An Independent Qualified Persons' Report on the Bokoni Platinum Mine, in the Mpumalanga Province, South Africa

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Qualified Persons:
NJ Odendaal (Director):
BSc (Geol.), BSc (Min. Econ.), MSc. (Min. Eng.),
Pr. Sci. Nat., FSAIMM, MGSSA, MAusIMM

CJ Muller (Director):
BSc.Hons. (Geol.), Pr. Sci. Nat

D v Heerden (Director):
BEng (Min. Eng.), M.Comm. (Bus. Admin.),
ECSA, FSAIMM, AMMSA

D Clemente (Chief Metallurgist):
NHD (Ext. Met.), GCC, MMMMA, FSAIMM

Minxcon
Suite 5, Coldstream Office Park
2 Coldstream Street, Little Falls, Roodepoort,
Gauteng, South Africa,
Tel: +27 11 958 2899 | Fax: +27 11 958 2105
www.minxcon.co.za

Directors: NJ Odendaal, D Van Heerden, CJ Muller
Registration No. 2004/029587/07

INFORMATION RISK

This Report was prepared by Minxcon (Pty) Ltd ("Minxcon"). In the preparation of the Report, Minxcon has utilised information relating to operational methods and expectations provided to them by various sources. Where possible, Minxcon has verified this information from independent sources after making due enquiry of all material issues that are required in order to comply with the requirements of the SAMREC and NI 43-101 Codes.

OPERATIONAL RISKS

Mining and mineral and coal exploration, development and production by their nature contain significant operational risks. It therefore depends upon, amongst other things, successful prospecting programmes and competent management. Profitability and asset values can be affected by unforeseen changes in operating circumstances and technical issues.

POLITICAL AND ECONOMIC RISK

Factors such as political and industrial disruption, currency fluctuation and interest rates could have an impact on future operations, and potential revenue streams can also be affected by these factors. The majority of these factors are beyond the control of any operating entity.

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ITEM 1 – SUMMARY

Minxcon (Pty) Limited ("Minxcon") was commissioned by Atlatsa Resource Corporation ("Atlatsa" or "the Client") to compile an independent NI 43-101 technical report for Bokoni Platinum Mine ("Bokoni"), South Africa, for use in a transaction to restructure, recapitalise and refinance Atlatsa and as a posting on the Canadian Securities Regulatory Electronic Filing site, SEDAR.

Item 1 (a) – Property Description

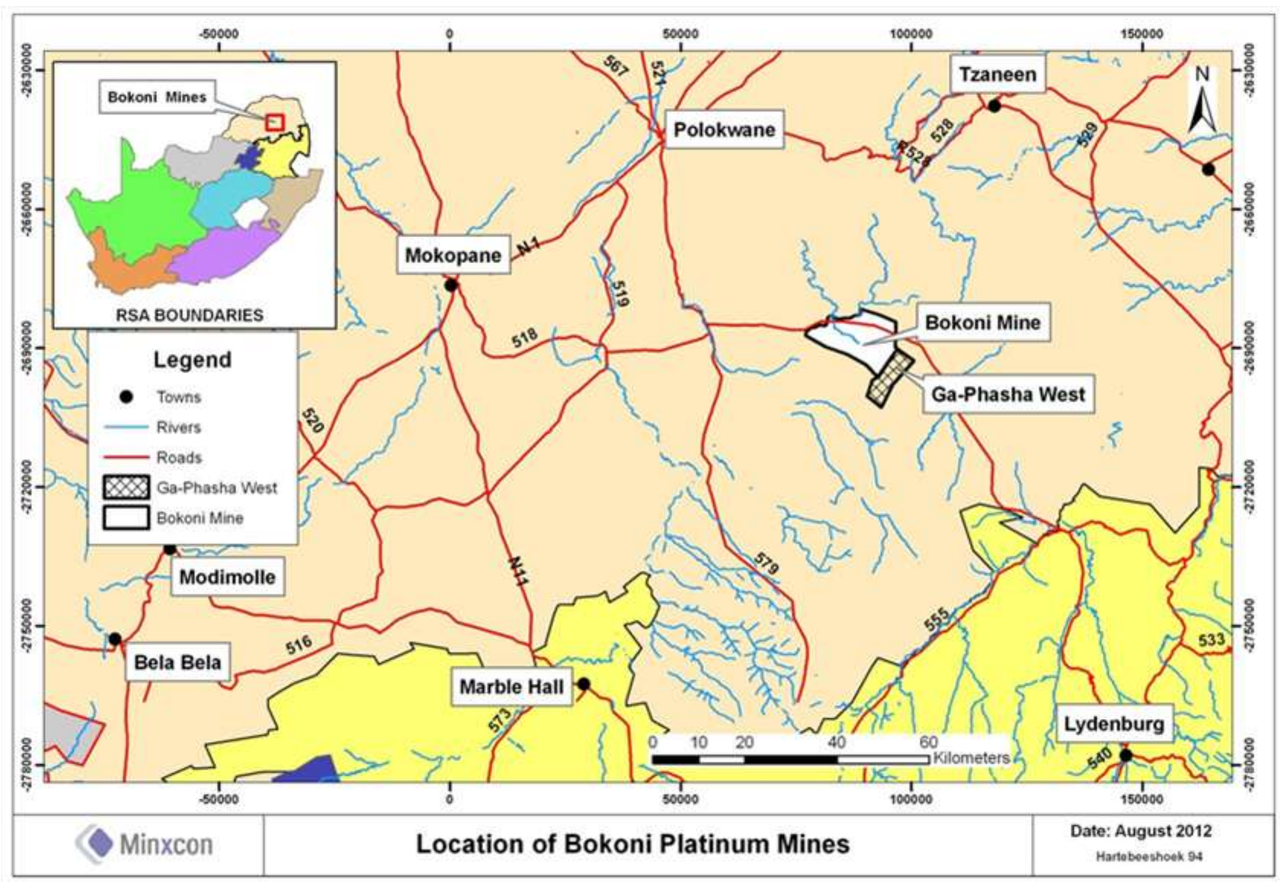
Bokoni Mine is situated in the Sekhukhuneland District of the Limpopo Province, the northernmost province of South Africa. It is located approximately 80 km southeast of Polokwane, the provincial capital, and approximately 330 km northeast of Johannesburg. The area is serviced by the R37, a tarred road that runs between Polokwane and Lydenburg.

The project is centred around the following coordinates on the Hartebeeshoek 94 coordinate system:-

- Latitude: 24° 17' 20" S; and
- Longitude: 29° 52' 23" E.

The location of the Bokoni Mine can be seen in the figure below.

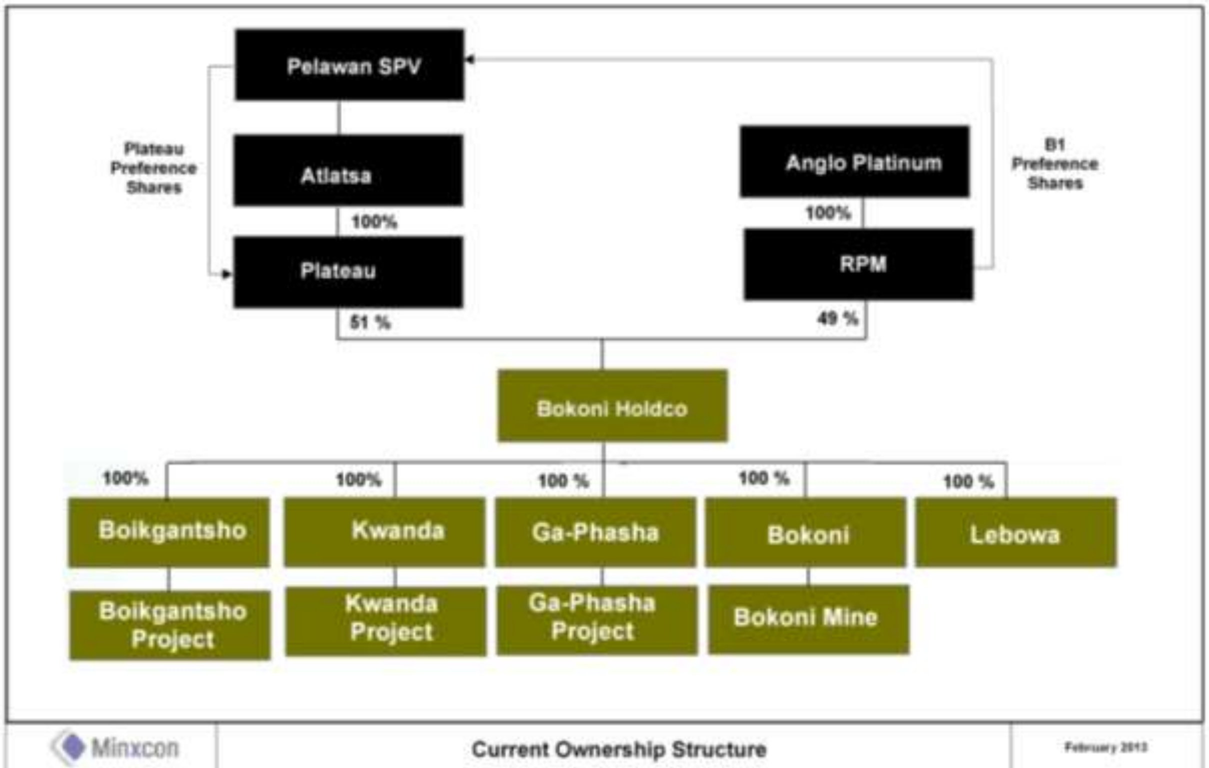
General Location of Bokoni Mine



Item 1 (b) – Ownership of the Property

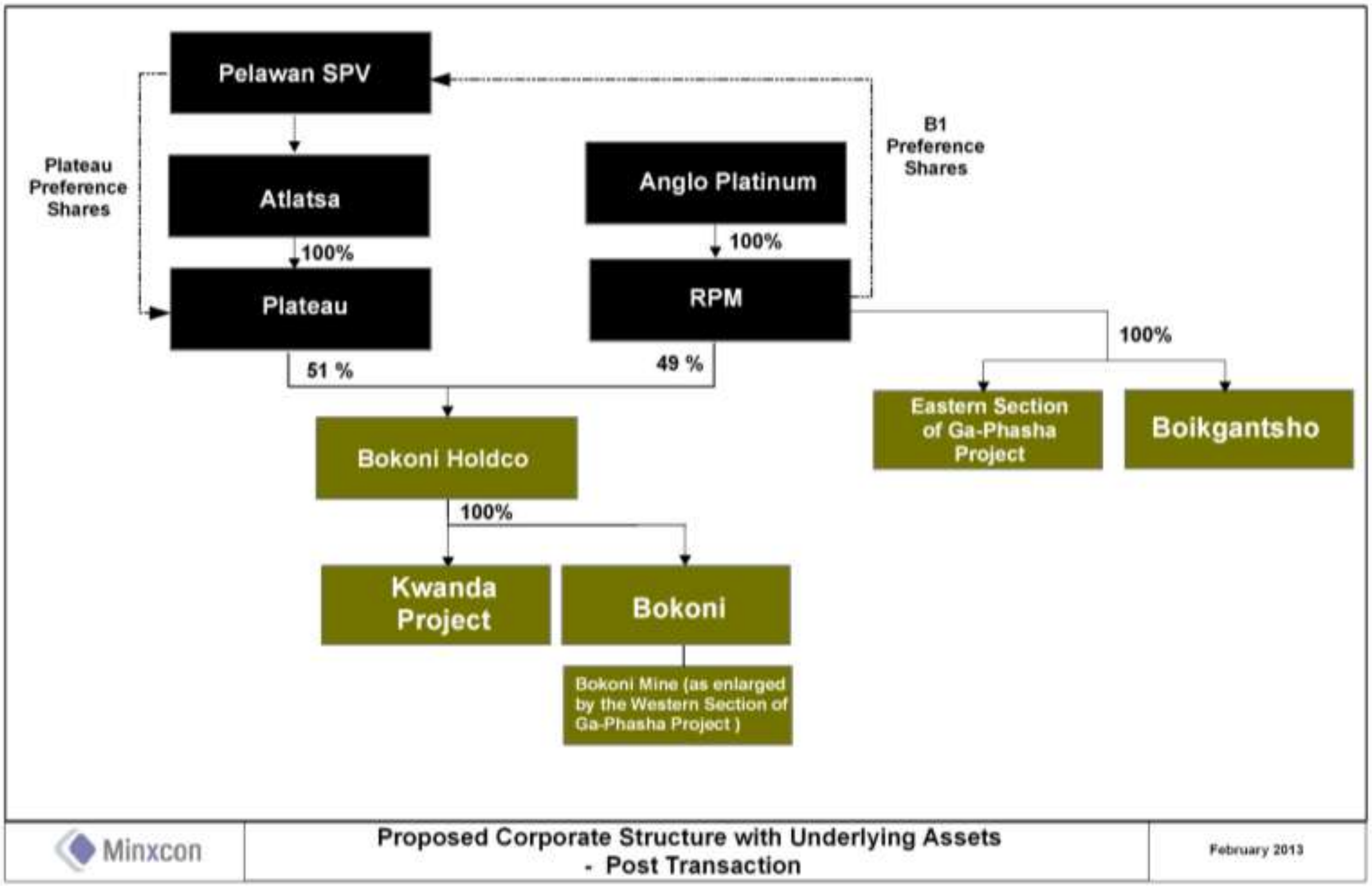
In 2008, Anooraq entered into a Transaction Framework Agreement with Amplats, whereby Amplats sold an effective 51% of Lebowa Platinum Mine to Anooraq, together with an additional 1% interest in each of the Ga-Phasha, Boikgantsho and Kwanda Joint Venture Projects, resulting in Anooraq holding a controlling interest in each of these projects. Lebowa Platinum Mine was renamed Bokoni Mine.

Current Ownership Structure



On 2 February 2012, Atlatsa released the key terms of an agreement with Amplats in respect of a transaction to restructure, recapitalise and refinance Atlatsa and the Bokoni Platinum Holdings (Proprietary) Limited ("Bokoni Holdings") group of companies (the "Bokoni group"). Amplats will, through a series of related transactions, acquire the whole of the Boikgantsho project and the Eastern section of the Ga-Phasha PGM project (the "Ga-Phasha Project").

Proposed Ownership Structure



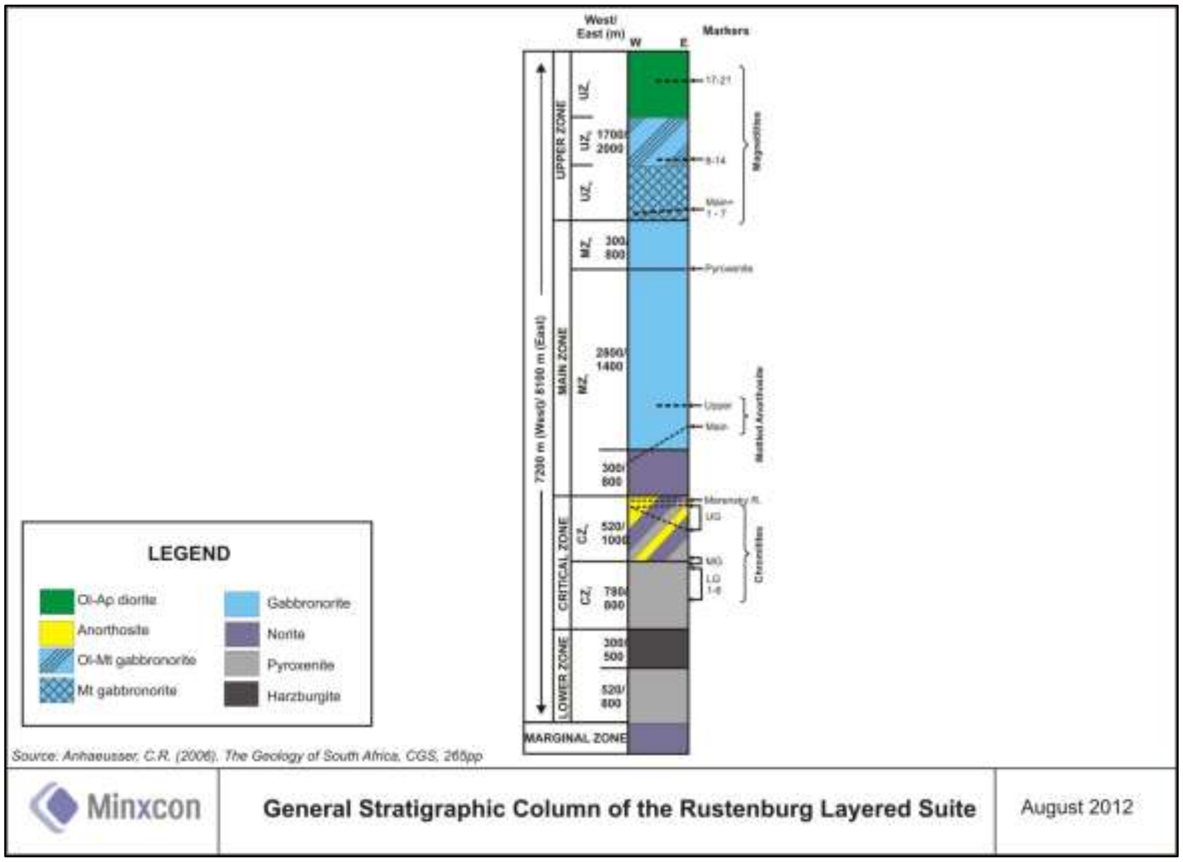
Item 1 (c) – Geology and Mineral Deposit

The Bushveld Complex ("BC"), a large layered igneous intrusive body in South Africa, together with the Great Dyke in Zimbabwe and the Stillwater Complex in Montana (United States of America) are good examples of stratified mafic and ultramafic intrusive complexes. The BC is host to extensive Resources of platinum group elements ("PGEs"): chromite, titanium and vanadium. The UG2 and Merensky Reefs constitute the mineralised units of the Project Area that form part of the Rustenburg Layered Suite ("RLS") of the Eastern Limb of the BC.

The Project Area (Bokoni Mine and Western portion of Ga-Phasha) is underlain by Main Zone ("MZ") and Critical Zone ("CZ") lithologies. Both the MZ and CZ outcrop on the Project Area. The UG2 and Merensky Reefs form part of the Upper Critical Zone ("UCZ"). The primary economic orebody is the UG2 Reef at the majority of the operations located in this area of the Eastern Limb. Both the UG2 and Merensky Reefs outcrop in this area and dip gently to the west at between 10° and 20°. Locally, dips may exceed this. The stratigraphic distance between the UG2 Reef and the overlying Merensky Reef varies between 240 m and 400 m, and comprises mafic and ultramafic cumulate units. Generally, both the UG2 and Merensky Reefs are oxidised at surface.

The UG2 and Merensky Reefs can be summarised as laterally and down-dip persistent economic PGE deposits. Local structures such as faults, shear zones and dykes, as well as replacement pegmatoids and potholes may locally affect the continuity of the layers. Both economic units tend to have characteristic vertical grade profiles with regard to PGEs, as well as the development of characteristic hanging-wall and footwall stratigraphy.

Generalised Stratigraphy of the Rustenburg Layered Suite



The UG2 and Merensky Reefs at the Project Area host polymetallic deposits. The prill ratio refers to the ratio of the four elements comprising a 4E (Pt, Pd, Rh, Au) PGE grade. The following table summarises the prill ratios for the UG2 and Merensky Reefs at Bokoni Mine.

Prill Ratios for the UG2 and Merensky Reefs at Bokoni Mine

Reef	Prill Ratio (Pt:Pd:Rh:Au) (%)
Merensky Reef	62 : 29 : 4 : 5
UG2 Reef	42 : 46 : 9 : 3

Item 1 (d) - Status of Exploration

Bokoni is currently a mature producing mine with brownfields exploration taking place. The brownfields exploration is in the form of underground diamond drilling. The geology is well-understood with an extensive database of drillhole data as well as underground chip sampling information.

No new surface drillholes were drilled in 2010 and 2011 and due to technical problems with the GMSI Sampling system, no new underground data was available for this period. The GMSI Sampling system is a sampling capture and reporting system designed for underground chip sampling data. Some data from underground diamond drilling has now been corrected and verified and brought into the estimate for 2012. Similarly, the underground channel sampling which was excluded from the 2011 Mineral Resource estimate has now been corrected and verified by ExplorMine and a large proportion of this data is included in the estimate presented in this Report. Surface drilling is currently taking place on the Klipfontein farm in the Ga-Phasha West Area, the details and results of this drilling will be available for the following financial year.

Item 1 (e) – MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

Mineral Resources

The following table summarises the Mineral Resources for the Bokoni Mine as at 30 June 2012, the cut-off grades were applied per respective investment centre (shafts) before combining all the investment centres into the table below. The individual cut-offs are tabulated in Table 18.

Mineral Resource Estimate for the Merensky and UG2 Reefs for the Bokoni Mine and Ga-Phasha West Areas combined as at 30 June 2012

Mineral Resource Category	Reef Type	SG t/m^3	Tonnage Mt	4E Grade g/t	Pt Grade g/t	Pd Grade g/t	Rh Grade g/t	Au Grade g/t	Cu Grade %	Ni Grade %	Content 4E Kg's ('000)	Content 4E Moz	SMW cm
Measured	MR	3.37	94.6	5.32	3.25	1.59	0.18	0.31	0.08	0.20	503	16.20	110
Measured	UG2	3.93	213.9	6.17	2.54	3.03	0.50	0.11	0.05	0.16	1320	42.50	110
Total Measured	**MR + UG**		**308.5**	**5.91**	**2.76**	**2.59**	**0.40**	**0.17**	**0.06**	**0.17**	**1823**	**58.70**	**110**
Indicated	MR	3.04	52.7	5.27	3.21	1.56	0.18	0.32	0.09	0.21	278	8.90	110
Indicated	UG2	3.93	109.4	6.24	2.56	3.06	0.50	0.11	0.05	0.17	683	21.90	110
Total Indicated	**MR + UG**		**162.1**	**5.92**	**2.77**	**2.57**	**0.40**	**0.18**	**0.06**	**0.18**	**961**	**30.80**	**110**
Meas + Ind	**MR**	**3.37**	**147.3**	**5.30**	**3.23**	**1.57**	**0.18**	**0.31**	**0.08**	**0.21**	**781**	**25.10**	**110**
Meas + Ind	**UG2**	**3.93**	**323.3**	**6.20**	**2.55**	**3.04**	**0.50**	**0.11**	**0.05**	**0.16**	**2003**	**64.40**	**110**
Total Meas + Ind	**MR + UG**		**470.6**	**5.92**	**2.76**	**2.58**	**0.40**	**0.17**	**0.06**	**0.18**	**2784**	**89.50**	**110**
Inferred	MR	3.37	192.9	4.98	3.07	1.44	0.18	0.29	0.09	0.21	961	30.90	110
Inferred	UG2	3.93	196.9	6.34	2.59	3.12	0.51	0.12	0.05	0.17	1248	40.10	110

Notes:

1. 49% is attributable to Anglo American Platinum.
2. 4E refers to platinum (Pt), palladium (Pd), rhodium (Rh) and gold (Au).
3. Cut-offs have been applied per respective investment centre. The total Resource area is above the cut-offs.
4. Tonnes have been rounded off to the appropriate level of accuracy.
5. The estimate is inclusive of any Mineral Reserve declared.
6. UG2 Prill Ratio: Pt : Pd : Rh : Au - 42 : 46 : 9 : 3.
7. Merensky Reef Prill Ratio: Pt : Pd : Rh - Au 62 : 29 : 4 : 5.
8. An 11% geological loss has been applied to the UG2 Reef.
9. A 17.5% geological loss has been applied to the Merensky Reef.
10. 1kg = 32.15076 oz.

Mineral Resource Estimate for the Merensky and UG2 Reefs for the Ga-Phasha West Area as at 30 June 2012

Mineral Resource Category	Reef Type	Resource cut off	SG	Tonnage	4E Grade	Pt Grade	Pd Grade	Rh Grade	Au Grade	Cu Grade	Ni Grade	Content 4E	Content 4E	SW
		cm.g/t	t/m^3	Mt	g/t	g/t	g/t	g/t	g/t	%	%	Kg's ('000)	Moz	cm
Measured	MR	245	3.37	20.10	4.52	2.73	1.35	0.15	0.30	0.08	0.21	91	2.9	110
Measured	UG2	327	3.93	40.40	6.00	2.53	2.86	0.51	0.10	0.03	0.15	243	7.8	110
Total Measured	**MR + UG**			**60.50**	**5.51**	**2.60**	**2.36**	**0.39**	**0.17**	**0.05**	**0.17**	**334**	**10.7**	**110**
Indicated	MR	245	3.04	37.70	4.97	3.04	1.44	0.18	0.31	0.08	0.21	187	6.0	110
Indicated	UG2	327	3.93	60.80	5.84	2.46	2.79	0.50	0.10	0.03	0.15	355	11.4	110
Total Indicated	**MR + UG**			**98.50**	**5.51**	**2.68**	**2.27**	**0.38**	**0.18**	**0.05**	**0.17**	**543**	**17.4**	**110**
Meas + Ind	**MR**	245	**3.37**	**57.80**	**4.82**	**2.93**	**1.41**	**0.17**	**0.31**	**0.08**	**0.21**	**278**	**9.0**	**110**
Meas + Ind	**UG2**	327	**3.93**	**101.20**	**5.90**	**2.49**	**2.82**	**0.50**	**0.10**	**0.03**	**0.15**	**598**	**19.2**	**110**
Total Meas + Ind	**MR + UG**			**159.00**	**5.51**	**2.65**	**2.31**	**0.38**	**0.18**	**0.05**	**0.17**	**876**	**28.2**	**110**
Inferred	MR	245	3.37	177.80	5.32	3.25	1.60	0.18	0.30	0.09	0.22	946	30.4	110
Inferred	UG2	327	3.93	123.00	6.26	2.61	3.00	0.54	0.10	0.04	0.16	770	24.7	110

***Notes*:**

1. 49% is attributable to Anglo American Platinum.
2. 4E refers to platinum (Pt), palladium (Pd), rhodium (Rh) and gold (Au).
3. Tonnes have been rounded off to the appropriate level of accuracy.
4. The estimate is inclusive of any Mineral Reserve declared.
5. UG2 Prill Ratio: Pt : Pd : Rh : Au - 42 : 46 : 9 : 3.
6. Merensky Reef Prill Ratio: Pt : Pd : Rh - Au 62 : 29 : 4 : 5.
7. An 11% geological loss has been applied to the UG2 Reef.
8. A 17.5% geological loss has been applied to the Merensky Reef.
9. 1kg = 32.15076 oz.

Mineral Reserves

The Mineral Reserves as stated by Minxcon for the Bokoni Platinum Mine is illustrated in the table below.

Mineral Reserves for the Bokoni Mine as at 31 December 2012

Area	Mineral Reserve Category	Reef Type	Tonnage	Grade 4E	Content 4E	Content 4E
			Mt	g/t	kg	Moz
Brakfontein	Proven	Merensky	23.72	4.92	116,801	3.76
	Probable	Merensky	0.03	4.22	119	0.004
	Proven and Probable	Total	23.75	4.92	116,921	3.764
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage Mt**	**Grade 4E g/t**	**Content 4E kg**	**Content 4E Moz**
Vertical	Proven	Merensky	1.06	4.18	4,430	0.14
	Probable	Merensky	0.00	0.00	-	0.00
	Proven and Probable	Total	1.06	4.18	4,430	0.14
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage Mt**	**Grade 4E g/t**	**Content 4E kg**	**Content 4E Moz**
UM2	Proven	Merensky	0.23	3.86	900	0.03
	Probable	Merensky	0.00	0.00	-	0.00
	Proven and Probable	Total	0.23	3.86	900	0.03
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage Mt**	**Grade 4E g/t**	**Content 4E kg**	**Content 4E Moz**
Middelpunt Hill	Proven	UG2	22.27	5.46	121,586	3.91
	Probable	UG2	13.76	5.41	74,454	2.39
	Proven and Probable	Total	36.03	5.44	196,040	6.30
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage Mt**	**Grade 4E g/t**	**Content 4E kg**	**Content 4E Moz**
Klipfontein Opencast	Proven	Merensky	2.75	3.46	9,511	0.31
	Probable	Merensky	0.00	0.00	-	0.00
	Proven and Probable	Total	2.75	3.46	9,511	0.31
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage Mt**	**Grade 4E g/t**	**Content 4E kg**	**Content 4E Moz**
Ga-Phasha West	Proven	Merensky	5.09	4.41	22,446	0.72
	Probable	Merensky	0.00	0.00	-	0.00
	Proven and Probable	Total	5.09	4.41	22,446	0.72
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage Mt**	**Grade 4E g/t**	**Content 4E kg**	**Content 4E Moz**
Total Bokoni	Proven	Merensky	32.85	4.69	154,088	4.95
	Proven	UG2	22.27	5.46	121,586	3.91
	Probable	Merensky	0.03	4.22	119	0.004
	Probable	UG2	13.76	5.41	74,454	2.39
	Proven and Probable	**Merensky**	**32.88**	**4.69**	**154,208**	**4.96**
	Proven and Probable	**UG2**	**36.03**	**5.44**	**196,040**	**6.30**
	Total Reserves	**Total**	**68.91**	**5.08**	**350,248**	**11.26**

Notes:

1. Tonnages refer to tonnes delivered to the metallurgical plant.
2. No vampings is included in the 2012 reserve statement tonnes.
3. Minimum stoping width of 110cm applied.
4. All figures are in metric tonnes.
5. 1kg = 32.15076 oz.
6. Pay limit: Brakfontein 4.02 g/t; Vertical 3.40 g/t; UM2 2.21 g/t; Middelpunt Hill 3.30 g/t.
7. Pay limit calculated: US$/oz = 1750 & R/US$ = 6.95.

Item 1 (f) – Development and Operations

Plant and Metallurgy

There are two concentrators at the Bokoni Platinum Mine: the Merensky Plant commissioned in 1991 and the Upper Group 2 Reef ("UG2") Plant commissioned in 2003. They are located alongside each other, adjacent to the mine shaft. The Merensky Concentrator with a capacity of 85 kilotonnes per month ("ktpm") is currently dedicated to processing ore from the Vertical Shaft and the UM2 Inclined Shaft. The UG2 plant with a capacity of 70 ktpm is dedicated to processing ore from the Middelpunt Hill UG2 adits and decline.

The UG2 plant consists of a crushing circuit followed by a conventional mill-float-mill-float ("MF2") circuit. The Merensky Plant comprises a regrind circuit consisting of cyclones and regrind mill which processes secondary rougher tails. Concentrates are thickened and then filtered before dispatch to the platinum refineries. Final tailings from each plant are thickened before being pumped to the respective tailings dams. The following average recoveries were achieved at the concentrators in 2012:

Plant Recovery Factors

Item	Merensky Reef	UG2
4E Recovery	90.7%	88.6%

Item 1 (g) - Market Valuation

The valuator performed an independent valuation on the Bokoni Platinum Mine and its resources.

The Discounted Cash Flow ("DCF") is based on the production schedule and all costs and capital associated to develop, mine and process the Reserve. Relevant taxation and other operating factors, such as recoveries, stay-in-business costs and contingencies were incorporated into the valuation to produce a cash flow over the life cycle of the project.

In generating the financial model and deriving the valuations, the following was considered:

- This report details the optimised cash flow model with consensus Economic input parameters.
- The DCF valuation was set up in financial years ending December.
- A hurdle rate of 9.73% based on the weighted average cost of capital (in real terms) was used for the discount factor.
- The impact of the Mineral Royalties Act using the formula for unrefined metals with a ceiling of 7% on revenue generated was included.
- An effective valuation date of 1 January 2013 was used.
- Sensitivity analyses were performed to ascertain the impact of discount factors, commodity prices, total working costs and capital expenditures.
- Valuation of the tax entity was performed on a stand-alone basis.
- The full value of the operation was reported – no attributable value was calculated.

Because the DCF is based on reserves which utilises only a small portion of the total resource, the DCF does not represent the full value and the value of residual resources was added. The residual resources are the total resources minus the resources used in the mine plan to state the reserves. The value of the residual resources was calculated using the market approach. These two values together represent the full value of the Project.

The following section includes the macro-economic and commodity price forecasts for the operations over the LoM. Forecast data is based on projections of the different commodity prices and the country-specific macro-economic parameters and is presented in calendar years.

Macro-Economic Forecasts and Commodity Prices over the LOM

		2013	2014	2015	2016	2017	Long-Term
	Year	1	2	3	4	5	6
Exchange Rate	ZAR/USD	8.61	8.50	8.84	8.90	8.94	9.19
Inflation Rate	SA	5.63%	5.30%	4.90%	4.60%	4.60%	4.60%
Inflation Rate	US	1.94%	2.40%	2.40%	2.40%	2.50%	2.50%
Basket Price	USD/Pt oz	2,312	2,386	2,439	2,431	2,448	2621
Gold	USD/oz	1,794	1,675	1,545	1,364	1,281	1,220
Platinum	USD/oz	1,692	1,727	1,755	1,740	1,731	1,801
Palladium	USD/oz	722	780	797	791	797	806
Rhodium	USD/oz	1,545	1,639	1,732	1,746	1,774	1,741
Nickel	USD/t	18,363	20,074	20,913	21,458	21,036	20,377
Copper	USD/t	8,122	7,866	7,340	6,888	6,515	5,875
Ruthenium	USD/oz.	85	85	85	85	85	85
Iridium	USD/oz.	1,025	1,025	1,025	1,025	1,025	1,025
Cobalt	USD/t	14,900	14,900	14,900	14,900	14,900	14,900

The financial model was cut in year 2046 (34 years) when the cash flow turns negative. The Reserve tonnes cut are 1.714 million tonnes. The saleable product produced is displayed in the table below.

Saleable Product

Tonnes Produced			Cut Model
Tonnes to mill		tonnes	68,754,334
Mill Head grade	Precious metals (4E)	4E g/t	5.77
Recovered Grade			
Recovered grade	Precious Metals (4E)	g/t	4.97
Metal Recovered			
Metal recovered	Platinum	oz	5,010,897
Metal recovered	Palladium	oz	3,929,150
Metal recovered	Rhodium	oz	654,611
Metal recovered	Gold	oz	296,226
Metal recovered	Iridium	oz	199,279
Metal recovered	Ruthenium	oz	906,433
Metal recovered	Nickel	tonnes	68,771
Metal recovered	Copper	tonnes	37,920
Metal recovered	Cobalt	tonnes	994

Operating costs comprise on-mine costs related to direct stoping and development, production services and supervision, underground transport, hoisting, pumping and ventilation, underground and surface engineering, plant operating costs and general overheads which includes central services. Other costs include general overheads, costs associated with Mine Health and Safety Regulations, Occupational Health, National Skills Fund, cost to mitigate socio-economic conditions of directly-affected persons, and environmental costs.

Summary of Operating Costs (LoM)

Net Turnover	ZAR/Milled tonne	1,743
Mine Cost	ZAR/Milled tonne	710
Plant Costs	ZAR/Milled tonne	186
Cash Operating Costs	**ZAR/Milled tonne**	**895**
Royalties	ZAR/Milled tonne	71
Total Cash Costs	**ZAR/Milled tonne**	**966**
Other Costs	ZAR/Milled tonne	149
Total Production Costs	**ZAR/Milled tonne**	**1,115**
EBITDA	ZAR/Milled tonne	628
Capex	ZAR/Milled tonne	120
Notional Cost	**ZAR/Milled tonne**	**1236**
EBITDA Margin	%	36%
NCE Margin	**%**	**29.11%**
Platinum Equivalent	oz	7,332,706
Notional Cost	**USD/ Platinum oz.**	**1269**
Palladium Equivalent	oz	16,374,179
Notional Cost	**USD/ Palladium oz.**	**568**

A summary of the capital costs are displayed in the following table, which also shows a breakdown for the first ten years. Other infrastructure includes the capital expenditure planned for central services and which is based on the budget plan as received from Bokoni. The large amount of planned plant project capital from 2016 until 2019 is for the planned construction of the new UG2 concentrator.

Capital Summary (ZAR million)

Division	LOM	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mining	1,742	371	344	322	290	204	92	79	26	8	7
Plant	1,731	3	40	60	280	127	382	839	-	-	-
Other Infrastructure	90	15	14	13	8	8	8	8	8	8	-
Mining (SIB)	2,835	119	117	89	87	87	87	87	87	87	87
Plant (SIB)	1,459	17	19	13	23	26	26	26	51	51	51
Other (SIB)	417	25	22	13	13	13	13	13	13	13	13
Total	**8,274**	**550**	**556**	**510**	**701**	**465**	**608**	**1,052**	**185**	**167**	**158**

This valuation is based on a free cash flow and measures the economic viability of the orebody (Mineral Reserves only) to demonstrate if the extraction of the Mineral Reserves is viable and justifiable under a defined set of realistically assumed modifying factors. The model is based on financial years running from January to December, and commences on 1 January 2013. The following table illustrates the DCF value of the Project at various discount rates:

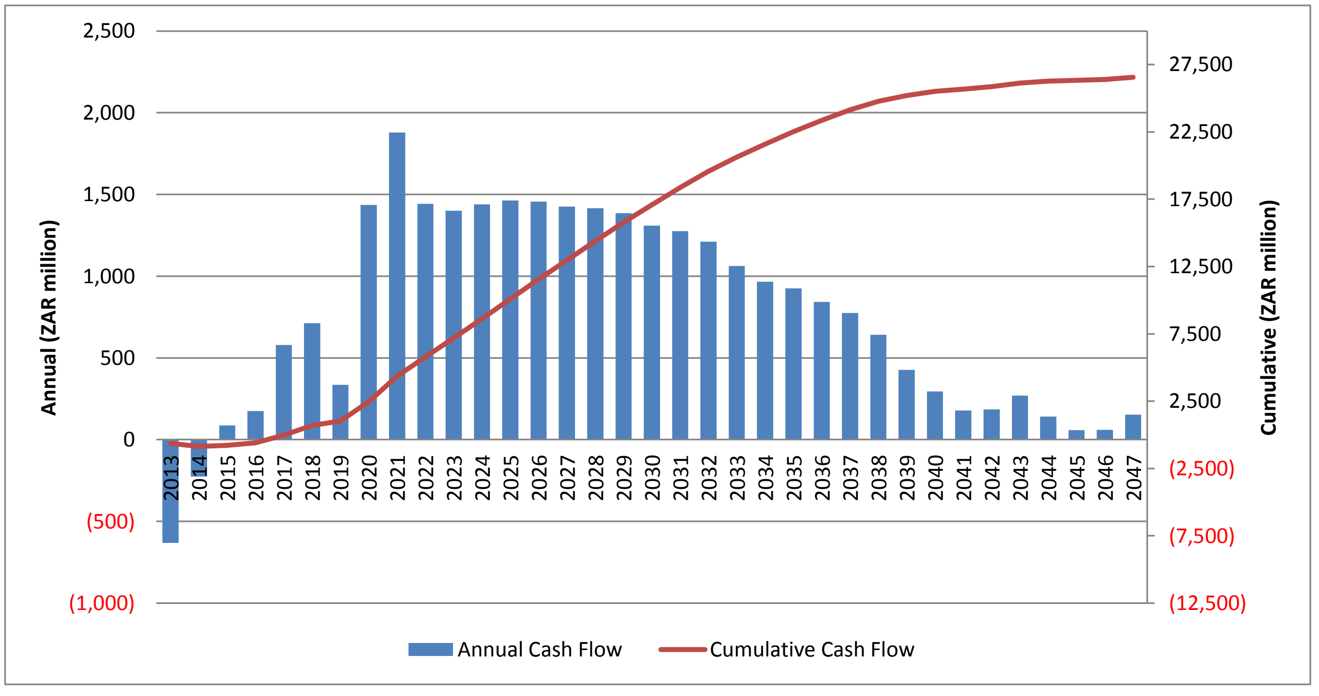
DCF Valuation at Various Discount Rates (Real Terms)

Discount Rate	NPV (ZAR million)
15.0%	4,020
12.5%	5,275
10.0%	7,006
9.73%	**7,230**
7.5%	9,450
5.0%	13,001
2.5%	18,318

A best estimate NPV of ZAR7,230 million was calculated at a WACC of 9.73%.

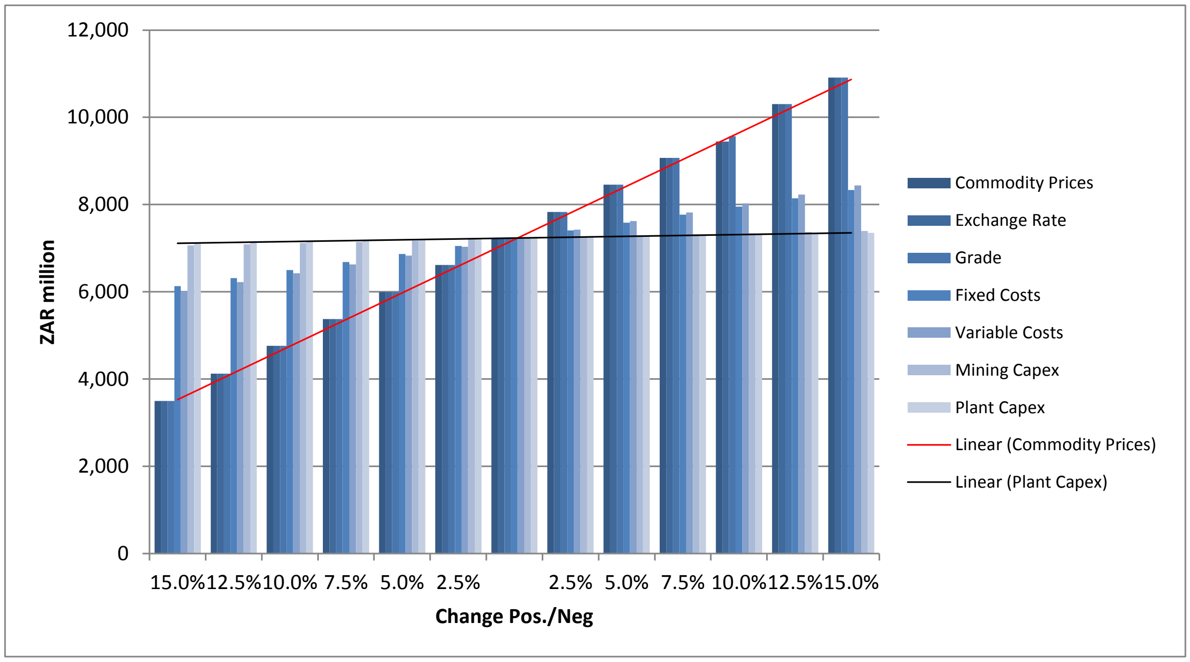
The annual and cumulative cash flow are displayed in the following figure. The highest cash flow is during 2021 showing an amount of ZAR1.878 billion.

Annual Cash Flow



Based on the real cash flows calculated in the financial model, Minxcon reported a DCF valuation and performed single-parameter sensitivity analyses to ascertain the impact on the NPV. The metal prices and exchange rates have the biggest impact on the NPV. In 2021 the mine will produce more tonnes with very little capital expenditure, which is the reason for the high cash flow during this specific year.

Sensitivity Analysis



Valuation Summary

The range of values for the Project is illustrated in the following table.

Project Valuation

Tonnage '000	Oz ('000)	USD/oz	Lower Value (ZARm)	Best Estimated Value (ZARm)	Higher Value (ZARm)
68,754	10,997	62.5	4,472	7,230	9,423

Item 1 (h) - Conclusions and Recommendations

Conclusions

Mineral Resources

- The Bokoni Mine Mineral Resource estimate on the UG2 and Merensky Reefs meets the requirement of reasonable prospects for eventual economic extraction.
- The Bokoni Mineral Resources satisfy the requirements for Measured, Indicated and Inferred Mineral Resources for the National Instrument 43-101.

Mining

- The 2012 LoM plan is deemed realistic and achievable.
- The modifying factors that were applied to the Mineral Resources to convert it to Mineral Reserves are realistic.
- The life of mine is long, approximately 39 years for the UG2 reef and 28 years for the Merensky reef.
- It is a mature, well-established operation.
- By including the Klipfontein (Ga-Phasha West) portion in future LoM planning and Mineral Reserve estimations, an upside potential is created.

Processing

- The ore metallurgy is well-known and understood. No foreseeable changes in ore mineralogy are expected.

- The two plants at Bokoni are reasonably designed and can perform at a higher level if adequately maintained and managed.
- On average, the Merensky plant had a higher recovery than the UG2 plant which is typical of most orebodies in the Bushveld Igneous Complex.
- Higher unit costs were recorded for the UG2 plant due to lower tonnages.
- The overall financial performance before the October labour strikes was stable. An overall opex of ZAR220/t was recorded for 2012.

Market Valuation

- The Bokoni Operation has a significant mineral resource with a long LOM on both the Merensky reef and the UG2 reef.
- A DCF value range of ZAR4.47 billion to ZAR9.42 billion with a best estimated value of ZAR7.23 billion is placed on the LOM, based on Reserve only.
- Cumulative cash flow remains negative until 2017.
- The operation has a high profitability Notional Cost Expenditure ("NCE") margin of 29% based on the economic parameters provided.
- Cash flow turns negative in 2047 in the planned area and this will need to be considered in the long-term planning of the mine. As a result, the cash flow was trimmed back to year 2046 – a life of mine of 34 years.
- The operation is highly sensitive to commodity prices and the ZAR/USD exchange rate.

Recommendations

Mineral Resources

- The underground sampling database should be reviewed and audited on a regular basis.
- Auditing and refinement of the drillhole databases (surface and underground) should be ongoing.
- Geological facies modelling should be undertaken in order to refine the geological and Mineral Resource models.

Mining

- It is recommended that pit optimisations be conducted on the Klipfontein opencast.

Processing

- It is recommended that tonnages be increased for the UG2 plant to ensure that unit costs are decreased. This is, however, dependent on supply of ore from the mine.
- The implementation of advanced process control software may increase overall plant stability during start-up, mill circuit and flotation circuit control enabling recovery improvements. It is recommended that advanced control be trialled at Bokoni to evaluate its viability.

ITEM 2 – INTRODUCTION

Item 2 (a) – ISSUER RECEIVING THE REPORT

Minxcon (Pty) Limited ("Minxcon") was commissioned by Atlatsa Resource Corporation ("Atlatsa" or "the Client") to compile an independent NI 43-101 technical report for Bokoni Platinum Mine ("Bokoni"), in the Limpopo Province of South Africa, for use in a transaction to restructure, recapitalise and refinance Atlatsa. This document is intended as a full equity evaluation of Bokoni Platinum Mine ("Bokoni Mine"), South Africa.

Item 2 (b) – TERMS OF REFERENCE AND PURPOSE OF THE REPORT

The report was compiled in compliance with the specifications embodied in the Standards of Disclosure for Mineral Projects as set out by the Canadian Code for reporting of Resources and Reserves - National Instrument 43-101 (Standards of Disclosure for Mineral Projects), Form 43-101F1 and the Companion Policy Document 43-101CP ("NI 43 101") as well as the standards and guidelines according to the Canadian institute of mining, metallurgy and petroleum on valuation of mineral properties ("CIMVAL").

The Project Area refers to the following farms: Diamand, Middelpunt, Umkoanesstad, Brakfontein, Avoca, Klipfontein, Zeekoegat, Wintersveld and Jagdlust.

In order to satisfy the requirements of National Instrument 43-101, Minxcon completed an independent valuation on the Bokoni Operations. Minxcon carried out the following scope of work for the Valuation Report:

- Visit to the Bokoni Operations
- Visit to the Bokoni offices in Johannesburg
- Use of technical and environmental reports prepared by various Consultants.
- Minxcon has not sought an independent legal opinion on the shareholding, effective rights and obligations of the Bokoni Operations.

Item 2 (c) – SOURCES OF INFORMATION AND DATA CONTAINED IN THE REPORT

The following sources of information were used to compile this report:-
This Report was prepared based on a technical review by ExplorMine Consultants ("ExplorMine") over a three-month period from January 2012 to June 2012. The effective date of the Technical Report is 30 June 2012. The following sources of information were also used to compile this report:-

- An Independent Qualified Persons' Report on the Bokoni Platinum Mine, Limpopo Province, South Africa, Anooraq Resources Corporation, Minxcon, Compiled by King H.L. *et al*, dated 22 March 2012.
- Project Geological Report, Prepared by R Booth, dated January 2007.

A detailed reference section may be found in Item 27. Appendix 1 has been added as a separate document.

Item 2 (d) – QUALIFIED PERSONS' PERSONAL INSPECTION OF THE PROPERTY

Minxcon is an independent advisory company. Its consultants have extensive experience in preparing technical and economic advisors' and valuation reports for mining and exploration companies. Neither Minxcon nor its staff have any interest capable of affecting their ability to give a fair opinion, and will not receive any pecuniary or other benefits in connection with this assignment, other than normal consulting fees.

Johan Odendaal (Director, Minxcon): BSc (Geol.), BSc. Hons. (Min. Econ.), MSc (Min. Eng.), Pr. Sci. Nat. Reg. No. 400024/04, FSAIMM Reg. No. 702615, MGSSA No. 965119, MAusIMM Reg. No. 220813, IAS

Johan has 25 years' experience in the mining and financial industry. This includes 8 years as an independent mining consultant specialising in the valuation of mining projects and 12 years as a mining analyst at two major stockbroking firms. During this time, he was rated one of the top mining analysts and became a globally recognised industry specialist. Johan inspected the property in question on 4 April 2012.

The qualified persons from ExplorMine Personnel visited the site on several occasions. The details of the site visits are detailed in Item 3 of this report.

Charles Muller: (Director, Minxcon) BSc. Hons. (Geol.), Pr. Sci. Nat (PR 400201/04)
Charles, with his wealth of knowledge in the field of geology and mineral and coal resource evaluation, fulfils Minxcon's criterion to combine skills with exceptional ability and extensive experience. Charles is proficient in data processing, orebody modelling and mineral and coal resource evaluation using Datamine™ and other computer packages specifically developed for the minerals and coal industry. During his more than 25 years in the mining industry, he has gained extensive experience in the fields of sedimentology, gold exploration and target generation of gold, platinum, diamonds, coal and base metal projects. His skills in software development, data system customisation and database integration are widely recognised in the mining industry. Charles has been involved with the modelling and geostatistical evaluation of various ore bodies across the globe. He has presented papers on mineral resource evaluation at international venues and has a number of publications to his credit. Charles did not inspect the property in question, as the inspection was undertaken by other qualified persons working on the Report.

Daniel van Heerden (Director, Minxcon): BSc (Min. Eng.), M.Comm. (Bus. Admin.), ECSA Reg. No.20050318, FSAIMM Reg. No.37309. 4
Daniel has worked in the mining industry for more than 28 years. He has a vast amount of experience in managing underground and open cast mining operations in South Africa and abroad for world-class mining majors and junior mining companies. He is responsible for new business development for two major mining companies, one of which is focused on gold, while the other deals mainly with platinum. He has experience in mining mergers and acquisitions (friendly and hostile) and related activities such as valuation, due diligence, finance structuring and change management required post the event. Daniel has also made significant contributions in the areas of ore reserve management and mine services management with the aim of improving mining productivity and reducing operating cost. Daniel inspected the property in question on 7 January 2013.

Dario Clemente (Director, Minxcon Projects): NHD (Ext. Met.), GCC, BKDP (WBS), FIMM
Dario has over 37 years' experience in the metallurgical industry, including five years abroad working for large international companies – as a Metallurgical Manager at a tungsten and tin base metal mine; and as a Technical Consultant at a polymetallic copper operation. He has extensive experience in base metal and platinum group metals refining, as well as gold and uranium metallurgy. He has also co-authored technical papers and presented his findings locally and abroad. He is currently heading the Metallurgy division of Minxcon Projects. Dario inspected the property in question on 12 October 2011.

The following individuals are the authors of the ExplorMine Technical Report titled "Technical Report, The Mineral Resource Estimate for the UG2 and Merensky Reefs at the Bokoni Platinum Mine and Ga-Phasha West Area, Limpopo Province, Republic of South Africa", dated 30 June 2012, on which the resource estimation section is based.

Messrs Mitchell and Deiss and Dr Northrop, are competent persons registered with the South African Council of Natural Scientists ("SACNASP"), as well as with various mining and geological professional bodies.

Mr Andre Deiss, BSc. (Hons.), Pr.Sci.Nat., MSAIMM.
Mr Deiss has 19 years' experience in geology and geostatistics in Southern Africa, and has worked for numerous large South African and International mining companies as a geologist. In a consulting capacity, Mr Deiss has provided geological and geostatistical services to mining companies in Southern Africa that are active in a wide scope of commodities. Mr Deiss is responsible for the geological modelling, assay and geological database compilation, data integrity, and quality control and assurance.

Dr Bill (William) Northrop, PhD, GDE, Pri.Sci.Nat., FGSSA, FSAIMM
Dr William (Bill) Northrop has 43 years' experience in the mining and exploration industry in various commodities including gold, oil, base metals, and diamonds. Dr Northrop has been involved in mines and projects throughout Southern and Eastern Africa for numerous large multinational mining companies. He has a wide range of geological, geophysical and geostatistical experience. Dr Bill Northrop is responsible for the estimation and reporting of the Mineral Resource.

Mr Garth Mitchell, BSc. (Hons.), B.Com., Pr.Sci.Nat., MSAIMM, MGSSA

Mr Mitchell is a geologist with 19 years' experience in the mining and exploration industry and has been responsible for the reporting of Mineral Resources on various properties in South Africa during the past seven years. Mr Mitchell has been employed by major South African gold mining companies since 1993 as a Mining Geologist and Exploration Geologist. He has 6 years of senior mine management experience as an Ore Reserve Manager. Mr Mitchell has consulted and contracted for numerous companies during the past 8 years. Mr Mitchell is responsible for the geological modelling, assay and geological database compilation, data integrity, and quality control and assurance.

