to this report and also hosts the uranium mineralisation of economic interest here. The Warmbad Formation varies in thickness from approximately 9m in the deeper parts of the basin to nil thickness where it pinches out and was eroded by the overlying Molteno sandstones on the flanks of palaeo-highs.

The coal seam stratigraphy developed within the Warmbad Formation has the following nomenclature:

- Upper Seam
- Top Marker Seam
- Middle Seam
  - Upper Middle Seam
  - Parting
  - Lower Middle Seam
- Lower Seam

The Lower Seam is sporadically and poorly developed in the Settlers-Tuinplaats sub-basins (the Settlers Farms area) and is of no economic interest.

The Middle Seam constitutes the main coal resource target and is split by a carbonaceous shale parting (with intercalated coal bands) into an Upper Middle Seam and a Lower Middle Seam.

In the northern and western parts of the Settlers sub-basin this parting thins and the full Middle Seam package is mineable (Total Middle Seam). To the south, where the parting thickens, the Lower Middle Seam is the selected mining horizon. As one approaches the flanks of palaeo-highs in the eastern part of the Settlers sub-basin the coal seams higher in the stratigraphy, including the Upper Middle Seam, have been lost to erosion by the overlying Molteno sandstones and only the Lower Middle Seam is preserved. In these areas it is known as the Peripheral Lower Middle Seam.

In the Tuinplaats sub-basin the Upper Middle Seam is well developed and constitutes the selected mining horizon. In places the Top Marker Seam can be added to the Upper Middle Seam to increase the mining height. The Upper Middle Seam here shows metallurgical properties and could be considered as a blend coking coal.

The Upper Seam is best developed in the more distal parts of the basin, away from palaeo-highs, but is thin and not considered to be economic.

The uranium mineralization in the Springbok Flats occurs almost exclusively within the Warmbad Formation, associated with carbonaceous shale and bright coal at the top of the sequence. Although not as consistently or strongly mineralised as the Warmbad Formation, uranium mineralization can be found in virtually all subdivisions of the Karoo strata in varying quantities.

Borehole information indicates that the uranium mineralization is best located adjacent to the flanks of palaeo-highs and grades in the upper Warmbad Formation are greater where the overlying sediments of the Codrington Formation are more coarse grained and permeable. Where Beaufort mudstones of the Lehau Formation directly overly the coal bearing strata and exceed 20cm in thickness, uranium grades tend to be low with the mudstone acting as an impermeable barrier to the mineralising fluids. Uranium mineralization shows higher grades in the palaeo-topographical low areas (channels) associated with the maximum pebble sizes (>15mm) of the Codrington Formation sediments. It is clear that the uraniferous shale/coal is generally restricted to a single horizon, usually in the highest carbonaceous shale/coal band in the local sequence.

The thickness of the mineralised zone depends on the distance from the palaeo-high and therefore on the thickness of the coal. Where the fully developed Warmbad Formation is present, mineralised thicknesses of up to 1.50m were encountered.

It is generally believed that the uranium was derived from the erosion and decomposition of granite and felsite rocks of the BIC during Molteno times. The uranium was transported in aqueous solution down dip from palaeo-highs and percolated through the coarse grained sediments of the Codrington Formation to be precipitated from solution under reducing conditions at the peat/sediment interface. The highly mineralised zone is usually not more than about 20cm thick.

Mineralogical investigations were inconclusive, but it is clear that the uranium mineralization is very finely disseminated in the mineralized zone and probably occurs as organometallic complexes, and as uranium minerals adsorbed on the coal. The dominant mineral appears to be coffinite, $U(Si,H_4)O_4$).

3.1.3 Beaufort Group (Lehau Formation)

The argillaceous sediments of the Lehau Formation comprise khaki, purple and grey coloured ferruginous mudstones.

These sediments are not developed on the elevated portions of pre-Karoo palaeo-highs. In areas where the Codrington formation is exceptionally thick, e.g. east of Settlers, the Lehau Formation sediments have been eroded during deposition of the Codrington Formation, causing the latter to be in contact with the Warmbad Formation.

In areas where the uranium mineralisation occurs around the flanks of palaeo-highs, the mudstone of the Lehau Formation is either absent or thinly developed (0-50cm). Where it is absent the overlying sandstone of the Codrington Formation will form a competent mining roof. In areas where the Lehau Formation is thinly developed it would be included in the mining selection, leaving the Codrington Formation in the roof.

3.1.4 Drakensberg Group

Codrington Formation (Molteno)

The Codrington Formation is subdivided into two clearly distinctive lithological units. These subdivisions are based on changes in properties arising from different depositional environments.

The upper part of the Formation is characterized by well defined upward fining cycles, comprising thick basal conglomerates, medium to fine grained light coloured sandstones and great purple mudstones.

Sedimentary structures noted in these cycles are:

- A graded bedded basal unit,
- A horizontally bedded unit, and
- A crossbedded unit.

Most of these cycles are capped by horizontally bedded siltstones and / or grey to purple mudstones. Tuffaceous mudstones, comprising angular to sub angular quartz, feldspar, mica and opaque minerals (50-80μm in diameter) (C.P. Snyman Internal Investigation) in a fine argillaceous matrix are sporadically developed at the top of the uppermost cycles.

Towards the top of the upper part of the formation a gradual increase in argillaceous sediments occur. This gradational contact makes it difficult to discern the exact contact between the Codrington and overlying Elliot Formation. For mapping and correlation purposes, the uppermost sandstone layer has been taken as the contact between the two formations.

A wedge-shaped deposit, characterised by units of poorly sorted conglomerates and granular to coarse grained sandstones, alternating in poorly defined upward fining cycles, is located in the lower part of the Codrington Formation. This deposit is restricted to areas adjacent to pre-Karoo palaeo-highs.

The lower part of the Codrington Formation shows rapid lateral and vertical facies changes. The deposit can be distinguished from the upper part of the Codrington Formation by the predominance of conglomerates and coarse grained sandstones with subordinate mudstones, mostly silty.

The deposit is highly porous and has high sandstone:shale ratio. Rarely developed mudstones have shoestring geometries and do not affect fluid migration.

The conglomerates comprise sub-rounded to sub-angular quartz, quartzite, felsites and perthite pebbles in a brown to grey arenaceous matrix. The individual pebbles are poorly cemented and can easily be removed by hand from the beds. These pebbles reveal a weak fabric with the long axes of the pebbles parallel to one another.

The sandstones are mainly granular to coarse grained and are notably better sorted than conglomerates. A red iron oxide matrix is characteristic of the sandstones.

Sedimentary structures are mainly absent though crossbedding and horizontal bedding occur in the distal parts of the deposit.

The thickness of the Codrington Formation varies from 40m to a few centimetres. The maximum development occurs adjacent to the paleo-highs and rapidly thins out away from these palaeo-highs towards the deeper parts of the basin.

A prominent unconformity is present where the Codrington Formation overlies the older sediments of the Warmbad Formation.

Elliot Formation

The Elliot Formation comprises both arenaceous and argillaceous sediments and can be subdivided into three distinct units:

- The upper part of the Formation has the same character as the overlying Clarens Formation. However, a decrease in grain size and a change in colour from light coloured to reddish brown is distinctive. Furthermore, the absence of bioturbation in the Clarens Formation distinguishes these sediments from those of the Elliot Formation.
- The middle part of the formation comprises well defined upward fining cycles. These cycles consist of graded bedding and/or clay pebble conglomerate basal units; laminated and cross-laminated units; and very thinly laminated and/or dark-brown mudstone upper units. Clay pebble conglomerate beds are best developed in the lower-most cycles, where they contain abundant fossil bone fragments. These conglomerates are regionally developed and can be considered as marker horizon.
- The lower part of the formation is characterised by massively bedded mudstone, varying from red to purple and more rarely to blue grey and green in colour. These mudstones, particularly in the lower portion, enclose thin layers of siltstone and sandy mudstones. Subordinate thin cherty layers are occasionally developed.

The thickness of the formation is generally fairly constant and seldom exceeds 125m. In certain areas however, especially towards the southern rims of the basins it thins out where a minimum thickness of 5m was recorded. North of Settlers, this formation unconformably overlies the pre-Karoo rocks and great variations in thickness are encountered in this area.

In the areas where the Codrington Formation is not developed, e.g. in the distal parts of the Settlers basin, no distinct lithological differences exist between the lower part of the Elliot Formation and the Lehau Formation. In these areas it is difficult to discern the contact between these two stratigraphic members.

Clarens Formation

The transition from the Elliot Formation to the Clarens Formation is very gradational. The appearance of the first bioturbated horizon in the succession has been taken as the contact between the two formations. For mapping and correlation purposes this contact tends to be the more reliable one.

The Clarens Formation consists of fine grained, light coloured pinkish, even textured sandstone. The thickness of this formation remains fairly constant over the entire Springbok Flats and seldom exceeds 125m.

The sandstone comprises mainly sub angular to rounded quartz grains (0.04 – 0.30mm) accompanied by subordinate potassium feldspar and plagioclase grains. The heavy minerals comprise zircon, epidote, tourmaline and magnetite. The sandstone is typically free of pebbles and granular particles (Wagner et al, 1927, page 76).

Sedimentary structures are rarely developed. In areas where sedimentary structures are present, mainly medium scale crossbedding and horizontal bedding are developed.

The upper 10m of the Formation tends to be tuffaceous, fine grained, green to grey in colour with well defined upward fining cycles. Sedimentary structures are represented by stratification, and crosslamination. Plant imprints and subordinate coal bands are sometimes encountered.

Letaba Formation

The Karoo sedimentation was terminated by the outpouring of basaltic lavas, in which distinctive flows can be recognised. The lavas comprise alternating, finely crystalline dark-grey to green massive and amygdaloidal units. Thicknesses well over 600m were encountered towards the north of Settlers. The underlying Clarens Formation has only been indurated for a few centimetres by the lava.

In the lower parts of the Letaba Formation, sandstones are intercalated with the lavas. Such intercalations are commonly developed towards the central part of the Springbok Flats. These resemble the sandstone of the Clarens Formation and differ from it only in being better stratified and composed very largely of exceptionally well rounded quartz grains (Wagner et al, 1927, pg 78). The prevalent colour of the sandstones is dark, brick red.

The contact of the formation with the underlying Clarens Formation is sporadically marked by a thin agglomerate.

3.2 Geological Structures

The Karoo Supergroup was deposited on an undulating pre-Karoo surface. Towards palaeo-highs, the lower stratigraphic subdivisions of the Karoo Supergroup pinch out or have been eroded. In these areas the Clarens, Elliot or Codrington Formations transgress onto the pre-Karoo rocks.

3.2.1 Faults

The Northern perimeter of the Springbok Flats Basin is bound by faults with down throws to the South. This resulted in the basin having a regional dip of approximately 1-2° towards the north.

In the Main Basin, the Karoo sediments were laid down in two shallow northeast-southwest trending elongated basins or synclinal flexures, connected by a broad flat anticlinical flexure (Visser et al, 1959, pg.9). Several normal faults following a north-easterly strike occur in the connecting anticlinical flexure. The northern and southern synclinal flexures are referred to as the Roedtan and Settlers-Tuinplaats Basins respectively (Figure 3.3).

A geological structure plan and sections for the coal measures in the eastern part of the Prospecting Right are shown in Figure 3.4.

3.2.2 Dolerite Intrusions

A prominent dolerite sill approximately 30 to 50m thick transgresses the coal seams around the western peripheries of the Settlers sub-basin (Figure 3.3). Numerous smaller dolerite sills probably of the same generation tend to follow the floor of the basin.

In some of the basins, such as the Tuinplaats sub-basin, no dolerite is present.

Where dolerite sills intersect the Warmbad Formation complete burning of the Upper Coal Zone occurred while devolatilisation is prominent where the dolerite over or underlies the Warmbad Formation in close proximity.

No dolerite dykes have been intersected in any of the exploration boreholes, although undoubtedly dykes will be encountered during mining operations.

Figure 3.1: HolGoun Energy – Location of the Springbok Flats Coalfield

Figure 3.2: HolGoun Energy – Stratigraphic Succession of the Springbok Flats Basin with expanded view of the coal measures

Figure 3.3: HolGoun Energy – Basin Structure and Coal Zone profile

Figure 3.4: HolGoun Energy - Geological Structure Plan and Sections in Eastern Part of Prospecting Right

4 Mineral Resource Estimates

4.1 Introduction

This section summarises the methods used to derive and classify the Coal Resource estimates prepared for the HolGoun Assets. All tonnages and qualities are reported on an *in situ* air-dry uncontaminated basis, unless otherwise stated. The guidelines contained in the *South African Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves* (the "SAMREC Code") have been followed in estimating and reporting the Mineral Resources associated with the HolGoun Assets. The *South African guide to the systematic evaluation of coal resources and coal reserves* ("SANS 10320:2004") has been followed in estimating and reporting the Coal Resources associated with the HolGoun Assets.

4.2 SRK Audit Procedures

The Coal Resources have been audited and verified by SRK (G van Heerden, PrSciNat) based on a geological model constructed by GEMECS using historical borehole data supplied by HolGoun. These historical data have also been verified and validated by SRK and GEMECS. SRK considers that, given the scope and level of geological investigations, the estimates associated with the HolGoun Assets reflect an appropriate level of precision and confidence.

SRK's audited estimates of Coal Resources use the terms and definitions as set out in the 2007 Edition of the SAMREC Code.

4.3 Quality and Quantity of Historical (TNC) Resource Data

The data inputs to the geological model forming the basis of Coal Resource estimates are derived from surface vertical drilling intersections and associated analytical results. The geological model was constructed using the historical exploration borehole data collected by TNC during the late 1970s and early 1980s. The procedures and quality control measures reported in the historical reports are summarised below:

4.3.1 Drilling and Logging

The historical drilling was conducted using standard diamond drilling and coring procedures for coal exploration. Full core was retrieved in competent strata with the core diameter generally being 57.5mm (NXC – South African Series). All cores were logged by TNC geologists and lithological logs are available on request. The coal intersections were not split (longitudinally), but were logged with the aid of down-hole geophysical traces. The geophysical logging methods used to examine coal seam qualities were:

- Bed Resolution Density Logs ("BSD");
- Long Spaced Density Logs ("LSD");
- Gamma Ray Detail Log ("Gamma");
- Neutron-Neutron Log ("NN")

Approximately 300 non-directional deflections were drilled in the uraniferous coal areas. Generally, the deflections started ±100m above the Coal Zone. Some special analyses i.e. geotechnical investigations, trace element analyses of the ash of the coal, grindability, abrasiveness and disequilibrium tests were conducted on some of these deflections.

The holes are deemed to be vertical and, considering the gentle regional dip (1-2°), all intersection thicknesses logged are deemed to be the true thickness. Coal intersections are defined as all intersections of coal as logged. The historical borehole data (collar coordinates, lithologies, sample intervals and analytical results) were captured by GEMECS into a GBIS geological database.

A number of 123mm air flush core boreholes were also drilled to obtain larger samples. All these boreholes were twinned with existing boreholes, which were carefully selected in order to obtain representative intersections from the Settlers-Tuinplaats region of the Springbok Flats Coalfield. Core samples were submitted to laboratories inland and overseas for liberation and liquefaction tests.

4.3.2 Borehole Densities

A total of 425 boreholes lie within or immediately adjacent to, the HolGoun Assets, giving an average borehole density of 1 borehole per 98 hectares over the whole area. There are 93 historic boreholes within the East Complex, 6 of which were twinned during the 2007 exploration programme conducted by HolGoun. HolGoun possesses additional borehole information covering areas outside of the Prospecting Rights and these have been included in the geological model to enhance confidence around the margins of the HolGoun Assets. It is the opinion of SRK that the density, distribution, and quality of data is sufficient to allow an estimate of the Coal Resources to be made at an appropriate level of confidence.

The surveyed locations of boreholes for within the Settlers Farms area are indicated in Figure 4.1.

