Red Hill Energy Inc.

National Instrument 43-101 Report

Pre-Feasibility Study

Ulaan Ovoo Coal Project, Mongolia

8 May 2009

Report No. 3377M

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3. SUMMARY

3.1 Project Highlights

This document presents the results of the NI 43-101 compliant pre-feasibility study ("PFS" or the 'Study') independently prepared by Minarco-MineConsult ("MMC") of Sydney, Australia, for the Ulaan Ovoo Coal Project ("the Project") located in northern Mongolia and 100% owned by Red Hill Energy Ltd ("Red Hill" or "the Company").

Red Hill commissioned Minarco-MineConsult ("MMC") to prepare a pre-feasibility study ("PFS") of their 100%-owned Ulaan Ovoo coal project ("the Project") located in northern Mongolia. This PFS follows from the Project's preliminary economic assessment ("PEA"), prepared by Behre Dolbear and Company (USA) Inc., that was filed on SEDAR on October, 2006.

The Project involves open cut mining of coal and waste rock using conventional shovel and truck techniques. Higher quality coal of > 5,000 kcal/kg (as received (ar)), known as "by-pass coal", will be crushed and stockpiled while other coal, known as "washed coal", will be beneficiated in a wash plant prior to stockpiling. Both washed and by-pass coal will be blended on the product stockpile to derive a consistent product prior to transport from the site by rail to the Port of Nadhodka on the Russian eastern seaboard and sold on the export thermal market. Infrastructure construction is proposed for the latter half of 2009, overburden removal commencing in 2010 with mining and sale of coal proposed to commence in 2011.

Joharko International (Brisbane, Australia) ("Joharko"), estimated mine infrastructure costs as well as capital and operating costs related to mine-site power generation. Joharko also determined in situ coal, product coal qualities and estimated wash plant yields. Pells Sullivan Meynink ("PSM") reviewed previous studies into geotechnical and hydrological aspects and provided comment on design criteria for mining. Sustainability Pty Ltd ("Sustainability") completed a review of various environmental, and other related studies, previously carried out on Ulaan Ovoo, by other parties.

The long term coal price forecast was provided by Red Hill. MMC completed the mine planning and prepared an economic model based on the contributions of the other consultants and Red Hill.

Mr. Romeo Ayoub, a Consulting Mining Engineer with MMC, served as the qualified person responsible for the preparation of the PFS. Ms. Merryl Peterson of Runge, a geologist, was responsible for converting the geological model to an appropriate format for mine planning and preparing geological plans for this report. Mr. Gary Harradine of Joharko, a processing engineer, was responsible for the transport, infrastructure, coal preparation and handling (including washing) and coal product specification. Based on the outcomes of the PSM report, Joharko also prepared a design concept for the river diversion.

Only measured and indicated resource categories were applied to the PFS to estimate potential mineable coal, forming the basis of mine planning and economic evaluation. Inferred resources were not considered in the Study.

Though the PFS reflects a higher level of accuracy than the scoping study completed in 2006, it is still subject to variable levels of accuracy on capital and operating cost estimates. Mineral resources are not mineral reserves, and do not have demonstrated economic viability. Given the nature of this Study and the level of accuracy associated with a PFS, there can be no certainty that the mineable coal resource projections or economic outcomes presented herein will be realized.

The PFS concludes that the Project is quite sensitive to coal price and off-site operating costs. Recent changes in the international economy, and its subsequent impacts on commodity prices have made forecasting coal price challenging. In response, MMC has estimated the technical value of the Project across a range of thermal coal prices to provide a better understanding of

Project economics. The key Project production and financial outcomes are summarized in **Table 3.1** and **Table 3.2** below.

Table 3.1 - Project Production and Expenditure

Item	
Total Mined Coal (ROM Mt)	108
Mine Life (production years)	17
ROM Production Rate (Mtpa)	6.3
Average Stripping Ratio (bcm/ROM t)	1.8
Saleable Coal Production	
Total Saleable Coal @ 15% ash (Mt)	100
Average Annual Sales (Mtpa)	5.9
Average Cash Costs	
On-Site Cost (US$/t product)	$15
Off-Site Cost (US$/t product)	$41
Total Cash Cost (US$/t product)	$56
Capital Cost (US$ millions)	
Initial Capital Cost	$337
Sustaining / Replacement Capital	$155
Total Life Of Mine Capital Cost	$492

Mtpa= Million metric tonnes per annum; t= metric tonne; ROM = run of mine

Table 3.2 - Technical Project Value

Thermal Coal Price ($/ product t. FOB)[1]	$60	$68	$76
NPV @ 10% (US$M)	-$231	$0	$250
Payback @ 10% (years)	-	-	9.5
IRR %	1%	10%	19%
Cash Mining Cost FOB (US$/t product)	$55	$56	$56
Average Annual Revenue (US$ millions)	$354	$399	$449
Average Annual After-Tax Net Profit (US$ millions)	$10	$40	$76

1: Coal prices FOB Nadhodka Port

Table 3.2 indicates, assuming the expenditure estimates are reasonable, that a thermal coal price of at least $68/ product t (gar, FOB) must be achieved to deliver a positive net present value (NPV) at a discount rate of 10%.

3.2 Coal Resources

Red Hill announced a NI 43-101 compliant resource estimate of 208 Mtonnes completed by Behre Dolbear in October 2006. The resource estimate is summarised in **Table 3.3**.

Table 3.3 - Summary of Coal Resources

Measured Resources (Mt)	Indicated Resources (Mt)	Total (M +I) Resources (Mt)
174	34	208

Runge converted the Behre Dolbear geological model from a *Surfer* to *Minescape* modelling system) as this was better suited to our mine planning approach. The resultant model had resources of 193 Mt. Runge is confident that the difference in the two estimates, being less than 7%, is not material, and is due entirely to differences in the geological modelling software used.

3.3 Mine Development Strategy

The PFS defines an open-cut mining strategy of expanding the mine from lower stripping ratio areas to higher stripping ratio areas to maximise the Project's economic potential. All waste rock will be directed to a large surface dump to the north and west of the pit as the steep coal dips prevent in-pit dumping of waste rock.

Coal processing will be conducted on site with approximately 60% of the coal crushed and placed directly on the product stockpile and the remainder beneficiated using a wash plant. Average wash plant yield has been estimated at 80%. The initial three production years (2011 to 2013) will target higher quality coal seams which require no washing for sale. From 2016 on, between 2.5 and 4.8 Mt of ROM coal per year will be processed through the washplant. The final coal product will be a thermal coal of moderate energy at nominally 5,000 kcal/kg ar. The coal product is proposed to be railed to the Port of Nadhodka starting in 2011 for sale on the export market.

The total project life is 21 years, comprising a 2-year construction phase (2009 to 2010) followed by an 18-year mining period with site reclamation in the final year. The initial construction phase involves site preparation, infrastructure construction, and waste pre-stripping and stockpiling of coal. Major infrastructure to be constructed on site includes a wash plant, power station, coal stockpiles and handling equipment, mine offices, equipment workshops, and a staff camp facility.

A 6.5 km long Zelter River diversion levee will be built during the project construction phase to protect the mine, surface facilities and waste dump. The existing Shaamar-Ulaan Ovoo road will be relocated onto this levee.

3.4 Potential Mineable Coal

The quantity of open-pit mineable coal is estimated at 108 Mt of run-of-mine (ROM) coal at a stripping ratio of 1.8 to 1 (waste bcm: coal ROM t). The saleable product is estimated at 100 Mt of thermal coal. No inferred resources were included to calculate the potential mineable coal resource. A summary of the mineable coal quantity is provided in **Table 3.4**.

Table 3.4 - Potential Mineable Coal

	Waste (Mbcm)	Coal (Mt ROM)	Total Coal Product (Mt Product)
Total	194	108	100

Abbreviations: ROM = run of mine; Mbcm = million bank cubic metres; Mt = million metric tonnes

3.5 Production Summary

Mining commences with the stockpiling of small amounts of ROM coal in 2010 and saleable coal production begins in 2011. ROM coal production increases to 6 Mtpa from 2012 to 2015 and targets higher quality seams suitable for "by-pass" and direct sale. From 2016 on, annual ROM coal production ranges from 6.5 to 7 Mt to achieve a coal product of 6 Mt.

The mine plan indicates an overall stripping ratio (bcm/ROM t) of 1.8:1. The strip ratio is initially above average at > 2.5 (bcm/ROM t) to establish pit development and coal inventory. After Year 11 (2021), the stripping ratio averages 0.8:1(bcm/ROM t) til the end of the mine life.

The current land use within the mining lease is as pasture land. Progressive rehabilitation of surface overburden dumps will be conducted throughout the mine life in order to minimize end-of-mine reclamation effort, and to support early re-vegetation with native plant species. The final pit void will fill with water to form a lake. The mine site will be reclaimed and facilities will be salvaged or contributed to local communities, as permitted.

3.6 Workforce

The mining workforce requirements were estimated based on MMC's experience with similar sized projects and previous studies. Joharko provided the wash plant workforce requirements. A key assumption was that maintenance personnel for the mining equipment would be provided by the equipment suppliers under a maintenance agreement. The remaining workforce, including sufficient staff for all levels of management, supervision, planning, and equipment operation would be directly employed by the mine. **Table 3.5** shows a breakdown of the total site workforce including staff and support services for a typical year. In general, the workforce will range from 500 to 600 employees.

Table 3.5 - Typical Mine Workforce at Full Production

Personnel	Total
Management	47
Mining Operations	309
Community Relations	16
HR and Safety	20
Tech Services	69
CHPP	35
Infrastructure	30
Total	**526**

3.7 Indicative Market Specifications for Ulaan Ovoo Coal Product

The product specification for the Ulaan Ovoo coal product is shown in **Table 3.6**.

The ash content, calorific value and sulphur contents have been derived from the coal resource model (see Section 3.3), and are expressed on an 18% total moisture basis. The total moisture basis (18%) was selected from limited borehole assay data.

Table 3.6 - Indicative Market Specifications for Ulaan Ovoo's Coal Product

Product	Ash (% ar)	Calorific Value (kcal/kg (gar))	Total Moisture %	Sulphur (% ar)
Thermal Coal	15	5,000	18	0.32

3.8 Coal Markets and Pricing Assumptions

Red Hill has investigated various marketing strategies for the sale of the Ulaan Ovoo coal products into numerous potential markets. The principal market selected for the Ulaan Ovoo coal product was the export thermal market. Domestic sale was not considered as part of this study.

A coal pricing estimate of $76/ product t (gar, FOB) was provided by Red Hill based on its internal market analysis undertaken in early 2008. Recent changes in the international economy, however, have led to changes in commodity prices from those forecast earlier in 2008 and has made forecasting coal price challenging. In response, MMC has estimated the technical value of the Project across a range of thermal coal prices to provide a better understanding of Project economics. The coal price estimates used by MMC included:

- $76/ product t (gar, FOB) (original Red Hill estimate)
- $68/ product t (gar, FOB), and
- $60/ product t (gar, FOB).

This was considered a reasonable range of long term coal forecast thermal coal prices in the current economic climate.

Russian consultants, Rosinformugol, were commissioned by Red Hill to estimate existing Russian rail freight rates and distances from mine to market. Joharko checked these for reasonableness. It is proposed that the Project will construct a rail link of 116 km to the main Mongolian railway and gain access to the Russian rail system. The total cost of coal transport was estimated at $30/ product t, which alone represents over 50% of total operating expenditure.

3.9 Capital Expenditures

The mine development plan assumes that capital spending begins in 2009, with the majority of capital spending (equipment and facilities) occurring up to 2014 and completion of the wash plant. Initial capital expenditure was calculated through to 2014 to include all major capital. Thereafter there will be on-going capital expenditures classified as either replacement or sustaining capital primarily being replacement mining equipment. The components of capital spending are listed in **Table 3.7**.

Table 3.7 - Initial and Sustaining Capital Costs

Capital Item	US$ (millions)
Overburden Removal Equipment	75
Coal Mining Equipment	22
Support Equipment	9
Coal Handling/Blending/Wash Plant (CHPP)	94
Coal Transport (New Rail Spur)	120
Mine-Site Buildings, Roads & Camp	18
Total Initial Capital	**$337**
Sustaining / Replacement Capital	**$155**
Total Project Capital Spending	**$492**

3.10 Mine Operating Costs

The mine operating costs reflect a typical truck-and-shovel open-pit operation with a favourable stripping ratio and limited coal beneficiation requirements. Estimated cash costs are summarized in **Table 3.8**.

Table 3.8 - Estimated Production Cash Costs

Unit Cash Costs per Product Tonne	US$/t
Overburden Removal	$5
Coal Mining & Haulage to CHPP	$2
Field Support Cost	$1
Coal Washing and Handling (CHPP)	$3
Admin & Overheads	$3
Total Mine Operating Costs/tonne (FOR)	**$15**
Transport	$30
Port	$9
Royalty	$2
Total Project Operating Costs/tonne (FOB)[1]	**$56**

1. FOB Port of Nadhodka

3.11 Project Financial Summary

Table 3.9 summarizes the key financial outcomes for the Project across a range of thermal coal prices.

Table 3.9 - Key Financial Outcomes

Thermal Coal Price ($/ product t. FOB)[1]	$60	$68	$76
NPV @ 10% (US$M)	-$231	$0	$250
Payback @ 10% (years)	-	-	9.5
IRR %	1%	10%	19%
Cash Mining Cost FOB (US$/t product)	$55	$56	$56
Average Annual Revenue (US$ millions)	$354	$399	$449
Average Annual After-Tax Net Profit (US$ millions)	$10	$40	$76

1: Coal prices FOB Nadhodka Port

The Project is particularly sensitive to the long-term thermal coal price and requires a price of more than $68/ product t (gar, FOB) to deliver a positive net present value (NPV) at a discount rate of 10%.

Project returns are also affected by changes in operating and capital costs. The Project is most sensitive to off-site operating costs. As only 35% of total coal requires washing, the Project is not highly sensitive to washplant yield. A summary of the key operating and capital sensitivities are presented in **Table 3.10**.

Table 3.10 - Sensitivities to Other Operating and Capital Cost Parameters

Sensitivities to Changes in Capital and Operating Costs	NPV ($M) 10% Discount	% Change
Coal Price @ $76/t product	$250	0%
Lower Wash Plant Yields (to 70%)	$222	-11%
Capital Cost Sensitivities		
10% Cost Increase	$214	-14%
10% Cost Decrease	$286	14%
Operating Cost Sensitivities		
10% On-Site Cost Increase	$200	-20%
10% On-Site Cost Decrease	$300	20%
10% Off-Site Cost Increase	$128	-49%
10% Off-Site Cost Decrease	$372	49%

3.12 Additional Project Opportunities

Several opportunities remain at Ulaan Ovoo for generating additional revenues and profits, as well as for lowering costs. These opportunities were considered outside the scope of the work, but may be addressed in subsequent feasibility studies. These opportunities include:

- Exporting coal through China;
- Increase the quantity of saleable coals through resource additions achieved by exploration drilling. Additional resource drilling, if successful, could either expand the mine size or extend mine life;
- Decrease mining costs by using local mining contractors and/or using lower priced Russian or Chinese mining equipment;
- Improve washing yields through selective mining, and
- Gain competitive access to the domestic Mongolian or Russian markets.

The Project has no significant issues that would prevent successful mining and processing of the coal. Furthermore, there are a number of opportunities to increase the coal resource, reduce coal loss and add value to the Project. However, the key issues of marketing, transport and operating logistics need to be resolved for this to be realised.

4. INTRODUCTION

4.1 Purpose of Report

This report summarises the geological studies undertaken to date on the Red Hill 100%-owned Ulaan Ovoo coal project located in Mongolia.

Red Hill conducted resource drilling on the Ulaan Ovoo property in 2006, and the data collected from these boreholes was incorporated into a geological model by Behre Dolbear. The NI 43-101 technical report on the geological resources was completed in February 2006. This report formed the background to a Scoping Study completed by Behre Dolbear in October 2006.

In June 2008 MMC, part of the Runge group, was engaged to prepare a pre-feasibility study on the deposit. As part of this project the geological model has been updated by Runge, the resources confirmed and the NI 43-101 technical report updated.

4.2 Sources of Information

This report is based on data provided to Runge and MMC by Red Hill or their appointed sub-consultants.

Runge and MMC have worked alongside Red Hill geologists in interpreting much of this data, and Runge is directly responsible for the preparation of the geological model. Many of the general details, such as the location and physiography, regional geological setting, and details of methods used in previous exploration programs, are drawn directly from the Behre Dolbear NI 43-101 report (Reference 1) or provided by Red Hill staff. The geological model developed by Runge provides the basis for the resource estimates. Additional data has been supplied to Red Hill by other parties, such as geophysical logs, coal quality data, and technical advice.

A full list of cited references is provided in Section 23 of this report.

For the purpose of this Study, all common measurements are given in metric units. All tonnages shown are in metric tonnes (“t”) or 1,000 kilograms, and most analytical results are expressed in percent (“%”). All monetary values are in US Dollars (“US$”), unless otherwise identified.

Drafts of this report were provided to Red Hill and advisors for the purpose of confirming the accuracy of factual material as well as the reasonableness of assumptions relied upon in this report.

4.3 Site Inspection

A site inspection was not made by any Runge or MMC geological staff. However, site visits have been made by MMC mining engineers and infrastructure specialists.

5. RELIANCE ON OTHER EXPERTS

The opinions and conclusions presented in this report are based largely on the data provided to MMC and Runge by Red Hill or their appointed representatives or sub-consultants as outlined in Section 4.

Some of the data used in this report were not within the control of Red Hill, Runge or MMC. It is believed by MMC and Runge that the information and estimates contained herein are reliable under the conditions and subject to the qualifications set forth in this report.

MMC confirms that standard geological and engineering practices have been used by Red Hill, and standard geological and engineering practices appear to have been used by operators of previous exploration programs in conducting the exploration programs, data analysis, and resource estimation. MMC makes no expressed or implied warranties regarding the accuracy of the exploration results.

Neither MMC nor Runge have conducted a legal review of ownership or property boundaries, and present this information for general reference only.

6. PROJECT DESCRIPTION AND LOCATION

The Ulaan Ovoo coal deposit is located in the territory of Tushig soum (sub province) of Selenge aimag (province) in Northern Mongolia. It is 8 km west of the central village of Tushig soum and 17 km away from Mongolian-Russian border port Zelter (Figure 6.1).

Figure 6.1 - Location of Ulaan Ovoo Coal Project

The deposit area covers an area of approximately 790 hectares. Red Hill Energy Inc. holds Ulaan Ovoo Property under mining license No 1231A, which covers an area of 213 hectares, and exploration license No 5895X with an area of 254 hectares. The licences are for a term of 30 years with a 40-year extension option. In November 2006 Red Hill purchased 100% of the title and interest in six exploration licences—6830, 6831, 6832, 6834, 6837 and 12170—surrounding 1231A and 5895X (Figure 6.2).

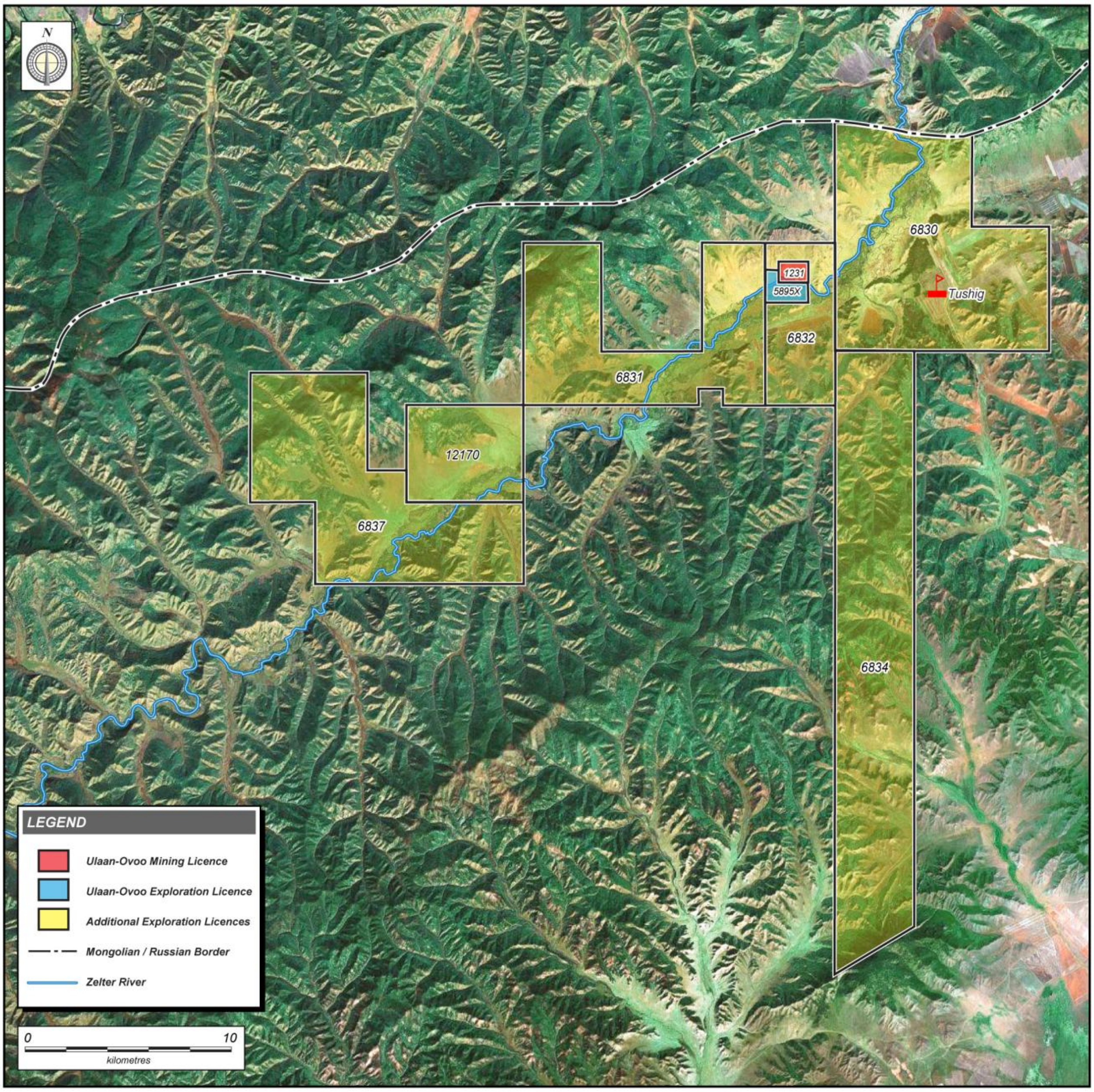


Figure 6.2 - Ulaan-Ovoo Mining License, Exploration License Areas and Option Areas

The Ulaan Ovoo licences have the following geographic coordinates (**Table 6.1**):

Table 6.1 - Coordinates of Mining Licences

Licence 1231A	Latitude	Longitude	Licence 5895X	Latitude	Longitude
1	104° 57' 05"	50° 19' 25"	1	104° 57' 05"	50° 19' 10''
2	104° 58' 37"	50° 19' 25	2	104° 56' 25"	50° 19' 10''
3	104° 58' 37"	50° 18' 47"	3	104° 56' 25"	50° 18' 10''
4	104° 57' 05"	50° 18' 47"	4	104° 58' 37"	50° 18' 10''
			5	104° 58' 37"	50° 18' 47''
			6	104° 57' 05"	50° 18' 47''

7. ACCESS, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

7.1 Property Access

The Project site is accessible via paved highway and then unimproved road; and by railway and then unimproved road as shown in Figure 7.1. The various means of access are:

- Access by road from Ulaanbataar (427 km) – Proceed northward from Ulaanbataar via Altanbulag-Ulaanbaatar highway AO401 to the central village of Shaamar soum (sub-province) (300 km). Then, via an improved dirt road, which connects Shaamar, Zuunburen, Tsagaannuur and Tushig soums (119 km). This segment of the trip includes crossings of the Orkhon, Selenge, and Zelter Rivers by concrete bridges. The last segment of the trip is via an improved dirt road from the central village of Tushig soum, to the deposit (8 km).
- Access by railway (498 km) – Take the Trans-Mongolian railroad to Shaamar soum station from Ulaanbaatar (384 km), and travel by improved dirt road to the deposit area as described above (114 km).
- Access by road from Russia (162 km) – Access to the project is via a 120 km concrete road from Galuutnuur village to Petropavlowsk village, then another 25 km on improved dirt road to the border village of Zheltura port, then another 17 km on dirt road to the project site (see Figure 7.3).

Figure 7.1 - Access to Ulaan Ovoo Coal Deposit

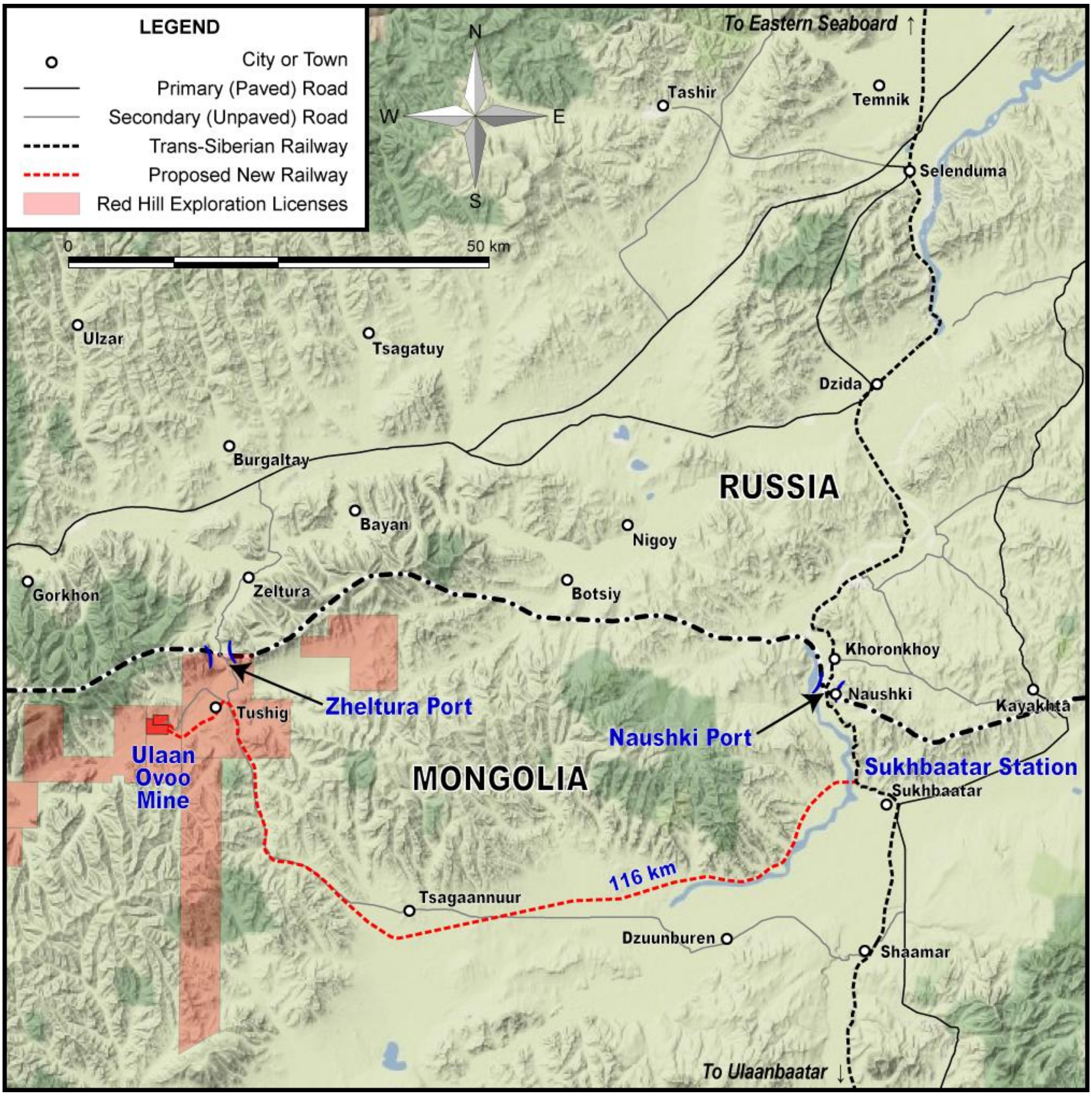


Figure 7.2 Proposed Site Access

7.2 Local Resources and Regional Infrastructure

Ulaan Ovoo deposit is located within the territory of Tushig soum (sub-province) of Selenge aimag (province), and the nearest settlement to the deposit is the soum's central village, also called Tushig, located approximately 7 km to the southeast of the project area. The soum borders the state of Buryatia of Russia to the north, Bugat soum of Bulgan aimag to the west, and Tsagaannuur soum of Selenge aimag to the east and south. Tushig soum has a territory of 276 square km and a population of 7,500.

The central village of the sub-province is considered as remote and rural, but it is included in the central power distribution system, has an elementary, secondary, and high school, a hospital, a non-permanent border port, and relatively good infrastructure. The area supports cell phone-based communications. The nearest neighbouring soum centre is Tsagaannuur at a distance of 49 km, and the nearest village is Petropavlowsk in Buryat state of Russia, located 42 km northeast of the project site.

Residents of Tushig soum are mainly engaged in animal husbandry as well as wheat and vegetable farming.

Future mining efforts can look to this community as a support centre, potential source of workers for the mine, and a place to build housing for the workforce.

7.3 Climate

The project has a sharply continental climate with predominately hot summers and cold winters.

The area is hot and relatively rainy in summer, with highest temperatures of 35° to 40°C in June and July; and cold in the winter, with lowest temperatures in the range of –35° to –40°C in December and January.

Annual precipitation fluctuates between 100 mm and 500 mm, and most (60 to 70%) of it falls as rain in August. Maximum snow depths may reach up to 2 m where drifted but averages 10 to 20 cm where not drifted.

Wind usually blows from northwest to southeast with an average speed of 4 to 7 m/s although calm conditions tend to prevail.

7.4 Physiography

Ulaan Ovoo coal deposit is situated in the Zelter River valley, which runs between the Zed and Buteel Mountain Ranges in Northern Mongolia. The river flows from southwest to northeast and exits northward into Russia at the Zheltura Border Crossing, 17 km northeast of the project area. Geographically, the district is included in a region having medium-sized mountains, the highest altitude being 1,800 metres.

The south half of the deposit underlies the flood plain of the Zelter River and the north half lies on the southern flank of a low hill to the north of, and topographically above, the flood plain. Surface elevations at the project site range from 764 to 820 m above sea level.

Mountainous parts of the region have taiga-like forests of conifer and deciduous trees. The southern aspects of the hills in the area tend to be relatively treeless. Braided stream deposits covered with a mixture of small trees and bushes form the Zelter River valley flood plain. The north half of the coal deposit area is treeless and the south half is covered by willows and birch. Fertile soil is up to 4 m thick at flood plain of river valley and 20-30 cm on the adjacent hillsides (Figure 7.3).

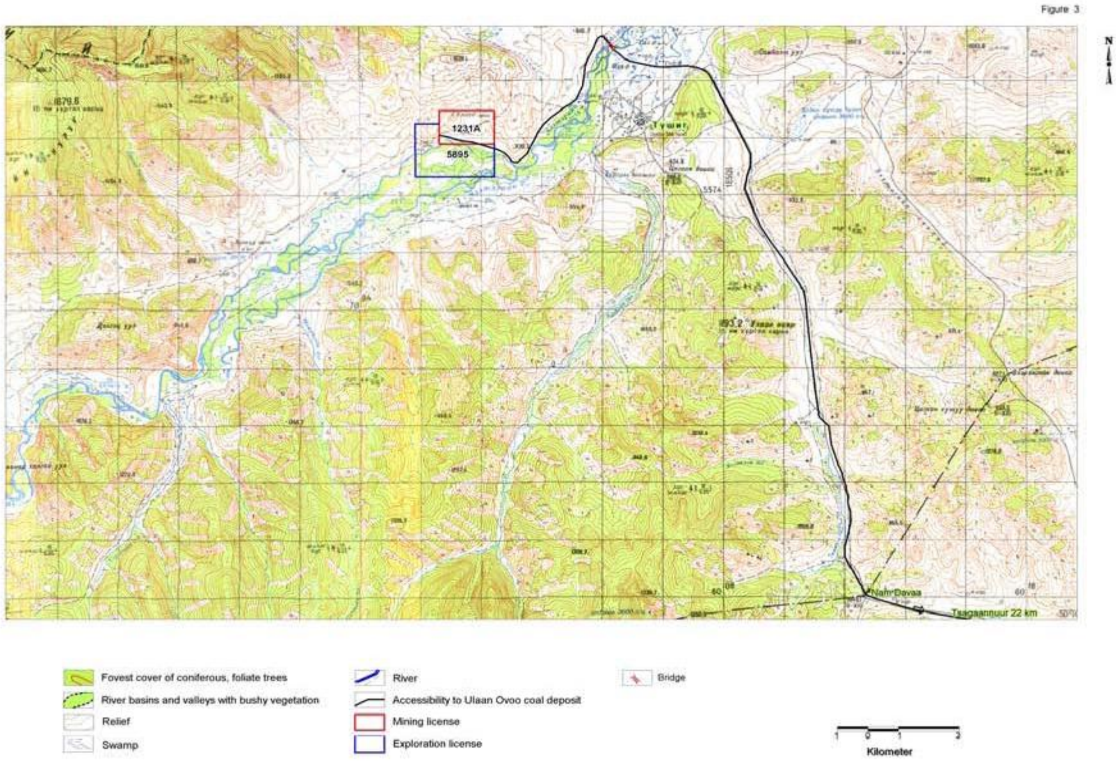


Figure 7.3 - Topographic Map of the Ulaan Ovoo Area

8. PROJECT HISTORY

8.1 History of Prior Ownership of The Property and Ownership Changes

Under the Mining law of Mongolia approved in 1994, Erdenet, a Mongolian-Russian state-owned joint venture, was granted Mining License No 166 for the Ulaan Ovoo Property in Tushig soum, Selenge aimag, on November 2 1995, by the Ministry of Energy, Geology and Mining, for a term of 10 years. The Russian metric coordinates are listed in **Table 8.1.**

Table 8.1 - Russian Mining Licence 166 Coordinates

	X	Y
1	518500	498900
2	498900	499000
3	512485	492000
4	576345	491900

After the enactment of the new Minerals Law of Mongolia in July 1997, the Director of the office of Geological and Mining Cadaster granted a revised mining license certificate No 1231A to the Ulaan Ovoo Property to Erdenet, the Mongolian-Russian joint venture.