Minxcon has scrutinised all the information provided by these companies and is satisfied that the information is sound and could be used in the Review of Bokoni Mine for the purposes of Resource and Reserve declaration and sign-off, as well as an economic valuation of the mine.

Bokoni Mine was visited on several occasions by Messrs Mitchell and Deiss in the course of the work conducted during the Mineral Resource Estimation and the compilation of this Report. The site visits to the main office complex and exploration office were affected since December 2009 and recently in January 2012. The sites were visited to collect raw data for collation and preparation of the Mineral Resource Estimate. Mr Mitchell also visited the UG2 underground stoping operations at Middlepunt.

The Anglo Platinum Limited ("Anglo Platinum") core yard located at Driekop (approximately 50 km southeast of Bokoni Mine) where all recent surface drill cores for the Bokoni Mine Property are stored was also visited during December 2009. Drilling, logging, sampling and quality control procedures were discussed with Anglo Platinum personnel.

Item 2 (e) - Forward Looking Statement

Certain statements in this report, other than statements of historical fact, contain forward-looking statements regarding the Bokoni operations, economic performance or financial condition, including, without limitation, those concerning the economic outlook for the mining and platinum industry, expectations regarding platinum prices, exchange rates, production, cash costs and other operating results, growth prospects and the outlook of operations, including the completion and commencement of commercial operations of specific production projects, its liquidity and capital resources and expenditure, and the outcome and consequences of any pending litigation or enforcement proceedings.

Although Minxcon believes that the expectations reflected in such forward-looking statements are reasonable, no assurance can be given that such expectations will prove to be correct. Accordingly, results may differ materially from those set out in the forward-looking statements as a result of, among other factors, changes in economic and market conditions, changes in the regulatory environment and other State actions, success of business and operating initiatives, fluctuations in commodity prices and exchange rates, and business and operational risk management.

ITEM 3 – RELIANCE ON OTHER EXPERTS

Minxcon has accepted the information supplied by Atlatsa and ExplorMine as valid and complete. This information applies and is not limited to drillhole data and Mineral Resource models. The estimation and compilation of the Mineral Resources for 2012 were undertaken by ExplorMine. SRK Consulting, an independent international consulting practice, audited the 2010 estimation and the methods and parameters have not changed for 2011 and 2012. The Report from SRK is available on request from the Client.

ITEM 4 – PROPERTY DESCRIPTION AND LOCATION

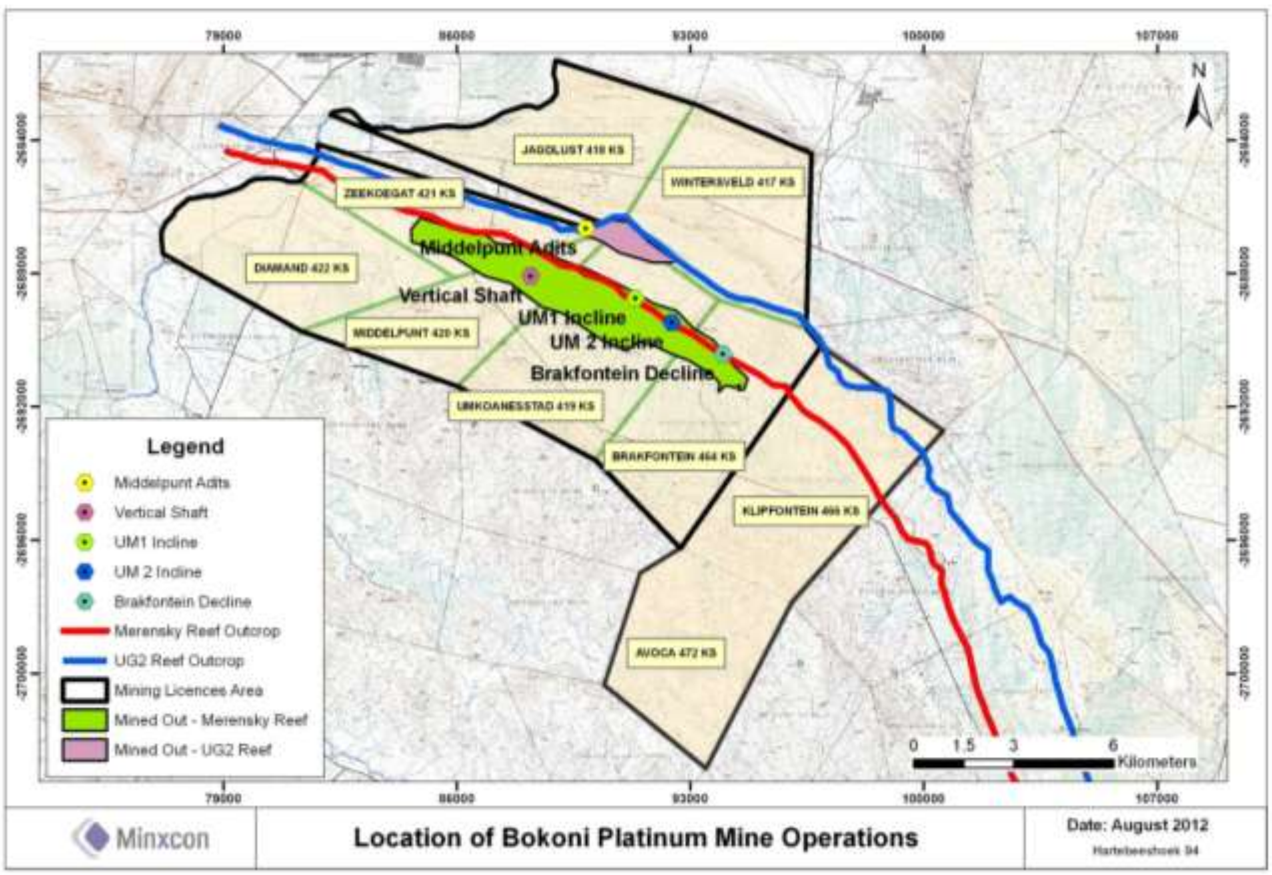
Bokoni Mine is situated in the magisterial district of Sekhukhuneland in the Province of Limpopo, the northernmost province of South Africa. The mine is located approximately 80 km southeast of the city of Polokwane, the provincial capital, and approximately 330 km northeast of Johannesburg. The area is serviced by the R37, a tarred road that runs between Polokwane and the town of Lydenburg. There is direct access along a tarred service road from the main tarred road to Bokoni Mine (Figure 1).

The project is centred on the following coordinates in the Hartebeeshoek 94 coordinate:-

- Latitude: 24° 17' 20" S; and
- Longitude: 29° 52' 23" E.

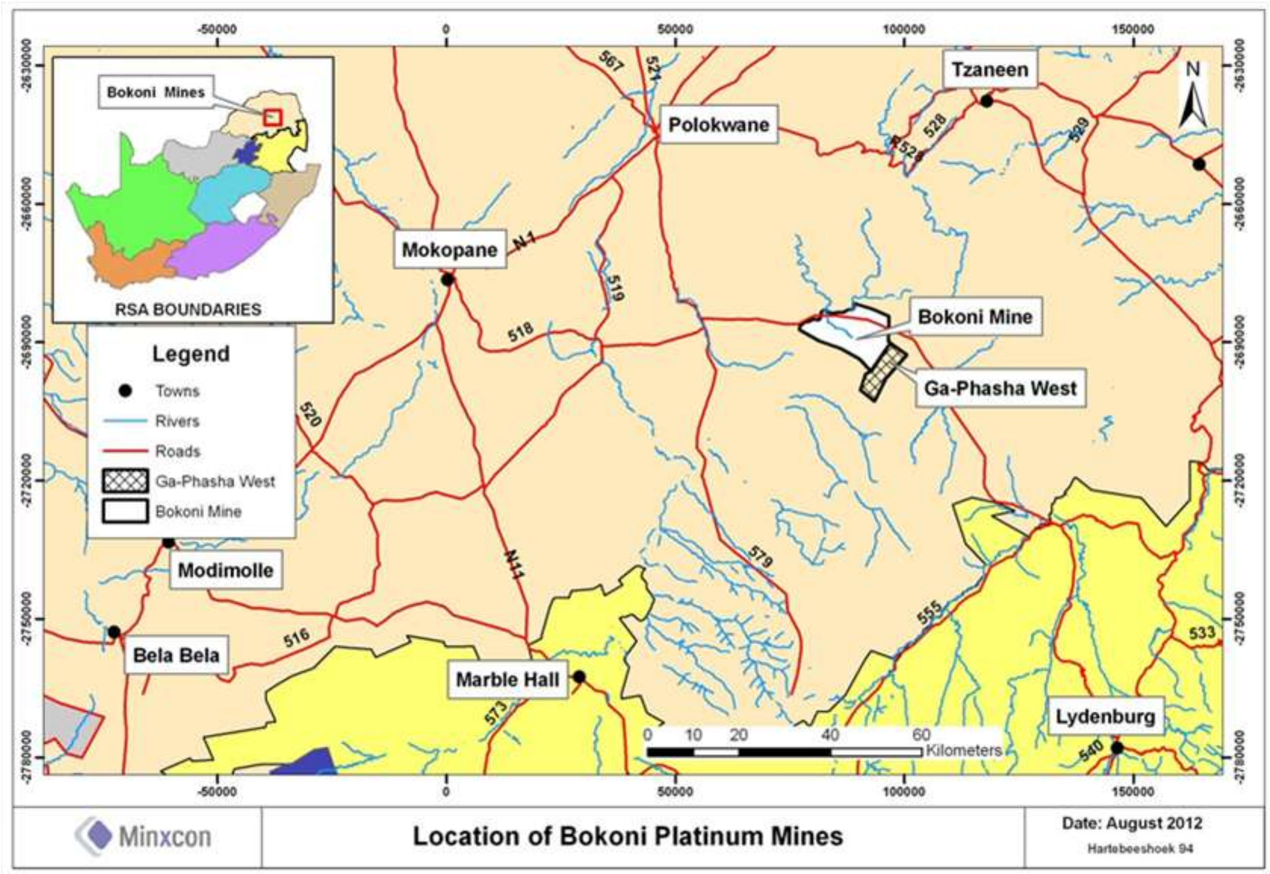
The extent of the mining license area, the various farms that compose the Bokoni project area and the locations of the various adits are illustrated in Figure 1.

Figure 1: Location of the Project Operations



The location of the Bokoni Mine can be seen in Figure 2.

Figure 2: Location of the Bokoni Mine



Bokoni consists of an opencast and an underground operation. Both UG2 and Merensky operating shafts are present, as detailed below:-

Merensky

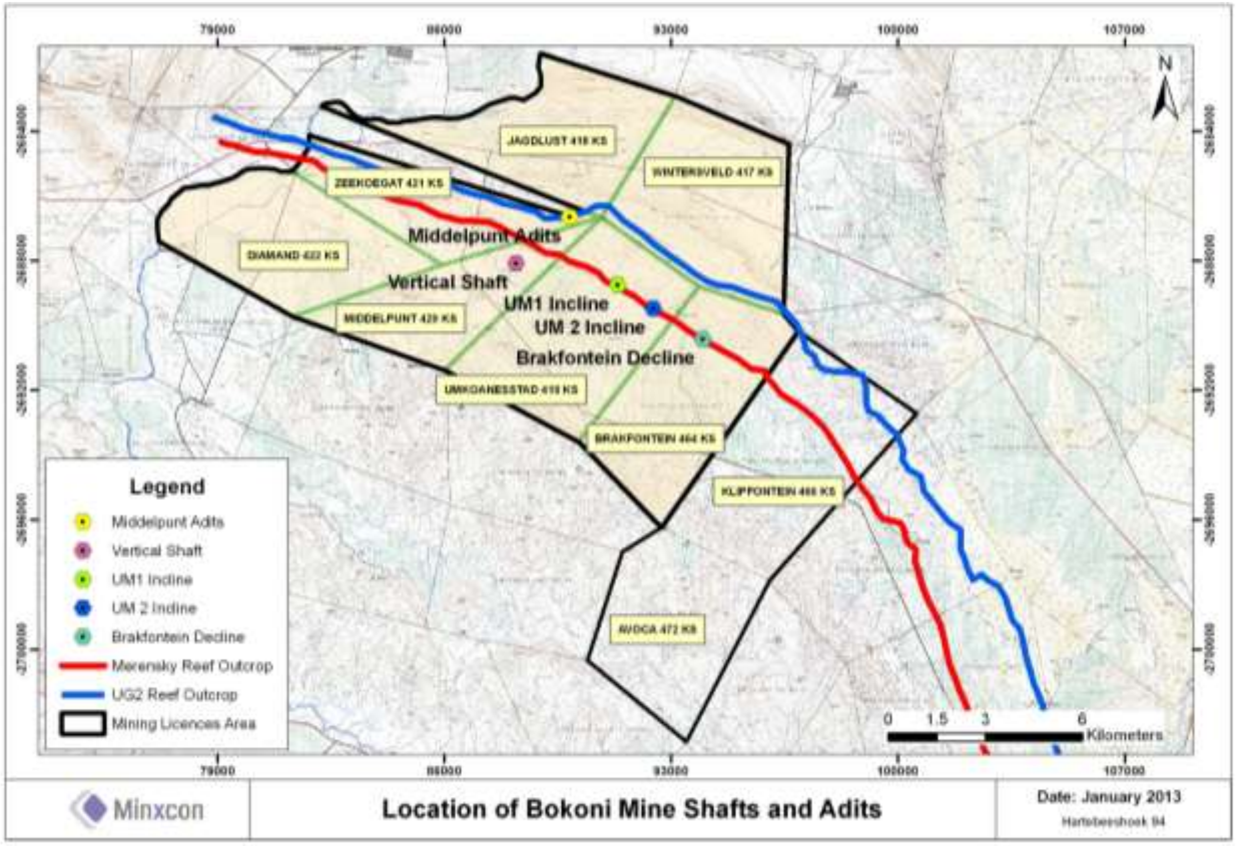
- Vertical Shaft;
- Brakfontein Shaft;
- UM2 Shaft;
- Ga-Phasha West; and
- Klipfontein opencast.

UG2

- Middelpunt Hill Shaft.

The extent of the mining license area, the various farms that compose the Bokoni project area and the locations of the various adits are illustrated in Figure 3.

Figure 3: Location of the Bokoni Mine Shafts and Adits



The location of the opencast in relation to the mining right area is depicted in Figure 4.

Item 4 (a) - AREA OF THE PROPERTY

The total surface area of the Bokoni Mine in terms of the Mining Rights is estimated at 15,460 hectares (fifteen thousand four hundred and sixty hectares) in extent and is indicated on Figure 2.

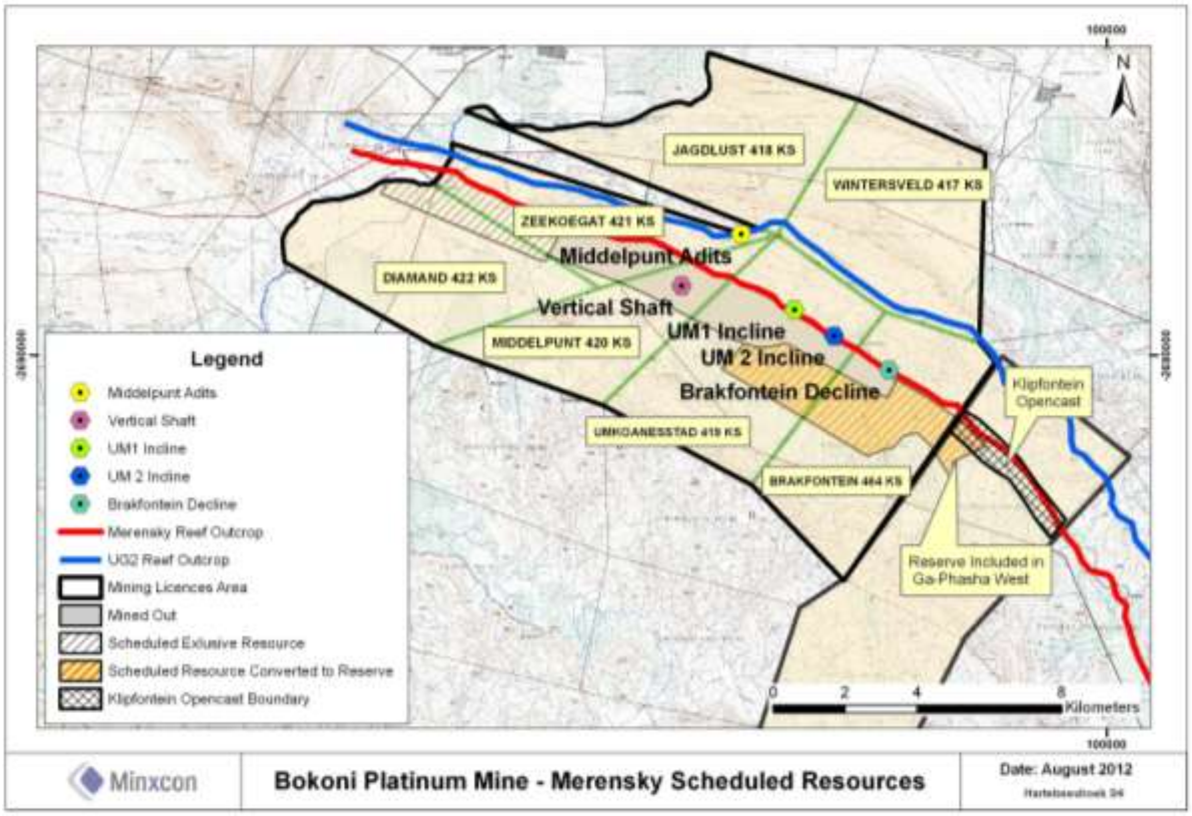
The project area stretches over parts of or all of the following farms:-

- Jagdlust 418 KS;
- Wintersveld 417 KS;
- Zeekoegat 421 KS;
- Diamand 422 KS;
- Middelpunt 420 KS;
- Umkoanesstad 419 KS; and
- Brakfontein 464 KS.

Item 4 (b) - LOCATION OF THE PROPERTY

Bokoni Mine is located approximately 80 km southeast of Polokwane in the Limpopo Province of South Africa. The extent of the mining license area, the various farms that compose the Bokoni project area and the locations of the various adits are illustrated in Figure 4.

Figure 4: Location of the Project Operations



In addition to ongoing mining operations, the future Klipfontein Opencast location is illustrated in Figure 4.

Item 4 (c) – MINERAL TENURE

South Africa has a complex system of mineral tenure, with all old order rights having to be converted to new order rights under the new regulations of the Mineral and Petroleum Resources Development Act (by 2009 for old order mining licences). As far as Minxcon and ExplorMine Consultants could ascertain, all relevant surface right permits and any other permits related to the work conducted on the properties have been obtained from the mine and are valid. Minxcon and ExplorMine are not aware of any legal proceedings that may have an influence on the rights to prospect or mine for minerals. A summary of the legal aspects and tenure relating to these areas is detailed in the following sections:-

Mining and Prospecting Rights

The legal aspects and tenure relating to the Mining Licence and Prospecting Rights of the project are detailed in

Table 1 below.

Table 1: Project Licences

Farm	New Order Licence Number	Area (ha)	Date Conversion Granted	Period Valid For
Middelpunt 420 KS	LP30/5/2/59/MR	1544.91	12/05/2008	Up to 30 Years
Diamand 422 KS		2238.65		
Umkoanesstad 419 KS		2635.1		
Zeekoegat 421 KS		2127.69		
Brakfontein 464 KS		2391.04		
Wintersveld 417 KS	LP30/5/2/65/MR	2459.75	12/05/2008	
Jagdlust 418KS		2062.63		
Klipfontein 465 KS (Ga-Phasha West)	LP30/5/2/65/MR	2841.88	29/06/2009	
Avoca 462 KS (Ga-Phasha West)	LP30/5/2/65/MR	1093.36	29/06/2009	
	Total Area	**19395.01**		

Surface Rights

The surface overlying the Bokoni Mine Property is owned by the State, and tenure to the required areas is currently held through various Surface Right Permits in terms of Section 90 of the Mining Rights Act of 1967, and lease agreements. Pursuant to Item 9 in Schedule II to the MPRDA, such Surface Rights will remain in force and attach to converted mining rights. These Surface Rights have been re-registered in accordance with the requirements of Item 9. Table 2 summarises the mining and surface rights ownership for Bokoni Mine. Surface rights were not verified by Minxcon.

No application for a surface lease will be made for the farm Avoca on Ga-Phasha West. Currently, no surface infrastructure will be required at Avoca. Due to the depth of ore below surface on the Avoca property, no mining will take place in the near future on this property. The surface lease for Umkoanesstad is still pending.

Table 2: Mining and Surface Rights for Bokoni Mine

Farm	Old Order Mining Licence (Expiry Date)	Title Deeds	Newly Granted Surface Leases (Expiry Date)
Umkoanesstad 419 KS	06/2003 (17/12/2025)	State T 7107/93	Pending
Middelpunt 420 KS	06/2003 (17/12/2025)	State T 24685/96	K5750/08: Surface lease of the portion of the farm with the State (13/09/2052)
Zeekoegat 421 KS	06/2003 (17/12/2025)	State T 5310/41	K4947/08: Surface lease of the portion of the farm with the State (13/09/2052)
Diamand 422 KS	06/2003 (17/12/2025)	State T 7107/93	K5845/08: Surface lease with the State (13/09/2052)
Brakfontein 464 KS	06/2003 (17/12/2025)	State T 3571/2000	K5820/08: Surface lease of the portion of the farm with the State (13/09/2052)

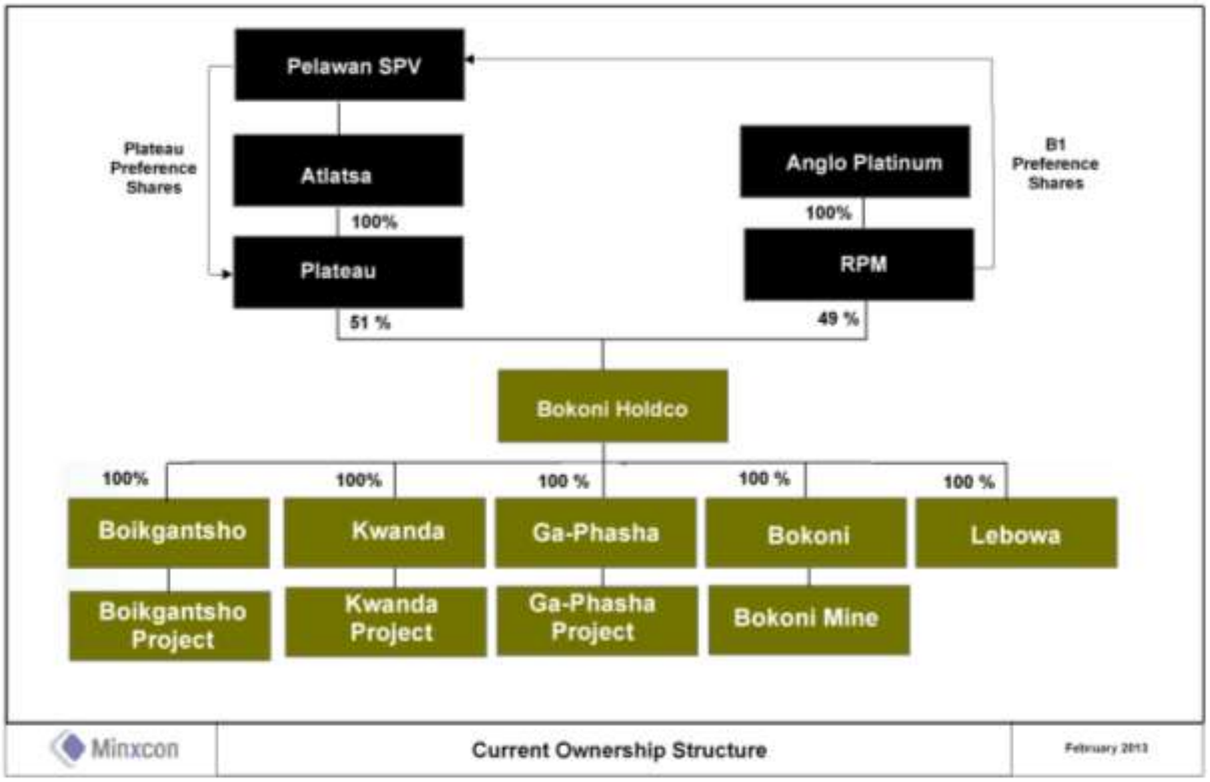
Water License

A water licence No. 24013835 was issued on 24/10/2008 which is valid for a period of thirty years and will be reviewed every five years.

Item 4 (d) - Issuer's Title to/Interest in the Property

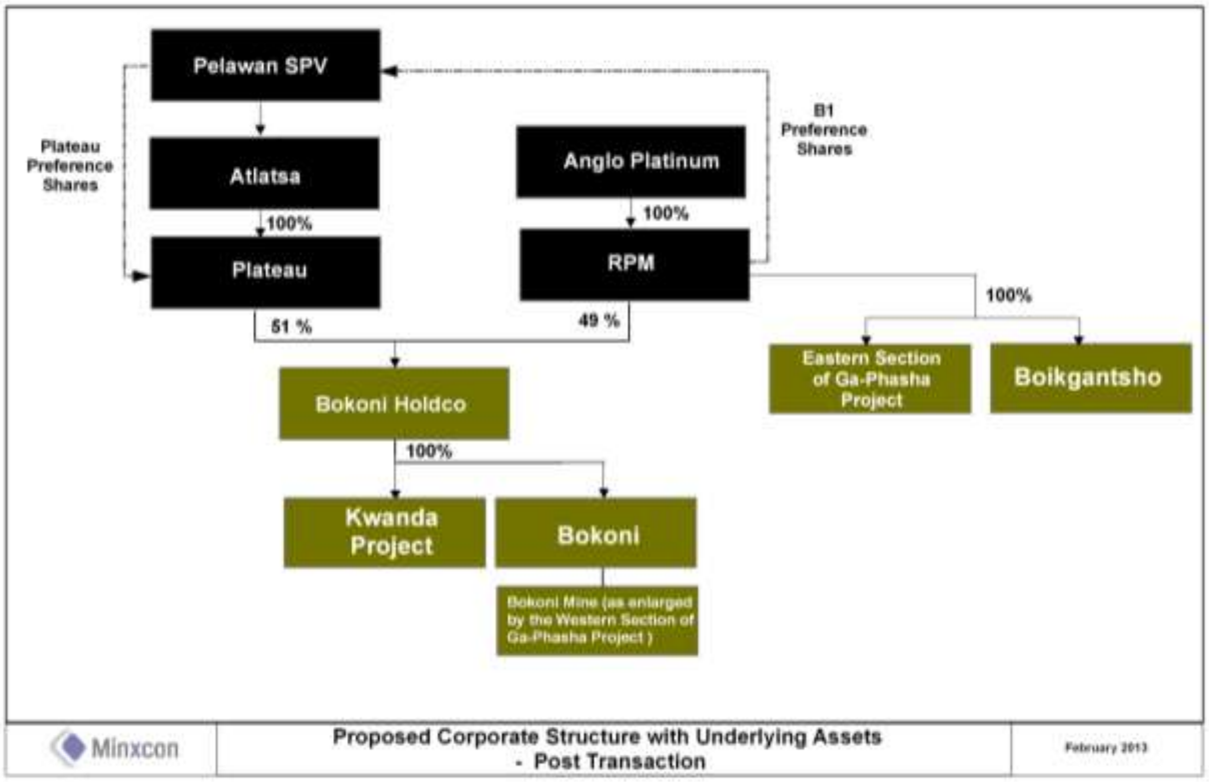
Bokoni Mine is a 51:49 joint venture between Atlatsa and Anglo American Platinum ("Amplats"). Figure 5 illustrates the current ownership structure for Bokoni Mine.

Figure 5: Current Ownership Structure



In 2012, Atlatsa and Amplats agreed to split the Ga-Phasha development project into an Eastern and Western section. The Eastern section, comprising the Paschaskraal and De Kamp mineral properties, was consolidated into Amplats' adjacent Twickenham operation, while the Western section, comprising the Klipfontein and Avoca mineral properties, was consolidated into the adjacent Bokoni Platinum Mine operations. The Western section of Ga-Phasha can be accessed through the existing shaft infrastructure at Bokoni's Brakfontein property.

Figure 6: Proposed Corporate Structure Showing Underlying Assets



Item 4 (e) – ROYALTIES AND PAYMENTS

The Mineral and Petroleum Resources Royalty Act came into effect on 1 March 2010. Under the legislation, passed in 2008, companies will have to pay extra taxes proportional to their profitability after Capex. The law requires all companies extracting minerals in South Africa to pay royalties at a rate between 0.5% and 7% based on gross sales, less their allowable deductions, depending on the refined condition of the Mineral Resources. Therefore, companies are taxed on either the refined or unrefined formula.

- Refined mineral formula = 0.5 + [EBIT/Gross sales x 12.5] x 100
- Unrefined mineral resource formula =0.5 + [EBIT/Gross sales x 9] x 100

The unrefined mineral formula was used, since the tailings are classified as untreated material, and undergoing further refining at Amplats. Due to large unredeemed Capex, the minimum rates applied for a large part of the life of the operation.

Toll Treatment of Concentrate

Other costs received from the mine also included in the model are:-

- Penalties (Net Revenue x 0.5%);
- Sample costs (Milled Tonnes x ZAR0.74); and
- Treatment costs (Milled Tonnes x ZAR21.6).

Item 4 (f) – ENVIRONMENTAL LIABILITIES

Eight environmental authorisations have been approved for Richtrau No. 177 (Pty) Ltd's Lebowa Platinum Mines Limited ("LPM"), now Bokoni Mine, by the Department of Minerals and Energy ("DME") Reference 6/2/2/318, since 1998 (Table 3). These eight authorisations covered various components and activities of the mine as it developed, and the report prepared by J9 Environmental Consultant CC, dated June 2009, is a consolidation of these documents into one environmental impact assessment report ("EIAR") and environmental management programme ("EMP").

In addition to consolidating the reports, the significant specialist studies were also updated, including surface water, ground water, air quality, noise and archaeology. New specialist studies that were deemed crucial and had not been undertaken previously, included in the latest report, are a storm water management plan and bio-monitoring assessment.

Environmental Financial Provisions (brief summary)

Environmental liability provisioning in the South African mining industry is a requirement of the MPRDA and must be agreed to with the relevant regulatory authorities (mainly the DMR and the Department of Water Affairs ("DWA"). For existing mines such as the Bokoni Mine operations, monies are accrued based on the estimated environmental rehabilitation costs (should the mine have to close) and over the operating life of a mine. Contributions are made to an environmental trust fund in this regard, which is approved by the South African Revenue Service.

Digby Wells Environmental ("Digby Wells") was appointed by Bokoni to update their environmental liability estimate at their Bokoni operations. Closure liability costs in their January 2013 Report were calculated by means of both the Department of Mineral Resources' ("DMR's") standard method for assessment of mine closure and the Digby Wells method of calculation. This has resulted in two separate closure liability costs for each of the mines. The total cost of the environmental liability, according to the DMR's rates, is ZAR119,180,523.02, while, in comparison, Digby Wells' rates is ZAR136,087,890.01.

Currently, the most significant environmental liabilities that have been identified at Bokoni Mine are dust generation from the tailings dams and seepage of contaminated water from the settling dams. The consolidated Merensky tailings dam at the Bokoni Mine has been identified as a major source of dust in this relatively arid area. At present, some remedial steps have been undertaken to allay the dust and these include partial vegetation of the slopes of the dam as well as constructing wind screens on the top of the dam. Both are considered inadequate and in the longer run, as legislation becomes stricter, it is expected that the slopes and top of the tailings dams will have to be clad with rock and/or adequately vegetated.

Initial shallow underground mining at the Bokoni Mine intersected both weathered and fractured overlying aquifers and there is an ongoing seepage of ground water into the workings from the Rapholo River. In addition, water from the decant water catchment dam below the tailings dam also seeps into the workings. Total ingress is in the order of 11,000 cubic metres per day. Subsequently there is ongoing pumping of a significant amount of water out of the mines and into surface settling dams.

Rehabilitation Trust and Guarantees (brief summary)

Minxcon was provided with documentation to the guarantee letter from Amplats for 2011, and workings supporting the calculation of the Anglo guarantee of ZAR87,027,110. Also included was the Standard Bank statement indicating the balance of the environmental investment (ZAR27.7 million) as at 31.12.2012. The Environmental Management Program includes a detailed 'Environmental Closure Assessment' detailing all areas of environmental liability. It is understood that Atlatsa will ensure that the Rehabilitation Trustfund is funded to cover the total environmental liability on closure of operations.

Surface Water (brief summary)

The mine is mainly located in the catchment of the Rapholo River (Quaternary Drainage Region B52J), which is a non-perennial tributary of the Olifants River. The main development of the mine is on the northern catchment of the river. The Rapholo is characterised by steep granite hills and highly erodible floodplains. The remainder of Richtrau, namely the MPH decline and adits, lies within the Bok River catchment, another tributary of the Olifants River. The catchment straddles the Zeekoegat and Jagdlust farms. Malips Dam is an instream dam on the Bok River used for recreational purposes by the mine. Both rivers are non-perennial, only having flow after floods or significant rains.

The specialised SRK Consulting Report No.401652 May 2009 on Surface Water Use states the following:
Potential use of surface water by surrounding communities and the environment is as follows:-

- **Domestic use** does not take place as no farmers or other parties use or rely on the Rapholo or Bok River as a water source for domestic purposes due to their ephemeral nature.
- **Livestock watering** is possible only where goats and cattle drink from water discharged into the Rapholo River by the mine.
- **Irrigation** only takes place where members of the local communities have made use of excess mine water that would otherwise be discharged to the Rapholo River.
- **Recreational use** is restricted to the Malips Dam on the Bok River where Atokia Village uses the dam for fishing.

- **Aquatic ecosystems** do not exist as the rivers are dry except during storm events.

Groundwater (brief summary)

Environmental Groundwater Solutions CC, Groundwater Monitoring Services CC and ERM undertook various groundwater investigations at the mine since 2001. During 2008 and 2009, this work was reviewed by ERM, consolidated and updated to develop a conceptual and numerical hydrogeological model and groundwater management plan for the mine.

All relevant hydrogeological, water quality, leach characteristics (tailings material) and water balance (discharge, infiltration, storage) information, collected from the various reports and sources, were collated in a master data file. This information was used in the groundwater resource assessment, refinement of the conceptual model and as input parameters for the numerical model. Following the data collation and identification of data gaps, limited intrusive investigations were carried out:-

- a borehole audit and hydrocensus;
- drilling of shallow monitoring wells in the Rapholo River;
- surface geophysical investigation;
- drilling of additional groundwater monitoring boreholes; and
- groundwater monitoring and environmental isotope sampling.

Item 4 (g) – Permits to Conduct Work

Permits and various licences are in place. The environmental permits for conducting work at Bokoni are summarised in Table 3.

Table 3: Environmental Permits for Bokoni Mine

Report Title	Report Number	Submission	Approval
LPM EMP	LPM: 63/06144/06	Oct 1997	Jun 1998
LPM EMP Amendment - Middelpunt Adit	LPM: 63/06144/06	Feb 1999	Approved
LPM EMPR Amendment - New Tailings Storage Facility	SRK: 308029	Apr 2003	Jul 2003
LPM EMPR Amendment - New Concentrator	SRK: 312871/2	Apr 2003	Sept 2003
LPM EMPR Addendum - Brakfontein shafts and infrastructure	SRK: 312871/3	Oct 2003	Nov 2003
LPM EMPR Addendum - Brakfontein & Middelpunt Hill Mine (MPH)	SRK: 312871/3	Apr 2004	Nov 2004
LPM EMPR Amendment - Ventilation Fans	LPM: 160306	Mar 2006	Jul 2007
LPM EIAR+EMP - MPH 120 ktpm & Vertical Shaft 55 ktpm	ERM: 0050275	Jan 2007	Approved

Notes:

1. LPM = Lebowa Platinum Mines
2. EMP= Environmental Management Programme
3. EMPR= Environmental Management Programme Reports

Lebowa Platinum Mines is a wholly-owned subsidiary of Bokoni Holdings. The environmental rights are still under LPM and do not need to be transferred to BPM.

A section 102 application to the DMR to incorporate Klipfontein and Avoca into the existing Bokoni Mining Right was submitted. As part of the application, an amended Mine Works Program ("MWP"), Environmental Management Program (EMP") and Social and Labour Plan ("SLP") were submitted for approval. The MWP and EMP include the opencast mining intended at Klipfontein.

Item 4 (h) – Other Significant Factors and Risks

After analysing the information provided by the client, Minxcon came to the conclusion that there are no significant factors or risks that may affect access to or work on the property.

ITEM 5 – ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

Item 5 (a) – Topography, Elevation and Vegetation

Bokoni Mine is located within a Grassland biome between a range of hills to the north and a range of low mountains to the south. The plain is divided in two by the Rapholo River, a major river in the area, which joins the Olifants River downstream. The project occurs at an elevation of between 800 m above mean sea-level ("mamsl") and 1,600 mamsl, the average altitude of the adjacent mountains. The plain, hills and mountains are sparsely vegetated with grasses, shrubs and occasional small trees with stunted growth. Indigenous trees are almost absent, except in a few localised habitats. The vegetation is dominated by grassland, but is extensively over-grazed by cattle and sheep. Notable expanses of bare soil can be seen on the surrounding properties and erosion is evident along watercourses in the area. There is some subsistence agriculture in the adjacent areas, which is limited to small family-farmed maize fields.

Item 5 (b) – Access to the Property

Bokoni Mine is accessed via the R37 tar road, which runs between Polokwane and Lydenburg, a town to the southeast situated in the Mpumalanga province. The nearest railway stations are at Polokwane and Steelpoort, which are, respectively, situated 80 km and 100 km from Bokoni Mine. Rail is, however, not the preferred means of transport and all goods and equipment are delivered to Bokoni Mine by road. The nearest commercial (domestic) airport is at Polokwane, but Bokoni Mine does have a private heliport for use by visitors and in case of emergencies.

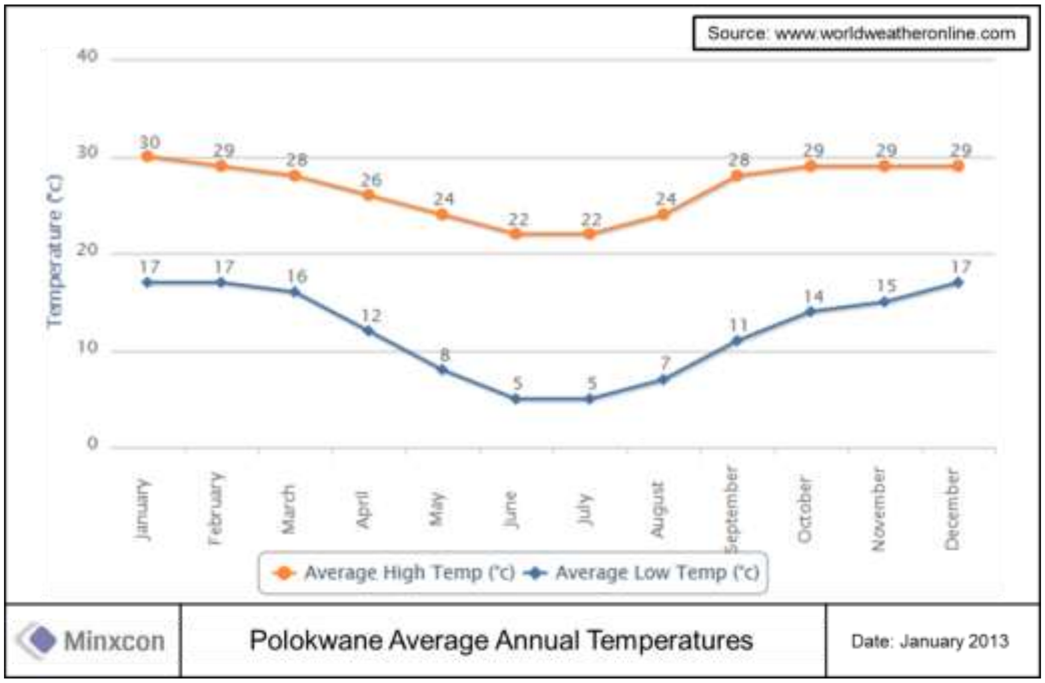
Item 5 (c) – Proximity to Population Centres and Nature of Transport

The nearest city is Polokwane, which is a modern and developing town providing housing, schooling, health care, shopping, commercial and government administrative facilities. Many Bokoni Mine employees reside in Polokwane and commute to Bokoni Mine by company bus or by private vehicle. The remaining employees are housed in a mine residential 'village' at Bokoni Mine, while some staff, who are indigenous to the area, reside in local private dwellings in the surrounding rural area.

Item 5 (d) – Climate and Length of Operating Season

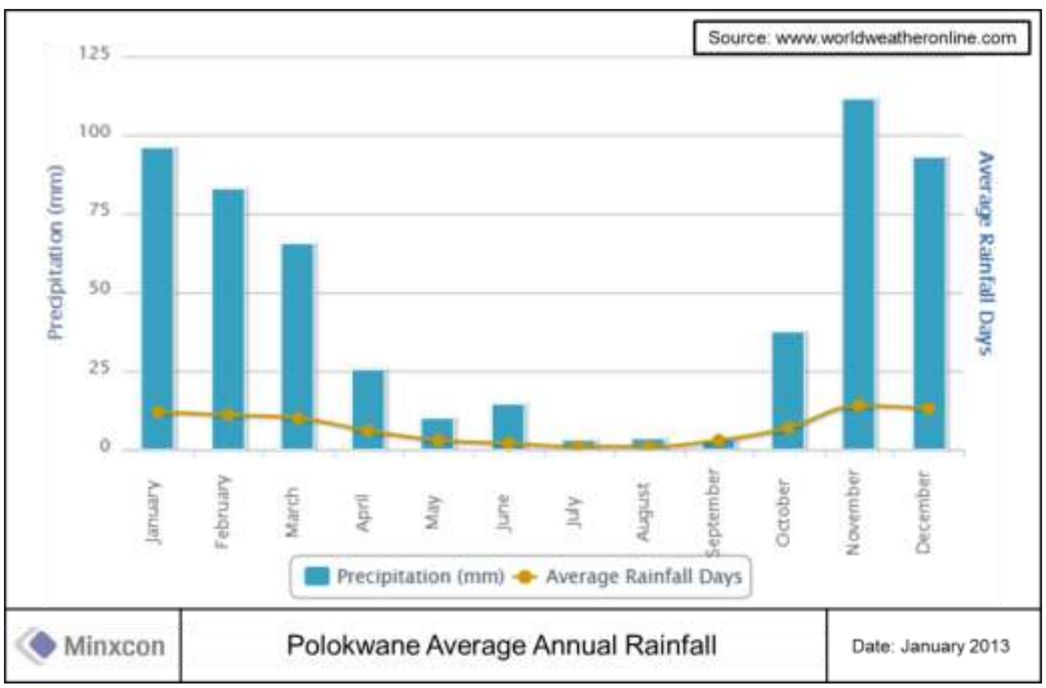
The climate in the area is typical of the Highveld of South Africa, with mild winters and warm summers. Average summer temperatures range between 25°C and 32°C. Winter daytime average temperatures are a cool 15°C to 19°C, but night-time temperatures often drop below freezing and morning frost is common. Figure 7 shows the average annual temperatures for the Polokwane weather station situated roughly 63 km to the northwest of the Bokoni mine. This can be seen as a good representation of the climate at the Bokoni mine as the Polokwane weather is considered to be representative of the entire South African average.

Figure 7: Polokwane Average Annual Temperatures



Most precipitation in this area of South Africa occurs during summer and autumn from October through to March. Figure 8 shows the average annual rainfall for the Polokwane weather station which can be seen as representative of the rainfall at the Bokoni mine. Annual precipitation ranges between 300 mm and 500 mm. Mining operations can continue throughout the year without interruption from any natural forces.

Figure 8: Polokwane Average Annual Precipitation



Item 5 (e) – INFRASTRUCTURE

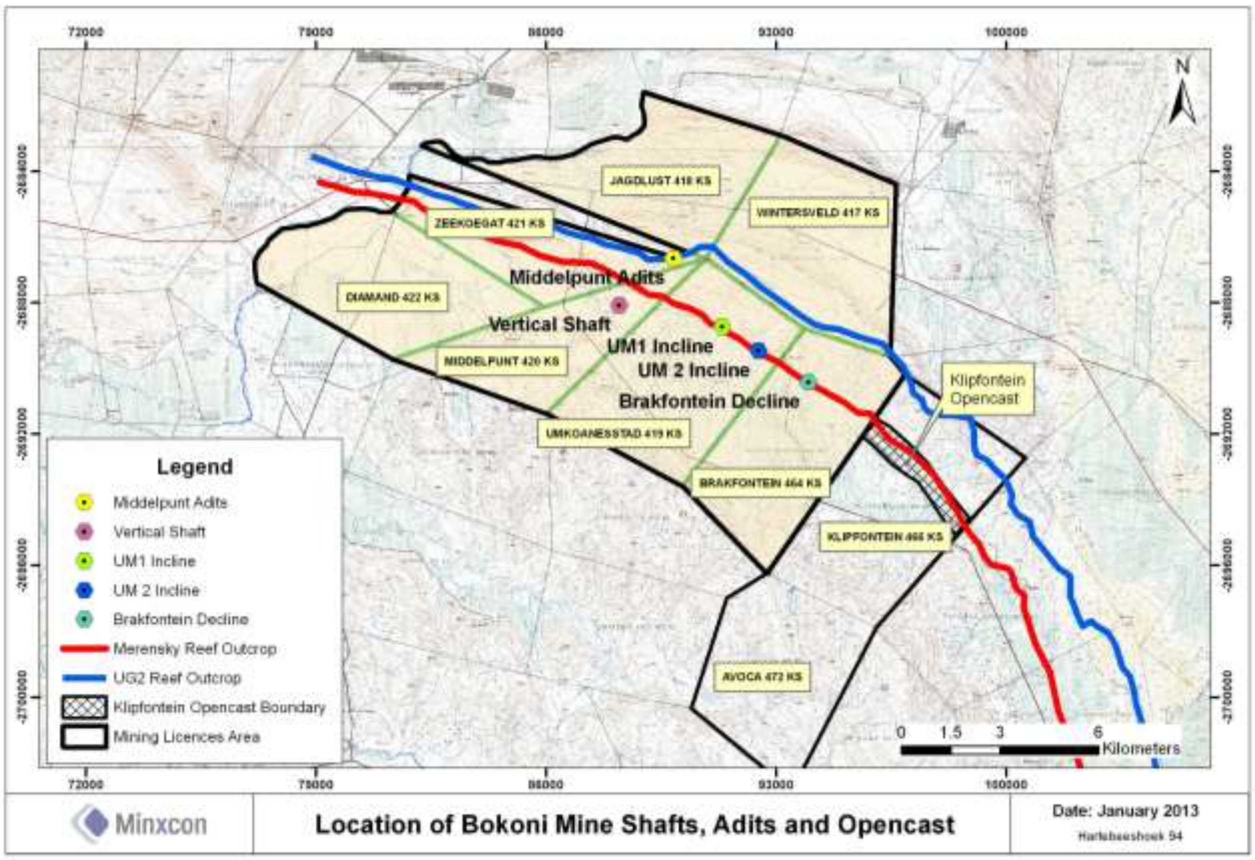
The Bokoni platinum mine is a well-established mine situated approximately 80 km southeast of Polokwane. The mine has been operating for a number of years and all the necessary infrastructure is in place and in a good working condition.

The mine consists of the following operations:-

- Vertical shaft mining the Merensky reef;
- Middelpunt Hill mining the UG2 reef;
- UM2 mining the Merensky reef;
- Brakfontein mining the Merensky reef; and
- The future Ga-Phasha opencast operation that will mine the Merensky reef.

The location of the various shafts, adits and the opencast that make up the Bokoni mining operation is illustrated in Figure 9.

Figure 9: Location of the Various Shafts, Adits and the Opencast



Main infrastructure on the Bokoni platinum mine include the following:-

- Various shafts and adits;
- Main mine office and site offices;
- Workshops and storerooms;
- Change houses and lamp rooms;
- Processing plants;
- Haul roads and access roads;
- Compressed air stations;
- Ventilation fans;
- Tailings storage facilities;
- Waste rock stockpiles;
- Security offices;
- Various water dams;
- Various sub stations and transformer yards;
- Diesel tanks and refuelling facilities; and

- Explosives magazine.

Power Supply and Electric Distribution

The Eskom power supply is managed by the Lesideng Municipality. Bokoni is supplied with electricity from the Middelpunt substation and three 20 MVA overhead supply lines, feeding the Middelpunt Switchyard. Further distribution reaches the Merensky West ventilation fans, the Atok Main Switchyard and the Compressor switchyard.

The two on-site substations are rated at 22 kV, which supply the UM2 and Brakfontein operations. A series of transformers distribute electricity to the Vertical Shaft man winder substation and the main intake 6.6 kV substation where power is converted to a low voltage of 400 V or 500 V. The electricity gridline to the operations runs across the Bokoni property adjacent to the dirt road leading to the mines and concentrator. The power lines run along concrete pylons, thus eliminating the possibility of damage due to fire, prevalent with timber pylons. Standby power is available in the form of a standby generator with a capacity of 1.2 MVA capable of sustaining critical operations in the event of a power failure.

Water Supply

Both mining and the processing plant require service water. Water for the mining operations is obtained from surface service water storage dams. These dams are supplied from numerous used process-water settling dams. At Brakfontein, a 200,000 m^3 dam exists which contains water purified by clarification. All piping from the water source to the operations is positioned above ground on concrete bases with sacrificial cradle supports, catering for expansion and contraction due to temperature fluctuations.

Potable water is drawn from well-field boreholes on the Jagdlust property, adjacent to the Olifants River which bounds the mining lease area on the northwestern side, as the municipality does not provide "water-on-tap". The extraction is limited to 787,000 cubic metres per annum, in accordance with the Department of Water Affairs and Forestry ("DWAF") permit. Although the well-field has never been depleted, continuous supply to fulfil the requirements of both the existing and expansion projects cannot be guaranteed. In addition, the DWAF permit may be subject to volume changes dependent on demand from the local community and depletion rates.

Potable water is pumped into surface dams with a 600 m^3 storage capacity prior to distribution. On site, potable water is gravity-fed to the underground operations and the surface compressors. The main offices, change houses, concentrators, the clinic and on-site employee accommodation are the other consumers of potable water.

Mining Personnel

Skilled and semi-skilled labour is sourced from the immediate surrounding areas while more capable mining and management personnel are sourced on a provincial and national level.

The Eastern Limb of the Bushveld Complex is characterised by mature platinum and chrome mines and numerous developing mines and exploration projects. As a result, the local industry is currently experiencing increasing activity. Electrical and water supply infrastructure is well-established in this portion of the Limpopo Province. Electrical supply is provided through an existing agreement with Eskom (parastatal electrical service provider).

The installed capacity of 60 MVA is reported as sufficient for the current workings at Bokoni Mine. This power supply is supplemented by the two approved expansion projects: the Middelpunt Hill Delta 80 UG2 Project and the Brakfontein Merensky Project. Regionally, Eskom has strengthened their grid by building the Lesideng Main Transmission Station which feeds the Witkop-Merensky 400 kV ring which provides a firm 500 MVA to the region.

In January 2008, the mismatch between installed, available, electrical generation capacity and rapidly growing demand in South Africa came to a head, resulting in rolling blackouts and a temporary shutdown of the mining industry. After the shutdown, electricity supply to the mining industry was curtailed to 90% of historic demand. The recent changes in the global financial markets have led to a drastic drop in growth, and have effectively alleviated the electricity shortage in the short term. Nationally, Eskom has embarked on a programme developing electrical supply to meet future growth in electrical demand.

Bokoni Mine has standby electricity generating capacity able to support some critical operations, such as shaft winders and hoisting, however, the ventilation fans and the concentrators cannot be supported.
Bokoni Mine is currently self-sufficient in the supply of industrial and potable water. Potable water is drawn from a well-field on the Jagdlust property adjacent to the Olifants River, which bounds the mining lease area on the northwest. This extraction is limited to 787,000 cubic metres per annum in accordance with the DWAF permit. The well-field has never run dry. Permanent supply cannot, however, be guaranteed and the existing water use permit is subject to review by the DWAF from time to time. There is ingress of groundwater into the underground workings, estimated at nearly 11,000 cubic metres per day. There is currently no shortage of available industrial water.

The available potable water is limited and this could be an issue in terms of any future expansions at Bokoni Mine. These potential water shortages have been considered and addressed on a regional scale by affected mining and exploration companies, who have developed a Northern and Eastern Limb water scheme which forms part of the long-term strategy to ensure adequate water supply to all of the various Northern and Eastern Limb mines, including Bokoni Mine.

There are two concentrators at Bokoni Mine, namely the Merensky Concentrator commissioned in 1991 and the UG2 Concentrator commissioned in 2003. They are located adjacent to the Vertical Shaft.