4.3.3 Sampling Procedures

The following sampling procedures were used:

- During logging of the boreholes, sampling did not proceed until the geophysical logs had been interpreted (see example in Figure 4.2);
- Once all the coal seams had been properly identified on the core and verified on the geophysical log, the geologist continued with marking the roof and floor contacts of each seam (see example in Figure 4.2);
- All discrepancies between geophysical logs and the actual core, such as depths and thickness, were investigated and resolved at the drill site before core was packed into core boxes or sampled;
- Coal lithologies were described using standard lithological codes. Special attention was given to:
  - Occurrences of mineralisation (pyrite, calcite etc),
  - Signs of weathering,
  - Effects of devolatilisation,
  - Cleating,
  - Joints (slickenside);
- After the coal seam had been described in detail, it was divided into samples based on the lithology.
- During the identification of the samples the following guidelines applied:
  - If the total thickness of a coal intersection did not exceed 0.50m, it was usually not sampled separately, but still described in detail,
  - The proposed mining method was considered before the coal was divided into samples. The sampling was always done in such a way that the analytical results allow the maximum flexibility in adjusting the selected mining horizon,
  - The main mineable horizon was identified and taken as one sample, provided that it was not thicker than 2.00m, in which case it was split into two or more samples. Care was taken not to bulk samples at this stage as it would have inhibited flexibility in selecting a suitable mineable horizon,
  - Thin sandstone and/or shale bands (<0.20m) in the roof were included with overlying coal bands if they were considered to would have been mined together with the main selection,
  - The same principle applied to the floor, in which case the parting were included with the lower coal horizon,
  - Seam partings thicker than 0.50m were sampled separately;
- Once the samples had been identified and marked, sample tags were prepared using a waterproof pen, containing the following information:
  - The samples were numbered in ascending order,
  - Sample Number = HA642046C, where

    HA642 = Abbreviated farm name and number,

    046 = Borehole number,

    C = Sample Number (3rd sample from the floor).

- Each sample was placed in a separate sample bag with its unique number;
- Sample bags were sealed properly using a stapler to prevent any spillage (sample loss);
- The weight of all samples taken were recorded and logged for comparison with laboratory records.

4.3.4 Laboratory Particulars

For the duration of the project, the sample analyses were conducted at the Fuel Research Institute of South Africa ("FRI") located in Pretoria, and West Rand Consolidated Laboratory ("WRC"), a Gencor group laboratory located in Krugersdorp. These laboratories conducted the coal and uranium analysis respectively.

The methodology used at the time was that all coal samples were submitted to FRI who then performed the necessary sample preparation and ensuing proximate analysis inclusive of Calorific Value ("CV") and sulphur on the raw fractions as well as the required float/sink fractions.

Contact was made with Mr. H.P. Boshoff, a since retired manager of FRI, who confirmed the following procedures, controls and standards used at the time:

- All prepared samples were split and duplicate samples were kept in case of any repeat analysis being required and also to be able to assemble a composite sample for special analysis at a later stage.
- To perform quality control, FRI had its own set of standard samples with known values which were included in sample batches at random. In addition equipment calibration was performed on a daily basis for their calorimeters against a known standard sample. The laboratory also participated in a Round Robin scheme with other laboratories i.e. McLachlan and Lazar, TCOA and SGS to check the accuracy of analysis.

At WRC the submitted samples were prepared for uranium XRF analysis on the different float and sink fractions. Excess sample material was returned to FRI for their normal suite of coal analysis, i.e. proximate, CV and total sulphur. On shale samples only raw ash, sulphur, RD and uranium grades were determined.

4.4 Twin Borehole Drilling Campaign

HolGoun completed the Twinning Campaign during 2007 with a view to confirming the historical borehole data (stratigraphy, interval thicknesses, ore horizons, coal quality and uranium grades). The distribution of the Twin Boreholes can be seen in Figure 4.1.

A total of 20 boreholes were completed, constituting twin holes drilled adjacent to historical boreholes, with the separation distances between twin and historical pairs approximately 15 to 20m (see Table 4.1). The twin sites covered a representative selection of geological conditions from the Uranium and Steam Coal area in the west (Settlers sub-basin) to the Coking Coal area in the east (Tuinplaats sub-basin).

GEMECS submitted a comprehensive report detailing the Twinning Campaign and the results therefrom. The report is entitled "*Comparison between historical and modern twin boreholes on the Springbok Flats, Limpopo, South Africa*", GEMECS Project Number GMX-08-0016.

Figure 4.1: Plan showing Historical and Twin Borehole Locations

Figure 4.2: Typical example of a Geological Log with associated BRD and LSD geophysical logs

4.4.1 Quality Assurance and Quality Control

SRK conducted several site visits during the Twinning Campaign and audited the drilling, logging and sampling operations. HolGoun has a set of Quality Assurance and Quality Control ("QA/QC") procedures for all aspects of site investigations and SRK has audited the operations as per the QA/QC procedures. No deviations from the procedures were noted.

The laboratory used for all coal analytical investigations was Advanced Coal Technology ("ACT"), based in Pretoria. ACT is the Exxaro in-house coal laboratory.

The following Certified Reference Materials ("CRMs") were used:

- SARM19 (coal); and
- pure graphite for coal traces and calibration.

SRK is satisfied that the analytical data supplied is accurate and reliable, and that the appropriate sample preparation and analytical techniques were implemented.

4.4.2 Comparison of Twin Hole Data with Historical Data

The important results of the twin hole comparisons are shown in Tables 4.1 to 4.2.

Table 4.1 shows excellent agreement between twin and historic borehole pairs in terms of the elevation of intersection of important stratigraphic units, including the Coal Zone. Table 4.2 compares the thicknesses and raw qualities of the mineable seams. The agreement between comparisons is considered to be good. Some variation in the comparison of raw coal qualities can be expected as a result of differing sampling strategies between the Twinning Campaign and the historical boreholes.

Table 4.1 Comparison of Elevations between selected Twinning Campaign and Historical Boreholes

Borehole ID	DISTANCE	COLLAR	ELEVATIONS IN BOREHOLE (metres above mean sea level)			
Twin	APART	ELEVATION	BASE OF FORMATION		COAL ZONE	
Historical	m	mamsl	MOLTENO	BEAUFORT	Roof	Floor
AV665007	6.49	1033.01	656.73	652.59	652.59	647.49
AV665-04		1033.00	654.90	652.46	652.46	646.81
DELTA		**0.01**	**1.83**	**0.13**	**0.13**	**0.68**
AV665006	8.40	1036.24	649.72	-	649.72	646.83
AV665-03		1036.10	647.78	-	647.78	644.84
DELTA		**0.14**	**1.80**		**1.80**	**1.85**
BK134024	7.03	1031.11	713.46	711.46	711.46	706.04
BK134-08		1031.30	712.74	712.74	712.74	705.80
DELTA		**-0.19**	**0.91**	**-1.09**	**-1.09**	**0.43**
CH666017	4.24	1039.18	616.36	615.76	615.76	610.04
CH666-11		1039.60	616.60	615.50	615.50	609.16
DELTA		**-0.42**	**0.18**	**0.68**	**0.68**	**1.30**
CU669006	32.57	1025.54	677.24	676.74	676.74	672.17
CU669-04		1026.70	678.53	678.08	678.08	673.68
DELTA		**-1.16**	**-0.13**	**-0.18**	**-0.18**	**-0.35**
DU668028	4.09	1029.89	669.64	-	669.64	666.33
DU668-01		1029.70	669.31	-	669.31	665.96
DELTA		**0.19**	**0.33**		**0.33**	**0.37**
DU668015	30.39	1032.78	662.92	-	662.92	662.08
DU668-10		1032.70	661.59	-	661.59	659.66
DELTA		**0.08**	**1.33**		**1.33**	**2.42**
DU668024	6.69	1033.68	652.52	-	652.52	652.34
DU668-14		1033.50	652.06	-	652.06	651.80
DELTA		**0.18**	**0.46**		**0.46**	**0.54**
LC667031	20.21	1037.29	631.78	-	631.78	628.93
LC667-09		1037.30	630.43	-	630.36	627.52
DELTA		**-0.01**	**1.35**		**1.42**	**1.41**
ML657016	66.15	1043.09	600.13	-	600.13	594.47
ML657-02		1044.30	603.46	-	603.46	597.50
DELTA		**-1.21**	**-3.33**		**-3.33**	**-3.03**
PE671033	10.12	1044.35	657.20	-	657.20	656.21
PE671-16		1044.70	657.64	-	657.64	656.44
DELTA		**-0.35**	**-0.44**		**-0.44**	**-0.23**
PE671051	9.12	1027.26	700.94	-	700.94	695.72
PE671-01		1027.00	700.73	-	700.73	695.79
DELTA		**0.26**	**0.21**		**0.21**	**-0.07**
WB612019	19.97	1087.63	564.10	551.99	551.99	550.07
WB612-08		1088.00	561.60	553.02	553.02	550.22
DELTA		**-0.37**	**2.50**	**-1.03**	**-1.03**	**-0.15**
GG679020	40.32	1027.88	712.88	701.46	701.46	694.21
GG679-01		1028.30	712.45	700.83	700.83	693.27
DELTA		**-0.42**	**0.43**	**0.63**	**0.63**	**0.94**
HO675040	27.14	1030.96	691.16	686.29	686.29	679.65
HO675-04		1031.00	691.61	685.83	685.83	679.61
DELTA		**-0.04**	**-0.45**	**0.46**	**0.46**	**0.04**
LW635018	11.91	1023.00	732.00	718.67	718.67	711.42
LW635-11		1023.10	735.50	718.60	718.60	711.24
DELTA		**-0.10**	**-3.50**	**0.07**	**0.07**	**0.18**
P631017	20.17	1010.89	ND	706.04	706.04	698.70
P631-08		1011.07	ND	705.43	705.43	698.13
DELTA		**-0.18**	**ND**	**0.61**	**0.61**	**0.57**
RV632042	45.84	1018.80	772.20	755.35	755.35	748.70
RV632-19		1021.10	775.40	755.60	755.60	749.32
DELTA		**-2.30**	**-3.20**	**-0.25**	**-0.25**	**-0.62**
RV632043	39.84	1021.59	731.79	718.86	718.86	712.32
RV632-09		1023.40	735.25	722.80	722.80	715.94
DELTA		**-1.81**	**-3.46**	**-3.94**	**-3.94**	**-3.62**
ZK635011	37.42	1029.09	676.34	658.03	658.03	649.76
ZK635-06		1026.40	673.70	655.34	655.34	648.46
DELTA		**2.69**	**2.64**	**2.69**	**2.69**	**1.30**

Table 4.2 Comparison of Mineable Thickness and Raw Coal Qualities

Borehole ID	SEAM		RAW COAL QUALITIES (air-dried)							REMARKS
Twin / Historical	Name	Thickness m	RD	CV MJ/kg	IM %	ASH %	VM %	FC %	TS %	
AV665006	LMS	0.87	1.54	22.5	2.9	28.8	27.2	41.1	5.19	
AV665-03	LMS	0.83	1.52	22.9	3.8	26.9	29.3	40.0	4.28	
DELTA		0.04	0.02	-0.4	-0.9	1.9	-2.1	1.1	0.91	
AV665007	LMS	1.75	1.57	21.4	2.8	31.5	28.0	37.8	2.46	
AV665-04	LMS	1.75	1.62	19.6	3.1	35.7	25.9	35.3	3.05	
DELTA		0.00	-0.05	1.8	-0.3	-4.2	2.1	2.5	-0.59	
BK134024	LMS	1.60	1.59	20.8	2.5	33.2	27.3	37.0	3.39	
BK134-08	LMS	1.59	1.60	20.8	2.7	33.9	26.8	36.6	3.35	
DELTA		0.01	-0.01	0.0	-0.2	-0.7	0.5	0.4	0.04	
CH666017	LMS	1.47								Devolatilised
CH666-11	LMS	1.42								Devolatilised
DELTA		0.05								
CU66906	LMS	1.48	1.55	21.9	2.5	30.0	28.9	38.7	1.96	
CU669-04	LMS	1.43	1.56	21.6	3.0	31.0	28.4	37.6	1.46	
DELTA		0.05	-0.01	0.3	-0.5	-1.0	0.5	1.1	0.50	
DU668028	LMS	1.55	1.58	21.1	2.9	32.0	25.8	39.3	3.20	
DU668-01	LMS	1.45	1.59	20.5	1.7	33.5	28.0	36.8	3.74	
DELTA		0.10	-0.01	0.6	1.2	-1.5	-2.2	2.5	-0.54	
DU668024		Poorly developed Coal Zone								
DU668-14		Poorly developed Coal Zone								
DELTA										
DU668015		Poorly developed Coal Zone								
DU668-10		Poorly developed Coal Zone								
DELTA										
GG679020	UMS	1.33	1.51	23.8	1.6	26.5	29.8	42.2	1.39	
GG679_01	UMS	1.26	1.59	21.5	1.8	33.3	28.5	36.4	8.30	Nugget Effect
DELTA		0.07	-0.08	2.3	-0.20	-6.8	1.3	5.8	-6.91	
HO675040	LMS	1.61	1.64	19.65	2.0	37.0	25.4	35.7	1.96	
HO675-04	LMS	1.67	1.57	22.00	2.5	31.5	27.3	38.7	1.62	
DELTA		-0.06	0.07	-2.35	-0.5	5.5	-1.9	-3.0	0.34	
LC66731	PMS	0.72	1.66	18.72	2.7	38.8	20.4	38.1	4.46	
LC667-09	PMS	0.81	1.63	20.40	2.5	36.6	24.6	36.3	5.32	
DELTA		-0.09	0.03	-1.68	0.2	2.2	-4.2	1.8	-0.86	
LW633018	UMS	1.67	1.53	24.12	1.1	27.9	29.7	41.3	3.40	
LW633-11	UMS	1.67	1.50	25.10	2.0	25.0	33.3	39.7	-	
DELTA		0.00	0.03	-0.98	-0.9	2.9	-3.6	1.6	-	
ML657016	PMS	1.58	1.58	20.77	2.7	32.4	27.4	37.5	2.84	
ML657-02	PMS	1.51	1.62	20.20	2.8	35.8	27.8	33.6	4.85	
DELTA		0.07	-0.04	0.57	-0.1	-3.4	-0.4	3.9	-2.01	
PE671033		Poorly developed Coal Zone								
PE671-16		Poorly developed Coal Zone								
DELTA										
PE671051	LMS	2.00	1.60	20.81	2.5	33.4	26.7	37.4	1.89	
PE671-01	LMS	1.63	1.62	19.90	2.9	35.8	25.9	35.4	2.07	
DELTA		0.37	-0.02	0.91	-0.5	-2.4	0.8	2.0	-0.18	
P631017	UMS	1.82	1.48	25.21	1.6	23.9	31.2	43.3	2.21	
P631_08	UMS	1.71	1.51	24.10	1.9	26.7	30.2	41.2	2.07	
DELTA		0.11	-0.03	1.11	-0.3	-2.8	1.0	2.1	0.14	
RV632042	UMS	1.45	1.46	25.8	1.3	22.0	31.2	45.5	2.32	
RV632-19	UMS	1.44	1.49	-	2.0	24.2	31.0	43.0	2.83	CV not analyzed
DELTA		0.01	-0.03		-0.7	-2.2	0.2	2.5	-0.51	
RV632043	UMS	2.34	1.51	24.30	1.2	26.2	29.9	42.7	1.56	
RV632-05	UMS	1.73	1.50	24.60	2.0	25.3	30.5	42.2	4.73	
DELTA		0.61	0.01	-0.30	-0.8	0.9	-0.6	0.5	-3.17	Nugget Effect
WB612019		Poorly developed Coal Zone								
WB612-08		Poorly developed Coal Zone								
DELTA										
ZK635011	UMS	2.59	1.60	22.07	0.8	33.2	27.8	38.2	2.40	
ZK635-06	UMS	2.15	1.61	21.70	2.0	34.7	24.4	38.9	-	
DELTA		0.44	-0.01	0.37	-1.2	-1.5	3.4	-0.7	-	

4.5 Geological Model and Estimation Parameters

Geological input data were compiled from the captured historical borehole data with collar coordinates in LO29 (Cape Datum).