Under a decision No. 880 (2002) the director of the Office of Geological and Mining Cadaster and with accordance to Minerals law of Mongolia, the Mining License No. 1231A was then transferred to a Mongolian-Chinese joint venture company called Mongolia Mid Asia International (MMAI) on December 14, 2002.

MMAI was restructured into a 100% Mongolian-owned company in 2005. The State Registration Office registered the company, and the mining license of the Ulaan Ovoo Property was renewed and granted to the newly restructured MMAI in compliance with the Minerals Law of Mongolia on June 5, 2005, for a term of 55 years.

Exploration License No. 5895X, covering an area adjacent to the license No.1231A, was granted by the director of the Office of Geological and Mining Cadaster to MMAI to be an additional portion of Ulaan-Ovoo Property on June 6, 2003.

An option to purchase these properties was entered into between UGL Enterprises LLC, a fully-owned Mongolian subsidiary company of Red Hill Energy, and Ochir LLC, the parent company of Mongolian MMAI, in November 2005.

In November 2005, Red Hill Energy LLC purchased both licences, and in November 2006, purchased the 6 exploration licence areas surrounding the deposit.

8.2 History of Geological Exploration Work

The first official geological survey work was undertaken by the Russians in 1974-1975. The fact that the Ulaan Ovoo deposit had coal was known before this survey because a ravine adjacent to the deposit has been traditionally called the 'coaly ravine'. This study recommended further coal exploration work and drilling.

Between 1979 and 1982, the Russians conducted geological mapping studies in the Selenge and Bulgan aimags. This work integrated stratigraphic, magmatic, and regional tectonic data around the Ulaan Ovoo deposit, and resulted in the first 1:200,000-scale geological map of the area. The exploration work included mapping, trenching and drilling undertaken in 1979.

In-fill drilling and coring was conducted in 1993 through to 1995.

The results of this Exploration Work are more fully described below in Section 12, Exploration.

In April 2006, a program to confirm previous exploration was undertaken by Red Hill. The previous drilling was conducted under the Russian system and there was some question as to whether or not the drilling adequately portrayed the deposit. In all, 11 holes were drilled under the aegis of this new program.

8.3 History of Production

At the request of the authorities of Tushig and Tsagaannuur soums, a small open pit in the sooty (weathered) coal has been exploited since 1998. The open pit or strip mine is 70 m long, 30 to 35 m wide. The highwall is 5.3 to 5.6 m high, average mining output 1,500 to 2,000 tonnes per year. The mining is extremely simple as the sooty coal is loaded by hand shovel onto the consumer's truck and hauled from the site.

The combined consumption of the two soum centres is 1,500 to 2,000 tonnes per year, judging by the extent of the current exploitation. At the beginning of October 2005, the current license holder, MMAI, signed a contract with the local authority providing that the payment for the coal mined be credited to an environmental protection fund in an account created by the Governor of the Tushig soum. In accordance with the Mineral Law of Mongolia, MMAI prepared a mine plan. Red Hill has paid the Mongolian Government the corresponding mining license fees since 2006.

In August 2008, approximately 25,000 tonnes of partially oxidized coal were removed from the open pit to a maximum depth of 15 m, as part of the preparation work required to take a bulk sample. The coal was separated from the overburden and stockpiled south of the pit for easy access. The now much larger pit has been closed to vehicle access and it is expected that the local consumers will have enough stockpiled coal to supply them for several years.

9. GEOLOGICAL SETTING

9.1 Regional Geology and Tectonic Setting

The stratigraphy in the area consists of basement rocks of mid Cambrian to lower Ordovician greenstone altered metamorphic schist. These, in turn, are overlain by lower Permian-aged volcanogenic rock of the Hanui series and mid to upper Jurassic coal-bearing sediments of the Sharyn Gol formation. Quaternary alluvial and colluvial material cover the river bottom and hillsides.

The Ulaan Ovoo coal deposit belongs to the Orkhon-Selenge coal-bearing district and is situated in the mid to upper Jurassic-age Zelter coal basin. Exploration efforts in 1995 through 1997 suggested that the Zelter coal basin hosted five small synclines that had the potential to host coal-bearing sediments; Guramsan, Huldaa River, Ulaan Ovoo, Tushig, and Hujir (Figure 9.1). These sedimentary basins are estimated to cover a total of 170 square km.

In addition to the experimental drilling at Ulaan Ovoo in 2006, a preliminary geological analysis of these basins was made. The results of this brief field reconnaissance showed that of these five potential coal basins, only three of them showed any potential for hosting coal. No mapping or drilling has been done to a level sufficient to quantify any coal resources in these areas. Figure 9.1 shows the approximate location of these five small basins and identifies the ones with potential for coal-bearing sediments.

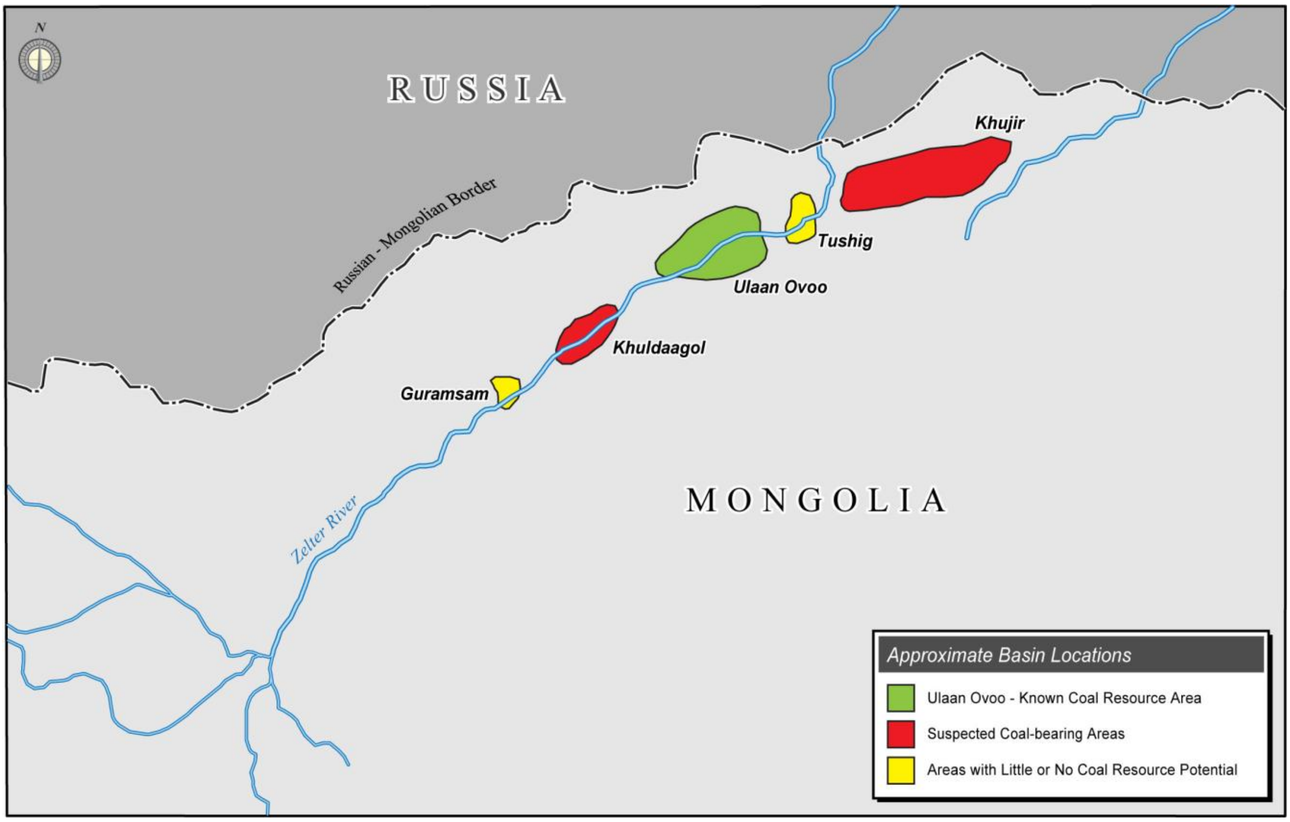


Figure 9.1 - Location of Possible Coal Bearing Basins in the Zelter River Drainage

9.2 Local Geology

The Ulaan Ovoo coal deposit is comprised of mid and upper Jurassic coal-bearing sediments of the Sharyn Gol Formation. This formation is composed of continentally derived tuffaceous-sandstone, tuffaceous-conglomerate, conglomerate, sandstone, siltstone, mudstone, and coal. The coal has burned at its northern margin forming basalt-like red clinker, hence the name Ulaan Ovoo or “Red Hill”.

Sediments of the Sharyn Gol Formation are not well exposed and the stratigraphic section is based only on drill core materials from Ulaan Ovoo deposit. The thickness of the formation is estimated to be 520 m.

In terms of its lithologic characteristics, this formation is divided into three structural members: upper, mid, and lower, of which only the middle member contains coal (**Table 9.1**).

Table 9.1 - Stratigraphy of Sharyn Gol Formation at Ulaan Ovoo Coal Deposit

Formation	Member	Member Thickness in Metres	Rock Description
Sharyn Gol Formation	Upper (J2-3chg3)	140	Shale with ash-like gray color, low grade oil shale, medium grained sandstone.
	Mid (J2-3chg2)	185	Sediments ranging from shale through conglomerate, coal and carbonaceous shale.
	Lower (J2-3chg1)	195	Tuffaceous conglomerate, tuffaceous sandstone, andesite-basalt, schist, conglomerate.

9.3 Tectonic Structure

The tectonic structure of the Ulaan Ovoo coal deposit is relatively simple. The coal-bearing basin forms a 2 km long and 1.6 km wide closed synclinal fold. The basin is fault bounded on the southwest, southern and eastern margins. Coal crops out along the northern and north-western margins.

The structure is divided into northern and southern blocks by a reverse fault, which is oriented at N65W. The central reverse fault has a throw of 9 m to 18 m with the north side being the downthrown side. The eastern part of the coal basin is abruptly terminated by a nearly vertical normal fault, oriented approximately N10W with the downthrown side of the fault containing the coal-bearing strata. The coal crops out in the north-western side of the deposit, and the dip angles of the rocks along this margin range from 10 degrees to 15 degrees toward the east. The northern flank of the fold dips at 20 degrees to 30 degrees toward the south. The south-western and southern margins of the basins are inferred to be defined by steep normal faults oriented N10W and N70E, respectively.

The only evidence of igneous activity is a thick sill (137 m thick) intersected in hole UGL-06-010. It appears the sill may have replaced the upper part of the Gol Seam. The sill probably originated in the central part of the basin, south of the Central Fault, and migrated tube-like up the steeply dipping south-east flank of the syncline to the outcrop in the east, about 400 m away. It probably resembles a flattened volcanic neck 200-500 m in width. An earlier interpretation of a NNW-SSE trending dyke south of the Central Fault has been proven to be incorrect.

10. DEPOSIT TYPES

10.1 Deposit Classification

The widely variable geological complexity of coal deposits has necessitated the use of several definitions and methods for resource estimation. Similarly, the probable extraction method has also influenced the definition of critical resource parameters. The degree of geological complexity, herein called "Geology Type", and the probable extraction method, herein called "Deposit Type", are general criteria in the classification scheme that must be established before the appropriate definition for the parameters used to quantify the resource can be determined.

"Geology Type" is specified in Geological Survey of Canada (GSC) Paper 88-21 (Hughes et al., 1989, Reference 3) and refers to the amount of geological complexity, usually defined by the structural complexity of the area. The classification of a coal deposit by "Geology Type" determines the limits to be applied to key estimation criteria such as distance between boreholes for each confidence category (i.e. measured, indicated, and inferred). Four classes are defined:

- Low – Deposits in the low category are relatively unaffected by tectonic deformation. Coal seams are flat-lying to very gently dipping (0-5°), and are generally unfaulted, although small-displacement normal faults and compaction may occur;

- Moderate – Deposits in this category have been affected to some extent by tectonic deformation. They are characterized by homoclines or broad open folds (wavelength greater than 1.5 km) with bedding inclinations of generally less than 30°. Faults may be present, but are relatively uncommon and generally have displacements of less than 10 m;

- Complex – Deposits in this category have been subjected to relatively high levels of tectonic deformation. Tight folds, some with steeply inclined or overturned limbs, may be present, and offsets by faults are common. Individual fault-bounded plates do, however, generally retain normal stratigraphic sequences and seam thicknesses have only rarely been substantially modified from their pre-deformational thickness, and

- Severe - Deposits in this category have been subjected to extreme levels of tectonic deformation. Tight folds, steeply inclined and overturned beds, and large displacement faults are common. The stratigraphic succession between faults may be difficult to ascertain owing to the level of deformation, and coal seams are commonly structurally thickened and thinned from their pre-deformational thicknesses. Exploration of these deposits follows an "ore-body" approach, rather than more conventional strategies commonly applied to stratified deposits.

Runge has reviewed the classification applied to Ulaan Ovoo, and believe that this deposit falls into the "Moderate" category. The deposit is gently folded. Only one fault has been identified within the basin, and major faults appear to be confined to the deposit margins.

"Deposit Type" as defined in GSC Paper 88-21 refers to the extraction method most suited to the coal deposit. Four categories are defined:

- Surface;

- Underground;

- Non-conventional, and

- Sterilized.

At Ulaan Ovoo, seams crop at the surface, beneath a veneer of weathered Quaternary unconsolidated sediments. As such, the coal seams are amenable to surface extraction methods. The Ulaan Ovoo deposit is thus classified as a “Surface” mineable deposit.

10.2 Sedimentary Depositional Setting

Coal deposits in Mongolia were formed during the Carboniferous, Permian, Jurassic, and Cretaceous periods (Jargalsaihan et al., 1996, Reference 4). Permian coal deposits, such as those at Baruun Naran, Tavan Tolgoi, and Nariin Sukhait occur in the southern part of the country and contain the highest quality coal. Younger deposits generally consist of lower rank lignitic coals.

The Ulaan-Ovoo coal deposit is Jurassic in age and is typical of the Sharyn Gol type of coal deposit in Mongolia. The coal comprises a single seam in the north-western part of the syncline and splits to the southwest forming two thick coal sequences (seams) which are relatively thick and flat lying. These seams host thick groupings of coal plies separated by thick clastic layers derived from flood events and ash falls which occurred during the time of coal deposition. The primary source of the flood induced sediments was to the south and southwest, and the parting thicknesses increase in that direction. Although the overall geometry is typical of coal mining deposits, the seams are generally thicker than usually encountered, ranging from a total of 15 to over 85 metres in thickness, and averaging 45 metres throughout the deposit area.

11. MINERALISATION

11.1 Coal Seams

The Ulaan-Ovoo coal deposit, which is part of the 520 m thick Sharyn Gol formation, has two main coal seams that contain five sub-units of coal (Figure 11.1).

Mod Coal Seam (formerly Coal Seam I): This seam is the lower of the two main coal sequences. It merges with the upper and thicker Gol Coal Seam in the north-eastern part of the area and splits to the southwest. It is well developed in the western part of the syncline. Its thickness ranges from 2.0 m to 7.5 m and thins in the south-western part of the deposit. The seam contains up to three partings with thicknesses of 0.56 m to 0.77 m. In the area where it is best developed, the Mod Coal seam is separated from the Gol Coal Seam by a sandstone parting which may exceed 30 m in thickness.

Gol Coal Seam (formerly Coal Seam II): This is the uppermost of the two main coal seams. Because of limited drilling south of the Central fault, it had previously only been clearly defined in the northern half of the syncline. It has relatively consistent thickness in the northern half of the deposit, ranging from 29.8 m to 63.9 m. In the west, the Gol Seam splits into two major sub-seams, and its aggregate thickness diminishes where it splits. Further to the west sub-seam the lower split further subdivides into two smaller sub-seams. The Gol seam may contain as many as 11 partings. These partings consist mainly of clayey rocks and coal-bearing mudstone with a thickness of 0.15 m to 1.0 m. With proper design, the thickest of these partings can be removed during the mining process. Consequently, the partings will not represent a serious diminution of coal quality if properly handled.

Several thin coal beds are encountered to the west of the syncline, in the lower part of the middle member of the Sharyn Gol formation (J2-3 chg). Their thickness ranges between 0.9 m to 2.0 m. The extent of these thin seams is not known at this time, but they do not add materially to the coal resource base of the deposit. The following cross sections (**Figure 11.2**) show the style of splitting of the coal seams across the deposit area (the section locations are shown on **Figure 11.1**).

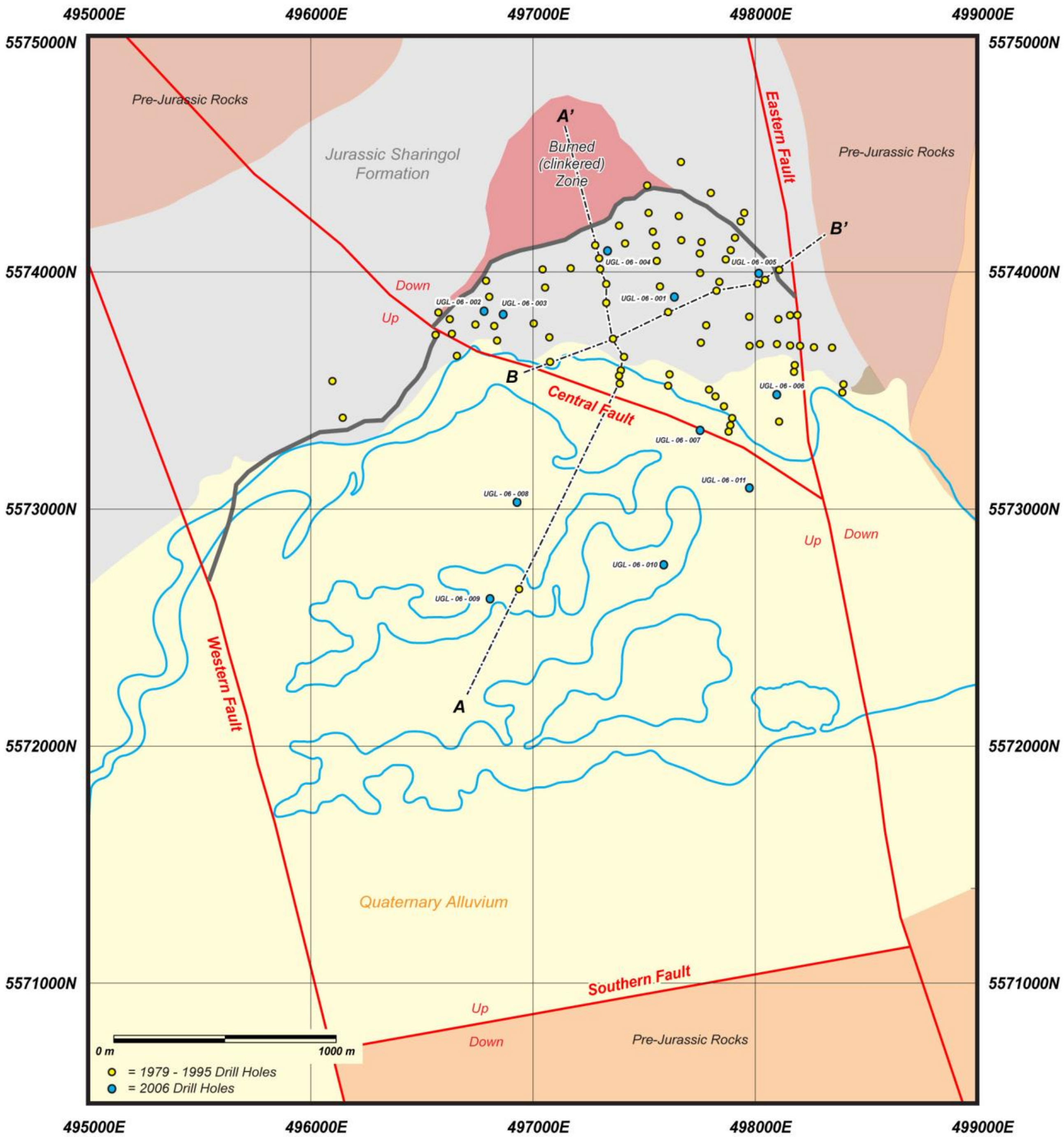


Figure 11.1 - General Geology of the Ulaan Ovoo Coal Deposit

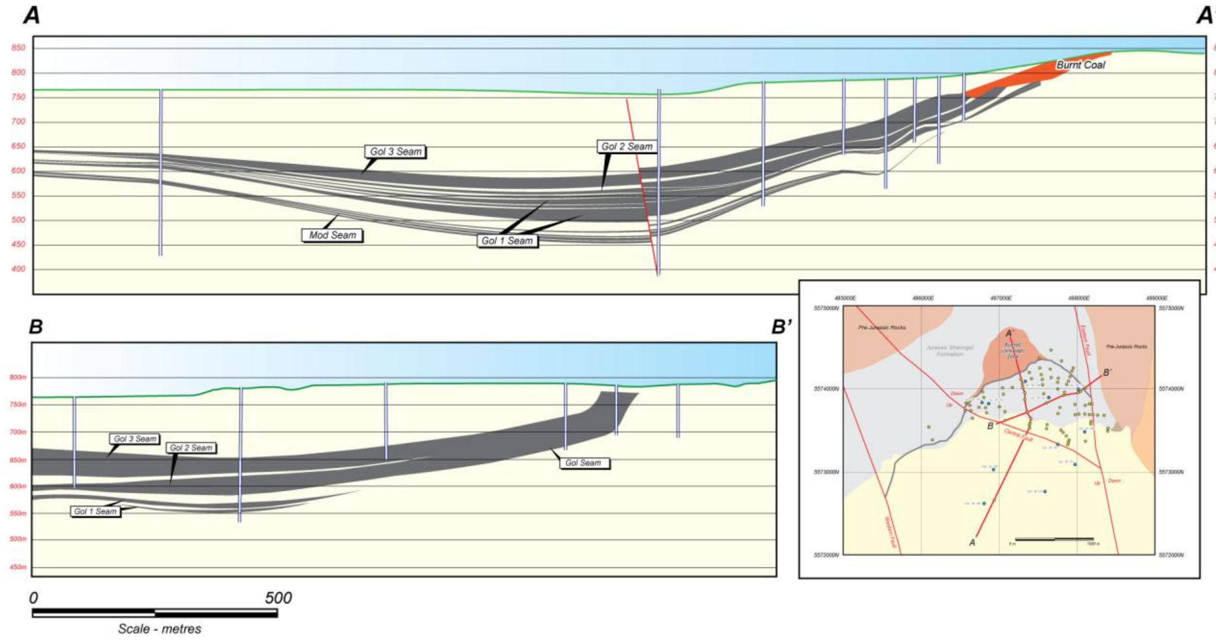


Figure 11.2 - Diagrammatic Cross Sections

11.2 Associated Minerals

As noted previously, the coal at Ulaan Ovoo has been burned along its northernmost margin forming a low clinker-capped knob called “Ulaan Ovoo,” or Red Hill. Parts of this may be stripped during the mining of the coal deposit, and could be used for construction material, road metal, and concrete filling material. Although relatively soft, the use of clinker for road metal is common in many mines.

Some of the coal has weathered in place and contains humates (humic acid). Although the humic acid content is low; (1.1 to 8.44% in oxidized coal and 6.59 to 8.7% in sooty coal), this material is hygroscopic and absorbs and retains water as well as heat. It could have special but limited agricultural value as a soil amendment.

Another interesting mineral occurrence associated with the Ulaan Ovoo coal deposit is a thin oil shale zone that occurs above the coal. Locally it is termed “combustible schist.” It has a thickness of 10 to 13.5 m and occurs in the shaley zone of the upper Sharyn Gol formation. The oil shale is dark grey coloured, brown tinted, thinly laminated. When heated it produces a thick smoke that smells like burning tires. Resin yield is 1 to 2.85% (**Table 11.1).** This oil content is too low to have commercial value.

Table 11.1 - Results on Resin in Combustible Schist of Ulaan Ovoo Deposit

Sample No.	Sampling Intervals		Thickness (m)	Moisture (%)	Resin (%)	Inert (%)	Gas (%)	Total Organic Matter (%)	Percentage in Total Organic Matter	
	From	To							Resin	Gas
110	64.0	64.8	0.8	3.8	1.40	81.30	13.5	14.9	9.39	90.61
210	64.8	65.6	0.8	4.0	1.50	82.30	12.2	13.7	11.7	88.9
310	65.6	66.5	0.9	3.6	1.0	81.35	14.05	15.05	6.64	93.36
410	66.5	67.3	0.8	2.8	2.85	81.55	12.8	15.65	18.21	81.79
510	67.3	69.3	2.0	3.0	0.35	82.70	13.95	14.3	2.45	97.55
610	69.3	70.0	0.7	3.4	1.60	82.40	12.6	14.2	11.26	88.74
710	70.0	70.8	0.8	2.8	1.40	81.90	13.9	15.3	9.15	90.85
810	70.8	72.2	1.4	3.6	1.10	81.75	13.45	14.65	8.19	91.81
910	72.2	73.0	0.8	3.0	1.40	82.30	13.3	14.7	9.52	90.48
1010	73.0	77.0	4.0	2.4	1.0	82.40	14.2	15.2	6.58	93.42

Spectral analysis of coal ash of samples collected during the course of exploration showed that the germanium content in the coal was significantly above that of the host sediments, being in one instance 12 times background, but still staying within permissible levels. Other potential environmental contaminants, such as mercury and arsenic, also remained within permissible levels.

There are deposits and occurrences of various kinds of construction materials near the coal deposit, but these have not been geologically examined or tested for potential utility.

12. EXPLORATION

12.1 1979 Exploration

In 1979, J. Jargalsaikhan and A. Chimiddorj executed the first exploration drilling of the deposit with state financing. It was carried out by an exploration crew of the Geological Administration in Ulaanbaatar with the aim of providing coal to such local territories as Sukhbaatar, Zuunburen, Tsagaannuur, and Tushig. This work, which covered the northern part of the deposit, included the following:

- Topographic geodesy work – field mapping of 1.4 square km and the establishment of 38 survey control points;
- Drilling work – 35 boreholes with a combined depth of 3267.7 m;
- Geophysical work – a total of 30 boreholes underwent electric logging of apparent resistivity and calliper. Radioactivity survey used gamma (radioactivity) and gamma-gamma (density) logging methods.
- Trenching – to identify shallow coal, trenching by hand was conducted to a depth of 3 metres, totalling 1250 cubic m; and
- Sampling work on the following samples (**Table 12.1**):

Table 12.1 - 1979 Sampling

Description	Samples
Full coal assays	298 samples
Partial coal assays	132
Coal ash spectral analysis	10
Coal ash chemical analysis	10
Coal bulk density	17
Coal moisture analysis	15
Plastometric properties	10
Physical and mechanical tests of coal	2
Physical and mechanical tests of rock	5
Chemical analysis of water	2
Coal composition analysis	12

This work defined the presence of a 340 m thick sequence of coal-bearing sediments contained in a syncline, 1.7 km long and 1.6 km wide. The upper portion of the coal-bearing zone is shale-dominant, while the lower part is sandstone-dominant. The central part of the sequence is dominated by a 24.6 to 63.1 m thick (average of 48.4 m) main coal seam. Much of this seam rests within 26.3 to 116.0 m of the surface although it outcrops on both the east and west sides of the syncline.

Overall core recovery was only 53%. Of the 35 holes drilled, three holes (Nos. 44, 40, and 42) did not penetrate the full section of coal.

12.2 1992-1995 Infill Drilling Program

Between 1992 and 1995, a geological crew under Erdenet Company, a Mongolian-Russian state-owned mining and processing enterprise, conducted infill exploration and a hydrogeological survey for the northern half of the Ulaan Ovoo deposit area and recommended mining the property. Much of the 1992 – 1995 program was done to define sub-surface hydrology. One hole (number 62) was drilled at the southern extent of the syncline to determine the extent of coal in that direction. Seventeen holes were drilled as in-fill holes and the remainder of the program was conducted to more closely define the perimeters of the syncline and define the hydrology. The tasks carried out during the 1993-1995 Ulaan Ovoo infill program are listed in **Table 12.2**.

Table 12.2 - Tasks Carried Out in 1993 – 1995 Exploration

Drilling	**Holes**	**Metres**
Exploration Drilling	17	2,389.3
Prospecting Drilling	1	339.4
Drilling in Non-coal Areas	5	700.5
Hydrological Drilling	43	4,716.2
Total Drilling	**66**	**8,145.4**
Surface Prospecting	**Kilometres**	
Prospecting Traverse Lines	180	
Geophysical Borehole Logging	**Metres**	
Apparent Resistivity (Electric)	2,883	
Gamma Ray (Radioactivity)	6,203	
Gamma-Gamma (Density)	6,082	
Cavemometer	4,901	
Inclinometer	2,005	
Laboratory Assays	**Assays**	
Geotechnical Coal Assays	464	
'As Produced' (Working) Moisture	26	
Phosphorus	34	
Bulk Density	26	
Specific Gravity	26	
Petrographic Analysis	52	
Oxidized Coal Analysis	136	
Vitrinite Reflectance, R_0	52	
Spectral Assays on Coal Ash	141	
Radio Emission of Coal	29	
Faunal and Floral (Paleontological) Analysis	20	
Humic Acid Yield in Oxidized and Sooty Coal	10	
Chemical Constituents of Coal	9	
Chemical Assays of Water	80	
Total Assays	**1105**	

The Geodesic and Topographical Bureau of Mongolia created topographical maps of the deposit area at 1:1000 (in a few locations), 1:2000, and 1:5000 scales in 1993.

Topographical mapping was done with the aid of an ET-2 electronic tachometer and KA-2 and KN theodolites. Objects in the mapping area had a positional accuracy of 1 m over the entire map and 0.3 m in relation to nearby objects. The mine surveying department of Erdenet executed these tasks.

12.3 Hydrogeological Survey of the Northern Ulaan Ovoo Deposit

An Erdenet exploration crew conducted hydrogeological surveys. This survey work consisted of a total of 54 holes, including two pumping wells, 24 sampling wells, and 9 wells for slug tests. A hydrological net of 30 holes was established during the three-year period between 1992-1995 and sub-surface hydrologic zones were identified and monitored. Two surface water observation points were also established on the Zelter River. Sixty-one water samples were taken to analyse the chemical composition of both the surface and ground water. Pit dewatering scenarios were developed.

12.4 2006 Exploration Program

In April 2006, a program to confirm previous exploration was undertaken by Red Hill. The previous drilling was conducted under the Russian system and there was some question as to whether or not the drilling adequately portrayed the deposit. In all, 11 holes were drilled under the aegis of this new program. Six holes were drilled north of the central fault and twinned pre-existing drilling. The remaining five holes were drilled south of the central fault where only limited data (one hole) was available. This program confirmed previously reported results and showed that previous reports significantly understated the coal resources.

12.5 2008 Bulk Sample Excavation Program

In August 2008, an excavation program was conducted in order to expose relatively unoxidised coal for a bulk sample representative of the full coal seam. Prior to sampling, the pit was widened to the full width of the outcrop, about 45 m, and deepened to 15 m. About 25,000 tonnes of moderately oxidized coal were removed between 5 and 10 m depth, and this coal was stockpiled outside the pit for the use of local consumers. A total of about 4,300 kg of coal were sampled and are being sent to SGS Laboratories in Tianjin, China, for analysis.

13. DRILLING

13.1 Pre-2006 Exploration

The 1979 exploration program used an SBUD-150-ZIV drilling rig, whereas the 1992-1995 infill exploration program utilized Russian ZIF-650 and EKB-5 drilling rigs.

The starting diameter of a borehole was 132 millimetres (mm) for the first 4 to 8 m in soil or overburden, at that point a casing was set and 127 or 108 mm diameter core barrels were used to core the majority of each hole. The hole was completed using a 76 mm drill bit. All boreholes were drilled with solidified alloy drill steels.

During the course of this work, where there were coal layers, drilling was carried out with shorter runs (0.5 to 1.2 m). This was increased in rock layers to 3 to 4 m runs. The average core yield from the coal was 53.0% in the 1979 program and 59.9% in the 1992-1995 program (see **table 13.1).**

Table 13.1 - Core Yield from Exploration Boreholes

Borehole No.	Borehole Depth (m)	Coal Seam Thickness (m)	Core Recovery (m)	Core Recovery %
1979 Detailed Exploration				
11	92.0	75.4	60.8	61.4
12	82.8	No coal		
13	83.9	No coal		
14	144.3	71.7	23.3	32.5
15	90.2	No Coal		
16	83.9	No Coal		
17	122.0	52.2	16.4	31.4
18	123.7	83.4	46.5	55.8
19	125.7	45.8	15.6	34.1
20	152.0	54.3	24.9	45.8
21	82.3	48.1	21.0	43.6
22	172.4	57.8	68.2	41.2
23	87.1	48.2	61.7	51.9
24	115.0	52.1	37.6	72.2
25	108.5	39.4	31.9	81.0
26	74.4	42.2	42.2	100.0
27	80.0	34.0	21.1	62.1
28	102.5	3.0	1.1	36.7
29	70.6	4.1	3.0	73.2
30	121.8	50.4	39.6	78.6
31	67.5	3.7	1.4	37.8
32	53.8	11.9	11.6	97.5
33	77.4	19.3	14.0	72.5
34	130.0	51.2	24.8	48.4
35	150.4	40.8	15.1	37.0
36	51.0	23.5	11.3	48.1
37	56.8	8.0	7.6	95.0
38	76.8	27.4	16.2	59.1
39	50.9	11.7	1.0	8.5
40	150.6	28.1	9.2	32.7
41	66.6	35.7	8.5	23.8
42	92.0	36.2	7.3	20.1
43	20.9	1.7	1.5	88.2
44	67.9	65.4	47.8	73.1
45	31.0	3.0	1.8	60.0
	Average Core Recovery			**53.0%**
1992-1995 Infill Exploration				
46	355.0	65	50.4	77.5
47	121.0	36.5	10.6	29.2
48	218.0	66.8	29.4	43.9
49	60.0	12	9.2	76.6
50	110.0	37.9	19.7	52.0
51	67.3	20.9	10.0	47.8
52	88.1	41.9	32.8	78.2
53	91.5	19.4	15.6	80.4
54	115.0	10.2	4.7	46.1
55	250.4	45.8	32.1	70.1
56	82.2	7.4	1.1	14.5
57	110.0	32.6	18.3	57.2
58	250.2	28.8	19.0	66.0
59	70.3	8.6	5.3	66.3
60	250.6	26.3	21.0	78.4
61	149.7	3.9	1.8	46.2
62	339.4	17.2	9.1	53.0
8k	175.0	52.6	33.1	62.9
9k	222.0	62.0	33.9	54.7
10k	250.0	60.6	26.4	43.6
11k	83.0	52.6	40.9	77.7
	Average Core Recovery			**59.9%**

The exploration grid of Ulaan Ovoo deposit consisted of traverse lines spaced 100 m to 250 m apart; on these lines, boreholes were spaced 40 m to 250 m apart (Figure 13.1).