There are two tailings dams at Bokoni Mine, namely the Merensky tailings dam and the UG2 tailings dam. These are located near the Merensky and UG2 concentrators respectively. The Merensky tailings dam has an area of approximately 70 ha and is known as the Consolidated Tailings Dam (being five previous dams, combined into a single facility). The UG2 tailings dam is relatively new (commissioned in 2003), with an area covering approximately 63 ha. There are physical provisions for future tailings dams, known as Site B for Merensky and Site D for the UG2. These tailings storage facilities will be adequate for the Life of Mine ("LoM").

Waste rock dumps are located adjacent to the various shafts to accommodate the broken waste rock hoisted from underground. The inert waste rock is used for construction and in future may be used to clad the slopes of the tailings dams.

Bokoni Mine's organisational structure is similar to other South African mines, whereby production is divided into the departments of Mining and Engineering and services are provided through Technical Services, Administration, Finance and Safety, and Training. In each instance, a Head of Department reports to the General Manager. As required by South African statute, various persons are legally appointed to their positions, including the Mine Manager and his immediate subordinates, as well as the Engineering Manager and his subordinates. Appointed managers are obliged to ensure that the mining activities are carried out according to the MPRDA's regulations and/or codes of practice or standard procedures drafted and adopted by Bokoni Mine. Bokoni Mine employs approximately 3,800 people across all disciplines and in all categories. Bokoni Mine's employment policy is to include all core skills from rock-face to manager as permanent employees.

Bokoni Mine is affected by the industry-wide skills shortage, particularly in the mining, processing and engineering disciplines. Various initiatives are being employed to mitigate the skills shortage such as the payment of retention allowances and training and development programmes.

Item 5 (f) –HYDROGEOLOGY

There have been several studies conducted on groundwater in the Bokoni area. A study by E. Martinelli & Associates (January 1999), on hydrogeology and groundwater resources on the farms Klipfontein 465KS, Brakfontein 464KS and Umkoanesstad 419KS indicated that the groundwater resources on the three farms are relatively poorly developed, especially when compared to Maandagshoek, Driekop and Twickenham. Exploitable aquifers are associated with the main SW-NE trending dykes and the major SE-NW trending fracture zone that traverses the main valley. The aquifers associated with these features are linear and characterised by variable hydraulic parameters.

In September 2001 Groundwater Monitoring and Environmental services conducted an initial hydrological study, the primary objective of which was to delineate and evaluate possible water supply options for an expansion of Bokoni Platinum (Groundwater Monitoring Services, 2001). The study identified 3 main aquifer systems in the Bokoni UG2 Reef Project Area:-

1. A primary alluvial aquifer associated with the unconsolidated sand and gravel in the valley of the ephemeral Rapholo River.
2. A secondary weathered, intergranular aquifer associated with dykes, fracture zones, mafic intrusions and pyroxenite in the hangingwall of the Merensky Reef. The weathered intergranular aquifers are laterally extensive, low-yielding aquifers, with groundwater occurring almost everywhere at the base of bedrock weathering.
3. A deeper secondary fractured aquifer associated with structural features such as dykes, fractures and faults. The intersection of vertical fractures and dykes is considered to be particularly favourable for the development of aquifers.

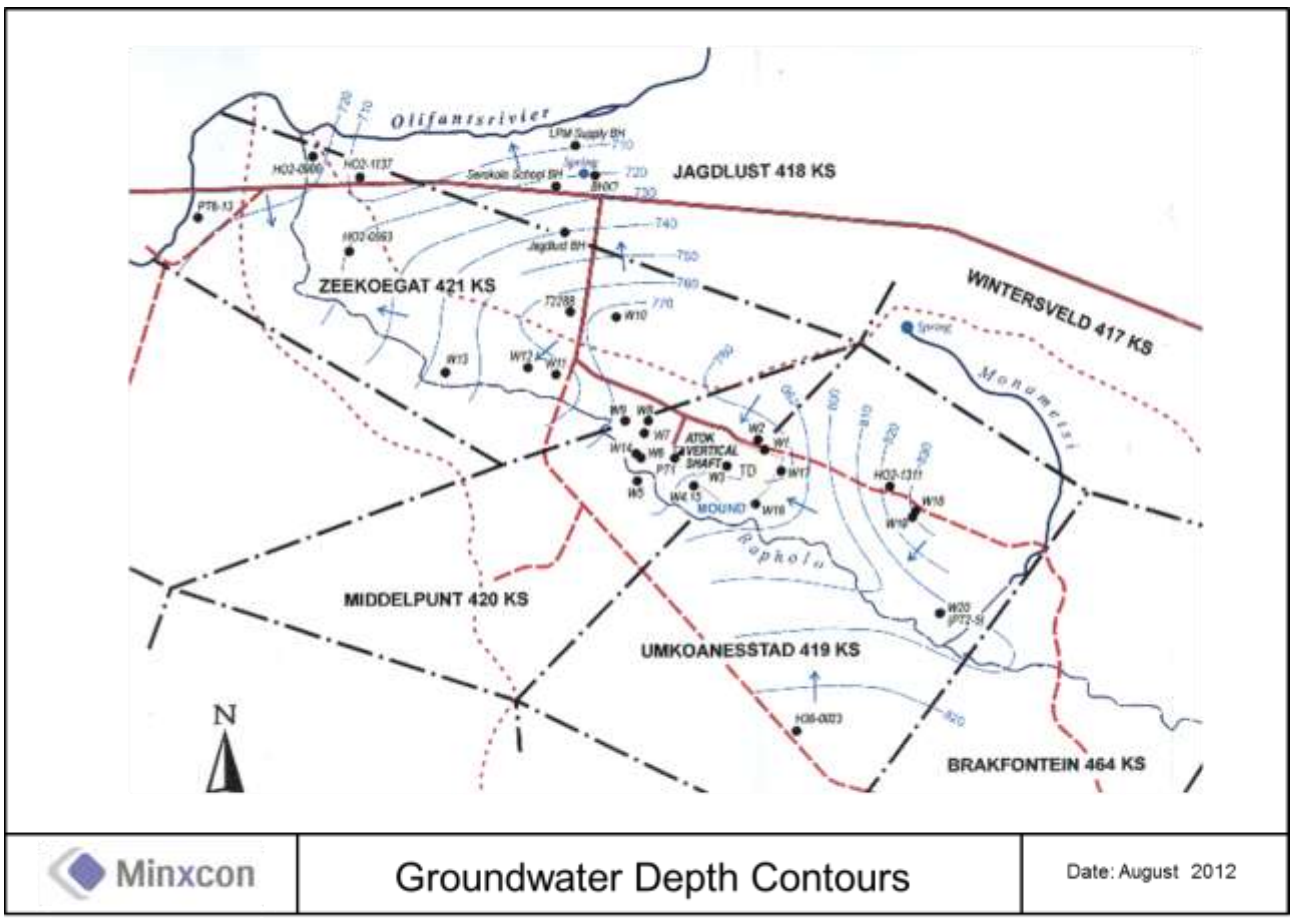
A second study conducted from August 2002, also by Ground Water Monitoring and Environmental Services (October 2002), was intended to assess the impact of open cast mining of the UG2 and Merensky Reefs on the farm Zeekoegat 421 KS.

The investigation showed that significant groundwater is present in the proposed opencast mining area at depths between 29 m (east of the Rapholo River) and 6.7 m (adjacent to the Olifants River). Mining will impact on the groundwater, and a dewatering programme will have to be established in order to mine below the water table. Groundwater Monitoring Services undertook a third study in June 2003, in order to firm up on the hydrogeological characteristics of the western portion of the Bokoni UG2 Reef Project Area (Figure 15). A detailed report ,which is available on request from the client, as compiled by Environmental Groundwater Solutions cc & Groundwater Monitoring Services cc; Assessment of Impacts on Ground Water Resources at the Proposed Merensky Reef Shafts Brakfontein 464ks, Lebowa Platinum Mines, for Amplats (2003).

Water in the underground workings is not limited to any specific area, but is more pronounced in the shallow areas of the Merensky Reef (van der Kevie, B 2012) (0).

The UG2 Reef mining at Middelpunt Hill is practically ground water free due to the steep surface contours of the Hill guiding water to drain on surface rather than seeping into the ground and penetrating the mine workings (van der Kevie, B 2012).

Figure 10: Groundwater Depth Contours and Water Borehole Localities over the Bokoni UG2 Reef Project Area



ITEM 6 – HISTORY

Item 6 (a) – PRIOR OWNERSHIP AND OWNERSHIP CHANGES

The Bokoni Platinum Mine has undergone several ownership and name changes since it was commissioned in 1969. Table 4 summarises the ownership changes that Bokoni Platinum Mine has undergone.

Table 4: Prior Ownership and Ownership Changes

Date	Description
1969	Atok Platinum Mine (Pty) Limited was commissioned by Anglo Transvaal Consolidated Mines ("Anglovaal").
1977	Acquired by Rustenburg Platinum Mines ("RPM") Limited. RPM was a subsidiary of Johannesburg Consolidated Investments Limited ("JCI"), in which Anglo American Corporation ("AAC") held a significant equity interest.
1990	JCI was 'unbundled' and its platinum interests were listed separately as Lebowa Platinum Mines Ltd ("LPM"), which was later merged with Amplats' other mines to become a wholly-owned subsidiary of Amplats Limited.
2002	In terms of "old order" mining rights, i.e., those granted under legislation that pre-dated the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002), Amplats owned the mineral rights to shallow ore resources for the Ga-Phasha area. The deeper deposits under these farms were owned by the South African Government. Following an agreement between the Government and Amplats it was decided to combine and name the combined Mineral Resource the Ga-Phasha PGM Project. Fifty per cent would be allocated to a successful Black Economic Empowerment tenderer.
	Following a tender process, Pelawan Investments (Pty) Ltd. (Pelawan) was awarded the mineral rights over the farms Avoca and DeKamp. Accordingly, Pelawan became entitled to a 50% interest in the Ga-Phasha Project. Amplats, through its wholly-owned subsidiary, Rustenburg Platinum Mines Ltd., held the balance of the 50% ownership in the Project.
2004	Pelawan Investments Limited ("Pelawan") affected a reverse takeover of Anooraq Resources Corporation, a Canadian company listed on the Toronto Stock Exchange Venture market ("TSX-V") and the American Stock Exchange ("AMEX"). Pelawan affected the takeover by reversing its 50% interest in Ga-Phasha into Anooraq in exchange for a controlling shareholding.
Sept-2004	Amplats and Anooraq formalised their Joint Venture Arrangement over the Ga-Phasha Project through an incorporated joint venture, utilizing a company called Micawber 277 (Pty) Ltd, in which Amplats and Anooraq each held a 50% shareholding.
2008	Amplats and Anooraq entered into a Transaction Framework Agreement, whereby Amplats sold an effective 51% of Lebowa Platinum Mine to Anooraq, as well as an additional 1% interest in each of the Ga-Phasha, Boikgantsho and Kwanda Joint Venture Projects, resulting in Anooraq holding a controlling interest in each of these projects, for a total cash consideration of ZAR3.6 billion (Lebowa Transaction).
2009	In October 2009, Lebowa Platinum Mine was renamed Bokoni Platinum Mine.
Feb-2012	2012 Anooraq Resources and Anglo American Platinum Limited ("Amplats") announced an agreement ("Transaction") to refinance Anooraq, restructure and recapitalise the Bokoni Operations. A new strategic plan for Bokoni resulting in the disposal of undeveloped platinum group metals ounces to Amplats, recapitalisation and refinancing of Anooraq and Bokoni, together with accelerated production growth at Bokoni Platinum Mine.
May-2012	Anooraq announced the implementation of a name change, from Anooraq Resources Corporation to Atlatsa Resources Corporation ("Atlatsa"), effective from the 14^{th} of May 2012

Atlatsa is currently in possession of Converted Mining Rights in terms of Item 7 of the MPRDA. The original Mining Authorisations for Bokoni Mine in terms of s.9(1) of the South African Minerals Act, 1991, was Old Order License Number 6/2003.

Item 6 (b) – HISTORICAL EXPLORATION AND DEVELOPMENT

The discovery of platinum in the BC occurred in 1924 during panning activities in a dry river bed on the farm Maandagshoek, located west of the town of Burgersfort. The platinum was traced to the dunite pipes in the Maandagshoek area and shortly afterwards the platiniferous horizon named the Merensky Reef was discovered on the farm Maandagshoek, some 45 km south of the present-day Bokoni Mine.

Northern Platinum's Limited conducted exploration on the dunite pipes and the Merensky Reef between 1925 and 1927 in the Dwars and Olifants River areas. This exploration resulted in some 700,000 tonnes of ore being mined from these early operations. Trenches and numerous small adits were excavated on the UG2 and Merensky Reefs in the 1920s. This was done where the reefs outcropped in the hills on the eastern side of the Project Area. Diamond drilling was introduced in the 1960s throughout the whole area to determine the basic characteristics of the reefs. Geological comparisons with the Western Bushveld PGM deposits were unfavourable for the Eastern Bushveld and this, as well as market factors, contrived to reduce the level of exploration and development.

In the 1960s Anglovaal conducted exploration on the farm Klipfontein. The exploration included 15 shallow Merensky Reef boreholes and an extensive trenching programme along the UG2 Reef outcrop comprising 30 trenches. RPM obtained the exploration results as part of the procurement of Anglovaal's Atok interests. Anglovaal also drilled boreholes that intersected the Merensky Reef on the farm Paschaskraal in the 1960s. In the 1980s JCI drilled additional boreholes to intersect both the UG2 and Merensky Reefs.

Six phases of exploration have taken place at Bokoni Mine since 1964. All six phases have included diamond drilling. Diamond drilling and channel sampling represent by far the largest exploration datasets for the Bokoni Mine Property. 1999 saw a significant interest in the Eastern Limb, which was driven by the increasing demand (and robust forecast of demand) for PGMs. Amplats continued with major exploration drilling programmes from 2001 to 2008. The Middelpunt Project was initiated to target the UG2 on the basis of geological continuity, grade consistency and precious metal values. In addition, the Brakfontein Merensky Reef project was also initiated. The more recent exploration activities by Amplats have included the upgrading of the geological Mineral Resources for the area and diamond drilling to improve the overall coverage.

Several sets of exploration and mining data and associated sampling and assay data have been acquired over time on the Bokoni property by previous and current owners. The standards applicable to the collection and interpretation of this data have largely remained consistent. The exploration data includes the following:-

- Surface drillholes;
- Underground drillholes;
- Aeromagnetic surveys;
- Underground channel sampling;
- Surface geological mapping; and
- Underground geological mapping.

The bulk of the surface drilling on the Bokoni Mine property was conducted by Amplats as the operator. Amplats employed contractors to conduct the drilling activity although diamond core logging and sampling was conducted by Amplats staff at the Driekop Exploration Base (located approximately 50 km southeast of Bokoni Mine). No single drilling contractor was used to complete the drilling and contracts were put out to tender at the beginning of each exploration phase.

Item 6 (c) – HISTORICAL ESTIMATES

Bokoni Mine was previously owned and operated by Amplats. The annual Mineral Resources and Reserves were compiled by Amplats personnel up to 2009, in accordance with the Australasian Code for the Reporting of Mineral Resources and Mineral Reserves ("the JORC Code", 2004) as a minimum standard and in compliance with the SAMREC Code. The Snowden Group reviewed the 2007 Amplats Mineral Resources and concluded that the 2007 Mineral Resource and Reserve estimates were in accordance with SAMREC and the definition standards as set out by the Canadian Institute of Mining ("CIM").

Resources

Mineral Resources for Bokoni Mine were estimated by ExplorMine Consultants ("ExplorMine") from 2009 to 2012. SRK Consulting (SA) (Pty) Ltd ("SRK") was mandated by Atlatsa in 2010 to review and audit the 2010 Mineral Resources. The estimation method was unchanged for the 2011 estimate and this audit report from SRK is therefore relevant to the 2011 estimate as well. The following statement is taken out of the report on the audit of the Resource estimate:-

"SRK met with representatives from Bokoni Mine and ExplorMine on 31 May 2010, and were presented with the methodology and results of the Mineral Resource estimates. ExplorMine provided a dataset to SRK which included:

- The original sampling data from the underground chip sampling and surface and underground drillholes;
- Wireframes of the topography and mineralised horizons;
- Perimeters of the estimation domains;
- Parameter files used in the estimation;
- Scripts used to perform the estimation;
- Block models containing the estimates; and
- The report detailing the estimation and the results.

SRK has not re-estimated the Mineral Resources, but has performed sufficient checks on the estimates to be satisfied with the quality of the estimates. SRK interacted with ExplorMine during the estimation process, and provided advice on improvements to the process, which was incorporated by ExplorMine. SRK has checked the processes used by ExplorMine to select the mineralised units and to generate composites of the mineralised units. SRK conducted verification of the generation of the experimental semi-variograms, the modelling of the semi-variograms, and the search parameters used by ExplorMine. SRK has checked the accuracy of the Mineral Resource estimates by comparing the estimation results to the original data used in the estimate. This was done globally, as well as in a spatially related manner, by comparing the estimate and source data in parallel slices along the strike and dip of the orebody. SRK is of the opinion that there is a reasonable agreement between the source data and the final estimates."

Table 5 and Table 6 summarise the 2010 and 2011 Mineral Resource tabulations respectively.

Table 5: Atlatsa 2010 Mineral Resources – Merensky and UG2 Reefs

Mineral Resource Category	Merensky Reef Total 2010			UG2 Total 2010		
	Tonnage	Grade 4E	4E	Tonnage	Grade 4E	4E
	Mt	g/t	Moz	Mt	g/t	Moz
Measured	43.50	5.13	7.20	92.30	6.52	19.30
Indicated	50.80	4.88	8.00	113.80	6.33	23.10
Total Meas+Ind	94.30	5.00	15.20	206.10	6.42	42.40
Inferred	127.90	4.89	20.10	145.60	6.41	30.00

Notes:

1. 51% is attributable to Atlatsa Resources.
2. A 4E pay limit of 290 cm. g/t applied for UG2.
3. A 4E pay limit of 242 cm. g/t for the Merensky Reef.
4. Tonnes have been rounded off to the appropriate level of accuracy.
5. The estimate is inclusive of any Mineral Reserve declared.
6. UG2 Prill Ratio: Pt : Pd : Rh : Au - 42 : 46 : 9 : 3.
7. Merensky Reef Prill Ratio: Pt : Pd : Rh - Au 62 : 29 : 4 : 5.

Table 6: Atlatsa 2011 Mineral Resources – Merensky and UG2 Reefs

Mineral Resource Category	Merensky Reef Total 2011			UG2 Reef Total 2011		
	Tonnage	Grade 4E	4E	Tonnage	Grade 4E	4E
	Mt	g/t	Moz	Mt	g/t	Moz
Measured	43.32	5.15	7.17	96.62	6.49	20.20
Indicated	53.61	4.88	8.42	124.28	6.30	25.20
Total Meas+Ind	96.93	5.00	15.59	220.90	6.38	45.40
Inferred	128.80	4.89	20.30	147.61	6.40	30.40

Notes:

1. 51% is attributable to Atlatsa Resources.
2. A 4E pay limit of 290 cm. g/t applied for UG2.
3. A 4E pay limit of 242 cm. g/t for the Merensky Reef.
4. Tonnes have been rounded off to the appropriate level of accuracy.
5. The estimate is inclusive of any Mineral Reserve declared.
6. UG2 Prill Ratio: Pt : Pd : Rh : Au - 42 : 46 : 9 : 3.
7. Merensky Reef Prill Ratio: Pt : Pd : Rh - Au 62 : 29 : 4 : 5.

Reserves

The table below shows the previous estimate done by Atlatsa.

Table 7: Mineral Reserves for Bokoni Mine as at 31 December 2011

Area	Mineral Reserve Category	Reef Type	Tonnage	Grade 4E	Content 4E
			Mt	g/t	Moz
Brakfontein	Proven	Merensky	19.16	4.07	2.51
	Probable	Merensky	7.30	3.67	0.86
	Proven and Probable	**Total**	**26.46**	**3.96**	**3.37**
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**
			Mt	**g/t**	**Moz**
Vertical	Proven	Merensky	1.68	4.14	0.22
	Probable	Merensky	0.64	3.73	0.08
	Proven and Probable	**Total**	**2.32**	**4.03**	**0.30**
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**
			Mt	**g/t**	**Moz**
UM2	Proven	Merensky	0.34	4.20	0.05
	Probable	Merensky	0.13	3.78	0.02
	Proven and Probable	**Total**	**0.48**	**4.08**	**0.06**
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**
			Mt	**g/t**	**Moz**
Middelpunt Hill	Proven	UG2	17.04	5.50	3.01
	Probable	UG2	20.77	5.26	3.52
	Proven and Probable	**Total**	**37.81**	**5.37**	**6.53**
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**
			Mt	**g/t**	**Moz**
Total Bokoni	Proven	Merensky	21.18	4.08	2.78
	Proven	UG2	17.04	5.50	3.01
	Probable	Merensky	8.07	3.67	0.95
	Probable	UG2	20.77	5.26	3.52
	Proven and Probable	**Merensky**	**29.25**	**3.97**	**3.73**
	Proven and Probable	**UG2**	**37.81**	**5.37**	**6.53**
	Total Reserves	**Total**	**67.06**	**4.76**	**10.26**

Notes:

1. The Mineral Reserve is stated at a 4E grade.
2. Tonnages refer to tonnes delivered to the metallurgical plant.
3. No vampings is included.
4. All figures are in metric tonnes.
5. 1oz = 31.10358 g.

Item 6 (d) – HISTORICAL PRODUCTION

Hoisted Tonnages and Grade

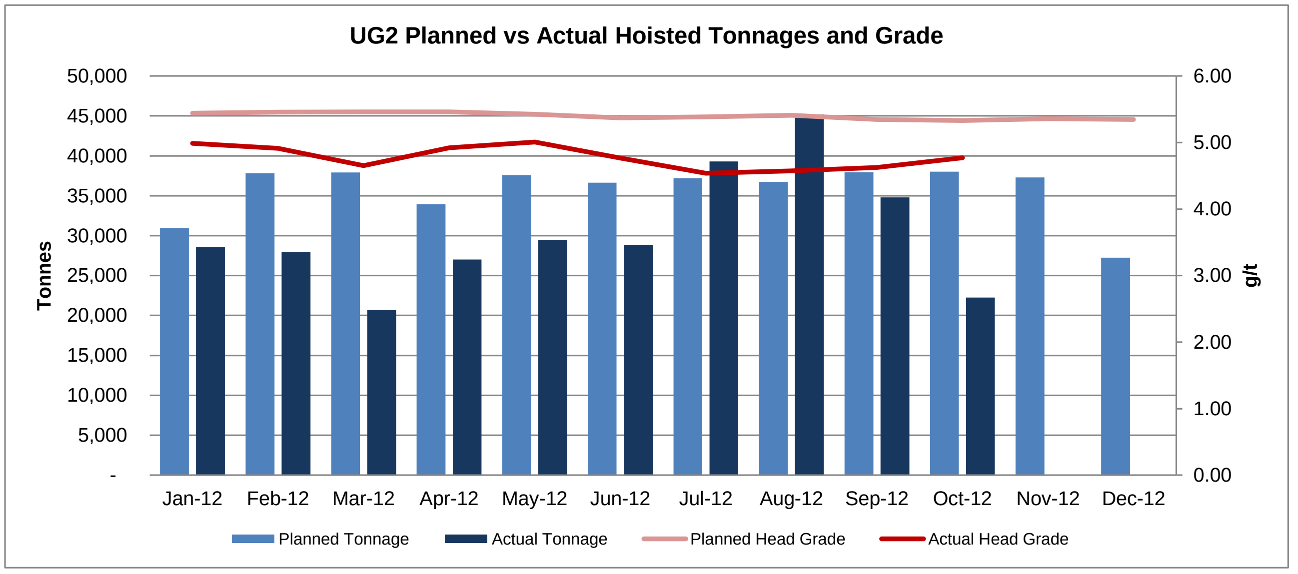
The historical production figures for Bokoni Mine for the financial years 2007 to 2012 are detailed in Table 8.

Table 8: Historical Production

Description	Unit	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Square metres broken	m²	334,327	265,817	209,175	231,322	218,452	181,079
Total development	m	5,531	18,322	13,890	14,760	18,517	20,359
Tonnes milled	t	1,332,503	1,097,533	943,403	1,044,084	1,047,401	863,674
Mill Head Grade	g/t	4.53	4.44	4.31	4.12	4.04	4.10
Mine Call Factor	%	99.18%	97.54%	104.26%	97.63%	89.80%	111.80%

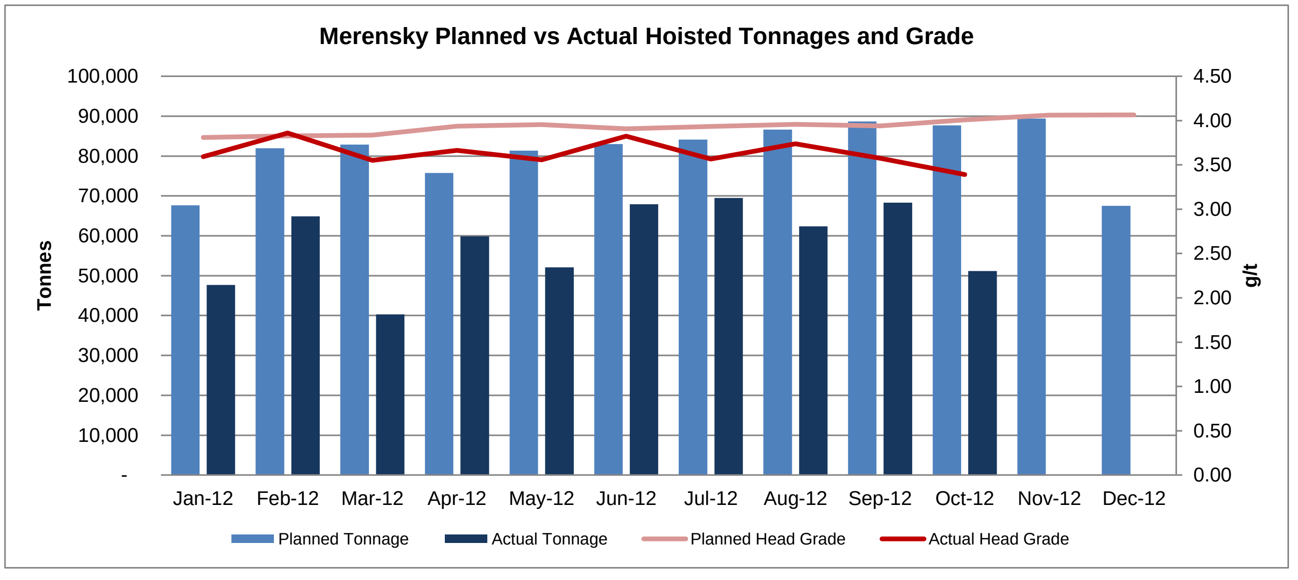
The 2012 planned versus actual hoisted tonnage and grade for UG2 is illustrated in Figure 11.

Figure 11: UG2 Hoisted Reef Tonnage 2012



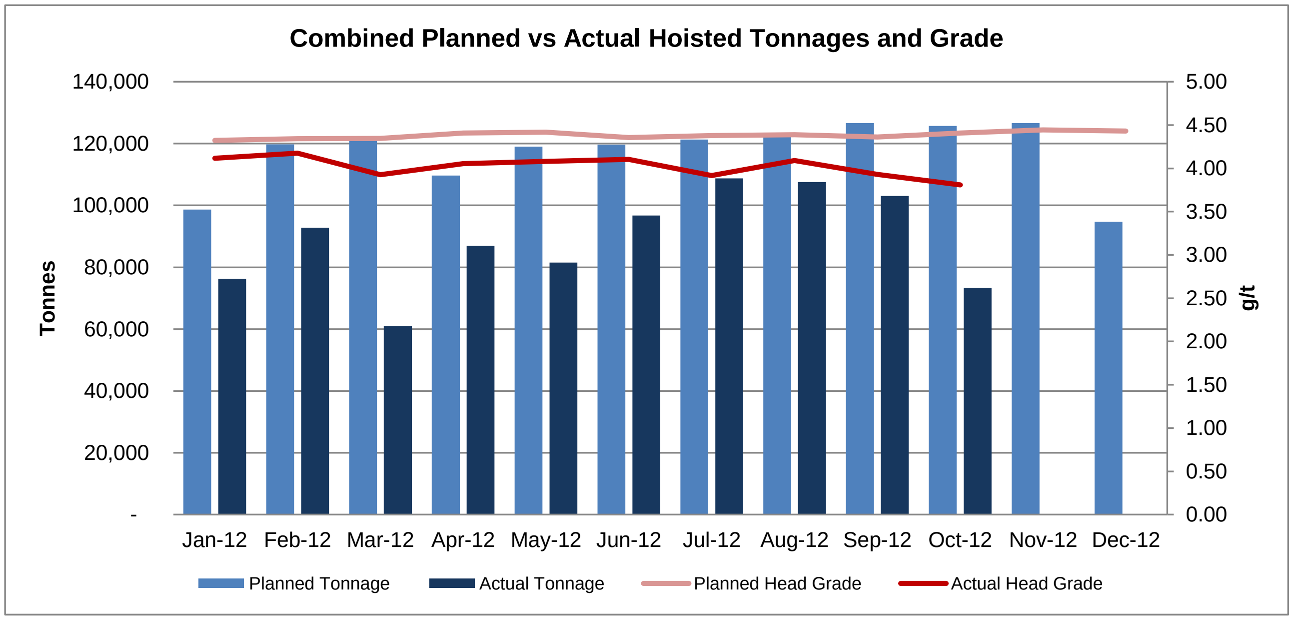
The planned UG2 production target was only achieved twice during 2012. Also note that a dip in all production profiles, due to a strike, can be seen during the last quarter of 2012. The Merensky planned versus actual hoisted tonnage and grade is illustrated in Figure 12.

Figure 12: Merensky Hoisted Reef Tonnage 2012



The planned Merensky production target was never achieved during 2012. The planned versus actual combined hoisted tonnage and grade for Bokoni is illustrated in Figure 13.

Figure 13: Combined Hoisted Reef Tonnage 2012



The actual tonnes and grade delivered for 2012 were much lower than planned. The 2012 actual versus planned hoisted tonnages and head grade is detailed in Table 9.

Table 9: 2012 Actual Versus Planned Hoisted Tonnages and Grades

Description	Unit	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Total
Planned														
Tonnes	t	98,633	119,765	120,818	109,686	118,977	119,684	121,321	123,360	126,595	125,687	126,657	94,715	1,405,898
Grade	g/t	4.32	4.34	4.35	4.41	4.42	4.35	4.38	4.39	4.36	4.41	4.44	4.43	4.38
Content	g	426,295	519,903	525,171	483,401	525,775	521,211	531,304	541,532	552,258	553,991	562,773	419,800	6,163,412
Actual														
Tonnes	t	76,257	92,830	60,975	86,911	81,570	96,775	108,782	107,559	103,108	73,374	-	-	888,142
Grade	g/t	4.12	4.18	3.92	4.05	4.08	4.10	3.92	4.09	3.93	3.81			4.02
Content	g	313,810	387,695	239,327	352,382	332,937	397,191	426,208	439,854	405,191	279,518	-	-	3,574,112

ITEM 7 – GEOLOGICAL SETTING AND MINERAL DEPOSIT

Item 7 (a) – Regional, Local and Property Geology

Regional Geology

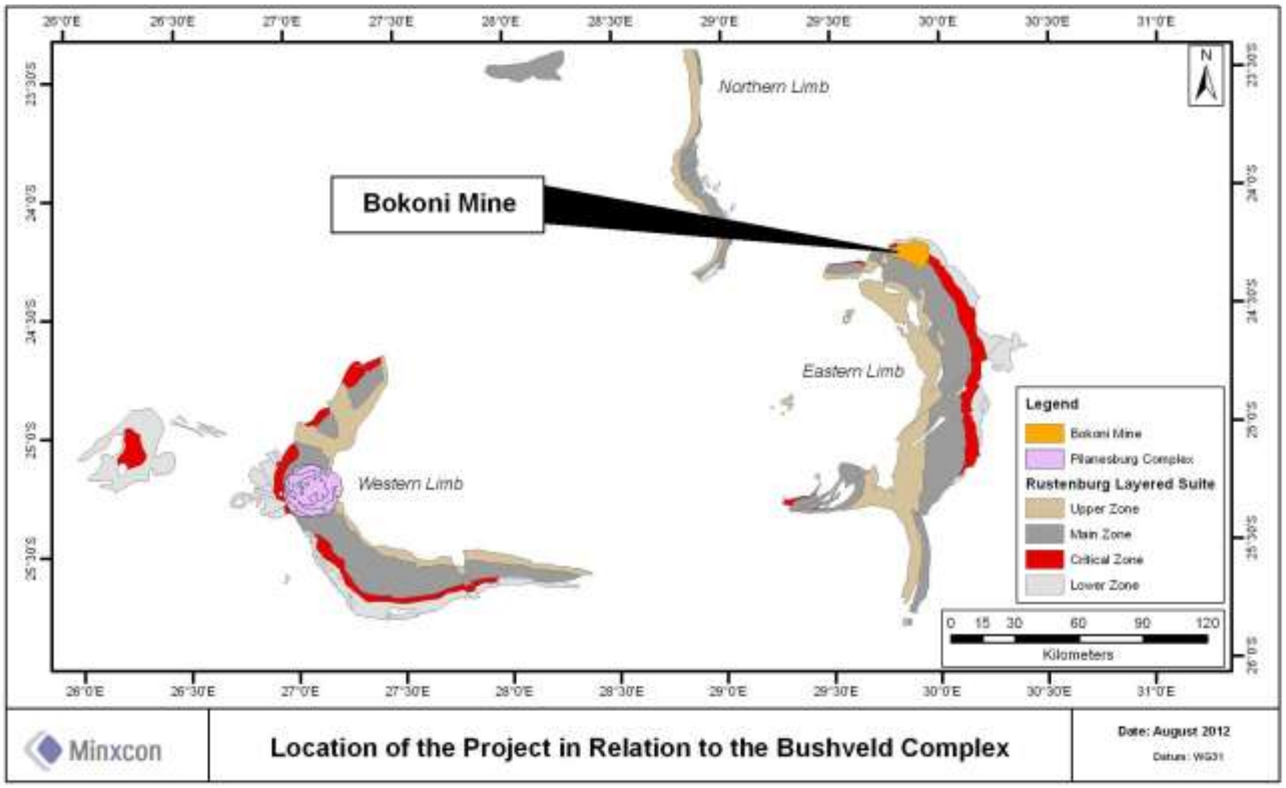
The Project Area is located within the BC which is a world-renowned mineral complex, known for its PGEs, chromite, vanadium and titanium mineralisation. The BC is situated in the north-central Kaapvaal Craton and is the largest known layered complex in the world with a surface area of 66,000 km^2. The BC underlies parts of the Limpopo, North-West, Gauteng and Mpumalanga Provinces. The BC was intrusively emplaced within, and exhibits a transgressive relationship to the Transvaal Supergroup sequence, a large sedimentary basin of late Archaean-Proterozoic age (ca. 2500 to 2060 million years ago) located within the north-central Kaapvaal Craton. The BC was emplaced approximately 2060 million to 2058 million years ago. It is generally accepted that, rather than being a single body, the BC is a series of overlapping lopolith-shaped intrusions resulting from several magma pulses at relatively shallow crustal depths (<8 km) (Harmer and Sharpe, 1985).

The BC comprises five lobes in a broad ellipse-shaped body. The five lobes are referred to as the Eastern, Western Bushveld, Northern Bushveld, Southern Bushveld and Far-western Bushveld. The Project Area falls within the Eastern Bushveld (Figure 18). The BC consists of a mafic-ultramafic succession of layered and massive rocks known as the Rustenburg Layered Suite ("RLS"), a penecontemporaneous series of granitic rocks, named the Lebowa Granite Suite ("LGS") and felsic extrusive rocks of the Rooiberg Group ("RG"). The Transvaal Supergroup forms the floor of the BC. In the northern limb of the BC, the BC transgresses into the Archaean granites. The mafic-ultramafic layered rocks of the RLS outcrop in the three main limbs: the Western, Eastern and Northern Limbs. The Southern Bushveld is completely covered by a sedimentary succession of the Karoo Supergroup.

The true thickness of the RLS varies from 7,000 m to 12,000 m. The magmatic layering of the ultramafic-mafic rocks is remarkably consistent and can be traced over several hundreds of kilometres of strike. The layering can be correlated throughout most of the BC. The similarity of geology across large areas within each of the three main limbs, particularly the sequence of igneous layering that includes both the UG2 and Merensky Reefs, is probably indicative of simultaneous differentiation and replenishment of a basaltic magma under essentially identical conditions. The dip of the igneous layering is generally shallow and towards the centre of the Complex.

The BC measures approximately 250 km north to south and 450 km east to west. Granites and related felsic volcanics occur in the centre of the complex between the limbs. Large parts of the BC are covered by post-Bushveld sedimentary successions of the Waterberg Group and Karoo Supergroup, as well as more recent alluvial deposits of Holocene age.

Figure 14: Location of the Project in Relation to the Bushveld Complex



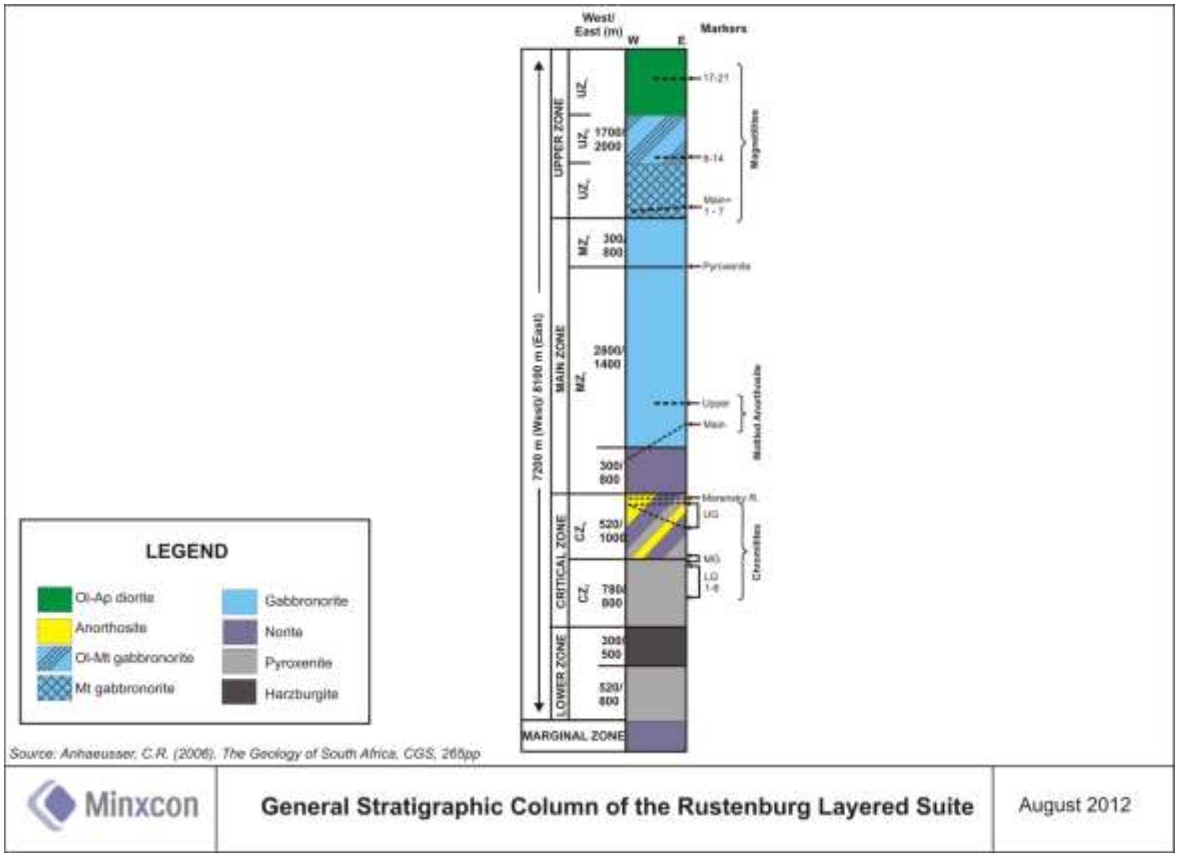
The PGE mineralisation (as well as chromite and vanadium) is hosted in the Critical Zone of the RLS. The RLS stratigraphy is divided into five major units, which are described in Table 10, from deepest to shallowest.

Table 10: Major Units of the Rustenburg Layered Suite

Zone	Description
Marginal Zone	Comprises a heterogeneous succession of generally unlayered basic rocks dominated by norites. These rocks contain quartz and hornblende believed to be a result of contamination of the basic magmas by the enclosing host rocks. The Marginal Zone ranges in thickness from several metres to several hundred metres, and field exposures of this zone are generally poor.
Lower Zone	Dominated by ultramafic rocks. The most complete exposure is in the north-eastern part of the Eastern Limb of the BC. In this area, the Lower Zone ("LZ") occurs as a series of dunite-harzburgite cyclically layered units. The unit varies in thickness, having a trough-like geometry with the thinnest succession developed over structural highs in the basin floor.
Critical Zone	Contains the largest Resources of chromium and PGEs in the world. The CZ is subdivided into the Lower Critical Zone ("LCZ") and the Upper Critical Zone ("UCZ") and is made up of cyclic units consisting of chromitite, pyroxenite, norite and anorthosite. Cycles in the LCZ are entirely ultramafic in character and are dominated by pyroxenite with interlayered harzburgite and chromitite layers. The UCZ represents a mixed mafic-ultramafic cyclic unit comprising layered pyroxenites, norites, anorthosites and chromitites. The base of the UCZ is marked by the appearance of cumulus plagioclase. The igneous layering within the CZ is remarkably uniform over much of the BC and occurs on a variety of scales, with individual layers traceable for tens to hundreds of kilometres, and may also be locally regular to highly irregular in aspect. Chromitite layers occur throughout the CZ, usually at the base of crystallization cycles. The chromitite layers have been classified into lower, middle and upper groups, with the lower group occurring in the pyroxenitic LCZ, the upper group in the anorthositic UCZ and the middle group straddling the boundary between lower and upper divisions. The layers are identified according to their location within the layered succession, with numbers commencing from the bottom up. The lowermost group is known as the LG1 (Lower Group 1), followed by LG2, LG3 through to LG7. The overlying group progresses upwards from the MG1 (Middle Group 1) through to the MG4 and, finally, to the UG1 (Upper Group 1), UG2, and UG3. The thickness of these chromitite layers ranges from several millimetres to several meters. The chromitite layers may comprise multiple layers of chromitites separated by intercalated silicate rocks. The thickest chromitite layers, specifically the LG6 and MG1, are mined for their chrome content. All of the chromitite layers in the BC contain anomalous concentrations of PGE's, with a general increase in PGE content upward in the sequence, with the UG2 Reef currently being one of two reefs of commercial interest for its PGE content. The other main PGE layer, the Merensky Reef, occurs above the UG chromitites, close to the top of the UCZ. The vertical separation between the UG2 and the Merensky Reefs is variable across the BC and in the Eastern Limb it can attain stratigraphic separation of between 240 m and 400 m. The top of the CZ is characterised by the Giant Mottled Anorthosite, a robust anorthosite.
Main Zone	The thickest unit within the RLS. In general, approximately half the RLS stratigraphic interval is occupied by this zone. The MZ consists of gabbro-norites with some anorthosite and pyroxenite layering. The Pyroxenite Marker is located approximately in the top third of the Zone. Layering is not as well developed as in the CZ and LZ.
Upper Zone	Dominated by gabbros. However, layered anorthosite and magnetite sequences are also present. There is no chilled contact with the roof rocks, which comprise rhyolites and granophyres. The base of the Upper Zone ("UZ") is typically taken as the first appearance of cumulus magnetite above the Pyroxenite Marker.

A generalized stratigraphic column illustrating the zones of the RLS of the Eastern Limb of the BC is illustrated in Figure 15, while the extent and regional geology of the Eastern Limb of the BC is illustrated in Figure 15.

Figure 15: Generalized Stratigraphy of the Rustenburg Layered Suite



Local Geology

The Project Area is located on the northern extremity of the Eastern Limb of the Bushveld Complex. The Eastern Limb of the BC stretches from the town of Zebediela in the north, to the town of Bethal in the south. In the area north of the town of Steelpoort, the RLS has sub-concordantly intruded the Pretoria Group, which is located immediately above the Magaliesberg Formation. Both units belong to the Transvaal Supergroup. To the south of Steelpoort, the RLS is in contact with progressively younger rocks of the Transvaal Supergroup in comparison to the north of Steelpoort.

In the Eastern Limb, the Critical Zone is developed over about 150 km of strike length in three areas separated by regional faulted systems. The UG2 and Merensky Reefs outcrop over about 130 km, but also occur in down-faulted blocks and erosional outliers.

Property Geology

The Project Area is accessible via the R37 tarred road between the City of Polokwane and the town of Burgersfort.

The Project Area is underlain by MZ and CZ lithologies. Both the MZ and CZ outcrop on the Project Area.

Within the mining lease area, the RLS dips from northeast to southwest at approximately 25° in the north-western area (Zeekoegat) and gradually decreases to approximately 18° in the southeastern area (Brakfontein). The UG2 and Merensky Reefs dip continuously down towards the mine boundary in the southeast. The UG2 and Merensky Reefs both subcrop and in some instances outcrop on the mining lease area. The mining area is bisected by a series of parallel NE-SW trending faults and dykes, as well as a series of E-W trending faults and dykes. The northeastern portion of the mining area is overlain by a range of pyroxenite hills and the southwestern portion is below the valley floor, overlain by black turf. The depth extent of the UG2 and Merensky Reefs at the Bokoni Mine boundary has been modelled by ExplorMine; the UG2 Reef approximates 2,400 m below surface along the southeastern mine boundary, whereas the Merensky Reef approximates 1,300 m below surface at the boundary. Mining at depths of 2,400 m is currently not practical as the virgin rock temperature at these depths is above 75°C. Ventilation, mining technology and related costs currently prevent mining operations at these temperatures. For this reason, areas below 2,400 m below surface have been removed from the Mineral Resource quantification. Generally, both the UG2 and Merensky Reefs are oxidised at surface

Stratigraphy

A summary of the property stratigraphy is presented below from the deepest to the shallowest unit. UG2 Reef widths average approximately 73 cm across the Project Area. There is a general westward increase in reef width from an average of 67 cm on Umkoanesstad, 71 cm on Middelpunt, to an average of 74 cm on Zeekoegat. A generalised stratigraphic column has been constructed for the Project Area from the Bastard pyroxenite down to the UG1 horizon and is illustrated in Figure 16.

- **UG1 CHROMITITE**

The UG1 usually consists of a series of chromitite layers up to 1.2 m in thickness. In some cases, several layers or stringers of chromitite are "detached" from the bottom or top of the main layer. These appear to diverge into the footwall/hangingwall anorthosite, only to converge again and join the main layer in the form of lenses. These lenses of anorthosite are usually impregnated with numerous chromite grains. Below the main layer there is always a zone of anorthosite, up to 5 m in thickness, which contains elongated blebs and stringers of chromitite. These occur below the "detached" chromitite zone described above. Bifurcation of chromitite layers within the UG1 sequence is very common. The intimate association of chromitite and anorthosite is a characteristic of the UG1 chromitite unit throughout the Bushveld Complex. Layers of norite, leuconorite, anorthosite and pyroxenite, approximately 80 m to 90 m thick, overlie the UG1 and are, in turn, overlain by the UG2 Reef layer.

- **UG2 FOOTWALL MARKER (FWM)**

This marker occurs from 7 m to 15 m below the UG2 Reef. Chromitite stringers are often associated with this poikilitic anorthosite.

- **UG2 REEF**

The average thickness of the UG2 Reef assemblage is 70 cm. Thin pyroxenitic to leuconoritic lenses of limited lateral extent occur within the UG2 Reef. The immediate footwall of the UG2 Reef is usually a pegmatoidal feldspathic pyroxenite (similar to the Merensky Main Reef in appearance), which varies in thickness from a few centimetres up to 70 cm. The footwall pegmatoidal pyroxenite contains some base-metal sulphides, but its precious metal content is generally low with erratic high values. The contact between this coarse-grained, pegmatoidal pyroxenite and the underlying poikilitic pyroxenite is usually irregular and is gradational over a few centimetres. A thin boundary chromitite stringer may be seen locally. The UG2 Reef is overlain by medium-grained feldspathic pyroxenite almost 10 m in thickness, which may contain up to 6 thin 1 mm to 10 mm chromitite stringers. The separation distances between these chromitite stringers and the UG2 Reef have important implications with respect to geotechnical issues during mining operations. A thin anorthosite layer (1 cm to 3 cm thick) occurs above the chromitite stringers and is generally referred to as the Hangingwall Anorthositic Marker ("HAM").There is no apparent difference in mineralogy in the wide zones of pyroxenite above and below the UG2 Reef, as is evidenced by the lack of mineralogical and textural variations. The average reef widths for the UG2 Reef are as follows: Zeekoegat, 74cm; Middelpunt, 71cm; and Umkoanesstad, 67cm.

The UG2 Reef occasionally exceeds a thickness of 95 cm as a direct result of internal xenoliths comprising anorthosite, feldspathic pyroxenite and norite. Although the total chromitite thickness remains constant, the width between the upper and lower UG2 Reef contacts can exceed 2 m in places. These features can cause mining difficulties, due to the changes in the UG2 Reef elevation, deteriorating ground conditions and dilution. It has been noted that more than half of all UG2 Reef intersections have some form of inclusion 'waste' layers which are made up of feldspathic pyroxenite.

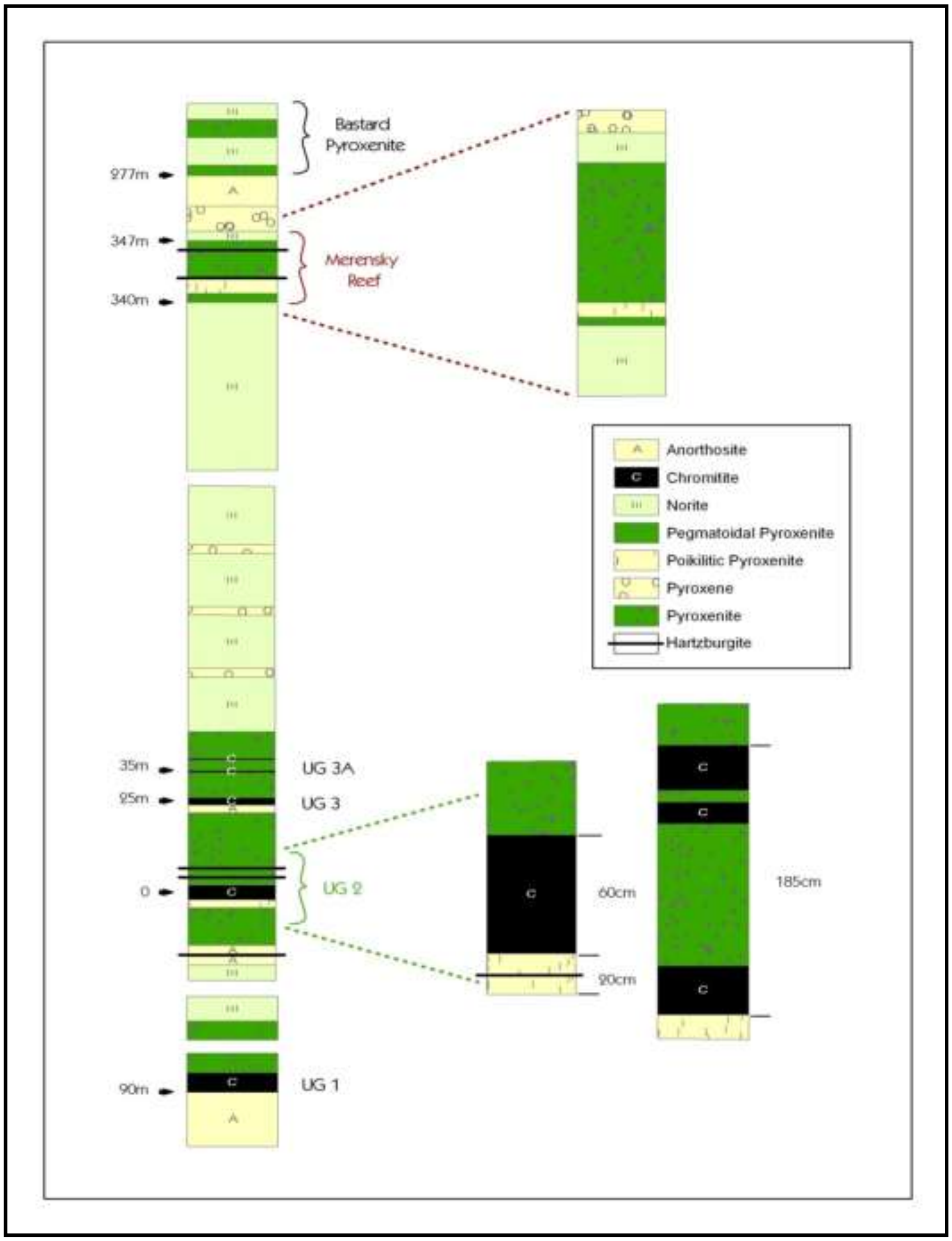
- **UG3 CHROMITITE ("UG3")**

The UG3 Chromitite Layer is approximately 10 cm to 30 cm in thickness and generally occurs 20 m to 30 m above the UG2 Reef. The UG3 footwall normally comprises a poikilitic anorthosite, typically 50 cm to 60 cm in thickness. Below this UG3 footwall, norites grade into the hangingwall pyroxenites of the UG2 Reef. The UG3A and UG3B are usually thin (10 cm to 15 cm). Poorly defined chromitite occurrences often occur approximately 11 m above the UG3 and are of a more disseminated nature.