The geological structural and coal quality model was constructed by GEMECS utilizing Gemcom's Minex Horizon Module (version 4.1J). Borehole intersection elevations, thicknesses and coal qualities were gridded using the General Gridding algorithm with a unit cell size of 100 x 100m in order to produce a continuous 3-dimentional geological model. Structural influences such as palaeo-highs, dolerite sill transgressions and no-coal areas were accounted for in the model. The full seam thicknesses are modelled in order to determine the gross *in situ* coal volumes. *In situ* coal qualities (raw and products) were determined by gridding the borehole seam composite values.

4.6 Coal Resource Estimates

4.6.1 Resource Classification

Classification of Mineral Resources in terms of geological confidence complies with the terms, definitions and guidelines given in the SAMREC Code. Principally, the main criterion for classification is the density and spatial distribution of boreholes (cored intersections with analytical results), with cognisance also given to the regional and local geological complexities. SRK considers the data to be insufficient to allow for the confident assumption of physical and quality/grade continuity between boreholes. The density, spatial distribution of the boreholes and general deposit characteristics allows the Coal Resources to be appropriately categorised into *Inferred Resources* as per the SAMREC Code.

4.6.2 Coal Resources

Coal Resources (tonnage and quality) are derived from the geological model within Coal Resource Blocks after application of appropriate cut-off parameters to the modelled seams. The physical and coal quality cut-off parameters applied include:

- Minimum Seam Thickness = 1.20m (Steam and Coking Coal);
- Minimum Dry Ash-Free Volatile Content = 28.0% (Steam and Coking Coal);
- Maximum Raw Ash Content (air dry basis) = 40.0% (Steam Coal only); and
- Minimum Theoretical Yield at F1.40 = 30.0% (Coking Coal only).

The tonnage within the constrained resource blocks is deemed to be the Gross Tonnage In Situ ("GTIS"). A Geological Loss Factor (15% in this case) was applied to discount the GTIS Tonnage for possible unknown geological disturbances e.g. dolerite transgressions, washouts etc, that are not apparent from the current borehole information. This discounted value results in the Total Tonnage *In Situ* ("TTIS"). No consideration has been given to the proposed mining methods and thus no theoretical mining heights have been proposed.

At present, the full seam thickness represents the potential theoretical mining height and thus the TTIS is equivalent to the Mineable Tonnage *In Situ* Resource ("$MTIS_{Resource}$").

The Coal Resources from all seams within the HolGoun Assets are considered to represent a Steam Coal suitable for local power generation or coal-to-liquids beneficiation. The Upper Middle Seam shows coking properties and a choice exists to treat these resources as Coking Coal or to include them with the Steam Coal resources.

<u>Steam Coal:</u>

The location and extent of Steam Coal Resource Blocks covering the Upper Middle Seam in the eastern Tuinplaats sub-basin are shown in Figure 4.3. Resource tonnes, raw qualities and product (after de-stoning) yields and qualities are listed in Table 4.3 and Table 4.4 respectively.

The tonnages and qualities of only the potentially mineable seams are reported in this IER i.e. not the entire Coal Zone. Other coal occurrences that may be present but not considered to be of any significant economic importance as a standalone coal seam are not reported.

Table 4.3: Inferred Steam Coal Resource Tonnage in East Complex (in-situ air dried, uncontaminated)

Seam	Resource Area (ha)	Average Depth Below Surface (m)	Average Seam Thickness (m)	RD	GTIS[1] (Mt)	MTIS (Mt)
Upper Middle	3,614	290	1.65	1.52	91	77

1 Inclusive of Coking Coal GTIS as per Table 4.7.

Table 4.4: Inferred Raw Steam Coal and Product Qualities in East Complex (air dried, uncontaminated)

Upper Middle Seam	Yield (%)	Moisture (%)	Ash (%)	Volatiles (%)	Fixed Carb (MJ/kg)	CV (%)	Sulphur (%)
Raw Coal	-	2.0	27.6	30.1	40.3	23.70	2.54
Primary Product (steam)	83.6	2.0	19.9	32.9	45.2	26.53	1.61

Coking Coal:

The Upper Middle Seam, located in the Tuinplaats sub-basin in the east of the HolGoun Assets, has been shown to produce a 42% yield of coking coal (semi-soft blend) when washed at a cut-point relative density of 1.40. The Coking Coal resource potential of this seam was evaluated separately to the Steam Coal resource estimation with the two estimates for the Upper Middle Seam being mutually exclusive (the Steam Coal estimate of Table 4.3 includes, however, all potential Coking Coal). The Coking Coal option, however, still offers a Steam Coal middlings product. The mineable selection for Coking Coal resulted in a more restricted seam thickness and a reduced areal extent compared to the Steam Coal option due to more stringent cut-off criteria. The resulting Upper Middle Seam Coking Coal resource block is shown in Figure 4.4, and its resource tonnage, coking coal and middlings yields and qualities are listed in Table 4.5 and Table 4.6 respectively.

Table 4.5: Inferred Coking Coal Resource Tonnage (in-situ air dried, uncontaminated)

Seam	Resource Area (ha)	Avg Depth Below Surface (m)	Avg Seam Thickness (m)	RD	GTIS (Mt)	MTIS (Mt)
Upper Middle	**3,109**	**308**	**1.49**	**1.51**	**70**	**60**

Table 4.6: Inferred Coking Coal Quality and Products

Upper Middle Seam	Cut-Point Density (g/cm^3)	Yield (%)	Ash (%)	Swell Index	Roga Index	CV (MJ/kg)	Sulphur (%)
Raw Coal	-	100.0	26.7	-	-	23.83	2.50
Primary Product (Coking)	1.40	42.4	11.7	5.7	73	29.74	1.46
Middlings Product (Steam)	1.70	41.9	24.5	-	-	24.72	1.63
Total Product Yield		**84.3**					

Figure 4.3: Extent of Steam Coal Resource Blocks, Eastern Tuinplaats Sub-basin

Figure 4.4: Extent of Coking Coal Resource Blocks, Eastern Tuinplaats Sub-basin

4.6.3 Coking Coal Qualities

Historical test work conducted on 4 large diameter borehole cores examined washability at densities of 1.4 to 1.7, coking propensity tests and analyses of physical and chemical properties. Further tests and analyses were carried out on all historical exploration borehole cores for proximate analyses, CV, total S, swelling index, Roga index, dilation, plastometer fluidity and petrographic analysis for maceral distribution. The average results of these tests are set out in Tables 4.7 to 4.9.

Table 4.7: Average Proximate Analysis and Coking Properties

Yield (%)	Moisture (%)	Ash (%)	Volatiles (%)	Sulphur (%)	Swelling Index	Roga Index	Dilation Ampl. (%)	Plastometer fluidity
40%	2.1%	11.8%	36.5%	1.5%	5.5 to 6	74	87%	1,000

Table 4.8: Ash Analysis (average of large diameter borehole cores)

SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	CaO (%)	MgO (%)	Na_2O (%)
63.2%	22.0%	3%	1.12%	4.7%	0.56%	0.31%

K_2O (%)	MnO (%)	P_2O_5 (%)	SO_3 (%)	Softening Temp (°C)	Hemisphere Temp (°C)	Flow Temp (°C)
1.22%	0.07%	0.16%	2.83%	1,300°	1,400°	1,400°

Table 4.9: Petrographic Properties

Vitrinite (%)	Exinite (%)	Reactive semifusinite (%)	Inerts (%)	Minerals (%)	Reactives (%)	ROV (max) (%)	Petrographic Expected Yield (M10, %)	Petrographic Expected Yield (M40, %)
84.0%	1.8%	1.6%	6.1%	6.5%	87.4%	0.80%	9.4%	50%

4.7 Statement of Geological Risk

The review presented in this report is based purely on the data presented to, and reviewed by, SRK and contained within the area of the Prospecting Rights. SRK is of the opinion that additional exploration drilling on the Springbok Flats Project will increase the geological confidence of the resource estimates and allow detailed mine planning exercises to be carried out with associated Reserve estimates. SRK considers the risk of overstating the *Inferred Resources* to be low.

4.8 SRK Comments

SRK is satisfied that the twin borehole information has confirmed the validity of the historical borehole data with respect to surveyed collar positions, intersection elevations and thicknesses, raw coal qualities and uranium grades. SRK is satisfied that the Coal Resource Estimates presented in this report have been estimated and reported in accordance with local and internationally accepted codes for the reporting of Coal Resources.

The Coal Resources presented here are at a low level of confidence as indicated by an Inferred Resource classification and no guarantees are implied regarding final Coal Resource Estimates following further prospecting drilling.

5 Mining / Underground Infrastructure

5.1 Introduction

Conceptual mining plans have been discussed in documentation dating back to 1980, mainly in relation to the coal deposits lying to the south but similar of the HolGoun properties (see Figure 2.3).

The stratigraphy is presented in several reports, but indicates a weak mudstone layer immediately overlaying the coal seam(s). The information indicates relatively poor roof and floor conditions are expected for the coal measures.

The documentation presents coal mining conditions which, while being challenging, can be controlled by adopting sound geotechnical principles and appropriate mining approaches and mining methods. The information indicates conditions which appear to be similar to those encountered in the deep mines of the United Kingdom and the mines in certain parts of Australia. Therefore the mining conditions expected on the HolGoun properties have been encountered elsewhere, and a suitable design and approach can be developed using current technology available.

The documentation refers to continuous miner ("CM") development and longwall production. As the depths expected on the HolGoun properties are generally greater than 200m (see Figure 5.1) this approach is appropriate. A bord and pillar approach will yield an extraction ratio of less than 50% when the pillars are left intact at the end of the mine's life. This can however be increased to above 70% when the pillars are stooped out.

The information refers to an area to the east where only the UMS is of economic importance (see Figure 4.7). This area contains some 77Mt of Coal Resource, from which coking coal and steam coal products can be produced.

5.2 Geohydrology

The Springbok Flats is in general a dry area but boreholes with relatively high yields do occur sporadically. This is an indication that aquifers exist in the area but minimal information is documented about these aquifers (quantity of water, the area coverage, depth below surface, etc.) in this area and a detailed geohydrological study will be required.

Recent boreholes drilled did intersect water at depths up to 70m. The indication is that aquifers are possibly near surface at the top of the Drakensberg lavas as well as in the cave sandstones. Care must therefore be taken during mine planning stages to design longwalls (130-150m long with barrier pillars of up to 50m) that will not goaf all the way into the aquifers but only in the Beaufort mudstones. Only elastic movements will have to occur in the areas of the aquifers to prevent possible large pumping exercises from the mine workings.

5.3 Geotechnical

In order to predict the behaviour of the rock material during coal mining operations, several geotechnical investigations were conducted by Dr. H. Olivier (Keeve Steyn and Partners, Consulting Engineers). The geotechnical studies revealed that the geomechanical behaviour of the rock masses during mining operations will be influenced by the rock material properties of the argillites, in particular the durability of the Lehau Formation mud rocks (Beaufort Group).

Figure 5.1: Depth Contours of Bottom of Package

The assessment of rock durability showed that the majority of mud rock samples tested had poor durability ratings and disintegrated rapidly on exposure to air.

Immediately underlying the Beaufort argillites are alternating bands of carbonaceous mudstone and bright coal comprising the Upper Seam. Due to the expected roof conditions it is recommended that the Upper Seam be maintained as the roof.

The immediate roof of the Middle Seam comprises alternating bands of carbonaceous shale and bright coal of the Upper Seam. The Upper Seam with an average thickness of 1.00m is overlain by the mudstones of the Lehau Formation. Owing to the tendency of these mudstones to slake within a short time after exposure to air, it consequently constitutes poor roof conditions.

The floor rocks of the Middle Seam are comprised of carbonaceous shales with a propensity to disintegrate when disturbed and exposed to air. These floor conditions will prove difficult for long wall mining. Dilution of the coal seam with roof and floor material during mining will have to be carefully managed.

During the exploration programme, diamond drill cores were logged geotechnically in order to arrive at a more quantitative definition of the engineering properties of the Karoo strata. The following parameters recommended by Mr. R. Whyte (Engineering geologist previously at the Chamber of Mines) were recorded on a routine basis:

- Core Loss
- Fracture Frequency – the number of fractures in the core were counted for each defined lithological unit, and the fracture frequency was calculated as:

$$\text{Fracture Frequency} = \frac{\text{Number of fractures per unit}}{\text{Total Length of unit}} \times \frac{100\%}{1}$$

- Rock Quality Designation ("RQD"). Within each defined lithological unit, the RQD was calculated by:

$$\text{RQD} = \frac{\text{Total length of pieces of core} > 0.10\text{m}}{\text{Total core length recovered}} \times \frac{100\%}{1}$$

- Rock quality – a semi-quantitative observation on the rate of breakdown of the rocks after exposure to the atmosphere. The rock quality is rated from 1 (good rock) to 4 (poor rock).

In addition to the above parameters, 10m of the immediate roof of the coal and the coal bearing horizon was photographed in order to preserve a permanent record of the condition of the core prior to sampling. Only 150 boreholes were recorded in this manner.

Uranium mining was not considered during the exploration and investigations done in the 1970/80's and limited geotechnical investigations were done in the uranium mineralised zones. The only difference is that the roof in these areas will be either competent Molteno sandstones or thin (up to 40cm) Beaufort Mudstone which will have to be mined with the Uranium mineralised layer. The roof will therefore be very competent in the Uranium mineralised area. The floor will consist of either the lower middle seam or the peripheral middle seam unless the coal is mined as well. The floor will then consists of a micaceous grey sandstone, shales or weakly carbonaceous shale, pending on the location.

Faulting in the area has a predominant trend WNW-ESE but no major faulting has been proven within the area of the Settlers prospect. A continuous dolerite dyke occurs on the Western boundary of the prospect area but it is not considered likely that intrusive bodies will be a major problem. This is a good indication that longwall mining methods can be applied.

5.4 Conceptual Mining Approach

A geological model was built using the historical and twin borehole data and an Inferred Mineral Resource estimate was declared according to the SAMREC Code. The coking coal model in the east block was used by MRM for conceptual mine planning, modelling and scheduling in the X-PAC mine software package.

Longwalls and CMs are the only mining equipment used for these conceptual mine designs. HolGoun and SRK have reviewed the conceptual plan compiled by MRM and believe the design and assumptions used are reasonable.

5.4.1 Production and Design Parameters

The design parameters used in the mine designs are summarised in Table 5.1.

Table 5.1: Design Parameters used in Conceptual Mine Design

Parameter	Units	East Complex (Coking Coal)
Main Development	(No of Roads)	7
Secondary Development	(No of Roads)	5
Longwall Development	(No of Roads)	2
Longwall Width	(m)	200
Development Width	(m)	5.0
Barrier Pillar	(m)	50
Development Pillar Width	(m)	23
Development Pillar Lengths:		
300 – 400 m depth	(m)	23
400 – 500 m depth	(m)	-
500 – 600 m depth	(m)	-
600 – 700 m depth	(m)	-
Geological Losses	(%)	15%
Mining Losses	(%)	5%
Uranium Seam Thickness	(m)	-
Contamination Thickness	(m)	-
Uranium Seam Density	(t/m^3)	-
Contamination Density	(t/m^3)	-
Mining Height Development	(m)	seam height
Mining Height Longwall	(m)	seam height
Minimum Mining Height	(m)	1.2
Contamination % of RoM	(%)	7.25
Long Wall Production	(ktpm)	125
CM Production Development	(ktpm)	28
CM Production Stooping	(ktpm)	42
Stooping Extraction of Pillar	(%)	40%
Long Wall Move Duration	(days)	21
Primary Wash Plant Factor	(%)	95%
Fines Factor	(%)	5%
Liberation Factor	(%)	5%
Secondary Wash Plant Factor	(%)	95%

5.4.2 East Complex – Coking Coal

The East Complex comprises a coking coal mine and coal washing plant. Coal products will include a primary coking coal and a secondary middlings steam coal product. A limited administrative facility and a stand-alone discard facility for coarse and fine rejects is envisaged.

The mine will be developed with a CM and the bulk coal extracted by means of a longwall. The RoM coal will be conveyed to surface via conveyor belts.

This conceptual mine will have a down-cast conveyor decline with road access next to it from surface down to the shallowest seam intersection on the farm Zoetfontein. A raise bore hole will be drilled in close proximity to this intersection point which will act as an up-cast shaft with fans on surface. This infrastructure will suffice for the life of mine ("LoM").

The general mine layout and infrastructure is shown in Figure 5.2.