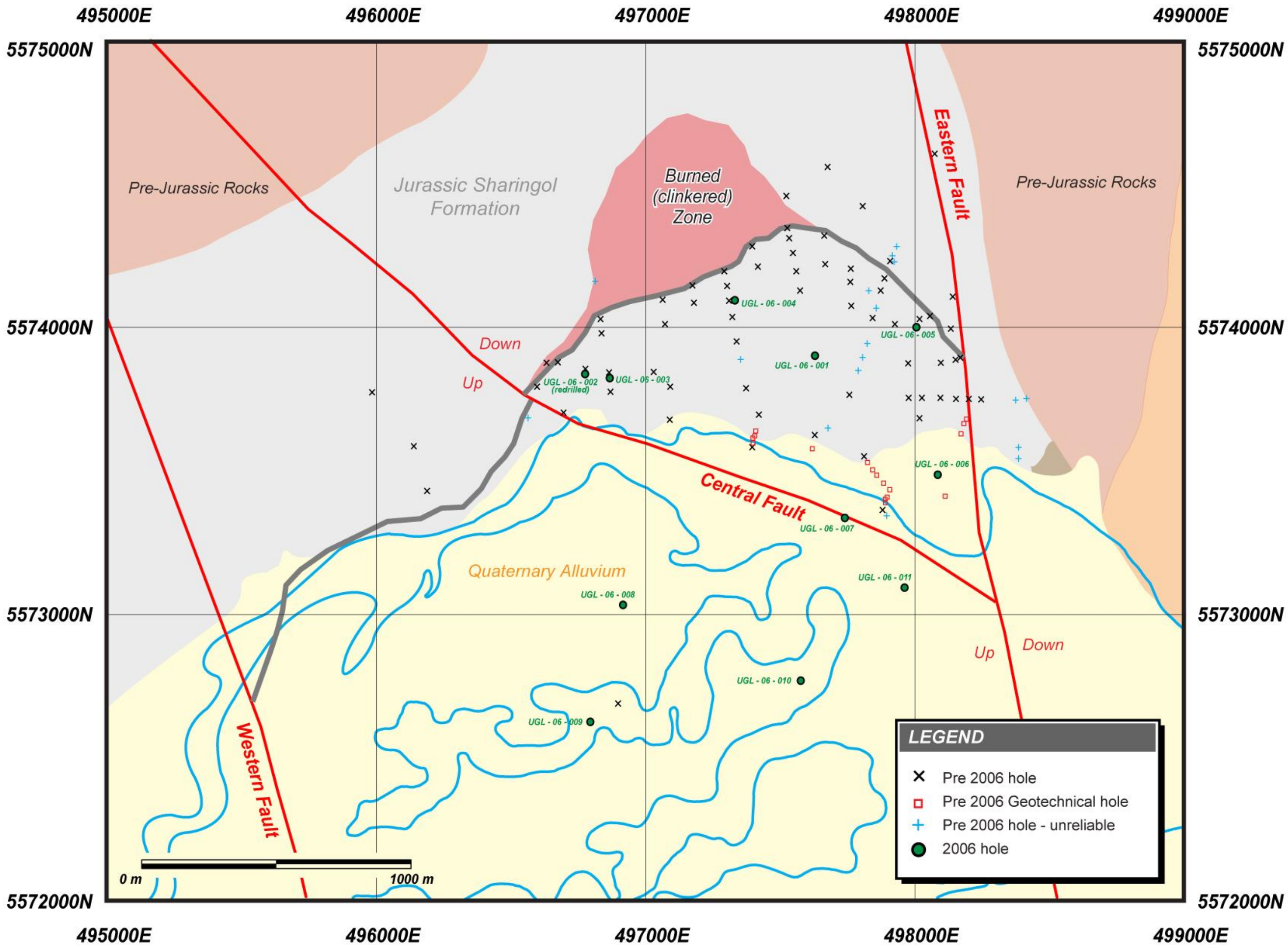


Figure 13.1 - Borehole Locations

Borehole electric logging methods were applied to the exploration holes in Ulaan Ovoo deposit for the following objectives:

- To determine depth and thickness of coal;
- To distinguish partings in coal seams;
- To determine diameter and wall conditions of boreholes; and
- To determine borehole deviation at depth.

The logging methods used included apparent resistivity, gamma ray (radioactivity), gamma-gamma (density), measurement of cone depression, and measurement of inclination. The percentage of drilling for which electric logging methods were used are as follows: 89% for gamma ray, 87% for gamma-gamma, 41% for apparent resistivity, 59% for cone depression, and 29% for inclination.

Log interpretation was made to identify coal, siltstone, sandstone, sooty coal, and oxidized coal, but such logging did not distinguish oxidized coal from severely weathered (sooty) coal.

13.2 2006 Drilling

Landdrill International Inc. of Ulaanbaatar, Mongolia, was contracted to drill the holes and used a skid-mounted Longyear Model 44 rig. The procedure was to:

- drill with a 132 mm (HWT) full face PCD bit and set conductor casing and
- core from the base of the casing to total depth with an HQ-3 (61.1 mm ID) triple tube core drilling string.

Coring was done using 3 m HQ rods behind a 96 mm OD diamond core bit with inert polymer as a medium. Wireline coring methods were used with a sleeved 3 m core barrel assembly. All drilling was done on a 24-hour schedule.

The drill core was described in white light and, occasionally, ultraviolet light. Information was logged on forms at a scale of 3 cm=0.5 m, and the core photographed with a digital camera. The core information logged includes lithology, rock mechanics, and sampled intervals. Other information was noted during drilling and logging including water and gas encountered and unusual drilling conditions. After completion of the core logging, the core was sampled, placed in plastic sleeves, and the samples noted on the core log. The lithology and rock mechanics information are considered to be logged in acceptable detail.

After reaching total depth, the boreholes in the resource area were geophysically logged. Some of these were logged through the core rods if the hole was not stable. The logging suite included gamma, spontaneous potential, gamma-gamma density, single point resistivity, and caliper. Printed field copies at a scale of 1 cm=2 m and Log ASCII Standard (LAS) electronic files of the logs were provided to Red Hill.

Table 13.2 lists core recovery for the 2006 drilling program. Core recovery for UGL_06_002 was inadequate, and the hole was re-drilled as UGL_06_003.

Table 13.2 - Core Recovery 2006 Drilling Program

Hole	Recovery
UGL_06_001	93.4
UGL_06_002	33.8
UGL_06_003	90.5
UGL_06_004	98.2
UGL_06_005	90.0
UGL_06_006	98.1
UGL_06_007	98.7
UGL_06_008	99.1
UGL_06_009	98.5
UGL_06_010	98.4
UGL_06_011	91.9

14. SAMPLING METHOD AND APPROACH

14.1 Initial Coal Sampling Methodology – 1992-1995

The bulk of the sampling during the 1979 detailed exploration and 1992-1995 infill exploration was from core samples. The main work objectives were to determine the quality and calorific value of the coal, its petrography, and technological variables of the confining sediments and parting material. Coal seams and splits were sampled separately from burden sediments and partings. The coal was then selected for different tests depending upon various visible features.

Samples were taken at consistent intervals and thicknesses to allow a comparison of coal quality. Samples were taken every 0.9 to 1.2 m for oxidized coal and every 3 to 5 m for non-oxidized coal. When partings exceeded 0.10 m in thickness, they were separated and tested separately.

Coal seam core samples were double checked against geophysical logs to identify core losses.

The sample testing is listed in **Table 14.1**.

Table 14.1 - Samples tested between 1979 and 1995

1979 Exploration:	
Analyses of coking coal	10
Physico-mechanical analysis of coal	2
Physico-mechanical analysis of rocks	5
Chemical analysis of water	2
Analysis of the composition of elements in the coal	12
1992-1995 exploration:	
Analysis of coking coal	10
Radioactivity analysis of coal	29
Analysis of chemical elements in coal and rock ash	141
Paleontological analysis of flora	20
Chemical analysis of water	80
Analysis of the composition of elements of coal	80

Although no unusual results were noted in the reported coal quality, the work done in this program had deficiencies that required remediation during the 2006 drill program. These are:

- core recoveries for both programs were extremely low – averaging 53.7 percent;
- sample locations were not identified on either the geological or geophysical logs in a formal manner;
- no formal testing procedures were stated or clearly followed; and
- no independent audits of sampling or testing were conducted during either of the two previous programs.

Although there are severe deficiencies, none of them, either singularly or collectively, are of sufficient significance to devalue the overall merit of the previous exploration programs.

14.2 Coal Sampling Methodology – 2006 Program

The sampling of cores was started and completed as soon as possible after lithologic descriptions and photographs were done. The sampling method followed that of ASTM D5192 where practical.

Sample treatment methods included washing the core of contaminants and allowing sufficient time for the free water to drain from the core to enhance sample representativeness. Sample preservation included placing the core in 15 micron plastic, then placement in wooden core boxes for protection. The samples were removed from the core tray in intervals up to 1 m in thickness depending on the thickness of partings and the beginning and end of core runs.

The guidelines used in selecting sample intervals include:

- Bone coal (shaly coal) was sampled similar to coal.
- Partings less than 0.3 m thick were included with coal.
- For partings between 0.3 and 1.0 m thick, the entire parting was sampled separately and sent to the laboratory.
- For partings greater than 1.0 m thick, the lower and upper 0.5 m were sampled separately from the middle portion of the parting. The lower and upper splits were sent to the laboratory, while the middle split was archived.
- The first 1.0 m of rock other than coal or bone coal above and below the major coal seam (i.e., immediate roof and floor) was sampled separately and sent to the laboratory.
- The minimum coal seam thickness or aggregate coal plus parting thickness is 0.5 m.
- Stray coal seams greater than or equal to 0.5 m were sampled.
- Where unbroken by large (>0.3 m) partings, maximum sample thickness was generally limited to the run length, 3.05 m.

The samples were placed in 15 micron plastic sleeves, the sleeves sealed and labelled, and the sample placed into partitioned wooden core boxes for shipping. The plastic sleeves preserved the samples from loss of moisture and introduction of foreign materials and kept the samples separate from other core samples.

15. SAMPLE PREPARATION, ANALYSES AND SECURITY

15.1 Sample Dispatch and Security 1992-1995

Unlike gold or other metallic sampling and analysis, coal sampling is not as sensitive to intentional sample upgrading or malicious modification. However, some sampling errors can creep into any sampling scheme. Even given the overall poor core recoveries, sample preparation, analysis, and security procedures do appear to have met overall coal industry standards.

At all stages of exploration, geological engineers under the supervision of the Chief Geological Engineer did the sampling. The Chief Geological Engineer had more than 10 years of exploration experience and was responsible for the supervision of all the drilling and sampling on the property.

Samples from boreholes were placed in storage boxes in proper order, and the cores were washed, numbered, and placed into a polyethylene bag to preserve moisture before placing into an additional cotton bag. Shipping of samples to their respective laboratories was done on a monthly base. All samples, other than those for radioactivity analysis of coal and paleontological analysis of flora, were sent to the Mongolian Central Geological Laboratory. Having operated for 45 years, it is the only accredited national laboratory in Mongolia.

15.2 Sample Preparation and Analysis 1992-1995

The Mongolian Central Controlling Laboratory of Radioactivity carried out the radioactivity analysis of the deposit's coal. A laboratory under the Mongolian Paleontology Institute executed the paleontological analysis.

Samples selected for analyses of the 'working' or 'as produced' moisture of the coal and the physio-mechanical properties of the host rock were full cores. They were wrapped in cotton cloths and then coated with paraffin to prevent moisture loss. This process was performed immediately after the cores were extracted from the boreholes, in a cabin attached to the drilling machine.

All samples collected were sent to laboratories monthly, and the sample crushing, splitting and processing were carried out at the Central Geological Laboratory in Ulaanbaatar. The infill exploration included the analyses and samples analysed listed in **Table 15.1**.

Table 15.1 - Analyses 1992 – 1995

Full technical analyses of the coal	464
'As produced' moisture	26
Phosphorus	34
Volume weight	26
Specific gravity	26
Micro components in the coal (petrographic analyses)	52
Degree of oxidation	136
Vitrinite reflectance	52
Spectral analysis of ash from coal and rocks	141
Humic acid yield	10
Elemental structure in the coal	9
Chemical analysis of water	80

No information was found as to the quality or adequacy of laboratory analyses.

It should be noted that all of the samples from the historical (pre-2006) exploration programs and their laboratory duplicates are not now available, or have not been kept. All coal samples have been lost, and the hard cores from drilling are scattered over the drilling area. In contrast, laboratory duplicates from the 2006 drilling program were kept by SGS Laboratories in Denver, Colorado, USA, and all non-laboratory core from that program is stored in wooden core boxes in a secure warehouse on site.

15.3 Sampling Methodology 2006

A strict chain of sampling and sample handling and chain of custody was adopted. Samples were recovered by coring, described in the field, carefully wrapped and shipped to SGS Laboratories Denver for analysis. SGS followed standard coal analysis protocols for proximate analysis and retains samples for additional testing or auditing should it be deemed necessary. Proper chain of custody procedures was employed throughout the process. Unlike earlier programs, core recoveries averaged over 95%, as opposed to 56%, and samples were sealed immediately and analysed as quickly as possible to preserve moisture content.

16. DATA VERIFICATION

16.1 Data Verification Behre Dolbear

Reported samples were compared with the original laboratory analytic sheets when the originals were available. No change from the original results to the reported results were noted.

Behre Dolbear did no double-checking or verification of sampling or analytic procedures and there is no documentation to validate that any such verification has taken place.

Two grab samples were taken by Ochir LLC, the previous property holder, from the upper part of the coal seam and analysed. These samples were not taken in a rigorous manner and do not represent more than just character samples.

16.2 Data Verification Runge

Runge checked the borehole data prior to updating the geological model. Data was provided in several formats and these were cross-checked to identify any errors. Graphical output from the model was used to detect any possible anomalies in the data.

Runge did no verification of electronic data against original field or laboratory data.

17. ADJACENT PROPERTIES

With the exception of the previously noted report of the existence of coal in adjacent basins in the Zelter River drainage, there are no reports of active exploration or mining for coal on any of the adjacent properties.

18. COAL QUALITY, WASHABILITY, AND TESTING

18.1 Coal Testing 1992-1995

18.1.1 Introduction

Although the main goal of the exploration conducted in 1979 and in 1995 was to define the thermal characteristics of the Ulaan Ovoo coal deposit and its utility as a fuel source for either electric power generation or heating, additional testing was done to evaluate the coal for other purposes including crude oil potential, semi-coking coal potential, and metallurgical feedstock (carbon source).

Plastometric analysis was executed on 60 samples for the various of the Gol Seam, all being non-oxidized coal.

According to the Russian classification system, the non-oxidized coal of the Ulaan Ovoo deposit belongs to class D (*dlinnoplamennii*, or long flame). According to the definition of this class, the non-oxidized coal at the deposit can possibly be used as fuel for power stations and construction material processing (chalk, cement, brick, etc), and coal adsorbent (filter). This is consistent with ASTM D 388-05, which defines this coal type as "high volatile C bituminous coal."

According to the Russian Standard GOST 25543-88, the same type of coal as Ulaan Ovoo is used in coking technology, coke preparing process, liquid fuel extraction, and semi coking.

During exploration in 1995, 10 samples were taken from borehole No. 10k for oil shale seam data, and the content of resin was 1.0 to 2.85%.

18.1.2 Analyses

Fifty-two samples from three of the exploration boreholes, within the deposit area, underwent vitrinite reflectance measurement and the composition of the petrographic constituents of the coal was analysed.

Coal in the deposit consists mainly of bright coal, semi-dull coal, and dull coal (rare). Of these, bright coal consists of durain-clarain and semi-dull coal consists of clarain. Most coal is of the clarain type. The coal is low in ash content.

The coal composition has 78 to 83% vitrinite-group micro ingredients, including 36 to 39% collinite and 42 to 44% tellinite. Liptinite-group micro ingredients account for 3.2 to 5.2% of the combustible part of the coal. Fusinite-group micro ingredients account for 3 to 4%. Ash content of the coal is 4.6 to 9.8%, most of it occurring as clay minerals. Sulphide, primarily pyrite and marcasite, and carbonate minerals, largely calcite and gypsum, occur in even-sized grains.

The coal's degree of maturity is moderate, with vitrinite reflectance (R_0) values of 0.51 to 0.61, with an average of 0.55, based on 22 composite samples from 10 boreholes.

Table 18.1 - 1992 – 1995 Proximate Analysis Results

Coal Types	'As analyzed' moisture W^a, %	'As produced' moisture W^r_t, %	Ash content A^d, %	Volatile matters V^{daf}, %	Sulfur content S^d_t, %	Caloric value Q^{daf}, kcal/kg
Non-oxidized	7.1	13.8	9.6-15.8	39.9-52.3	0.13-0.53	7,025-7,533
Oxidized	10.6	20.6	7.9-14.7			5,135-5,860
Sooty	11.3	26.5	14.8-23.7			4,524-5,376

The close correlation between the Ulaan Ovoo and Sharyn Gol deposits implies that Ulaan Ovoo coal might have a high spontaneous combustion potential but no testing has been undertaken to confirm this. In regard to metamorphism, the coal was classified as "long-flame" hard coal in Russian terminology and high volatile bituminous coal in American terminology, which relates to an intermediate grade between brown coal and hard coal.

Sub-aerial oxidation of coal was noted to depths of 15 to 30 m in the drilling. The oxidation depth is to a large degree dependent upon ground water levels and the type of rock capping the coal.

Table 18.2 compares the Ulaan Ovoo Coal with the Sharyn Gol coal currently being produced about 160 km to the southeast.

Table 18.2 - Ulaan Ovoo Coal Quality in Comparison to Sharyn Gol Deposit Coal

Parameters		Coal Deposit							
		Ulaan Ovoo				Sharyn Gol			
		No.	Min	Max	Ave	No.	Min	Max	Ave
'As analyzed' moisture, %		*553*	3.2	11.9	**6.5**	-	-	-	**-**
'As produced' moisture, %		*20*	7.5	22.0	**13.8**	*18*	10.9	21.8	**15.3**
Ash content, %ad		*571*	4.6	27.1	**10.5**	*962*	4.2	44.9	**20.5**
Volatile matter, %daf		*571*	33.6	56.4	**43.0**	*440*	27.7	53.1	**41.4**
Sulfur content, %		*571*	0.19	0.62	**0.32**	*341*	0.25	4.02	**0.87**
Calorific value, kcal/kg daf		*571*	5015	8177	**7296**	*207*	6670	7580	**7180**
Plastometrics	X	*10*	53	67	**59**	-	-	-	**-**
	Y	*10*	0	0	**0**	-	-	-	**-**
Elemental contents	Carbon, %	*9*	65.5	81.5	**74.7**	*125*	72.4	77.5	**75.6**
	Hydrogen, %	*9*	3.2	3.9	**3.8**	*125*	4.4	5.8	**5.1**
	N+O, %	*9*	1.8	9.5	**5.2**	-	-	-	**-**
Petrography	Vitrinite reflectance, R_0	*46*	0.50	0.57	**0.52**	*2*	-	-	**0.55**
	Total of other constituents	*42*	1.8	10.6	**4.7**	*22*	-	-	**11.0**
	Vitrinite, %	*50*	78.5	95.3	**87.8**	*22*	-	-	**77.0**
Russian Standard GOST-25543-82	Category	D*				D			
	Group	1D**				1D			
	Code	0614200				0614200			
Russian Standard GOST-25543-88	Category	D				D			
	Group	DV***				DF****			
	Code	0504200				0514200			

Note: *D: *dlinnoplamennii* (long flame)
**1D: *pervii dlinnoplamennii vitrinitovii* (first long flame vitrinite)
***DV: *dlinnoplamennii vitrinitovii* (long flame vitrinite)
****DF: *dlinnoplamennii fusinitovii* (long flame fusinite)

18.2 2006 Testing

The ten holes drilled in 2006 were sampled as described in Section 14.2, and dispatched to the SGS laboratory in Denver for testing. Table 18.3 lists the methods of analysis used by SGS. All samples were tested on an individual basis and compositing to working section was performed mathematically. Samples were tested for:

- Proximate analysis;
- Total sulphur
- Energy; and
- Total moisture and residual moisture.

Drillhole statistics for the seams are reported in **Table 19.3**.

The air-dried moisture (Inherent Moisture) tests were never performed by SGS as these are not commonly reported in the United States [usually dry basis is used instead]. Thus, Ulaan Ovoo coal cannot be reported on an air-dried basis.

Table 18.3 - SGS Denver Methods of Analysis

		Standard test method
Coal Quality parameters		**Denver (2006 & 2007)**
As Received Basis	**Moisture (%)**	**D 3302-05 (ASTM)**
EQ Moisture Basis	**Moisture (%)**	**D 1412-04 (ASTM)**
Air Dried Basis	**Moisture (%)**	**D 3173-03 (ASTM)**
Proximate Analysis Dry Basis	**Ash (%)**	**D 5142-04 (ASTM)**
	Sulfur (%)	**D 5142-04 (ASTM)**
	Volatile (%)	**D 5142-04 (ASTM)**
	KCal/kg	**D 5865-04 (ASTM)**
Hardgrove Grindability Index	**HGI**	**D 4089-02 (ASTM)**
Ultimate Analysis Dry Basis	**Carbon (%)**	**D 5373-02 (ASTM)**
	Hydrogen (%)	**D 5373-02 (ASTM)**
	Nitrogen (%)	**D 5373-02 (ASTM)**
	Oxygen (%)	**D 5373-02 (ASTM)**
Ash Fusion Temperature	**IT (°F)**	**D 1857-04 (ASTM)**
Reducing	**ST (°F)**	**D 1857-04 (ASTM)**
	HT (°F)	**D 1857-04 (ASTM)**
	FT (°F)	**D 1857-04 (ASTM)**
Ash Fusion Temperature	**IT (°F)**	**D 1857-04 (ASTM)**
Oxidizing	**ST (°F)**	**D 1857-04 (ASTM)**
	HT (°F)	**D 1857-04 (ASTM)**
	FT (°F)	**D 1857-04 (ASTM)**
Mineral Analysis of Ash (%	**SiO2 (%)**	**D 4236-04 (ASTM)**
Weight Ignited Basis)	**Al2O3 (%)**	**D 4236-04 (ASTM)**
	TiO2 (%)	**D 4236-04 (ASTM)**
	Fe2O3 (%)	**D 4236-04 (ASTM)**
	CaO (%)	**D 4236-04 (ASTM)**
	MgO (%)	**D 4236-04 (ASTM)**
	K2O (%)	**D 4236-04 (ASTM)**
	Na2O (%)	**D 4236-04 (ASTM)**
	SO3 (%)	**D 4236-04 (ASTM)**
	P2O5 (%)	**D 4236-04 (ASTM)**
	SrO (%)	**D 4236-04 (ASTM)**
	BaO (%)	**D 4236-04 (ASTM)**
	Mn2O3 (%)	**D 4236-04 (ASTM)**
Ash Viscosity Temperature	**T250 (°F)**	**B&W Steam 40th Edition**
Sulfur Forms Dry Basis	**Pyritic (%)**	**D 2492-02 (ASTM)**
	Organic (%)	**D 2492-02 (ASTM)**
	Sulfate (%)	**D 2492-02 (ASTM)**
		Standard test method
Coal Quality parameters		**Denver (2006 & 2007)**
Trace Elements (All Values in	**Trace Elements**	**D 6357-04 (ASTM)**
µg/g)	**Arsenic**	**D 6357-04 (ASTM)**
	Beryllium	**D 6357-04 (ASTM)**
	Boron	**D 6357-04 (ASTM)**
	Cadmium	**D 6357-04 (ASTM)**
	Chromium	**D 6357-04 (ASTM)**
	Copper	**D 6357-04 (ASTM)**
	Lead	**D 6357-04 (ASTM)**
	Chloride	**D 4208-02 (ASTM)**
	Fluoride	**D 3761-96 (2002) (ASTM)**
	Molybdenum	**D 6357-04 (ASTM)**
	Barium	**D 6357-04 (ASTM)**
	Lithium	**D 6357-04 (ASTM)**
	Manganese	**D 6357-04 (ASTM)**
	Mercury	**D 3684-94 (2006) (ASTM)**
	Nickel	**D 6357-04 (ASTM)**
	Selenium	**D 6357-04 (ASTM)**
	Silver	**D 6357-04 (ASTM)**
	Vanadium	**D 6357-04 (ASTM)**
	Zinc	**D 6357-04 (ASTM)**
	Colbalt	**D 6357-04 (ASTM)**
	Strontium	**D 6357-04 (ASTM)**
	Thallium	**D 6357-04 (ASTM)**
	Bromine	**D 3761-96 (2002) (ASTM)**
	Tin	**D 6357-04 (ASTM)**
	Zirconium	**D 6357-04 (ASTM)**

19. RESOURCE ESTIMATES

19.1 History of Resource Estimation Prior to 2006

In reporting the historical estimates of reserves and resources below, the reader is cautioned that these estimates do not comply with the guidelines of National Instrument 43-101 and should not be relied on. Further, these historical estimates have not been verified, either in quantity or methodology by a Competent Person.

The old Soviet system of resource classification did not incorporate the concept of economics in developing estimates of mineral commodities. It referred to “mineable reserves” for the portion of a deposit considered Explored (classes A, B, and C1) and Evaluated (class C2). Potential “resources” were considered Prognostic and rated P1, P2, and P3. The categories in the “mineable reserves” area were considered well enough explored to begin mining. The methodology involved in assigning the various classifications varies from commodity to commodity and deposit to deposit. Generally the density of measured points is sufficient to establish a crude resource estimation but cannot be considered a “mineable reserve” because no cost estimation or economic analysis was done to establish the mineability.

The 1979 study inferred the resource to be 42.4 million tonnes (Russian resource categories A+B+C1+C2). This resource included 23.561 million tonnes classified as A+B+C1. *(It should be noted that this Russian classification system does not conform to the reserve/resource classification system as dictated by NI 43-101.)* Coal analyses, conducted by Russian and Mongolian laboratories, classified the coal as “hard coal class D” with an average ash content of 11.2%, ‘as produced’ moisture of 13.4%, calorific value of 7,370 kcal/kg, and sulphur content of 0.29%. The coal-bearing stratum occurred at depths ranging from 26.3 to 116 m.

Between 1992 and 1995, a geological crew under Erdenet, a Mongolian-Russian state-owned mining and processing enterprise, conducted infill exploration and updated the resource estimation for the northern part of the deposit. The new resource estimation increased the tonnage to 78.2 million tonnes (A+B+C1+C2), of which 50.2 million tonnes were classified as A+B+C1. The amount of sooty coal was estimated to be 0.808 million tonnes in the A+B resource categories. The study also inferred that an additional 51.8 million tonnes of coal existed in the southern part of the deposit. A potential area for initial exploitation was delineated, containing 24.832 million tonnes of coal in A+B+C1 categories.

In 2001, Mongolrostsvetmet Corporation evaluated the possibility of producing 0.6 to 1.0 million tonnes of coal per year from the deposit. Although this was termed a “prefeasibilty study” it would not qualify as such under the dictates of NI 43-101. Later, in 2004, MMAI LLC commissioned another study to evaluate the possibility of producing 6 million tonne per year from the property. This later report (Reference 5), did not have a formal summary of conclusions or make any formal recommendations. It was designed to evaluate the property with a goal to produce coal at a rate of 6.0 million tonnes per year and suggested a mine life of 13 years for the northern portion of the deposit. It identified potential groundwater problems in the development of the southern part of the deposit but concluded that with proper attention to the hydrology, that the deposit could support a 6.0 million tonne per year surface mine for a period of 22 years. Calorific quality of the coal was reported to exceed coal quality of main coal suppliers of the region (Erdenet, Ulaanbaatar, and Hutul) by 116 to 2,176 kcal/kg. Potential coal markets identified by the report included the Russian Federation, Republic of Korea, People’s Republic of China, Japan, and Mongolia. Although operating and capital cost estimates were produced in this report, the owners of the deposit were not financially able to put the property into production and elected to sell the property. Although this report is extremely detailed, was well researched, and concluded that the deposit had definite merit, it does not rise to the level of standards required by World Financial Institutions and cannot be considered a true “Feasibility Study”.

Both of these studies were conducted in the context of a technical assessment of the property and studied the technical aspects of the deposit and whether it would technically support a mine. Economics and environmental concerns were not major issues considered in these studies and as a consequence they do not rise to the level of pre-feasibility or feasibility studies under the definition of NI 43-101.

19.2 *Surfer* Model Behre Dolbear 2006

As part of the Scoping Study undertaken by Behre Dolbear in 2006 (Reference 2), a gridded model of the Ulaan Ovoo Coal Deposit was constructed using *Surfer 8* computer program. The model included the results of the 11 holes drilled during 2006 and 66 boreholes included in the previous resource estimation.

A series of grids were developed to model the deposit, including:

- topography – based on digitised points from the topographic map of the area developed during the 1979 and 1992 to 1995 exploration programs;
- bottom structure of the lowest coal seam;
- projected outcrops based upon intersecting topography and bottom structure;
- borehole locations based upon relevant survey data;
- a thickness grid of total coal thickness was derived from drill information;
- the thickness grid was converted to in-situ tonnage using a bulk density of the coal of 1.46 g/cm^2;
- the thickness grid was then cut by a series of polygons that represented areas within 500 m of the nearest measurement of coal thickness to represent measured coal resources and greater than 500 m but less than 1,000 m to represent indicated coal resources;

Behre Dolbear reported that this methodology is consistent with the JORC method of computing coal resources as presented in the Australian Code for Reporting of Mineral Resources and Ore Reserves (the JORC Code) September 1999 and the Proposed Revisions to the Code dated June 2, 2004.

Resources were reported as listed in **Table 19.1**.

Table 19.1 - Coal Resource Estimates Behre Dolbear 2006

Coal Resources by Category (in million tonnes)	
Measured Coal Resources	174.5
Indicated Coal Resources	34.3
Total Demonstrated Coal Resources	208.8
Note: Assumes Bulk Density @ 1.46 g/cm^2 Note: In addition to the stated resources there is a projected 35.9 Mtonnes inferred	

19.3 2008 Conversion of Geological Model

19.3.1 Geological Model

Runge converted the previous model from Surfer software to Mincom's *Minescape* software. The advantage of using a software system specially designed for geological modelling stratigraphic deposits, rather than a simple gridding system, is that the relationship of the various surfaces and coal seams is inherently understood by the software package. As the Mincom software has good mine planning tools, it is also in a more appropriate format for subsequent mine planning. The data used to generate the Mincom model was provided by Red Hill.

As part of the process, Runge also reviewed the Behre Dolbear modelling approach and results.

Survey Data

Borehole coordinates were provided in three different formats – *Excel* spreadsheet, *AutoCAD* drawing file, and *Minex* file. All three produced the holes in the same location, which also compares with maps in the Scoping Study, and it is therefore considered that the hole locations are correct.

The holes modeled consisted of the 66 holes from above, plus 8 holes which did not contain any coal intersections, but which are still useful observations. Ten of the eleven 2006 holes were included in the model (UGL-06-002 was rejected because of poor core recovery; it is replaced by UGL-06-003 which is 85 m away).

Lithology Data

Downhole lithology was provided as a *Minex* ASCII file and as an *Excel* spreadsheet. Red Hill advised that the seam correlations in the *Minex* file were the most up to date and seam nomenclature used was from that file, whilst downhole depths and rock types were used from the *Excel* spreadsheet. The *Minex* model had assigned splitting based on a stone band greater than 1 m within a named coal seam. However, the *Minex* data file did not contain stone bands intersections within a named seam. Using the *Excel* data meant that these thinner unnamed and uncorrelated stone bands could be modeled.

The base of alluvium/colluvium was also recorded in the borehole data, although the base of weathering was not recorded.

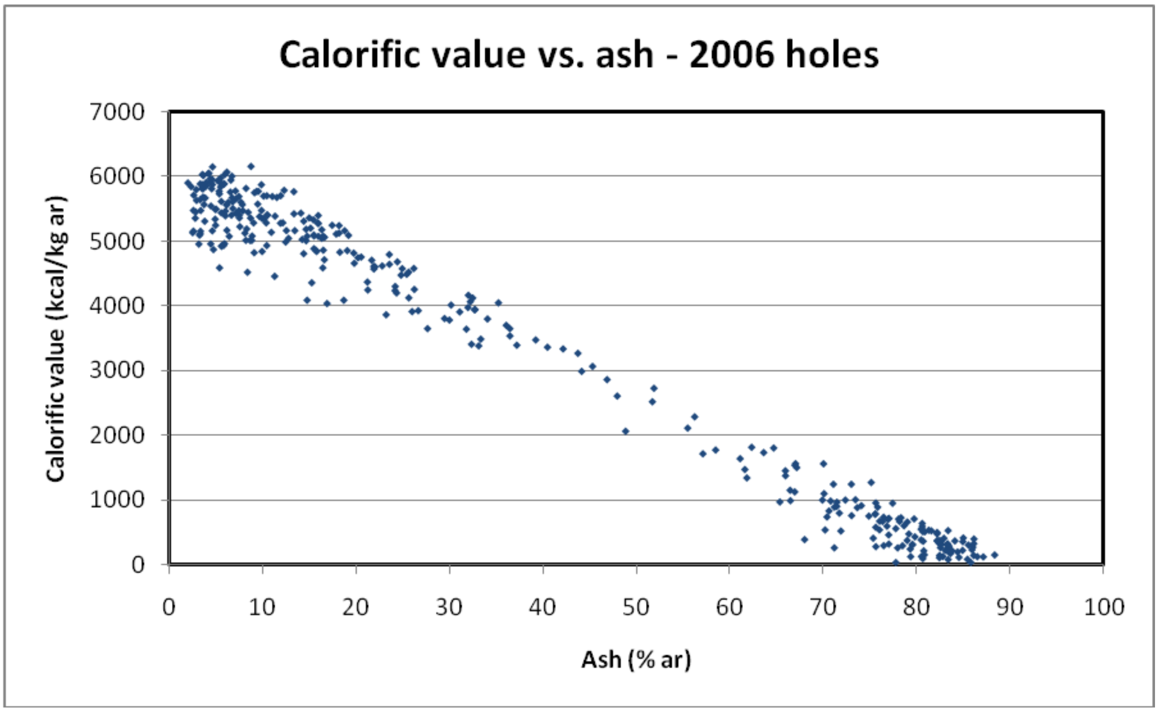
Table 19.2 lists the thickness of the various seams from the boreholes (ALV is the base of alluvium/colluvium).