- **MERENSKY REEF**

The Merensky cyclic sequence consists of a dark pyroxenite at the base while the overlying rocks become progressively lighter in density and colour. The basal pyroxenite is termed the Merensky pyroxenite and the mineralised portion of this pyroxenite, that is called the Merensky Reef, is invariably associated with two very thin chromitite stringers (usually 5 mm to 20 mm in thickness). The Merensky Reef is usually defined as that portion contained between these chromitite stringers. This pyroxenite package varies in thickness between 50 cm and 200 cm. A 20 cm to 50 cm thick pegmatoidal pyroxenite usually occurs immediately below the lowermost chromitite stringer. Visible sulphides occur in variable quantities, from above the uppermost chromitite stringer to below the pegmatoidal pyroxenite. The uppermost chromitite stringer is usually associated with the highest PGE grades. These chromitite stringers are not all present throughout the area, but at least one is always present. A 40 cm to 70 cm thick poikilitic, plagioclase pyroxenite occurs above the upper chromitite stringer before grading into a norite. This norite contact is normally referred to as the top of the Merensky pyroxenite. The norite grades into a poikilitic pyroxene anorthosite, followed by a second pyroxenite, which is the Bastard Pyroxenite. The Bastard Pyroxenite has sometimes been confused with the Merensky Reef. It generally contains sporadic low mineralisation. A norite occurs above the Bastard Pyroxenite which grades into a poikilitic pyroxene anorthosite up to 60 m thick. This is referred to as the Giant Poikilitic Anorthosite and is generally accepted as the demarcation of the top of the Critical Zone. The Merensky Reef typically occurs between 240 m and 400 m stratigraphically above the UG2 Reef.

Figure 16: Generalised Stratigraphic Column of Bokoni Mine



Structural Geology

The strike direction of the UG2 Reef is generally NW-SE and follows the Atok valley down towards Twickenham. The elevation contours of the UG2 Reef indicate a relatively undisturbed tabular orebody. The dip varies from an average of 25° on Zeekoegat to 18° on Umkoanesstad. Relatively gentle reef undulations are expected to occur randomly in all directions. There is no evidence that rolling reef of any appreciable magnitude would affect mining, undulations of ~1 m amplitude over ~30 m may be expected on approach to potholes.

- **FAULTS**

Thus far, mining has been remarkably uncomplicated as far as faulting is concerned. Based on existing Merensky workings, minor faulting is expected to occur while mining the UG2 Reef. Faulting at Bokoni consists of dextral and sinistral strike-slip faults, normal and reverse dip-slip faults, as well as faults of combined strike-slip and dip-slip character. Displacements have generally been, and are expected to be, less than 1 m in magnitude.

ExplorMine noted that major joint directions, measured from strong macro-lineament features, evident from the LandSat™ Spacemap (Figure 18), show dominant strike directions to be in the order of 099° and 159°. Underground mapping has revealed two dominant joint directions, striking at 118° and 168°, with a subordinate set striking at 174°.

- **JOINTS**

Joints that occur at Bokoni Platinum Mines are filled and are named according to the infilling. On the UG2 and Merensky Reefs, there are three basic types of joints:-

  - Pegmatite veins (PV) are present at regular intervals.
  - Calcite filled joints are present, but are spaced at more irregular intervals.
  - Joints with alteration products (olivine and pyroxene altered to serpentinite).

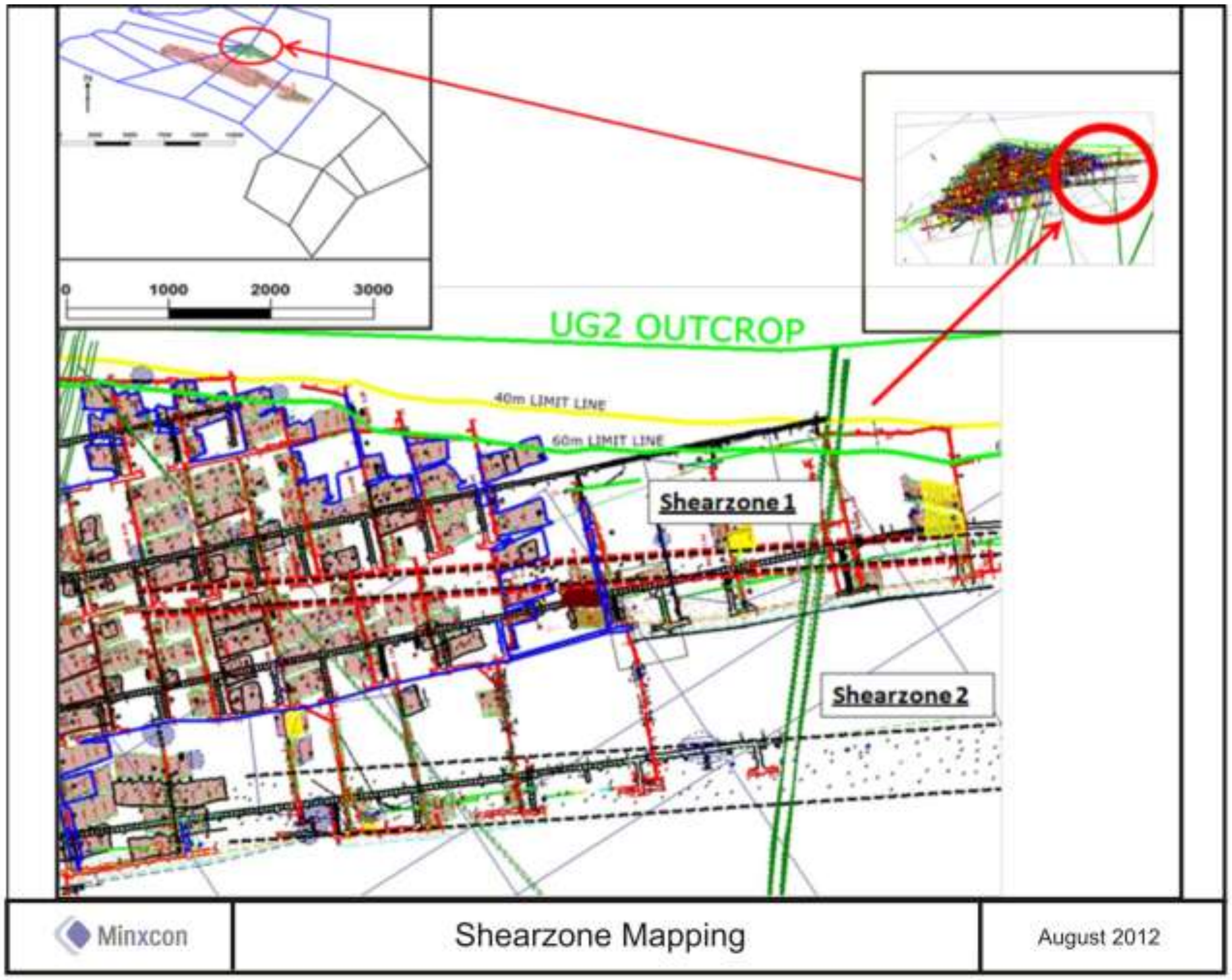
- **SHEAR ZONES**

Deformation in the BC is primarily of a brittle nature and shear zones are not common. Brittle deformation, rather than plastic deformation, results in faulting rather than shearing. Two shear zones have been mapped at Bokoni (Figure 17) indicated by the red and black (shearzone 1) and black (shearzone 2) broken lines. The extent of the shear zones has not been extrapolated yet. Van der Kevie's identified a possible hazard, due to the shear zones, that may result in a loss of raise line due to fall of ground, which may impact on face availability and hamper flexibility. The report by van der Kevie is available on request from the Client.

There are several structures that may be interpreted as shear zones within the Project Area: these are strike-parallel lineaments that were picked up by an aeromagnetic survey. It is more likely, however, that some of these are strike fault/fracture zones. Such features are quite common in the BC. Numerous examples of these features have been observed and mapped at Bokoni Mine; an example of this is the footwall marker at the base of the lower Merensky Pyroxenite.

The pink blocks on Figure 17 indicate the mined-out areas in the UG2 Reef. The blue lines outline the stopes in the UG2 Reef.

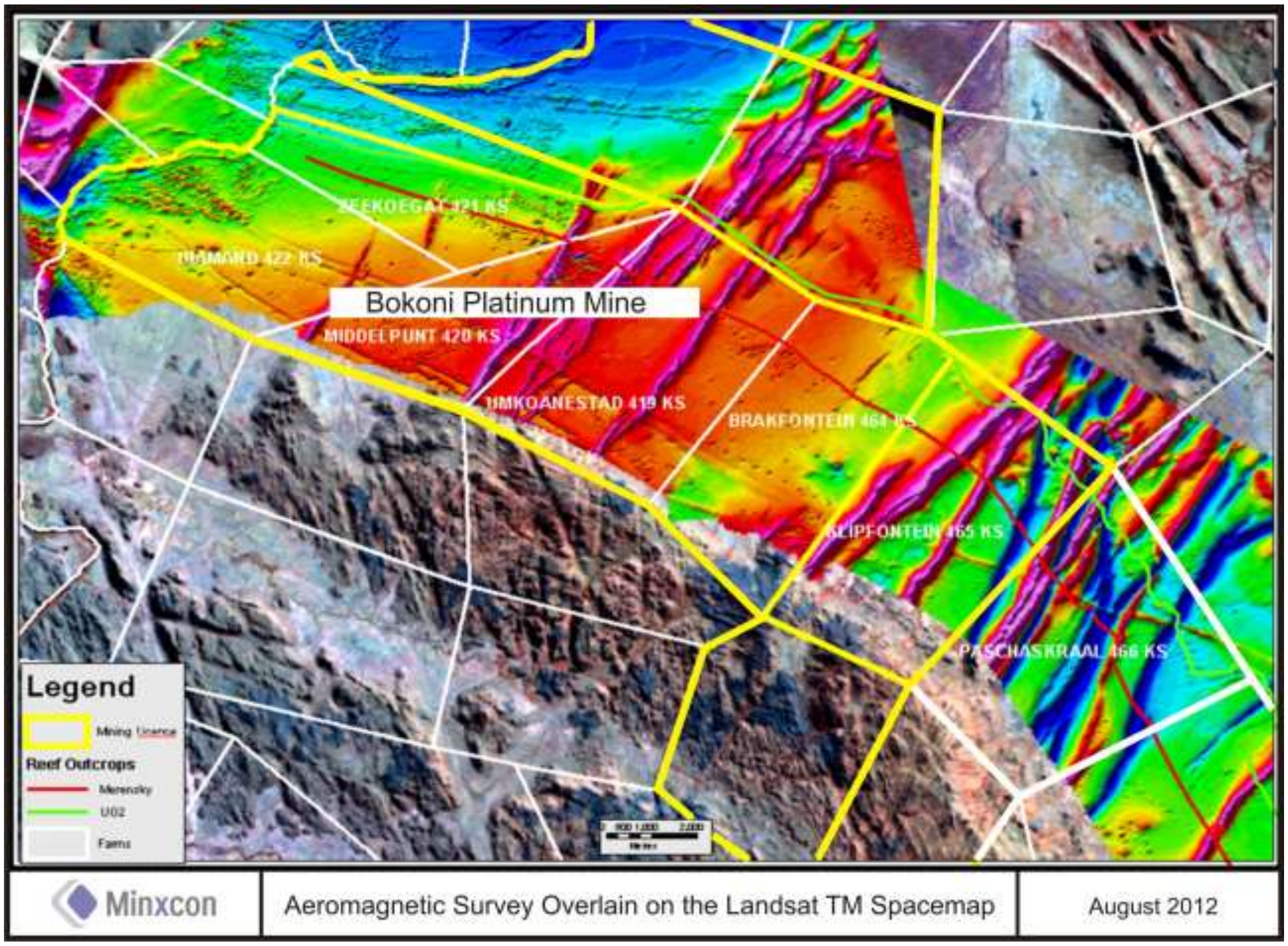
Figure 17: The Mapping of Shear Zone 1 and 2 at Bokoni Mine



- **DYKES**

Dykes at Bokoni are composed primarily of dolerite, which is generally fine-grained and of good competence, with associated areas of dense jointing and alteration. Dyke occurrences are noted on the farms Zeekoegat, Middelpunt and Umkoannesstad. Underground workings at Umkoanesstad have intersected an entire dyke swarm of northeast-striking dykes which was predicted by an aeromagnetic survey to pass through this area. The survey identified several swarms of northeast-striking dolerite dykes. Underground dyke intersections are generally less than 10 m in width. No serious problems were encountered during mining through these features, and no significant displacements were noted to be associated with them. The estimated geological loss associated with dykes across the property is 4%. The aeromagnetic response to these features exaggerates the actual width dimension as depicted in the purple lines in Figure 18. Not all dykes have magnetic responses and a few east-west orientated dykes are known to have no magnetic response. The broad tectonic setting is characterised by NNE-SSW and east-west trending dykes and faults/fractures.

Figure 18: Aeromagnetic Survey Overlain on the LandSat™ Spacemap – Bokoni Mine



- **POTHOLES**

Potholes are magmatically eroded depressions which are usually deep and have serious structural implications in terms of reef continuity and mineability. Potholes are defined as areas where normal reef characteristics are destroyed and therefore pothole areas are believed to be un-mineable and are considered a geological loss.

The UG2 and Merensky Reefs are known to have crystallised on successive, lower footwall lithologies within these potholes. Potholes occur as a result of pre-crystallisation, thermochemical erosion and defluidisation of the cooling footwall stratigraphy upon renewed injection of hot, convecting primitive magma above, which together create the depressions into which the UG2 and Merensky Reefs have sporadically crystallised. The standard nature and characteristics of the UG2 and Merensky Reefs are not preserved in Bokoni potholes, where the succession rather occurs as a variably thickened feldspathic pyroxenite package containing disrupted chromitite, thinning out onto the steep pothole walls. Grades are highly erratic, and invariably sub-economic. UG2 potholes in the Sekhukhuneland area are of the destructive type, where the succession is highly undulatory, highly variable in thickness, and commonly disrupted.

The potholes affecting the UG2 Reef are on average 50 m in diameter. This is evident from mine intersections to date. This size is larger than the Merensky average of 30 m in diameter, but the occurrence of potholes in the UG2 is less frequent than that experienced in the Merensky. In the Bokoni area there is more literature about the Merensky potholes than of the UG2. Current indications are that potholes account for 9% of the estimated total geological loss of 15% (historically potholes accounted for 15% of the geological loss). The precise locations of individual potholes and their dimensions cannot be predicted. In most cases the potholes affect only one of the economic units. In minor instances, however, the underlying or overlying economic unit may be affected by the development of an associated single pothole. The mapped and drilled potholes on the UG2 Reef and the Merensky Reef on Bokoni Mine are illustrated in Figure 19 and Figure 20.

Figure 19: Mapped and Drilled UG2 Reef Potholes, Dykes and Bifurcated Reef Intersections

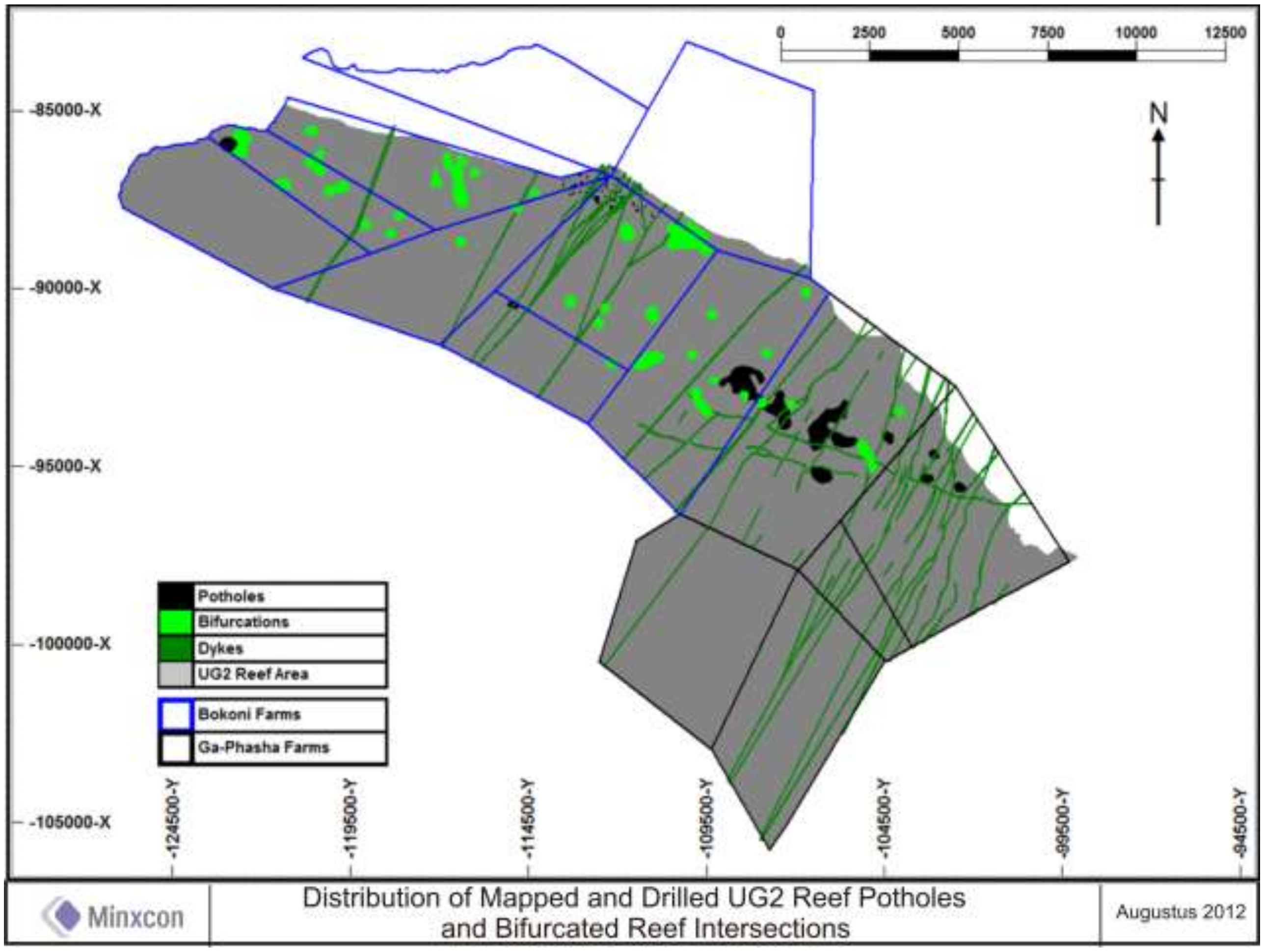
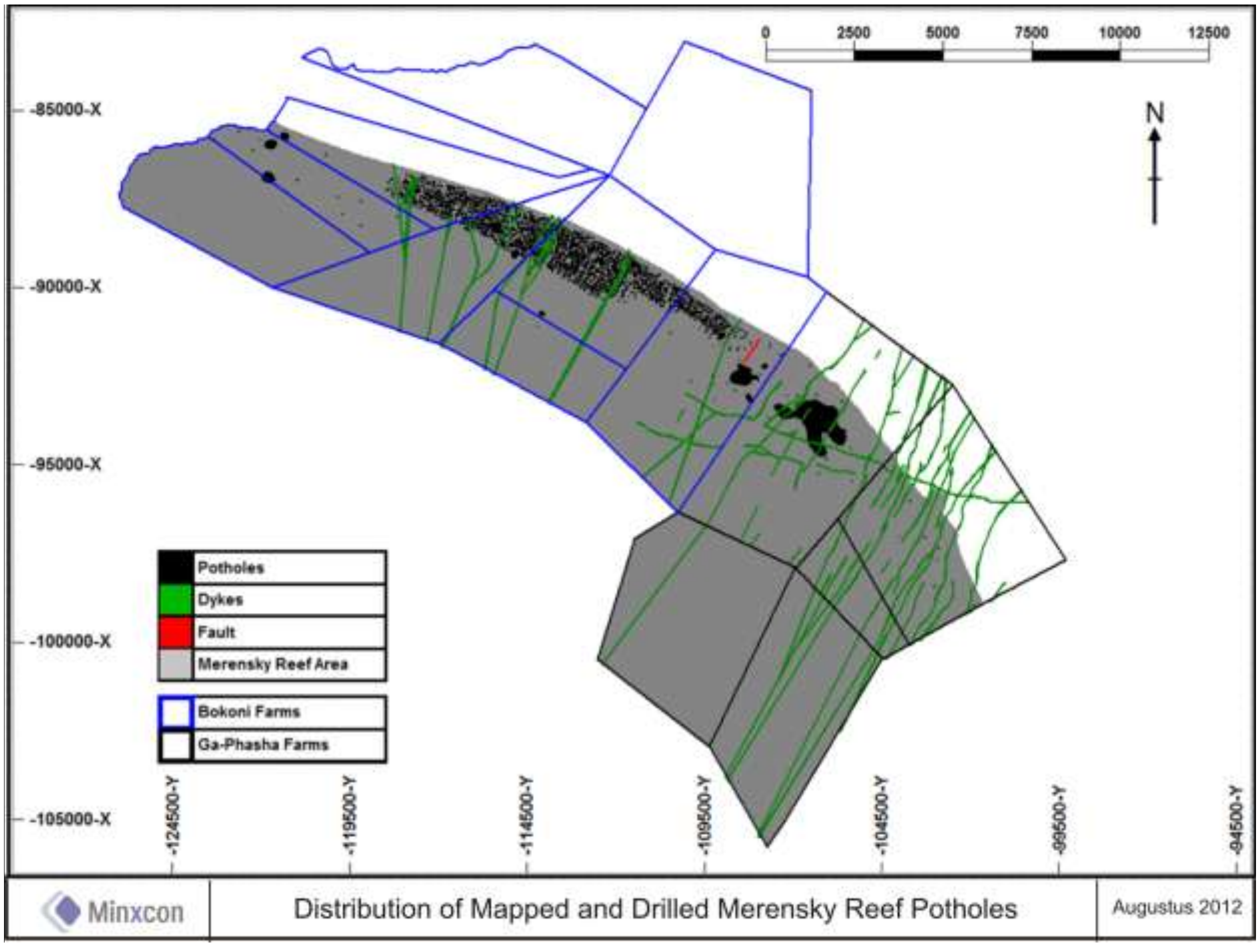


Figure 20: Distribution of Mapped and Drilled Merensky Reef Potholes



- **REPLACEMENT PEGMATITES**

Replacement Pegmatites occur throughout parts of the Critical Zone and lower Main Zone of the BC. The Replacement Pegmatites invade the cumulate layered stratigraphy as randomly occurring, late stage discordant replacement bodies to varying extents. Four varieties of Replacement Pegmatites have been recognized: ultramafic, mafic, intermediate and felsic. These features have been recorded at Bokoni Mine and geological losses are estimated at less than 3%.

At Bokoni Mine, the type of Replacement Pegmatites that commonly occur is the minor felsic type, while the intermediate replacement pegmatite occurrences are rare. There is a noted general absence of the more voluminous mafic and ultramafic pegmatites. The felsic pegmatites generally occur as white, sub-vertically orientated veins that seldom exceed 10 cm in width. Occasionally, irregular-shaped pegmatite masses also occur. These seldom exceed 2 m in diameter. These felsic pegmatites are minor in abundance and extent, compared to the more highly destructive mafic and ultramafic pegmatites that occur elsewhere in the BC e.g. RPM Rustenburg. Drill core from across the project area has intersected a few minor mafic and ultramafic replacement pegmatite occurrences, preferentially associated with the UG2 succession. These minor occurrences give no indication of being particularly iron rich and do not indicate any extensive replacement.

- **BIFURCATED (UG2) REEF**

In some instances the UG2 Reef exceeds a thickness of 95 cm as a direct result of the presence of internal xenoliths comprised of anorthosite, feldspathic Pyroxenite and norite. This does not affect the total width of the chromititedeposit, only the spacing between the upper and lower UG2 Reef contacts, which can exceed 2 m in places. This presents a problem to mining, due to changes in the UG2 Reef elevation, deteriorating ground conditions and dilution. Further drilling to determine the extent of this phenomenon is planned in the vicinity of the bifurcated reef intersections observed in the drillholes. Currently, the borehole spacing of 300 m – 500 m is considered inadequate to delineate these features. It has been noted that half of all UG2 Reef intersections have some form of inclusion 'waste' layers which are commonly made up of feldspathic pyroxenite. Based on current information, a minimum of 6.5% of the total Bokoni UG2 Reef resource should contain bifurcated reef in excess of 95 cm. The mapped and drilled UG2 bifurcated reef Intersections are illustrated in Figure 19. The UG2 Reef is extensively bifurcated in the northeastern corner of Umkoanesstad, extending into the northwest of Brakfontein.

- **CHROMITITE STRINGERS**

The UG2 Reef is overlain by a succession of thin, leader chromitite layers that occur at varying distances above the reef ranging from a few cms to ~2 m above. The leaders may affect the stope width in some instances. This feature has been geotechnically investigated and modelled.

The Bokoni UG2 Reef is relatively free of leader bands compared to other UG2 Reef environments. There are commonly up to four very thin (1 mm to 5 mm) chromitite layers. In some rare instances, a series of thin chromitite layers, or one or two layers (up to a total of 10 cm in width) also occur immediately above the reef (generally 2 cm to 10 cm above). The occurrence of chromitite leaders is expected to affect the hangingwall stability of the reef.

- **ALTERATION ZONES**

Alteration zones are normally responsible for "bad ground" and where such ground cannot be mined the loss is considered to be a mining loss as opposed to a geological loss. A known and defined alteration zone of some magnitude would be considered a geological loss, though such zones are generally difficult to predict and delineate.

- **UCB**

The undulating calcite break ("UCB") is a persistent, undulating, altered, sub-horizontal joint that occurs at varying elevations above the reef in parts of the project area, especially in the Middelpunt and Umkoanesstad vicinity. The UCB is expected to affect reef stability in places.

Item 7 (b) – Significant Mineralised Zones on the Property

Both the UG2 and Merensky Reefs tend to have characteristic vertical grade profiles, with regard to PGEs, as well as development characteristic of hangingwall and footwall stratigraphies. PGE mineralisation includes platinum (Pt), palladium (Pd), rhodium (Rh), ruthenium (Ru), osmium (Os) and iridium (Ir).

The precious metals gold (Au) and silver (Ag) and the base metals chrome (Cr), iron (Fe), cobalt (Co), nickel (Ni) and copper (Cu) are often associated with PGEs.

The UG2 and Merensky Reefs are a result of compositional layering of differentiates found in the mafic igneous rocks of the BC. The two reef layers are separated by approximately 350 m of mafic and ultramafic cumulate rocks.

In a large, layered intrusion such as the BC, the sulphide droplets that segregate out of the parental magma eventually settle out of the magma, and once magma convection ceases are deposited on already consolidated layers of the magma chamber to form sulphide-rich zones. Local structure such as faults and dykes, as well as iron-rich ultramafic pegmatites ("IRUPs"), potholes and upwarps in the Transvaal Supergroup floor rocks may locally affect the continuity of these layers.

The UG2 Reef occurs as either a pure chromite or a cumulate framework of chromite with interstitial plagioclase and/or orthopyroxene. The bulk of the PGE mineralisation associated with the UG2 is hosted within the main chromitite layer as disseminated sulphides attached to the chromite grains. Typically, the sulphides form embayments in the chromite grains at triple junctions. Less commonly, the sulphides may be occuled within the chromite grains. The typical sulphides which host the PGE are pyrrhotite, pentlandite and chalcopyrite. The UG2 Reef in this area of the BC is characterised by a Pt and Pd telluride assemblage and Pt-Rh-Co-Cu sulphide assemblage. The PGE grades are typically elevated at the top and basal contacts of the chromitite seam. The disseminated mineralisation may extend into the footwall units and is typically related to disseminated chromite and chromitite stringers.

The UG2 chromitite hosts some base metal sulphide ("BMS") and precious metal sulphide accumulations with variable occurrences in the immediate footwall rocks. Very little sulphide accumulation occurs in the hangingwall rocks. BMS share interstitial space with plagioclase feldspar and orthopyroxene within an oxide framework of chromite grains. The PGE mineralisation occurs as PGE in solid solution with BMS. This is due to discrete PGE cations occupying space within the BMS lattices as 'impurities'. The mineralisation also largely occurs as discrete PGEs that typically occur in close association with, and enclosed within the BMS, silicates and oxides. The PGEs comprise sulphides, sulpharsenides, arsenides, bismuthides, tellurides, bismuth tellurides and alloys. PGE sulphides, tellurides and alloys are the main vehicles of mineralisation in the Bokoni UG2 Reef.

The footwall units of the UG2 Reef tend to be pegmatoidal pyroxenite and pyroxenites, but can vary to include norite and leuconorites. These layers commonly host disseminated chromitite and some BMS within close proximity to the reef. The contacts of the UG2 Reef are generally sharp.

The UG2 Reef is overlain by a medium-grained poikilitic feldspathic Pyroxenite that averages 9.85 m in width and thins to the south. This Pyroxenite layer hosts a variable number (generally from 0-4) of very thin chromitite leaders.
The Merensky Reef is a pyroxenitic unit characterised by enclosing chromitite stingers. The economic portion of the Merensky Reef is typically demarcated by the chromitite stringers. The PGE mineralisation of the Merensky Reef is typically associated with base metal sulphides and silicates. The BMS is interstitial with plagioclase feldspar within cumulate orthopyroxene. The PGE mineralisation typically occurs in combination with sulphides, sulpharsenides, arsenides, tellurides and alloys.

The main PGEs encountered at Bokoni Mine within the UG2 Reef are braggite, laurite and cooperite. The UG2 Reef has a lower platinum:palladium ratio and a relatively higher rhodium content when compared with the Merensky Reef.

The main PGE minerals encountered at Bokoni Mine within the Merensky Reef are braggite (35%), cooperite (24%), laurite (13%), moncheite (28%) and a platinum-iron alloy. The distribution of the precious-metal phases appears to vary laterally and vertically through the Merensky Reef and its immediate adjacent lithologies.

The two major BMS minerals are pentlandite and chalcopyrite. The UG2 Reef has lower concentrations of copper and nickel when compared to the Merensky Reef.

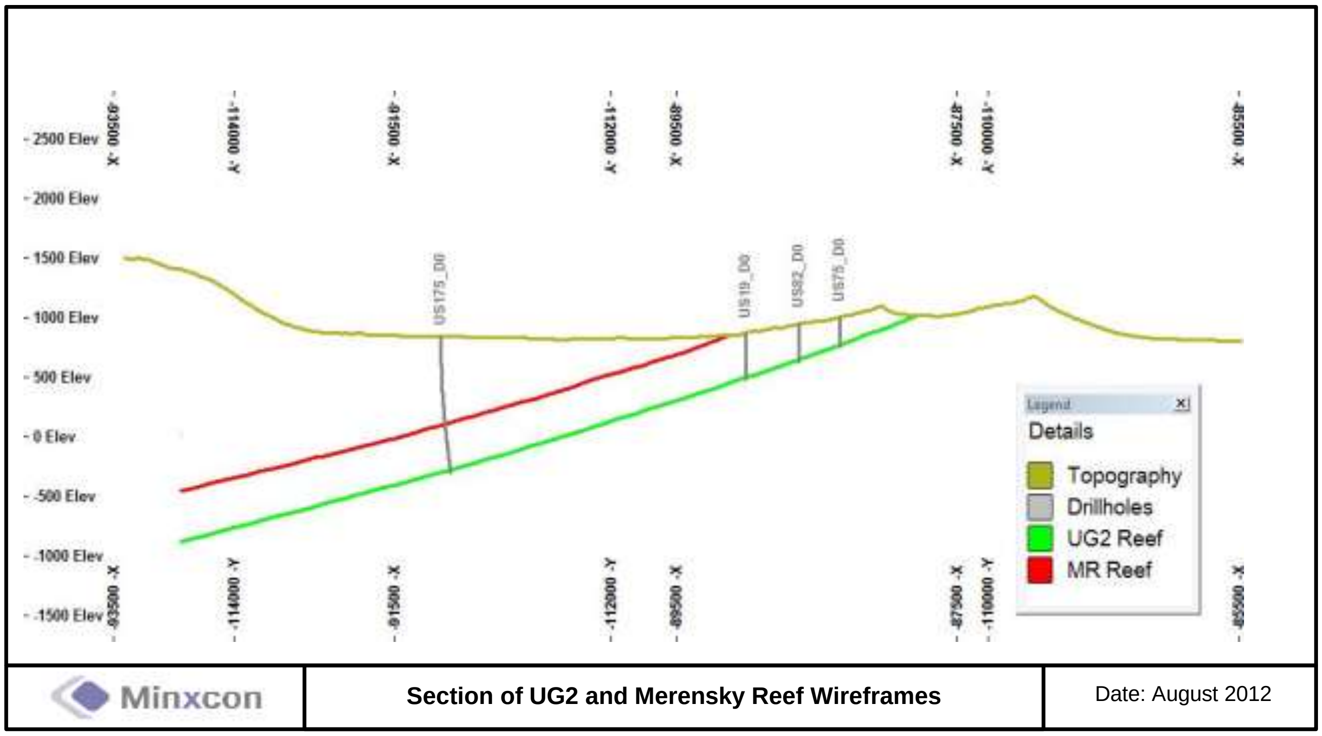
Item 7 (c) – GEOLOGICAL MODEL

Reef Wireframe surfaces

A combination of desurveyed surface drillhole reef intercepts, channel samples and previous structural interpretations, topography and an interpreted aeromagnetic survey were used by ExplorMine Consultants to complete a first principles structural interpretation.

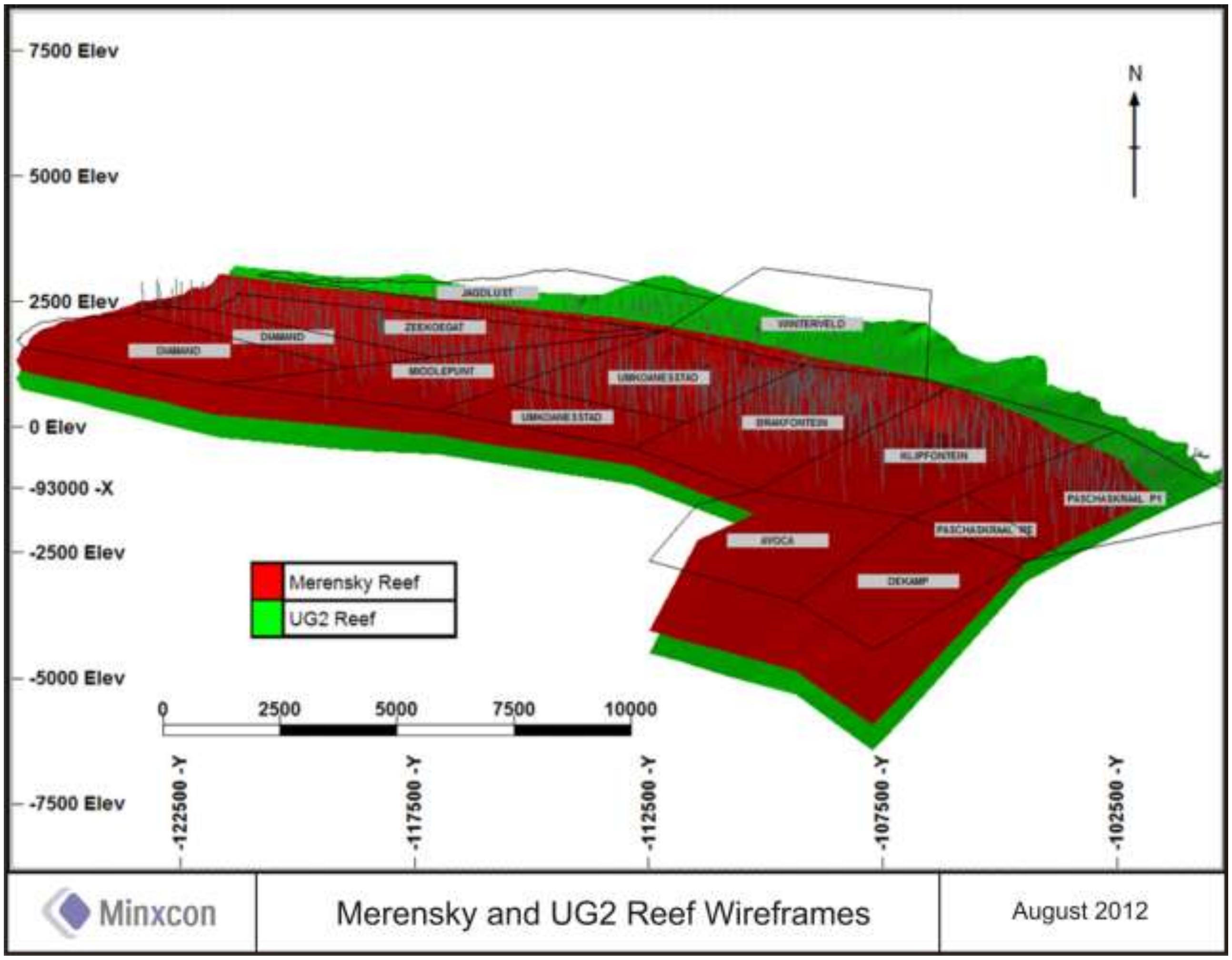
The top contacts, as determined during the reef coding process, of the UG2 and Merensky Reefs were wireframed as continuous surfaces-honouring intersections (Figure 21 and Figure 22). All valid intersections were utilised irrespective of the validity of the grade information. All valid intersections were utilised irrespective of the validity of the grade information. Figure 22 illustrates a section of the Merensky and UG2 wireframes showing boreholes US175_D0, US19_D0, US82_D0 and US75_D0 were use in the wireframing.

Figure 21: Section of UG2 and Merensky Reefs' Wireframes



Utilising boundary polygons and the intersections, wireframe surfaces were gridded. Mother surface drillholes were always used as the dominant indication of the surface as these intersections have downhole surveys. Where the mother drillhole intersection was not available, the next sequential intersection was utilised. The De Kamp and Paschaskraal farms are not included in the Project Area. Figure 22 illustrates in 3D the wireframe surfaces produced by the top contacts of the reefs in the drillhole intersections, the green surface represents the UG Reef and the red surfaces represent the overlying Merensky Reef.

Figure 22: Merensky and UG2 Reef Top Contact Surface Wireframes



- **Pothole Modelling**

A pothole model was not compiled by ExplorMine for the UG2 Reef, due to sparse data relating to the potholes recorded in the existing UG2 mine workings in the Project Area. A geological loss of 9% for potholes, based on historical mining data, was used for the UG2 Reef. A pothole prediction model was created for the Merensky Reef by analysing the pothole distributions in the mined-out area. Point semi-variograms were generated for the areas (m^2) of potholes. In addition, the number of potholes per unit area (200 m by 200 m) was calculated and a corresponding point semi-variogram was generated. The resultant variogram models provided a basis for estimating the area of potholes and the number of potholes to be expected for a given block.

Potholes intersected by the surface drillholes and dykes, as interpreted from the aeromagnetic image, have been projected to the wireframe surface and 'cut out' of the final estimated model to indicate areas on the reef horizon where mineralisation is not expected to be normal. Pothole intersections were modelled at the localities indicated by surface drillhole information. The dimensions of these potholes were determined utilising the pothole intersection model.

A regional pothole has been discovered in the Brakfontein area which has been divided into two components, a 'destructive pothole area' where no recognisable section of the Merensky Reef is preserved and a 'non-destructive pothole area' where the Merensky Reef is partially preserved.

- **Geological Losses**

Geological losses refer to areas of destruction on the reef by such means as faults (regional or local), dykes, potholes and IRUPS. The geological losses related to dykes were coded by ExplorMine into the final composite models using the spatial distribution of dykes from the interpreted aeromagnetic data. The geological losses are applied to the tonnages from the Resource estimation model.

- **Relative Density/Specific Density**

Specific gravity (SG) is the ratio of the density (mass of a unit volume) of a substance to the density of a given reference material. Specific gravity usually means specific gravity with respect to water. In many instances, the drill holes were analysed for SG. All samples were analysed for specific gravity using a gas Pycnometer on pulped samples.

The method of determining the SG using a gas Pycnometer is based on the Archimedean principle. A gas pycnometer uses the calculation of the pressure change resulting from the displacement of gas by a solid object to determine the volume (m^3) used to calculate an SG (t/m^3). The unknown sample volume is placed in a chamber of known volume which is then charged to pressure at a pressure higher than that of the chamber. The sample volume is then calculated using the ideal gas law (Jarman, 2011).

The gases most commonly used are helium and dry air. The Grabner analyser is the type of gas Pycnometer used to determine the SGs of the Project Area.

A 10% replication of base metal and density measurements is conducted for QA/QC purposes. The results of the specific gravity analyses are reported in conjunction with the routine assays. The specific gravity for each reef unit was estimated into the primary block models using the variography and values from the composite data. Average specific gravity values from the reef composites are 3.374 and 3.9267 for the Merensky and UG2 Reefs respectively.

ITEM 8 – DEPOSIT TYPES

The BC, a large, layered igneous intrusive body in South Africa together with the Great Dyke in Zimbabwe and the Stillwater Complex in Montana (United States of America) are good examples of stratified mafic and ultramafic intrusive complexes. The BC is host to extensive resources of PGEs, chromite, titanium and vanadium.

Many theories have been developed to understand the emplacement and formation of the BC. Due to the wealth and volume of research conducted on the origins of the BC, it is outside the scope of this project to summarise the pertinent models proposed. In a large, layered intrusion such as the BC, the sulphide droplets are proposed to segregate out of the parental magma and eventually settle out of the magma, and once magma convection ceases are deposited on already consolidated layers of the magma chamber to form sulphide-rich zones. The UG2 and Merensky Reefs tend to have characteristic vertical grade profiles with regard to PGEs, as well as the development of characteristic hangingwall and footwall stratigraphies.

The units of the layered RLS tend to dip regionally at low angles towards the centre of the BC. The economic horizons of the CZ of the BC can be traced for over several hundreds of kilometres. The UG2 and Merensky Reefs can be summarised as being laterally, and down-dip persistent economic PGE orebodies. Local structures such as faults and dykes, as well as replacement pegmatoids, potholes and upwarps in the Transvaal Supergroup floor rocks may locally affect the continuity of the UG2 and Merensky Reefs.

The Merensky Reef may regionally consist of different reef or facies types. The UG2 Reef may also be explained in terms of distinct facies types. Based on the availability and intensity of sample information, different facies types may be discerned as homogeneous data populations. Holistically, local facies variations are present in both the economic units, but grade ranges and unit thicknesses encountered in both the UG2 and Merensky Reefs are relatively constant along strike and dip. This allows the use of moderate to widely-spaced drillholes to model these orebodies to a low level of confidence, that is, modelling based on assumed geological and/or grade continuity.

The observed grade and width continuity allow the UG2 and Merensky Reefs to be extracted as tabular orebodies. The persistence on either a local or a regional scale of chromitite stringers within the hangingwall lithologies pose geotechnical constraints which are generally overcome by modern rock strata control. In addition, should the grades be considered to be economic and the dilution tolerable, the persistence on either a local or a regional scale of chromitite stingers, within the footwall units allows for the extraction of additional PGE mineralisation.

Weathering and Oxidation

The weathered overburden across the Bokoni Mine Area consists of soil and calcrete. The depth of the overburden is highly variable. The rocky and hilly areas have no overburden, while the overburden in the soil-covered valley areas may be in excess of 50 m. Table 11 shows the available average overburden depth of some of the farms in the Project Area (the overburden values were not available for all the farms in the Project Area).

Table 11: Average Overburden Depths for Bokoni Mine

Farm	Average Overburden Depth (m below surface)
Zeekoegat	10.2
Middelpunt	22.0
Umkoanesstad (valley)	30.0
Umkoanesstad (mountain)	2.2

These average overburden depths should be used with caution, especially in detailed mine planning. The reason for this is the high variability in the overburden depths and the undulatory nature of the underlying bedrock. The average depth of oxidation is estimated by adding 25 m to the average overburden depth. The available estimated average oxidation depths for some of the farms in the Project Area are given in

Table 12 (the oxidation values were not available for all the farms in the Project Area).

Table 12: Average Oxidation Depth for Bokoni Mine

Farm	Average Oxidation Depth (m below surface)
Zeekoegat	35.2
Middelpunt	47.0
Umkoanesstad (valley)	55.0
Umkoanesstad (mountain)	27.2

The figures above confirm the findings in the borehole core. The depth of oxidation on Middelpunt and Umkoanesstad mountains is known to be highly variable and reaches an estimated maximum of ~32 m.

ITEM 9 – EXPLORATION

Item 9 (a) – SURVEY PROCEDURES AND PARAMETERS

This section summarises the exploration activities, other than drilling, undertaken at Bokoni Mine. Since 1964, the following activities have occurred at Bokoni Mine:

- Remote sensing;
- Ground and Aeromagnetic surveys;
- Seismics;
- Landsat;
- Surface geological mapping and trenching;
- Underground geological mapping and chip/diamond saw sampling;
- Surface and underground drilling; and
- Downhole surveys

Atlatsa has conducted and continues to conduct mapping, drilling and chip/diamond saw sampling underground. Surface drilling is currently taking place on the Ga-Phasha West farms. The bulk of the exploration was conducted by previous owners of the property.

Remote Sensing

The Landsat™ Spacemap image of the Bokoni Platinum Mine area is presented in **Error! Reference source not found.**. The NNW-SSE and WNW-ESE macro-lineament features defining dominant joint and fault directions are easily discernible (purple lines). The green line represents the UG2 Reef outcrop position, and the red line the Merensky Reef outcrop position.

Ground and Aeromagnetic Surveys

A number of geophysical surveys were conducted on sections of the BC including Bokoni Mine. Tests were conducted by the JCI Geophysics Unit in June of 1975 to determine the applicability of the magnetic method in delineating pegmatite bodies. It was hoped that the pegmatites might be associated with potholes and therefore indicate their locations. The tests successfully delineated the ultramafic pegmatite bodies, but not necessarily the potholes as the two features are commonly independent.

In 1980, a ground magnetometer survey was undertaken along a 93 km long line, in the vicinity of the Bokoni Platinum Atok Section over a survey grid. This survey resulted in the delineation of three prominent magnetic anomalies:-

a) A number of NNE-trending linear magnetic anomalies of long wavelength and large signal-to-noise ratio, were interpreted as dolerite dykes of Waterberg or Karoo age.
b) Curvilinear or linear, short wavelength anomalies of weak to moderate amplitudes are interpreted as surficial cultural or overburden features.
c) Curvilinear, zonal trends of weak amplitude having ambiguous causative sources either at depth or near surface.

Potholes, which may be associated with iron-rich ultramafic pegmatites ("IRUPS") and are prevalent in this area, were not detected by the survey, the reason being that IRUPs are not common at the Bokoni Mine.

In October 1981, a detailed, high resolution, low altitude aeromagnetic survey was executed in the basal portion of the northeastern BC. The survey totalled some 7000 kms of line over a 55 km of strike length. The survey was aimed at a regional assessment of the area from a mining point of view. Isomagnetic contour maps were analysed at a scale of 1:25000 for major, magmatically-disturbed zones underlying the Merensky Reef. The results only indicated two localised dyke swarms. The dyke swarms consist of NE-SW striking diabase dykes that pass predominantly through the farms Klipfontein, Umkoanesstad, and to a lesser extent Middelpunt. Lesser dyke occurrences were also noted on the farms Zeekoegat, Diamand and Brakfontein. The aeromagnetic survey interpretation also showed minor dunite and pegmatite on the farms Brakfontein, Umkoanesstad and Diamand. The interpreted magnetite-bearing horizons are of no significance to the UG2 or the Merensky Reefs.

In 2000, an aeromagnetic survey was conducted with superior resolution. The interpretation of the survey complemented the results of previous surveys with better resolution and definition of structural discontinuities. The survey highlighted the IRUP anomaly and associated potholing in the south eastern portion of Brakfontein. A detailed report utilizing the survey images is available on request from the Client. The report as compiled by SJ du Plessis, AKK Rompel, EC Luck & P Courtnage is titled; Aeromagnetic Survey Interpretation and correlation with other remotely sensed Data on Bokoni PM (1 September 2004). An aeromagnetic survey plan showing the structural lineaments in the project area is shown in Figure 18, the project area is outlined in yellow, the purple lines indicate the position and trend of intrusives.

Seismics

The environment and the technological development of seismics to date, make it an attractive tool for structural exploration and planning. Seismics can identify faults with throws as small as 10 m, as well as potholes with some level of confidence.

3D seismic surveys have been conducted for UG2 at the Modikwa Mine and the results of the survey are encouraging. Seismics have been considered for the Project Area, however, the position of the surface infrastructure and the presence of the mined-out area on the Merensky Reef above the UG2 Reef, do not make it a viable option. A significant portion of the project area is too shallow to get any benefit from a seismic survey.

Landsat

The Landsat program is used for the acquisition of satellite imagery of Earth. Landsat was launched on July 23, 1972 as the Earth Resources Technology Satellite which was eventually renamed Landsat. The most recent satellite, Landsat 7, was launched on April 15, 1999. The instruments on the Landsat satellites have acquired millions of images. The images are archived at Landsat receiving stations around the world. These images are a unique resource for global change research and applications in agriculture, cartography, geology, forestry, regional planning, surveillance, education and national security. Landsat 7 data has eight spectral bands with spatial resolutions ranging from 15 m to 60 m. The temporal resolution is 16 days (Wikipedia, 2012).

Older Landsat™ 5 or newer Landsat ETM 7 immediately reveal areas of outcrop of the Merensky and the UG2 Reefs and, after further processing, indicate the geological units, in particular the platiniferous CZ and the MZ of the RLS. Airborne magnetic surveys are the subsequent dataset necessary for interpretation of the geology under surface cover.

Trenching

The UG2 is characterised by limited outcrop exposure on Bokoni Mine. A limited strike length of UG2 outcrop occurs along the hills located along the northern boundary of the Bokoni Mine, as well as on the farms Umkoanesstad 419KS and Wintersveld 417KS.

The UG2 Reef outcrops, on the Umkoanesstad and Wintersveld farms, have been geologically mapped. A number of dolerite dykes, which outcrop in the hills on the northern boundary of the mine, have also been mapped. The mapping was completed by exploration personnel. Surface mapping was done for outcrops of the Upper Critical Zone and dolerite dykes. The Upper Critical Zone was mapped on the mountain range along the northern boundary of the Mine, on the Umkoanesstad Mountain and within the farm Wintersveld. The dykes were mapped on the Umkoanesstad Mountain. Errors in the mapping of the trenches could result in the structural projections to underground levels being projected incorrectly.

Underground Mapping and Sampling

Underground mapping of the development and stopes exposing the UG2 and Merensky Reefs has, routinely been done by the mine's geologists. Written protocols exist, which detail the geological mapping process and the recording of geological data. The most important data recorded during the routine underground geological mapping, is the position and extent of pothole features and dykes. Errors in the underground mapping could result in incorrect interpretation of geological structure utilised in a geological model thus giving wrong guidance for the production planning and production reconciliation. The underground sampling guides the mine in terms of the accuracy of the grade and resource models.

Item 9 (b) – SAMPLING METHODS AND SAMPLE QUALITY

Underground sampling and sample quality

The following section has been extracted from the 2010 Atlatsa ITR (Page 52 – Page 54).

As a matter of routine, the UG2 and Merensky Reefs' exposures underground are mapped and sampled. The sampling of the economic horizon follows the industry standard of sampling across the width of the unit perpendicular to strike. The sampler is responsible for the underground reef sampling and the following procedure has historically been, and currently is, employed at the Bokoni Mine:

- Sample widths are cut at 10 m intervals in raises and advance scraper gullies;
- Sample widths are only cut where full reef exposure exists;
- Sample width cuts are strictly orientated at 90° to the dip of the reef exposure;
- Sample widths are marked with a 4.5 cm to 5 cm width on the exposure face;
- Latitudinal zero sample datum lines are drawn 2 cm above the top reef contact ("TRC") and 2 cm below the bottom reef contact ("BRC");
- Samples are then marked at approximately 15 cm intervals between the datum lines until the entire channel is marked out. Hangingwall and footwall samples are then sampled at 10 cm and 15 cm intervals respectively, generally until the entire face exposure has been sampled;
- Samples are not less than 8 cm in length;
- Sample cutting is done from the bottom of the mineralised unit upwards and the associate sample numbers are numbered from the top of the mineralised unit down;
- The actual dimensions of the samples are recorded, the samples are placed in clean plastic bags and unique barcodes are pasted on the bag, which is then sealed;
- Samples are co-ordinated by the sampling team using underground survey pegs; and
- The sampling team records geological features such as lithology (including reef, hangingwall and footwall), dykes, faults, potholes and alteration.

Samples are captured in the Mineral Resources Management ("MRM") database by the sampler on the same day. The sampler is responsible for ensuring that his/her sections are captured correctly. The sample bags are then sealed with an impulse sealer and the barcode scanned. The samples are then packed into containers and sent to the Eastern Bushveld Regional Laboratory ("EBRL") via courier. The samples are maintained in a chain of custody from the sampling site to the laboratory by a sample dispatch note and sample request forms.

The basic channel sampling method used at the Bokoni Mine is similar to channel sampling methodology employed historically in South African gold and platinum mines. Historically, channel samples were collected using chisels to perform a so-called 'H-cut' method. Recently, however, a 'V-cut' method has been used on the platinum mines, where a compressed rotary diamond saw is utilised. The new method reportedly results in a considerable reduction in sample contamination, and also leads to more continuous samples with more accurate dimensions.