Figure 5.2: Conceptual Coking Coal Mine Layout for East Complex

The inferred geological model was imported into X-PAC and a conceptual mine was designed, modelled and scheduled. The mine lay-out is cut to the 1.2m minimum seam height contour and all longwalls shorter than 500m are eliminated. The development and long walls will be done on seam height which is on average 1.49m.

The planned tonnage and yield profiles as produced by the conceptual mine design are shown in Figure 5.3. The scheduling indicated the number of CMs to support the longwall could be reduced to only one instead of the three as allowed in the 2007 IER. This will need to be examined more carefully as part of the feasibility study. The production build-up as generated by the conceptual plan appears to be reasonable.

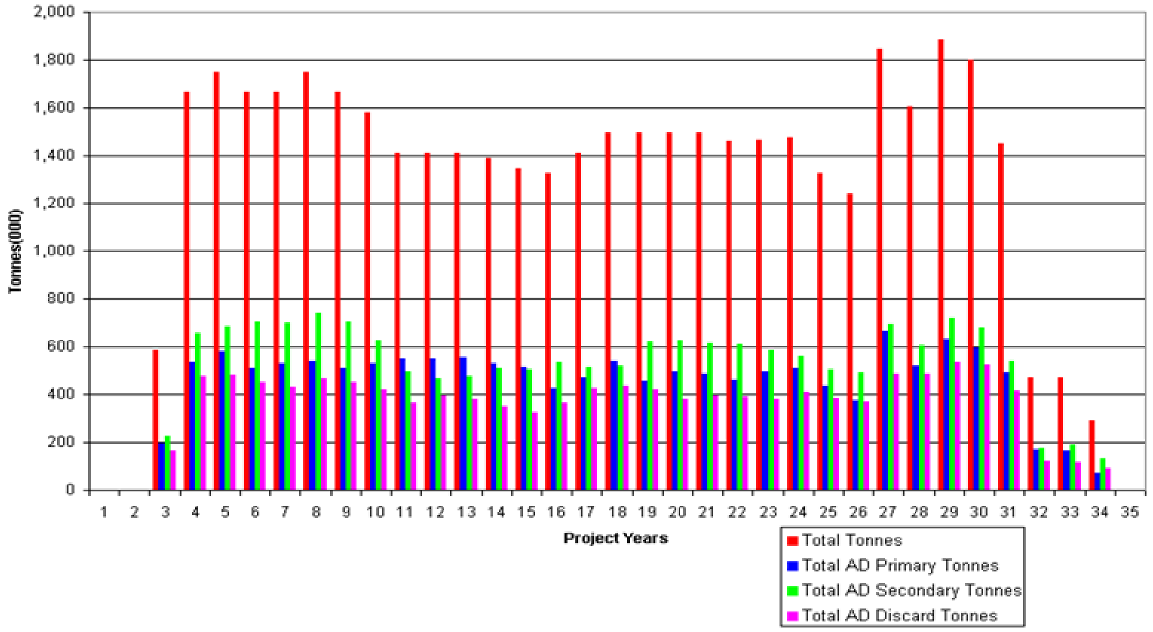

Figure 5.3: Conceptual Mine Plan – Air Dried Coking Coal, Steam Coal and Discard

The conceptual mine design yields the LoM production figures for the East Complex as summarised in Table 5.2.

Table 5.2: LoM Coking Coal Production for East Complex

LoM Production Parameter	Units	Values
Development RoM	(kt)	5,735
Stooping RoM	(kt)	3,081
Longwall RoM	(kt)	35,952
Total RoM	(kt)	44,768
Primary Product (coking coal)	(kt)	15,085
Primary Yield	(%)	34%
Secondary Product (steam coal)	(kt)	17,400
Secondary Yield	(%)	39%

5.5 Access

Access to the deposits will be from the shallowest areas, wherever possible.

Access to the East Complex is planned from the north western edge of the farm Zoetfontein 630 KR. The depth of the shaft system is expected to be in the region of 260m. A single decline is planned, wide enough (6-6.5m) to accommodate a conveyor and a roadway for men and material. The decline will serve as a down-cast shaft. A dedicated up-cast shaft will be raise bored close to the decline's intersection point with the coal seam. It is envisaged that the whole deposit can be served through the two initial shafts (see Figure 5.6).

All shaft sizes will be confirmed during the feasibility studies after final ventilation designs are done.

5.6 Surface Infrastructure

Surface infrastructure will be located to minimise any sterilisation of the coal deposits..

The coking coal mine and associated washing plant and possible rail load-out facility built on a paleo-high on the farm Zoetfontein where the box-cut is planned to avoid coal sterilisation. A central office complex with associated change house, stores and workshops and related infrastructure will be located near to the washing plant and mine access.

5.7 Underground Infrastructure

The East Complex is planned to be developed with CM's and the coking coal will be extracted with longwall equipment. All RoM material will be transported to surface by means of conveyors where it will be dumped on surface in silos or RoM stockpiles.

Most of the equipment is dedicated to a production section and maintenance will be done in the sections. Ancillary equipment (men and material transport facilities) will be serviced in surface workshops.

Dedicated stone-dust silos will be erected on surface connected to underground areas to provide stone-dust for underground application.

5.8 Coal Inventory Estimation

Although a conceptual mine design has been developed, the lack of a detailed Coal Resource model has not enabled any conversion of Coal Resources to Coal Reserves to be done. Tables 5.3 to 5.6 below are extracts from SANS 10320, and detail the conversion process of Coal Resources to Coal Reserves.

Table 5.3: Qualifications for Coal Resource reporting categories

Coal Resource Category	**Qualification**
Gross in situ coal resource	Full seam
In situ coal resources	Full seam, geological loss factors
Mineable in situ coal resource	Theoretical mineable seam, geological loss factors, depth cut-off, stripping ratio cut-off

Table 5.4: Calculations for Coal Resource reporting categories

Coal Resource Category	**Qualification**	**Simplified Calculation**
Gross Tonnes *In Situ* **GTIS**	All coal above minimum seam thickness and grade cut-off's	GTIS = [Area defined by minimum seam thickess and grade]*[Average Seam Thickness]* [Average Relative Density]
Total Tonnes *In Situ* **TTIS**	Geological and Modelling Losses applied	TTIS = GTIS * [1 - % Geol.Loss]* [1 - %Mod.Loss]
Mineable Tonnes *In Situ* **$MTIS_{Th.MH}$** (Theoretical Mining Height)	Coal in area defined by Mineable Seam Thickness & Depth / Strip Ratio cut-off's. Geol. & Mod. Losses applied	$MTIS_{Th.MH}$ = [Area defined by minimum seam thickness (up to Th.MH) and grade & Depth / Strip Ratio Cut-off's]* [Avg. Th.MH Thickness]*[Avg. $RD_{Th.MH}$] * [1 - %Mod.Loss]

Table 5.5: Qualifications for Coal Reserve Reporting Categories

Coal Reserve Category	**Qualification (incremental)**
Mineable in situ coal reserve (theoretical mining height)	Theoretical mining height, mine layout losses, depth cut-off, strip ration cut-off
Mineable in situ coal reserve (practical mining height)	Practical mining height, dilution, minimum and maximum mining height cut-offs
Extractable coal reserve	Mining layout extraction factors
Saleable coal reserve	Raw (100%) / practical product yield, saleable product moisture correction factor

Table 5.6: Calculations for Coal Reserve Reporting Categories

Coal Reserve Category	Qualification	Simplified Calculation
Mineable Tonnes *In Situ* **$MTIS_{Pr.MH}$** (Practical Mining Height)	Coal in area defined by Minimum & Maximum Practical Mining Heights, including Dilution	**$MTIS_{Pr.MH}$** = [Area defined by Minimum & Maximum Practical Mining Heights (with previously defined area less Layout Losses)]* [Avg Pr.MH Thickness]* [Avg $RD_{Pr.MH}$] * [1 - %Geol.Loss] * [1 - %Mod.Loss]
Run of Mine Reserve **RoM**	Extractable Coal Reserve less Recovery Efficiency Factor including Contamination and Moisture Correction Factor	RoM = ({$MTIS_{Pr.MH}$ * [%Mining Extraction Factor]} / [1 - %Cont.]) *[%Mining Recovery Factor] * [1 + %RoM Moisture Correction Factor]
Saleable Coal Reserve **Sales**	Sum Total of ALL Products after Coal Processing operations	Sales = RoM *[%Yield] * [1=%Sales Moisture Correction Factor]

The mineable inventory derived from Inferred Coal Resources during the conceptual mine design cannot be called reserves in terms of the SAMREC Code.

5.9 Additional Requirements

The above mine design and schedules have been based on a geological model that comprises an Inferred Resource. This is sufficient to support a preliminary assessment of the project, but will need further exploration work to enable a mine design with improved confidence to be done.

Further exploration, geophysical and geotechnical work should be done to enable the confidence in the geological model, geological structure and subsequent mine design to be improved.

6 Metallurgy/ Processing

6.1 Introduction

This section presents a review of recent metallurgical work done together with historical metallurgical work that is relevant to the selected processing routes for the East Complex. Key design considerations of the selected processing routes are also presented.

6.2 Historical Metallurgical Testwork

6.2.1 Report on Coal Preparation

The report by WG Denyer entitled '*Coal preparation plant conceptual process design*' dated July 1986 details the beneficiation possibilities for the Springbok Flats coal. It specifically relates to power station coal and liquefaction coal. Coking coal is not dealt with; however the principles would equally apply.

- **Washability**

Attached to the report are a number of appendices which detail washability work carried out on various drill core samples from 1979 until 1982. It is difficult to correlate the various pieces of work and it is clear that not all the work is included in the report. It is reasonable to assume that indeed sufficient work was done to allow a summary of washability data for the coalfield to be established. This is included as a memo from C Lombard copied to WG Denyer in June 1982.

It is quite clearly demonstrated that coking coal, coal for liquefaction and power station coal were separable from the RoM ore.

- **Processing Options**

The report details two alternative processing schemes for production of liquefaction and power station coal. The fundamental difference between the two processing schemes lies in the coal liberation size, -6mm for liquefaction and -25mm for power station coal. A case for power station coal alone is also detailed.

The processing steps suggested in the schemes were all drawn from 'state of the art' operating coal washing plants of the time. These processing steps are as relevant today as they were then. Improvements in fines heavy media separation, in flotation and in fines dewatering technologies may enhance plant performance today. In addition, relaxation around coal qualities for liquefaction and power station combination resulting from more modern technologies should allow higher overall yields to be obtained.

Water consumption figures given in the report for the alternatives can be considered relevant.

6.2.2 Report on Coal Liquefaction

Liquefaction of Springbok Flats coal is explored in a report prepared on behalf of General Mining Union Corporation, Trans Natal Coal Corporation and Sentrachem entitled '*Investigation into the production of transportation fuels*' dated December 1980. The work was carried out over two years in two phases, which could probably be defined as pre-feasibility and feasibility studies today.

The work carried out was extensive and covered all aspects of liquefaction, subject to the constraints of what was then considered 'state of the art' technology. Mini plant and pilot plant tests were carried out on the H-coal process with HRI in the USA at considerable expense (US$2.5million in 1980 terms). These tests demonstrated that the beneficiated coal was amenable to liquefaction and that an acceptable hydrocarbon product mix resulted.

No foreseeable problems were highlighted. It was noted that the high contents of vitrinite and exinite in the Springbok Flats coals distinguished them as better quality for liquefaction than most other South African coals.

On the basis of all the test work carried out, Bechtel was commissioned to do a study on a liquefaction facility with a capacity of 50,000 barrels per day. General Mining carried out the mining and beneficiation portion of the work and key data from this is reported:

The preliminary economic analysis was positive and suggested that the project would be superior to the Sasol project as it was in 1980.

6.3 Process Description Coke Production

The technology reported on when these resources were previously studied in the early 1980s is equally applicable today. There have been some improvements made in the areas of fines beneficiation, flotation and solid liquid separation that make overall performance better.

Coking coal is used in the metallurgical industries for reduction of ferrous ores for example in blast furnaces or electric ferroalloy furnaces. These processes require the coke to be as coarse as possible to ensure good gas permeability. Typically therefore, coking coal is sold in size fractions from 100mm down to 1mm.

The process flowsheet for the production of coking coal is shown schematically in Figure 6.1 and contains a number of basic processing steps as described below.

6.3.1 Design Basis

The coal beneficiation plant is designed for a treatment rate of 2Mtpa RoM and a yield of up to 0.7Mtpa of coking coal. Conventional DMS separation technology is to be applied for the coarser fractions. -1mm material will be recovered by a combination of spirals and flotation. The technologies applied are all standard and should pose no processing risk. Recoveries and product grades are based upon washability information and mass balances previously determined.

6.3.2 RoM Crushing and Screening

RoM coking coal will be fed to a jaw crusher via a vibrating grizzly that will remove -100mm material. Combined grizzly underflow and jaw crusher product will be fed to a wet screening plant where the coal will be screened at 10mm and 1mm. The -100+10mm coal will report to the coarse drum plant. The -10+1mm coal will report to a fine DMS cyclone plant. The -1mm underflow will be cycloned to remove slimes with the slimes fraction reporting to a flotation plant. The grits will report to a spirals plant.

6.3.3 Coarse DMS Cyclone Plant

RoM coal of -100+10mm will report to a two stage DMS cyclone plant. In the first stage coking coal will be separated at a specific gravity of 1.4. In the second stage power station middlings will be separated at a specific gravity of 1.6. After washing, coking coal, middlings and tailings will be washed to recover the dense media, in this case magnetite. Magnetite is recovered from the washings by magnetic separation.

6.3.4 DMS Cyclone Plant

The -10+1mm RoM coal will report to a two stage fines DMS cyclone plant. The coal will be separated into the same fractions in the same way as for the coarse plant.

6.3.5 Spirals Plant

The -1mm grits are treated on mineral separation spirals to yield a clean ultrafine power station coal and tailings. Spiral product will be thickened and then dewatered in centrifuges. Spiral tailings will be dewatered on dewatering screens prior to disposal.

6.3.6 Flotation

Slimes will be thickened to a solid content appropriate for flotation. The RoM coal slurry will be floated conventionally using a previously determined reagent suite. Flotation product will be thickened and filtered using pressure filters prior to being blended with the grits product from the centrifuges. Flotation tailings will be thickened and then pumped to an appropriate tailings dam.

6.3.7 Water Reticulation

As far as possible all water from the various unit operations will be collected and recycled. Water runoff from the slimes dam will be returned to the plant.

6.4 Planned Metallurgical Testwork

HolGoun has advised SRK that it plans to embark on an extensive programme of metallurgical testwork, but this is focused on the uraniferous shales. The objective of these tests will be to investigate:

- areas of possible process enhancements identified by HolGoun. This test work includes pressure leach, alkaline leach, pre concentration (radiometric sorting and gravity separation) and concentration of ash (ultrafine gravity separation);
- the application of radiometric sorting for grade enrichment to the processing plants which will reduce the process plant capital and operating cost significantly. A preliminary assessment indicates that the uranium treatment facility would then be 1/10th of the size currently envisaged which will also negate the effect of high acid consumption;
- local companies that are willing to construct sulphur burning acid plants and supply acid over the fence on a cost plus basis.

6.5 Conclusions

The East Complex coal measures can be exploited for:

- Steam coal;
- Coking coal.

A large amount of metallurgical test data is already available and demonstrates robust processing routes. Other processing options, which have the potential to simplify the processing scheme, need to be evaluated.

Figure 6.1: Schematic Flow Diagram for Coking Coal DMS Separation Plant

7 Tailings

SRK was requested to undertake a conceptual study for the waste and tailings deposition for HolGoun on a Coking Coal Mine and DMS Plant ("DMS") on the Springbok Flats.

The evaluation has been performed to provide a stand-alone waste disposal facility for the East Complex (the DMS plant).

7.1 Estimated Storage Requirements

The discard waste streams from the coarse drum plant, fines cyclone plant and spirals plant (refer Figure 6.4) will report to the rejects dumps, where these wastes will need to be compacted, and covered if necessary, to prevent spontaneous combustion occurring. The fines underflow from the thickener (Figure 6.4) and the UP fines underflow from the CCD (Figure 6.5) will both report to tailings impoundment facilities due to the fineness of these waste streams.