Table 19.2 - Borehole Statistics Coal Thickness

Seam/ Horizon	No.	Thickness (m)			Interburden (m)
		Mean	Minimum	Maximum	Mean
ALV	71	8.3	0.4	32.0	
G3	46	21.2	1.3	54.2	
G2	49	14.9	0.8	39.8	2.5
G1D	26	3.0	0.5	11.0	3.3
G1C	26	2.6	0.4	14.0	1.9
G1B	21	3.1	0.5	17.2	2.3
G1A	18	3.8	0.8	29.1	1.9
G1	18	8.8	1.0	18.7	
G	13	54.5	3.0	77.9	
M4	15	1.7	0.2	4.7	19.1
M3	15	2.2	0.2	5.5	2.6
M2	11	3.8	0.3	13.3	1.6
M1	9	2.7	0.8	4.5	1.7
M	12	3.9	0.7	9.2	
ERT	13	2.3	0.1	7.4	20.7
GUN	8	2.7	1.0	11.4	57.3

Quality Data

Quality data from the 1992-1995 program and 2006 programs was provided in an *Excel* spreadsheet. Red Hill informed Runge that some of the parameters from the older data were suspect, and that only the ash, sulphur and specific gravity (density) were reliable. Calorific value results in particular were not reliable. In order to check this, cross plots of ash content (% ar) vs calorific value (kcal/kg ar) for the old and new holes were created (Figure 19.1). Figure 19.1 shows clearly that calorific value in the older holes is not reliable.



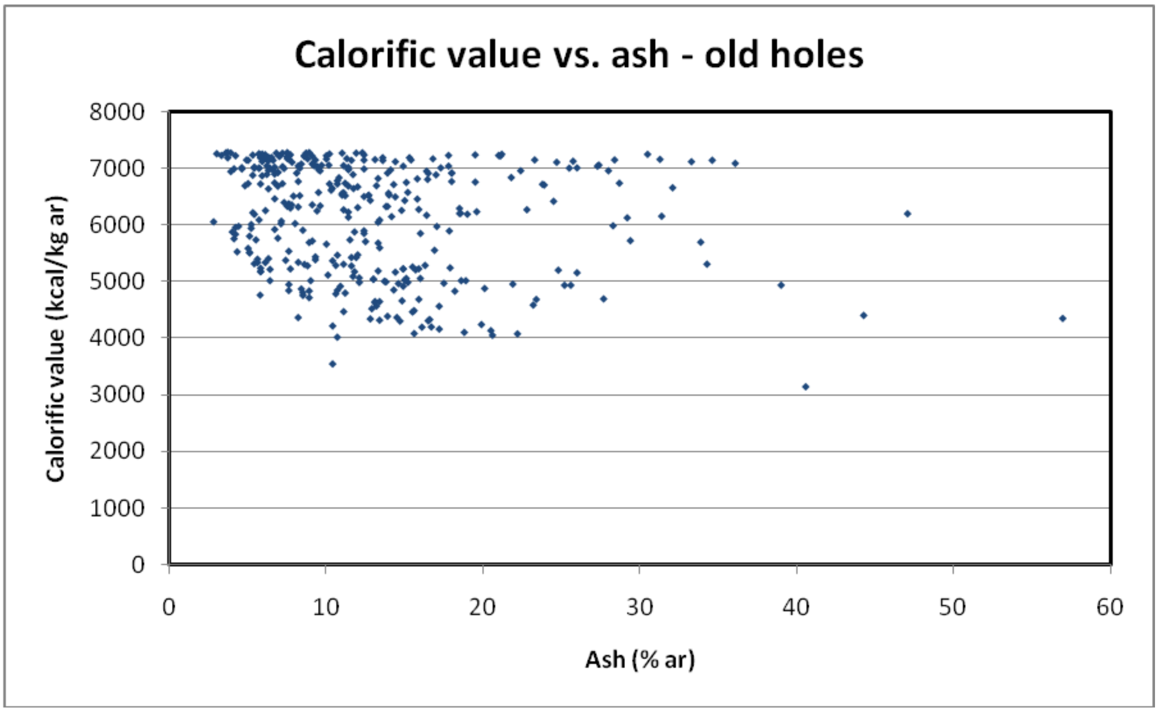


Figure 19.1 - Comparison of Correlation between Ash and Calorific Value between "Old" and "New" Holes

Stone bands within the seam, and roof and floor samples, were also tested in the 2006 boreholes. The stone bands within the seam have been included in composites for the seam.

Table 19.3 lists the major quality parameters from the new boreholes, and from all boreholes.

Table 19.3 - Borehole Quality Statistics

A – All Holes

	Specific gravity g/cc				Moisture % ad				Residual moisture %				Total moisture %				Ash % (as received)			
Seam	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean
G3	36	1.31	1.47	1.36	7	6.38	15.18	10.02	7	7.85	14.9	11.78	36	4.25	26.97	10.49	36	6.11	32.7	12.33
G2	40	1.31	1.48	1.36	7	4.31	15.24	8.75	7	7.85	13.45	11.64	40	3.42	26.64	9.45	40	6.45	33.9	13.18
G1D	15	1.33	1.64	1.4	5	4.79	13.45	7.83	5	7.71	12.05	9.79	15	3.9	21.96	10.44	15	8.59	46.78	20.12
G1C	18	1.33	1.61	1.38	6	3.5	10.6	7.2	6	9.13	12.98	10.71	18	2.7	18.75	9.79	18	9.44	37	17.25
G1B	11	1.36	1.58	1.4	3	4.45	10.34	7.17	3	8.52	12.59	9.93	11	2.6	21.64	9.85	11	5	36	18.77
G	11	1.27	1.38	1.35	3	7.55	16.54	11.68	3	6.93	12.49	9.75	11	3.61	26.96	9.76	11	4.26	14.46	9.04
G1	0	-	-	-	0	-	-	-	0	-	-	-	14	3.2	11.88	6.36	14	4.8	26.63	12.58
G1A	11	1.36	1.65	1.43	5	3.9	8.2	6.24	5	9.22	11.31	10.58	11	2.4	18.57	10.94	11	9	39.64	22.48
M4	6	1.3	1.74	1.43	3	5.85	10.03	7.69	3	5.67	9.66	7.87	6	3.76	17.48	10.13	6	6.51	51.63	21.52
M3	7	1.36	1.5	1.41	4	6.24	9.11	7.67	4	6.13	10.73	8.39	6	6.16	17.3	12.69	6	10.16	25.29	19.18
M2	8	1.31	1.46	1.37	5	3.78	10.35	7.72	5	5.42	12.58	9.87	7	3.39	18.73	13.29	7	7.45	34.63	16.3
M	8	1.36	1.44	1.37	2	6.95	13.85	10.4	2	6.52	11.88	9.2	8	1.41	19.46	9.25	8	6.11	35.67	17.36
M1	6	1.36	1.89	1.53	5	3.27	9.35	6.74	5	3.46	11.27	6.93	6	2.38	14.64	11.45	6	15.87	65.6	37.62
ERT	4	1.36	1.48	1.44	3	4.91	7.12	5.92	3	7.87	10.61	9.18	4	6.2	14.99	12.47	4	19.66	32.14	26.08
GUN	2	1.36	1.38	1.37	1	14.04	14.04	14.04	1	5.88	5.88	5.88	2	1.95	19.1	10.53	2	21.95	74.24	48.09

	Volatile matter % (as received)				Fixed carbon % (as received)				Total Sulphur % (as received)				Calorific value BTU/lb (as received)				Calorific value BTU/lb (MAF)				Free Swell index			
Seam	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean
G3	30	26.76	56.44	40.33	30	9	49.12	36.12	30	0.13	0.71	0.31	30	7469	14385	11363	30	10972	18915	14823	7	0.1	1.1	0.5
G2	36	24.6	62.53	40.08	36	8.56	50.76	36.63	34	0.12	0.62	0.34	36	7563	14500	11569	36	10675	22252	15067	7	0	1.3	0.5
G1D	15	18.08	58.67	38.32	15	16.34	43.4	31.12	15	0.18	0.62	0.36	15	5162	14373	11437	15	13063	20093	16262	5	0	1.3	0.4
G1C	16	24.41	58.13	38.46	16	16.18	44.1	33.6	16	0.22	0.58	0.36	16	6301	14187	11288	16	12704	18331	15505	6	0	1.5	0.7
G1B	11	22.29	55.9	37.99	11	21.68	47.3	33.39	11	0.22	0.65	0.43	11	6672	14490	11755	11	13024	19671	16271	3	0	0.5	0.2
G	11	29.05	44.09	38.36	11	36.39	50.8	43.32	11	0.18	0.5	0.31	11	9405	14718	12209	11	13380	16502	15031	3	0.6	1.3	1
G1	12	35.13	59.02	45.34	12	10.25	52.44	35.55	12	0.16	0.65	0.34	12	7452	14135	12548	12	10787	18521	15519	0	-	-	-
G1A	11	22.21	56.68	34.04	11	22.59	44.4	32.53	11	0.23	0.6	0.38	11	5803	14724	10833	11	12411	21221	15901	5	0	1.5	0.5
M4	6	17.65	54.61	33.28	6	18.28	46.4	35.08	6	0.21	1.03	0.56	6	4546	13666	10474	6	12651	18538	15044	3	0	2	0.8
M3	6	26.15	55.27	33.11	6	21.54	46.98	35.02	6	0.16	1.12	0.49	6	8028	12704	9810	6	13181	15835	14253	4	0.3	1.1	0.7
M2	7	26.65	34.09	29.06	7	35.29	53.16	41.35	7	0.23	0.62	0.42	7	8807	12859	10280	7	12824	20732	14717	5	0.4	1.5	1
M	8	25.47	77.86	45.3	8	11.51	41.1	28.09	7	0.22	1.07	0.58	8	7752	14094	11802	8	12179	17905	15547	2	0.8	1.5	1.2
M1	5	17.57	28.42	24.01	5	12.55	41.54	30.71	5	0.23	0.44	0.36	5	3456	9728	7384	5	11513	13905	13238	5	0	1	0.6
ERT	4	23.23	46.4	31.28	4	17.1	37.14	30.17	4	0.4	0.56	0.49	4	7329	14215	9730	4	13142	22386	15773	3	0.5	1	0.7
GUN	2	26.22	59.52	42.87	2	-35.71*	32.73	-1.49	1	0.39	0.39	0.39	1	8298	8298	8298	1	14075	14075	14075	1	1	1	1

** - Fixed carbon is calculated as 100 – (IM+Ash+VM). Some of the old data has errors for stone band samples.*

B – 2006 Holes

	Specific gravity g/cc				Moisture % ad				Residual moisture %				Total moisture %				Ash % (as received)			
Seam	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean
G3	7	1.31	1.47	1.37	7	6.38	15.18	10.02	7	7.85	14.9	11.78	7	16.58	26.97	20.62	7	6.9	23.26	12.34
G2	7	1.31	1.48	1.38	7	4.31	15.24	8.75	7	7.85	13.45	11.64	7	15.24	26.64	19.37	7	7.57	27.91	15.75
G1D	5	1.33	1.64	1.47	5	4.79	13.45	7.83	5	7.71	12.05	9.79	5	14.59	21.96	16.86	5	9.46	46.78	26.56
G1C	6	1.33	1.61	1.42	6	3.5	10.6	7.2	6	9.13	12.98	10.71	6	13.67	18.75	17.16	6	9.44	37	19.74
G1B	3	1.36	1.58	1.49	3	4.45	10.34	7.17	3	8.52	12.59	9.93	3	12.75	21.64	16.35	3	14.72	36	27.79
G	3	1.27	1.38	1.32	3	7.55	16.54	11.68	3	6.93	12.49	9.75	3	13.96	26.96	20.2	3	4.26	11.2	7.54
G1	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
G1A	5	1.39	1.65	1.51	5	3.9	8.2	6.24	5	9.22	11.31	10.58	5	14.1	18.57	16.17	5	19.11	39.64	28.28
M4	3	1.3	1.74	1.5	3	5.85	10.03	7.69	3	5.67	9.66	7.87	3	12.44	17.48	14.95	3	6.51	51.63	27.69
M3	4	1.4	1.5	1.45	4	6.24	9.11	7.67	4	6.13	10.73	8.39	4	14.22	17.3	15.43	4	20.5	25.29	22.5
M2	5	1.31	1.46	1.38	5	3.78	10.35	7.72	5	5.42	12.58	9.87	5	14.41	18.73	16.87	5	8.45	21.25	14.4
M	2	1.38	1.44	1.41	2	6.95	13.85	10.4	2	6.52	11.88	9.2	2	18.01	19.46	18.73	2	15.1	24.11	19.6
M1	5	1.38	1.89	1.56	5	3.27	9.35	6.74	5	3.46	11.27	6.93	5	10.89	14.64	13.26	5	15.87	58.99	32.02
ERT	3	1.45	1.48	1.46	3	4.91	7.12	5.92	3	7.87	10.61	9.18	3	14.27	14.99	14.56	3	19.66	32.14	24.68
GUN	1	1.38	1.38	1.38	1	14.04	14.04	14.04	1	5.88	5.88	5.88	1	19.1	19.1	19.1	1	21.95	21.95	21.95

	Volatile matter % (as received)				Fixed carbon % (as received)				Total Sulphur % (as received)				Calorific value BTU/lb (as received)				Calorific value BTU/lb (MAF)				Free Swell index			
Seam	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean	No.	Min	Max	Mean
G3	7	26.76	33.89	29.76	7	29.73	42.62	37.28	7	0.23	0.71	0.34	7	7469	10460	9037	7	12934	13678	13373	7	0.1	1.1	0.5
G2	7	24.6	34.33	27.55	7	32.25	41.81	37.32	7	0.26	0.59	0.39	7	7668	10337	8835	7	13366	13872	13591	7	0	1.3	0.5
G1D	5	18.08	31.13	24.78	5	20.43	43.14	31.79	5	0.28	0.48	0.39	5	5162	10311	7669	5	13063	13879	13509	5	0	1.3	0.4
G1C	6	24.41	31.39	27.49	6	24.91	43.33	35.6	6	0.33	0.58	0.43	6	6301	10398	8571	6	12704	13916	13506	6	0	1.5	0.7
G1B	3	22.29	26.83	25.09	3	27.05	37.5	30.77	3	0.22	0.63	0.47	3	6672	8711	7498	3	13024	13671	13405	3	0	0.5	0.2
G	3	29.05	32.09	30.73	3	39.73	42.75	41.53	3	0.25	0.5	0.41	3	9405	10229	9894	3	13665	13716	13685	3	0.6	1.3	1
G1	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-
G1A	5	22.21	28.16	25.21	5	22.84	37.96	30.34	5	0.23	0.6	0.39	5	5803	9173	7353	5	12411	13874	13147	5	0	1.5	0.5
M4	3	17.65	30.24	24.63	3	18.28	45.77	32.73	3	0.21	1.02	0.6	3	4546	10710	7830	3	12651	14091	13479	3	0	2	0.8
M3	4	26.15	27.3	26.67	4	33.2	38.59	35.41	4	0.38	0.44	0.41	4	8028	9008	8497	4	13181	13819	13627	4	0.3	1.1	0.7
M2	5	26.65	30.58	28.53	5	37.2	42.73	40.2	5	0.36	0.51	0.42	5	8807	10321	9583	5	13604	14078	13892	5	0.4	1.5	1
M	2	25.47	27.84	26.65	2	30.96	39.06	35.01	2	0.73	1.07	0.9	2	7752	9201	8476	2	13740	13747	13743	2	0.8	1.5	1.2
M1	5	17.57	28.42	24.01	5	12.55	41.54	30.71	5	0.23	0.44	0.36	5	3456	9728	7384	5	11513	13905	13238	5	0	1	0.6
ERT	3	23.23	29.83	26.23	3	30.2	37.14	34.53	3	0.4	0.56	0.48	3	7329	8696	8236	3	13142	13846	13568	3	0.5	1	0.7
GUN	1	26.22	26.22	26.22	1	32.73	32.73	32.73	1	0.39	0.39	0.39	1	8298	8298	8298	1	14075	14075	14075	1	1	1	1

Topography

Topography data was supplied as a gridded data file, with a cell size of 5 m. It was also supplied as an *AutoCAD* drawing file. There was no difference in the data between the two files.

Structural Model

A structural model was built using the *Stratmodel,* the stratigraphic modelling module of Mincom's *Minescape*. **Table 19.4** shows the modelled seam stratigraphy. The model was created using parent/child convention. Parting, or stone bands within a named seam unit, was also modelled. A topographic model was built from the supplied gridded DTM data (**Figure 26.1**).

Table 19.4 - Modelled Stratigraphy

G	G3	
	G2	
	G1	G1D
		G1C
		G1B
		G1A
M	M4	
	M3	
	M2	
	M1	
ERT		
GUN		

Modelling parameters are listed in **Table 19.5.**

Table 19.5 - Modelling Rules

Schema	redhill
Topography model	topo
Topo model cell size	5
Geology model cell size	25
Interpolator - thickness	Planar
Interpolator - surface	FEM
Parting modelled	Yes
Conformable sequences	Weathered, Fresh
Upper limit for seams	ALV
Control points	To control subcrop
Constraint file	No
Mask polygons	Burn zones, eastern margin limit
Faults	Central fault
Modelling method	Parent/child

Base of weathering was not logged in boreholes, and has been modeled at 10 m below topography.

Base of alluvium has been logged in all boreholes and has been modeled. It has been used as the upper cutoff for seams at the subcrop (**Figure 26.2**).

In the north of the area the splits of the Gol Seam have been burnt. This coal has been excluded from the model using masking polygons.

The central reverse fault has been included in the model. The eastern faulted limit of the deposit has been modeled using a limiting masking polygon. To the west and south the model is limited by the extrapolation distance (1,000m).

Figure 26.3 to **Figure 26.8** show contours of the major seam floor, thickness and burden.

__Quality Model__

Quality has been modelled using inverse distance as the interpolator **(Table 19.6).** Two models were created – one using the old and the 2006 boreholes, the other using only the 2006 boreholes. The latter has been used for resource estimation, due to the unreliability of the calorific value results in the old data. Although there were only 10 holes drilled in 2006, the spacing is sufficient to provide sufficient confidence in the quality model. When compositing plies to the modelled seam, analysed stone bands within the seam have been included.

Table 19.6 - Quality Modelling Parameters

Quality models	raw
Interpolator	Inverse distance, power 2
Model type	Table

Figure 26.9 to **Figure 26.13** show contours of Gol Seam quality parameters.

19.3.2 Use of Resource Classification Systems

The Canadian Institute of Mining (CIM) defines standards for reporting of resources and reserves. The majority of their definitions are similar to the Australian JORC Code. CIM recommend the use of Geological Survey of Canada Paper 88-21 (Reference 3) in defining coal resources and reserves.

As discussed in Section 10, Ulaan Ovoo has been classified as a “moderate geology type” deposit under the Canadian classification system as detailed in Paper 88-21 (Reference 3). The borehole spacing required for measured, indicated and inferred status within a “moderate deposit” is:

- Measured – distance from nearest data point 0-450 m
- Indicated – distance from nearest data point 450-900 m
- Inferred – distance from nearest data point 900-2400 m

The JORC Code (Reference 6) provides minimum standards for public reporting of Resources and Reserves to the investment community. For coal deposits, the JORC Code is supplemented by the Australian Guidelines for Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves (referred to as “the Guidelines”, Reference 7).

The Code and the Guidelines provide a methodology which reflects best industry practice to be followed when estimating the quality and quantity of Coal Resources and Reserves.

A Coal Resource is defined as that portion of a coal deposit that exists in such form and quantity that there are reasonable prospects for economic extraction. The location, quantity, quality, geological characteristics and continuity of a Coal Resource are known, estimated or interpreted from specific geological evidence and knowledge. Coal Resources are subdivided into three categories:

- Measured – for which quantity and quality can be estimated with a high degree of confidence. The level of confidence is such that detailed mine plans can be generated, mining and beneficiation costs, and washplant yields and quality specifications, can be determined;

- Indicated - for which quantity and quality can be estimated with a reasonable degree of confidence. The level of confidence is such that mine plans can be generated and likely product coal quality can be determined; and

- Inferred - for which quantity and quality can be estimated with a low degree of confidence. The level of confidence is such that mine plans cannot be generated.

Resources are estimated based on information gathered from Points of Observation. Points of Observation include surface or underground exposures, bore cores, geophysical logs, and/or drill cuttings in non-cored boreholes. It should be noted that Points of Observation for coal quantity estimation need not be used for coal quality estimation.

The estimate is calculated using the area, thickness and in situ density of the coal seam. The basis from which the in situ density is derived should be clearly stated. It is important to note that in situ density is not the same as the density reported by the standard laboratory measurement.

The Guidelines suggest distances between Points of Observation that should be used when estimating resources:

- Measured – Points of Observation no more than 500 metres apart;

- Indicated - Points of Observation no more than 1,000 metres apart; and

- Inferred - Points of Observation no more than 4,000 metres apart

The Guidelines stress that these distances are only a broad guideline. If the coal seams in the deposit are faulted, intruded, split, lenticular, or have significant lateral variations in thickness or quality, then the distance between Points of Observation should be decreased.

The table of estimation of Resources should be accompanied by a report, and a statement by the Estimator that the Resources comply with the JORC Code. The Estimator should state their qualifications and experience.

19.3.3 Resource Estimation Parameters

Behre Dolbear have estimated resources using the JORC Code. The similarity between the Canadian and Australian systems is such that there is no material difference in the estimation methodology.

The Points of Observation used to define the Coal Resources at Ulaan Ovoo are those boreholes with a reliability type of 1 or 2, as shown in **Table 19.7**. Both the 2006 and the old holes with quality data have been used as Points of Observation.

Table 19.7 - Points of Observation

<table>
<tr><th>Type</th><th>Point of Observation Description</th><th colspan="4">Value and Use of Point of Observation</th></tr>
<tr><td>1</td><td>Cored and analysed intersection of seam with wireline log, may or may not have lithology log</td><td rowspan="3">TYPES 1 – 3
Reliable for structure and thickness</td><td></td><td rowspan="2">TYPES 1 – 2
Required for quality confirmation</td><td></td></tr>
<tr><td>2</td><td>Cored and analysed intersection of seam without wireline log, may or may not have lithology log</td><td></td><td></td></tr>
<tr><td>3</td><td>Non cored intersection of seam with wireline log, may or may not have lithology log</td><td></td><td></td><td>Type 3
May support quality</td></tr>
<tr><td>4</td><td>Non cored intersection of seam without wireline log, may or may not have lithology log</td><td></td><td>Type 4
Supportive of structure and thickness</td><td></td><td></td></tr>
</table>

The following borehole spacing has been used to define the Resource categories at Red Hill:

- Measured - Points of Observation less than 500 metres apart;
- Indicated - Points of Observation less than 1,000 metres apart; and
- Inferred - Points of Observation less than 2,000 metres apart.

The distances chosen are in line with those suggested in the Guidelines. The areal distribution of the different resource categories for each seam is illustrated in the figures in Section 26.

19.3.4 Summary of Resource Estimation

Red Hill announced a NI 43-101 compliant resource estimate of 208 Mtonnes completed by Behre Dolbear in October 2006. This comprised 174.5 Mt of Measured status and 34.3 Mt of Indicated status coal resources.

The Measured + Indicated Resource estimated by Runge is 193.8 Mtonnes. Runge is confident that the difference in the two estimates, being less than 7%, is not material, and is due entirely to differences in the geological modelling software used.

Figure 26.14 and **Figure 26.15** show the resource polygons.

20. OTHER RELEVANT DATA AND INFORMATION

20.1 Key Project Assumptions

The overall approach by MMC to the PFS involved first identifying the key project objectives, profit drivers, and site issues and then addressing these in a practical, achievable and profitable mine plan. A number of specialists were commissioned and managed by MMC and Red Hill to support the mine planning. MMC applied both proprietary in-house software and leading commercial software to prepare the mine plan.

Red Hill management at the start of this PFS Project discussed the scope of the study, the planning guidelines, and the key project assumptions with MMC. The Study guidelines and assumptions used in the PFS included:

- Conventional truck and shovel equipment;
- Selective open cut mining;
- Coal below sale specifications to be washed by an on-site plant;
- Single product for thermal export markets;
- Coal product transport by rail from the mine gate;
- Equipment maintenance provided through a MARC agreement with the equipment suppliers to include training and provision of maintenance labour;
- All permits awarded to allow construction of infrastructure by early 2010 and initial coal production by 2011;
- Power to be generated by an on-site, third party-owned power station;
- Rail spur to main line to be constructed by 2011, and
- Economic modelling to assume capital purchase of equipment, where practical.

20.2 Mining Software

The proprietary software packages used for the PFS were:

- Runge's Xpac Scheduler
- Mincom Mine Planning Software, and
- MMC's Mine Management Software ("*MiMaSo")*.

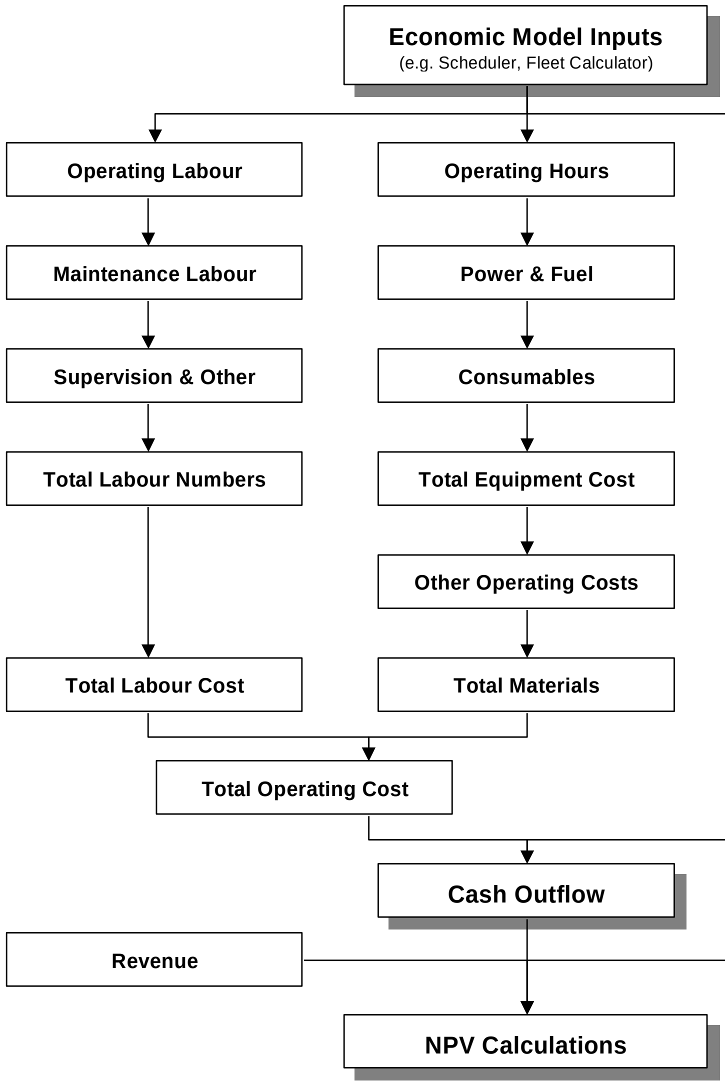
Mincom was used for designing the pit shell, scheduling blocks and estimating quantities and qualities of mineable coal. Xpac software was used for creating a ROM model and for production scheduling.

The MMC in-house developed MiMaSo software was used for a number of tasks including fleet calculation, scheduling and economic modelling. A brief description of the key packages used follows:

- ***Equipcost***: equipment cost database which gives capital and operating costs for a large range of equipment.
- ***Fleet Estimation***:this module determines the equipment requirements needed to achieve the production schedule. An important aspect here is the determination of excavator and truck numbers.

- ***Ecmod***: the economic model ties together production, equipment, workforce and builds up capital and operating costs. Whist there is a capability to determine a relative NPV this is not required in this job. It is assumed costing will be done in constant dollars.

A flow chart of the process used by MMC to prepare an economic model is presented below.



21. INTERPRETATION AND CONCLUSIONS

21.1 Conclusions

Ulaan Ovoo is a coal deposit of Jurassic age, which occurs in a small syncline measuring 2 km in length and 1.6 km in width. The area is divided into southern and northern parts by an east-west fault. The deposit area contains two main coal seams (with aggregate coal thickness of up to 63 m). Within these two major seams, five thinner splits have been defined. The seams include 5 to 11 definable partings of clay and sandstone with thicknesses ranging from 0.15 to 1.0 m.

A computer-based geological model of Ulaan Ovoo has been developed by Behre Dolbear in Surfer software and then converted by Runge to Mincom software for mine planning. The total resources for planning from the Mincom geological model were estimated at 193.8 Mt. The potential mineable coal was estimated at 108 Mt ROM or almost 100 Mt coal product. The mine life was 18 years of coal production at almost 6 Mt coal product per year.

The key Project production and financial outcomes are summarized in **Table 21.1** and **Table 22.2** below.

Table 21.1 - Project Production and Expenditure

Item	
Total Mined Coal (ROM Mt)	108
Mine Life (production years)	17
ROM Production Rate (Mtpa)	6.3
Average Stripping Ratio (bcm/ROM t)	1.8
Saleable Coal Production	
Total Saleable Coal @ 15% ash (Mt)	100
Average Annual Sales (Mtpa)	5.9
Average Cash Costs	
On-Site Cost (US$/t product)	$15
Off-Site Cost (US$/t product)	$41
Total Cash Cost (US$/t product)	$56
Capital Cost (US$ millions)	
Initial Capital Cost	$337
Sustaining / Replacement Capital	$155
Total Life Of Mine Capital Cost	$492

Mtpa= Million metric tonnes per annum; t= metric tonne; ROM = run of mine

Table 21.2 - Technical Project Value

Thermal Coal Price ($/ product t. FOB)	**$60**	**$68**	**$76**
NPV @ 10% (US$M)	-$231	$0	$250
Cash Mining Cost (US$/t product)	$55	$56	$56
Average Annual Revenue (US$ millions)*	$354	$399	$449
Average Annual After-Tax Net Profit (US$ millions)*	$10	$40	$76

1: Coal prices FOB Nadhodka Port

Table 3.2 indicates, assuming the expenditure estimates are reasonable, that a thermal coal price of at least $68/ product t (gar, FOB) must be achieved to deliver a positive net present value (NPV) at a discount rate of 10%.

22. RECOMMENDATIONS

MMC recommends, based on the findings of this PFS, that the Project proceed to a more advanced stage of planning, beginning with the preparation of a feasibility study. In support of the feasibility work, MMC recommends Project knowledge and understanding be expanded in the following specific areas:

- **Geology**. Additional geological drilling on the property would likely improve structural interpretation of the geological model, increasing the confidence in mineable coal quantity estimates.

- **Coal Quality and Yields**. Preparation and testing of bulk-coal samples in a wash plant test facility would provide valuable information to inform washing-system design, and more accurately predict washing yields and product quality.

- **Mining**. Additional and more detailed mine planning is required to confirm the mining method approach as well as the operating and capital costs. Future mine planning studies should include a more detailed geotechnical pit-slope stability study to support pit design and to confirm engineering rock properties.

- **Coal Handling and Processing**. A coal processing specialist should be engaged to further refine wash plant design as well as capital and operating cost estimates.

- **Site Infrastructure and Support Services**. A civil construction specialist should be engaged to improve estimates of site infratructure capital and operating costs to a higher level of accuracy.

- **Hydrology**. Furthere hydrological analsyis is required to better understand river flows and the likely impact of the proposed river diversions on the environment. This would also allow diversion designs to be refined based on improved data.

- **Transport**. Additional railroad studies should be undertaken to examine rail option to China. Further research is also required to confirm rail transport haulage rates.

- **Coal Marketing**. Additional coal marketing work is recommended to confirm future coal selling prices into target markets.

- **Environment**. Further data and analysis is required to assess the environmental impacts of the river diversion, ground water pumping and the mine operations in general.

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12. Rosinformugol Consulitng: *Appraisal Of Prospective Demand For Coal From The Ulaan-Ovoo (Mongolia) Coal Deposit In The Russian And International Markets*, 2007

24. DATE AND SIGNATURE PAGE

Romeo Ayoub
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Sydney NSW 2000
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I, Romeo Ayoub of Sydney Australia, do hereby certify that:

1. I am an Independent Consulting Mining Engineer, at the above address.
2. I am a Member of the Australian Institute of Mining and Metallurgy (AUSIMM) Member No. 109567.
3. I graduated from the University of New South Wales, Australia with a Bachelor of Engineering (Mining) (BE) in 1991.
4. I have been working as a mining engineer or mining consultant, specializing in the field of coal mining continuously since 1992.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am the author of the Technical Report entitled "Pre-Feasibility Study Ulaan Ovoo Coal Project, Mongolia", dated February, 2009 (the "Technical Report").
7. I have contributed to the mining summary within the Technical Report.
8. I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which makes the Technical Report misleading.
9. I am independent of Red Hill or any of their subsidiary companies applying all of the tests in section 1.5 of National Instrument 43-101.
10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that Instrument and Form.
11. I consent to the filing of the Technical Report with the stock exchange and other regulatory authorities and any publication by them, including electronic publication in the public company files on their website accessible by the public, of the Technical Report.

Dated this 8th day of May, 2009

Romeo Ayoub (BE Mining)

25. ADDITIONAL REQUIREMENTS FOR TECHNICAL REPORTS ON DEVELOPMENT PROPERTIES AND PRODUCTION PROPERTIES

25.1 Introduction

Red Hill commissioned MMC to prepare a pre-feasibility study ("PFS" or the "Study") of their 100%-owned Ulaan Ovoo coal project ("the Project") located in northern Mongolia. This report is based on the geological model which was recently updated by Runge Ltd (MMC and Runge Ltd are part of the Runge Group).