The area covered by the sampling is approximately equivalent to the mined out area for each reef. The samplers routinely sample the stope faces as the reefs are exposed by mining. The samples are retrieved from both stoping and on-reef development underground sections. The number of chip (underground) samples that were used in this estimate is summarised in Table 13.

ExplorMine and Minxcon are satisfied that the underground channel sampling is as per industry best practice. Regular planned task observations are conducted by supervisors to ensure channel sampling procedures are adhered to.

OTHER SAMPLING

A series of bulk samples were taken from the UG2 outcrop on Zeekoegat from a test winze on the west of the property in 1991. A series of borehole samples and trench grab samples taken from the Zeekoegat trenching exercise in mid-2002 were submitted for mineralogical and metallurgical work. Similarly, a number of large-diameter boreholes were drilled across Bokoni, from Zeekoegat in the west to Brakfontein in the east, and were completed in December 2002.

Item 9 (c) – Sample Data

Details regarding the number of the different types of samples utilised in the estimation of Mineral Resources for Bokoni Mine are summarised in Item 10 of this report.

Item 9 (d) – Results and Interpretation of Exploration Information

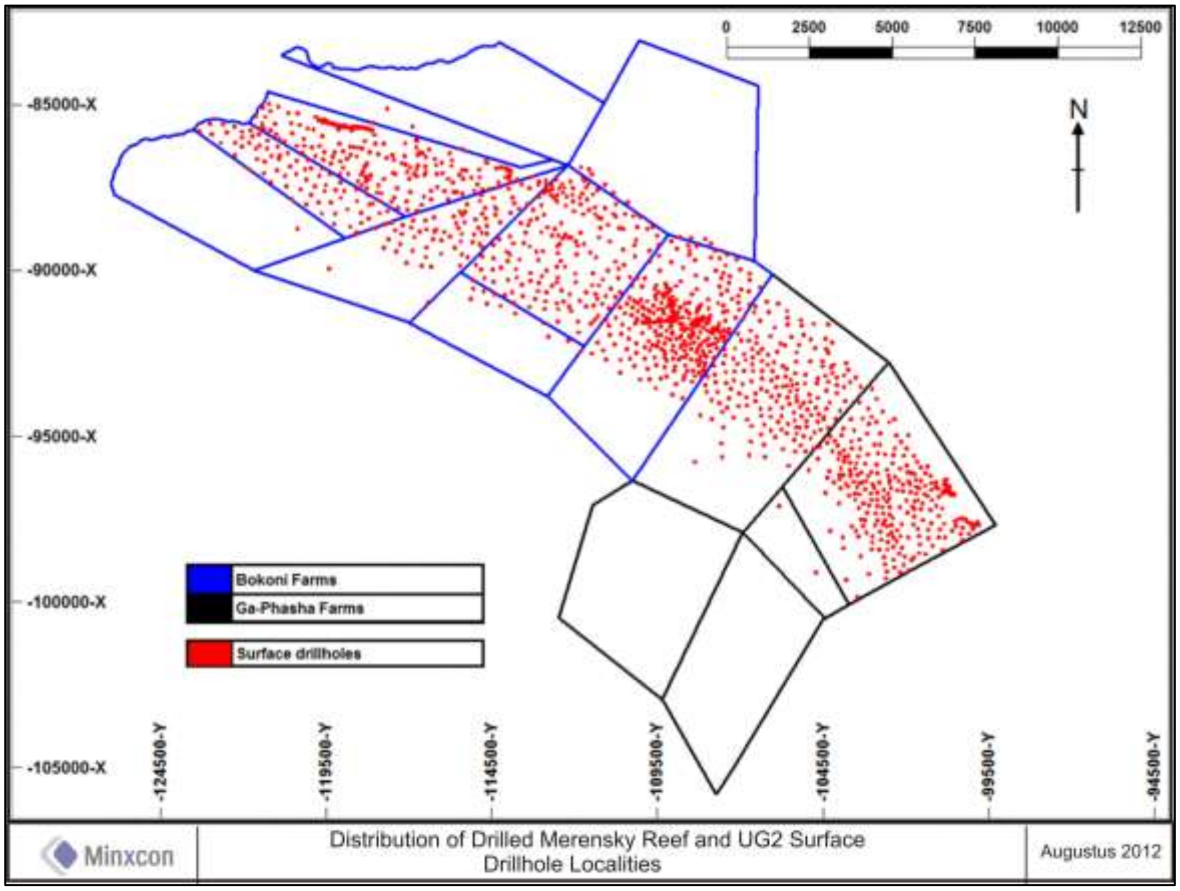
The information gathered from the exploration activities is incorporated into the geological and Mineral Resource estimation models on an annual basis. Incorporation onto geological plans is routinely undertaken by the geologists.

ITEM 10 – DRILLING

Item 10 (a) – TYPE AND EXTENT OF DRILLING

Diamond drilling was and is currently being conducted at Bokoni. The average grid spacing of the surface drilling completed on the Bokoni Mine properties is 300 m by 300 m. Approximately half of the lease area is covered by the surface drilling programmes completed up until 2008. The core recoveries from the historical drilling are excellent and deemed not to materially affect the drillhole data for the Mineral Resources. Figure 23 shows the borehole coverage of the UG2 Reef and the Merensky Reefs. Figure 21 illustrates drill holes intersecting the UG2 and the Merensky Reefs.

Figure 23: UG2 and Merensky Reefs Surface Drillholes



Surface Drilling Procedures

Borehole drilling sites are laid out using GPS technology and the results obtained from reconnaissance and planning. In recent years, the drilling has targeted both the UG2 and Merensky Reefs. Boreholes drilled down-dip of the Merensky Reef have intersected both reefs which are separated by approximately 350 m of intermediate stratigraphy.

The bulk of the surface drilling (Figure 23) on the Bokoni Mine property was conducted when the Mine was owned by Amplats. Amplats employed contractors to conduct the drilling activity, even though diamond core logging and sampling were conducted by Amplats staff at the Driekop Exploration Base (located approximately 50 km southeast of the Bokoni Mine). No single drilling contractor was used to complete the drilling and contracts were put out to tender at the beginning of each exploration phase.

It was the responsibility of the relevant drilling company to supply all the machinery, equipment, tools, consumables, and competent operating staff required for the defined drilling contract. Amplats provided core trays, and if necessary, core-depth marking blocks. Amplats staff marked the drilling sites, provided a source of drilling water and issued all drilling instructions (including the borehole number).

The following activities were minimum standards and procedures that were performed by Amplats during drilling programmes:

- Drilling instructions, locality of borehole sites, drilling angles and directions, expected reef depths, reef recognition, end of hole depths (between 10 m and 30 m below reef), core size (unless otherwise instructed, wireline BQ core size was used as the standard) and deflection requirements, were issued by the staff geologist.
- Frequent inspection visits to active drill sites by the geologist or technician, including visits to the drill site after the mineralised zone had been intersected, were carried out in order to confirm intersections and be able to issue accurate deflection instructions.
- The drilling contractor was required to accurately determine hole depth at each core pull, record this depth in the operator's log, and on the core depth block in each case.
- The core was removed from core barrels and packed into core trays, ensuring that all pieces of core were facing the correct way. Depth blocks were inserted at the correct points between core runs, i.e. at the end of each core run.
- Every core tray has the borehole number, deflection number where appropriate, and its core tray number clearly marked on it. The first piece of core in each tray also bears the borehole number. The drilling contractor was generally responsible for marking the depth measurements on the core itself (i.e. at 1 m intervals).
- The mother borehole is denoted as D0 (parent intersection) with the first deflection as D1, the second as D2, and so on.
- The convention in borehole identification is: Farm/Area Code – Borehole Number (this usually starts at 1 for the very first borehole drilled on a particular farm, and increases consecutively from there on as subsequent holes are drilled) – Deflection Number (D0 = mother hole, D1 = first deflection, D2 = second deflection, D3 = third deflection, etc.).
- Core transport from the drill sites to the exploration camp was the responsibility of the drilling contractor. If core was not delivered to the satisfaction of the staff geologist, a deflection wedge was drilled at the appropriate depth interval.
- As a standard, three non-directional deflections were drilled for each mother (primary) intersection. If the borehole was greater than 400 m in depth but less than 1000 m, four non-directional wedges were drilled. If the borehole exceeded 1,000 m, six non-directional wedges were drilled. The first deflection (D1) is usually set at a TOW position of 5 m above the TRC/zone of interest, the second deflection (D2) at 10 m above, the third (D3) at 15 m, and so on.
- As a rule, downhole surveys were conducted by the drilling contractor. Occasionally, independent surveys were commissioned as a check. The downhole surveys were generally multishot electromagnetic ("EMS") surveys.
- Borehole site surveys, i.e. the surveying of the X, Y and Z World Geodetic System (WGS84) co-ordinates of the borehole collar positions, were conducted after the holes were completed by qualified surveyors.
- On completion of the drilling process, an identification beacon was installed, the borehole was plugged and the site was rehabilitated.

Diamond drilling of recent years has ensured intersections for both the UG2 and Merensky Reefs. Only boreholes drilled down-dip of the Merensky outcrop have intersected both horizons. The UG2 and Merensky Reefs are separated by some 350 m of intermediate stratigraphy. The average grid spacing of the surface drilling completed on the Bokoni Mine properties is 300 m by 300 m. Approximately half of the lease area is covered by the surface drilling programmes completed up until 2008.

Historical, electronically-stored surface borehole data is of varying quality. Surface boreholes drilled prior to 2000 contain only 4E grades as opposed to individual prill grades. In addition, many of the deflections were either not sampled, or the sample grades were not stored.

Underground Drilling Procedures

Underground AXT (32.15 mm) diameter diamond drilling is planned and monitored by the mine-based geological staff at Bokoni Mine to define the local elevation and grade values of reefs underground. These geologists are also responsible for the logging and sampling of the underground drill cores. The basic logging methodology is identical to that applied to the drill cores from surface drilling. The sampling method is also similar with the exception that whole cores are sampled at approximately 20 cm intervals for both the UG2 and Merensky Reefs' mineralised intersections. The underground prospecting drillholes are drilled vertically at +90°. Cover drillhole core (drillhole drilled for intersection of water and methane as part of the mine's safety protocols) is discarded following logging. The cover drillholes are drilled as AX diameter core.

Minxcon and ExplorMine Consultants are of the opinion that the overall methodology in terms of the underground drilling is acceptable. ExplorMine noted that there were minor issues with respect to the measurement of sample lengths. Minxcon has noted that no signing over of the underground core is undertaken between the geologist and the drilling foreman. The geologists do, however, sign the daily report. The drillers are responsible for the depth markers and the markers are checked by the geologists.

Both the cover and underground drilling information is captured on the SABLE™ Warehouse software package by the geological staff. Should a pothole be predicted in the vicinity of mining, Atlatsa geologists drill in an attempt to intersect the pothole. If a pothole is intersected, an advance strike gully is pushed through the pothole to determine the extent.

The underground prospect drillholes are stored at Driekop Exploration Base. Approximately four certified reference materials ("CRMs") and one blank sample are inserted into the sample stream from the prospect drillholes. The blank sample comprises anorthosite material. Historically, ExplorMine has recommended that Atlatsa ensures that the overall data capture process is improved, and Minxcon concurs with this recommendation.

Borehole Sampling Procedures

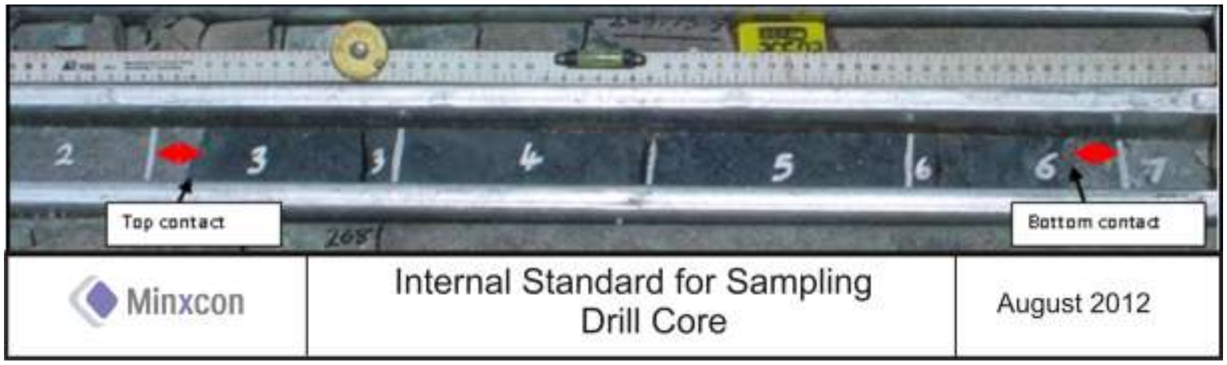
The following section has been extracted from the 2010 Atlatsa ITR (Page 52 – Page 54).

Surface borehole logging has been historically undertaken by qualified Amplats geologists and contract geologists at the Driekop Exploration Base (located approximately 50 km southeast of the Bokoni Mine). All boreholes and their deflections are logged in terms of standard lithology, mineralisation, alteration and structure conventions. Logging details are entered directly into laptop computers, making use of the SABLE™ Warehouse software package. Geotechnical and structural logging is also carried out by geotechnical staff and structural geologists.

No new surface drillholes have been drilled on Bokoni Mine since 2008. The surface drillhole sampling procedure as used by Amplats is summarised below:-

- Before core logging begins, the geologist carefully inspects the core to ensure that the trays and core are marked with the correct borehole number, that the core is correctly orientated, that individual pieces fit together, that hole depth marking blocks are correctly inserted and that hole depth marking has been correctly and accurately done.
- Core losses are identified and estimated.
- Once core scrutiny and preparation is complete, the core logging is completed by the geologist using proprietary logging software SABLE™ Warehouse, where the logging data is entered directly into a laptop computer. Various aspects of a core succession are logged, such as lithology, stratigraphy, texture, structure (layering angles, faults and joints) and mineralisation.
- A standard on rock identification is used.
- 10% of all core logging is reviewed by a suitably-qualified supervisor where adherence to logging standards and accuracy of the geological log are verified.
- Sampling was conducted on the entire mineralised zone with continuous sampling of equal width throughout; with sample suites aligned on a standardised zero stratigraphic datum, such as a TRC.
- Half core BQ diameter, 15 cm long (on average, but not exceeding 20 cm in length) samples were prepared to provide an adequate level of detail through a succession and sufficient material for assay (minimum of 100 g, and this sample size ~210 g).
- The mineralisation zone for both the UG2 and Merensky Reefs extends for variable distances beyond the reef boundaries into the hangingwall and footwall.
- The convention for sampling a reef layer was to extend the sampling interval from 2 cm above the TRC to 2 cm below the BRC, to ensure that all material belonging to the reef cut was completely sampled.
- Hangingwall sampling was completed from the TRC +2 cm mark upwards at constant 15 cm sample widths through the hangingwall mineralised zone. Similarly, footwall sampling commenced from BRC -2 cm and extends downwards through the footwall mineralised zone, also at constant 15 cm sample widths (Figure 24).

Figure 24: Internal Standard for Sampling Drill Core



- Sample marking is completed by the same geologist who initially logs the core, during the same logging exercise to ensure the lithological and sample logs match exactly.
- Sample boundaries are clearly marked on the core with a permanent ink marker and the depth measurement of every sample boundary is recorded. Each sample is assigned a unique code comprising the borehole number and a sample number.
- Once the core has been completely marked off for sampling, the sample section core is removed from the trays and the core cut longitudinally in half with a diamond blade core cutter (Figure 25).

Figure 25: Diamond Blade Saw Cutting of Drill Core

- The top half that was originally marked out with samples is then laid next to the bottom half, and the sample intervals and numbers are exactly duplicated onto the flat side of the bottom half.
- This bottom half is retained and returned to its correct position in the core trays.
- The top half is then sampled, where individual samples are separated with a sharp chisel. The surface on which this is done must be properly cleaned between each sample to avoid any cross-contamination.

- Once the sample has been prepared, it is labelled and bagged. The open end of the bag is then folded over twice and stapled closed. The full sample number is also written on the outside of the plastic bag with a permanent ink marker. Once a complete suite of samples has been prepared, all samples are placed in a larger plastic bag labelled with the borehole number and the sample number range and tied closed with string or twine (Figure 26).

Figure 26: Sealed and Labelled Sample Bags Ready for Dispatch

After the Bokoni Mine property core has been logged and sampled according to the required standards and procedures, it is stored at the Driekop Exploration Base (located approximately 50 km southeast of the Bokoni Mine) ready for dispatch.

Core trays are packed in an orderly and logical fashion. The trays from any one borehole are stacked together and in tray number order. Core tray stacks are packed in blocks of the same origin, i.e. the farm or project area as denoted by the farm/project code, and in order according to borehole number. There are 135 completed boreholes with UG2 Reef intersections and deflections within the delineated Project Area.

Minxcon visited the Driekop Exploration Base to review the security and storage of the Bokoni drill core. Minxcon is satisfied that the security and storage of drillhole core is acceptable.

Rock Temperature

Downhole surveys were carried out on completed boreholes to measure a number of physical aspects of the holes, including the rock temperature gradient. This is measured from the base of the hole upwards at predetermined intervals that may vary from hole to hole depending on the depth of the hole. On average, the critical temperature of 40° is measured at a borehole depth of 684m in the Project Area.

Item 10 (b) – Factors Influencing the Accuracy of Results

See Item 10 (a) for any drilling, sampling or recovery factors which could materially impact the accuracy and reliability of the results.

Item 10 (c) – Exploration Properties – Drillhole Details

This item does not apply as Bokoni Mine is an advanced property.

ITEM 11 – SAMPLE PREPARATION, ANALYSES AND SECURITY

The bulk of the samples sourced from surface exploration diamond drilling, underground diamond drilling and underground channel sampling were prepared and collected by employees of Amplats, the previous owners of Bokoni Mine.

Item 11 (a) – SAMPLE HANDLING PRIOR TO DISPATCH

The samples are maintained in a chain of custody from the sampling site to the laboratory by a sample dispatch note and sample request forms.

Item 11 (b) – SAMPLE PREPARATION AND ANALYSIS PROCEDURES

Borehole Samples

Surface and underground exploration borehole samples (as from 2000) were submitted to Anglo Research Analytical Services Laboratory ("AR") (previously known as Anglo American Research Laboratories ("AARL")) located in Crown Mines Johannesburg. AR is a SANAS-accredited (South African National Accreditation System) analytical facility with Facility Accredited Number T0051. AR Laboratory operates in accordance with international management and quality standards (ISO: 17025). The laboratory first obtained accreditation in May 1996.

At AR, the flow of samples through the laboratory from sample receipt to primary sample preparation, through processing at both primary and secondary sample preparation to instrumental analysis and final sample disposal, is tracked in a Laboratory Information System called STARLIMS®. Care is taken during the handling of samples to avoid potential cross-contamination or misplacement of samples. High and low-grade materials are processed in completely separate areas throughout the laboratory, using dedicated and clearly-labelled equipment. An audit trail is maintained throughout sample handling.

Borehole core samples are analysed for Au, Pt and Pd ("3E") using lead collection fire assay Inductively Coupled Plasma Optical Emission Spectroscopy ("ICP-OES"). Where the 3E grade exceeds 1.5 g/t, samples are further assayed for rhodium content. All 3E and Rh assays are performed in duplicate and the process is twin-streamed. Cu and Ni are determined by wavelength dispersive X-Ray Fluorescence spectrometry ("XRF"). All samples are analysed for SG using a gas Pycnometer on pulped samples. Replication of XRF and SG determinations are performed at a rate of 10%.

A summary of the assay process is as follows:-

- The client is informed of the arrival of the samples, and the assaying method is confirmed.
- Samples are uploaded into STARLIMS® using the sample names as recorded on the client's Analytical Request Form, sample list ("ARF"). The client is notified of any discrepancies between actual samples received and the information on the ARF.
- A Batch Report ("BR") is generated from STARLIMS®. The batch of samples is checked against the BR to ensure that it is a true and accurate reflection of the batch. The BR accompanies the batch of samples throughout the laboratory.
- The batch is then made available for Primary Sample Preparation. Wet samples are transferred to clean, stainless steel dishes and dried overnight at 80°C in sealed ovens.
- Samples are weighed prior to and after primary sample preparation procedures (crushing and milling).
- Samples are crushed to ≤ 3 mm particles using jaw crushers. The crushed sample is collected in clean stainless steel dishes, labelled, covered and stored for further processing. The crusher is cleaned manually with compressed air between samples and dust extraction is effected by a down draught airflow system. Quartz is used for cleaning at the beginning and end of each batch. The crusher product size is also checked.
- Samples are pulverised to at least 80% <75 µm using Labtechnik LM mills and low-chrome pulverizing vessels. Conformance is checked and recorded on 10% of samples in a batch. Where non-conformance is detected, the relevant samples are re-pulverized. Mill pots are cleaned manually between each sample by brushing, blowing with compressed air or vacuuming. Quarry quartz is milled between individual batches and certain samples for cleaning purposes. In addition, an aliquot of the quarry quartz is milled as a sample at the beginning and the end of each batch. These milled quartz portions are treated as "quartz blanks" to monitor the contribution of the mill pots to the samples and are analysed with the batch of samples. The data is reported to the client.

- Au, Pt, Pd and Rh are analysed in duplicate. Rh in a sample is only determined when the sum of Au, Pt and Pd ≥ 1.5 g/t. Samples are analysed using a fire assay lead collection fusion technique, followed by acid dissolution of the resulting precious metal prills and determination of Au, Pt, Pd and Rh by ICP-OES.
- The lower limit of detection for this method is 20 ppb (0.02 g/t). A 50 g aliquot is used for the analysis of Merensky Reef material and 30 g for UG2 material.
- Ag is used as a co-collector for the Au, Pt and Pd analyses whereas Pd is used for the Rh analysis.
- Special flux mixtures are used and are modified as per sample matrix requirement.
- Total copper and nickel are routinely analysed. Cr2O3 analysis is done on selected samples, as requested by the client.
- A pressed powder XRF technique is used and samples are analysed on the Philips PW 2400 and an AXIOS sequential spectrometer.
- The lower limit of detection for Cu and Ni is 5 g/t and for Cr2O3 is 100 g/t. Sample mass used per disc is 27 g.
- Specific densities are carried out on pulped samples using the Grabner analyser.
- Results are transmitted electronically to the client with security if requested.

Item 11 (c) – Quality Assurance and Quality Control

Surface Drillhole Samples – Internal Quality Control

Amplats surface borehole sampling protocol contains an assay QA/QC procedure which includes:-

- Insertion of certified reference materials ("CRMs"), in-house reference materials ("IHRMs") and blanks to determine the accuracy (bias) and internal precision of the laboratory. A comparison of the blind QCs (analysed as unknown) with the same laboratory QCs (analysed as known) is done. Blanks are inserted as unknown samples between the normal 10% check samples to determine whether there was any contamination present during the analyses of the batch. The blank is usually washed silica sand with trace values for PGE, Cu and Ni.
- Duplicates of randomly selected sample pulps (from samples that have already been analysed and returned from the laboratory) are added to an analysis batch to evaluate internal laboratory precision and repeatability at various grades.

As AR returned assay results to Amplats, dedicated individuals were responsible for analysing the assay results and associated QA/QC controls. Any deviations from the QA/QC protocols were queried with the exploration site and AR. If accepted, the assay results are processed through clearing tables and migrated into the final SABLE™ Data Warehouse.

Surface Drillhole Samples – Laboratory Quality Control

AR has a comprehensive assay quality control system that includes blanks, CRMs, IHRMs, and twin streaming/replicate analyses. Care is taken during the handling of samples to avoid potential cross-contamination or misplacement of samples. High and low-grade materials are processed in completely separate areas throughout the laboratory, using dedicated and clearly-labelled equipment. Samples are weighed and checked upon receipt. Quarry quartz is crushed and milled between individual batches to avoid any possible carry-over. The quartz is analysed with the batch and the data is then reported to AR during progress meetings.

Quartz blanks are designed to monitor the entire process from sample preparation to instrumentation. They are treated as normal samples throughout the process. Quartz blanks consist of EGGO quarry quartz (a very clean, coarse-grained quartzite). As this represents a natural geological material, small amounts of trace elements, such as Cu & Ni, are expected to be present. Any contamination introduced during sample preparation and subsequent processes will be reflected in the quartz blank (i.e. it will become a known amount).

For each tray of 28 fusions (worksheet) of 3E and Rh analysis, reagent blanks, CRM and duplicate samples will be included for control purposes. Internationally certified reference materials, as well as internal reference materials, of matched matrices are used. Fire assay pots are used only once to avoid the possibility of cross-contamination of samples from remnant flux.

Reagent blanks are introduced during secondary preparation. These are essentially reagents mixtures excluding sample material. For example, in fire assay the reagents would be assayed, a button made, the prill dissolved, and the solution read. Reagent blanks reflect contamination introduced during the analysis phase but not the primary preparation phase. SPECDENS and XRF data don't have reagent blanks, but do have quartz blanks.

With each method, CRMs and IHRMs are run. These are usually type-specified to the method. For example, in the Merensky Reef fire assay for 3E and Rh (also simply known as 4E) SARM7 (CRM) and MER001 (IHRM) are run. For UG2 samples SARM65 (CRM) and UG2001 (IHRM) are run. For XRF analyses IHRM is run, and for SPECDENS calibration blocks, acid washed quartz and quartz are run. CRMs and IRMs of matched matrices are used.

For each standard of each analyte, the precision is calculated, and spread about the certified value. When standard values exceed the stated precision from the certified values, the related sample batch data is rejected and the worksheet analysed. This may result in a total reanalysis/reassay, or just instrument reading depending on the problem. Each procedure is executed according to well-documented protocols. A complete audit trail is maintained in the laboratory to ensure traceability, transparency and ISO compliance.

These results are reported along with the sample data. The precision of the analysis is monitored by the twin-stream analysis of precious metals, as well as the 10% replication of base metal and density measurements. A full calibration of the ICP-OES instrumentation is performed prior to sample analysis, and a synthetic check sample is included after every 10 to 15 samples to ensure that the calibrations are still valid.

Worksheets are accepted or rejected based on the quality control data of the standards, replicates and blanks. A comprehensive monthly Quality Report is prepared by the AR Quality Section and is issued to the client. The report contains information on the blanks, CRMs, IHRMs, twin-stream and replicate result performance.

10% of samples analysed at AR are selected and submitted for quality control check assays by Genalysis, Australia. Samples are analysed at Genalysis for precious metals by the nickel sulphide fire assay collection method with an ICP-MS finish; for base metals (Cu and Ni) by peroxide fusion with an ICP-OES finish and for density measurements by gas Pycnometer.

Underground Drillhole and Underground Chip Samples

The underground diamond drilling samples and underground chip samples are routinely submitted to EBRL situated at the Polokwane Smelter Complex, owned by Amplats. EBRL is a SANAS-accredited (ISO 17025 registered) laboratory with Facility Accreditation Number T0414. The original date of accreditation was 8 October 2009. The bulk of the assay results for the underground drilling and channel sampling are therefore dated prior to the accreditation of EBRL.

Underground borehole core samples and chip samples are analysed for Pt, Pd and Rh ("3E") using lead collection fire assay Inductively Coupled Plasma Optical Emission Spectroscopy ("ICP-OES"). Lower detection limits are 0.25 g/t for Pt and 0.05 g/t for Pd and Rh. Cu and Ni are determined by wavelength dispersive XRF with a lower detection limit of 10 ppm. All samples are analysed for SG using a gas Pycnometer on pulped samples.

Underground Drillhole and Underground Chip Samples – Internal Quality Control

Bokoni Mine has not inserted internal CRMs, IHRMs or blanks into its underground borehole or chip sampling streams in the past, although the mine protocols detail the use of standards and blanks. The Bokoni Mine geologists indicated to Minxcon during the site visit that four standards and one blank is currently inserted into the underground drillhole sampling stream. The Mine evaluator inserts both standards and blanks into the underground sampling stream. The mine evaluator is currently reviewing and sourcing new standards and blanks for the underground sampling stream

Underground Drillhole and Underground Chip Samples - Laboratory Quality Control

EBRL operates according to international quality standards. Consistent and stringent standards of analytical practice are applied. Each activity is executed according to well-documented procedures. A complete audit trail is maintained in the laboratory to ensure traceability, transparency and ISO compliance. Care is taken during the handling of samples to avoid potential cross-contamination or misplacement of samples.

CRMs and IHRMs of matched matrices are used. These results are reported along with the sample data. A reagent blank, one CRM and an IHRM are used per tray of fusions. Fire assay pots are used only once to avoid the possibility of cross-contamination of samples from remnant flux.

Item 11 (d) – ADEQUACY OF SAMPLE PREPARATION

Prior to 2000, a variety of analytical techniques were used in assaying samples for the Bokoni Mine:

- Lead-collection fire assay: a total of 4E PGE was reported with low confidence due to a high temperature cupellation step in the process that caused the loss of the majority of Rh in the samples. This technique has not been utilised since 2000.
- Lead-collection fire assay gravimetric prill: individual PGMs determined with similar levels of confidence as above.
- Nickel-sulphur dissolution: individual PGEs determined with high confidence and accuracy.

Since the overwhelming bulk of the data used in the 2010 and recent Mineral Resource estimations were generated after 2000, the assay results generated prior to 2000 were not considered significant by ExplorMine. Minxcon concurs that the pre-2000 results should not have a large effect on the Mineral Resource estimation.

Minxcon and ExplorMine Consultants have not conducted an audit of the laboratories and accepts that accreditation with SANAS is valid at the date of this Technical Report.

In terms of the surface diamond drilling, the sampling and assay procedures and associated QA/QC protocols are of a high standard and, in the opinion of both ExplorMine Consultants & Minxcon, are in line with industry norms and standards.

Although the standards for sampling in terms of the underground chip sampling and underground drillhole sampling are in line with Industry norms, there is some concern with respect to the QA/QC procedures. Although the Bokoni Mine has written protocols dealing with this issue, these protocols have not been fully adhered to. In addition, the analytical laboratory EBRL only achieved SANAS accreditation in October 2009. Therefore, the bulk of these assay results were not subject to the stringent controls that such an accreditation demands. Minxcon is of the opinion that EBRL is deemed a well-respected institution in the field of PGE assaying and therefore this aspect is not considered detrimental to the estimation process.

ITEM 12 – DATA VERIFICATION

The majority of the geological and sampling data was obtained from diamond drilling and underground channel sampling.

ExplorMine Consultants processed several sets of data during the Mineral Resource estimation process. The following data sources were considered:-

- Surface diamond drilling sourced from Amplats' SABLE™ Data Warehouse;
- Underground diamond drilling – sourced from Bokoni Mine;
- Channel sampling – sourced from Bokoni Mine GMSI MRM software;
- Geological data including surface outcrops and reef potholes, faulting and intrusive features in underground excavations – sourced from Bokoni Mine MicroStation® software;
- Geophysical aeromagnetic interpretations – sourced from Bokoni Mine;
- Mining outlines including stoping and development - sourced from Bokoni Mine MicroStation® software; and
- Mineral rights and surface rights boundaries - sourced from Bokoni Mine MicroStation® software.

Item 12 (a) – DATA VERIFICATION PROCEDURES

The following table summarises the total number of drillholes and channel sections as reported by the Bokoni Mine datasets:

Table 13: Data Sets Considered by ExplorMine for the Mineral Resource Estimation Process

Source	Total Number of Intersections/Collars
Surface Boreholes – Mother Holes	949
Surface Boreholes - Deflections	3,029
Underground Channel Sampling	5,573
Underground Diamond Drilling	205
Total Merensky Reef and UG2 Intersections	9,756

In the previous Mineral Resource estimate (2011) completed by ExplorMine, several datasets were excluded from the estimate due to various data issues. Some data from underground diamond drilling has now been corrected and verified and brought into the estimate. Similarly, the underground channel sampling which was excluded from the previous Mineral Resource estimate has now been corrected, verified by ExplorMine and a large proportion of this data is included in the estimate presented in this Report. An "exception" list has been generated detailing all data excluded from the estimation process with the attendant reason for the exclusion.

The datasets were verified by ExplorMine in terms of the following:

- All surface borehole and channel data was verified. All data is recorded in World Geodetic System ("WGS") co-ordination protocol;
- The validity of orientation surveys/information for all data was verified;
- Sample validity was confirmed for elements such as sample overlaps and invalid values;
- Trace values were set to half of the laboratory detection limit;
- Missing values (Pt, Pd, Rh, Au and 4E) were populated using relevant regressions;
- A core bedding angle ("CBA") field is also created which is sourced from both the SABLE™ logs. Missing CBA values were populated using an algorithm which utilises existing data and, if necessary, angle of intersection with modelled reef wireframes;
- Reef coding was reconstituted using the existing reef coding, lithological/stratigraphic information and sampling/assay data. To assist with reef coding or identification, background 'waste' values were excluded below 0.75 g/t 4E;
- All potholed (UG2 and Merensky Reefs) and bifurcated (UG2 Reef) intersections were coded separately from normal reef intercepts;
- While the potholed intersections were excluded from both the UG2 and Merensky Reefs' accepted composites, the upper portions (up to a maximum width of 150 cm) of the bifurcated UG2 Reef were coded and included in the accepted composites as this portion of the UG2 Reef is mined in a normal mining-cut during stoping operations;

- True channel widths were determined in a process using the core bedding angle ("CBA") field; and
- Boreholes were desurveyed utilising the Datamine™ HOLES3D desurvey process. An error log was generated as part of this process. Errors were repaired as far as possible. Where errors could not be repaired, the data was excluded and returned to Bokoni Mine staff as an exception list for future correction.

Table 14 details the final total number of accepted UG2 and Merensky Reefs' composite intersections that were generated by the verification process for use in the Mineral Resource estimation. Intersections with potholed Merensky and potholed and bifurcated UG2 intersections were uniquely coded so as to distinguish them from normal reef intersections. While the potholed intersections were excluded from both the UG2 and Merensky Reefs' accepted composites, the upper portions (up to a maximum width of 150 cm) of the bifurcated UG2 Reef was coded and included in the accepted composites as this portion of the UG2 Reef is mined in a normal mining-cut during stoping operations. The numbers of composites generated for reef disturbances are also tabulated in Table 15.

Table 14: Summary of Composites Generated for the Mineral Resource Estimation Process

Source	Reef Composites			
	Merensky Reef	UG2 Reef	UG2 Reef Zone 1	U2 Reef Zone 2
Surface Drillholes	1423	2037	1728	309
Underground Drillholes	2	0	0	0
Underground Channel Sampling	3601	1548	1548	0
Total	**5026**	**3585**	**3276**	**309**

Table 15: Summary of Composites Generated for Reef Disturbances

Source	Reef Disturbances			
	Merensky Reef	UG2 Reef	UG2 Reef Zone 1	UG2 Reef Zone 2
Potholes	381	21	21	0
Bifurcations	0	194	186	8
Total	381	215	207	8

Item 12 (b) – Limitations on/Failure to Conduct Data Verification

ExplorMine and Minxcon relied on the validation of the following data by the relevant qualified personnel of Bokoni Mine:-

- Geophysical data;
- Geological identification of the mineralised units within the drillhole data;
- Mining and property strings used to define the Mineral Resource area;
- Areas of potholes or reef interruptions; and
- QA/QC data and analysis thereof. The QA/QC procedures applied to the Bokoni surface drillholes were historically undertaken by Amplats personnel and documented in a report compiled by S. Malenga in 2008. In reviewing the available documentation, ExplorMine has accepted that these procedures are within industry norms and that they have been adhered to.

Minxcon has accepted that the digital drill-hole data utilised in the estimation processes are valid in terms of the original logs and assay certificates, as provided by the Bokoni Mine personnel and ExplorMine QPs.

Item 12 (c) – Adequacy of Data

It is Minxcon's opinion that the application of the surface drillhole data is adequate for the geostatistical estimation processes employed by ExplorMine. The data for both the UG2 and Merensky Reefs is spatially well-represented and of an adequate support level for the estimating of orebodies of this nature. Minxcon is of the opinion that sufficient processes were employed by ExplorMine in the verification of the data for use in the estimation process.

Minxcon is of the opinion that the following data validation processes could add value to the estimation process:

- Analysis of the grade profile within the UG2 and Merensky units and use thereof in the coding of the mineralised section and economic cuts;
- Application of lithology-determined SG values for the drillholes' missing SG data; and
- Statistical comparison of the underground valid drillholes, the valid underground chip sample sections and the surface drillholes to establish presence of population bias or lack thereof.

ITEM 13 – PROCESSING AND METALLURGICAL TESTING

Item 13 (a) – Nature and Extent of Testing and Analytical Procedures

The PGE economic units of interest in the UCZ in this area are the Merensky Reef and the UG2 Reef. The mineralogy of both the Merensky and UG2 Reefs is well-known and the ores are treated at different plants designed to effectively recover PGEs from the two ore types. There are two independent circuits: one treating Merensky Reef and the other treating UG2 Reef. The circuits are of a design typically used in most similar operations where platinum group metals ("PGMs") are recovered in the Bushveld Igneous Complex.

Item 13 (b) – Basis of Assumptions Regarding Recovery Estimates

The Merensky reef processing plant comprises a crushing circuit as well as milling and flotation circuits. The concentrates are filtered and transported by road to the platinum refinery owned and operated by Amplats (Pty) Ltd ("Anglo Plat"). The process is described in more detail in Item 3.

The processes that are employed at Bokoni are typical for this orebody and a wide database of empirical data exists for similar operations in the area. This and abundant historical data forms a solid basis for assumptions regarding throughput, recovery and recovery grade.

Item 13 (c) – Representativeness of Samples

The Complex is well-known and it is believed that the samples are a good representation of the orebody as a whole. Test work is carried out on samples from new mining areas where there is reason to believe that a change in mineralogy or ore type may affect the metallurgical performance in the current plants. Operating conditions may be adjusted to cater for the changes.

Item 13 (d) – Deleterious Elements for Extraction

The UG2 orebody contains chrome, which unavoidably ends up in the concentrate. The presence of chrome in the concentrate incurs a processing penalty, but does not prevent the processing of concentrate in the smelting furnaces. The UG2 plant operating parameters are, however, continually reviewed in order to reduce the content of chrome in the final product.

ITEM 14 – MINERAL RESOURCE ESTIMATES

The Mineral Resources were compiled by Qualified Persons, in compliance with the definitions and guidelines for the reporting of Exploration Information, Mineral Resources and Mineral Reserves in Canada, "the CIM Standards on Mineral Resources and Reserves – Definitions and Guidelines" and in accordance with the Rules and Policies of the National Instrument 43-101 – Standards of Disclosure for Mineral Projects, Form 43-101F1 and Companion Policy 43-101CP.

Minxcon has undertaken a generalised review of the ExplorMine Mineral estimation process. On a global basis Minxcon is satisfied that the Mineral Resource estimation reflects the orebody based on the available data.

The following section summarises the pertinent aspects of the Mineral Resource estimation process undertaken by ExplorMine.

The Mineral Resource estimates reported in this section are based on validated data sets supplied by Atlatsa (Bokoni Mine). Messers Deiss and Mitchell and Dr Northrop have verified the final composite data accepted for the estimate, all of whom are independent of Atlatsa and its associated entities. All of the geological data used in the estimation process, including data which determines the extent, continuity and disturbance of the mineralised horizons has been collected and collated by qualified and suitably experienced geologists, surveyors and other mineral resource practitioners employed currently and historically at Bokoni Mine and Amplats.

The estimation has been conducted by and under the supervision of Dr W.D. Northrop BSc (Hons.), MSc, PhD, GDE, Pr.Sci.Nat. FGSSA, FSAIMM) who is independent of Atlatsa and any of its associated entities.

Mr D. Siboza is the Bokoni Mine Geologist responsible for the geology, logging, collecting and interpretation of geological data.

The Mineral Resources estimates presented here are inclusive of the Mineral Reserves. The Mineral Resources reported for the Delta80 Project have a reasonable prospect of eventual economic extraction given the fact that a mining operation with several shafts is currently operating on the property.

Although the structure of the area is relatively complex, the Merensky Reef and the UG2 at Bokoni are defined as tabular orebodies across the mine Area, which is compliant with a two-dimensional ("2-D") approach to the Mineral Resource estimation. Ordinary kriging methodology of geostatistical estimation was employed based on the data spacing for the borehole data. The estimation process utilised the 4E grade (g/t), channel width (m), and relative density (SG t/m^3). Minxcon has noted that no fatal flaws are evident in the kriging estimation process.

Item 14 (a) – ASSUMPTIONS, PARAMETERS AND METHODS USED FOR MINERAL RESOURCE ESTIMATES

The bulk of this section is a summary of the geostatistical estimation undertaken by ExplorMine and described in the Atlatsa 2012 Technical Report (pages 77-97).

Geological Modelling - Block Model Creation

A block modelling process was undertaken to allow estimation of the UG2 and Merensky Reefs in Datamine™. Two types of block models were constructed to allow estimation. The first and main Resource model type facilitated estimation of the main mineralised 'interval' for the UG2 and Merensky Reefs. The secondary type of model facilitated the estimation of multiple 10 cm reef hangingwall and footwall layers. The top reef contact was used as a datum for the various block models as per discussions with Atlatsa.

In terms of the primary block model for the UG2 and Merensky Reefs, three orthogonal block models were created on a zero elevation average plane, including Measured (X=200 m, Y=200 m and Z=10 m), Indicated (X=400 m, Y=400 m and Z=10 m) and Inferred (X=800 m, Y=800 m and Z=10 m) parent cell block models. These cell sizes where determined by conducting kriging neighbourhood analysis studies. The 200 m by 200 m dimension also approximates the smallest mining unit ("SMU") as determined by the Bokoni Mine raise line spacing. Parent cell ordinary kriging estimates were done for 4E g/t, Pt g/t, Pd g/t, Rh g/t, Au g/t, Cu %, Ni %, channel width (cm), and density.

Two zones based on the study of the relationship between channel width and grade and metal content were identified for the UG2 Reef. An area of the UG2 Reef on the Ga-Phasha Property was identified as having lower-grade reef (4E g/t) when compared to the remainder of Ga-Phasha Property (Figure 27. Two more statistical zones were identified for the UG2 Reef in terms of Cu% and Ni% and applied in the estimation. The various reef zones are shown in Figure 27. These zones do not coincide with the second geo-zoning. No zonal split was applied for the Merensky Reef.

Figure 27: Geostatistical Zones Modelled for the UG2 Reef for Pt, Pd, Rh and Au (4E)

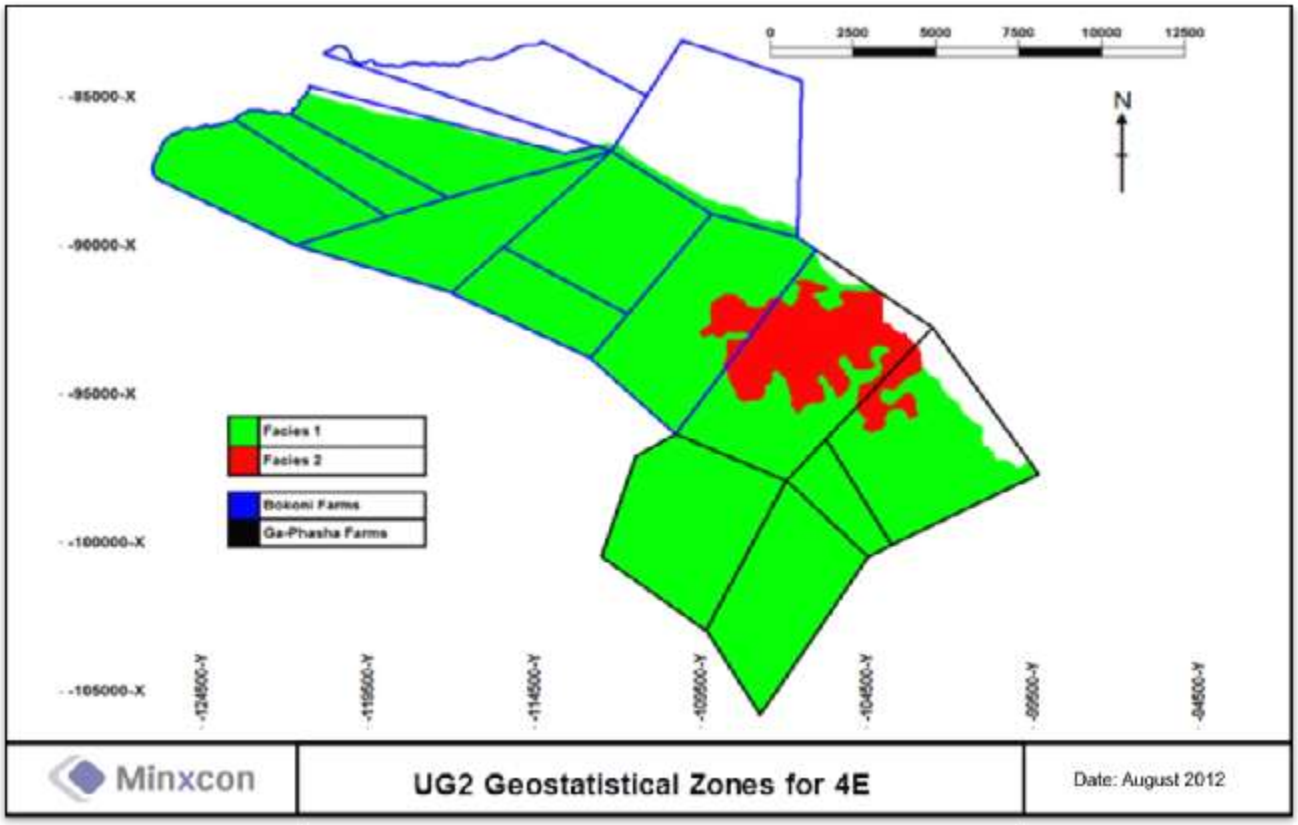
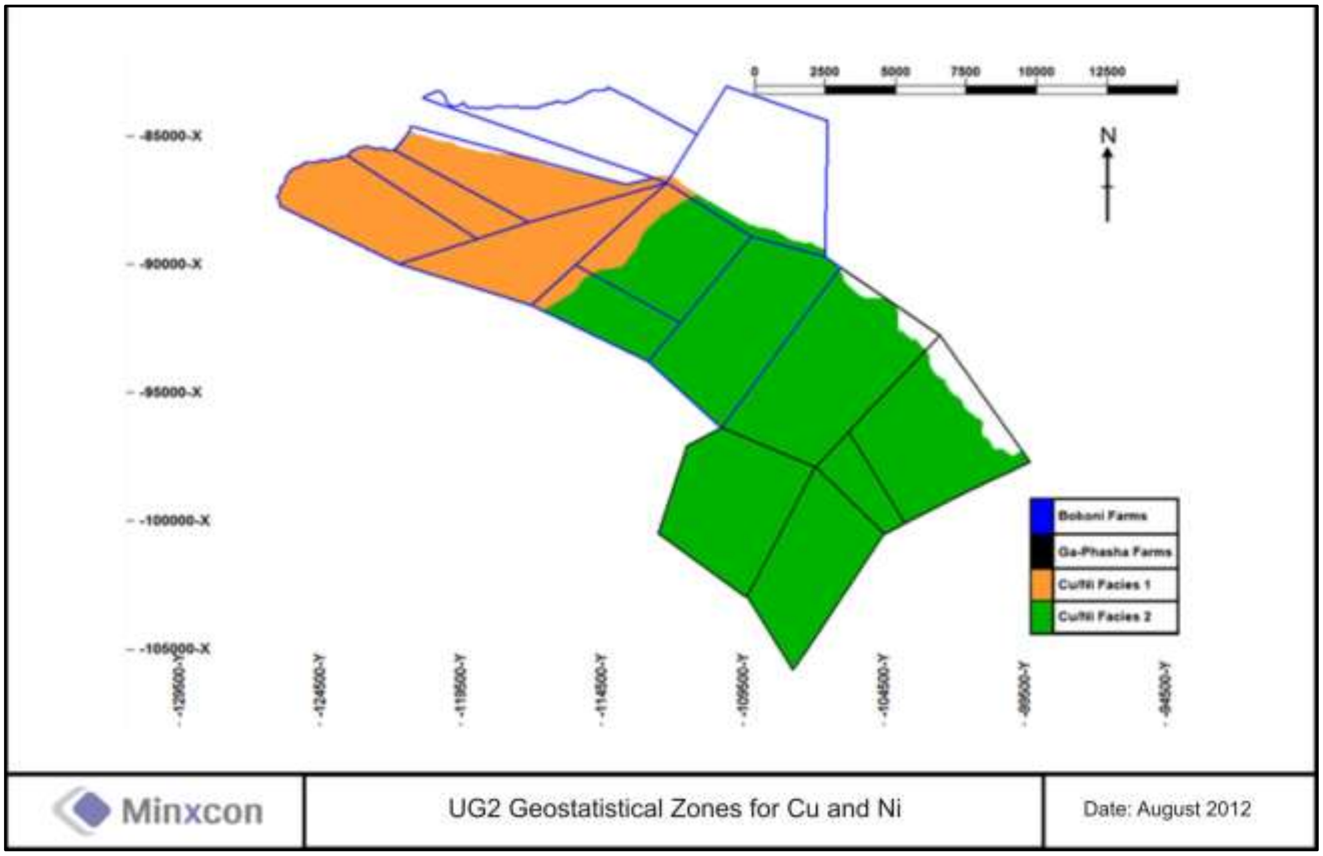


Figure 28: Geostatistical Zones Modelled for the UG2 Reef, Ni and Cu



In terms of the secondary block models for the UG2 and Merensky Reefs, for each successive 10 cm reef hangingwall and footwall layer, three orthogonal block models were created initially on a zero elevation average plane, in the same dimensions as those constructed for the primary block model and constructed in the same geographical locations. Parent cell ordinary kriging estimates were done for 4E g/t, Pt g/t, Pd g/t, Rh g/t, Au g/t, Cu%, and Ni%.

The top surface (zero elevation) of the primary block model was then used as a basis for 'stacking' the secondary block model to create a multiple vertical cell hangingwall. The basal contact of the primary block model was utilised as the zero point for 'stacking' of the footwall secondary block models. Composites were calculated from the stacked block models by the use of a process called MODTRA in Datamine™ to simulate a vertical single-celled block model such that various iterations of Mineral Resource width could be generated.

The average local dip (SDIP° - on a 400 m : X 400 m :Y grid) of the relevant reef wireframe was estimated into the block model and used to correct the volume (tonnage) increase required for an orthogonal block model produced on an inclined plane. The factor 1/cos (SDIP°) was applied to the output of the Mineral Resource estimates.

Two types of geotechnical pillars were coded into the UG2 and Merensky Reef block models. These included an oxidised reef zone and a water pillar along the Olifants River as indicated in Figure 29. The water pillar was excluded from the Mineral Resource estimate. The oxidised zone immediately adjacent to mined out areas was also excluded from the Mineral Resource estimate, while oxidised zones adjacent to unmined areas were included in the Mineral Resource estimate.