Table 7.1 summarises the 32 year Life of Mine (LoM) waste tonnages and the estimated volumetric containment requirements for the expected waste/tailings streams for the DMS Plant (East Complex).

Table 7.1: **DMS Plant – LoM Waste Streams Tonnages and Estimated Storage Requirements (East Complex)**

Description	Dry feed rate (tph)	LoM Dry Tonnage (kt)	Estimated Target Density (t/m^3)	Estimated Volume ($000\ m^3$)
DMS Stream 4	22.2	5,641.7	1.4	4,029.8
DMS Stream 7	10.1	2,566.7	1.4	1,833.4
DMS Stream 9	6.0	1524.8	1.4	1,089.1
Totals for DMS Discard Dump		**9,733.3**		**6,952.3**
DMS Stream 12	10.1	2,566.7	1.0	2,566.7
Totals for DMS Tailings		**2,566.7**		**2,566.7**
Volumetric Ratio of Coarse (c) to Fines (f) Waste Disposal Requirement/s				1.0 (c) : 0.37 (f)

From Table 7.1 above is can be seen that the volumetric ratio of the coarse waste streams to the fine waste stream for the DMS Plant is approximately 1.0 to 0.37 or 100 to 37. This would justify the construction of a co-disposal facility with approximately half of the coarse discard waste stream being required to safely contain the LoM/LoP (Life of Plant) fines production, thereafter the coarse discard waste stream would need to be formed into a separate coarse waste discard dump/facility or alternatively deposited as an extension to the side walls of the co-disposal facility once the containment walls have been formed.

7.2 Conceptual Study Considerations

The conceptual study was based on the development of a single stand alone co-disposal facility to accommodate the coarse discard and fine waste streams originating from the DMS Plant over the 32 year LoM/LoP. This development will involve the placement of the coarse discard material, which will need to be compacted to prevent spontaneous combustion, to form high sided containment dams/ponds into which the DMS fine material/tailings will be placed. Construction of the co-disposal facility would be in close proximity to the Coking Coal DMS Plant.

The conceptual designs and cost estimates for the co-disposal facility were based on a very high level desk top study and the following should be noted:

- No plans of the area or preferred area/s have been made available;
- No survey has been made available;
- No geotechnical information associated with the tailings dam sites has been made available;
- No geotechnical characteristics or strength parameters for the various waste and tailings streams have been made available;

- The distance between the plants is approximately 18km (straight line distance);
- The exact positions of neither the plants nor the preferred sites for the discard dump/s and tailings storage facilities have been provided.

Taking the above into account, the conceptual designs and cost estimates were based on the following assumptions:

- The 1:50 year and 1:100 year storm event rainfall intensities will be 130mm and 150mm respectively for the general area under consideration.
- It is assumed that the average slope of the ground (where the tailings dam/s will be constructed) will be on average 1 (v) :100 (h);
- The foundation geotechnical conditions will be suitable for a tailings dam development without the need for dedicated and expensive lining systems;
- Each development will require main drains and associated out let drains;
- Perimeter solution trench/s, paddocks and access roads will be required;
- Penstock pipelines with decant structures and energy dissipators have been included in each of the options. Penstock towers of 20m height have been incorporated into the high level cost estimate, as both facilities will have maximum heights exceeding 25metres;
- Access to the decant structures and towers will be via wooden catwalks or jet float walkways;
- Delivery piping around the tailings dam facility will be 100NB HDPE or steel in the case of the DMS Plant and 250NB HDPE or steel in the case of the Uranium Plant;
- The placement of the coarse discard material to form the containment wall/s will form part of the operational costs in the case of the East Complex DMS Plant. Included in these costs would be the compaction and covering of the material to prevent spontaneous combustion occurring;
- The return water dam has been provisionally sized to cater for the 1:50 year storm event;
- For costing purposes it is assumed that the tailings dam facility will be square for materials calculation purposes.

Key considerations incorporated into the conceptual designs for the two co-disposal facilities are summarised in Table 7.2.

Table 7.2: Key Considerations in the East Complex Conceptual Co-disposal Facility Design

Parameter	Units	Co-disposal Facility Design Assumption
Fines containment footprint	(ha)	15
Phase 1 coarse discard/Imported Material footprint	(ha)	45
Phase 1 total footprint	(ha)	60
Phase 2 extension		
- coarse discard	(ha)	45
- 3 additional fines discard basins/ponds	(ha)	-
Total footprint area at end LoM/LoP	(ha)	105
No of compartments	(No)	1
Maximum starter wall height	(m)	4.0
Maximum starter wall volume	(m^3)	35,000
Reinforced Concrete penstock (20m high)	(No)	-
Total coarse discard in containment walls	(kt)	8,575
Total imported material	(k m^3)	
- proportion of total LoM coarse discard	(%)	60
- equivalent production period	(years)	17
Delivery pipeline around facility		100NB steel/HDPE
Return Water storage volume	(m^3)	40,000
Maximum height at end of LoM/LoP	(m)	30

7.3 Capital Cost Estimate

It has been assumed that the facility will be constructed in a phased manner, incorporating two phases for the East Complex facility . The capital cost estimate for the construction of the co-disposal facility to be located at the East Complex is summarised in Table 7.3. The delayed capital expenditure for the remaining development of the footprint of the disposal facility could be undertaken as part of the operational costs of the mine.

The costs in Table 7.3 exclude VAT and professional fees, but include a 20% contingency.

Table 7.3: Capital Cost Estimate for the East Complex Waste Disposal Facility

Description	Estimated Initial Capital Expenditure (R'000)	Delayed Capital Expenditure (R'000)	Total Estimated Capital Expenditure (R'000)
Facility No 1 (East Complex)	35,500	4,500 (Required in Year 17)	40,000

7.4 Conclusions

It is SRK's opinion, based on a very high level desktop study, that the disposal of the waste streams of the DMS plant can be safely undertaken, provided that the facility is designed to accepted engineering practices.

8 Bulk Services

The project area is within a 100km of Pretoria and the N1 Highway linking the Gauteng province with the Limpopo province to the North. Relatively large townships are present in Mpumalanga just south of the proposed project area. Bulk services will have to be developed with the project in close proximity.

8.1 Electricity

Electricity is distributed to the Settlers town and to all the farms in the area as well to the townships to the south but no major gridlines cross the area of the proposed projects. An electricity supply line will have to be built from the existing North-South national grid lines, which runs parallel to the N1 Highway approximately 40km to the West of the town Settlers. Electricity is required for construction and operation of the project.

8.2 Water

The Renosterkop dam lies less than 30km south east of the Uranium project and south of the Coking coal project. Aquifers are also present in the area. The geohydrological study will determine how much water in the aquifers is available for industrial use. The feasibility study will then determine what needs to be sourced either from the Renosterkop dam or elsewhere if necessary. The Pienaars River is less than 60km to the south west and the Olifants River or Loskop dam 70km to the south east. There are therefore major water sources available within reasonable reach if required.

Drinking water will have to be purified on site and a sewage plant will have to be build for the East Complex. Recycling of sewage water will have to be investigated to conserve water.

8.3 Roads and Railway Lines

The R576 and R516 tar roads connect the town Setlers with the main north-south N1 highway. These tar roads are in a relative good condition and will be adequate to connect the project with the N1 highway. Well maintained gravel roads are in use by the farming community and will need upgrading for heavy mining equipment during the wets season.

A single, not electrified, railway line connects the area with the main electrified north-south line at the town of Pienaarsrivier. This line may be utilised to export coking coal from the East Complex project. The railway line will require upgrading if utilised for this purpose.

9 Environmental Issues

9.1 Introduction

The scope of work for the environmental input into the IER was to evaluate the current status of the environmental work and also the previous research undertaken on the HolGoun prospecting areas. In order to assess and evaluate the environmental component of the work previously undertaken, a review of the available information was undertaken between 17 and 25 July 2007 and during a site visit on 18 July 2007.

The identification of the project opportunities and risks and recommendations and the way forward is provided. In addition, a summary of the processes required in order to meet the environmental legislative requirements has been included.

9.2 Project Description

The proposed prospecting development entails the prospecting for coal within the Springbok Flats area, with the coking coal earmarked for export and the uraniferous coal to be utilised for power generation. The intention is therefore in the future to erect a power station on the surface mining area. The process of burning the uraniferous coal will be used to generate electricity and the ash collected during the burning of the coal for further processing in a uranium plant in order to extract the uranium content within the ash.

9.3 Environmental Components Undertaken to Date

Prior to commencing with the prospecting operations, HolGoun applied for a Prospecting Permit over 42 farms in the Springbok Flats. The Prospecting Environmental Management Plan ("EMP") was submitted to the Limpopo Department of Minerals and Energy. The Prospecting EMP was approved and a Prospecting Permit was subsequently issued on the 15th of November 2006.

The Prospecting Permit is valid for four years and allows HolGoun to undertake the following tasks:

- Drilling of approximately 100 boreholes, not exceeding 250m deep using diamond drilling;
- Conduct analyses of each sample with a regime of physical and chemical test;
- Conduct analyses on certain parts of the borehole core for uranium and other trace elements;
- Selecting of composite samples for analyses by selected laboratories to determine the susceptibility of the coal to washing.

The following documentation was reviewed and found to be relevant from an environmental perspective:

- Haines, Scwiebus and Scott: Recovery of Uranium, power and alumina from the uraniferous coal seam of the Springbok flats Coal Field, 1981;
- JS Smit and HU Bantz: Tirisano Power Station Project. Preliminary report on the coal reserves of the farms Moepi 687KP and Schilpadfontein 692KR, Mathanjana District, RoB;
- DC Oldroyd: Rock mechanisms aspects of the Northern Transvaal coalfield, southern portion;
- K Linning: Geological motivation for an experimental mine – Springbok Flats, 1978;
- Pre-feasibility study on the Warmbad Power Station, 1979;
- HU Bantz: Settlers-Tuinplaats Coalfield – Geological Overview, 1992;
- A.A. Smithen and B. Read of Gencor: Environmental Impact for Power Stations, 1986.

The above- mentioned documents detailed a number of basic environmental assessments relating to the impact of a proposed mine in the Settlers Area on the environment and more specifically on groundwater (quality and quantity), air and surface subsidence. These basic assessments were based on assumptions rather than detailed specialist studies and background information. For the purpose of the exercises being undertaken at that stage (i.e. resource determination and feasibility study) these basic environmental evaluations can be viewed as adequate.

In addition to the historical reports indicated above, the following current documentation was also assessed and reviewed:

- Prospecting Permit Application dated July 2006;
- Prospecting Permit dated 15 November 2006.

During the site visit undertaken on 18 July 2007, the prospecting operations were viewed to be meeting the requirements of the Prospecting Permit as well as the Prospecting EMP.

9.4 Project Environmental Issues and Compliance

9.4.1 Groundwater

The study area is located on a perched aquifer that is currently being utilised by the surrounding farmers and townships. Any impact on the groundwater (quality as well as quantity) would potentially have an impact on the surrounding settlements and agricultural activities. Any tailings or ash dams / impoundments have the potential to pollute groundwater, generally associated with changes in pH of the groundwater and the leaching of salts and metals into the groundwater. The manner in which ash is disposed of is the single most important factor in predicting potential groundwater impacts. In addition, the potential coal storage yard could potentially impact on the groundwater quality. The impact of the activities on groundwater can be managed and mitigated with the implementation of measures such as the design of a low permeability lining for the ash/dams impoundments, compacting the area allocated to the tailings /ash dams and discard dumps prior to disposal as well as ensuring that the ‘dirty water’ are contained within dirty water circuits. Final mitigation measures will be identified once the specialist study has been undertaken and the extent and significance of impact has been determined.

9.4.2 Air

Activities within the study area that contribute to the existing air quality include the farming activities and veld fires. The proposed mining activities as well as the power generation plant will potentially impact on the ambient air quality. Sources of emissions associated with the operational phase of the proposed power station include particulate and gaseous emissions from the power station flue stacks as well as low-level fugitive releases from the materials handling and ash-disposal facilities at the power station. Pollutants released would potentially include particulates, sulphur dioxide, oxides of nitrogen, various trace metals, carbon dioxide and nitrous oxide. All of these gasses are transparent to shortwave radiation coming into the earth’s surface, but trap long-wave radiation leaving the earth’s surface. This action leads to a warming of the earth’s lower atmosphere, which results in changes to the global and regional climates. The greenhouse gases released from coal-fired power stations are primarily CO_2 and nitrous oxide (NO_2). However it should be noted that with the implementation of best practice such as bag filters and scrubbers, the impact on the ambient air quality can be mitigated.

9.4.3 Heritage Resources

There are no known heritage resources within the study area listed on the South African Heritage Resources Agency’s database. However it should be noted that heritage resources which could potentially occur within the study area include structures older than sixty years, graves and sites of historical significance. Although the surface area is fairly disturbed as a result of the agricultural activities taking place, the historical significance of the area earmarked for the power station as well as the mining surface infrastructure would still need to be determined. Should heritage resources be found on site, an application for its removal would need to be submitted to the South African Heritage Resources Agency.

9.4.4 Sterilisation of Agricultural Land

Currently the study area is being actively cultivated and a number of pivot-irrigation systems being observed within the study area. According to the satellite imagery extracted from Google Earth - 24 pivot-irrigation systems could be identified on the date of the photograph. The impact of the mining operations as well as the power station of the agricultural activities would need to be determined.

9.4.5 Uranium Contamination/ Radiation

The control of radiation hazards in South Africa is governed by the Nuclear Energy Act (Act 46 of 1999) and is administered by the National Nuclear Regulator ("NNR"). Any person or organisation in possession of radioactive material (any quantity having a level above 20Bq/g) must apply for registration with the regulator. Potential hazards arise because of exposure of persons through well-defined pathways. These include the direct pathway of radiation that occurs due to gamma rays and the respiratory pathway through inhalation of radon gas and to dust. With reference to this project the activities associated with uranium include the mining as well as the handling of the ash after the coal has been processed in the power station. The impact of the mining activities and ash storage on the environment as well as the workforce would need to be determined.

With reference to the prospecting phase, in terms of the requirements of the Nuclear Energy Act, the NNR has to approve the drilling programme prior to drilling commencing. NNR approval of the drilling programme has been obtained.

9.4.6 Waste Management

The mining process as well as the power generation station would generate a number of waste streams. The major concerns being the ash dumps, the waste coal stockpiles and the brine from any treated waste water. In terms of Section 21(g) of the National Water Act, the storage of ash, brine, waste coal discards etc would be considered a waste product for which a water use license would have to be applied for. The license would have a suite of conditions which would seek to provide environmental protection to the groundwater resource.

9.4.7 Surface Water and Water Supply

A number of drainage lines/tributaries of the Olifants River system (Table 9.1) as well as surface dams and storage facilities are located within the study area. According to the Limpopo Integrated Development plan, the province has limited surface and ground water resources. Most of the water management areas are severely stressed and many people still do not have access to the accepted minimum supply of water. Most of the Limpopo Province relies on ground water as a source of supply. Water requirements for development (especially agriculture, mining and rural areas) are placing severe stress on the available water supply in the province.

Table 9.1: The surface water resource in Limpopo

River	Catchment (km^2)	Mean Annual Precipitation (mm)
Mokolo	14,409	533
Lephalala	6,725	469
Mogalakwena	19,314	481
Sand, Nzelele	19,972	453
Luvuvhu	5,941	627
Letaba	18,979	584
Olifants	54,563	631

With reference to the supply of water to the proposed future project, the existing Flag Boshielo Dam is located approximately 60km to the southeast of the study area. The Flag Boshielo dam has recently been raised by 5m in order to increase the holding capacity from 100 million m^3 to 188 million m^3 and increase the yield of 56 million m^3/ annum to 72 million m^3/ annum. Potentially water could be supplied to the mining and power station operations via a water pipeline from the Flag Boshielo Dam. It should however be noted that this is subject to HolGoun obtaining a Water Use Licence as well as joining the Olifants River Water Forum.