The purpose of the PFS was to further evaluate the economic potential of the Project based on refined mine planning coal transportation and other infrastructure assessments.

Data provided by mining industry specialists to support the Study included:

- Geological model was converted by Runge Ltd (Brisbane, Australia) to a Mincom software format for mine planning purposes,
- Geotechnical and preliminary hydrogeological assessments were provided by Pells Sullivan Meynink Pty Ltd (Sydney, Australia),
- Environmental review was provided by Sustainability Pty Ltd (Perth, Australia),
- Mine planning, mine equipment and labour requirements, and project economic modelling was undertaken by Minarco-MineConsult (Sydney, Australia),
- Mine infrastructure including the coal handling and preparation plant and preliminary river diversion design costed by Joharko International (Joahrko) (Brisbane, Australia),
- The construction of a railway connection from the Project to the existing Trans Mongolian Railway was designed and costed by Joharko, and
- Estimation of rail and port charges was made by Joharko.

Only measured and indicated Resource categories were used in the PFS to estimate potential mineable coal and to form the basis of mine planning and economic evaluation. Inferred resources were not utilized in the Study. Further geological information is provided in **Sections 9** to **11** of this report.

Given the nature of this Study and the level of accuracy associated with a PFS, there can be no certainty that the mineable, costs and saleable coal projections or economic outcomes presented herein will be realized.

MMC has not independently audited the information provided by the other consultants noted above. However, MMC has used its professional judgement in assessing the reasonableness and accuracy of the information provided by others and found it suitable for the purposes of this PFS.

MMC, the author of this PFS, operates as an independent technical consultant providing resource evaluation, mining engineering and mine valuation services to the resources and financial services industry. None of MMC or its staff or sub-consultants who contributed to this report has any known interest in:

- The Company,

- The mining assets reviewed, and
- The outcome of the intended use of this document.

25.2 Scope of Work

The general scope of work is as follows:

- Data collection and familiarisation,
- Assessment of product quality,
- An economic ranking of the coal based on preliminary mining unit cost estimates, off-site transportation costs and selling prices,
- A project options analysis to evaluate the commercial outcomes of alternative project development strategies, and to identify the preferred development option for more detailed analysis in the Study,
- Geotechnical assessment of mine and dump design criteria,
- Hydrogeological assessment, in particular, requirements associated with the diversion of the Zelter River,
- Environmental review of issues associated with the proposed mine development,
- Determine economic mining limits and estimate recoverable coal quantities and qualities within pit shell,
- Preparation of a life of mine schedule to determine waste and coal quantities,
- Estimate life of mine equipment, workforce and site infrastructure requirements, including capital and operating costs,
- Assess requirements and cost-benefits of coal washing. Preliminary design of an appropriate coal handling and preparation plant, including estimation of capital and operating costs,
- Identify options for coal transportation to port, preliminary design of preferred rail option, and estimation of capital costs. Estimate rail and port charges,
- Modelling of economic outcomes considering mining costs, coal preparation and transportation costs, coal prices and taxes/royalties, and
- Documentation of outcomes in a NI 43-101 compliant report, filed on behalf of Red Hill on SEDAR.

25.3 Mine Development and Operations

25.3.1 Economic Ranking of Reserves

Resource Model

MMC has used the Mincom geological resource model described in **Section 19** of this report for derivation of a mine development plan for Ulaan Ovoo.

Only two seams, Gol Seam and Mod Seam have been considered in the mining study. The western and southern limits of the Gol Seam and Mod Seam are in the inferred resource category (see **Figure 26.14** and **Figure 26.15**) and have been excluded from further consideration in this PFS. Similarly the lower seams (ERT Seam and GUN Seam) only contain inferred resources and have been excluded from consideration.

A typical north-south geological cross-section is shown on **Figure 25.1.**

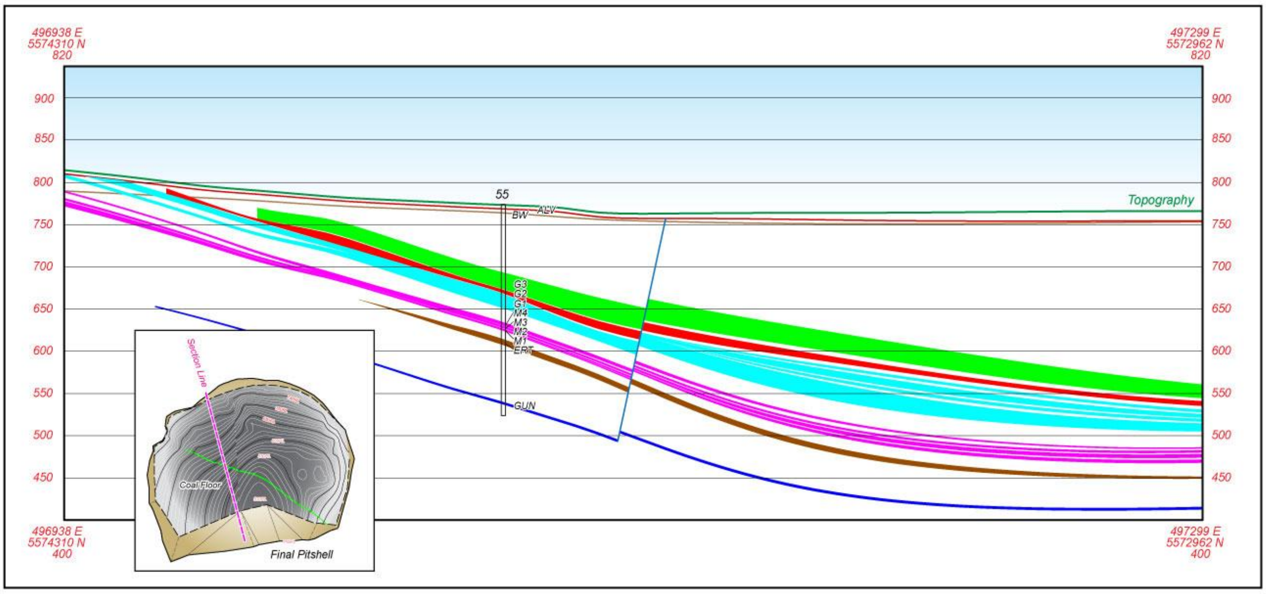

Figure 25.1 - Typical North-South Geological Section

The Gol Seam comprises plies G1 to G3 and the Mod Seam comprises plies M1 to M4 in ascending order.

Ranking Objectives

The purposes of the economic ranking of the mineable coal were:

- to define the economic pit shell, both laterally and stratigraphically (ie. which seam to be the pit floor), and
- to develop a mining strategy i.e. an economic mining sequence, and a coal product quality strategy.

The economic ranking work has been done at a strategic level of detail. The outcomes from the economic ranking have been used to derive the more detailed production and cost schedules described later in this report.

In situ to ROM Reserves

The first step in the economic ranking of the reserves was to convert the in situ coal and waste into as-mined or Run-of-Mine (ROM) quantities and coal qualities.

For quick analysis, the resources were divided into vertical blocks, 100 metres by 100 metres in plan, and extending from the floor of Mod Seam up to ground level (refer to **Figure 25.2**). Apart from the Zelter River, no property, environmental or any other issues are known to exist that may limit or hinder the extent of mining.

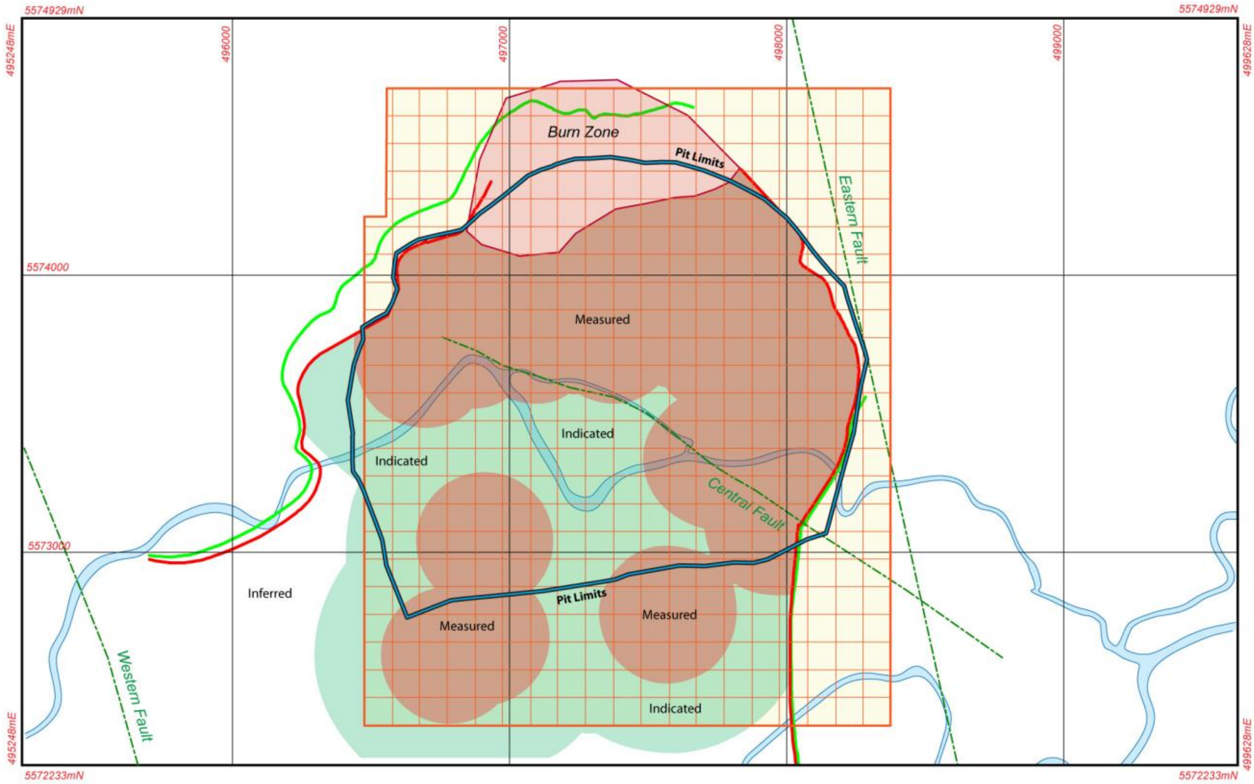

Figure 25.2 - Economic Reserve Ranking Blocks

MMC estimated coal loss and dilution which could be expected to occur during mining operations, and the minimum practical mining thickness with respect to the removal of waste partings between coal working sections and to the mining of the coal working sections themselves. Key input parameters are as follows:

Table 25.1 - Block Ranking Input

Parameter	Units	Value
Mining Factors		
Seam roof loss	m	0.25
Seam floor loss	m	0.25
Seam roof dilution	m	0.05
Seam floor dilution	m	0.05
Minimum mineable thickness	m	0.5
Coal Washing		
Average yield (per ROM t)	%	80
Operating Costs - On-site		
Waste + Coal Mining[1]	$/bcm	$9.50
Washing cost	$/ROMt	$2.00
Other site costs	$/ROMt	$6.00
Operating Costs - Off-site		
Rail and Port UO-Nadhodka	$/t prod	$38.00
Royalty Mongolian	$/t prod	$1.93
Coal Sales		
Nadhodka (FOB 5,000kcal/kg gar)	$/t prod	$75.00

1. ***Nominal value – variable cost based on haulage distance and work requirements***

A summary of the in situ coal quantities and the ROM mineable coal quantities within the ranked area is shown on **Table 25.2**.

Table 25.2 - Block Coal Quantities

Seam	Item	Units	In Situ Blocks	ROM Blocks
G3	**Quantity**	**Mt**	**54.7**	**46.4**
	Ash	% ar	12.5	13.9
	SE	kcal/kg ar	6,346	5,117
G2	**Quantity**	**Mt**	**33.0**	**37.9**
	Ash	% ar	15.8	16.6
	SE	kcal/kg ar	6,081	4,943
G1	**Quantity**	**Mt**	**61.6**	**56.6**
	Ash	% ar	24.9	27.6
	SE	kcal/kg ar	5,206	4,067
M	**Quantity**	**Mt**	**31.4**	**26.3**
	Ash	% ar	22.0	28.1
	SE	kcal/kg ar	5,596	4,148
TOTAL	**Quantity**	**Mt**	**180.6**	**167.1**
	Ash	% ar	19.0	21.3
	SE	kcal/kg ar	5,779	4,570

The coal quantities within the blocks subject to block ranking total 180.6 Mt of in situ coal down to the Mod Seam. These in situ quantities convert to 167.1 Mt of ROM coal, using the mining factors listed in **Table 25.1**.

Ranking Parameters

The potentially economic mineable coal has been defined as the ROM coal with a positive gross operating margin ($ per product tonne FOB), using the economic assumptions in **Table 25.1**. Note that this definition is for strategic planning purposes only. At this stage the coal quantities have not been subjected to the mine design process, nor an overall project economic evaluation (discounted cash flow analysis taking capital expenditure into account).

The on-site operating costs have been derived from MMC experience with other projects in Mongolia. The waste and coal mining costs vary according to the haul truck productivity, which in turn varies according to the depth of the mining unit below the dump point and the haulage distance to the dump point. The dump point for coal is the ROM hopper at the crushing station, and for waste is the centroid of the surface dump to the west of the pit (no inpit dumping has been allowed in this study). The waste and coal mining costs also vary according to the loader productivity, which in turn varies with the face height being mined.

The off-site operating cost estimates for rail transportation from Ulaan Ovoo to Nadhodka in far-east Russia and port charges at Nadhodka are discussed in Section 25.12 of this report.

The notional coal specification and selling price FOB Nadhodka are discussed in Section 25.3 above. From these estimates, an average energy price of $0.015/kcal ($75 for 5,000 kcal/kg coal Nadhodka FOB) was derived, and applied to the coal on a seam by seam basis. Consequently the price used to estimate the gross operating margin in each seam in each block varied with the specific energy of the product coal.

The allowance for coal washing was made as follows. Initial review of the ROM reserves in **Table 25.2** indicated that the average coal quality (21.3% ash and 4,570 kcal/kg gar) was below export thermal coal specification. MMC considered that the minimum specification required for an export thermal coal was 15% ash and 5,000 kcal/kg gar.

It was evident that the G3 plus G2 seams could typically be mined together as a bypass coal (at average ash of 14.3% and average specific energy of 5,092 kcal/kg ar) whereas the G1 seam and Mod Seam (at average ash of 26.1% and average specific energy of 4,191 kcal/kg ar) would require washing to achieve the notional sales specification.

No coal washability data was available to assist estimation of coal washing processes and performance. For the purposes of the economic ranking, it was assumed that all of the G1 and Mod seam coals would be washed and the average yield would be 80%, and the average washed coal quality would equal the sales specification. None of the G2 or G3 seam coal would be washed.

Ranking Results

The limits of the economic mineable coal, as defined within the blocks, are illustrated on **Figure 25.3**. The coloured blocks have a positive gross operating margin, in units of $/saleable tonne. The lowest economic seam name is annotated in each block.

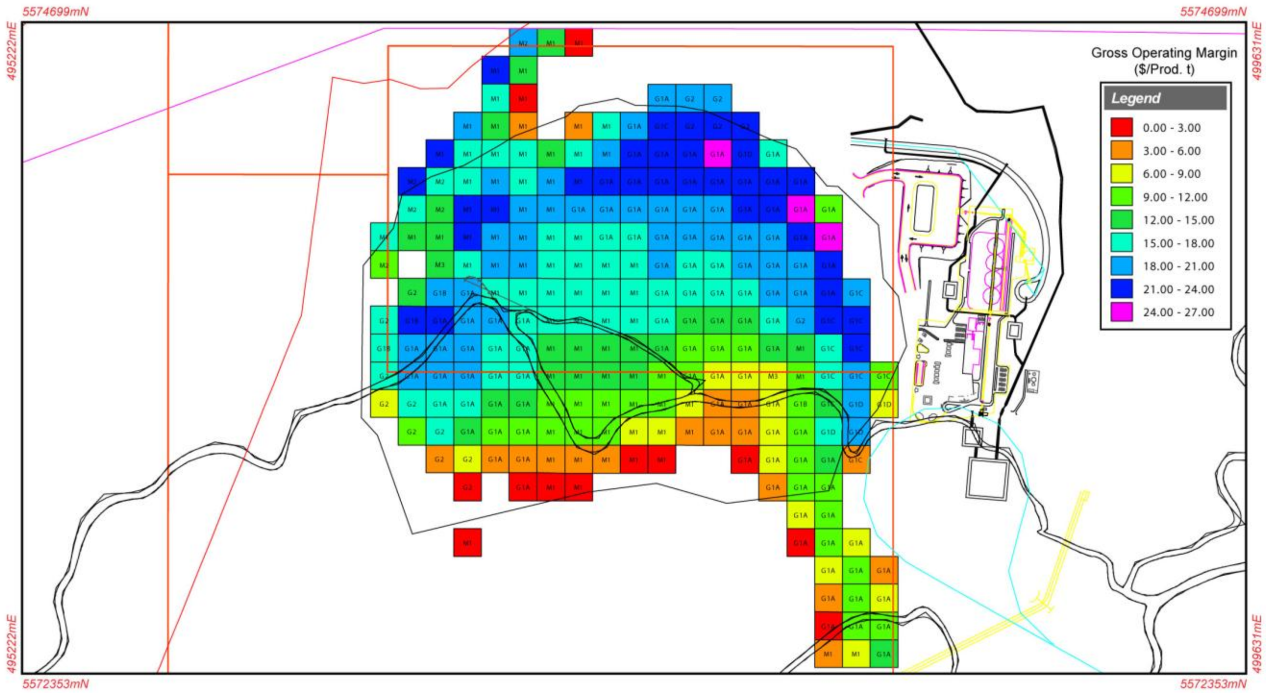

Figure 25.3 - Economic Reserve Limits

The potentially economic mineable coal extends from the eastern subcrop to the western boundary of the measured and indicated resources, and from the burn zone in the north to a few hundred metres south of the north arm of the Zelter River. This extent will likely reduce when accounting for the practicalities of mining.

The economic floor is typically located on the floor of the Gol Seam in the east, and on the floor of the Mod Seam in the central and western areas.

The potentially economic coal is estimated at 120 Mt ROM down to the Mod Seam (refer **Table 25.3**). Approximately 1 million tonnes of additional ROM coal in the ERT Seam (below the Mod Seam) were indicated to be economic, but this seam has not been considered in the mine scheduling and costing work as the ERT resources are not in the measured or indicated resource categories.

Table 25.3 - Economic Block Quantities

Seam	Item	Units	Economic Coal Blocks	
			ROM	Product
G3	**Quantity**	**Mt**	**37.9**	**37.9**
	Ash	% ar	12.7	12.7
	SE	kcal/kg ar	5,205	5,205
G2	**Quantity**	**Mt**	**35.1**	**35.1**
	Ash	% ar	16.1	16.1
	SE	kcal/kg ar	4,969	4,969
G1	**Quantity**	**Mt**	**36.3**	**29.1**
	Ash	% ar	26.5	15.0
	SE	kcal/kg ar	4,137	5,050
M	**Quantity**	**Mt**	**10.5**	**8.4**
	Ash	% ar	24.8	15.0
	SE	kcal/kg ar	4,376	5,050
TOTAL	**Quantity**	**Mt**	**119.8**	**110.4**
	Ash	% ar	18.9	14.6
	SE	kcal/kg ar	4,739	5,077

25.4 Geotechnical and Hydrogeological Review

A geotechnical and hydrological study for the Project was undertaken by Pells Sullivan Meynink (PSM). The results of their investigations are summarised below. Joharko assessed the PSM results to provide a preliminary design for diverting the Zelter River and accessing economically mineable coal.

25.4.1 Geotechnical Review

The scope of work involved reviewing existing data to estimate suitable pit and waste rock dump design criteria. PSM did not travel to site and relied on the information provided by Red Hill and MMC.

The 2006 Scoping Study refers to studies carried out by the Mongolian University of Sciences and Technology, Mining Engineering School in relation to slope stability which assessed the following generic face angles for pit design in each rock type:

- alluvium : 35°,
- scoria : 40°,
- overburden: 55°, and
- coal : 8°.

PSM consider that more specific slope designs dependent upon location within the pit can be recommended (refer **Table 25.4**). Note that these designs assume adequate groundwater depressurisation is achieved and are based on 15m high face batters. Overall angles quoted are toe-to-toe.

Table 25.4 - Pit Slope Design

Material	Design Criteria
Alluvium	30^0 slope angle 20 metre wide berm at the base
Weathered Rock	15 metre high batters at 45^0 7 metre wide berms
Fresh Rock	<u>Lowwall (Footwall)</u> Pit floor = seam floor if dip <25^0 Benching required when seam dip > 25^0 15 metre high batters at 45^0 10 metre wide berms Overall slope angle at 31^0 <u>Endwalls</u> When seam dip < 25^0 15 metre high batters at 60^0 8 metre wide berms Overall slope angle at 42^0 <u>Highwall</u> Vertical 15 metre high batters 10 metre wide berms Interramp slope angle at 55^0 Including ramps, overall slope angle at 42^0

Note that it is recommended that a wide working floor is maintained between the Gol and Mod seams, particularly as the highwall crosses the Central Fault.

The surface waste dump will be dumped in layers 25 metres thick at a rill angle of 37^0. Lower layer heights will be employed around the final perimeter of the dump to minimise the dozing effort to achieve the final dump slope of 10^0.

All waste dumping will occur to the north of the Zelter River levee to prevent erosion of the dump toe.

Washplant rejects will be dumped within the waste dump located to the north of the pit (close to the washplant).

25.4.2 Hydrological Review

PSM reviewed previous work and concept plans to comment on potential groundwater inflows to pit, conceptual surface water management system and plans for advancing the pit through the Zelter River.

A major component of the surface water management system is the proposed 4km to 5km long diversion of the northern arm of the Zelter River in the vicinity of the mine. Joharko assessed the PSM results to recommend a preliminary design for the river diversion.

The river diversion involves blocking the northern channel of the Zelter River and diverting it into the southern arm. It is believed the southern arm will be unaffected by the pit expansion and is capable of handling the water flows currently flowing through the northern arm of the river. To divert water flows within the river system at the mine the following engineering projects are proposed:

- A cut-off levee bank, with scour protection, would be constructed to divert the northern branch of the Zelter River to the south branch,
- Some spur dikes shall be required at high erosion points along the levee.
- At selected locations along the levee additional flood protection shall be added to protect the pit final wall. This work is only envisaged later in the mine life as the mine progresses down dip and towards the Zelter River, and
- The construction of a meander cut-off with some minor dredging within the Zelter River to facilitate flows in the southern arm of the river.

The required engineering works are shown in **Figure 25.4**.

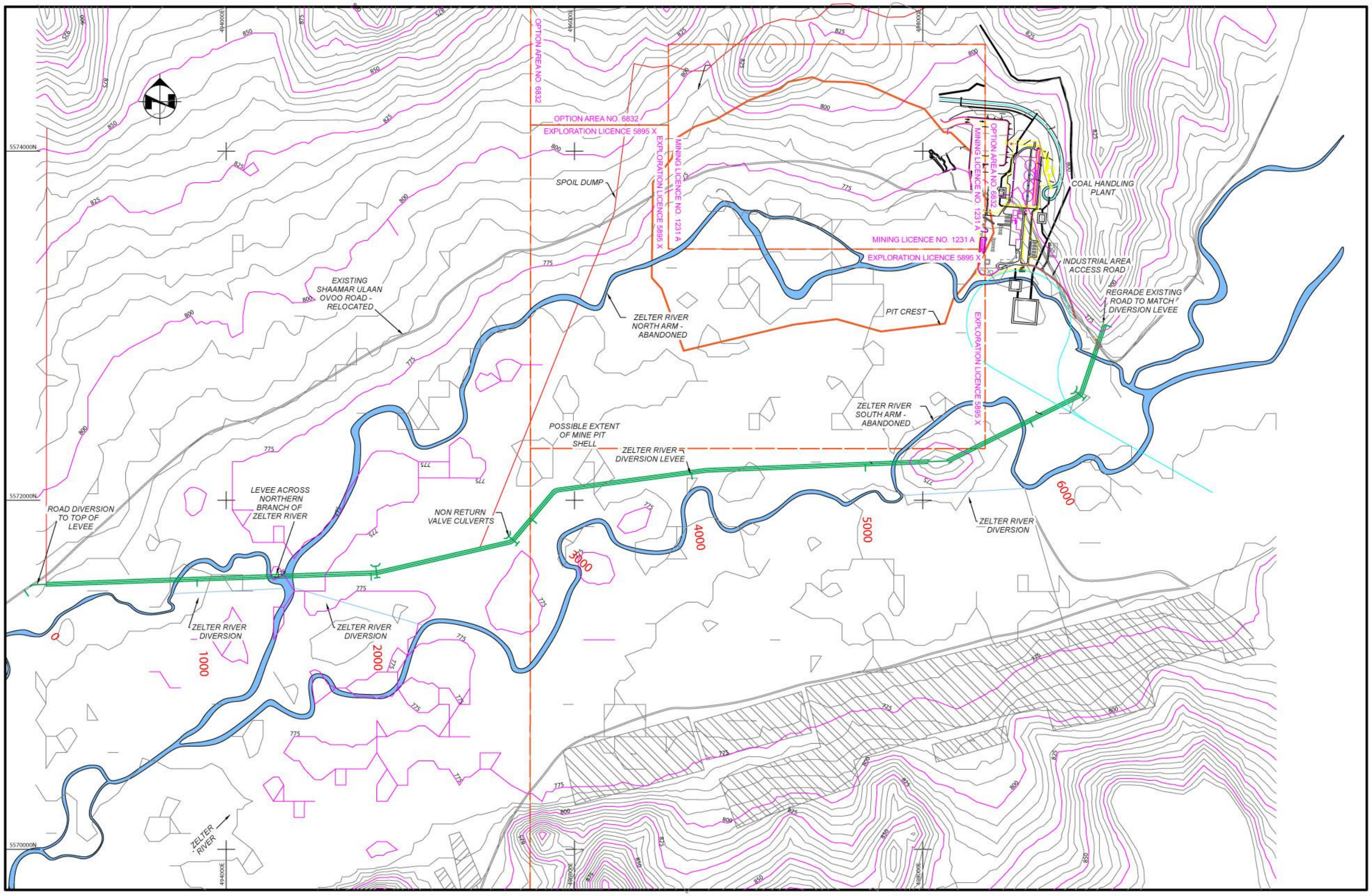

Figure 25.4 - Proposed Zelter River Diversion

With the river diverted into the southern channel the pit, infrastructure, and spoil dump shall all be located on the Northern side of the levee and well above the Zelter River flood plain. Water falling north of the levee shall be captured and channelled into clean water catchment dams. This water shall then be utilised in coal washing operations and dust suppression across the mine site.

The Ulaan Ovoo water management plan shall ensure all clean water flows are separated from coal handling operations and from the mining operation. No dirty water flows shall be returned to the Zelter River, but rather, these flows shall be re-cycled into the coal wash plant.

25.5 Mining Method

The recommended mining method is an open cut operation, using conventional truck-and-shovel mining equipment. With the low strip ratio, the overburden removal rate is not high enough to justify assessment of high capital cost lower operating cost methods including in-pit crushing and conveying, and trolley assist for trucks.

As the seam dips at Ulaan Ovoo are typically around 20 degrees, it is likely in-pit spoil dumps would not be stable and hence waste will be hauled to an outside waste dump to the west of the pit. The coal will be hauled to the ROM crusher located to the east of the pit (refer to **Figure 25.5**).

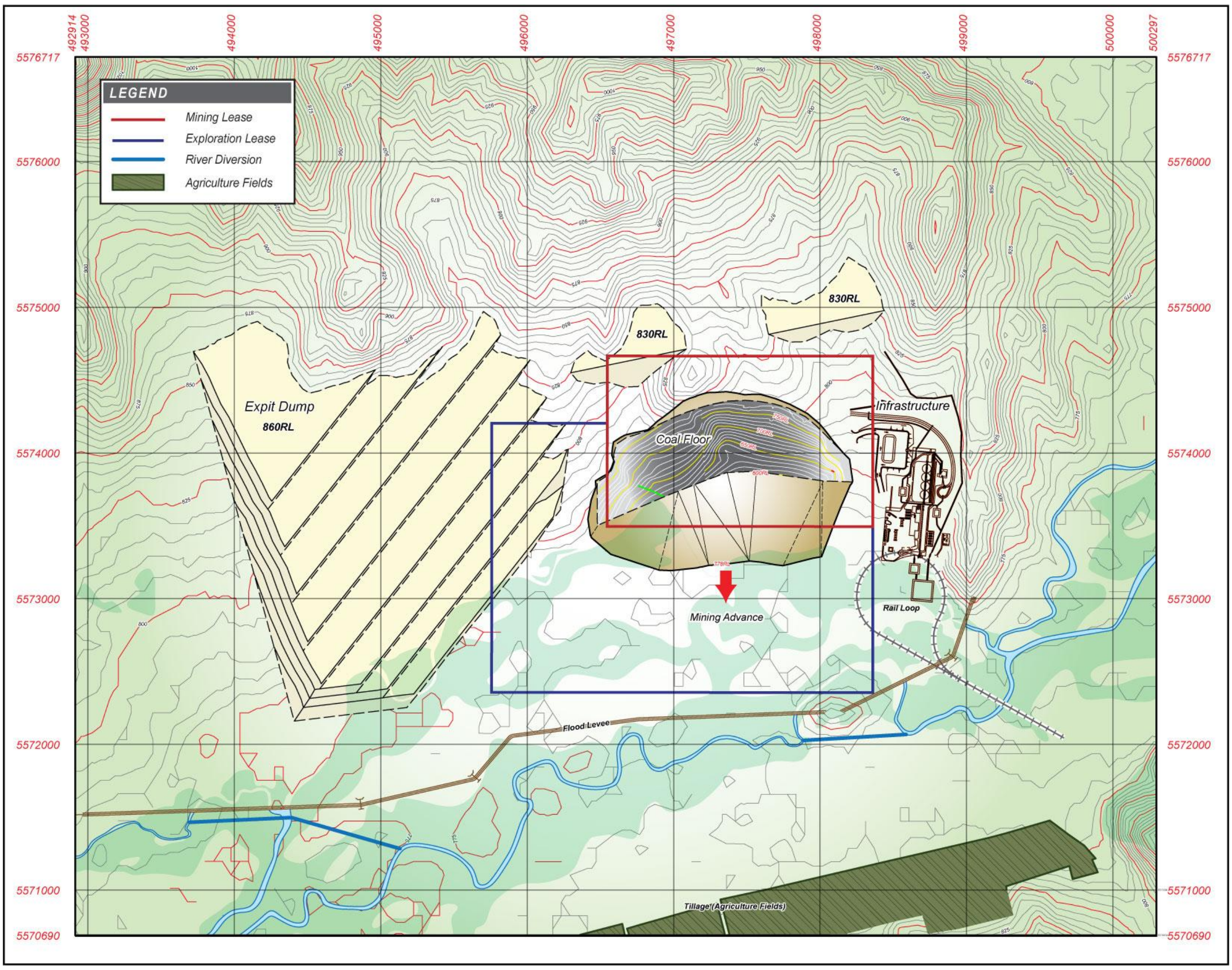

Figure 25.5 - Mine Stage Plan – Mid-life

The mine will advance in a series of pushbacks off the highwall. Below the alluvium, the overburden will be drilled and blasted in bench heights to suit the excavators. Successive benches will be mined, with overburden and coal hauled via temporary ramps on the highwall. In the lower benches, coal and parting will be selectively mined to a minimum thickness of 0.5 metres. Tracked dozers will assist with ripping and pushing thin seams and partings to the excavator, and with clean-up of coal roof and floor.

Because all waste and coal will be hauled via the highwall, provision has been made for two haulroad ramps on the highwall so that loading and hauling operations on the upper benches of a pushback do not interrupt concurrent haulage from the lower benches of the previous pushback.

The outside waste dump will be dumped in layers, with the final dump batters progressively shaped to 10 degree slopes, covered with topsoil pre-stripped from the mining operation and revegetated.

25.5.1 Mining Strategy

With a potential economic reserve of 100 Mt of saleable coal (**Table 25.5**), Redhill and MMC agreed that the mine should be planned at a nominal production rate of 6 Mtpa saleable coal, giving a notional mine life of 18 years.

Options Analysis

A range of options was considered with respect to washing strategy and product coal specifications. All of these options included mining the top plies of the Gol Seam (G3 and G2) as a bypass coal for direct export. **Table 25.5** shows that estimated economic reserve is 70 million ROM tonnes at an average ash of 14%. This should be marketable as an export thermal coal.

The underlying potentially economic mineable coal of G1 ply and the Mod seam is 38 million ROM tonnes at an average ash of 26.1% ash. It was concluded that the quality of this coal was too low to be marketable as an export thermal coal and would require further processing within a wash plant.

Review of opportunities for sale of this quantity and quality of coal in Mongolia and Russia led to the conclusion that the most reliable and profitable option was to wash the coal to an export thermal coal specification.

The last option considered was the timing of production from the lower seams. Delaying the mining of the lower seams would defer the need for the wash plant. However this option would result in higher annual strip ratios as production from G3 and G2 only would require an accelerated advance down-dip to uncover 6 Mtpa of coal in only G3 plus G2.

This option would also result in leaving the coal in G1 and in some areas, Mod Seam, lying on the pit floor, extending several hundred metres up-dip from the active mining floor in G2 Seam. With a seam dip of 20^o, it would be impractical to access and mine this floor coal at a rate of 7.5 Mtpa (for a saleable production of 6 Mtpa).

Preferred Option

An economic analysis was undertaken of the two phases of mining, that is, mining from natural surface to the floor of G2 seam, and mining from the floor of G2 Seam to the economic pit floor (which was either the floor of G1 seam or the floor of Mod Seam) (refer **Figures 25.6** and **25.7**).