Figure 29: Geotechnical Pillars Coded into the UG2 Block Model

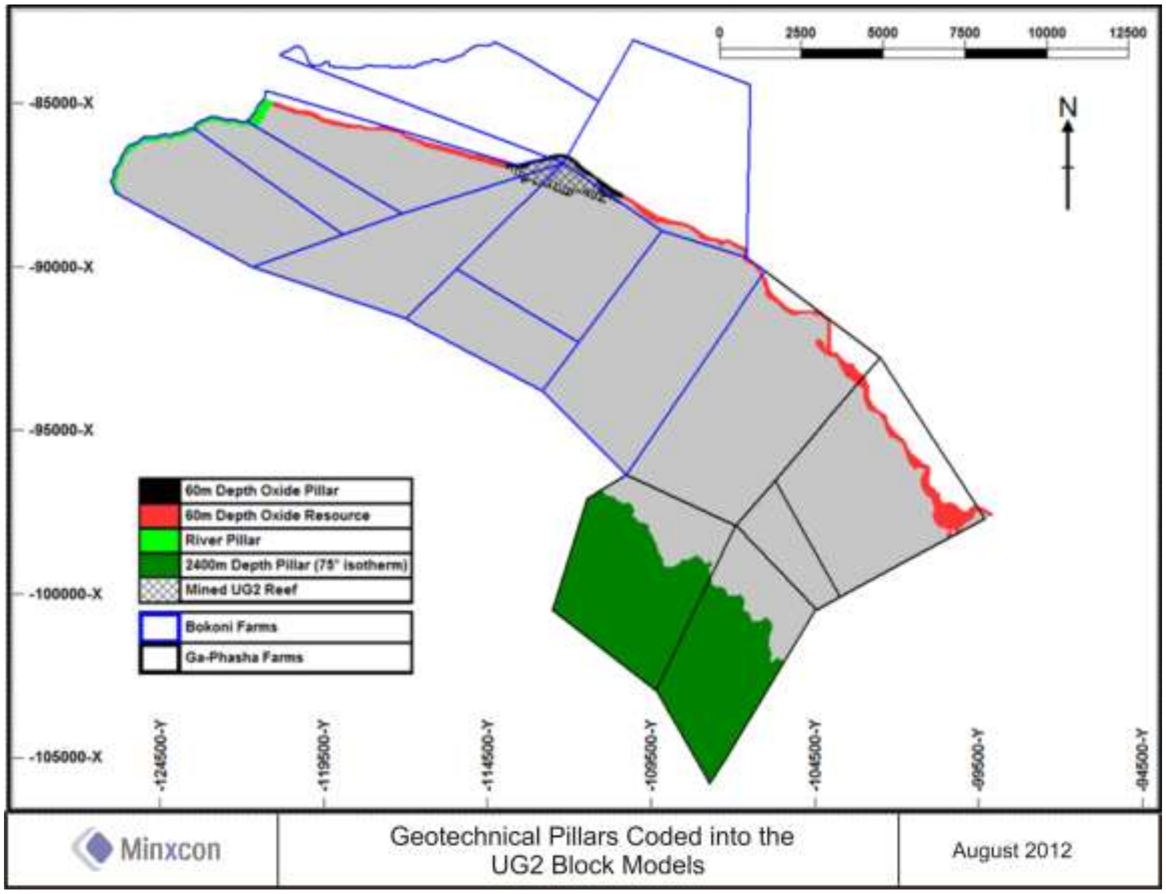
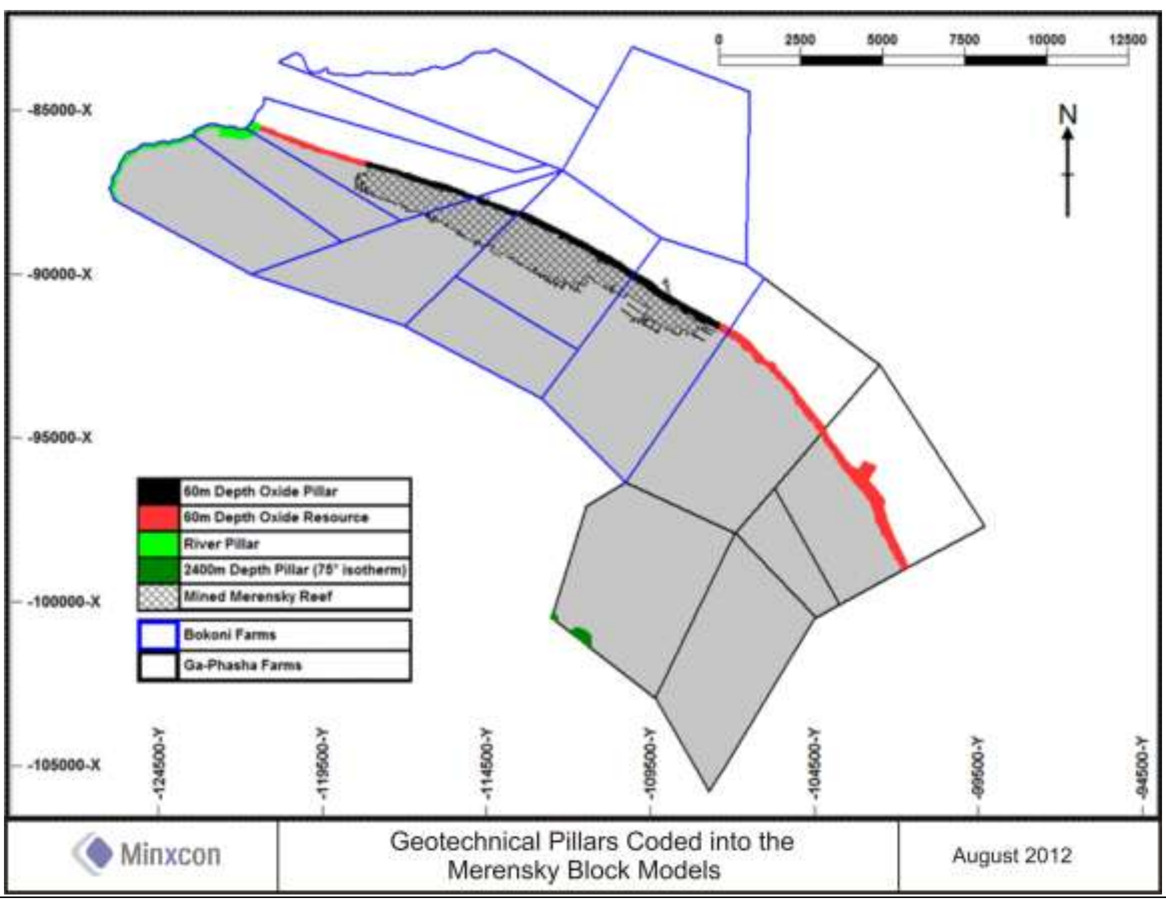


Figure 30: Geotechnical Pillars Coded into the Merensky Block Model



Geological losses were applied to the UG2 and Merensky Reef models. Losses include potholes, dykes, and faults. Due to the low number of potholes recorded in the UG2 Reef mining at the Middelpunt Decline, a UG2 Reef pothole estimation model could not be developed. A geological discount factor due to potholes of 9% was applied to the UG2 Reef based on historical mining data.

The process that would be used for calculating the geological losses related to potholes in the Merensky Reef is described below:-

- Geological losses related to potholes would be estimated into 200 m by 200 m parent cells on the same model origin as the grade model estimate.
- A geostatistical study of the distribution of the areas and distribution of potholes would be undertaken and semi-variogram models would be created and modelled.
- The resultant of the pothole estimate, the product of the number of potholes per block (200 m by 200 m) and the average area of those potholes would be obtained.
- The total area of potholes versus the total area of the block could be calculated, thus providing a proxy for the potential geological loss related to potholes.

Geological losses related to dykes have been coded into the final composite models using the spatial distribution of dykes from the interpreted aeromagnetic data and from underground geological mapping (Figure 18 and Figure 19). Historical geological losses related to faulting and shearing have been used to adjust the final volume outputs from the block model estimates. All large-scale faults have been modelled into the wireframe surfaces. Table 16 provides a summary of the geological losses applied to the Mineral Resource estimates.

Table 16: Geological Losses for the UG2 and Merensky Reefs in the Project Area

Geological Loss Type	UG2 Reef	Merensky Reef
Potholes	9.0%	~14.5%
Structure (Faults and Shears)	1%	1%
Replacement Pegmatites	1.0%	2% (Brakfontein only)
Dykes	Actual dimensions	Actual Dimensions
Total Geological Discount	**~11%**	**~17.5%**

The relative densities for each reef unit were estimated into the primary block models using the variography and values from the composite data. Average relative density values from the reef composites are 3.374 and 3.9267 for the Merensky and UG2 Reefs respectively.

MINERAL RESOURCE ESTIMATION – SUMMARY OF GEOSTATISTICAL PROCESS

A complete re-evaluation of the Mineral Resources was performed based on a database that has been completely checked and corrected for entry errors. ExplorMine has accepted that the initial database supplied by Atlatsa and Amplats has been validated in terms of the standard QA/QC protocols. The estimations are intended to perform an evaluation that will give a spatial expression of value distribution, so that the extraction of the PGM Mineral Resources can be planned efficiently. Hangingwall and footwall mineralisation was estimated in 10 cm layers, so mine management could decide which mining widths would be most lucrative. Both drillhole samples and underground chip samples were used for estimation.

The 4E g/t value and attendant variography was utilised for the purposes of Mineral Resource categorisation because it is more representative of the elements present. Irrelevant hangingwall and footwall data was coded out (zone coding) of the data before initial composites were made for the purpose of experimental variograms.

Mining Widths

An optimised mining width or cut has been applied to the Mineral Resource blocks to calculate a realistic *in situ* mining grade in grams per tonne by selecting increments of 5 cm from the footwall models which satisfy a minimum economic hurdle or pay limit. An algorithm is calculated which compares incremental composites to one another. The composite width, which maximizes content and satisfies the economic hurdle, is selected with a minimum width of 95 cm and a maximum width of 120 cm. The minimum width is the lowest possible mining cut and the maximum width is the widest possible mining cut at which fixed mining costs remain constant.

Outlier Analysis

The UG2 and Merensky Reefs both exhibited outliers when the distributions were analysed. Therefore, top and bottom-capping of outliers was necessary during the generation of the semi-variograms. A theoretical explanation to the background of the methodology used for the calculation of the various parameters used for resource categorisation is given in the following section.

ESTIMATION METHODOLOGY

Ordinary kriging was effected into a two-dimensional geological block model, which produced a two-dimensional spatial distribution of low and high grade in inclined reef structural blocks, which enables the design of single reef mining. Ordinary kriging was applied to all categories of resources. Ordinary kriging was done, utilising variogram models from the respective reefs and zones. A search equivalent one time the range of the variogram model was used in the first search volume for Measured and a search equivalent 1.5 times the range of the variogram model was used in the second search volume for Indicated. The minimum and maximum number of samples was determined by kriging neighbourhood studies. The minimum and maximum number of samples in the search volume was chosen so as to not access irrelevant samples.

A step-by-step preparation of the geostatistical database with attendant kriging parameters can be followed in the scripts provided:

- Additional fields were created in the data files to delineate zones defined in the UG2 Reef.
- These samples were then selected out of the database. The capping process, to rid the database of all element value outliers, was performed. This selection corresponded with visual examination of the tails of the skewed distributions.
- The composited database was then created on the basis of the zone coding for 4E value and width. Outliers, as defined by the distributions for the widths (cm), were capped.
- At this stage, an accumulative field was created as metre gram per tonne (mg/t) rather than centimetre gram per tonne so as to prevent the production of large variance figures that exist in this geological sequence when utilising cmg/t. This was done for general confidence examination of resource limits in the first instance, but the 4E (g/t) value was used to delineate the resource categories, as better standard variography was available.
- Further capping of outliers was done at this stage to fit the normal distributions.
- The variogram models for the ordinary kriging were created using the relevant reef and facies. The use of log variography and back transformation was only necessary in some cases as acceptable models were obtained on the natural variograms for the most part.
- The channel widths were estimated into the models by ordinary kriging in a similar fashion.
- The relative density database was utilised to make experimental variograms to which models were fitted for the use in geostatistical estimation of the relative density.

The optimum block size for the different resource categories was determined by completing a series of kriging neighbourhood studies for the 4E (g/t) variable for each reef.

An example of a kriging neighbourhood study is shown in Figure 31. The graph presented is for the UG2 Reef at a point selected where there is a relative low density of data. The interaction of various geostatistical parameters was used to determine the most suitable number of samples to be used for the search parameters. The graph presented is for the Merensky Reef at a point where there is a relative high density of data. The interaction of various geostatistical parameters was used to determine the most suitable block size for the estimate (Figure 32).

Figure 31: The Kriging Neighbourhood Study for the UG2 Reef.

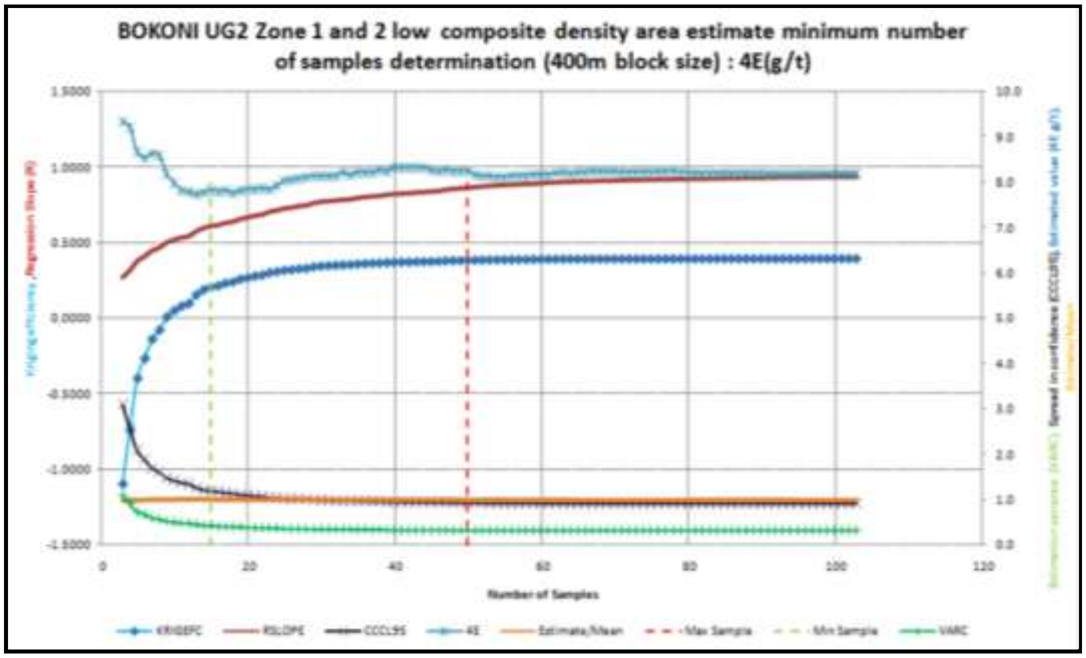
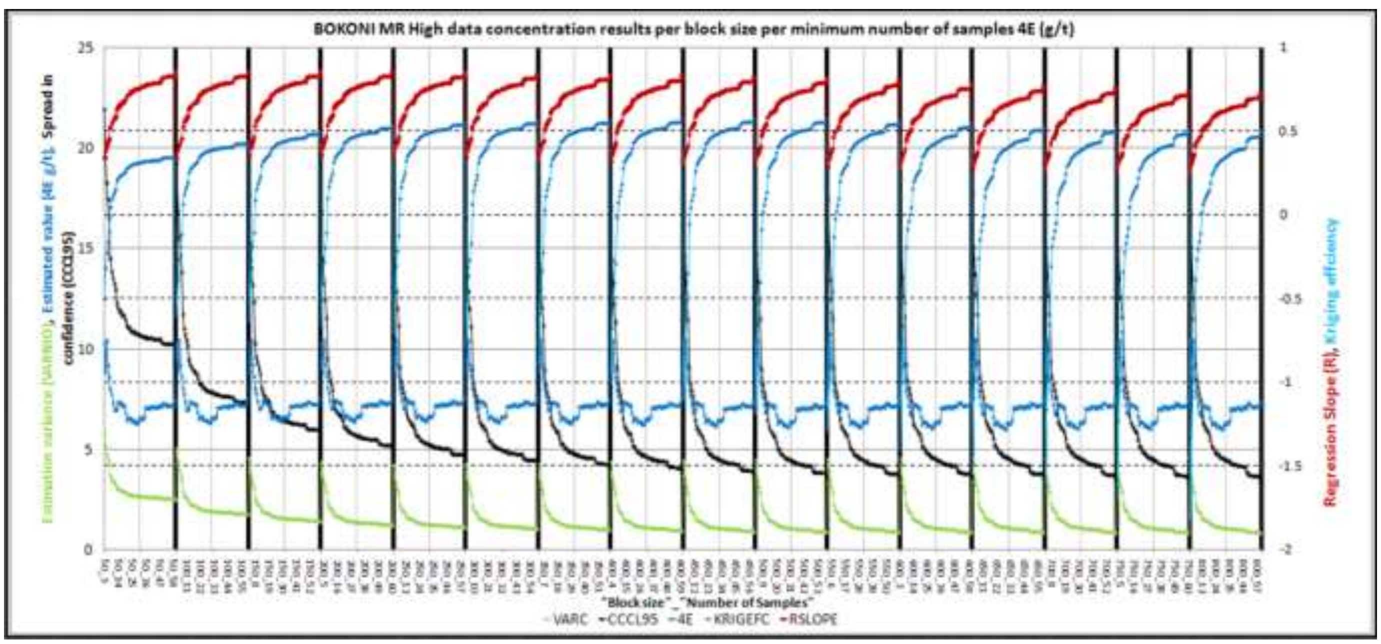


Figure 32: Kriging Neighbourhood Study Used to Determine the Optimal Block Size and Minimum and Maximum Number of Samples Required for a Given Estimate



In the example of the selection of minimum and maximum samples in Figure 31, the maximum number of samples was selected on the stabilisation of the kriging efficiency and the minimum number of samples on spread in confidence limits minimisation. In all instances the interaction of all the calculated and estimated geostatistical parameters are taken into account before a selection is made.

In the example of a kriging neighbourhood study in Figure 32, the Measured block size was fixed on the decrease in spread in confidence and the stabilisation of kriging variance

Examples of modelled variograms are presented in Figure 33 and Figure 34 for the Merensky and UG Reefs. All modelled variogram parameters presented are available on request from the Client.

Figure 33: 4E (g/t) Point Variogram Model for the UG2 Composite Data for Zone 1

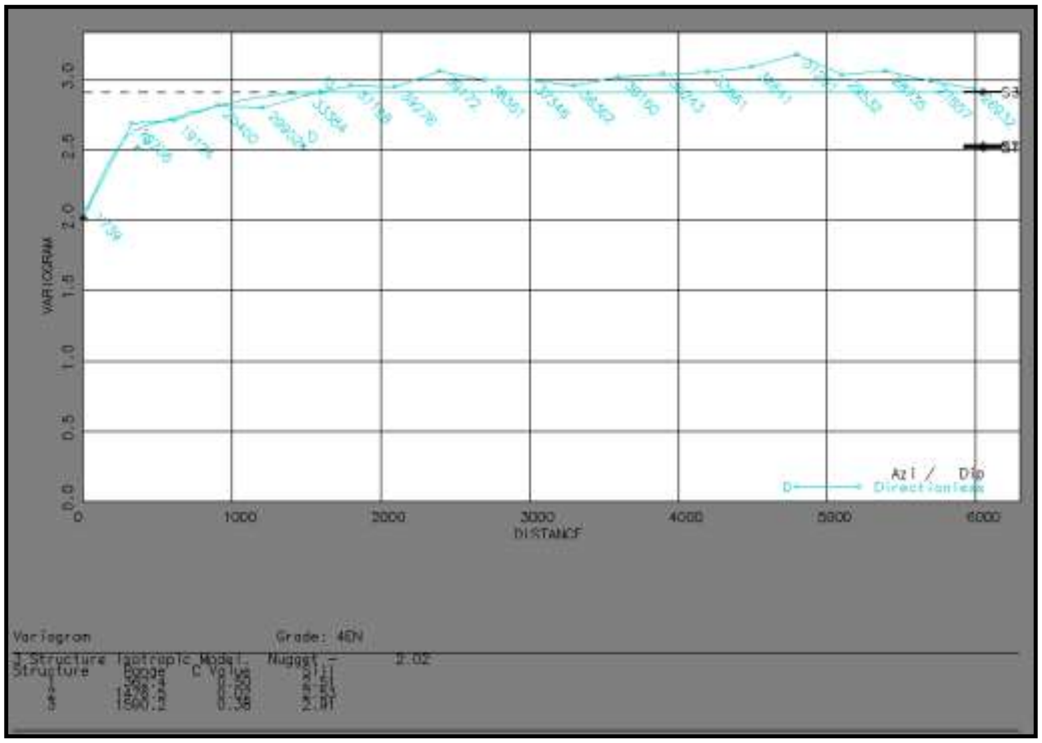
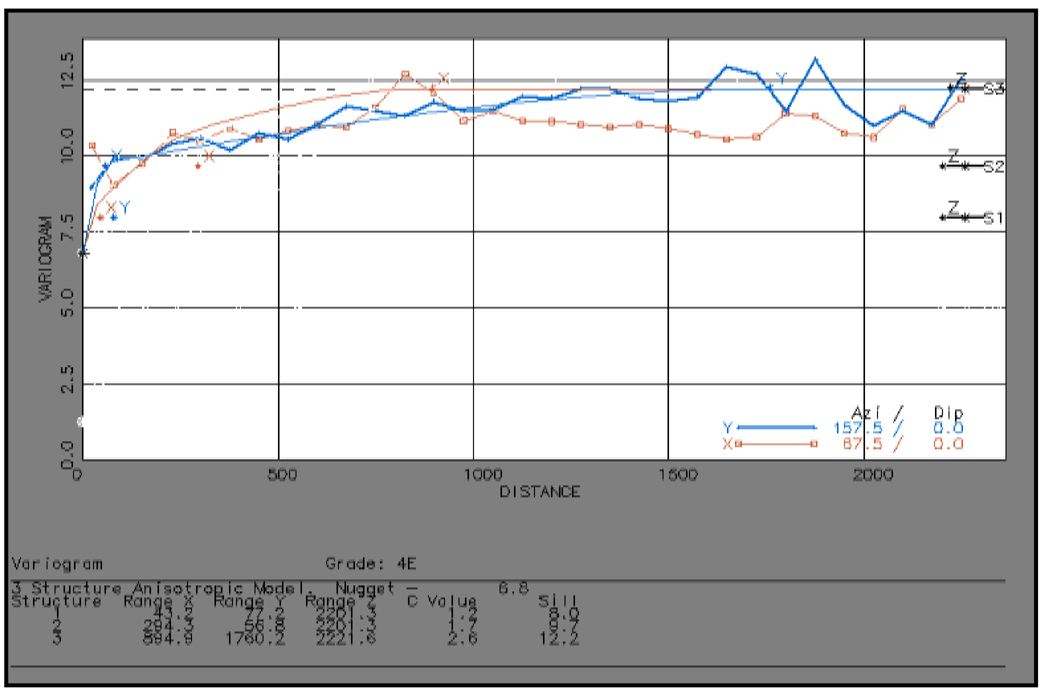


Figure 34: 4E (g/t) Point Variogram Model for the Merensky Reef Composite Data



Audit trails in the form of Datamine™ Java scripts are available on request from the Client and document the formation of the resource estimations, including all the data transforms. Each reef model estimate was inspected for conformity with the composite data used for the estimate.

DEPLETION OF MODEL

The estimation process as detailed above resulted in a global non-depleted resource model. The outlines of mining on the UG2 and the Merensky Reefs in the Bokoni Mine area were, therefore, applied to deplete each modelled reef horizon.

MODEL RECONCILIATION

ExplorMine conducted two types of data-model reconciliation:

- In the estimations completed, each block or cell contained a kriged estimate and an arithmetic mean estimate sourced from the relevant data. These estimates were regressed and the results are presented in Table 17. All the regressions indicated high to moderate degrees of regression.
- The second type of reconciliation conducted was a swath analysis. Block model estimation reconciliation was completed by comparing the average drillhole composite values versus the block model estimate for 500 m swaths orientated approximately parallel to the strike and dip of the UG2 and Merensky Reef surfaces.

The swath analysis for each reef was completed with combined Mineral Resource categories on the primary block model and for the corresponding first hangingwall block model and first three footwall block models. The swath analysis included all estimated g/t values for 4E, Pt, Pd, Rh, Au, Cu, Ni, and relative density (RD).

Table 17: Regression Results for Kriged and Arithmetic Mean Estimates for the UG2 Reef

	All Mineral Resource Categories								
REEF	4E (g/t)	Pt (g/t)	Pd (g/t)	Rh (g/t)	Au (g/t)	Cu (%)	Ni (%)	RD (t/m^3)	CW (m)
UG2	0.968	0.959	0.958	0.987	0.970	0.973	0.967	0.961	0.850
MR ALL	0.988	0.986	0.988	0.981	0.973	0.740	0.714	0.804	0.930

The results of the swath analysis show a good correlation between the average drillhole composite values and block model estimate per 500 m swath (Figure 35 and Figure 36).

Figure 35: Results of Swath Analysis for the UG2 Reef Primary Block Model Estimate for 4E (g/t) and Pt (g/t)

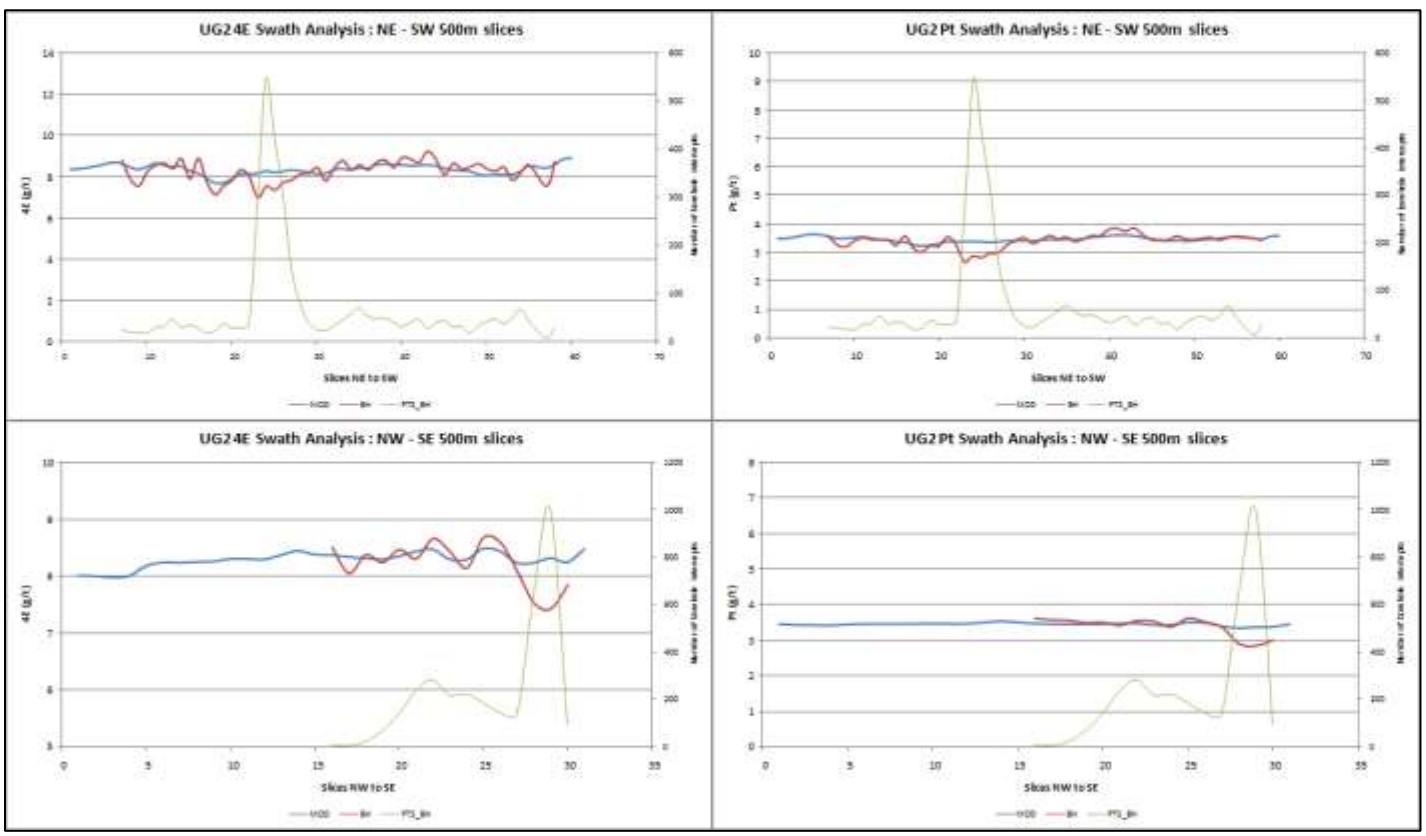
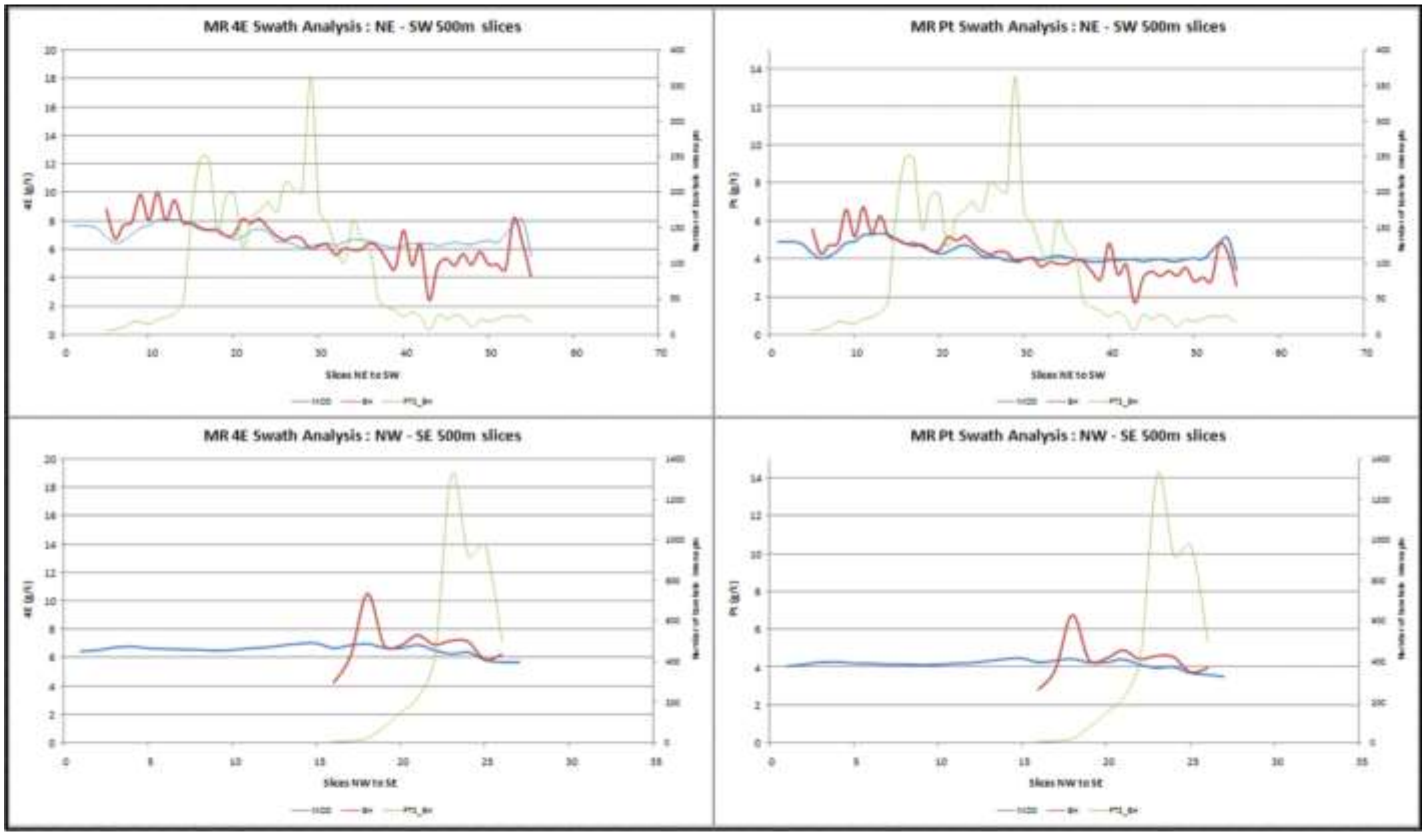


Figure 36: Results of Swath Analysis for the Merensky Reef Primary Block Model Estimate for 4E (g/t) and Pt (g/t)

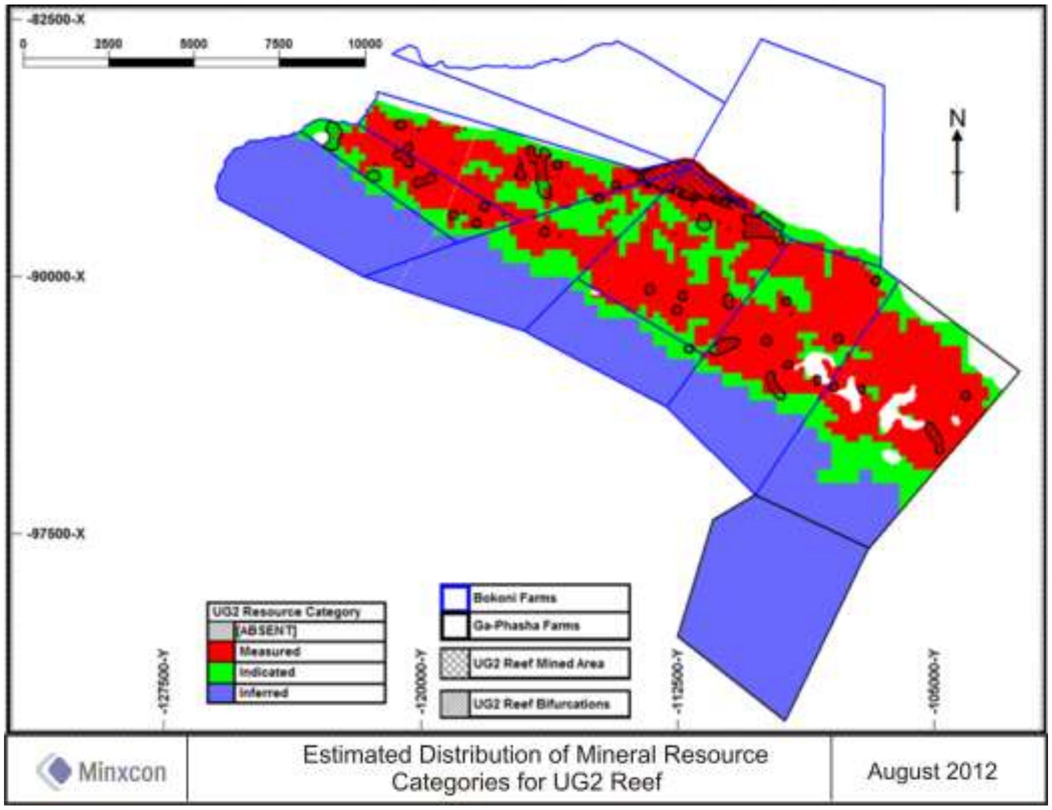


MINERAL RESOURCE CATEGORISATION

The delineation of Mineral Resource category was determined through a matrix of categorisation criteria:-

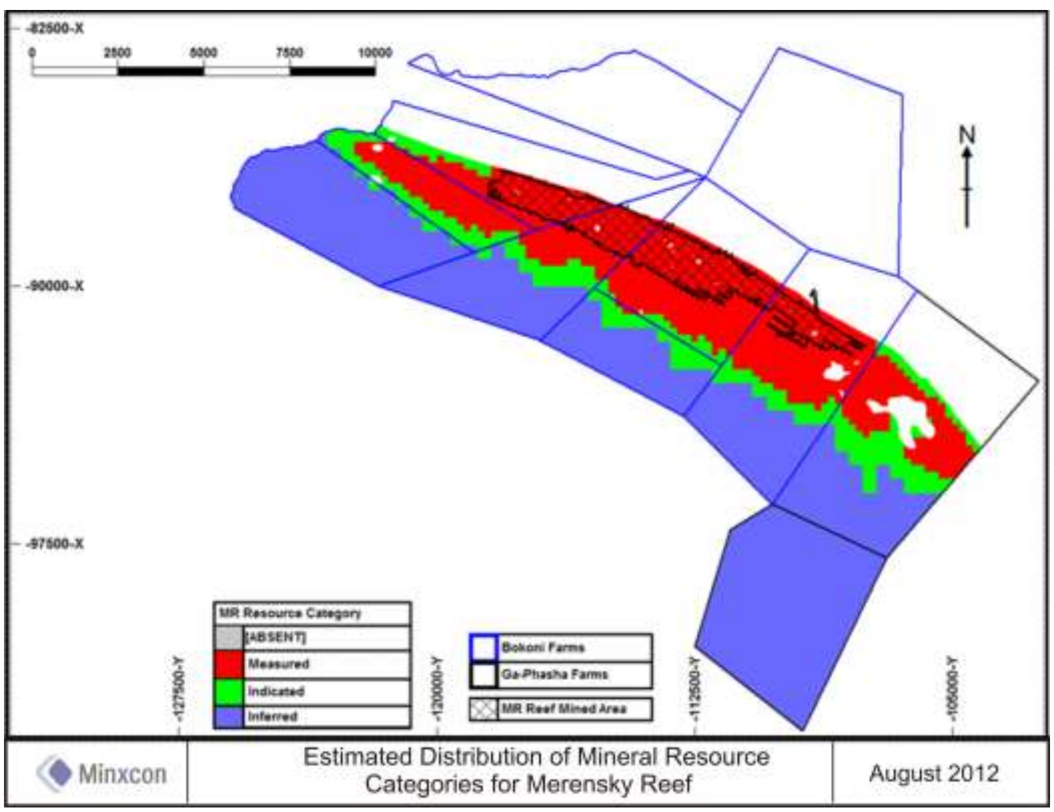
- In the first instance, geological continuity is required, and is provided by the geological modelling process as described above.
- Secondly, a kriging neighbourhood study determined the minimum number of samples required for a Measured, Indicated or Inferred estimate.
- Thirdly, the search volume number utilised in the estimate of each block determines whether that estimate may be considered for classification as Measured or Indicated material. The first search volume demarcated a potential Measured Mineral Resource, which equates to the range of the respective 4E g/t modelled variogram. The second search volume equivalent to 1.5 times the range of the respective 4E g/t modelled variogram demarcated a potential Indicated Mineral Resource. Search volumes greater than 1.5 times the search volume demarcated Inferred Mineral Resources.
- Finally, Measured Mineral Resources were demarcated by an R Slope of greater than 0.85 for both the Merensky and UG2 Reefs (this equated to an average kriging efficiency of 0.4 for the Merensky and 0.36 for the UG2 Reefs respectively). Indicated Mineral Resources were defined by an R Slope of 0.55 and 0.6 for the Merensky and UG2 Reefs respectively (this equated to positive average kriging efficiencies for both the Merensky and UG2 Reefs). The remainder of the estimate was classified as Inferred material.
- The Mineral Resource categories are presented in Figure 37 and Figure 38, the white areas represent dykes and potholes.

Figure 37: Mineral Resource Classification – UG2



Minxcon recommends that the regions of Indicated Resources be combined into a solid block if they cannot be upgraded to Measured Resource.

Figure 38: Mineral Resource Classification - Merensky



MINERAL RESOURCE CUT-OFF AND TABULATION

The cut-offs used to declare the Mineral Resource were calculated for each investment centre (i.e. each shaft). The cut-offs were determined using the PGE commodity prices, as well as operating costs and mining factors and forecasts. Cut-offs of this order are well within accepted PGE-producing mines' norms. The total Resource area is above the cut-offs (Table 18). Mineral Resources that are not Mineral Reserves have not demonstrated economic viability. The Mineral Resource pertains to 4E grades (g/t).

Table 18: Cut-offs for the Individual Investment Centres

Investment Centre	Reef Type	Cut-Off
		cm.g/t
Vertical	MR	354
Umkoanesstad	MR	237
Brakfontein	MR	442
Middelpunt	UG2	360

An optimised mining width or selective mining width ("SMW") has been applied to the Mineral Resource blocks to calculate a realistic *in situ* mining grade in grams per tonne by selecting increments of 5 cm from the footwall models which satisfy a minimum economic hurdle or pay limit.

An algorithm is calculated which compares incremental composites to one another. The composite width which maximizes content and satisfies the economic hurdle is a minimum width of 95 cm and a maximum width of 120 cm. The minimum width is the lowest possible mining cut and the maximum width is the widest possible mining cut at which fixed mining costs remain constant. The tonnages have been adjusted for non-productive pothole areas and areas that have been excluded from mining due to geotechnical reasons. Tonnage has been further reduced through geological loss adjustments. Relative density has been applied in the calculation of tonnage.

Reef areas which occur below 2400 m have been removed from the Mineral Resource classification as the virgin rock temperature at these depths is above 75°C. Ventilation and mining technology and related costs currently prevent mining operations at these temperatures.

The Mineral Resource estimate for the UG2 and Merensky Reefs at Bokoni Mine and Ga-Phasha West as at 30 June 2012 is shown in Table 19, and the Mineral Resource estimate for the UG2 and Merensky Reefs at Ga-Phasha West as at 31 December 2012 is shown in Table 20.

Table 19: Mineral Resource Estimate for the Merensky and UG2 Reefs for the Bokoni Mine and Ga-Phasha West Areas Combined as at 30 June 2012

Mineral Resource Category	Reef Type	SG	Tonnage	4E Grade	Pt Grade	Pd Grade	Rh Grade	Au Grade	Cu Grade	Ni Grade	Content 4E	Content 4E	SMW
		t/m^3	Mt	g/t	g/t	g/t	g/t	g/t	%	%	Kg's ('000)	Moz	cm
Measured	MR	3.37	94.6	5.32	3.25	1.59	0.18	0.31	0.08	0.20	503	16.2	110
Measured	UG2	3.93	213.9	6.17	2.54	3.03	0.50	0.11	0.05	0.16	1320	42.5	110
Total Measured	**MR + UG**		**308.5**	**5.91**	**2.76**	**2.59**	**0.40**	**0.17**	**0.06**	**0.17**	**1823**	**58.7**	**110**
Indicated	MR	3.04	52.7	5.27	3.21	1.56	0.18	0.32	0.09	0.21	278	8.9	110
Indicated	UG2	3.93	109.4	6.24	2.56	3.06	0.50	0.11	0.05	0.17	683	21.9	110
Total Indicated	**MR + UG**		**162.1**	**5.92**	**2.77**	**2.57**	**0.40**	**0.18**	**0.06**	**0.18**	**961**	**30.8**	**110**
Meas + Ind	**MR**	**3.37**	**147.3**	**5.30**	**3.23**	**1.57**	**0.18**	**0.31**	**0.08**	**0.21**	**781**	**25.1**	**110**
Meas + Ind	**UG2**	**3.93**	**323.3**	**6.20**	**2.55**	**3.04**	**0.50**	**0.11**	**0.05**	**0.16**	**2003**	**64.4**	**110**
Total Meas + Ind	**MR + UG**		**470.6**	**5.92**	**2.76**	**2.58**	**0.40**	**0.17**	**0.06**	**0.18**	**2784**	**89.5**	**110**
Inferred	MR	3.37	192.9	4.98	3.07	1.44	0.18	0.29	0.09	0.21	961	30.9	110
Inferred	UG2	3.93	196.9	6.34	2.59	3.12	0.51	0.12	0.05	0.17	1248	40.1	110

Notes:

1. 51% is attributable to Atlatsa Resources.
2. 4E refers to platinum (Pt), palladium (Pd), rhodium (Rh) and gold (Au).
3. Cut-offs have been applied per respective investment centre. The total Resource area is above the cut-offs.
4. Tonnes have been rounded off to the appropriate level of accuracy.
5. The estimate is inclusive of any Mineral Reserve declared.
6. UG2 Prill Ratio: Pt : Pd : Rh : Au - 42 : 46 : 9 : 3.
7. Merensky Reef Prill Ratio: Pt : Pd : Rh - Au 62 : 29 : 4 : 5.
8. An 11% geological loss has been applied to the UG2 Reef.
9. A 17.5% geological loss has been applied to the Merensky Reef.
10. 1kg = 32.15076 oz.

Table 20: Mineral Resource Estimate for the Merensky and UG2 Reefs for the Ga-Phasha West Area as at 30 June 2012

Mineral Resource Category	Reef Type	Resource Cut-Off	SG	Tonnage	4E Grade	Pt Grade	Pd Grade	Rh Grade	Au Grade	Cu Grade	Ni Grade	Content 4E	Content 4E	SW
		cm.g/t	t/m^3	Mt	g/t	g/t	g/t	g/t	g/t	%	%	Kg's ('000)	Moz	cm
Measured	MR	245	3.37	20.10	4.52	2.73	1.35	0.15	0.30	0.08	0.21	91	2.9	110
Measured	UG2	327	3.93	40.40	6.00	2.53	2.86	0.51	0.10	0.03	0.15	243	7.8	110
Total Measured	**MR + UG**			**60.50**	**5.51**	**2.60**	**2.36**	**0.39**	**0.17**	**0.05**	**0.17**	**334**	**10.7**	**110**
Indicated	MR	245	3.04	37.70	4.97	3.04	1.44	0.18	0.31	0.08	0.21	187	6.0	110
Indicated	UG2	327	3.93	60.80	5.84	2.46	2.79	0.50	0.10	0.03	0.15	355	11.4	110
Total Indicated	**MR + UG**			**98.50**	**5.51**	**2.68**	**2.27**	**0.38**	**0.18**	**0.05**	**0.17**	**543**	**17.4**	**110**
Meas + Ind	**MR**	245	**3.37**	**57.80**	**4.82**	**2.93**	**1.41**	**0.17**	**0.31**	**0.08**	**0.21**	**278**	**9.0**	**110**
Meas + Ind	**UG2**	327	**3.93**	**101.20**	**5.90**	**2.49**	**2.82**	**0.50**	**0.10**	**0.03**	**0.15**	**598**	**19.2**	**110**
Total Meas + Ind	**MR + UG**			**159.00**	**5.51**	**2.65**	**2.31**	**0.38**	**0.18**	**0.05**	**0.17**	**876**	**28.2**	**110**
Inferred	MR	245	3.37	177.80	5.32	3.25	1.60	0.18	0.30	0.09	0.22	946	30.4	110
Inferred	UG2	327	3.93	123.00	6.26	2.61	3.00	0.54	0.10	0.04	0.16	770	24.7	110

***Notes*:**

1. 51% is attributable to Atlatsa Resources.
2. 4E refers to platinum (Pt), palladium (Pd), rhodium (Rh) and gold (Au).
3. Tonnes have been rounded off to the appropriate level of accuracy.
4. The estimate is inclusive of any Mineral Reserve declared.
5. UG2 Prill Ratio: Pt : Pd : Rh : Au - 42 : 46 : 9 : 3.
6. Merensky Reef Prill Ratio: Pt : Pd : Rh - Au 62 : 29 : 4 : 5.
7. An 11% geological loss has been applied to the UG2 Reef.
8. A 17.5% geological loss has been applied to the Merensky Reef.
9. 1kg = 32.15076 oz

Minxcon and ExplorMine Consultants are of the opinion that the Bokoni Mine Mineral Resource estimate on the Merensky and the UG2 meets the requirement of "reasonable prospects for eventual economic extraction" and is representative of the 4E + Cu/Ni mineralisation as its occurs in the Bokoni Mine area. Figure 39 and Figure 40 illustrates the grade-tonnage curves for the Merensky and UG2 Reefs respectively, per mineral resource category and total Mineral Resource.

Figure 39: Grade-Tonnage Curves for the Merensky Reef Estimated Mineral Resources per Mineral Resource Category and Total Mineral Resource

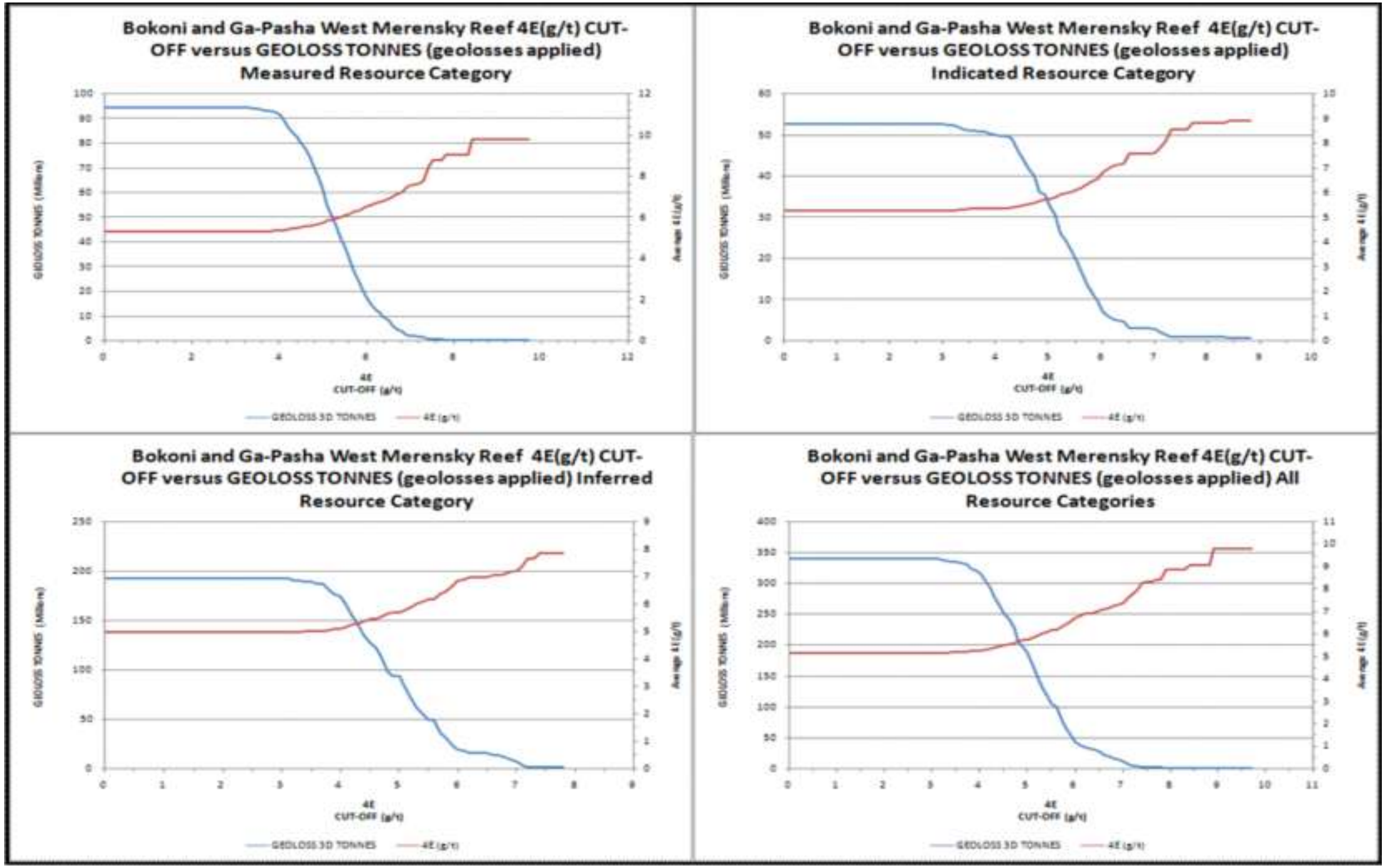
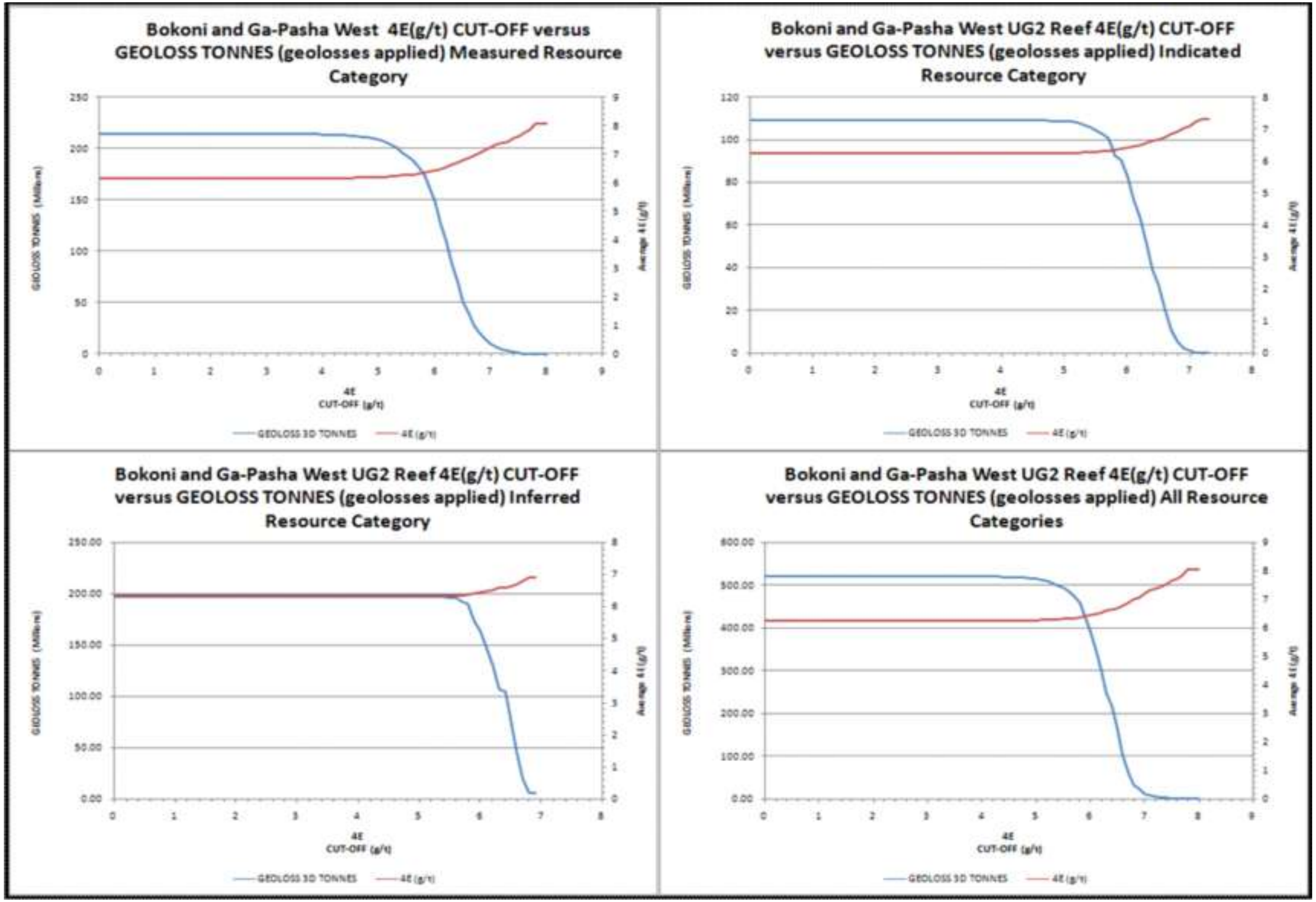


Figure 40: Grade-Tonnage Curves for the UG2 Reef Estimated Mineral Resources per Mineral Resource Category and Total Mineral Resource



The reconciliation of the mineral resources is presented in the table below.