The Flag Boshielo Dam also supplies water for domestic use in the north-western part of the Olifants Water Management Area ("WMA"). There are a number of small towns and settlements, such as Lebowakgomo, with farming communities as well as light industry. From Flag Boshielo Dam, the river flows through the Bushveld Basin. The Olifants River has a relatively dense network of tributary rivers and streams that feed into it. The impact of the proposed development of the surface water as well as the water reserves would need to be determined.

9.5 Legislative and policy requirements

The proposed future mining activities would require a number of legislative permissions that must be met prior to the establishment of the mine and coal washing plant. The legal context of the proposed development (post prospecting phase) is discussed in Section 2 of this IER.

9.6 Risks and Opportunities

9.6.1 Prospecting Phase

As indicated previously the environmental processes followed by HolGoun to date are in accordance with the requirements of the MPRDA. In addition, based on the observations made during the site visit, the environmental management and protection measures that are being implemented during the prospecting phase are in accordance with the requirements of the approved EMP and Prospecting Permit.

A financial provision of R50,000 has been allocated to rehabilitation after the prospecting phase. This financial provision will need to be amended once the Mining Right Application is submitted to reflect the ongoing rehabilitation that would be required during the future mining phase

However it should be noted that even though the Prospecting Permit makes reference to and approves bulk sampling, the EMP does not cover it in sufficient detail. Should the proponent undertake bulk sampling, it is recommended that the EMP be updated to include an assessment and mitigation measures for the activities associated with bulk sampling.

9.6.2 Feasibility Phase

The major environmental risks associated with the proposed future mining, which would require additional investigations are:

- The availability of water to supply the development;
- Impact of the sterilisation of agricultural land;
- Impact of the development on the perched groundwater table;
- Impact of the development on air quality;
- Impact of the development on the surface water.

9.6.3 Kyoto Protocol:

The Kyoto Protocol could potentially influence the proposed development, specifically the power station. The power station could be used as an opportunity to implement best practice air emission mitigation technology for carbon emissions, which in turn could provide the proponent with carbon credits, which could be sold via the tradable permit scheme.

The United Nations Framework Convention on Climate Change ("NFCCC") and the subsequent Kyoto Protocol was ratified by the South African Government on 29 August 1997. One of the mechanisms that has been introduced as an incentive to reduce greenhouse gases is the buying and selling of carbon credits. Carbon credits are a tradable permit scheme, which is an incentive for countries and businesses to reduce greenhouse gasses into the air. Developed countries that have ratified the Kyoto Protocol have set quotas on the levels of greenhouse gas emissions. Industries that exceed their allowed quotas then buy carbon credits, while those that operate below quotas can sell the remaining credits. The process allows developing countries such as South Africa to generate carbon credits which can be sold to developed countries to offset their emissions. The trading of carbon credits does potentially have significant opportunities for the project.

In the case of the HolGoun Power Station, it will be key to demonstrate the extent of carbon credit (offset) to prove a concept called additionality. Additionality is a term used by Kyoto's Clean Development Mechanism to describe the fact that a carbon dioxide reduction project (carbon project) would not have occurred had it not been for concern for the mitigation of climate change. More succinctly, a project that has proven additionality is a beyond-business-as-usual project.

9.7 Conclusion

As indicated in Section 9.5, there are a number of risks associated with the proposed mining of coal and the coking coal beneficiation plant. Further investigations are therefore required. It is believed that, based on the available information, the environmental impacts identified thus far can be effectively managed with the implementation of best practice environmental mitigation measures. Further environmental investigations would however be required to confirm this in the project feasibility stage.

10 East Complex – Production Schedule and Capital and Operating Costs

A summary of the production schedule and capital and operating costs developed for the East Complex as defined in the IER and as incorporated into the PEA is presented here.

10.1 Production Schedule

The production schedule of the East Complex (to 2019) is shown in Table 10.1 and in Figure 10.1.

Table 10.1: Base Case - East Complex Production Schedule

Mining Section	Units	LoM Totals/ Averages	2011	2012	2013	2014	2015	2016	2017	2018	2019
			1	2	3	4	5	6	7	8	9
CM section 1	(kt)	8,816	0	0	336	336	336	336	336	336	336
Longwall section	(kt)	35,952	0	0	251	1,327	1,414	1,328	1,327	1,414	1,327
RoM coal	**(kt)**	44,768	0	0	587	1,663	1,750	1,664	1,663	1,750	1,663
Recovery:											
Coking coal	(%)				33%	32%	33%	31%	32%	31%	31%
Steam coal	(%)				38%	39%	39%	42%	42%	42%	42%

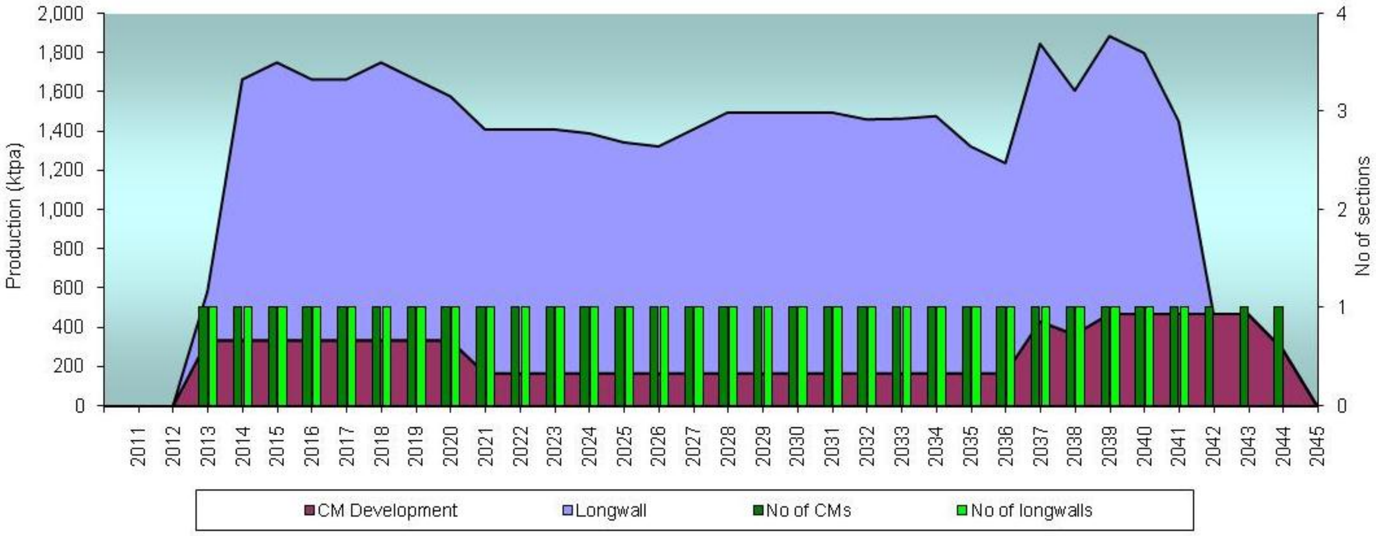

Figure 10.1: Production Schedule – East Complex

10.2 Capital Cost Summaries

The capital cost summary for the East Complex is presented in Table 10.2. These capital amounts cover start up capital requirements only and should be considered as order of magnitude estimates at this stage, even though HolGoun obtained quotes from some equipment suppliers. The treatment with respect to phasing of the capital expenditure is also shown.

Table 10.2: Base Case Project Capital Cost Summary for the East Complex

Description	Units	Totals/ Averages	2011 1	2012 2	2013 3	2014 4	2015 5	2016 6
Mining - vertical shaft	(Rm)	0.0						
Mining - conveyor decline	(Rm)	50.1	25.0	25.0				
Mining - longwall equipment	(Rm)	345.0				345.0		
Mining - CM development equipment	(Rm)	50.0			50.0			
Mining - sundry equipment	(Rm)	6.0			3.0	3.0		
Mining - Materials handling	(Rm)	15.0			7.5	7.5		
Mining - Shaft infrastructure	(Rm)	27.1	13.5	13.5				
Ventilation - raisebore hole/fans	(Rm)	10.8			10.8			
Beneficiation Plant	(Rm)	194.0	106.7	77.6	9.7			
Surface Infrastructure	(Rm)	5.0	2.5	2.5				
Purchase of Surface Rights	(Rm)	5.0	5.0					
Services	(Rm)	30.0	15.0	15.0				
Load out facility	(Rm)	10.0			10.0			
Tailings dam	(Rm)	35.5		35.5				
Environmental closure fund	(Rm)	10.0			10.0			
Owner's project costs	(Rm)	6.0	3.0	3.0				
Contingencies	(Rm)	67.6	7.9	22.6	37.2			
Total East Complex Project Capital	**(Rm)**	**867.0**	**178.7**	**194.7**	**138.2**	**355.5**	**0.0**	

An annual sustaining capital provision, calculated as 3% of the mining, processing and waste disposal operating costs in any given year, has been allowed in the PEA.

10.3 Operating Cost Summaries

The operating cost estimates used for the East Complex is presented in Table 10.3.

Table 10.3: Operating Cost Estimates for East Complex (basis 1.75Mtpa in 2015)

Item	Annual Cost at Steady State (Rmillion)	R/t RoM
Mining cost	115.41	65.96
Coal Beneficiation Plant Cost	26.86	15.35
Tailings disposal	1.75	1.00
Administration	6.00	3.43
Marketing costs (coke)	0.06	0.03
Marketing costs (steam)	0.03	0.02
MPRDA Royalties	52.62	30.07
Environmental, SLP	0.44	0.25
Total Cost	**203.18**	**116.12**

11 Market Overview and Price Forecasts

11.1 The Coke Market in South Africa

The Coke Market Report produced by Resource-Net in July 2007 analyses pig iron output data, coke trade data and coking coal exports. In general, coke production can be closely related to pig iron output which is one of the major markets for coke apart from the metallurgical industry, i.e. producers of inter alia chrome and manganese.

Whilst the international market has an influence on South Africa, one must also take into account the local South African demand within the metallurgical market. The South African metallurgical market consumes coke of Chinese, Zimbabwean and South African origin.

The July 2007 report highlights the following key drivers on the availability and pricing of coke:

- Coke prices are standing at US$248 - US$255/t FOB;
- Short term availability of coke within China appears to have tightened;
- Chinese authorities have underlined their determination to limit annual exports of coke;
- Coke production in Poland is being restricted by coal shortages from that country's largest producer.

The DME energy statistics indicate that South Africa imported 1.586Mt of coking coal in 2003, 1.69Mt in 2004 and 1.86Mt in 2005. During the same time, South Africa exported 0.594Mt of coking coal in 2003, 0.917Mt in 2004 and only 0.52Mt in 2005.

Platts (2008) reported that BHP Billiton-Mitsubishi Alliance and ArcelorMittal had agreed in April 2008 to a hard coking coal contract price of US$305/t for the 2008 financial year.

Considering these factors, the outlook for HolGoun to supply coking coal into the South Africa market is very positive.

11.2 The Steam Coal Market

The Energy Information Administration ("EIA") in its International Energy Outlook 2007 Report projects that the world's energy needs will increase by over 50% by 2030. Developing economies will account for more than half of the global energy demand by 2030, compared with only 41% in 2007. In EIA's projections, coal consumption is seen to increase by 74% from 2004 to 2030, and coal's share of world energy consumption to increase from 26% in 2004 to 28% in 2030.

With the planned expansions to the Richards Bay Coal Terminal ("RBCT"), South Africa's exports are seen to increase to 91Mtpa. However, exports from the current players (Anglo Coal, BHP Billiton, Exxaro, Sasol and Xstrata) are seen to decline from the 70Mtpa in 2007 to around 64Mtpa in 2025, even after taking LoM and expansion plans into account. There is thus considerable export opportunity for new entrants to the South African coal market.

In South Africa, Eskom is a primary user of coal and has long-term supply contracts with mines to ensure a continuous supply of coal to power stations. Supply of coal has been problematic in recent years due to under-production at the tied collieries, availability of the correct quality from short-term supply contracts and by transportation of increased quantities of coal by road. The cost of coal to Eskom has been affected by purchases of coal at spot prices of up to R160/t in comparison to the R80 to R90/t per the long-term contracts.

The cost competitiveness of the South African coal producers (Figure 11.1) has been helped by the proximity to the ports and the relatively low railage cost to Richards Bay, although required upgrades to the railway network in South Africa and expansions at RBCT could see South Africa's export price increase to match that of Australia (Figure 11.1).

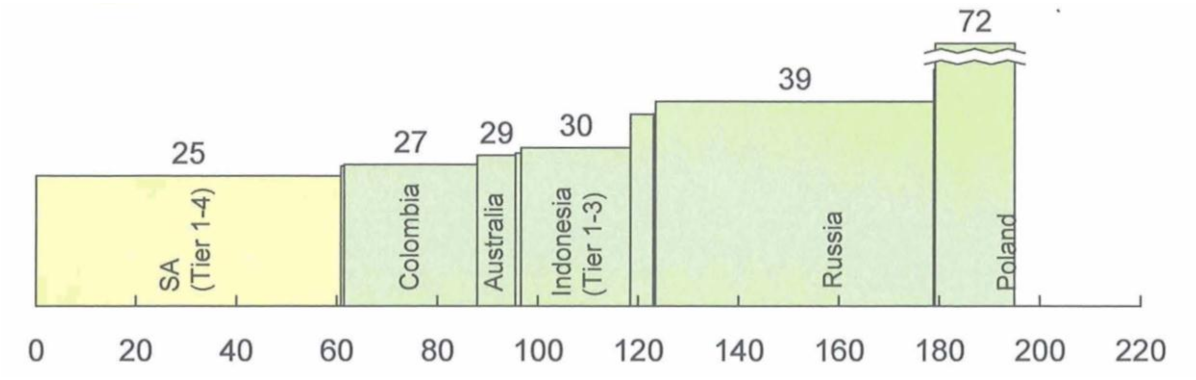

Figure 11.1: Export thermal cost curve US$/t FOB to Europe 2007 (source: McKinsey, 2007)

In early July 2008, Australian coal prices were above US$200/t FOB, prompting South African traders to expectantly eye the same levels for coal out of Richards Bay (Hill, 2008a). However, some Indian coal traders believed the price levels were too high and a correction was due, but not by much nor for long. A South African coal analyst had a more conservative view, considering that coal prices by the end of 2008 could reach the price levels existing at the beginning of the year (Hill, 2008a; Hill, 2008b).

12 Preliminary Economic Assessment

This section describes the process used to develop a financial model ("FM") in a MS Excel workbook that would enable a preliminary economic assessment of the various production and processing combinations to be done. A matrix of various scenarios has been developed to evaluate the project options. The results from this preliminary assessment for the East Complex are presented here.

12.1 Assumptions

12.1.1 Macro-economic Assumptions

The macro-economic assumptions incorporated into the PEA are summarised in Table 12.1.

Table 12.1: Macro-economic Assumptions in the PEA

Parameter	Units	Value
Rand:US$ Exchange Rate	(R:US$)	7.75
Coking coal (FOT mine price)	(US$/t)	150
Steam coal price (local)	(R/t)	110

A range of values for each of the parameters shown in Table 12.1 can be selected in the PEA and the effect of changes in the values on project economics readily assessed.

12.1.2 Fiscal Assumptions

Within the PEA, a separate cash flow model was developed for the East Complex as if it was a separate tax entity.

12.2 Economic Modelling

The model for the East Complex comprises a coal mine with production of approximately 0.6Mtpa of blend coking coal and 0.6Mtpa of steam coal (see Figure 10.1).

The results of the preliminary economic assessment for the East Complex on a stand-alone basis as extracted from the PEA are shown in Table 12.2. Table 12.2 presents the post-tax pre-finance cash flows for the East Complex. The technical economic parameters in Table 12.2 are stated in constant June 2008 terms. The annual cash flow projections in Table 12.2 are stated in constant money terms for calendar years ending 31 December. The cash flows commence on 1 January 2011 and exclude costs associated with further exploration, feasibility studies, permitting and HolGoun's holding costs up to end 2010.

Note that this table is not representative of financial statements and takes no account of deferrals of tax liabilities between accounting periods.