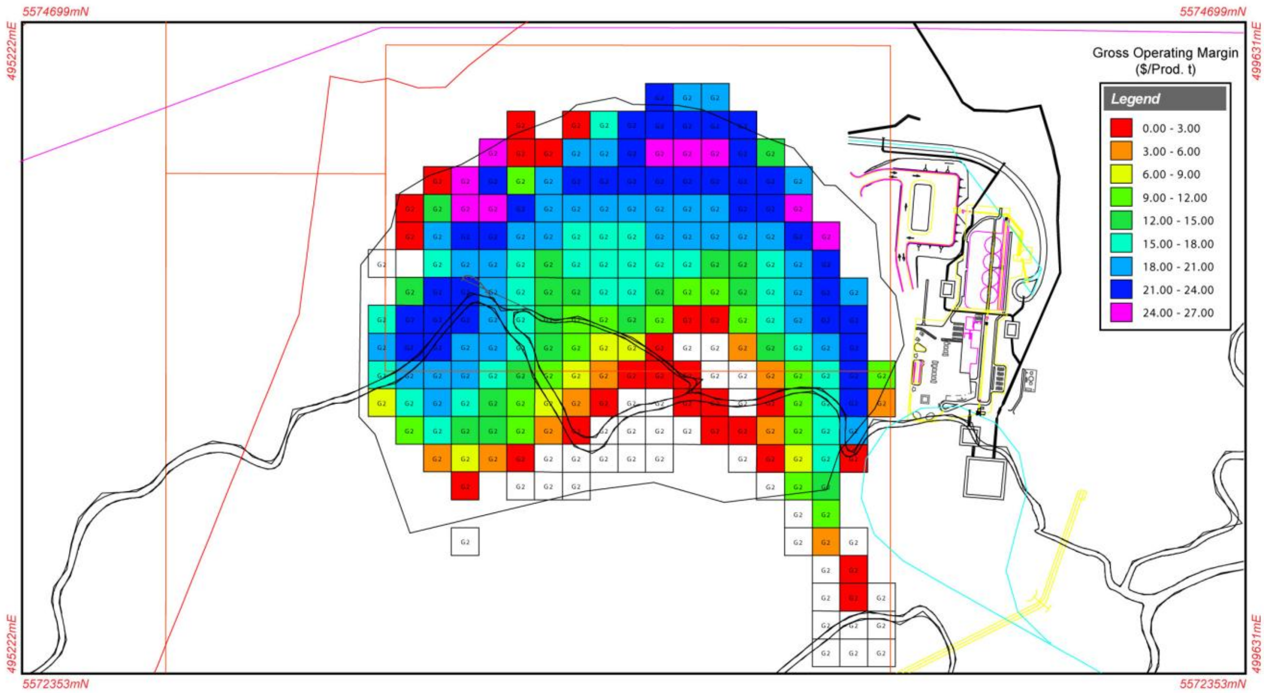

Figure 25.6 - Economic Reserves – Surface to G2 Floor

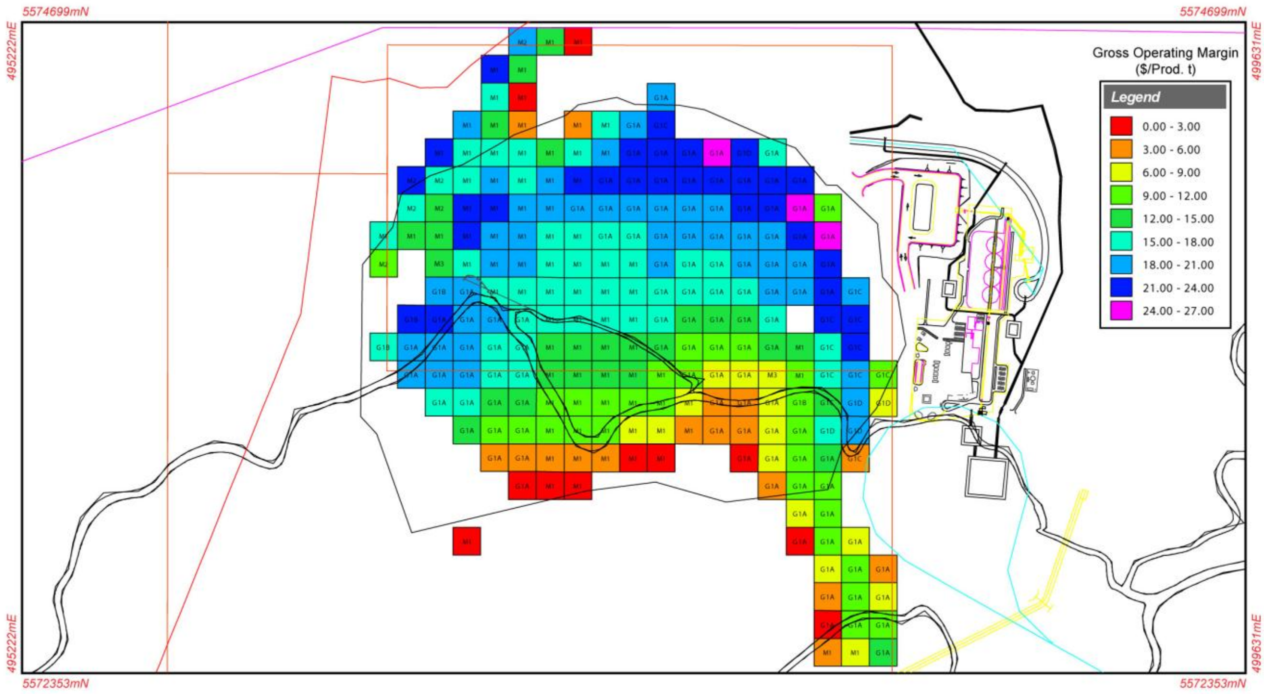

Figure 25.7 - Economic Reserves – G2 Floor to Economic Floor

Comparing the margin plots indicates that once mining commences in the upper seams, the margins available from the uncovered lower seams are as profitable as with the upper seams.

MMC recommends a strategy of mining all economic seams as they are uncovered, but with a three year delay on commencing mining of G1 and Mod seams to defer the wash plant construction by three years.

25.6 Final Pit Shell and Mineable Coal Estimate

Based on the outcomes of the economic block ranking, the strategic options analysis and the practical constraints due to the Zelter River, the surface mining limits were defined. A pit shell was then designed to the target coal seams based on the design criteria outlined in **Section 25.5.1**., The mineable coal quantity within the pit shell is summarised in **Table 25.5** and forms the basis of subsequent scheduling and mine planning.

Table 25.5 - Economic Block and Pit Coal Quantities

Seam	Item	Units	Mineable Coal	
			ROM	Product
G3	**Quantity**	**Mt**	**39.2**	**39.2**
	Ash	% ar	12.1	12.1
	SE	kcal/kg ar	5,104	5,104
G2	**Quantity**	**Mt**	**29.9**	**29.9**
	Ash	% ar	17.0	17.0
	SE	kcal/kg ar	4,859	4,859
G1	**Quantity**	**Mt**	**32.0**	**25.6**
	Ash	% ar	24.7	15.0
	SE	kcal/kg ar	4,321	5,050
M	**Quantity**	**Mt**	**6.8**	**5.4**
	Ash	% ar	26.2	15.0
	SE	kcal/kg ar	4,355	5,050
TOTAL	**Quantity**	**Mt**	**107.8**	**100.1**
	Ash	% ar	18.1	14.5
	SE	kcal/kg ar	4,757	5,014

25.7 Coal Production Schedule

The economic analysis in **Section 25.4** showed the characteristics of the economic coal to be in a crescent shape, following the sub-crops of the seams around the northern perimeter and down the eastern side where the seams become nearly vertical. For maximum project NPV, it is normal to schedule the mining of the most economic coal first, then to progress through the deposit in order of decreasing margins, subject to practical mining issues.

Consequently MMC has devised a development strip layout which allows early access to the highest margin coal, and provides an opportunity to maintain horizontal pit floors in the coal mining zone. The strip and block layout is shown on **Figure 25.8**. Also shown is the basal seam mined in each block. The selection of the pit floor requires further rationalization in the Feasibility Study to ensure that it is practical to vary the pit floor as shown.

Figure 25.8 - Strip layout for Pit

The scheduling criteria were as follows:

- Target of 4 Mtpa saleable coal in Year 1, then 6 Mtpa from Year 2 to mine end;
- Delay washplant commissioning to beginning of Year 4;
- Target the highest margin coal early, and generally progress from higher to lower margin coal over the mine life;
- Schedule waste removal to maintain sufficient inventory of uncovered coal on the pit floor, and to achieve a smooth waste mining equipment fleet requirement;
- Schedule coal mining to limit the variation in the elevation of active coal mining faces along each strip, and
- Schedule coal mining to maintain a practical dozer push distance between coal faces in G1 and Mod seam and the active pit floor on G2 seam floor.

The annual advance of the mine is depicted in plan view along G2 seam floor in **Figure 25.9**.

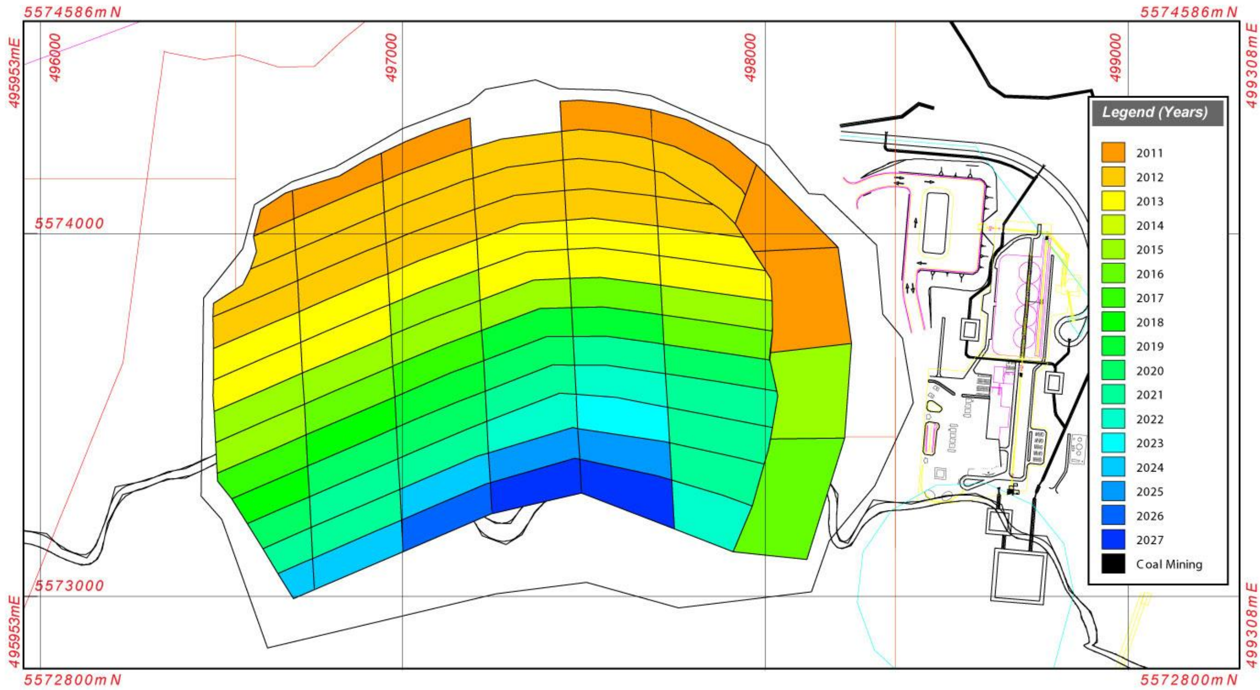

Figure 25.9 - Annual Pit Progress

The production schedule is shown in **Table 25.6**.

Table 25.6 - Mine Production Schedule

Year	Waste Mbcm	Total ROM Coal Mt ROM	ROM Coal Washed Mt ROM	ROM Coal Bypassed Mt ROM	Product Coal Mt Prod	Product Ash % ar	Product S.E. kcal/kg ar	Strip Ratio bcm/ROMt
2010	10.0							
2011	14.0	4.0	0.0	4.0	**4.0**	14.7%	5,042	5.9
2012	14.0	6.2	0.0	6.2	**6.2**	14.0%	4,932	2.3
2013	14.0	6.1	0.0	6.1	**6.1**	13.6%	4,938	2.3
2014	14.0	6.5	2.5	4.0	**6.0**	13.7%	4,939	2.2
2015	14.0	6.5	2.5	4.0	**6.0**	14.4%	4,953	2.2
2016	14.0	6.5	2.3	4.2	**6.0**	14.8%	4,943	2.2
2017	14.0	6.4	2.1	4.3	**6.0**	14.3%	4,976	2.2
2018	14.0	6.2	0.9	5.3	**6.0**	14.5%	4,999	2.3
2019	14.0	6.5	2.5	4.0	**6.0**	14.7%	4,953	2.2
2020	14.0	6.4	1.8	4.6	**6.0**	14.8%	4,975	2.2
2021	14.0	6.3	1.4	4.8	**6.0**	14.6%	5,030	2.2
2022	5.0	6.6	2.9	3.7	**6.0**	14.6%	5,059	0.8
2023	5.0	6.6	2.9	3.7	**6.0**	15.5%	5,036	0.8
2024	5.0	6.4	1.9	4.5	**6.0**	14.3%	5,110	0.8
2025	5.0	7.0	4.8	2.2	**6.0**	14.5%	5,122	0.7
2026	5.0	6.9	4.4	2.5	**6.0**	14.7%	5,093	0.7
2027	4.6	6.8	4.2	2.6	**6.0**	14.0%	5,145	0.7
2028	0.0	0.1	0.1	0.0	**0.1**	15.0%	5,050	0.0
TOTAL	**193.6**	**107.8**	**37.1**	**70.7**	**100.4**	**14.5%**	**5,014**	**1.8**

The mining life is 19 years, comprising start-up mining in 2010 followed by 18 years of coal production and sales through to 2028. Coal washing commences in 2014 and continues for the life of the mine at varying rates. The rate of plant feed will be smoothed to a more uniform rate in the Feasibility Study. Overall 34% of the ROM coal is washed and 66% is bypassed.

ROM coal production varies typically between 6.1 Mtpa and 7 Mtpa, while saleable is constant at 6 Mtpa.

The current mine plan manages the waste-to-coal strip ratio at a relatively constant 2.2 (waste bcm/coal ROM tonne) for the first 10 years, despite increasing mining depth. Stripping ratios decrease significantly in the last few years after the upper benches reach the final pit highwall. The average strip ratio over the life of the mine is 1.8 bcm/ROM t, and the maximum overburden removal rate is 14 Mbcm per year

The pit development mid-way through its life is shown in **Figure 25.5**. The extent of pit and dump development at the end of the mine life is shown on **Figure 25.10**.

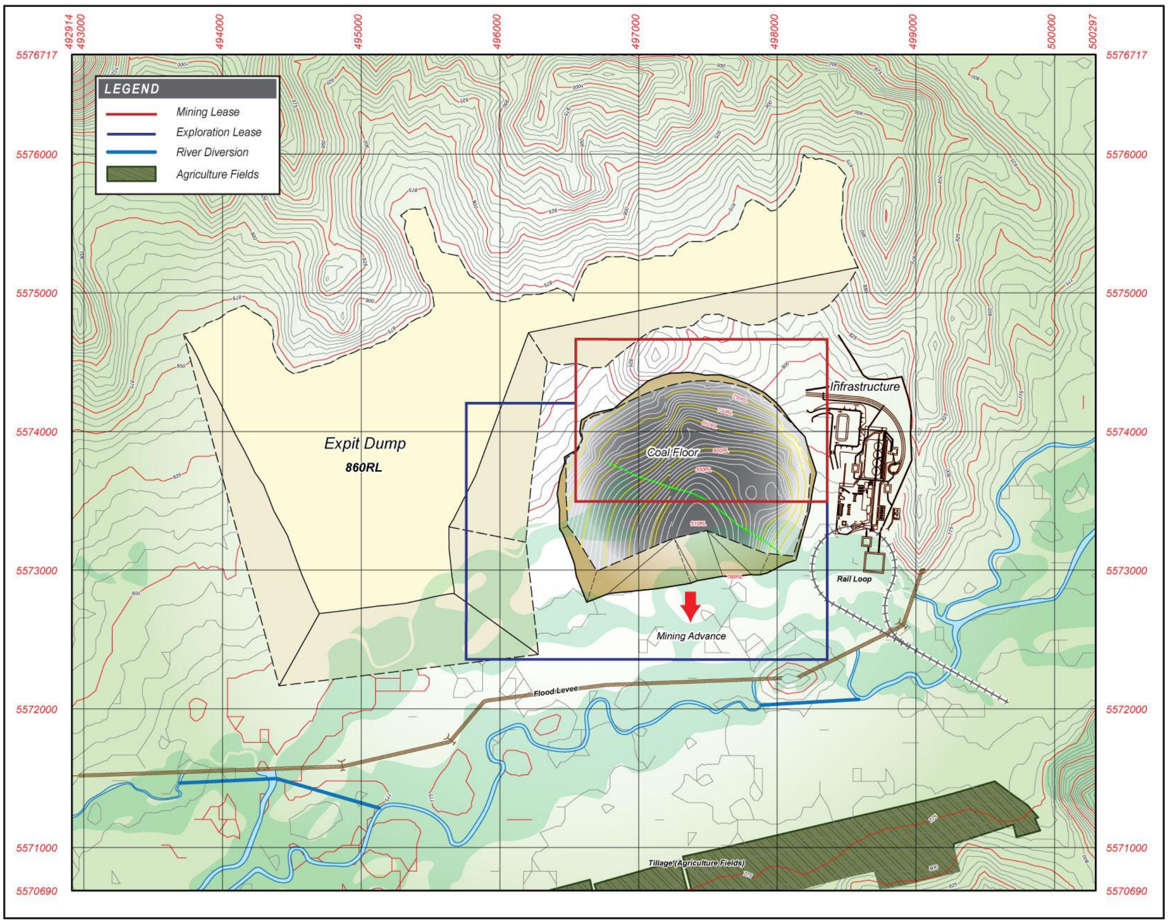

Figure 25.10 - Mine Stage Plan – End of Mine Life

25.8 Selection of Major Mining Equipment

The process of equipment selection adopted by MMC considered the following:

- Equipment types, including size and operating mode;
- Equipment availability;
- Equipment working hours;
- Material characteristics;
- Mining method;
- Truck haulage;
- Equipment fleet productivities;
- Ground preparation (drilling, blasting, dozing, etc), and
- Support equipment.

The overall objective of the process was to estimate fleet size and work requirements to allow capital and operating costs to be estimated.

The analysis and selection of major equipment focussed primarily on conventional truck and shovel options involving either electric rope shovels (P&H2800) or large hydraulic excavators (500 t class). Equipment requirements were determined for both scenarios and the cost-benefits analysed for selection of the preferred option.

The work roster reflected a continuous mining operation of a 3 panel roster with 2 x 12 hour shifts per day, and 7 days per week operation. Allowing for mechanical availability, public holidays and operating delays resulted in annual operating hours for major equipment ranging from 6,000 to 6,340 hours per annum.

Based on the geological conditions, and advice received from Red Hill, it was assumed that 100% of both coal and waste was to be blasted. Major support equipment was also estimated based on the estimated work load and our experience with similar Projects. The items considered were:

- Track dozers for waste (face, floor and dump maintenance), coal (ripping, coal preparation) and support (ramps, wedges, reclamation, etc.)
- Rubber tyre dozer for coal and floor cleanup;
- Front end loaders or small excavators for miscellaneous digging and cleanup operations;
- Graders for road maintenance, and
- Water trucks for road maintenance and dust control.

Additional support equipment such as light vehicles, pumps and lighting plants will be required, but for the purpose of this study were included only as a cost allowance with the mining overheads.

Detailed schedules of major equipment over time were produced using the MMC equipment estimation software. A summary of the numbers of major equipment, including support, for a typical year mid-way through the mine life is given in **Table 25.7**.

Table 25.7 - Major Equipment Summary

Equipment	Class / Size	Duty	Start-up	Mid-life
Hydraulic Excavator	79t	Waste Removal	1	1
Hydraulic Excavator	250t	Waste Removal	1	1
Hydraulic Excavator	530t	Waste Removal	1	1
Truck - Rear Dump	53t	Waste Removal	4	5
Truck - Rear Dump	154t	Waste Removal	5	7
Truck - Rear Dump	232t	Waste Removal	7	10
Dozer - Track	634 kW	Waste Removal	2	2
Hydraulic Excavator	79t	Coal	1	2
Hydraulic Excavator	250t	Coal	1	1
Truck - Rear Dump	53t	Coal	3	4
Truck - Rear Dump	154t	Coal	4	6
Front End Loader	11.5 cu.m.	Coal/Parting	1	1
Dozer - Track	433 kW	Coal/Parting	3	3
Hydraulic Excavator	79t	Support	1	1
Dozer - Rubber Tyre	358 kW	Support	2	2
Grader	205 kW	Support	2	3
Watercart	45.0 kl	Support	1	2
Truck - Articulated	38t	Support	2	2

25.9 Workforce Planning

Workforce requirements were estimated for the categories of management and administration, operators, maintenance personnel, and CHPP staff. Operations requirements were determined directly from the equipment numbers and working rosters. Supervisory and support staff numbers were developed based on MMC's experience with similar sized projects and previous studies. The PFS assumed that the mine would be owner-operated and hence would directly employ sufficient staff for all levels of management, supervision, planning and equipment operation.

The following **Table 25.8** shows the typical breakdown of the total workforce including management, operators and maintenance staff mid way through the mine life.

Table 25.8 - Typical Mine Workforce

Personnel	Total
Management	47
Mining Operations	309
Community Relations	16
HR and Safety	20
Tech Services	69
CHPP	35
Infrastructure	30
Total	**526**

The work roster reflected a continuous mining operation with the characteristics as outline above in **Section 25.9**.

25.10 Coal Handling and Preparation Plant

Joharko completed the design and estimate of capital and operating costs for the coal handling and preparation plant (CHPP) at the Project. Major assumptions in the development of CHPP design criteria for the coal handling and preparation plant include:

- ROM coal, from the mining operation, is assumed to be delivered to the ROM dump on a continuous basis for 5,800 operational hours per annum. Differing ROM coal qualities will need to be handled and processed separately from the pit through to zones on the product coal stockpile. It is expected that at least two ROM coal types will be mined simultaneously (after year 3) – one of a bypass quality and the other of a high ash quality that requires washing.
- The CHPP plant is based on a 1000tph coal handling, sizing, washing, and stockpiling design. A single 126,000t capacity (As-stacked) product stockpile will be suitable for both bypass and washed coal products.
- Thermal coal product specifications have been referenced from the April 2006 core drilling program and from the August 2008 bulk sampling program. It is understood from Red Hill Energy that the thermal coal products envisaged shall have an average energy of 5050kcal/Kg (net as received).
- Product coal reclaiming operations are to use coal valves and a reclaim tunnel rather than mechanical means. Reclaim tunnel operations require D11 Dozer assist but are cheaper and more flexible with respect to capital and operational needs when compared to mechanical reclaim methods, such as bucket wheel reclaimer's and the like.
- Ulaan Ovoo coal processing to be based on 24 hour per day 7 day per week operations. Ulaan Ovoo operating labour will be based on a 12 hour shift, 4 panel, and 7 day per week roster.

Joharko has assumed that coal washing is required only for Seam 1 (Mod) and not for the overlying Seam 2 (Gol). From Year 3 onwards the mine plan calls for Seam 1 and Seam 2 to be mined in parallel as the mine proceeds down-dip and towards the Zelter River.

The Gol seam is typically lower in ash and suitable for bypass operations throughout life-of-mine. The underlying Mod seam is higher in ash and therefore requires washing to meet the export product specification of 15% ash. The coal handling plant design allows for instantaneous switching from bypass operations (no washing) to washing operations and back again. By this means it will be possible to minimize in-pit coal stocks and to maintain sufficient product coal stocks for both washed and bypass coal products.

The wash plant facility is designed to cater for the occasional period where high ash Gol seam material is encountered or where mining conditions require the washing of both Gol and Mod seams. Reference coal types in the region have been used to estimate the wash plant yield, which is assumed to be 80% at an SG of 1.80 and product ash of 15% (ar).

Coal washability analysis, undertaken on fresh cored samples, will be of benefit in determining the incremental ash cut-point appropriate for Gol seam ROM coals and for the purposes of finalizing the wash plant design for Ulaan Ovoo.

The CHPP facilities consist of the following:

- 350t Capacity ROM Dump Station complete with 1000 t/h Primary Feeder Breaker
- Two-stage raw coal sizing and screening plant to receive and to size the ROM coal to 50 mm nominal top size at a maximum rate of 1000 t/h;
- 1000t/h Linear Luffing Stacker and 126,000 t capacity coal stockpile for both raw coal bypass and washed product coal products;
- 300t Wash Plant Surge bin feeding a single 1000 t/h Wash Plant;
- 1000 t/h Wash plant consisting of single stage dense medium cyclones (DMC) to process the coarse coal (+1.44 mm w/w) and Spiral Separators to treat the fine material (-1.44 mm w/w + 0.250 mm). Tailings (- 0.250 mm + 0 mm) will be thickened and dewatered. Coarse rejects will be conveyed to a 240t Rejects Bin and then disposed of in-pit or within spoil dumps. Slimes shall be pumped to tailings dams where clarified water shall then be returned to the wash plant for re-use;
- 4000 t/h product coal reclaim system via four coal valves and reclaim tunnel.
- 4000 t/h Train-loading system to reclaim both bypass coal and washed product coals to train loadout operations;
- 300t Train loadout bin complete with 100t weigh flash to rapidly load trains, and
- Supporting services and infrastructure for the CHPP facility.

A flow sheet outlining the CHPP process is shown in **Figure 25.11**. The layout of the CHPP is shown with the infrastructure in **Figure 25.12**.

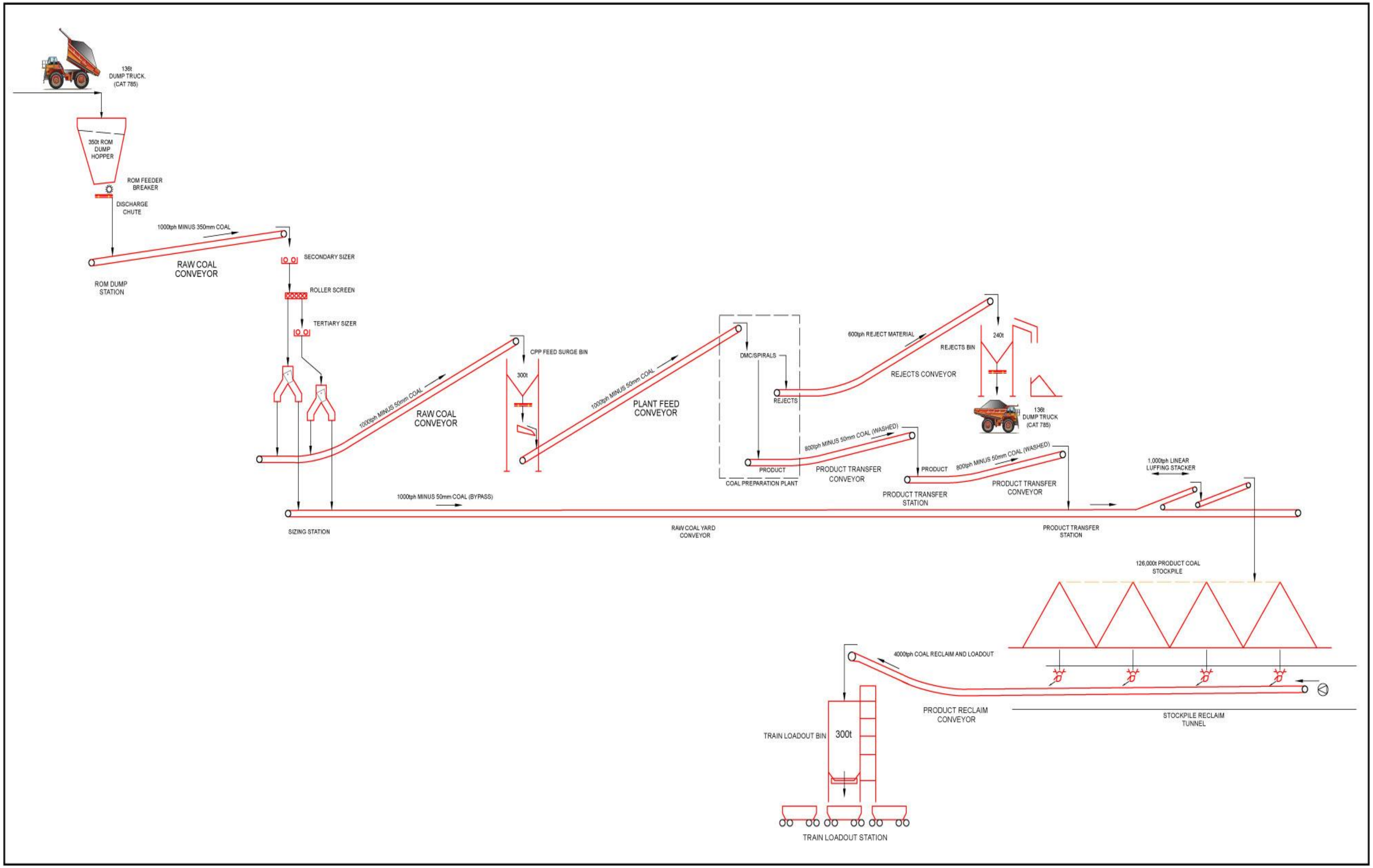

Figure 25.11 - CHPP Flow Diagram

25.11 Mine and Site Infrastructure

Joharko completed the design and estimate of capital and operating costs for the site infrastructure at the Project. Major assumptions in the development of site infrastructure design criteria:

- Water supply at Ulaan Ovoo is assumed to come from pit de-watering operations or from the adjacent Zelter River. No raw water pre-treatment is envisaged either for coal washing operations or for dust suppression. A potable water treatment plant shall be required to support the 300 man camp, amenities, and other facilities on site.

- Joharko has located the Ulaan Ovoo rail loop adjacent to the mine and within the Zelter River flood plain. This requires the rail line to be elevated over the flood level of the Zelter River and the north arm of the Zelter River system diverted into the southern arm at the mine. A levee bank complete with scour protection shall need to run along the southern boundary of the mine and CHPP facility for some 6.7km to protect the mine from water ingress during flood events.

- Mine development works shall create waste material which shall be provided for the CHPP civil infrastructure and the Levee construction needs free-of-charge. It has also been assumed that select fill from the mine development work will be suitable for ROM dump pad construction and/or other civil structures around the CHPP facility.

- Joharko has assumed ground bearing pressures range from 150kpa to 200kpa at the Ulaan Ovoo mine and along the rail infrastructure corridor. These bearing pressures are not uncommon in the Selenge Aimag region and Joharko has experience of these bearing pressures on other (nearby) Mongolian projects.

- All plant and equipment is to be designed for a 20 year mine life unless Mongolian Standards and Codes of Practice require longer design horizons. Mongolian codes of practice are limited and where not available Australian codes are used.

The following lists major mine infrastructure which was considered:

- Administration and other mine site buildings;
- Mine camp and associated facilities;
- ROM Pad stockpile;
- Coal crushing, conveying, wash plant and tailings dam;
- Product stockpiles and load-out facilities;
- Equipment workshop and equipment park-up area;
- Fuel and oil storage;
- Light and heavy vehicle wash bays;
- First aid and ambulance facilities including helicopter pad;
- Explosives storage area;

- Power reticulation;
- District heating distribution, and
- Water management infrastructure such as water storage dams, sedimentation ponds drainage channels.

The layout of the site infrastructure including the CHPP is shown in **Figure 25.12**.

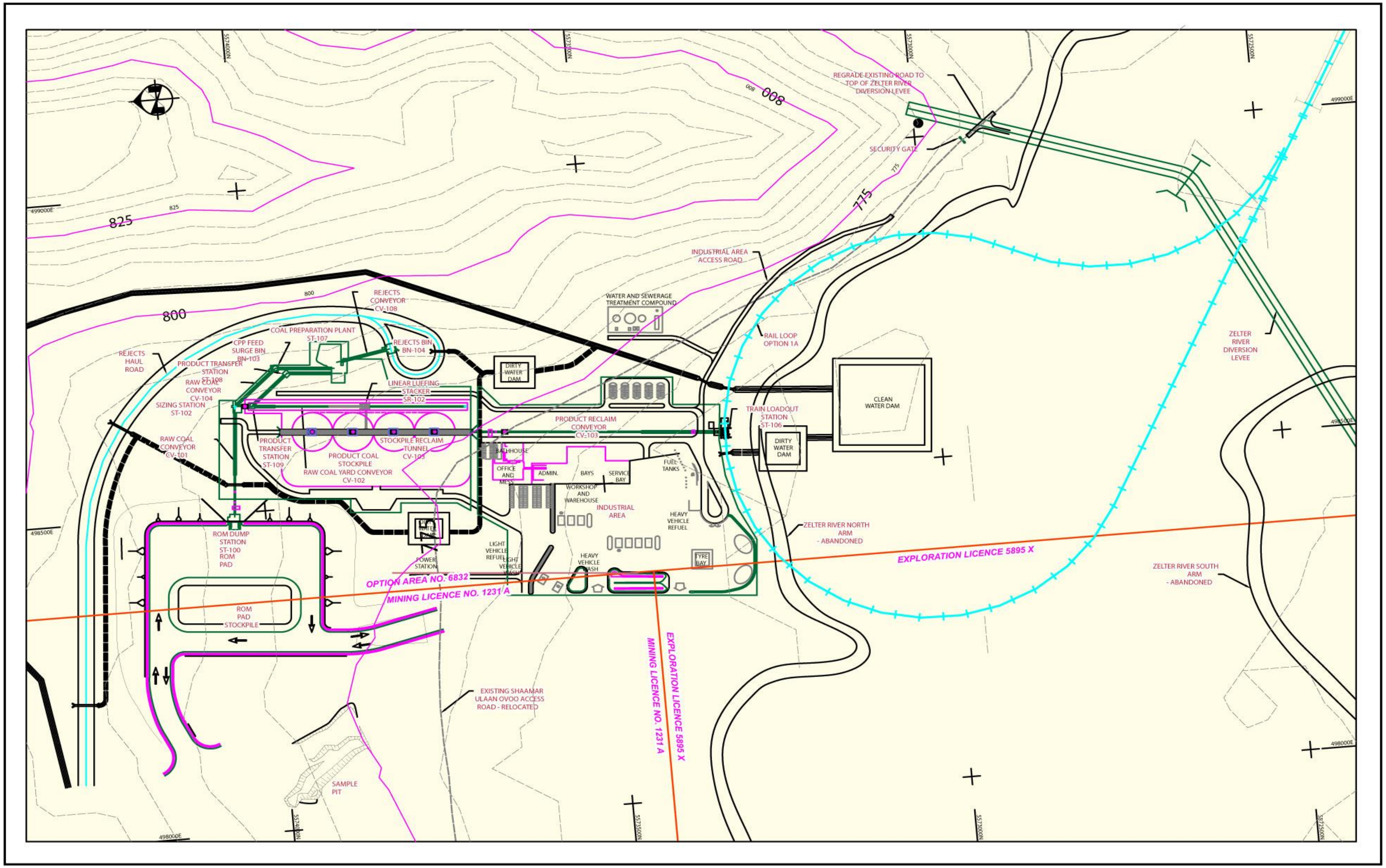

Figure 25.12 - Site Infrastructure Layout

The key mine services are power, communication, and water. Total water usage is assumed at 507 ML per year.