Table 21: Mineral Resource Reconciliation – 2010 to 2012 – UG2

Mineral Resource Category	Reef Type	2011			2012			Reconciliation					
		Tonnage	Grade 4E	4E content	Tonnage	Grade 4E	4E content	Tonnage	Tonnes % Change	Grade 4E	Grade % Change	4E content	Content % Change
		Mt	g/t	Kg's ('000)	Mt	g/t	Kg's ('000)	Mt		g/t		Kg's ('000)	
Measured	MR	43.32	5.15	265.9	94.6	5.32	503.3	51.3	118	0.17	3	237.4	89
Indicated	MR	53.61	4.88	337.9	52.7	5.27	277.7	-0.9	-2	-0.39	8	-60.2	-18
Meas + Ind	**MR**	**96.93**	**5**	**603.8**	**147.3**	**5.3**	**781**	**50.4**	**52**	**0.30**	**6**	**177.2**	**29**
Inferred	MR	128.8	4.94	1109.5	192.9	4.98	960.6	64.1	50	0.04	1	-148.9	-13

Table 22: Mineral Resource Reconciliation for the UG2 Reef 2012 vs. 2011

Mineral Resource Category	Reef Type	2011			2012			Reconciliation					
		Tonnage	Grade 4E	4E content	Tonnage	Grade 4E	4E content	Tonnage	Tonnes % Change	Grade 4E	Grade % Change	4E content	Content % Change
		Mt	g/t	Kg's ('000)	Mt	g/t	Kg's ('000)	Mt		g/t		Kg's ('000)	
Measured	UG2	96.6	6.49	718.8	213.9	6.17	1320.4	117.3	121	-0.32	-5	601.6	84
Indicated	UG2	124.3	6.3	971.8	109.4	6.24	682.6	-14.9	-12	-0.06	-1	-289.2	-30
Meas + Ind	**UG2**	**220.9**	**6.38**	**1690.6**	**323.3**	**6.19**	**2003**	**102.4**	**46**	**-0.19**	**-3**	**-312.4**	**18**
Inferred	UG2	147.6	6.4	1333.3	196.9	6.34	1248	49.3	33	0.06	-1	-85.3	-6

Item 14 (b) – Disclosure Requirements for Mineral Resources

The Mineral Resource classification is a function of the confidence of the whole process, including drilling, sampling, geological understanding and geostatistical relationships. The following aspects or parameters are considered by Minxcon to be the typical parameters to consider for Mineral Resource classification:

1. Sampling – quality assurance & quality control (QAQC):
   a. Measured: high confidence, no problem areas;
   b. Indicated: high confidence, some problem areas with low risk; and
   c. Inferred: some aspects might be of medium to high risk.
2. Geological confidence:
   a. Measured: high confidence in the understanding of geological relationships, continuity of geological trends and sufficient data;
   b. Indicated: Good understanding of geological relationships; and
   c. Inferred: geological continuity not established.
3. Number of samples used to estimate a specific block:
   a. Measured: at least 4 data points within variogram range and minimum of twenty 1m composited samples;
   b. Indicated: at least 3 data points within variogram range and a minimum of twelve 1m composite samples; and
   c. Inferred: less than 3 data points within the variogram range.
4. Kriged variance:
   a. This is a relative parameter; it is an indication only and is used in conjunction with the other parameters.
5. Distance to sample (variogram range):
   a. Measured: at least within 60% of variogram range;
   b. Indicated: within variogram range; and
   c. Inferred: further than variogram range.
6. Lower confidence limit (blocks):
   a. Measured: less than 20% from mean (80% confidence);
   b. Indicated: 20–40% from mean (80–60% confidence); and
   c. Inferred: more than 40% (less than 60% confidence).
7. Kriging efficiency:
   a. Measured: more than 40%;
   b. Indicated: 10–40%; and
   c. Inferred: less than 10%.
8. Deviation from lower 90% confidence limit (data distribution within Resource area considered for classification):
   a. Measured: less than 10% deviation from mean;
   b. Indicated: 10–20%; and
   c. Inferred: more than 20%.

ExplorMine implemented the following criteria in the classification of the Mineral Resources in 2010:

- Measured Mineral Resource - Spread in confidence limits of less than and equal to 12% per block in search volume one.
- Indicated Mineral Resource - Spread in confidence limits of less than and equal to 25% per block in search volume two (one and a half range of variogram).
- Inferred Mineral Resource - Spread in confidence limits of greater than 25% per block in search volume 2.0.

ExplorMine Consultants is of the opinion that the Bokoni Mine Mineral Resource estimate on the Merensky and the UG2 meets the requirement of "reasonable prospects for eventual economic extraction" and in ExplorMine Consultants opinion is representative of the 4E + Cu/Ni mineralisation as its occurs in the Bokoni Mine area. Minxcon concurs

Item 14 (c) – Prill Ratios

The UG2 and Merensky Reefs at the Project Area are polymetallic deposits. The prill ratio refers to the ratio of the four elements comprising a 4E (Pt, Pd, Rh, Au) PGE grade. The following table summarises the prill ratios for the UG2 and Merensky Reefs.

Table 23: Prill Ratios for the UG2 and Merensky Reefs at Bokoni Mine

Reef	Prill Ratio (Pt:Pd:Rh:Au)
	(%)
Merensky Reef	62 : 29 : 4 : 5
UG2 Reef	42 : 46 : 9 : 3

Item 14 (d) – Factors Affecting Mineral Resource Estimates

Effect of Modifying Factors

Modifying factors such as taxation, socio-economic, marketing or political factors have not been taken into account.

Technical Parameters Affecting the Resource Declaration

No mining or plant recovery factors have been built into the Mineral Resource model.

ITEM 15 – MINERAL RESERVE ESTIMATES

Item 15 (a) – Key Assumptions, Parameters and Methods

Key Assumptions

- The Bokoni Mineral Reserves were stated at a 4E grade. It is assumed that the other minerals are insignificantly small
- It is assumed that the planned productions will be achieved

Parameters

- The average scheduled development advance rate at Bokoni is 20 m per month
- Ledging and stoping is scheduled at an average of 250 m^2 and 290 m^2 per month respectively. An increase in schedule rates is planned by focussing on better labour and production efficiencies.
- Financial evaluations are completed on a 6E grade.
- The opencast is a maximum of 40m deep.

Methods

The Resource to Reserve process started by comparing the previous year's LoM plan to the current LOM plan. There were no changes in the mine design and infrastructure. The strategy has however changed from a 240 ktpm to a 160 ktpm per month plan. The capital needed for a 240 ktpm plant upgrade was deferred to 2019. A minor upgrade is still in the pipeline, changing the plant capacity to 160 ktpm. In order to change the Bokoni LoM plan to 160 ktpm, two shafts needed to be rescheduled. Middelpunt Hill was thus rescheduled and no production was planned for the Vertical shaft from 2016 onwards. This 31 December 2012 Reserve also included the Klipfontein opencast with 40 ktpm. The LoM delivered tonnes and grade to the concentrator were then diluted by applying modifying factors based on historical factors per shaft. The LoM reserves are subjected to a viable financial analysis.

Item 15 (b) – Mineral Reserve Reconciliation – Compliance with All Disclosure Requirements

Mineral Reserves

Table 24 below details the Mineral Reserves estimation for Bokoni as at 31 December 2012.

Table 24: Mineral Reserves for Bokoni Mine as at 31 December 2012

Area	Mineral Reserve Category	Reef Type	Tonnage	Grade 4E	Content 4E	Content 4E
			Mt	g/t	kg	Moz
Brakfontein	Proven	Merensky	23.72	4.92	116,801	3.76
	Probable	Merensky	0.03	4.22	119	0.004
	Proven and Probable	Total	23.75	4.92	116,921	3.764
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**	**Content 4E**
			Mt	**g/t**	**kg**	**Moz**
Vertical	Proven	Merensky	1.06	4.18	4,430	0.14
	Probable	Merensky	0.00	0.00	-	0.00
	Proven and Probable	Total	1.06	4.18	4,430	0.14
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**	**Content 4E**
			Mt	**g/t**	**kg**	**Moz**
UM2	Proven	Merensky	0.23	3.86	900	0.03
	Probable	Merensky	0.00	0.00	-	0.00
	Proven and Probable	Total	0.23	3.86	900	0.03
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**	**Content 4E**
			Mt	**g/t**	**kg**	**Moz**
Middelpunt Hill	Proven	UG2	22.27	5.46	121,586	3.91
	Probable	UG2	13.76	5.41	74,454	2.39
	Proven and Probable	Total	36.03	5.44	196,040	6.30
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**	**Content 4E**
			Mt	**g/t**	**kg**	**Moz**
Klipfontein Opencast	Proven	Merensky	2.75	3.46	9,511	0.31
	Probable	Merensky	0.00	0.00	-	0.00
	Proven and Probable	Total	2.75	3.46	9,511	0.31
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**	**Content 4E**
			Mt	**g/t**	**kg**	**Moz**
Ga-Phasha West	Proven	Merensky	5.09	4.41	22,446	0.72
	Probable	Merensky	0.00	0.00	-	0.00
	Proven and Probable	Total	5.09	4.41	22,446	0.72
Area	**Mineral Reserve Category**	**Reef Type**	**Tonnage**	**Grade 4E**	**Content 4E**	**Content 4E**
			Mt	**g/t**	**kg**	**Moz**
Total Bokoni	Proven	Merensky	32.85	4.69	154,088	4.95
	Proven	UG2	22.27	5.46	121,586	3.91
	Probable	Merensky	0.03	4.22	119	0.004
	Probable	UG2	13.76	5.41	74,454	2.39
	Proven and Probable	**Merensky**	**32.88**	**4.69**	**154,208**	**4.96**
	Proven and Probable	**UG2**	**36.03**	**5.44**	**196,040**	**6.30**
	Total Reserves	**Total**	**68.91**	**5.08**	**350,248**	**11.26**

Notes:

1. Tonnages refer to tonnes delivered to the metallurgical plant.
2. No vampings is included in the 2012 reserve statement tonnes.
3. Minimum stoping width of 110cm applied.
4. All figures are in metric tonnes.
5. 1kg = 32.15076 oz.
6. Pay limit: Brakfontein 4.02 g/t; Vertical 3.40 g/t; UM2 2.21 g/t; Middelpunt Hill 3.30 g/t.
7. Pay limit calculated: US$/oz = 1750 & R/US$ = 6.95.

Mineral Reserve Reconciliation

The reconciliation between the Mineral Reserve statements for the years 2011 and 2012 for Bokoni Mine is detailed in Table 25.

Table 25: Mineral Reserve Reconciliation between 2011 and 2012 for Bokoni Mine

Area	Mineral Reserve Category	Reef Type	Effective 31 December 2011			Effective 31 December 2012			Difference		
			Tonnage	Grade 4E	Content 4E	Tonnage	Grade 4E	Content 4E	Tonnage	Grade 4E	Content 4E
			Mt	g/t	Moz	Mt	g/t	Moz	Mt	g/t	Moz
Brakfontein	Proven	Merensky	19.16	4.07	2.51	23.72	4.92	3.76	4.55	0.85	1.24
	Probable	Merensky	7.30	3.67	0.86	0.03	4.22	0.004	-7.27	0.55	-0.86
	Proven and Probable	**Total**	**26.46**	**3.96**	**3.37**	**23.75**	**4.92**	**3.76**	**-2.72**	**0.96**	**0.39**
Vertical	Proven	Merensky	1.68	4.14	0.22	1.06	4.18	0.14	-0.62	0.04	-0.08
	Probable	Merensky	0.64	3.73	0.08	0.00	0.00	0.00	-0.64	-3.73	-0.08
	Proven and Probable	**Total**	**2.32**	**4.03**	**0.30**	**1.06**	**4.18**	**0.14**	**-1.26**	**0.15**	**-0.16**
UM2	Proven	Merensky	0.34	4.20	0.05	0.23	3.86	0.03	-0.11	-0.34	-0.02
	Probable	Merensky	0.13	3.78	0.02	0.00	0.00	0.00	-0.13	-3.78	-0.02
	Proven and Probable	**Total**	**0.48**	**4.08**	**0.06**	**0.23**	**3.86**	**0.03**	**-0.24**	**-0.23**	**-0.03**
Middelpunt Hill	Proven	UG2	17.04	5.50	3.01	22.27	5.46	3.91	5.23	-0.04	0.90
	Probable	UG2	20.77	5.26	3.52	13.76	5.41	2.39	-7.01	0.15	-1.12
	Proven and Probable	**Total**	**37.81**	**5.37**	**6.53**	**36.03**	**5.44**	**6.30**	**-1.78**	**0.07**	**-0.23**
Klipfontein Opencast	Proven	Merensky	0.00	0.00	0.00	2.75	3.46	0.31	2.75	3.46	0.31
	Probable	Merensky	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Proven and Probable	**Total**	**0.00**	**0.00**	**0.00**	**2.75**	**3.46**	**0.31**	**2.75**	**3.46**	**0.31**
Ga-Phasha West	Proven	Merensky	0.00	0.00	0.00	5.09	4.41	0.72	5.09	4.41	0.72
	Probable	Merensky	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Proven and Probable	**Total**	**0.00**	**0.00**	**0.00**	**5.09**	**4.41**	**0.72**	**5.09**	**4.41**	**0.72**
Total Bokoni	Proven	Merensky	21.18	4.08	2.78	32.85	4.69	4.95	11.67	0.61	2.17
	Proven	UG2	17.04	5.50	3.01	22.27	5.46	3.91	5.23	-0.04	0.90
	Probable	Merensky	8.07	3.67	0.95	0.03	4.22	0.004	-8.04	0.55	-0.95
	Probable	UG2	20.77	5.26	3.52	13.76	5.41	2.39	-7.01	0.15	-1.12
	Proven and Probable	**Merensky**	**29.25**	**3.97**	**3.73**	**32.88**	**4.69**	**4.96**	**3.63**	**0.72**	**1.23**
	Proven and Probable	**UG2**	**37.81**	**5.37**	**6.53**	**36.03**	**5.44**	**6.30**	**-1.78**	**0.07**	**-0.23**
	Total Reserves	**Total**	**67.06**	**4.76**	**10.26**	**68.91**	**5.08**	**11.26**	**1.85**	**0.32**	**1.00**

Notes:

1. The confidence level at Brakfontein and Middelpunt Hill increased.
2. No Reserves were stated for Klipfontein and Ga-Phasha in 2011.
3. The total content increased on the Merensky shafts previously stated in 2011, though depletion were applied and the total tonnes decreased.
4. The 4E grade for Merensky increased.
5. Tonnages refer to tonnes delivered to the metallurgical plant.
6. No vampings is included.
7. All figures are in metric tonnes.
8. Pay limit calculated: US$/oz = 1750 & R/US$ = 6.95.

Item 15 (c) – MULTIPLE COMMODITY MINERAL RESERVE

Prill Splits

The Mineral Reserves stated for Bokoni Mine is in the form of a 4E grade. This is made up of Platinum (Pt), Palladium (Pd), Rhodium (Rh) and Gold (Au).

Table 26 gives an indication of the prill splits per shaft.

Table 26: Bokoni Prill Splits per Shaft

Area	Reef Type	Tonnes (Mt)	Grade 4E (g/t)	4E (Moz)	Pt (%)	Pd (%)	Rh (%)	Au (%)
Brakfontein	Merensky	23.75	4.92	3.76	60.22	29.80	3.99	5.98
Vertical	Merensky	1.06	4.18	0.14	60.22	29.80	3.99	5.98
UM2	Merensky	0.23	3.86	0.03	60.22	29.80	3.99	5.98
Middelpunt Hill	UG2	36.03	5.44	6.30	42.67	46.86	8.75	1.72
Klipfontein	Merensky	2.75	3.46	0.31	60.22	29.80	3.99	5.98
Ga-Phasha West	Merensky	5.09	4.41	0.72	61.52	28.18	3.30	7.00

Metal Recoveries

The different metal recoveries per shaft can be seen in Table 27.

Table 27: Bokoni Concentrator Recoveries per Shaft

Area	Pt (%)	Pd (%)	Rh (%)	Au (%)
Brakfontein	90.71	91.64	92.13	69.87
Vertical	88.97	89.88	90.37	68.53
UM2	92.44	93.38	93.89	71.20
Middelpunt Hill	92.44	93.38	93.89	71.20
Klipfontein	85.53	87.47	86.08	80.01
Ga-Phasha West	70.80	71.72	72.21	54.95

The metal prices applicable to a 4E Reserve statement can be seen in Table 28.

Table 28: Metal Prices

	Year	2013	2014	2015	2016	2017	Long-Term
Exchange rate	ZAR/USD	8.61	8.50	8.84	8.90	8.94	9.19
Inflation rate	SA	5.63%	5.30%	4.90%	4.60%	4.60%	4.60%
Inflation rate	US	1.94%	2.40%	2.40%	2.40%	2.50%	2.50%
Platinum	USD/oz	1,692	1,727	1,755	1,740	1,731	1,801
Palladium	USD/oz	722	780	797	791	797	806
Rhodium	USD/oz	1,545	1,639	1,732	1,746	1,774	1,741
Gold	USD/oz	1,794	1,675	1,545	1,364	1,281	1,220

Item 15 (d) – FACTORS THAT COULD MATERIALLY INFLUENCE THE MINERAL RESERVE ESTIMATES

There are numerous factors that could materially influence the Mineral Reserves estimated. Large portions of the Resources are not converted to Reserves in the life of mine schedule. The Reserves estimated is only about 15% of the total Measured and Indicated Resources estimated. The Vertical shaft, for example, is only scheduled until 2015, but the shaft has a LoM potential of at least another 20 years, as stated in the 2011 Reserves.

ITEM 16 – MINING METHODS

Item 16 (a) – Parameters Relevant to Mine Design

Mine Design Parameters

The mine design criteria for the Merensky and UG2 operations are detailed in Table 29 per shaft.

Table 29: Mine Design Criteria - Merensky and UG2 Operations

Development	Unit	Brakfontein	Vertical	UM2	Middelpunt Hill
		W x H	W x H	W x H	W x H
Conveyor Decline	m	5.6 x 3.4	-	-	5.8 x 3.8
Material/ Trackless Decline	m	4.6 x 3.4	-	-	4.8 x 3.8
Chairlift decline	m	3.2 x 3.4	-	-	-
Cross-cuts	m	4.0 x 3.4	2.7 x 3.0	2.7 x 3.0	5.0 x 3.0
Raises	m	1.4 x 2.4	1.4 x 2.4	1.4 x 2.4	1.4 x 2.5
Haulages/ Haulages	m	5.8 x 3.6	2.7 x 3.0	2.7 x 3.0	5.8 x 3.4
Ore pass	m	2.0 Ø	2.0 x 2.0	2.0 x 2.0	2.0 Ø
Ventilation borehole	m	4.5 Ø - 6.1 Ø	-	-	4.5 Ø
Stoping	**Unit**	**Brakfontein**	**Vertical**	**UM2**	**Middelpunt Hill**
Face length (Including In-stope pillar)	m	36.8	36.8	36.8	37.8
Back lengths - maximum	m	250.0	58.0	95.0	240.0
Ore pass spacing	m	10.0	31.5	31.5	-
Effective panel length - maximum	m	32.8	32.8	32.8	31.5
Average Stope Width	cm	118.0	113.6	110.0	106.7

Notes:

1. The Mine Design Criteria for Ga-Phasha West is the same as for Brakfontein, as it is a strike extension to the West; and
2. Middelpunt hill is the only UG2 producing shaft.

Ventilation Design Criteria

Due to the mine keeping its wet bulb temperature below 27.5°C, it is not necessary to acclimatise the workers. The applied ventilation parameters for the Bokoni Mine are detailed in Table 30.

Table 30: Ventilation Design Criteria

Bokoni - Ventilation Planning Parameters		
Design Parameter	**Unit**	**Applied**
Face wet bulb temperature	°C	<27.5
Face dry bulb temperature	°C	<32.5
Stope face velocity	m/s	≥0.25
Specific cooling power	w/m²	280
Dust exposure RQC	mg/m³	<0.1
Volume/Stope	m³/s	15
Air Utilization	%	80
Intake Haulage velocities	m/s	6-8

Rock Engineering Design Criteria

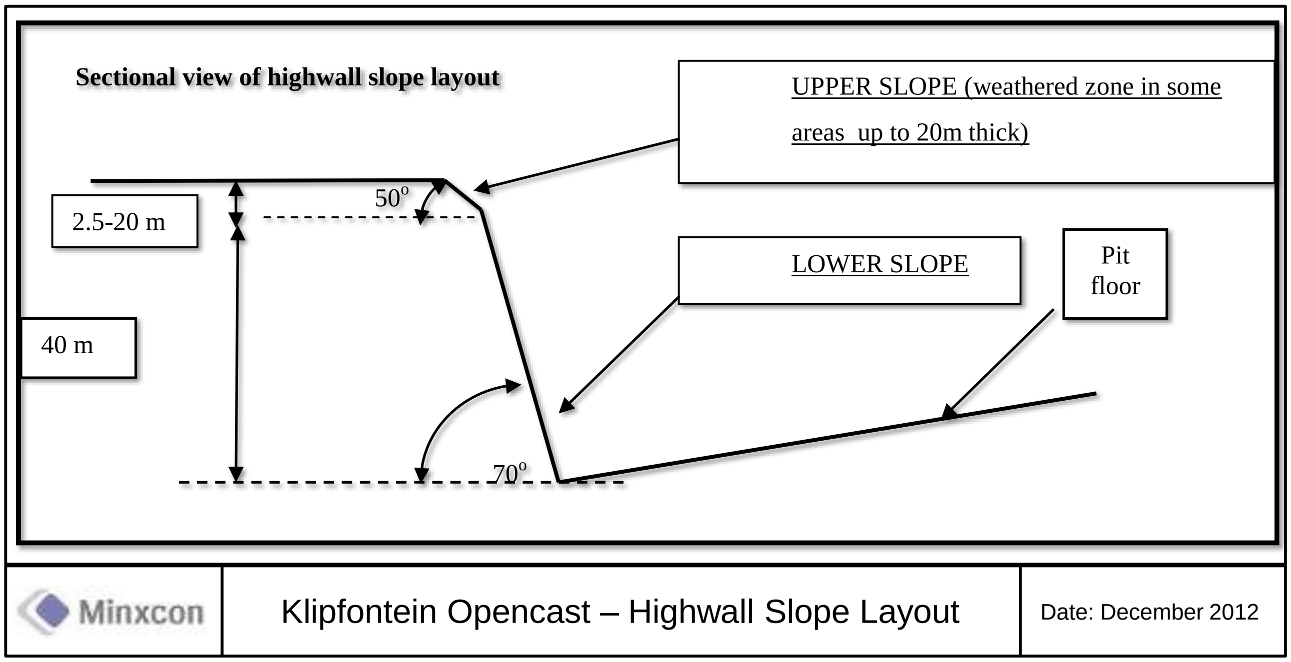
Merensky

A combination of permanent and temporary support is being used on all Merensky and UG2 shafts at the Bokoni Mine. The permanent support consists of pre-stressed elongates, C-packs, cluster sticks, roof bolts, and hydrobolts. Temporary support is in the form of Camlok props placed on each stope face and working development end. In-stope pillars and strike pillars are also left as a form of permanent support.

Opencast Parameters

The Klipfontein opencast is planning to produce 40,000 tonnes per month between 2013 and 2018. Figure 41 shows the layout of the 40 m highwall.

Figure 41: Section View of the Highwall Slope Layout



Mining is by means of a truck and shovel operation. The opencast design parameters can be seen in Table 31.

Table 31: Opencast Design Parameters

Design Criteria	Unit	Parameter
Tonnes	t	40,000 per month
Mining blocks	num	141 x 30 m wide
Reef dip	degrees	16
Wall angle	degrees	70
Pit Depth	m	40 at deepest
Berm Width	m	2 m at top of highwall
Geological Losses	%	20
Planned Delivered Grade	g/t	3.46

Item 16 (b) – Production Rates, Mining Dilution, Mining Unit Dimensions and Expected Mine Life

Production Rates

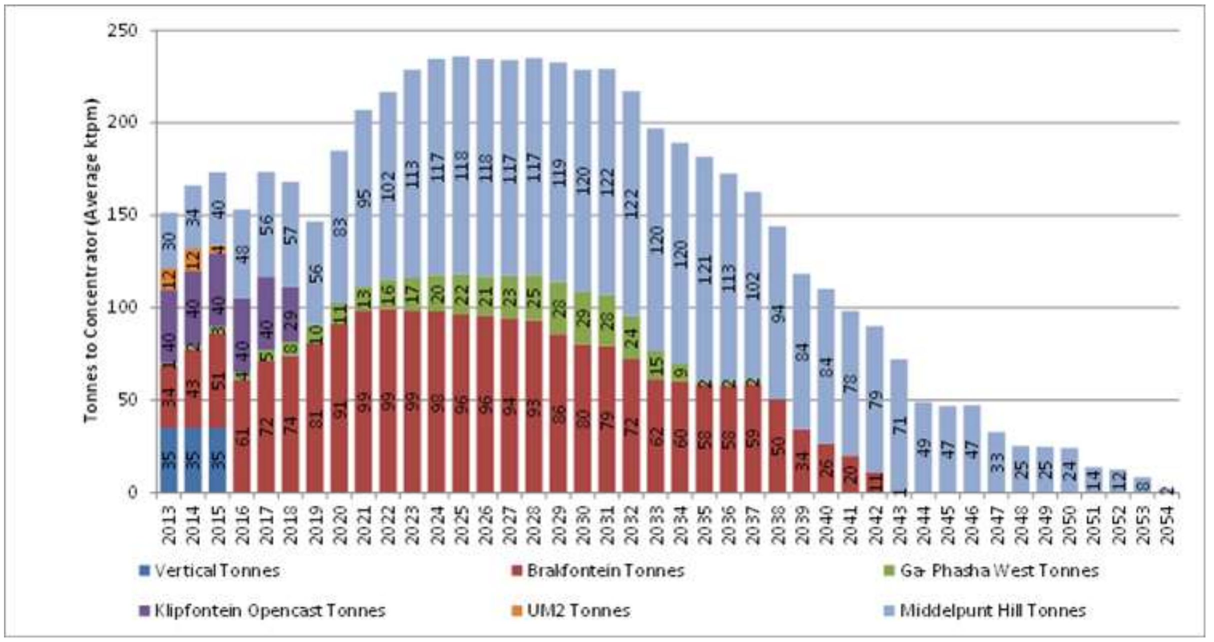
The average production rates per shaft for the first five years can be seen in Table 32. Note that the production capacity for the treatment plant is 160,000 tonnes per month. The delivered tonnes more than the plant capacity will be stockpiled and treated from 2019 onwards, when sufficient capacity is available.

Table 32: Bokoni Planned Production Rates (Average Tonnes per Month Delivered to Concentrator)

Year	2013	2014	2015	2016	2017
Vertical Tonnes	35,000	35,000	35,000	-	-
Brakfontein Tonnes	33,619	42,712	51,403	61,263	71,519
Ga-Phasha West Tonnes	1,198	1,806	3,253	3,871	5,380
Klipfontein Opencast Tonnes	40,000	40,000	40,000	40,000	40,000
UM2 Tonnes	11,515	12,141	3,965	-	-
Middelpunt Hill Tonnes	30,050	34,446	39,539	47,814	56,433
Total Tonnes per Month	**151,382**	**166,105**	**173,159**	**152,948**	**173,332**

The production rates per shaft over the LoM are detailed in Table 32.

Figure 42: Bokoni Tonnes per Shaft Delivered to Concentrator



Mining Dilution

Modifying factors are applied to calculate the planned tonnes called for in the budget. The modifying factors are applied to the CadsMine schedules. It is broken down into stoping and development modifying factors as detailed in Table 33.

Table 33: Modifying Factors

	Brakfontein		Vertical		UM2		Middelpunt Hill		Brakfontein Ga-Phasha W	
Stoping	**Percentage Applied (%)**	**Grade Applied (g/t)**	**Percentage Applied (%)**	**Grade Applied (g/t)**	**Percentage Applied (%)**	**Grade Applied (g/t)**	**Percentage Applied (%)**	**Grade Applied (g/t)**	**Percentage Applied (%)**	**Grade Applied (g/t)**
ASG's	5.07%	2.69	5.22%	1.56	5.85%	1.06	1.55%	0.71	4.74%	2.75
Winch Bed	0.42%	2.91	1.25%	2.50	1.14%	1.03	0.35%	1.30	0.28%	3.62
Sliping	0.00%	-	0.00%	-	0.00%	-	0.00%	-	0.00%	-
Re-development	1.66%	2.64	7.80%	1.62	7.99%	1.05	0.21%	0.81	1.35%	2.71
Off reef Re-development	0.00%	-	0.00%	-	0.00%	-	0.00%	-	0.00%	-
Fall of Ground	0.40%	-	0.40%	-	0.40%	-	0.20%	-	0.40%	-
MCF	100.00%	-	100.00%	-	100.00%	-	95.00%	-	100.00%	-
Development										
Winch Reef Development	0.08%	2.17	0.65%	2.03	0.00%	-	0.00%	-	0.02%	2.48
Overbreak Reef Development	1.64%	2.65	1.63%	2.35	1.79%	2.07	1.92%	1.13	1.39%	2.26
Cubby Reef Development	3.92%	2.44	3.79%	3.52	3.26%	1.02	8.67%	0.89	5.37%	3.15
Fall of Ground Reef Development	0.38%	-	0.38%	-	0.38%	-	0.18%	-	0.38%	-

Notes:

1. Not all factors applied have an associated grade with it.

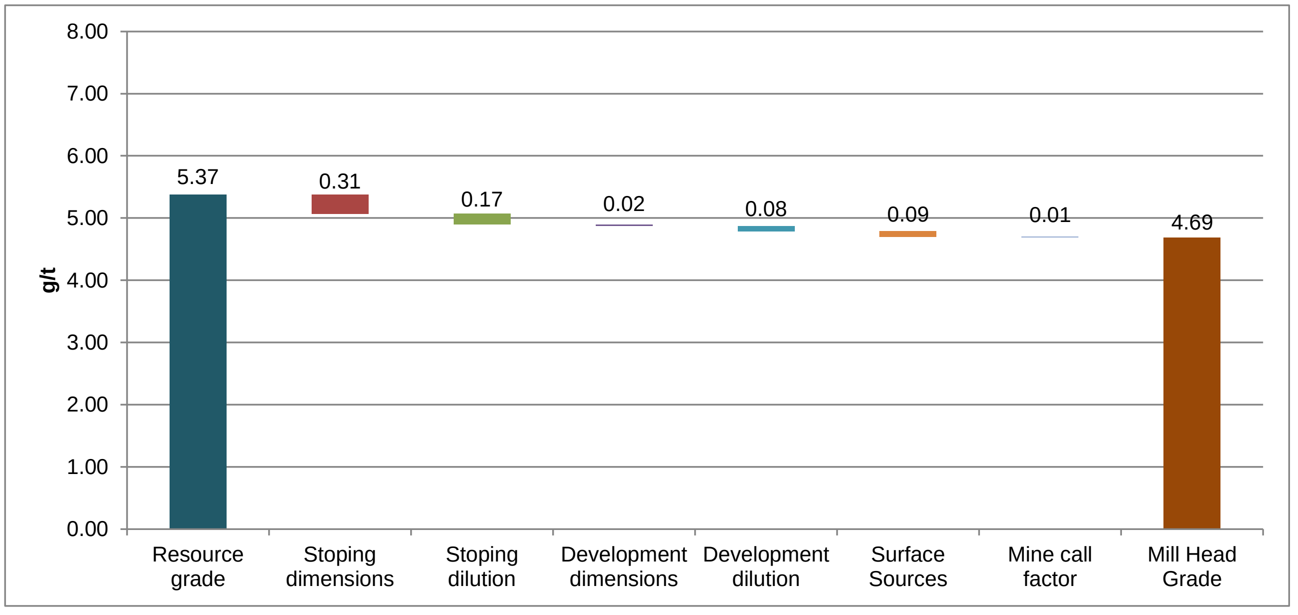
The effect that the modifying factors have on the tonnages and content is detailed in Table 34.

Table 34: Effect of Modifying Factors

Modifying Factor	Tonnage	Content
ASGs	Increase	Increase
Winch beds	Increase	Increase
Crushed pillar provision	Decrease	Decrease
Off-reef mining	Increase	Remains unchanged
Off-reef re-development	Increase	Increase
Overbreak (Stoping)	Increase	Increase
Falls of ground	Increase	Remains unchanged
MCF	Remains unchanged	Decrease
Waste Portion of Reef Development	Increase	Increase
Overbreak (Development)	Increase	Increase

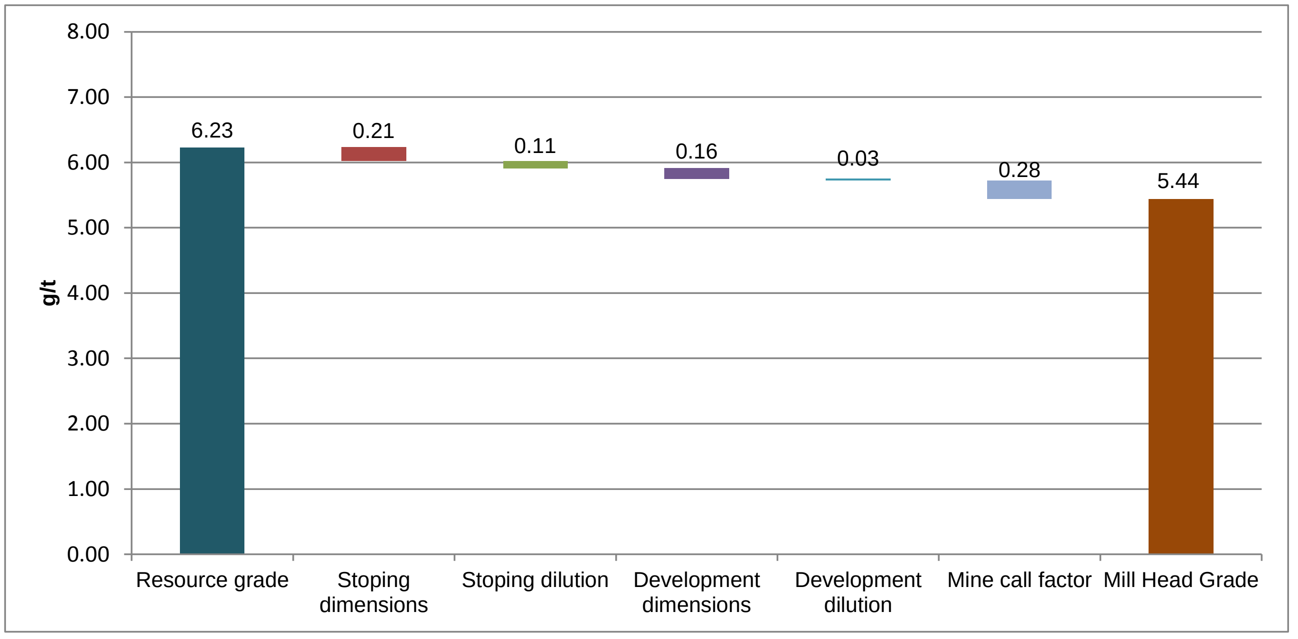
The Merensky Resource to Reserve waterfall graph showing the dilution of the grade from the resource grade to the mill head grade can be seen Figure 43.

Figure 43: Waterfall Graph Showing the Merensky Resource to Reserve Grade Dilution



The UG2 Resource to Reserve waterfall graph showing the dilution of the grade from the resource grade to the mill head grade can be seen Figure 44.

Figure 44: Waterfall Graph Showing the UG2 Resource to Reserve Grade Dilution



Mining Unit Dimensions

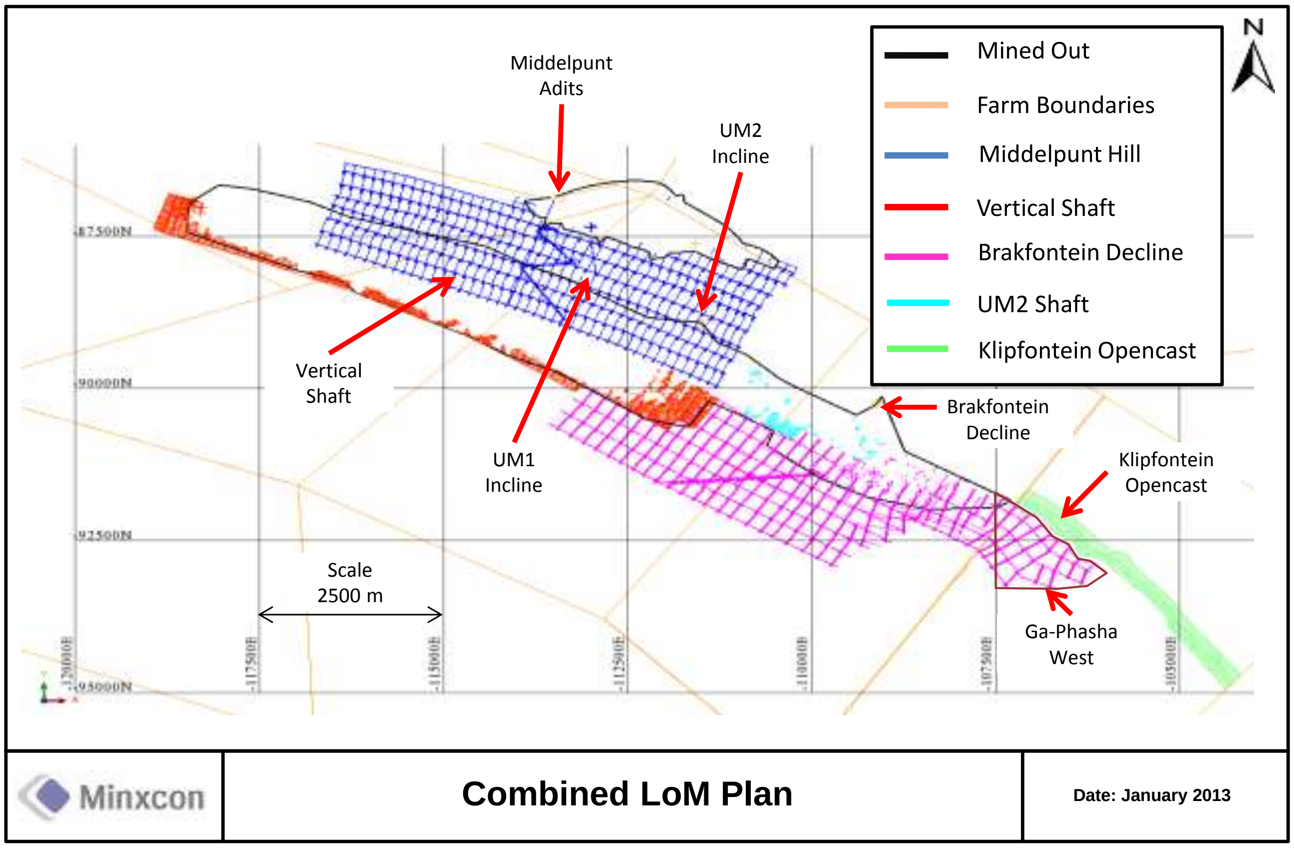
The dimensions were discussed under the Mine Design Criteria in Table 29.

Expected Mine Life

LoM strategy

The LoM strategy entails the mining of both the UG2 and Merensky reefs from the various shafts. The UG2 reef will be mined at Middelpunt Hill shaft, whilst the Merensky reef will be mined at Brakfontein, Vertical shaft, UM2, Ga-Phasha West and at the Klipfontein Opencast. The Merensky LoM extends to 2043, whilst the UG2 LoM extends to 2054. The areas that were included in the Merensky and UG2 LoM are illustrated in Figure 45. The figure illustrates the scheduled areas in the LoM plan.

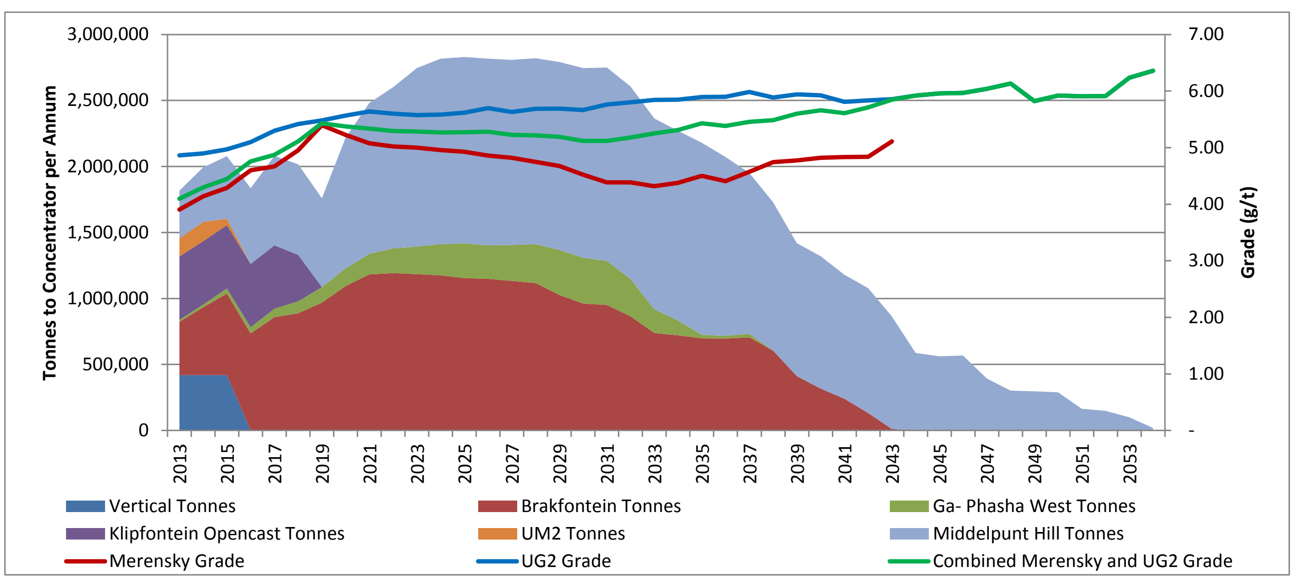
Figure 45: Bokoni Combined LoM Plan



Production Strategy

The production strategy was based on parameters from the mine design criteria discussed earlier in this document. The LoM profile for Bokoni Mine, illustrating delivered to concentrator tonnes and grade, is illustrated in Figure 46.

Figure 46: Bokoni Delivered to Concentrator Tonnes and Grade Profile



Note:

1. Tail cutting at MPH and Brakfontein were applied (delivered tonnes less than 30 ktpm)

Some of the tonnes produced by the Klipfontein Opencast will be stockpiled to keep the tonnes milled profile below the plant capacity of 160 ktpm. The milled profile is constant until 2019, from where an increase in milled capacity is planned.

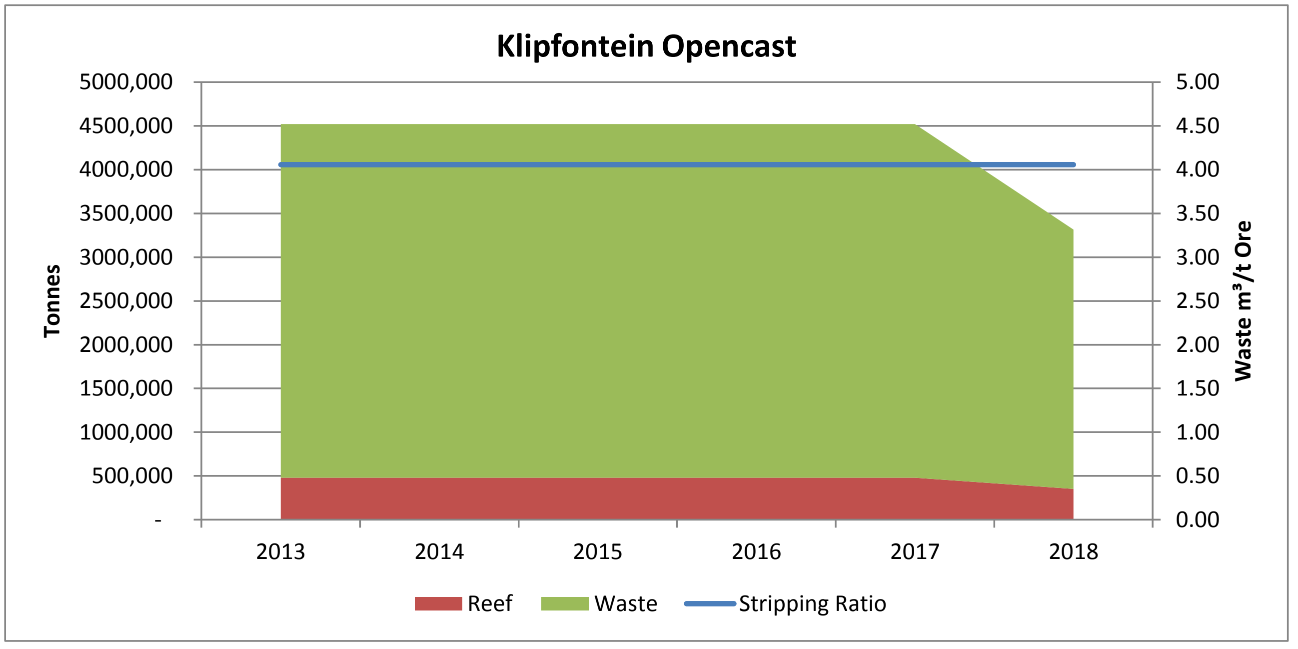
Item 16 (c) – Production Rates, Expected Mine Life, Mining Unit Dimensions, and Mining Dilution

Requirements for Stripping

The average stripping ratio over the life of the opencast is 4.1. The ratio is calculated on Volume Waste/ Tonnes of ore broken. The stripping ratio does not increase as the opencast is mined in an Eastern direction along the outcrop of the Merensky reef. A highwall of 40 m high is planned and no pit optimisation was done.

The following figure shows the tonnes and average stripping ratio for the opencast.

Figure 47: Tonnes and Average Stripping Ratio



Underground Development

It is essential to do enough development in order to open up sufficient ground for stoping to produce the required planned production per month. Off-reef development at Bokoni is done trackless with conveyor belts in the footwall drives. On-reef raises and strike gullies are developed conventionally. All underground mining operations are based on pneumatic mining, except for Brakfontein. At Brakfontein, the decline was initially equipped for compressed air but was subsequently converted to implement electric drilling. There has been a phased approach to converting raise line development using compressed air drilling to open-circuit hydropower.

Backfilling

Backfilling is needed when mining at great depth. It is currently not a Rock Engineering requirement to backfill stoped out panels at Bokoni, as mining is still shallow.

Item 16 (d) – Required Mining Fleet and Machinery

Bokoni has an extensive mining fleet that stretches over the various mining locations. Additional machinery is provided by outside companies on a contractual basis and does not form part of the Bokoni capital fleet. The main contractor on site is CDS. The basic Bokoni mining fleet is indicated in

Table 35. The Ga-Phasha opencast mining operation will be managed by an outside contractor, Benhaus.

Table 35: Bokoni Mining Fleet

Fleet Description	Amount						
	Vertical Shaft	Middelpunt Hill	Middelpunt Hill - CDS	Brakfontein	Brakfontein - CDS	UM2	Ga-Phasha
Excavator							4
Dozer							2
Grader		1			1		1
Water Truck							1
Service Truck		1					1
LDV	1	7	1	9	7	1	1
Crusher							1
Loader	17					7	1
Personnel Carrier		2		2			1
Diesel Bowser							1
Haul Truck							1
Dump Truck		6	2	2	10		1
Load Haul Dumper		12	5	4	9		
Utility Vehicle		6		4	3		
Drill Rig		2	2		5		3
Drifter/ Boomer			1		6		
Scissor Lift		2	2	2	4		
Locomotive	32					11	

Additional equipment used in the mining operations includes the following:-

- Chairlifts;
- Feed hoppers and Spillminator chutes;
- Single (55 kW) and double drum (37 kW) winches;
- Various conveyors;
- Ventilation fans;
- Electrical switchgear and transformers;
- Various pumps;
- Ancillary stoping equipment; and
- Electrical and Pneumatic rock drills.

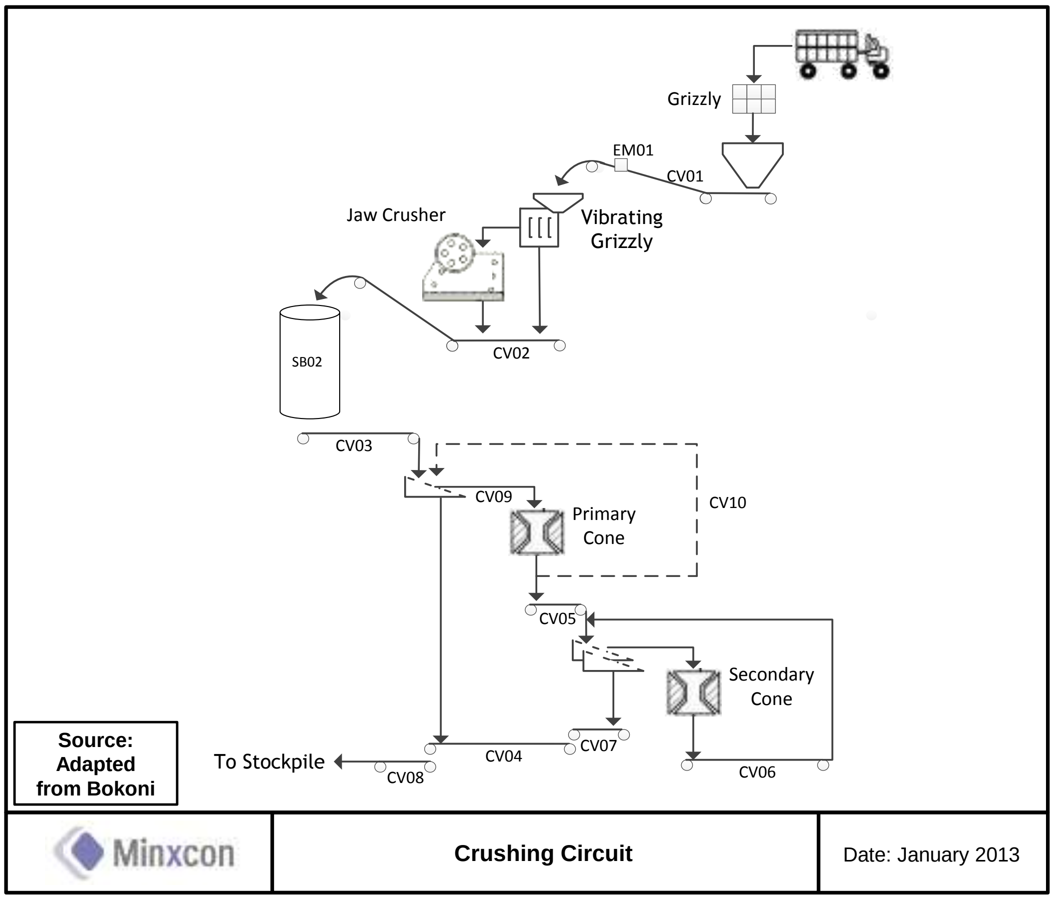
ITEM 17 – RECOVERY METHODS

Item 17 (a) – PROCESSING PLANT DESCRIPTION

Crushing Circuit

Referring to Figure 48, mined ore passes over a 300 mm static grizzly. Undersize falls into the surge bin and oversize is removed to the stockpile. The ore is reclaimed from the surge bin using brute force feeders. It is then transported to the 80 mm vibrating grizzly, first passing an electromagnet which removes tramp iron. Oversize is crushed in a jaw crusher; it is set at 80 mm on the closed end. Grizzly undersize falls onto conveyor CV02, where it recombines with the crushed ore from the jaw crusher. Ore is then transported to a surge bin with a capacity of 100 tonnes.

Figure 48: Crusher Circuit



A brute force feeder extracts ore from the surge bin onto conveyor CV03. The conveyor empties onto a single-deck vibrating screen (primary screen) with an aperture of 25 mm. Oversize from the screen is fed via CV03 to the primary cone crusher with a closed-end setting of 25 mm. The screen undersize reports to conveyor CV04, while the crusher product reports to conveyor CV05 for further processing. The product from the primary cone crusher can be returned to the primary screen in a closed-loop configuration by employing conveyor CV10.