Table 12.2: Summary of the East Complex Preliminary Economic Assessment

	HolGoun Energy (Pty) Limited																																						
	Springbok Flats Energy Project							Processing																															
	C:\Documents and Settings\mcda\My Documents\projects\holgoun ier\coal IER\[HolGoun east complex project oct2008.xlsx]IER							Starts																															
						01/01/2011	01/01/2012	01/01/2013	01/01/2014	01/01/2015	01/01/2016	01/01/2017	01/01/2018	01/01/2019	01/01/2020	01/01/2021	01/01/2022	01/01/2023	01/01/2024	01/01/2025	01/01/2026	01/01/2027	01/01/2028	01/01/2029	01/01/2030	01/01/2031	01/01/2032	########	01/01/2034	01/01/2035	01/01/2036	01/01/2037	01/01/2038	01/01/2039	01/01/2040	01/01/2041	01/01/2042	01/01/2043	01/01/2044
		Units		**Totals/**	01/01/2011	31/12/2011	31/12/2012	31/12/2013	31/12/2014	31/12/2015	31/12/2016	31/12/2017	31/12/2018	31/12/2019	31/12/2020	31/12/2021	31/12/2022	31/12/2023	31/12/2024	31/12/2025	31/12/2026	31/12/2027	31/12/2028	31/12/2029	31/12/2030	31/12/2031	31/12/2032	########	31/12/2034	31/12/2035	31/12/2036	31/12/2037	31/12/2038	31/12/2039	31/12/2040	31/12/2041	31/12/2042	31/12/2043	31/12/2044
				Averages	Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
	Mining		Reserves																																				
	Total CM section	(kt)		8,816		0	0	336	336	336	336	336	336	336	336	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	432	366	470	470	470	470	470	290
	Total Longwall section	(kt)		35,952		0	0	251	1,327	1,414	1,328	1,327	1,414	1,327	1,242	1,241	1,241	1,241	1,221	1,175	1,155	1,241	1,328	1,327	1,327	1,327	1,292	1,295	1,309	1,155	1,070	1,414	1,241	1,414	1,328	979	0	0	0
	RoM coal	(kt)	1	44,768		0	0	587	1,663	1,750	1,664	1,663	1,750	1,663	1,578	1,409	1,409	1,409	1,389	1,343	1,323	1,409	1,496	1,495	1,495	1,495	1,460	1,463	1,477	1,323	1,238	1,845	1,607	1,884	1,798	1,449	470	470	290
	Coking coal recovery	(%)						33%	32%	33%	31%	32%	31%	31%	34%	39%	39%	39%	38%	38%	32%	33%	36%	30%	33%	32%	32%	34%	35%	33%	30%	36%	32%	33%	33%				
	Power station coal recovery	(%)						38%	39%	39%	42%	42%	42%	42%	40%	35%	33%	34%	37%	37%	40%	37%	35%	42%	42%	41%	42%	40%	38%	38%	40%	38%	38%	38%	38%				
	Processing																																						
	RoM coal feed to plant	(kt)		44,768		0	0	587	1,663	1,750	1,664	1,663	1,750	1,663	1,578	1,409	1,409	1,409	1,389	1,343	1,323	1,409	1,496	1,495	1,495	1,495	1,460	1,463	1,477	1,323	1,238	1,845	1,607	1,884	1,798	1,449	470	470	290
	Production of coking coal	(kt)		15,085		0	0	196	536	582	509	530	540	510	531	549	551	553	528	513	425	471	538	454	494	486	461	497	510	436	377	667	521	631	596	491	172	163	70
	Production of steam coal	(kt)		17,400		0	0	223	654	687	703	702	742	704	625	493	466	474	511	504	533	515	522	621	624	616	610	585	558	503	490	693	603	720	679	542	177	192	130
											1.3817869	1.3250315	0.4241898																										
	Revenue	**(Rm)**		**19,450.2**		**0.0**	**0.0**	**253.0**	**694.9**	**751.7**	**668.7**	**693.4**	**709.6**	**669.9**	**686.1**	**692.1**	**691.2**	**695.0**	**669.7**	**651.6**	**552.7**	**604.0**	**682.9**	**596.0**	**642.7**	**632.3**	**602.7**	**642.3**	**654.8**	**561.7**	**492.3**	**851.2**	**671.6**	**812.6**	**767.9**	**630.4**	**219.2**	**210.3**	**95.8**
	Coking coal sales	(Rm)		17,536.2		0.0	0.0	228.4	623.0	676.2	591.3	616.2	628.0	592.4	617.4	637.8	640.0	642.9	613.4	596.2	494.0	547.3	625.5	527.7	574.1	564.5	535.6	578.0	593.4	506.3	438.4	774.9	605.3	733.4	693.3	570.7	199.7	189.1	81.6
	Steam coal sales	(Rm)		1,914.0		0.0	0.0	24.6	71.9	75.6	77.3	77.3	81.6	77.4	68.7	54.3	51.3	52.1	56.2	55.4	58.6	56.7	57.4	68.3	68.6	67.8	67.1	64.4	61.4	55.3	53.9	76.3	66.3	79.2	74.6	59.6	19.4	21.1	14.3
										0.1117542																													
	Operating Costs	**(Rm)**		**5,489.7**		**0.0**	**0.0**	**72.6**	**151.7**	**210.7**	**198.6**	**200.3**	**207.7**	**198.6**	**193.5**	**180.6**	**180.6**	**180.8**	**177.6**	**172.9**	**164.5**	**174.4**	**186.3**	**180.2**	**183.5**	**182.8**	**178.1**	**154.3**	**183.0**	**165.1**	**154.0**	**225.2**	**194.7**	**225.5**	**216.1**	**180.8**	**80.2**	**78.8**	**56.0**
	Mining	(Rm)		2,954.0				39.8	109.8	115.4	109.8	109.8	115.4	109.8	104.2	92.4	92.4	92.4	91.2	88.1	86.8	92.4	98.1	98.0	98.0	98.0	95.8	96.0	96.8	86.8	81.3	122.1	106.3	124.8	119.2	96.6	32.9	32.9	20.3
	Processing	(Rm)		818.7				22.6	26.5	26.9	26.6	26.5	26.9	26.5	26.2	25.6	25.6	25.6	25.5	25.4	25.3	25.6	25.9	25.9	25.9	25.9	25.8	25.8	25.9	25.3	25.0	27.2	26.3	27.4	27.0	25.8	22.2	22.2	21.5
	Tailings disposal	(Rm)		44.8				0.6	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.4	1.4	1.4	1.4	1.3	1.3	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.3	1.2	1.8	1.6	1.9	1.8	1.4	0.5	0.5	0.3
	Administration	(Rm)		192.0				6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	Marketing costs (coke)	(Rm)		1.5				0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	Marketing costs (steam)	(Rm)		0.9				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDA Royalties	(Rm)		1,266.2				0.0	0.0	52.6	46.8	48.5	49.7	46.9	48.0	48.4	48.4	48.7	46.9	45.6	38.7	42.3	47.8	41.7	45.0	44.3	42.2	18.1	45.8	39.3	34.5	59.6	47.0	56.9	53.8	44.1	15.3	14.0	5.4
	Environmental, SLP	(Rm)		11.2				0.1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.5	0.4	0.5	0.4	0.4	0.1	0.1	0.1
5%	Contingency	(Rm)		200.5				3.5	7.2	7.5	7.2	7.2	7.5	7.2	6.9	6.3	6.3	6.3	6.2	6.0	6.0	6.3	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.0	5.7	7.9	7.0	8.0	7.7	6.5	3.1	3.1	2.4
	Operating Profit	(Rm)		13,960.5				180.3	543.2	541.1	470.1	493.2	501.9	471.3	492.7	511.5	510.7	514.2	492.1	478.7	388.2	429.5	496.6	415.8	459.2	449.6	424.6	488.1	471.8	396.6	338.3	626.0	476.8	587.1	551.8	449.5	139.0	131.5	39.8
	MPRDA Royalty Calculation (June 2008)																																						
	Cumulative capital expenditure	(Rm)				178.7	453.9	868.9	692.7	153.8	4.1	4.1	78.0	31.6	4.0	3.6	3.6	77.3	3.5	30.9	8.8	3.6	77.5	3.8	3.8	31.3	3.7	372.2	3.7	3.4	3.2	59.5	77.7	4.6	4.4	3.7	1.7	29.2	1.3
	operating profit	(Rm)				0.0	0.0	180.3	543.2	593.7	516.9	541.7	551.6	518.1	540.7	559.9	559.1	562.8	538.9	524.3	426.9	471.8	544.4	457.5	504.2	493.8	466.8	506.2	517.7	435.9	372.7	685.6	523.8	643.9	605.6	493.7	154.3	145.4	45.2
	Cumulative capital after capital allowance	(Rm)				178.7	453.9	688.6	149.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	capital allowance	(Rm)				0.0	0.0	180.3	543.2	153.8	4.1	4.1	78.0	31.6	4.0	3.6	3.6	77.3	3.5	30.9	8.8	3.6	77.5	3.8	3.8	31.3	3.7	372.2	3.7	3.4	3.2	59.5	77.7	4.6	4.4	3.7	1.7	29.2	1.3
	EBIT after capital allowance, before royalty	(Rm)				0.0	0.0	0.0	0.0	439.8	512.8	537.6	473.6	486.5	536.7	556.4	555.5	485.6	535.4	493.3	418.1	468.2	466.9	453.7	500.4	462.5	463.1	134.0	513.9	432.5	369.5	626.1	446.1	639.3	601.1	489.9	152.7	116.3	43.9
	Gross Sales	(Rm)				0.0	0.0	253.0	694.9	751.7	668.7	693.4	709.6	669.9	686.1	692.1	691.2	695.0	669.7	651.6	552.7	604.0	682.9	596.0	642.7	632.3	602.7	642.3	654.8	561.7	492.3	851.2	671.6	812.6	767.9	630.4	219.2	210.3	95.8
9.0	Royalty Rate	(%)				0.0%	0.0%	0.0%	0.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	2.8%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	6.6%	5.6%
7																																							
	Royalties due	(Rm)				0.0	0.0	0.0	0.0	52.6	46.8	48.5	49.7	46.9	48.0	48.4	48.4	48.7	46.9	45.6	38.7	42.3	47.8	41.7	45.0	44.3	42.2	18.1	45.8	39.3	34.5	59.6	47.0	56.9	53.8	44.1	15.3	14.0	5.4
	Unit operating cost																																						
	per RoM coal mined	R/t RoM		122.6				123.8	91.2	120.4	119.3	120.4	118.7	119.4	122.6	128.2	128.1	128.3	127.8	128.8	124.4	123.8	124.6	120.5	122.7	122.2	122.0	105.4	123.9	124.8	124.5	122.0	121.2	119.7	120.2	124.8	170.4	167.5	192.9
	per tonne of product produced	R/t sales		169.0				173.0	127.5	166.1	163.9	162.5	162.0	163.6	167.4	173.3	177.6	176.1	170.9	170.1	171.7	176.9	175.8	167.7	164.2	165.8	166.4	142.5	171.2	175.9	177.7	165.6	173.3	167.0	169.5	175.0	230.1	222.1	280.3
						24.6433328	37.964022	57.241754	0.5710908	0.5959635	0.5712268	0.5710908	10.760297	4.3641943	0.54642206	0.4943236	0.4943236	10.658657	0.4886551	4.2684428	1.2142785	0.4943236	10.683666	0.5191962	0.5191962	4.3122997	0.5090479	51.33167	0.513833	0.4694509	0.4449181	8.211739	10.719708	0.6374792	0.6127425	0.51217298	0.23004149	4.02314494	0.17443474
	Capital Expenditure	**(Rm)**		**1,815.2**		**178.7**	**275.2**	**415.0**	**4.1**	**4.3**	**4.1**	**4.1**	**78.0**	**31.6**	**4.0**	**3.6**	**3.6**	**77.3**	**3.5**	**30.9**	**8.8**	**3.6**	**77.5**	**3.8**	**3.8**	**31.3**	**3.7**	**372.2**	**3.7**	**3.4**	**3.2**	**59.5**	**77.7**	**4.6**	**4.4**	**3.7**	**1.7**	**29.2**	**1.3**
	Mining - vertical shaft	(Rm)	15%	0.0																																			
	Mining - conveyor decline (per decline)	(Rm)	15%	50.1		25.0	25.0																																
	Mining - LW equipment	(Rm)	10%	345.0				345.0																															
	Mining - CM equipment	(Rm)	10%	50.0			50.0																																
	Mining - LW equipment (rebuild/replacement)	(Rm)	10%	602.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.0	0.0	0.0	0.0	0.0	67.0	0.0	0.0	0.0	0.0	67.0	0.0	0.0	0.0	0.0	335.0	0.0	0.0	0.0	0.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mining - CM equipment (rebuild/replacement)	(Rm)	10%	150.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0
	Mining - sundry equipment	(Rm)	15%	6.0			3.0	3.0																															
	Mining - Materials handling	(Rm)	15%	15.0			7.5	7.5																															
	Mining - Shaft infrastructure	(Rm)	10%	27.1		13.5	13.5																																
	Ventilation - raisebore hole/fans	(Rm)	10%	10.8				10.8																															
	Beneficiation Plant	(Rm)	0%	194.0		106.7	77.6	9.7																															
	Surface Infrastructure	(Rm)	10%	5.0		2.5	2.5																																
	Purchase of Surface Rights	(Rm)	0%	5.0		5.0																																	
	Services	(Rm)	15%	30.0		15.0	15.0																																
	Load out facility	(Rm)	10%	10.0			10.0																																
	Tailings dam	(Rm)	20%	40.0			35.5														4.5																		
	Environmental closure fund	(Rm)	0%	10.0			10.0																																
	Owner's project costs	(Rm)	10%	6.0		3.0	3.0																																
	Contingencies	(Rm)		143.8		7.9	22.6	37.2	0.0	0.0	0.0	0.0	6.7	2.5	0.0	0.0	0.0	6.7	0.0	2.5	0.9	0.0	6.7	0.0	0.0	2.5	0.0	33.5	0.0	0.0	0.0	5.0	6.7	0.0	0.0	0.0	0.0	2.5	0.0
	Sustaining capital	(Rm)	3%	114.5				1.9	4.1	4.3	4.1	4.1	4.3	4.1	4.0	3.6	3.6	3.6	3.5	3.4	3.4	3.6	3.8	3.8	3.8	3.8	3.7	3.7	3.7	3.4	3.2	4.5	4.0	4.6	4.4	3.7	1.7	1.7	1.3
	Cash Flow																																						
	EBITDA	(Rm)		13,960.5		0.0	0.0	180.3	543.2	541.1	470.1	493.2	501.9	471.3	492.7	511.5	510.7	514.2	492.1	478.7	388.2	429.5	496.6	415.8	459.2	449.6	424.6	488.1	471.8	396.6	338.3	626.0	476.8	587.1	551.8	449.5	139.0	131.5	39.8
	Taxation	(Rm)		-3,400.7		0.0	0.0	0.0	0.0	-108.4	-130.5	-136.9	-118.7	-123.1	-136.8	-142.2	-142.0	-122.3	-136.8	-125.4	-106.2	-119.3	-117.4	-115.4	-127.5	-117.1	-117.9	-32.5	-131.1	-110.1	-93.8	-158.6	-111.8	-163.1	-153.3	-124.8	-38.5	-28.6	-10.8
	Capex	(Rm)		-1,815.2		-178.7	-275.2	-415.0	-4.1	-4.3	-4.1	-4.1	-78.0	-31.6	-4.0	-3.6	-3.6	-77.3	-3.5	-30.9	-8.8	-3.6	-77.5	-3.8	-3.8	-31.3	-3.7	-372.2	-3.7	-3.4	-3.2	-59.5	-77.7	-4.6	-4.4	-3.7	-1.7	-29.2	-1.3
	Working capital	(Rm)		0.0																																			
	Net post-tax cash flow (ungeared)	(Rm)		8,744.7	0.0	-178.7	-275.2	-234.7	539.1	428.3	335.5	352.1	305.2	316.5	351.9	365.7	365.1	314.6	351.7	322.4	273.1	306.7	301.8	296.6	327.9	301.2	303.1	83.5	337.0	283.1	241.2	407.9	287.4	419.3	394.1	321.0	98.9	73.7	27.8

The following tables present the Net Present Values ("NPV") of the real cash flows as derived from the PEA for the East Complex (Table 12.2). In summary they include the following:

- The variation in NPV with discount factors given in ZAR and US$ (Table 12.3);
- The variation in NPV based on single parameter sensitivities (Table 12.4);
- The variation in NPV based on twin (revenue and operating expenditure) sensitivities (Table 12.5).