The total site power required is estimated to be 12 MW which is to be provided by a power station adjacent to the CHPP facility. It is assumed that the power station will be constructed by a third-party who shall own and operate the facility on behalf of Ulaan Ovoo. High voltage power generation and supply costs have been used in the operating costs assumptions for the project. These costs include a margin for capital and operating costs incurred by the third party along with a profit margin to the operator.

25.12 Rail Transportation

Joharko completed the design and estimate of capital and operating costs for the rail transport including construction of a rail link to the current Russian-Mongolian line.

Joharko had been requested by Red Hill Energy to review rail options that utilise the Zelter River border crossing point into Russia. Such rail options place the vast majority of the new rail infrastructure in Russia with a connection point, on the main trans-Siberian rail line, at the township of Dzida. Currently the Zelter River border crossing point is closed but the Mongolian and Russian authorities are considering opening the border for commerce and trade purposes. Should this border crossing point become available in the future there may be alternative rail connectivity options available to Red Hill Energy.

Major assumptions in the development of rail line design:

- No definitive train consignment requirements have been specified by Red Hill Energy at this time so Joharko has assumed that product coal is to be loaded onto rail wagons at a rate of 4000 tph (nominal) or 4500 tph (design).

- Trains are assumed to be between 5000 t and 8000 t consists for the haul to Nadhodka Port. Line speeds have also been designed for an average haul speed of 80km/hr. Beyond Sukhbaatar, on the main trans-Mongolian line, it has been assumed that fully loaded trains can continue through Russia without the need to be reconfigured in any way.

- Joharko has assumed the rail systems are constructed to existing Mongolian National Standards as a minimum. Where the design code is ambiguous, or lacking detail, Joharko has assumed Australian Rail Track codes (ARTC) appropriate for Mongolian terrain, climatic conditions, and rail freight usage. These codes are adjusted to 1520mm rail gauge as required.

- Joharko has used the following design standards

  (a) Mongolian National Standard for all new work between Ulaan Ovoo and the main trans-Mongolian rail line.

  (b) Line speeds of 80 km/hr on average, and 90 km/hr maximum.

  (c) Haul grade of 3% maximum and 1.2% under braking.

  (d) Minimum vertical curve radius of 3000 m.

  (e) Minimum vertical curve length of 40 m.

(f) Minimum horizontal curve radius of 400 m

(g) Chinese diesel loco's of the DF4b type, or equivalent.

(h) Train net weight between 5000 t and 8000 t.

(i) Lines to be without electrification.

- Ulaan Ovoo coal railings are to be based on 24 hour per day 7 day per week operations.

Several possible rail infrastructure corridors were investigated that connect the Ulaan Ovoo mine to the existing trans-Mongolian railway. Each rail corridor commences at the Ulaan Ovoo coal handling and preparation plant train loadout facility and terminates at various locations along the main trans-Mongolian rail line.

The optimum rail connection, known as Option 1A, is some 116km long (refer **Figure 7.2**). This railway connects the mine to a rail head at Sukhbaatar, a small village 15km south of the Russian border. The new rail infrastructure design is based on a Russian rail gauge of 1520mm (4ft 11 7/8 inches) as this standard has been adopted throughout Mongolia. Coal trains loaded at Ulaan Ovoo can therefore travel all the way to the Russian Port at Nadhodka without boggy change, or train change, which would otherwise be required if the trains headed south and through China.

25.13 Environmental Review

Environmental consultants, Sustainability Pty Ltd (Sustainability), has reviewed Environmental Impact Assessments, geological studies and other studies completed on the Project, as supplied by Red Hill. ECOS LLC, a licensed Mongolian EIA company, was commissioned to prepare the Detailed Environmental Impact Assessment (DEIA) for the Project. Sustainability's review of this and other documents aims to identify significant environmental aspects of the operation, review the completeness of the EIA and identify specific programs that are required to address significant impacts.

The primary impacts of the Project on the environment were identified as:

- Substantial alteration of the current, natural landscape through open cut development and all waste rock placed on the surface,
- As with all such operations, mining may have an impact on air quality through dust generation,
- Water usage may impact on groundwater currently used by local inhabitants,
- Socio-economic impact of the development, and
- Diversion of the Zelter River could cause adverse changes to the surface hydrology and flood plain.

Though many of the impacts can be mitigated through diligent environmental management, further data and analysis is required to better understand the risk to local communities associated with the diversion of the Zelter River; the hydrological risks to the region including local groundwater levels following mine pumping and the impact of the mine and mining activities upon the social and economic condition of the local communities.

25.14 Indicative Market Specifications for Ulaan Ovoo Coal Product

The product specification for the Ulaan Ovoo coal product is shown in **Table 25.9**.

The ash content, calorific value and sulphur contents have been derived from the coal resource model (see Section 3.3), and are expressed on an 18% total moisture basis. The total moisture basis (18%) was selected from limited borehole assay data.

Table 25.9 - Indicative Market Specifications for Ulaan Ovoo's Coal Product

Product	Ash (%) (ar)	Calorific Value (kcal/kg (gar))	Total Moisture %	Sulphur (% ar)
Thermal Coal	15	5,000	18	0.32

25.15 Coal Markets and Pricing Assumptions

Red Hill has investigated various marketing strategies for the sale of the Ulaan Ovoo coal products into numerous potential markets. The principal market selected for the Ulaan Ovoo coal product was the export thermal market. Domestic sale was not considered as part of this study.

A coal pricing estimate of $76/ product t (gar, FOB) was provided by Red Hill based on its internal market analysis undertaken in early 2008. Recent changes in the international economy, however, have led to changes in commodity prices from those forecast earlier in 2008 and has made forecasting coal price challenging. In response, MMC has estimated the technical value of the Project across a range of thermal coal prices to provide a better understanding of Project economics. The coal price estimates used by MMC included:

- $76/ product t (gar, FOB) (original Red Hill estimate)
- $68/ product t (gar, FOB), and
- $60/ product t (gar, FOB).

This was considered a reasonable range of long term coal forecast thermal coal prices in the current economic climate.

Russian consultants, Rosinformugol, were commissioned by Red Hill to estimate existing Russian rail freight rates and distances from mine to market. Joharko checked these for reasonableness. It is proposed that the Project will construct a rail link of 116 km to the main Mongolian railway and gain access to the Russian rail system. The total cost of coal transport was estimated at $30/ product t, which alone represents over 50% of total operating expenditure.

25.16 Mine Operating Costs

MMC estimated the capital and operating costs for major mining equipment based on indicative figures provided by equipment suppliers located in Mongolia. Where equipment supplier quotes were not available, MMC used estimates from its internal cost database. Mining overheads and blast costs were estimated based on comparison with similar operations in the industry.

Costs for major non-mining areas such as rail transport, CHPP, and infrastructure were provided by Joharko.

The mine operating costs reflect a typical truck-and-shovel open-pit operation with a favourable stripping ratio and limited coal beneficiation requirements. Estimated cash costs are summarized in **Table 25.10**.

Table 25.10 - Estimated Production Cash Costs

Unit Cash Costs per Product Tonne	**US$/t**
Overburden Removal	$5
Coal Mining & Haulage to CHPP	$2
Field Support Cost	$1
Coal Washing and Handling (CHPP)	$3
Admin & Overheads	$3
Total Mine Operating Costs/tonne (FOR)	**$15**
Transport	$30
Port	$9
Royalty	$2
Total Project Operating Costs/tonne (FOB)[1]	**$56**

2. FOB Port of Nadhodka

25.17 Capital Expenditures

The mine development plan assumes that capital spending begins in 2009, with the majority of capital spending (equipment and facilities) occurring up to 2014 and completion of the wash plant. Initial capital expenditure was calculated through to 2014 to include all major capital. Thereafter there will be on-going capital expenditures classified as either replacement or sustaining capital primarily being replacement mining equipment. The components of capital spending are listed in **Table 25.11**.

Table 25.11 - Initial and Sustaining Capital Costs

Capital Item	US$ (millions)
Overburden Removal Equipment	75
Coal Mining Equipment	22
Support Equipment	9
Coal Handling/Blending/Wash Plant (CHPP)	94
Coal Transport – New Rail Line	120
Mine-Site Buildings, Roads & Camp	18
Total Initial Capital	**$337**
Sustaining / Replacement Capital	**$155**
Total Project Capital Spending	**$492**

25.18 Project Financial Summary

Table 25.12 summarizes the key financial outcomes for the Project across a range of thermal coal prices.

Table 25.12 - Key Financial Outcomes

Thermal Coal Price ($/ product t. FOB)[1]	$60	$68	$76
NPV @ 10% (US$M)	-$231	$0	$250
Payback @ 10% (years)	-	-	9.5
IRR %	1%	10%	19%
Cash Mining Cost FOB (US$/t product)	$55	$56	$56
Average Annual Revenue (US$ millions)	$354	$399	$449
Average Annual After-Tax Net Profit (US$ millions)	$10	$40	$76

1: Coal prices FOB Nadhodka Port

The Project is particularly sensitive to the long-term thermal coal price and requires a price of more than $68/ product t (gar, FOB) to deliver a positive net present value (NPV) at a discount rate of 10%.

Project returns are also affected by changes in operating and capital costs. The Project is most sensitive to off-site operating costs. As only 35% of total coal requires washing, the Project is not highly sensitive to washplant yield. A summary of the key operating and capital sensitivities are presented in **Table 25.13**.

Table 25.13 - Sensitivities to Other Operating and Capital Cost Parameters

Sensitivities to Changes in Capital and Operating Costs	NPV ($M) 10% Discount	% Change
Coal Price @ $76/t product	$250	0%
Lower Wash Plant Yields (to 70%)	$222	-11%
Capital Cost Sensitivities		
10% Cost Increase	$214	-14%
10% Cost Decrease	$286	14%
Operating Cost Sensitivities		
10% On-Site Cost Increase	$200	-20%
10% On-Site Cost Decrease	$300	20%
10% Off-Site Cost Increase	$128	-49%
10% Off-Site Cost Decrease	$372	49%

25.19 Additional Project Opportunities

Several opportunities remain at Ulaan Ovoo for generating additional revenues and profits, as well as for lowering costs. These opportunities were considered outside the scope of the work, but may be addressed in subsequent feasibility studies. These opportunities include:

- Exporting coal through China;
- Increase the quantity of saleable coals through resource additions achieved by exploration drilling. Additional resource drilling, if successful, could either expand the mine size or extend mine life;
- Decrease mining costs by using local mining contractors and/or using lower priced Russian or Chinese mining equipment
- Improve washing yields through selective mining, and
- Gain competitive access to the domestic Mongolian or Russian markets.

The Project has no significant issues that would prevent successful mining and processing of the coal. Furthermore, there are a number of opportunities to increase the coal resource, reduce coal loss and add value to the Project. However, the key issues of marketing, transport and operating logistics need to be resolved for this to be realised.