Table 12.3: East Complex - variation of Real NPV with discount factors

Discount Factor (%)	**NPV (ZARmillion)**	**NPV (US$million)**
0%	8,745	1,128
6%	3,286	424
8%	2,489	321
10%	1,920	248
12%	1,502	194
14%	1,189	153
16%	949	122

Table 12.4: East Complex - Real NPV – single parameter sensitivity

Sensitivity Range - Revenue	-30%	-20%	-10%	0%	10%	20%	30%
Sensitivity Range - Working Costs	-30%	-20%	-10%	0%	10%	20%	30%
Sensitivity Range - Capital	-30%	-20%	-10%	0%	10%	20%	30%
Currency	**(Rm)**	**(Rm)**	**(Rm)**	**(Rm)**	**(Rm)**	**(Rm)**	**(Rm)**
Variation in NPV at 0% DCF							
Revenue	5,043	6,297	7,531	8,745	9,948	11,125	12,280
Total Working Costs	9,677	9,366	9,055	8,745	8,438	8,130	7,823
Capital	9,116	8,995	8,872	8,745	8,624	8,504	8,383
Variation in NPV at 10% DCF							
Revenue	967	1,291	1,608	1,920	2,233	2,535	2,831
Total Working Costs	2,158	2,079	1,999	1,920	1,842	1,764	1,687
Capital	2,111	2,050	1,987	1,920	1,857	1,794	1,731

Table 12.5: East Complex - Real NPV sensitivity – varying twin parameter at 10% discount

NPV (Rm)		**Revenue Sensitivity**						
		-30%	**-20%**	**-10%**	**0%**	**10%**	**20%**	**30%**
	-30%	1,184	1,503	1,816	2,129	2,436	2,733	3,024
	-20%	1,107	1,426	1,739	2,051	2,361	2,656	2,948
	-10%	1,029	1,349	1,663	1,972	2,282	2,580	2,871
TWC Sensitivity	**0%**	952	1,272	1,586	1,894	2,204	2,503	2,795
	10%	875	1,196	1,509	1,817	2,125	2,426	2,718
	20%	799	1,119	1,432	1,741	2,047	2,352	2,642
	30%	724	1,044	1,356	1,664	1,968	2,273	2,566

Table 12.6 summarises the key financial parameters and results from the project model for the East Complex .

Table 12.6: East Complex - Key Financial Parameters/Results

Description	Units	Result/Value
Production Summary:		
Coal mined (maximum RoM)	(Mtpa)	1.88
Coking coal sales (maximum)	(Mtpa)	0.67
Financial Summary:		
NPV @ 10% discount (real)	(ZARm)	1,920
	(US$m)	248
IRR	(%)	42.0%
Peak funding	(ZARm)	689
	(US$m)	89
Pay back period (start of construction)	(years)	4.3
Pay back period (start of production)	(years)	2.3
Life of mine (East Complex)	(years)	32.0
Unit Operating Cost:		
per RoM coal mined	R/t RoM	122.6
per tonne of product produced	R/t sales	169.0

13 Conclusions and Recommendations

13.1 Conclusions

HolGoun commissioned SRK to compile an IER for the East Complex of its Energy Project located within the Springbok Flats Coalfield. This IER has been extracted from the 2008 IER, which incorporated Coal and Uranium Resources declared according to the reporting requirements of the SAMREC Code and the MRM conceptual mine model and production schedule based on those Inferred Resources. The 2008 IER also reported on additional metallurgical testwork and investigation done by Mintek and Bateman for HolGoun.

This IER considers only the coal measures in the East Complex, which comprises the coal mine and coking coal beneficiation plant, and sale of coking coal and a middlings steam coal product. An administrative facility and a stand-alone discard facility for coarse and fine rejects will be included here.

SRK has undertaken a preliminary economic assessment of the East Complex, with the key results from this assessment summarised in Table 13.1.

Table 13.1: East Complex - Key Financial Parameters/Results

Description	Units	Result/Value
Production Summary:		
Coal mined (maximum RoM)	(Mtpa)	1.88
Coking coal sales (maximum)	(Mtpa)	0.67
Financial Summary:		
NPV @ 10% discount (real)	(ZARm)	1,920
	(US$m)	248
IRR	(%)	42.0%
Peak funding	(ZARm)	689
	(US$m)	89
Pay back period (start of construction)	(years)	4.3
Pay back period (start of production)	(years)	2.3
Life of mine (East Complex)	(years)	32.0
Unit Operating Cost:		
per RoM coal mined	R/t RoM	122.6
per tonne of product produced	R/t sales	169.0

The preliminary economic assessment of the East Complex indicates that the HolGoun assets can support a profitable coking and steam coal operation for more than 30 years. The preliminary economic assessment of the east Complex is seen to yield a NPV at 10% real discount of ZAR1,920million (US$248million) with an IRR of 42%. The reader is cautioned that this is not a valuation as it is premised on Inferred Resources, a conceptual mine design and capital and operating cost estimates at a scoping level of accuracy. The key considerations and input parameters in this preliminary economic assessment could change significantly which could adversely affect the economic results for the project.

A large amount of metallurgical test data is already available and demonstrates robust processing routes. Other processing options, which have the potential to simplify the processing scheme, need to be evaluated..

13.2 Upside Potential

The mining cut in the East Complex was selected so as to achieve a specific yield of coking coal from the coal mined. If a lower yield of coking coal can be accepted, then a wider mining cut can be used which extracts additional steam coal above and below the original mining cut.

The resource modelling has been done on a 1.2m cut-off. Untapped steam coal will be suitable for power generation or Coal to Liquid conversion. This has not been considered in the economic assessment.

13.3 Recommendations

SRK recommends that the project be advanced to the pre-feasibility study stage.

SRK Consulting

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GLOSSARY OF TERMS, ABBREVIATIONS AND UNITS

GLOSSARY

Adsorbed	a solid holding particles of another substance to its surface
Angular	rocks or fragments in a rock that have sharp edges
Anticline	rock strata folded to give a convex upward structure
Arenaceous	a sedimentary rock consisting wholly or in part of sand-size fragments, or having a sandy texture.
Argillaceous	term describing sedimentary rocks with a modal grain size in the silt fraction
Argillites	a compact rock, derived from mudstone or shale, more highly indurated than either of those rocks.
Arkosic	a sandstone containing at least 25% feldspar and less than 20% matrix of clay, sericite, and chlorite.
Boiturbation	the churning and stirring of a sediment by organisms
Calcination	to convert or be converted into an ash like powder by heat
Caliper	an instrument for measuring thickness and diameters
Carbonaceous	said of a rock that contains high proportions of carbon-bearing material
Coffinite	form of uranium mineralisation, $U(Si,H_4)O_4)$
Competent	a function of the rock strength and its ability to withstand deformation
Conglomerate	rocks consisting of relatively large rounded fragments of durable minerals or rock in a fine matrix
Crossbedding	cross-stratification in which the cross-beds are more than 1 cm in thickness
Decline	an inclined shaft used to gain access to underground workings
Devolatilisation	the loss of volatile constituents and the resulting proportional increase in carbon content during coalification.
Diamictite	poorly sorted re-worked glacial tillite
Dip	the angle of inclination from the horizontal of a geological feature
Disseminated	a scattered distribution of generally fine-grained metal-bearing minerals throughout a rock body, in sufficient quantity to make the deposit an ore
Dissolution	the act or process of dissolving into parts or elements
Distal	situated away from the point of origin or attachment
Dolerite	any dark, igneous rock composed chiefly of silicates of iron and magnesium with some feldspar
Epidote	a green monoclinic mineral, common in low-grade metamorphic rocks derived from limestone
Feldspar	a group of abundant rock-forming minerals of a general formula, where M can be K, Na, Ca, Ba, Rb, Sr, or Fe.
Felsite	a general term for any light-coloured, aphanitic igneous rock, with or without phenocrysts and composed chiefly of quartz and feldspar
Ferruginous	pertaining to or containing iron, e.g. a sandstone that is cemented with iron oxide.
Float yield	the percentage of material that is lighter than a given density in a dense medium separation plant
Granite	a granular igneous rock composed chiefly of feldspar and quartz
Grizzly	a coarse screen over the RoM feed bin

Indurated	to make hard, as rock
Inferred Mineral Resource	that part of a Mineral resource for which tonnage, grade and mineral content can be estimated with a low level of confidence. It is inferred from geological evidence and assumed but not verified geological and/or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that may be limited, or of uncertain quality and reliability.
Intercalated	layered material that exists or is introduced between layers of a different character
Interlaminated	said of laminae occurring between or alternating with others of different character; intercalated in very thin layers
Leaching	to remove soluble substances from a material by percolation
Magnetite	an iron oxide mineral
Mica	a shiny mineral that can be split into thin, partly transparent sheets, used as an electric insulator
Micaceous	consisting of, containing, or pertaining to mica
Mudstones	an indurated mud having the texture and composition of shale
Normal fault	a fault in which the hanging wall appears to have moved downward relative to the footwall
Partings	layers of country rock separating mineralised seams or reefs
Plagioclase	a group of triclinic feldspars, among the commonest rock-forming minerals
Proximate analysis	the determination of compounds contained in a mixture; for coal, the determination of moisture, volatile matter, ash and fixed carbon (by difference)
Pyrite	Common iron sulphide mineral, Fe_2S
Radioactive	the property of certain chemical elements causing them to emit radiation as a result of changes in the nuclei of atoms of the element
Raw qualities	the attributes of a coal (volatile matter, ash, CV, fixed carbon, etc.) in its raw as-received state
Rhythmites	an individual unit of a rhythmic succession or of beds developed by rhythmic sedimentation
Ring-fenced	two or more operations that are grouped together for company taxation purposes
Roadway	the access way cut by a continuous miner on either side of a longwall
SAMREC Code	South African Code for reporting of Mineral Resources and Mineral Reserves
Sandstone	a soft, porous rock formed from grains of sand naturally cemented together
Sill	an approximately horizontal sheet of igneous rock intruded between older rock beds
Siltstones	an indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay
Slake	the process of weathering where thin layers of material peel away from an exposed face
Slickenside	a polished and striated rock surface that results from friction along a fault plane
Slimes	metallurgical plant waste product that generally has a grain size of less than 1mm
Solution trench	a trench constructed outside of a tailings dam to collect water that drains from the tailings dam and feed into a collection dam, to be recycled to the process plant
Spiral tailings	the tailings or waste stream that is derived from a spirals plant
Stratigraphy	the arrangement of the sequence of rock strata of the earth's crust into units with reference to many different characters, properties, or attributes which the strata may possess
Sub-angular	said of sedimentary particles showing effects of slight abrasion, retaining its original general form, and having faces that are virtually untouched and edges and corners that are rounded off to some extent

Syncline	concave fold in stratified rock in which the strat dip down to meet in a trough
Tuffaceous	a general term for all consolidated pyroclastic rocks
Ultimate analysis	the determination of the elements in a compound; for coal, the determination of carbon, hydrogen, sulphur, nitrogen, ash and oxygen
Unconformably	said of strata that do not succeed the underlying rocks in immediate order of age or in parallel position; especially younger strata that do not have the same dip and strike as the underlying rocks; also, said of the contact between unconformable rocks
Up-cast shaft	a ventilation shaft which is used to exhaust used air from underground workings
Uraniferous	containing uranium-bearing minerals
Washed qualities	the attributes of a coal (volatile matter, ash, CV, fixed carbon, etc.) in a fraction that has been processed through a washing plant
Yield Pillar	a pillar which has been designed to yield in a controlled manner during mining operations
Zircon	is a common accessory mineral in siliceous igneous rock, crystalline limestones, schists, and gneisses, in sedimentary rocks derived therefrom, and in beach and river placer deposits

ABBREVIATIONS

ACH	aluminium chloride hexahydrate
Al	chemical symbol for aluminium
APPA	Atmospheric Pollution Prevention Act No 45 of 1965
BEE	Black Economic Empowerment
BIC	Bushveld Igneous Complex
BRD	Bed Resolution Density
CFB	Continuous Fluidised Bed
Cl	chemical symbol for chlorine
CM	Continuous Miner
CO_2	chemical symbol for carbon dioxide
CSIR	Council for Scientific and Industrial Research
CTL	Coal to Liquid plant
CV	Calorific Value
DEAT	Department of Environmental Affairs and Tourism
DME	Department of Minerals and Energy
DMS	Dense Media Separation
DWAF	Department of Water Affairs and Forestry
ECA	Environmental Conservation Act No 73 of 1989
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EMPR	Environmental Management Programme Report
FM	Financial Model
FRI	Fuel Research Institute of South Africa
FSI	Free Swelling Index
GTIS	Gross Tonnes in Situ
H, H_2	chemical symbol for hydrogen
HDPE	High Density Polyethylene
HDSA	Historically Disadvantaged South African
HolGoun	HolGoun Energy (Pty) Ltd
H_2S	chemical symbol for hydrogen sulphide
IER	Independent Engineer's Report
LMS	Lower Middle Seam
LoM	Life of Mine
LSD	Long Spaced Density
MPRDA	Minerals and Petroleum Resources Development Act No 28 of 2002
MTIS	Mineable Tonnes in Situ
MWP	Mining Work Programme
N	chemical symbol for nitrogen
NB	Nominal Bore
NEMA	National Environmental Management Act No 107 of 1998
NN	Neutron-Neutron
NNR	National Nuclear Regulator
NPV	Net Present Value
NWA	National Water Act No 36 of 1998
NO_2	chemical symbol for nitrous oxide
O	chemical symbol for oxygen
PLMS	Peripheral Lower Middle Seam
QA/QC	Quality Assurance / Quality Control

RD	Relative Density
RoM	Run of Mine
RQD	Rock Quality Designation
S	chemical symbol for sulphur
SACS	South African Committee for Stratigraphy
SAHRA	South African Heritage Resources Act No 25 of 1999
SAMREC	South African Mineral Resources Committee
SANS	South African National Standard for Reporting of Coal Resources
SARS	South African Revenue Services
SCP	Steam Coal Plant
Si	chemical symbol for silicon
SLP	Social and Labour Plan
SO_2	chemical symbol for sulphur dioxide
SRK	SRK Consulting (South Africa) (Pty) Ltd
SX	Solvent Extraction
TMS	Total Middle Seam
TNC	Trans Natal Coal Corporation Limited
TTIS	Total tonnes in situ
U	chemical symbol for uranium
UMS	Upper Middle Seam
UP	Uranium Mine and Plant
WMA	Water management area
WRC	West Rand Consolidated Laboratory
WUL	Water Use Licence
XRF	X-ray Fluorescence

UNITS

cm	a centimetre.
g	grammes.
g/l	grammes per litre
ha	a hectare.
hrs	hours.
km	a kilometre.
km^2	a square kilometre
kt	a thousand metric tonnes.
ktpa	a thousand metric tonnes per annum
ktpm	a thousand metric tonnes per month.
kV	a thousand volts.
kVA	a thousand volt-amperes
kW	a thousand watts
kWh	a kilowatt hour
m	a metre.
mm	a millimetre.
mamsl	metres above mean sea level
m^2	a square metre.
m^3	a cubic metre.
mg	milligramme
m^3/s	a cubic metre per second.
MJ/kg	megajoules per kilogramme
Mt	a million metric tonnes
Mtpa	a million metric tonnes per annum.
MVA	a million volt amperes.
MWh	a million watt hours
R, ZAR	South African Rand.
Rm	a million South African Rands.
R/t	South African Rand per tonne.
t	a metric tonne, equal to 2024 imperial pounds.
t/m^3, tm^{-3}	density measured as metric tonnes per cubic metre.
tph	tonnes per hour
US$	United States Dollar.
US$m	a million US$.
US$:R	Exchange rate value of one US$ in R.
US$/t	US Dollars per tonne.
V	a volt.
W	a watt.
°	degrees.
‘	minutes.
%	percentage.
µm	a micro metre (one millionth of a metre).

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