26. GEOLOGY ILLUSTRATIONS

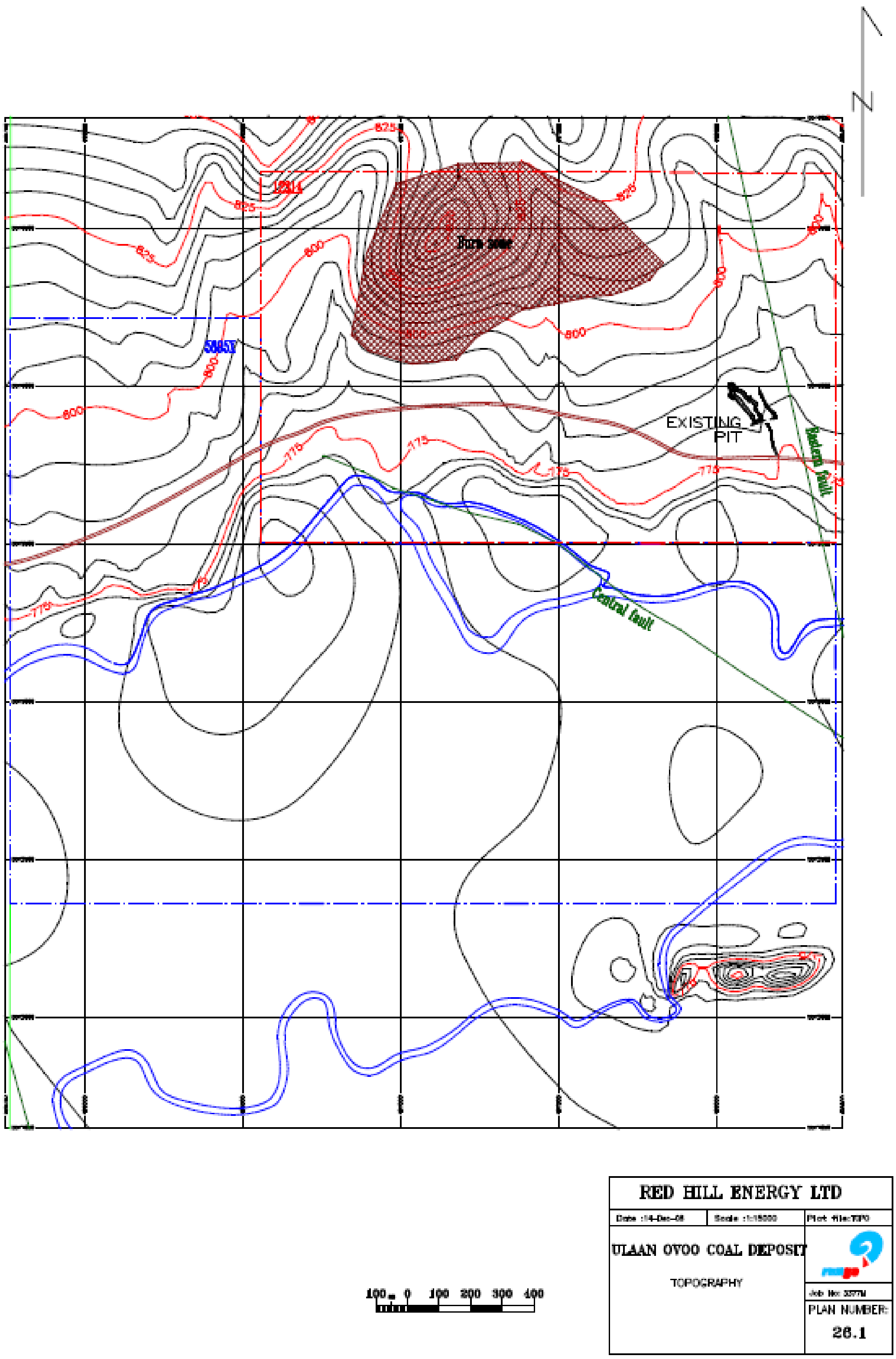

Figure 26.1 - Topography

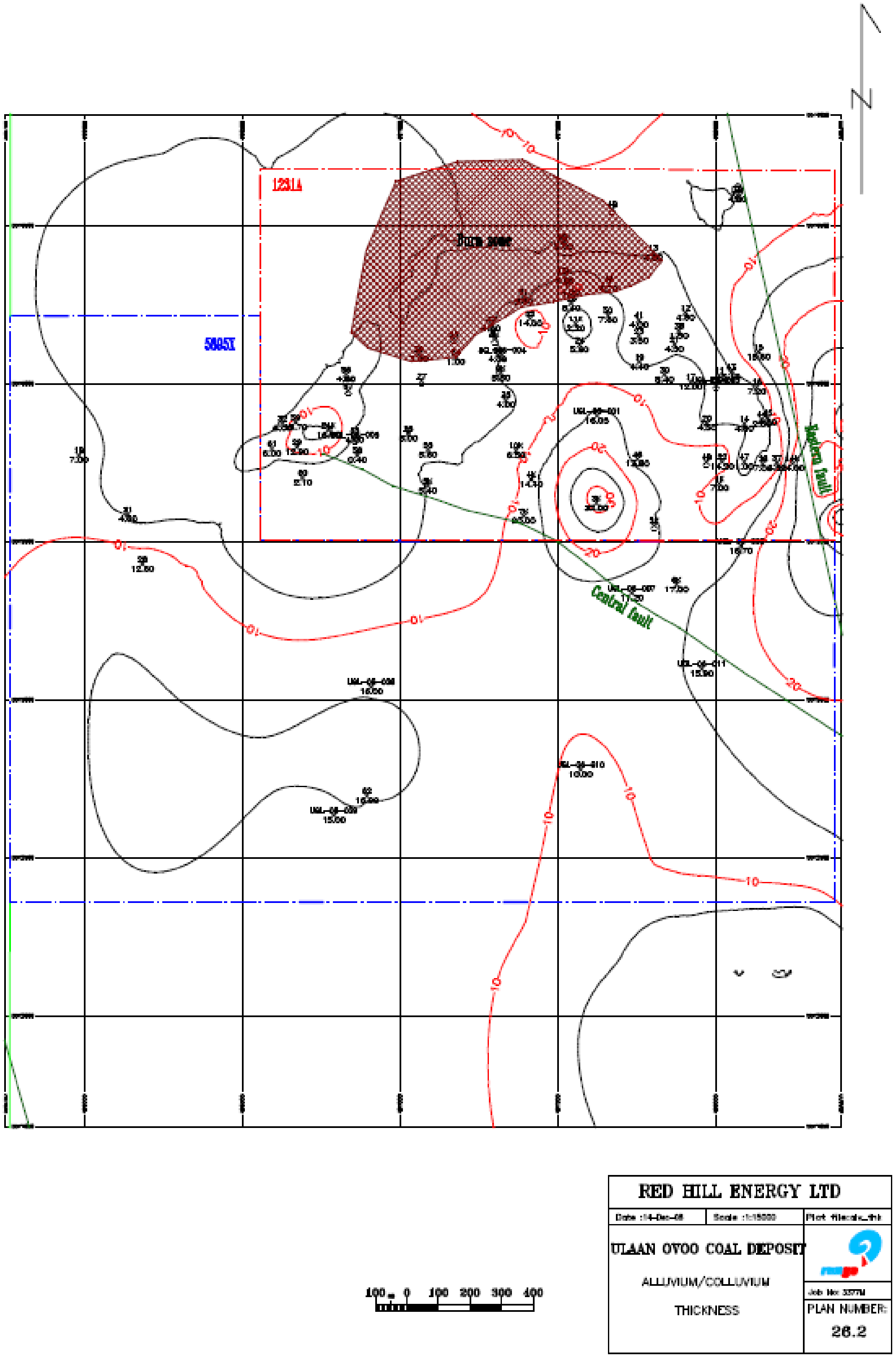

Figure 26.2 - Alluvium/Colluvium Thickness

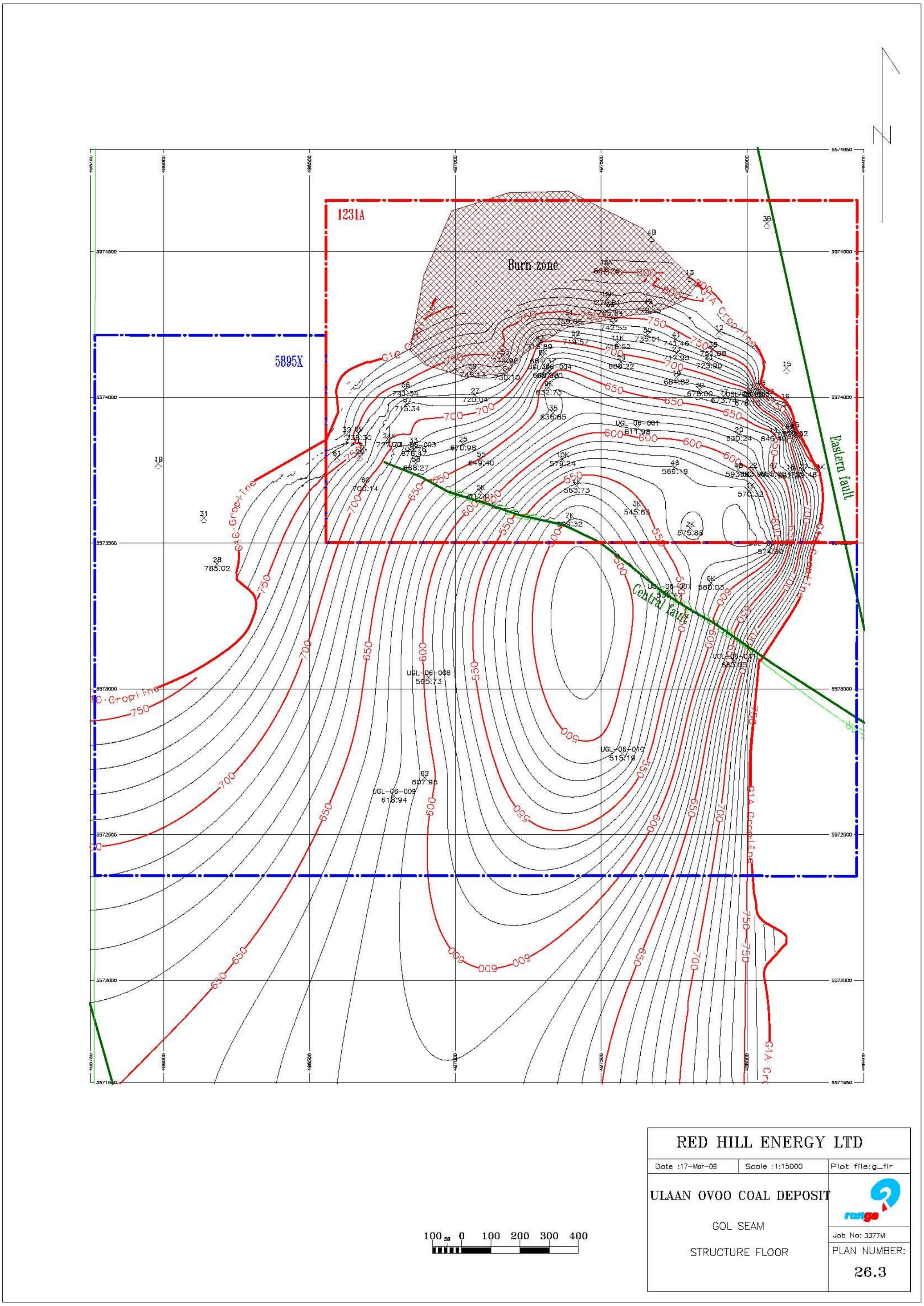

Figure 26.3 - Gol Seam Structure Floor

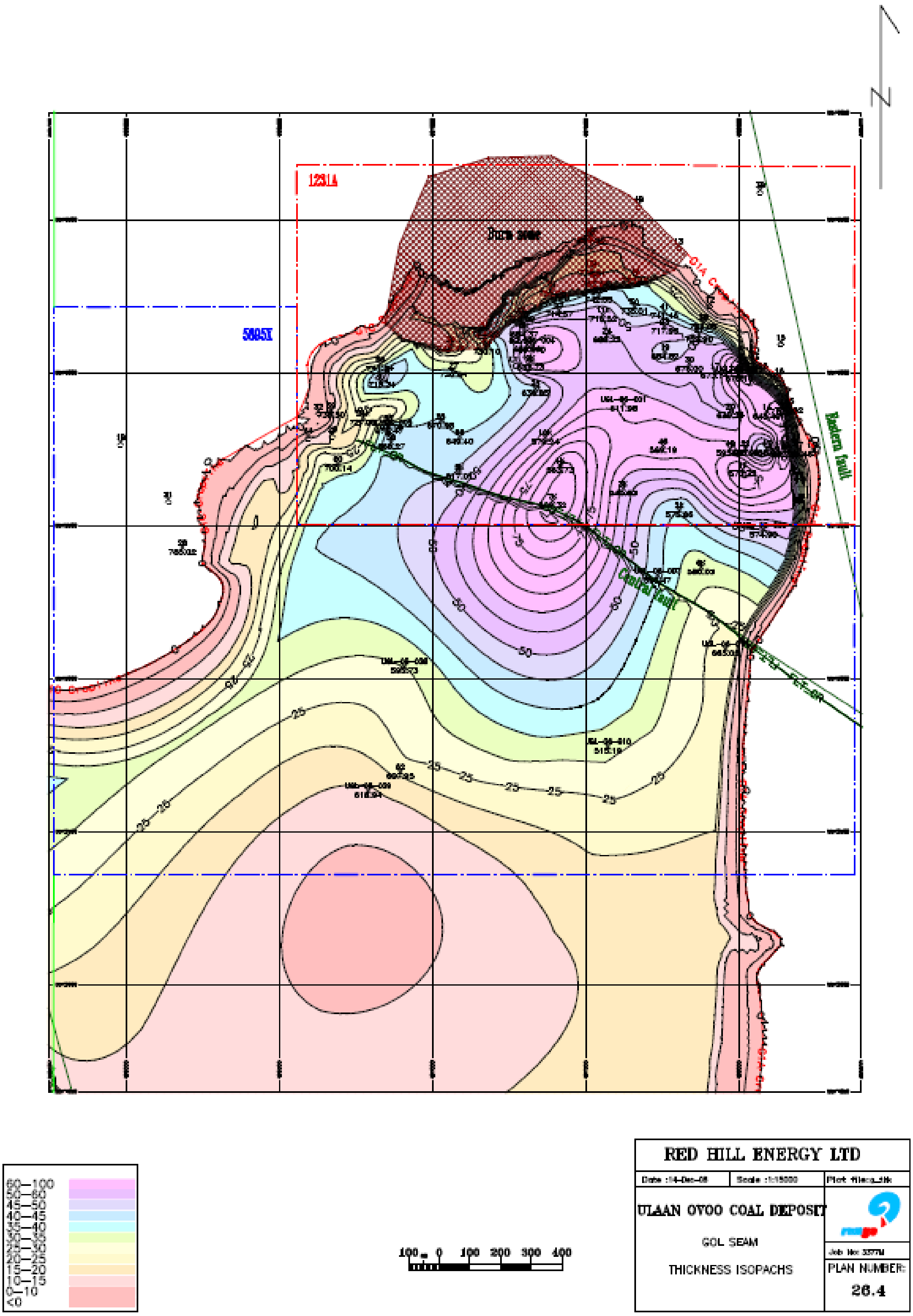

Figure 26.4 - Gol Seam Thickness Isopachs

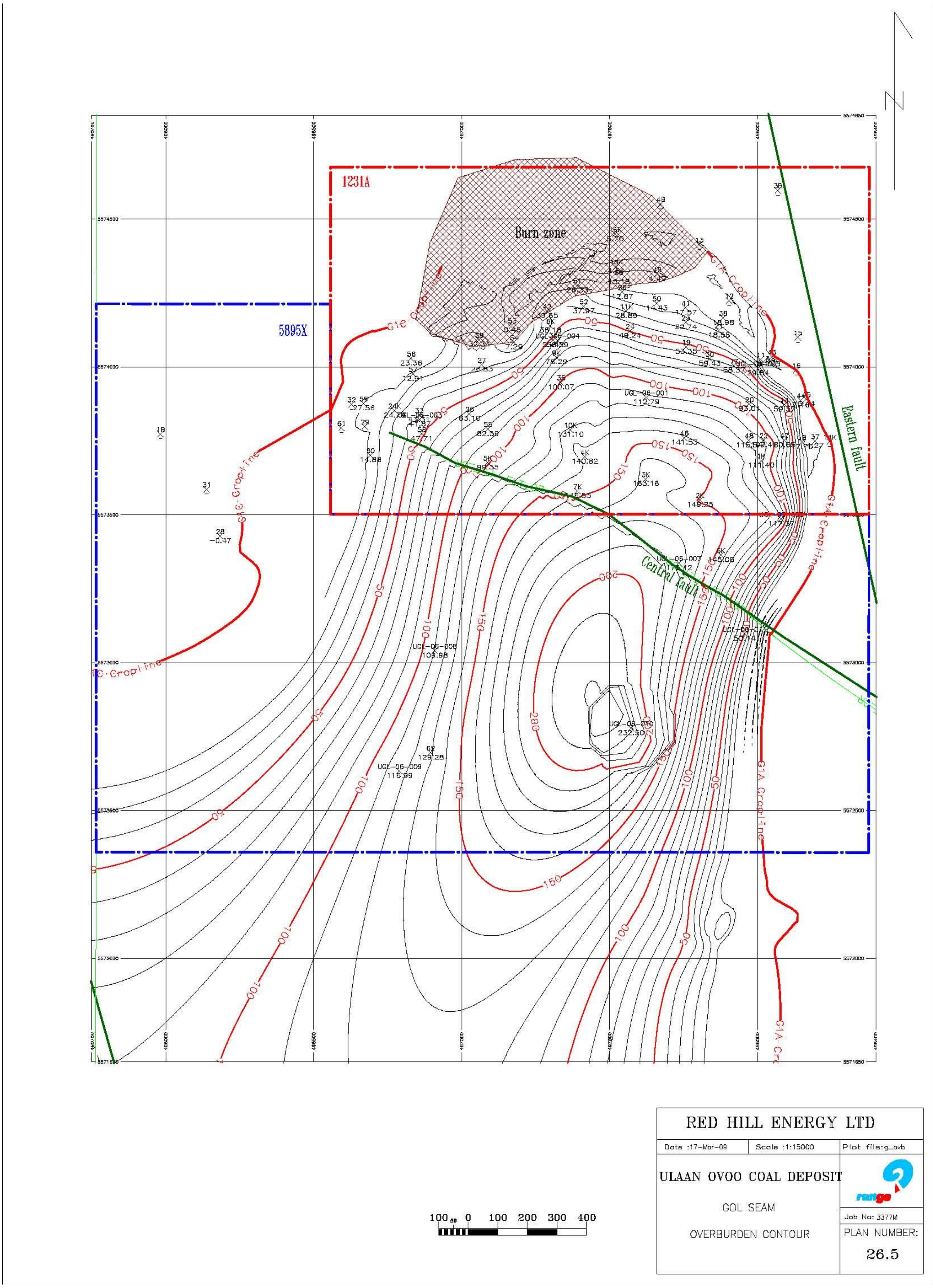

Figure 26.5 - Gol Seam Overburden Contour

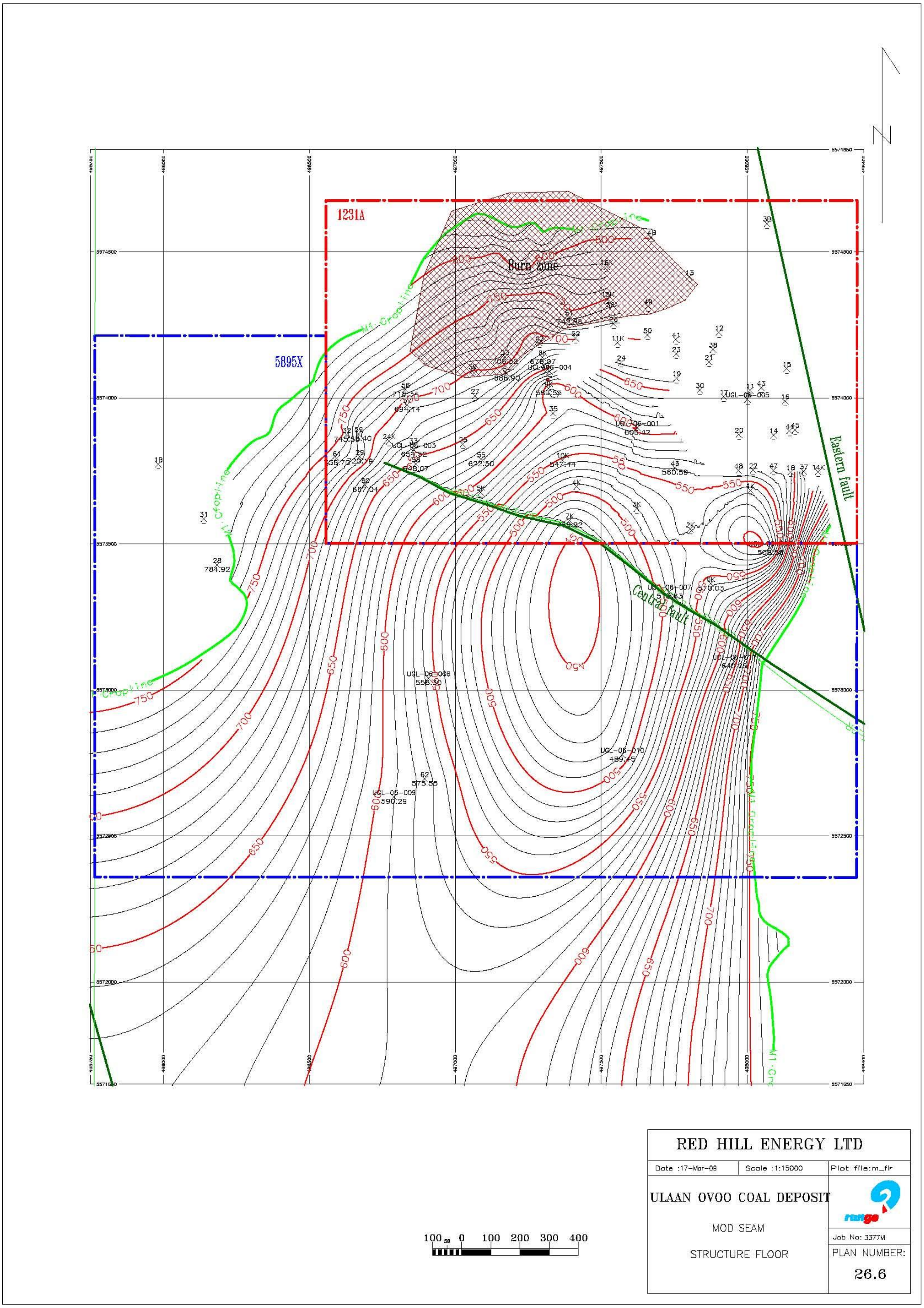

Figure 26.6 - Mod Seam Structure Floor

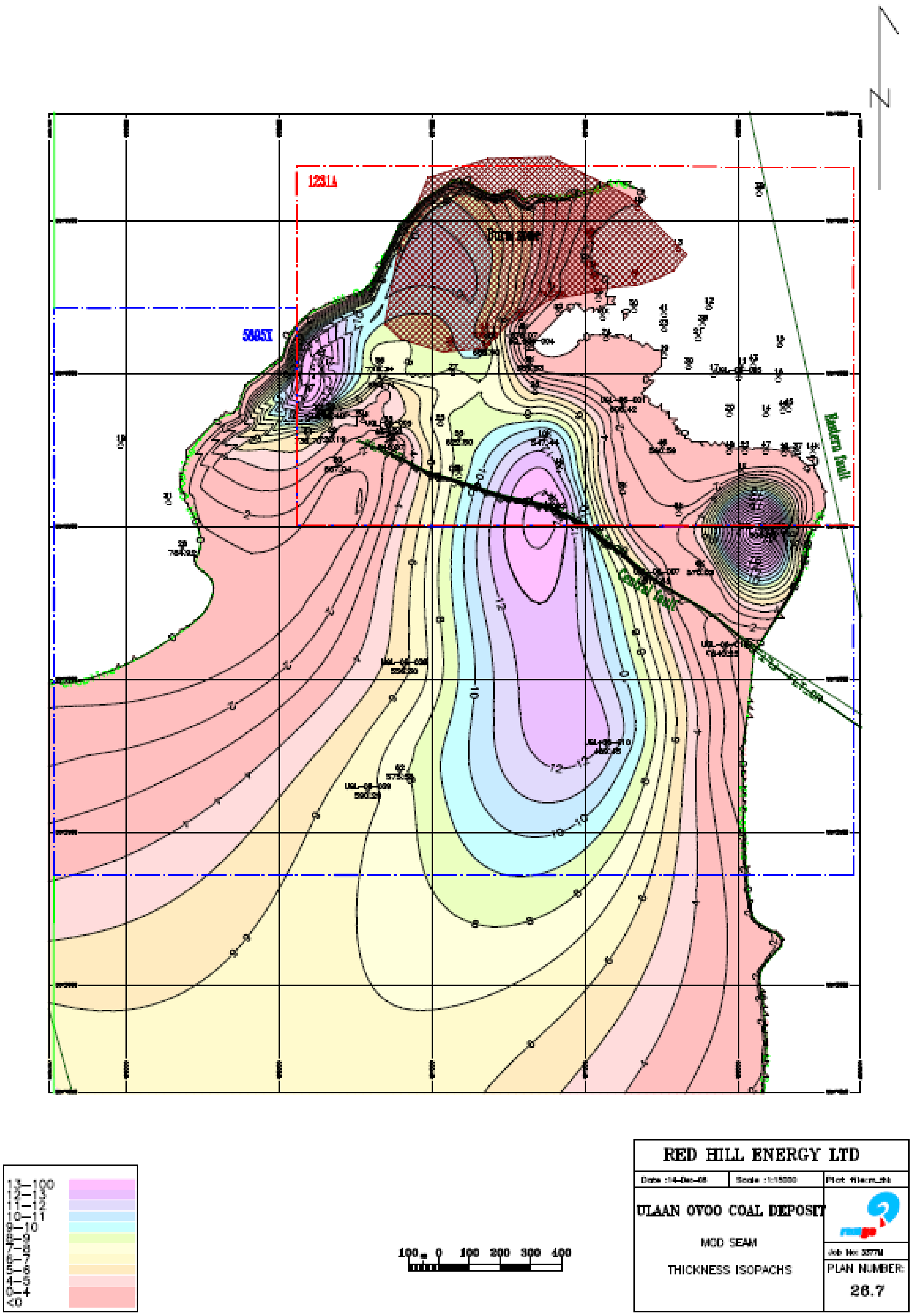

Figure 26.7 - Mod Seam Thickness

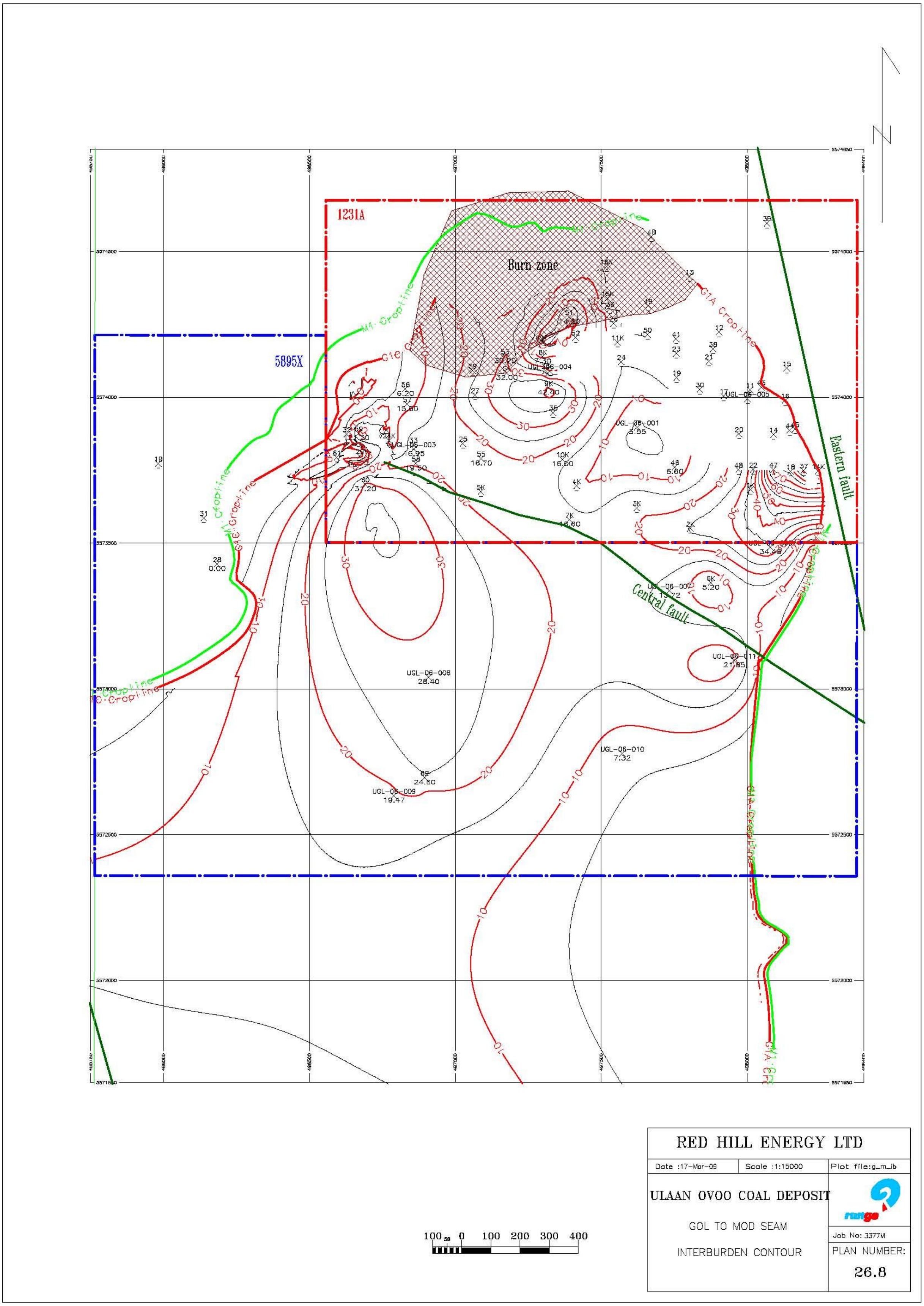

Figure 26.8 - Gol to Mod Seam Interburden Contour

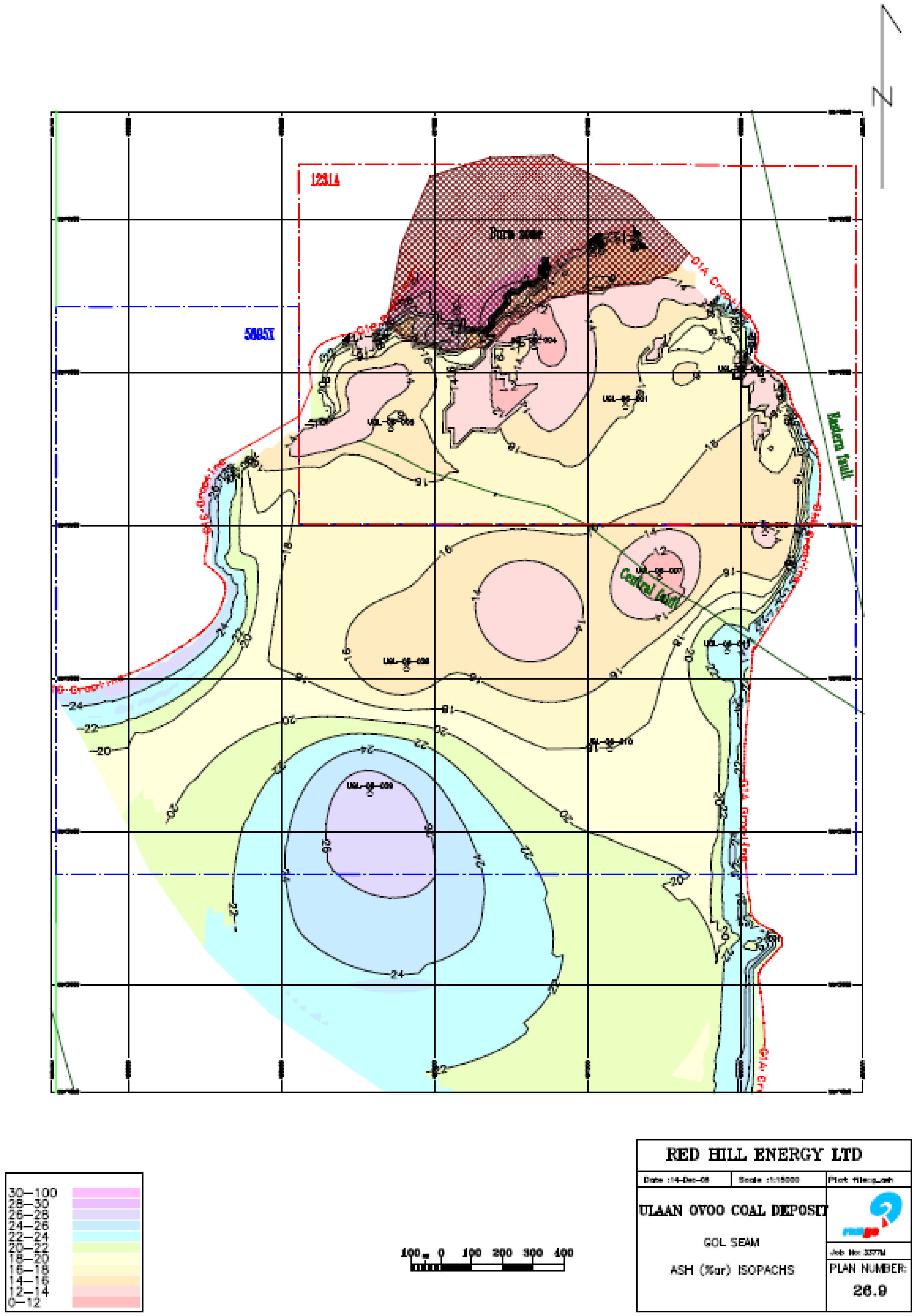

Figure 26.9 - Gol Seam Ash (% ar) Isopachs

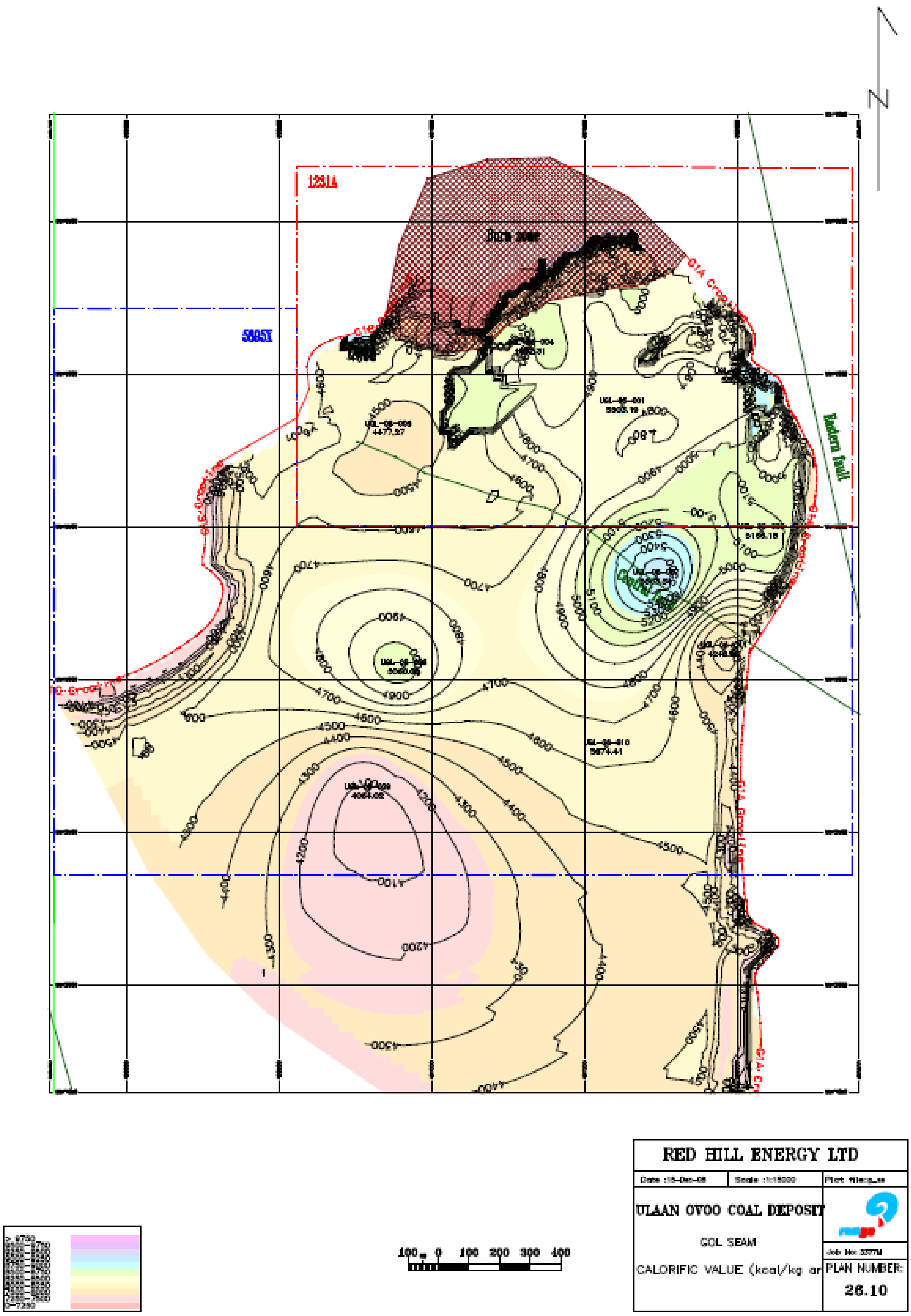

Figure 26.10 - Gol Seam Calorific Value (kcal ar) Isopachs

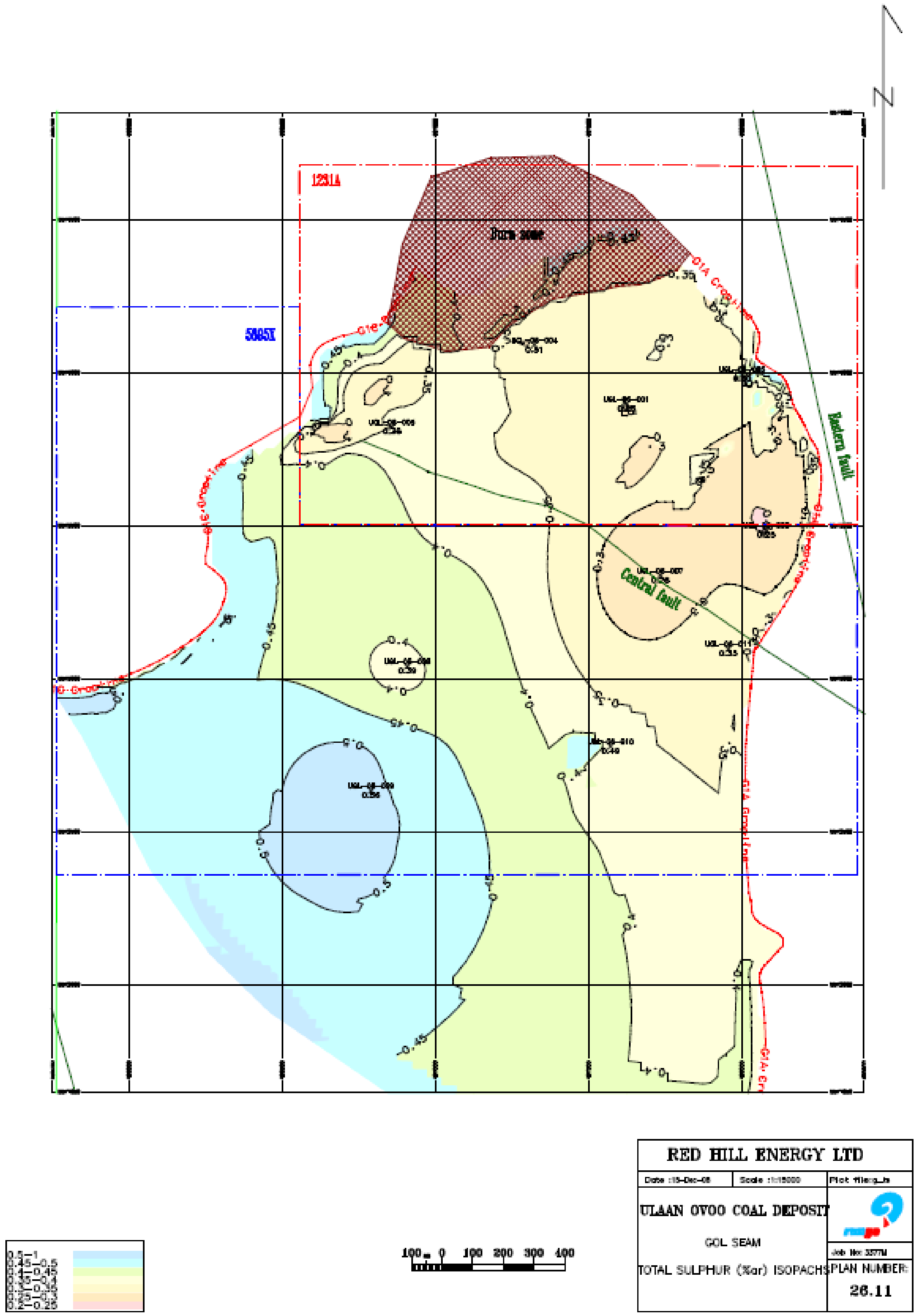

Figure 26.11 - Gol Seam Sulphur (% ar) Isopachs

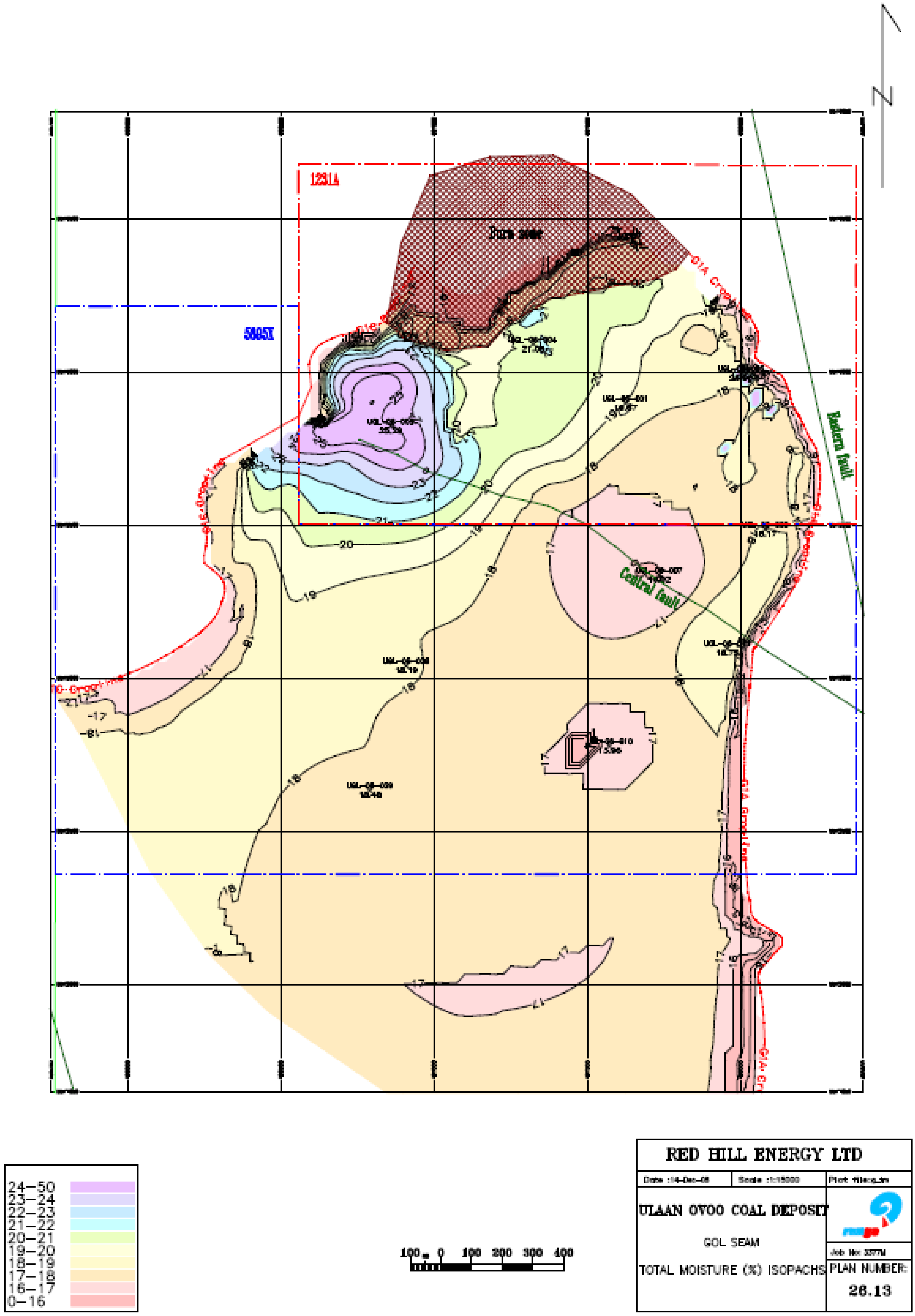

Figure 26.12 - Gol Seam Moisture (% ad) Isopachs

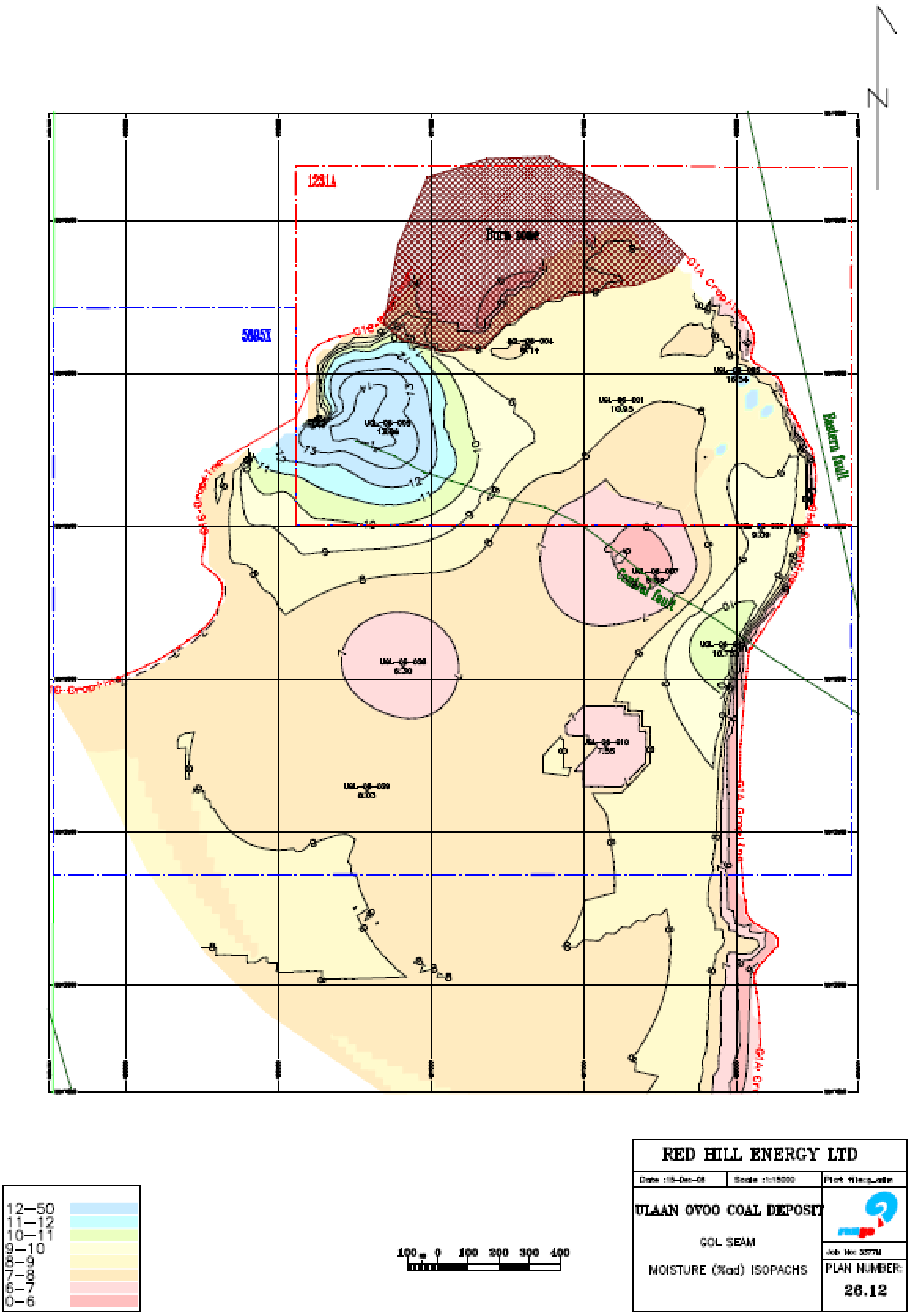

Figure 26.13 - Gol Seam Total Moisture (%) Isopachs

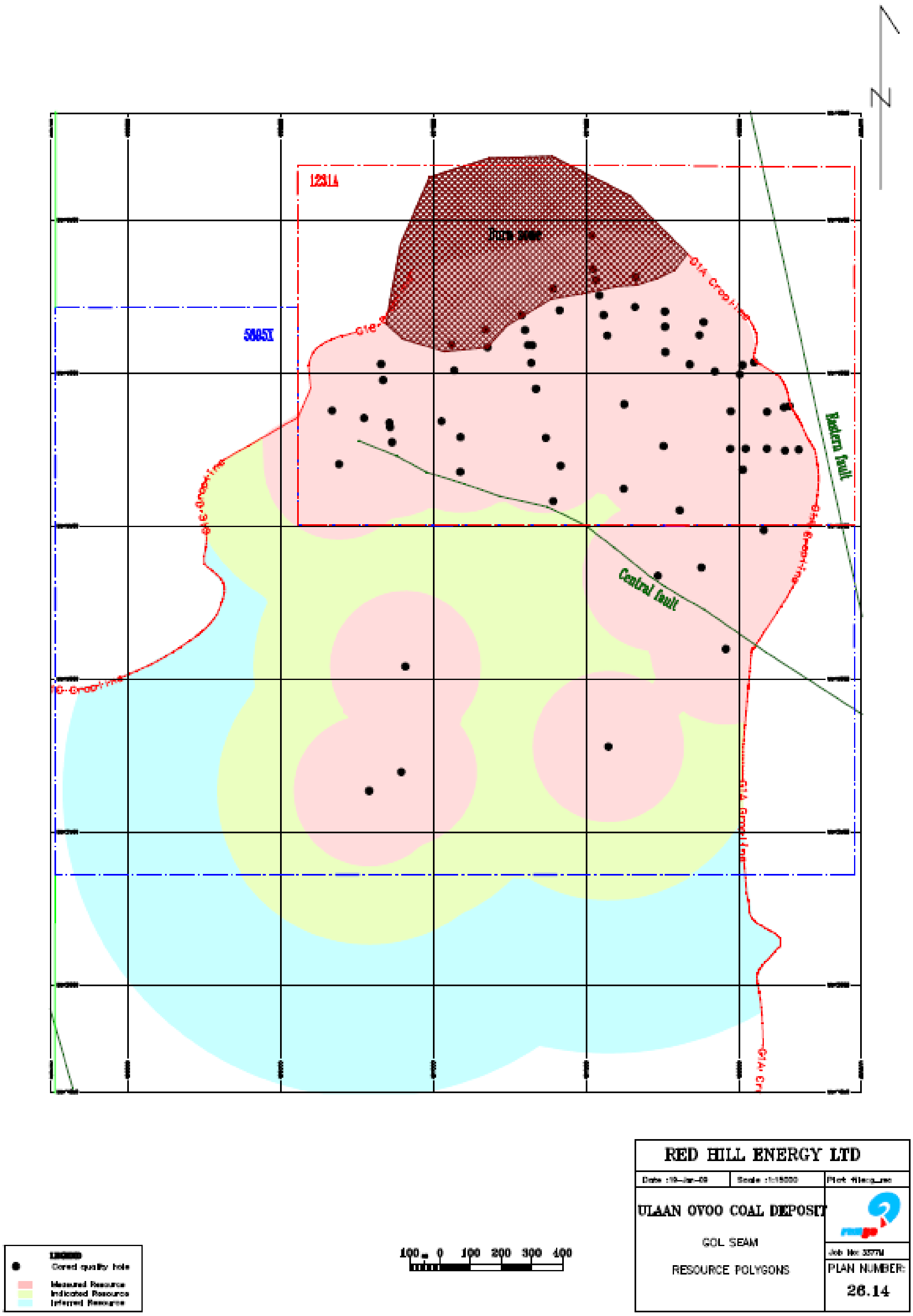

Figure 26.14 - Gol Seam Resource Polygons

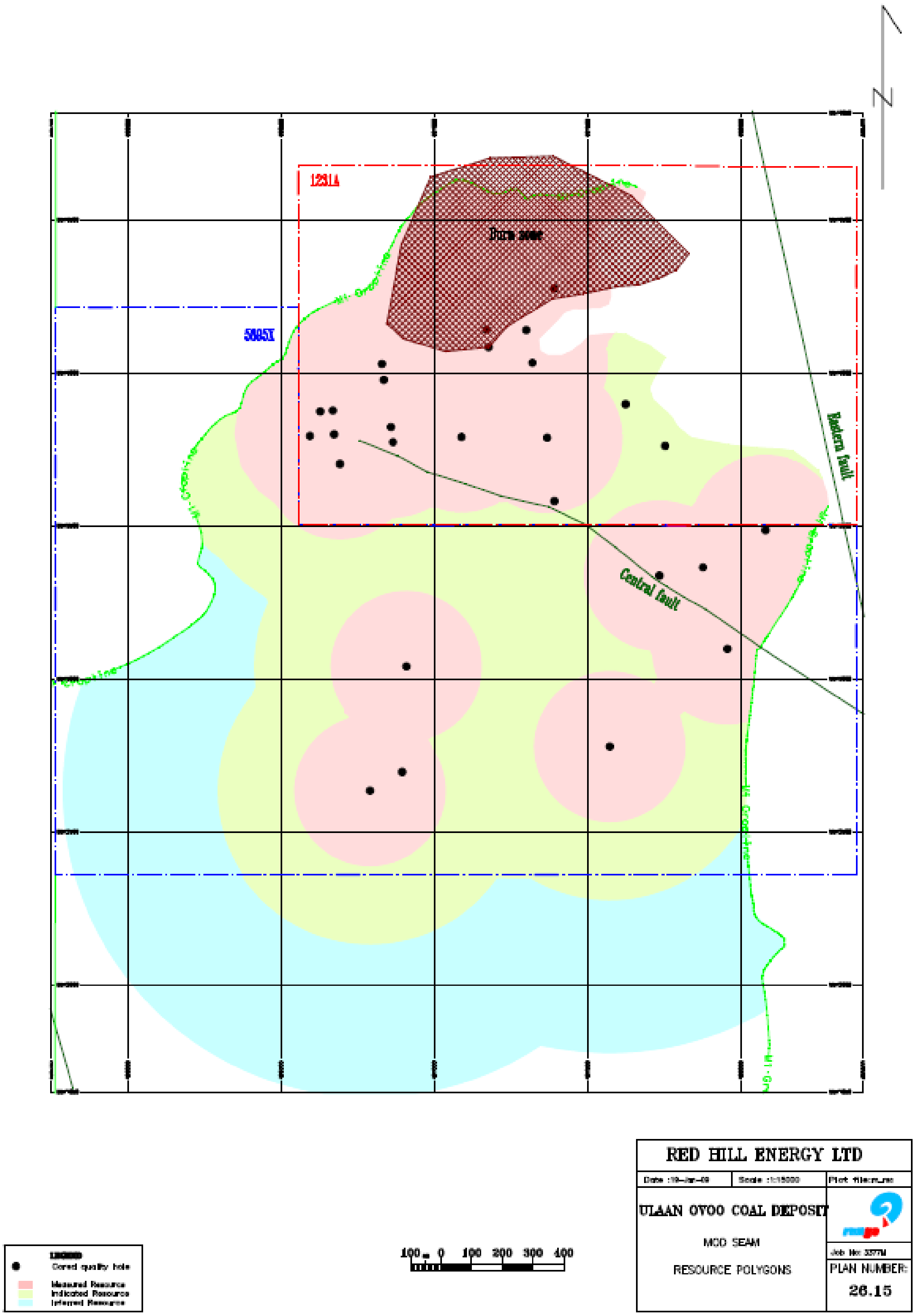

Figure 26.15 - Mod Seam Resource Polygons