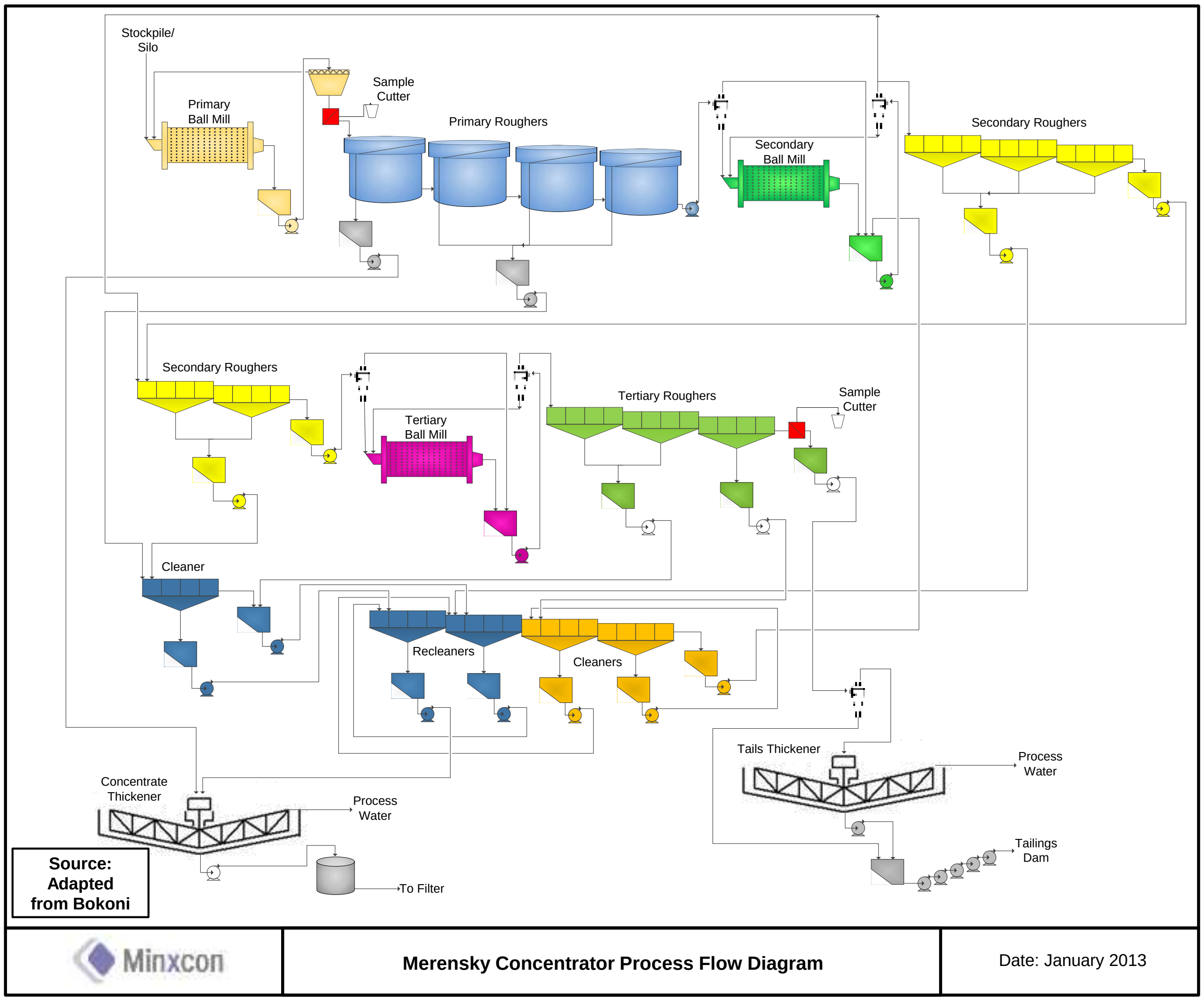
Conveyor CV05 empties onto a double-deck vibrating, secondary screen (20 mm and 15 mm). The screen undersize falls onto conveyor CV07, from where it is transported over CV04 and CV08 to the stockpile. The screen oversize is combined and fed to the secondary cone crusher with a closed-end setting of 15 mm. The crusher product falls onto conveyor CV06 and is transported back to the screen in a closed-loop configuration.

Merensky Plant

Crushed ore is stored in the plant silo, which has a capacity of 4,200 tonnes. The ore is extracted via vibrating feeders onto a conveyor and conveyed to the mill feed bin with a capacity of 60 tonnes. En route to the mill feed bin, tramp iron is removed by means of an electromagnetic belt sorter.

Ore is fed onto a conveyor via a vibrating feeder at a fixed rate (approximately 125 tph) which is controlled by the PLC. The conveyor feeds the primary autogenous Metso mill. To maintain mill density, water is automatically added using a ratio controller. Milled ore exits the mill through the exit grates and is screened in the discharge trommel screen. The trommel screen oversize is collected in a hopper, while the undersize is pumped onto one of two classifier screens with an aperture of 0.85 mm. The screen oversize is gravity-fed to the mill feed hopper while the undersize is sampled before being fed to the first primary rougher flotation cell.

Figure 49: Merensky Concentrator Plant Process Flow Diagram



The slurry enters four Wemco 5 flotation cells, where the reagents sodium isobutyl xanthate ("SIBX"), collector (Senkol N65) and frother (Senfroth 6005) are added. The first rougher cell concentrate can be sent either directly to the final concentrate thickener or it can be combined with the concentrate from cells 2 to 4 and pumped to cleaner bank 1. A conventional PID controller controls the pulp level by adjusting the automated pneumatic dart valves.

The rougher tailings are pumped to a dewatering cyclone. The cyclone underflow is gravity-fed into the secondary mill while the overflow gravitates to the secondary mill discharge sump. The dewatering cyclone underflow is reground in the secondary ball mill and exits the mill to recombine with the dewatering cyclone overflow in the mill discharge sump. Steel balls with a diameter of 30 mm are used.

The secondary rougher consists of two stages. Stage one consists of three banks of Wemco 120 flotation cells while stage two contains two banks of Wemco 144 cells. Each bank contains four cells each. Reagents are added in the first cells of banks 1 and 4. Pulp levels are maintained to setpoint by a conventional PLC-based PID controller.

Secondary rougher tails is pumped to a dewatering cyclone. The underflow is reground in the tertiary ball mill and exits the mill over a discharge trommel screen. The trommel screen oversize is collected in a hopper, while the undersize recombines with the dewatering cyclone overflow in the mill discharge sump. Steel balls with a diameter of 30 mm are used.

The tertiary roughers consist of three banks of Wemco 144 cells. The first bank consists of four Wemco cells with banks 2 and 3 consisting of five cells each. Reagents are added in cell 1 of bank 1. Tertiary rougher flotation tailings pass through an automatic sampler before being pumped to a dewatering cyclone and the tailings thickener. The thickener underflow is pumped to a discharge sump before being pumped to the tailings dam.

The cleaner and recleaner circuit employs OK cells. There are five banks with each bank comprising four flotation cells each. Depressant Gempolym M47 is added at the heads of each of the cleaner banks. The scavenger cleaner tailings are pumped via a tailings sump to the secondary mill discharge sump.

Concentrate from the first recleaner bank is thickened to an SG of above 1.6. It is then pumped to a surge tank and filtered in the Larox filter, which reduces the moisture content to below 14%.

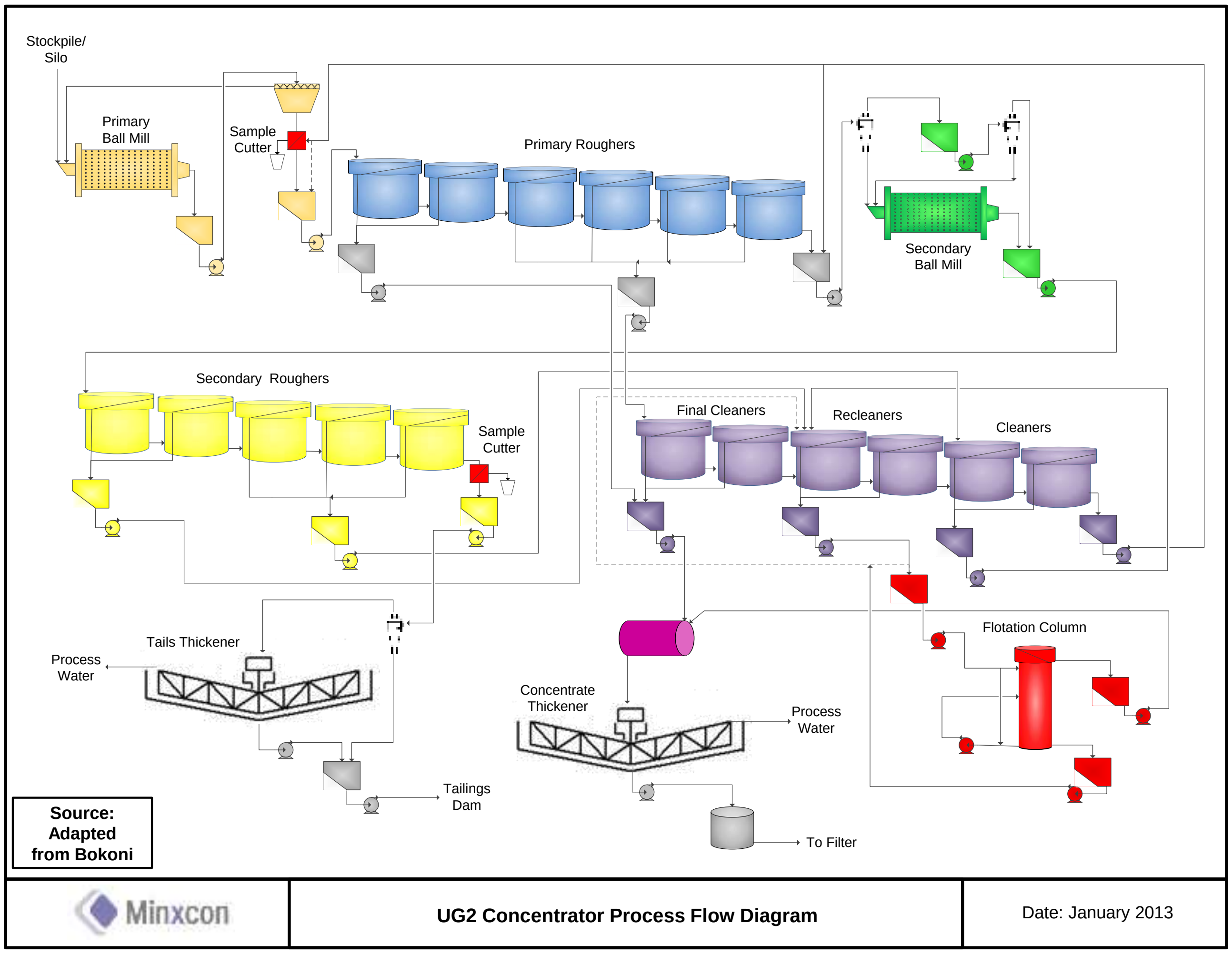
Merensky concentrate has a typical grade of 185 g/t PGM and Au. It is transported by road to the Amplats smelters for further processing and to the platinum and base metal refineries for refinement to final individual metals.

UG2 Plant

Mined ore is crushed and stored on the UG2 tip. The ore flows freely onto the surge bin conveyor and is stored in the mill surge bin. Ore is fed to the primary ball mill at a rate determined by a set value on the DCS (usually 85 tph).The quantity of water that is introduced into the mill feed is determined by an adjustable ratio controller and flows via an automated valve. Steel balls with a mean diameter of 70 mm are used as mill grinding medium. The milled ore passes through the exit grates to the mill trommel. Oversize is collected in a hopper, while undersize flows under gravity into the mill discharge sump. Water is added to reduce the slurry SG. The slurry is pumped over a screen with an aperture of 0.85 mm. Oversize is returned to the mill while the undersize is sampled and pumped to the rougher cells.

The rougher section consists of six OK 30 flotation cells. The pulp levels are automatically controlled by a PLC-based PID controller. Collectors SIBX and Senkol N65, depressant Gempolym M47 and frother Senfroth 6005 are added in the feed box to the first OK cell. Concentrate from cells 1 and 2 is pumped directly to the final concentrate thickener, while concentrate from cells 3 to 6 is pumped to the final cleaners. Tailings from cell 6 is combined with the cleaner tails and pumped to the primary hydrocyclone at the regrind mill.

Figure 50: UG2 Concentrator Process Flow Diagram



Cyclone underflow and overflow gravitates into the mill and primary cyclone overflow sump. From the sump it is pumped to the secondary cyclone. Milling takes place by means of 40 mm steel balls to produce an 80% passing 75 microns product. The slurry passes through the mill discharge grate and over a trommel screen. Oversize is collected in a hopper and undersize flows under gravity into the mill discharge sump. From there it is pumped to the secondary roughers.

The secondary roughers consist of five OK 30 cells equipped with automated level control. Reagents are added to cell 1. The concentrate from cells 1 and 2 is pumped to the re-cleaners and concentrate from cells 3 to 5 is pumped to the cleaner bank. The tailings exit over an automatic sampler and pumped to a hydrocyclone. The cyclone overflow is thickened, recombined with the cyclone underflow and pumped to the tailings dam.

The cleaner and recleaner bank consists of six OK cells: two OK 20 cells for the cleaner bank, two OK 20 cells for the recleaner bank and two OK 10 cells for the final cleaner bank. Each cell is equipped with automated level control. Chemicals are added to the feed inlet of the final cleaner bank cells. Recleaner concentrate is pumped to the flotation column, while the column concentrate is pumped to the thickener. Final concentrate is thickened to a high SG (above 1.6) and pumped to the Larox filter surge tank. The concentrate is filtered to contain less than 14% moisture and then sent to the smelt. UG2 concentrate typically has a grade of 200 g/t PGM and Au.

Item 17 (b) – Major Equipment

The major equipment at the Bokoni concentrators is listed below:

- Milling:
  - Merensky Plant:

    - Primary: 1,150 kW, 4.27 m by 4.57 m Metso mill;
    - Secondary: 1,150 kW, 3.66 m by 5.49 m overflow ball mill; and
    - Tertiary: 1,150 kW, 3.66 m by 3.66 m overflow ball mill.
  - UG2 Plant:
    - Primary: 1,250 kW, 3.66 m by 4.88 m ball mill; and
    - Secondary: 1,250 kW, 3.66 m by 4.88 m ball mill.
- Flotation cells:
  - Wemco 5, 120 and 144 SmartCells; and
  - Outokumpu 3, 5, 8, 10, 20 and 30 flotation cells ("OK cells").
- Larox Filters are used to filter the concentrates.

A distributed control system ("DCS") and programmable logic controller ("PLC") are used to enable remote monitoring and control of the plant. Conventional PLC programmed PID control is used throughout the plant. No other third party advanced controllers are installed at the Bokoni concentrators. No inspection of the equipment condition was made.

Item 17 (c) – CURRENT OR PROJECTED REQUIREMENTS FOR ENERGY, WATER, AND PROCESS MATERIALS

There is adequate water and power infrastructure for the current installed mill capacity of 160 ktpm. The water and power consumptions were not specifically interrogated and it is not expected to change significantly in the future. Power supply to the concentrators is steady and deemed reliable.

The reagents are added at various points along the processing route. The dosage rates are not expected to change significantly in the future. The dosage profiles are shown in Table 36 and Table 37.

Table 36: Reagent Dosage Profile (UG2)

UG2 Plant		
Reagent	**Dosing Point**	**Dosing Value (g/t)**
M47 Depressant	Rougher 1	50
	Scavenger 1	25
	Re-cleaner	15
	Final Cleaner	10
SIBX	Primary Mill	90
	Scavenger 1	60
Senfroth 6005	Rougher 1	75

Table 37: Reagent Dosage Profile (Merensky)

Merensky Plant		
Reagent	**Dosing Point**	**Dosing Value (g/t)**
M47 Depressant	Cleaner 1	40
	Cleaner 2	20
	Cleaner 3 (Final)	30
SIBX	Primary mill	37
	Secondary 1	34
	Secondary 4	27
	Tertiary 1	37
Senfroth 6005	Primary 1	45

Item 17 (d) - TAILINGS DISPOSAL

Tailings dams for the Merensky and UG2 ores are situated near each of the respective concentrators. The tailings dams are designed and operated as conventional upstream spigot dams. A series of catchment paddocks serve to collect run-off and sediment from the side slopes and evaporate this water. The tailings dams are provided with underdrains which assist with dam stability.

The Merensky tailings dam has an area of approximately 70 hectares ("ha") and is known as the Consolidated Tailings Dam (five previous dams, combined into one facility). Tertiary rougher tailings are dewatered in cyclones. The dewatering cyclone overflow is thickened in the final tailings thickener and pumped to the tailings tank, where it is recombined with the cyclone underflow as final tailings. The final tails are pumped to the tailings dam. The UG2 tailings dam is relatively new (commissioned in 2003) and is known as Dam No.6, with an area covering approximately 63 ha. Final tailings thickener underflow is pumped to the tailings dam.

Item 17 (e) – STOCKPILE HANDLING

Merensky ore and UG2 ore are treated separately in their respective concentrators and there is no blending of the two ores. Merensky ore is stored in three bins within the Merensky plant ahead of the milling circuit, namely:

1. a 510 tonne silo to separate the shaft from the crushing operations;
2. a 4,200 tonne silo for storage ahead of milling; and
3. a 60 tonne surge bin for mill feed control purposes.

UG2 ore from MPH UG2 adits is stored on the ground at the surface tip on separate stockpiles. In the crushing circuit there are a number of small surge bins, as well as a large mill feed bin.

Item 17 (f) – PROCESSING PERSONNEL

Bokoni employs approximately 150 people at the concentrator plants. This number is made up of management, administrative staff, plant operators, foremen, engineering staff and labour hire.

Item 17 (g) - PROCESSING PERFORMANCE

The following section details the performance of the Merensky and UG2 plants between January and December 2012.

Merensky Plant

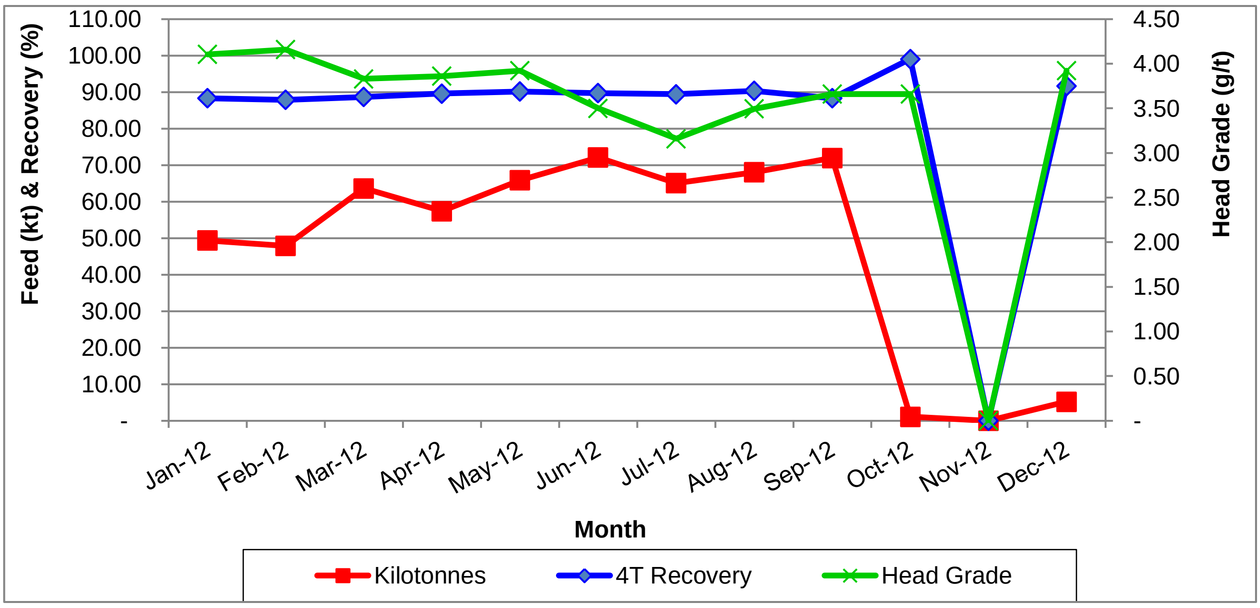
Table 38: Merensky Plant Performance (January to December 2012)

	Item	Unit	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Milling	Kilotonnes	kt	49.40	47.89	63.64	57.41	65.88	72.10	65.11	68.07	71.98	1.10	-	5.22
	Head Grade	g/t	4.11	4.16	3.83	3.86	3.92	3.50	3.16	3.50	3.66	3.66	-	3.92
	4E* Feed kg	kg	202.78	199.23	243.83	221.63	258.45	252.40	205.72	237.97	263.49	4.03	-	20.47
Tails	Kilotonnes	kt	48.34	47.02	62.35	56.13	64.38	70.57	63.85	66.70	70.62	0.87	-	5.05
	Grade	g/t	0.48	0.46	0.43	0.41	0.36	0.39	0.36	0.37	0.42	0.38	-	0.41
	4E Tails kg	kg	23.05	21.54	26.81	22.97	23.25	27.86	23.22	25.00	29.89	0.33	-	2.08
Concentrate	Kilotonnes	kt	1.06	0.86	1.30	1.28	1.50	1.53	1.26	1.36	1.37	0.24	-	0.16
	Grade	g/t	165.30	181.40	162.18	155.38	142.83	159.76	156.22	171.83	165.90	148.36	-	140.59
	4E Produced	kg	174.94	156.82	210.13	198.51	213.88	244.29	197.09	234.29	226.50	34.89	-	22.95
	4E Recovery	%	88.36	87.92	88.69	89.63	90.20	89.76	89.46	90.36	88.34	99.07	-	91.68
	Accountability	%	97.64	89.53	97.17	99.93	91.75	107.83	107.09	108.96	97.31	873.58	-	122.30

***Source*: Bokoni; *4E or four Elements (platinum, palladium, rhodium and gold)

Production was hampered due to labour strikes in October and November. As a result the plant was emptied in October which gave rise to an accountability of 874% and recovery of 99.07%. This is expected to have a negative impact on the recovery and accountability once the plant is re-commissioned and precious metal lock-up increases during normal operational throughput until equilibrium of the product is achieved in the process.

Figure 51: Merensky Feed Tonnes, Head Grades and Recovery (January to December 2012)



Source: Bokoni

Between January and September 2012 the treated tonnes showed an overall increasing trend. The head grades varied between 3.16 and 4.16 g/t with an average of 3.72 g/t. The plant performed consistently between January and September 2012 with recoveries of about 90%. Merensky tails were measured at an average of 0.41 g/t

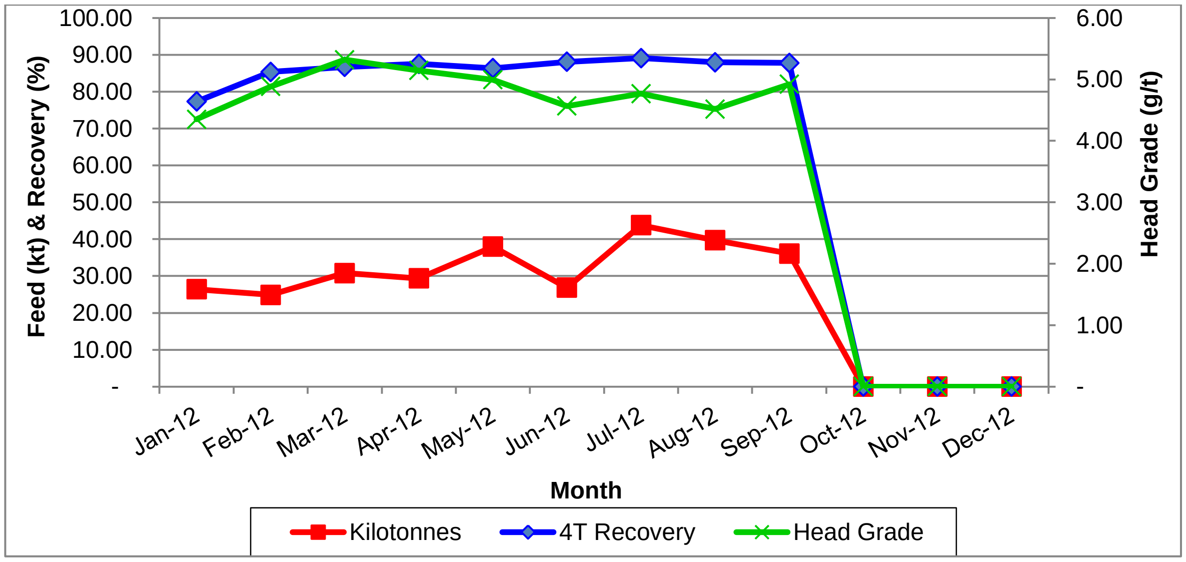
UG2 Plant

Table 39: UG2 Plant Performance (January to December 2012)

Item		Unit	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Milling	Kilotonnes	kt	26.41	24.91	30.81	29.38	37.95	26.86	43.77	39.70	36.10	-	-	-
	Head Grade	g/t	4.35	4.89	5.32	5.15	4.99	4.57	4.77	4.52	4.92	-	-	-
	Head grams	g	114.90	121.69	163.92	151.16	189.52	122.67	208.65	179.34	177.68	-	-	-
Tails	Kilotonnes	kt	26.03	24.43	30.19	28.81	37.09	26.22	42.82	38.95	35.36	-0.03	-	-
	Grade	g/t	0.91	0.75	0.66	0.62	0.66	0.65	0.56	0.63	0.64	-	-	-
	4E Tails kg	kg	23.71	18.39	20.07	17.86	24.46	17.15	23.86	24.36	22.57	-	-	-
Concentrate	Kilotonnes	kt	0.38	0.47	0.62	0.57	0.86	0.64	0.95	0.75	0.74	0.03	-	-
	Grade	g/t	212.65	227.00	211.79	220.70	180.42	198.44	205.16	236.14	220.73	150.34	-	-
	4E Produced	kg	80.82	107.51	130.98	125.61	154.83	126.98	194.86	178.14	162.26	4.95	-	-
	4E Recovery	%	77.32	85.39	86.71	87.55	86.36	88.10	89.09	87.97	87.79	-	-	-
	Accountability	%	90.98	103.47	92.15	94.91	94.60	117.50	104.82	112.91	104.03	-	-	-

***Source*: Bokoni**

Figure 52: UG2 Feed Tonnes, Head Grades and Recovery (January to December 2012)



Source: Bokoni

Unlike the Merensky plant, there was no production at the UG2 plant in December 2012. As shown in Figure 52, similar to the Merensky plant, the feed tonnes showed an overall increasing trend up to September 2012. Recoveries also showed an increasing trend while an average grade of 4.83 g/t was recorded between January and September 2012. The UG2 tailings grades (0.66 g/t) were higher than the Merensky plant.

Although the monthly accountabilities varied between 89% and 112%, the overall accountabilities for the Merensky and UG2 plants were 101.44% and 102.09% respectively. Plant accountability should be close to 100% at all times. The Merensky plant on average has a higher recovery than the UG2 plant. This is typical of most orebodies in the Bushveld Igneous Complex.

Although Bokoni's process control systems were not assessed, it is recommended that advanced control software is considered at Bokoni. Advanced controllers aid in:

- increasing plant start-up stability;
- enable improved mill and cyclone circuit control;
- increases overall flotation circuit and individual cell froth stabilities; and
- allowing for tighter pulp level control during periods of feed instability.

ITEM 18 – PROJECT INFRASTRUCTURE

Item 18 (a) – Mine Layout and Operations

Bokoni mining operations are conducted at various locations that function mostly independent from each other, with support provided by on-site workshops, offices etc. Bokoni mining operations consists of the following:

- Vertical shaft;
- Middelpunt Hill decline;
- Brakfontein decline;
- UM2 incline; and
- Klipfontein Opencast.

Bokoni is a hybrid mining operation, with conventional stoping and trackless off-reef flat development. Conveyor belts are located in the footwall drive and are suspended from the hanging- wall. Conventional mining operations take place at Bokoni from the reef dips at greater than 15°. The mine layout follows a scattered breast layout. Raises and strike gullies are developed conventional and on-reef.

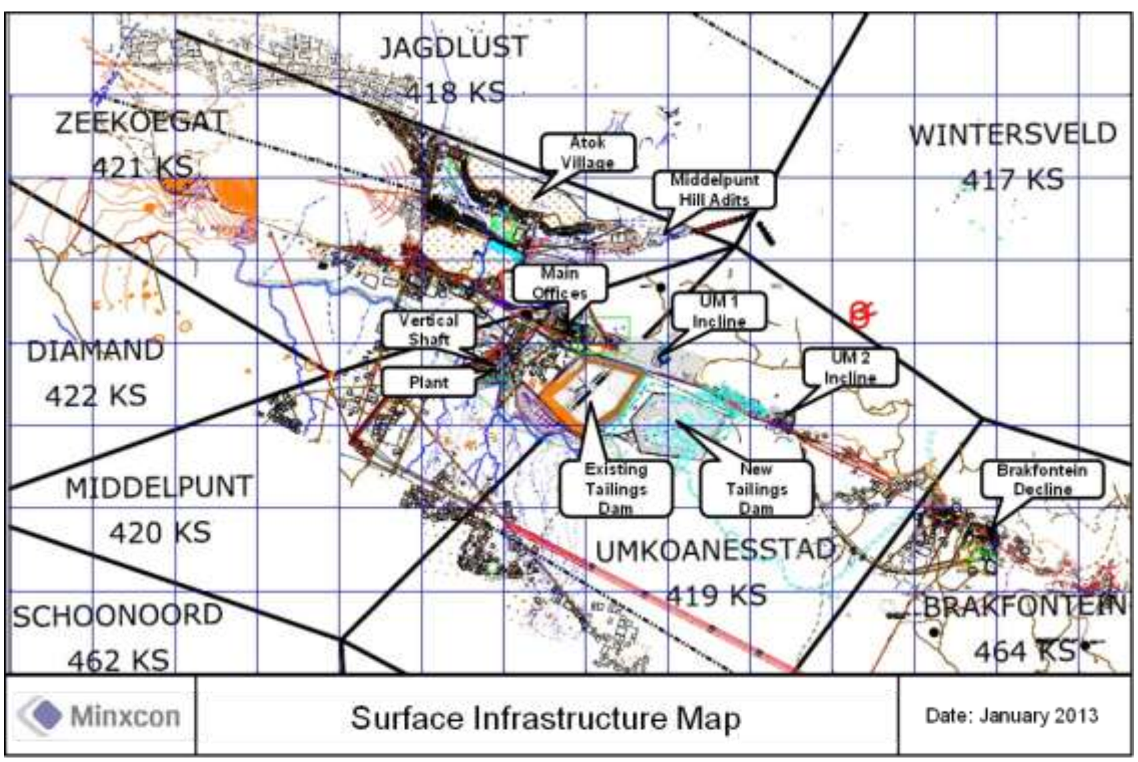
All mining operations are based on pneumatic mining methods, except for Brakfontein. At Brakfontein, the decline was initially equipped for compressed air, but was subsequently converted to implement electric drilling. There has been a phased approach to converting raise-line development using compressed air drilling to open-circuit hydropower. The majority of the ancillary equipment operates on compressed air, but the raise lines equipped for electric drilling have electrically driven ancillary equipment, such as the dewatering pumps and chainsaws. Compressed air is used to pressurise the water for the jackpots and hydrobolts. Bokoni is, however, in the process of converting all mining operations to closed-circuit hydropower.

Item 18 (b) – Infrastructure

Surface Infrastructure

The general layout of the surface infrastructure at the Bokoni Mine is illustrated in Figure 53.

Figure 53: Bokoni General Layout - Surface Infrastructure



The Bokoni surface infrastructure includes, but is not limited to, the following:-

- A UG2 Concentrator;
- A Merensky Concentrator;
- Various conveyors;
- Surface silos and ore stockpiles;
- The Merensky tailings dam;
- The UG2 tailings dam;
- Waste rock dumps;
- A total of 3 sewage plants;
- Offices and buildings;
- Storerooms and store yards;
- Lamp rooms;
- Change houses;
- Workshops;
- Surface ventilation infrastructure;
- Sub-stations and transformer yards;
- Bunded diesel tanks and refuelling bays;
- Compressors;
- Water dams;
- Roads (both tar roads and rock-fill constructed gravel roads);
- A vertical shaft;
- Adits and declines;
- A recreation club;
- A residential village;
- A clinic;
- A hostel; and
- Mine houses.

Underground Infrastructure

The underground infrastructure includes, but is not limited to, the following:-

- Chairlifts;
- Conveyors;
- Refuge chambers;
- Underground workshops (UM2 and Vertical Shaft);
- Water reticulation systems;
- Electrical reticulation systems; and
- Compressed air reticulation systems.

Roads

On-site access roads to the Vertical Shaft, concentrators and offices are tarred, while roads leading to the incline shafts are constructed from rock fill and are mainly used for hauling ore. Concrete culverts and pipes have been used at water crossings. Traffic on these roads consists of private vehicles, haul trucks, and pedestrians from the surrounding local community. Animals are also a common site on the roads and pose a potential safety hazard for locals and mining personnel traveling the roads. These shared roads have not been designed to support the future increase in travel frequency of haul trucks. For this reason, Bokoni is considering other means for transporting ore from both MPH and Brakfontein to the concentrator plant. Options include the use of road trains that will decrease the travel frequency on the roads and also the revolutionary Rail-Veyor system.

The gravel roads leading from the various declines to the concentrator plant are in a good condition. These roads are not public roads and are managed and maintained by Bokoni. Two water tankers with a 20,000 ℓ capacity each are used for dust suppression and operate twice daily. Additional road infrastructure will have to be established to accommodate hauling from the proposed Klipfontein opencast operation situated approximately 13 km to the southeast of the current Bokoni operations. Capital and operating cost expenditure has been included in the contract cost with the contractor that will be mining the opencast. Gravel roads will have to be closely monitored during the rainy season to prevent deterioration of the road surface. A grader should be used to maintain the road surface as the need arises.

Power Supply and Electric Distribution

The Eskom power supply is managed by the Lesideng Municipality. Bokoni is supplied with electricity from the Middelpunt substation and three 20 MVA overhead supply lines, feeding the Middelpunt Switchyard. Further distribution reaches the Merensky West ventilation fans, the Atok Main Switchyard and the Compressor switchyard.

The two on-site substations are rated at 22 kV, which supply the UM2 and Brakfontein operations. A series of transformers distribute electricity to the Vertical Shaft main winder substation and the main intake 6.6 kV substation where power is converted to a low voltage of 400 V or 500 V. The electricity gridline to the operations runs across the Bokoni property adjacent to the dirt road leading to the mines and concentrator. The power lines run along concrete pylons, thus eliminating the possibility of damage due to fire, which is common with timber pylons. Further substations on the mine include the UG2 Plant substation, the Vertical Shaft Reef/Waste Conveyor substation and the Concentrator Plant substation.

Due to the recent commissioning of the Lesideng Main Transmission Station for both Merensky and UG2 expansion projects, the installed supply to the Witkop-Merensky 400 kV ring is deemed sufficient for the current mine and concentrator plant operations. The power supply is steady and deemed reliable. Power consumption is read at the substations feeding the operational units. All electrical infrastructure and electrical installations stemming from the supply line are the property of Bokoni, who is responsible for their maintenance. A new surface electrical yard (substation) has been commissioned to supply the next production phase of the Brakfontein operations (Figure 54).

Figure 54: New Surface Electric Yard for Phase II

At Brakfontein, the current electrical supply underground is provided via 6.6 kV feeders. The underground distribution of electricity follows the normal routing whereby a substation exists at the apex to the West and East haulages. The underground substations reduce the voltage to 525 V. The major electricity consumers are the winders, the compressors and the series of motors for the decline conveyors. Implementation of hydro-power drilling will see a huge reduction in electrical consumption as the current pneumatic method is very inefficient. A similar electrical reticulation applies to the UM2 decline and the shafts. These operations have a limited life of less than five years. Power generation for the new Ga-Phasha opencast operation will be supplied by a 300 kVA generator located adjacent to the opencast operations.

Standby Power

Standby generating capacity of 1.2 MVA is available. The single 1.2 MVA Magnamax diesel generator located at the main intake substation can, however, only sustain electricity to some critical operations, such as shaft winders, hoisting and the dewatering pumps at the Vertical Shaft. The other operations, dewatering pumps, and the concentrators at the main offices are not supported during a break in transmission. It is noted that the ventilation fans at the Vertical Shaft do not operate when power is interrupted.

Smaller generators are located at the various mining operations. At Brakfontein, diesel used to run the generator is stored in a secured and purpose-built 28,000 litre self-contained tank (Figure 55).

Figure 55: Self-Contained Diesel Storage

Water Supply

Service/Industrial Water

Both mining and the processing plant require service water. Water for the mining operations is obtained from the surface service water storage dams. These dams are supplied from numerous used process-water settling dams. At Brakfontein, a 200,000 m^3 dam exists which contains water purified by clarification. All piping from the water source to the operations is positioned above ground on concrete bases with sacrificial cradle supports, catering for expansion and contraction due to temperature fluctuations.

Figure 56: Overland Water Supply Pipeline

At Brakfontein, each underground level is equipped with a pressure-reducing station ("PRS"). There is an ingress of groundwater into the underground workings, estimated at nearly 11,000 cubic metres per day. There is, therefore, no shortage of available industrial water, and excess water is delivered to the concentrator. Recirculation of water also takes place underground with recuperated water which also includes fissure water. Return water is filtered through a surface mud press. Service water at the new opencast section will be supplied by the contractor, Benhaus. For water accumulated during abundant seasonal rainfall, the option exists to route this excess water to the three by-pass Ericson surface dams, thus allowing water to be withdrawn independently. This water can be utilised for dust suppression or at the trackless workshop and wash bay illustrated in Figure 57 below.

Figure 57: Cleaning Bay for Trackless Equipment

Underground return water can follow a shorter recirculation route by extraction from the underground mud press. This cleaned water is piped back to the operation for drilling purposes with the balance fed to the return water dams. The cake from the filter process can be routed to the decline conveyor along with ore.

Water quality is to be verified annually via an internal and independent audit to ensure that the water acidity is acceptable for water-dependent equipment. Failure to monitor this may result in premature failure of equipment such as pumps.

Apart from monthly meter readings, the water balance should be iteratively updated to verify the consumption and recirculation of water as part of the existing water management scheme. This will allow the identification of heavy water consumers and verify the consistency in supply/demand trends, if projected consumption is met, as well as fluctuations between wet and dry seasons.

Potable Water

Potable water is drawn from well-field boreholes on the Jagdlust property, adjacent to the Olifants River which bounds the mining lease area on the northwestern side, as the municipality does not provide "water-on-tap". The extraction is limited to 787,000 cubic metres per annum, in accordance with the Department of Water Affairs and Forestry ("DWAF") permit. Although the well-field has never been depleted, continuous supply to fulfil the requirements of both the existing and expansion projects cannot be guaranteed. In addition, the DWAF permit may be subject to volume changes dependent on demand from the local community and depletion rates.

Potable water is pumped into surface dams with a 600 m^3 storage capacity prior to distribution. On site, potable water is gravity-fed to the underground operations and the surface compressors. The main offices, change houses, concentrators, the clinic and on-site employee accommodation are the other consumers of potable water. The water network does not extend to the local community, since they make use of borehole water. Potable water for the opencast operation will be stored in a small surface tank and will routinely be filled with a dedicated water truck.

Flood Protection

Deep perimeter trenches (Figure 58) have been established for heavy rainfalls to dispose of accumulated water on the mining sites. These trenches are fenced off to prevent any dumping of contaminants. The water is channelled to the river beds of the Oliphants River. Within the perimeter of the mine, the gradient at the various mining sites aid in diverting the water away from the operations, and the ground conditions are such that water is absorbed into the landscape.

Figure 58: Trench for Storm Water Control

Pumping and Dewatering

A pollution control dam is situated near the covered electrical distribution yard and the overhead emulsion explosive area. No other dams were noted at Brakfontein.

15 kW RNE pumps are used to dewater the stopes. 4kW electrical drilling units are used at Brakfontein and contribute to the underground waste water balance. Water is returned from the shaft's bottom return water dam to surface via a 250 NB pipe column with the help of parallel KSB 90 kW pumps with a 70 m^3/hour flow rate. There are no intermediate dams or underground settlers at Brakfontein.

The Bokoni water license also caters for the disposal of water. This amount can, however, be reduced by the recycling and recirculation of water underground, using water at the concentrator and for dust suppression of the roads and tailings dams. Dewatering of the opencast mining operation will be managed by the mining contractor, Benhaus.

Compressed Air

The main compressor station is situated adjacent to the Vertical Shaft. The flow rate from the four Centac 5CII compressors is 150,000 m^3/h (12,500 - 30,000 cfm units) at a pressure of 600 kPa, which is sufficient to provide downstream pressure for pneumatic drilling. Water coolers are located directly adjacent to the compressor house. Another Centac unit is installed at the UM2 operation.

At Brakfontein, two Ingersoll-Rand (Model 5C770MX3) centrifugal air compressors, as illustrated in Figure 59, deliver 13.2 m^3/s (28,000 cfm) for the remaining compressed air operations, namely:-

- development;
- explosive hole desludger;
- charging up;
- pressurisation of the jackpots and hydrobolts;
- dewatering; and
- refuge chambers.

Brakfontein has an additional spare compressor for emergency and maintenance purposes.

Figure 59: Compressed Air Units at Brakfontein

Piping

All underground piping is mounted on hangingwall bearer bars with U-brackets. The various lines are colour-coded to Amplats standards.

Refuge Chambers

Due to the majority of the Brakfontein production being drilled with electric drills, the compressed air requirement is reduced, and mostly supplies the refuge chambers. The compressors have been sized to ensure sufficient air flow to refuge chambers in the event of full occupation, in an emergency situation. The estimate is based on the principle of multiple units operating simultaneously, and one unit on standby for maintenance or downtime. At Brakfontein, the refuge chambers are accessed from both the conveyor decline and the material decline.

Ventilation

Two 1.2 MW ventilation fans are installed at Brakfontein. The primary intake airway is the chairlift and material declines, whilst the conveyor decline serves as the return airway. Since the development is trackless, forced ventilation is applied and overlapped to dilute the diesel exhaust emissions. Refrigeration and cooling will be required for Phase 2 mining as the depth will exceed 650 m below surface. An Investment Proposal ("IP") has been submitted for additional ventilation infrastructure to service the lower levels, namely 6 and 7 levels.

Ore Handling

At Bokoni, rock is scraped by 37 kW face winches, with a 55 kW strike gully winch feeding the centre gully winch into Advanced Strike Drives ("ASDs"). From the centre gully, ore is scraped into stope ore passes, that either feed the strike belt via a single discharge Spillminator chute, or into the muckbays, where ore is loaded by the LHDs. The discharge from the Spillminator chute is either ore or waste. A shuttle conveyor system has been installed to handle either reef or waste. All chutes are lined with 10 mm thick manganese liners.

Spillminator chutes are used at the transfer points to handle mud rushes. Although the Spillminator's double doors are designed to contain spillage, spillage still occurs, since skirtings often do not seal off the settling area on the receiving belt. The LHD off-loads the ore into reef tips. These tips are equipped with hydraulic hammers, breaking the Merensky rock to drop through the grizzly into the ore passes. The rock is then routed to the fibre-core main decline belt currently utilised for the Merensky ore and waste rock.

As the material surfaces, it travels along an overland belt to a transfer point. The ore is conveyed to a surface storage silo of approximately 3,000 tonnes (Figure 60). From here ore is trucked with 30 t ADTs to the concentrator plant.

Figure 60: Overland Conveyor Feeding the 3,000 Tonne Merensky Silo

Minxcon	Overland Conveyor Feeding the Merensky Silo	Date: January 2013

Waste Rock

Waste rock dumps are located in close vicinity to the various mining operations. The main source of waste rock is from the various development ends. Another conveyor routes waste rock to the rock dump. A mobile conveyor allows for the distribution of the shaft output to be spread along the ROM pad (Figure 61) for easier access and loading onto the haul trucks. The material is used for construction and in future may be used to clad the slopes of the tailings dams or for terracing.

Figure 61: Waste Dump Site with Advancing Conveyor

Minxcon	Waste Dump with Advancing Conveyor	Date: January 2013

Men and Material Access

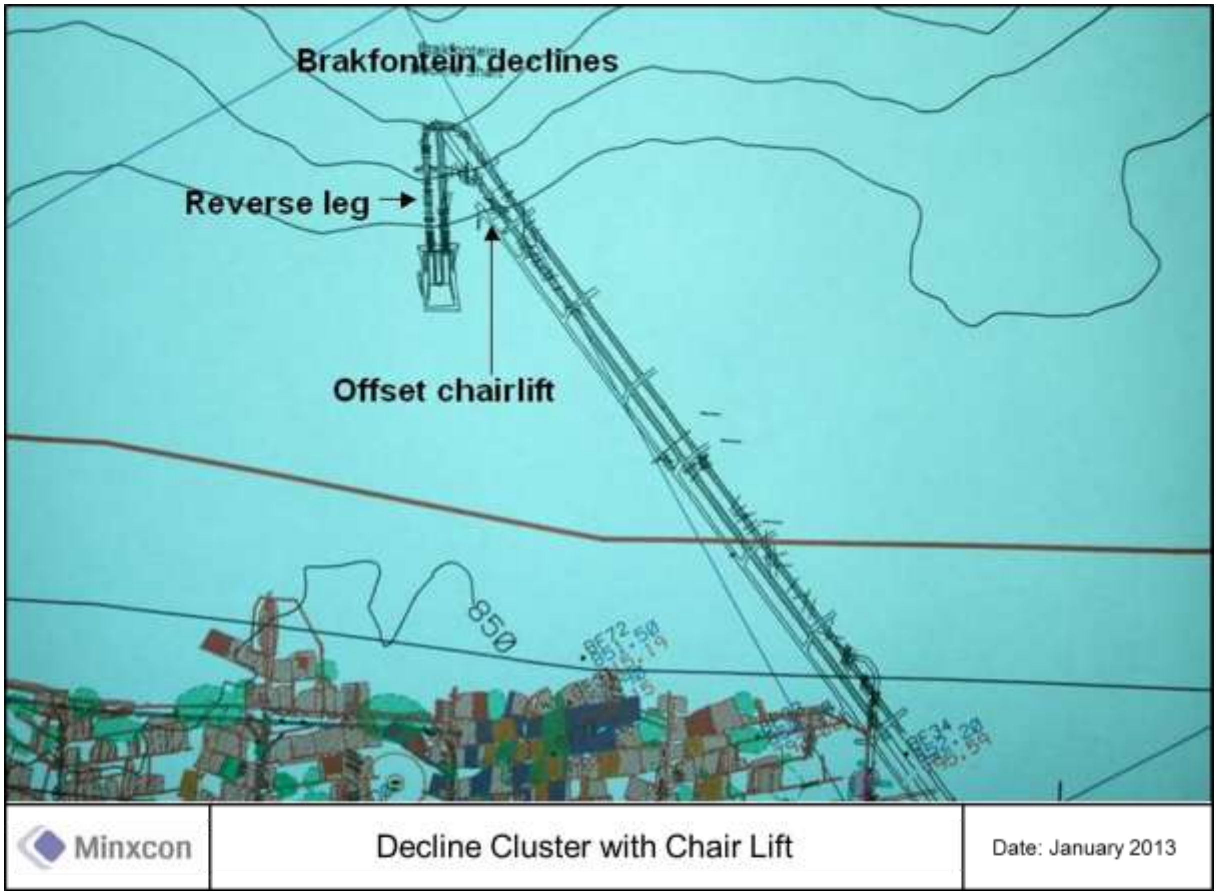
The Brakfontein shaft is accessed via a triple-barrel cluster. The declines consist of a chairlift, conveyor and men/material ways. The declines are developed 15 m in the footwall of the reef and span 2.3 km to 6 level.

The declines are equipped and sized as follows:-

- chairlift (3.2 x 3.4 m);
- conveyor and maintenance decline (5.8 x 3.2 m); and
- trackless decline (4.8 x 3.5 m) – this may vary slightly depending on overbreak/underbreak.

A series of laterals, approximately 90 metres apart, link the main conveyor decline and is accessed by a 15 metre connection to the material decline. The decline cluster layout is illustrated in
Figure 62.

Figure 62: Decline Cluster



At Brakfontein, the chairlift decline is operated from surface to 4 level, with landings on 2 and 3 levels roughly 90 m apart. The chairlift consists of a single section running the entire decline length, i.e. there is a single drive and tail section. The chairlift average gradient is less than 15°. The only steep section is from surface, prior to levelling at 1 level, where concrete steps line the footwall, to allow personnel to reach surface or 1 level, in the event of a chairlift failure. The chairlift is hangingwall mounted and overpasses exist at the various level stations (Figure 63).

Figure 63: Chairlift Decline and Level Station Overpass

Minxcon	Chairlift Decline and Level Station Overpass	Date: January 2013

Middelpunt Hill is serviced by a single decline shaft accommodating both a conveyor belt and men and material traveling way. Dedicated times for ore conveyance and men and material transport have been implemented to simplify logistics and promote safety underground. This does, however, cause some problems as the travel ways aren't wide enough for mining machinery to pass.

Portal

The Brakfontein portal is of a cut-and-cover design, and has been slightly offset from the main decline cluster to reduce the portal footprint area. It has also been excavated at a slightly higher elevation on the site layout to remain above the 1:100 year flood line.

Concentrators

There are two concentrators at Bokoni, namely the Merensky and UG2 Concentrators, located adjacent to the Vertical Shaft. These concentrators were upgraded in 2010 to increase their combined capacity to 165 ktpm. The Merensky unit was upgraded from 100 ktpm to 120 ktpm, whilst the UG2 counterpart was upgraded from 45 kptm to 60 ktpm. Since Merensky has started producing, 20% of the Merensky output was introduced into the UG2 supply to the UG2 concentrator.

The ore from the Merensky operations is delivered to the plant via an overland conveyor from the Vertical Shaft, and trucked from the Brakfontein decline with a fleet of 5 dump trucks (contractual agreement with Siswe Contractors). The demand in ore is a function of the depletion rate of the Merensky silo, and not the demand from the concentrator.

UG2 ore is trucked to the concentrator from Middelpunt Hill. Ore from the Twickenham operation also used to be fed to the UG2 concentrator, but this operation has been stopped. The UG2 concentrator plant has stockpiles and drying pads for blending capabilities. This is not ideal, as additional moisture in the UG2 ore can affect the efficiency of the concentrator plant. Additional steps would thus have to be taken to dry the ore, which will add unnecessary processing costs. The output material from the concentrators is trucked to the Amplats smelter at Polokwane for refinement.

Tailings Dams

Near each of the concentrators, there is a tailings dam for Merensky and UG2. The tailings dams are designed and operated as conventional upstream spigot dams. A series of catchment paddocks serve to collect polluted run-off and sediment from the side slopes and evaporate this water. The tailings dams are provided with under-drains which assist with dam stability.

Mine Equipment, Supplies and Storage

At Brakfontein, the general condition of the equipment and machines indicates regular maintenance. Satellite workshops at the other mining operation are set up for small to medium-size maintenance and repairs of mining equipment, as well as covered storage for spares and material stock.

Currently, the inventory for spares is managed through experience, whereby the procurement of spares is made according to knowledge of the equipment. Stores yards exist at both Brakfontein and Vertical shaft for the storage of bulk materials and spares as illustrated in Figure 64.

Figure 64: Stores Yard

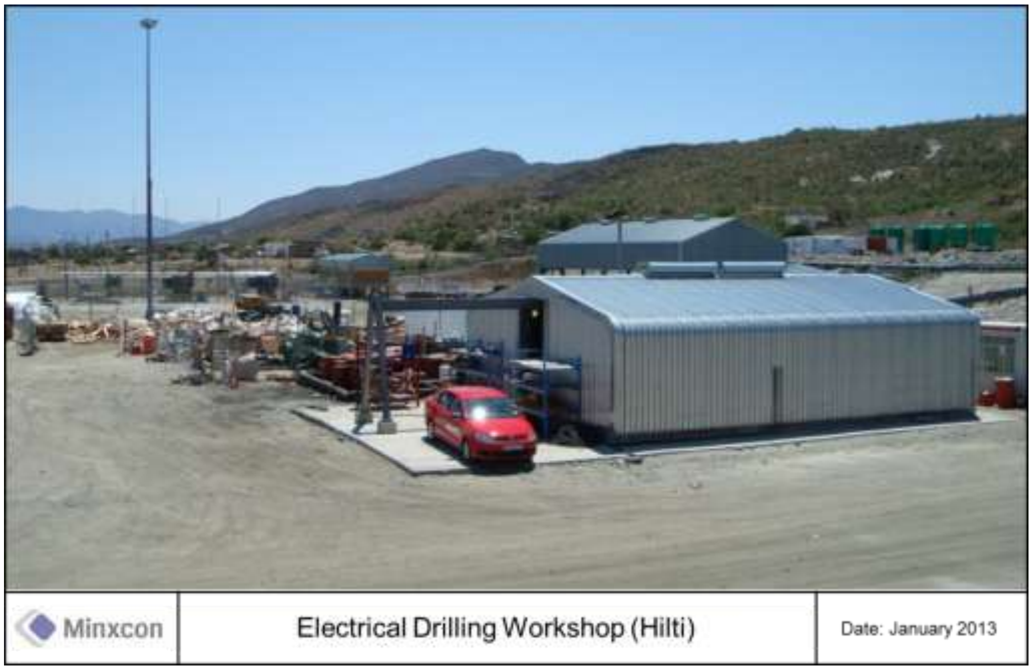
Workshops

Underground workshops at the Vertical Shaft and UM2 operation are rail-based. Each production level has a workshop.

At Brakfontein, there are no underground workshops. The first underground workshop is planned on 6 Level to cater for trackless equipment repairs. It will carry limited spares; essentially critical spares for breakdowns.

The Brakfontein mine operates with electric drills on a lease basis from Hilti. A fully equipped surface workshop has been established on site (Figure 65) to ensure quick servicing of the drills. A variety of essential spares from the supplier is kept in stock. The electric drilling operation is equipped with a 100% backup drill ratio, at the underground stores, to ensure sustained production.

Figure 65: Electric Drilling Workshop (Hilti)



The surface trackless workshop at Brakfontein is equipped with:-

- five trackless maintenance bays;
- tyre maintenance bay;
- 10-tonne overhead travelling crane;
- pressure cleaning bay;
- oil separation and grit traps; and
- spares and consumable stores for trackless machinery.

An inspection ramp and a brake ramp are also present on site. The trackless workshop is illustrated in Figure 66.

Figure 66: Trackless Workshop

This facility is suited for the current requirement which includes twenty-three trackless machines (Load Haul Dumpers (LHDs)), drill rigs and dump trucks). Underground satellite workshops or service bays may be required as mining develops further from the surface workshop. These offer a good solution as travelling costs can be reduced. The surface workshop is not fully enclosed, which will leave maintenance staff exposed to the weather.

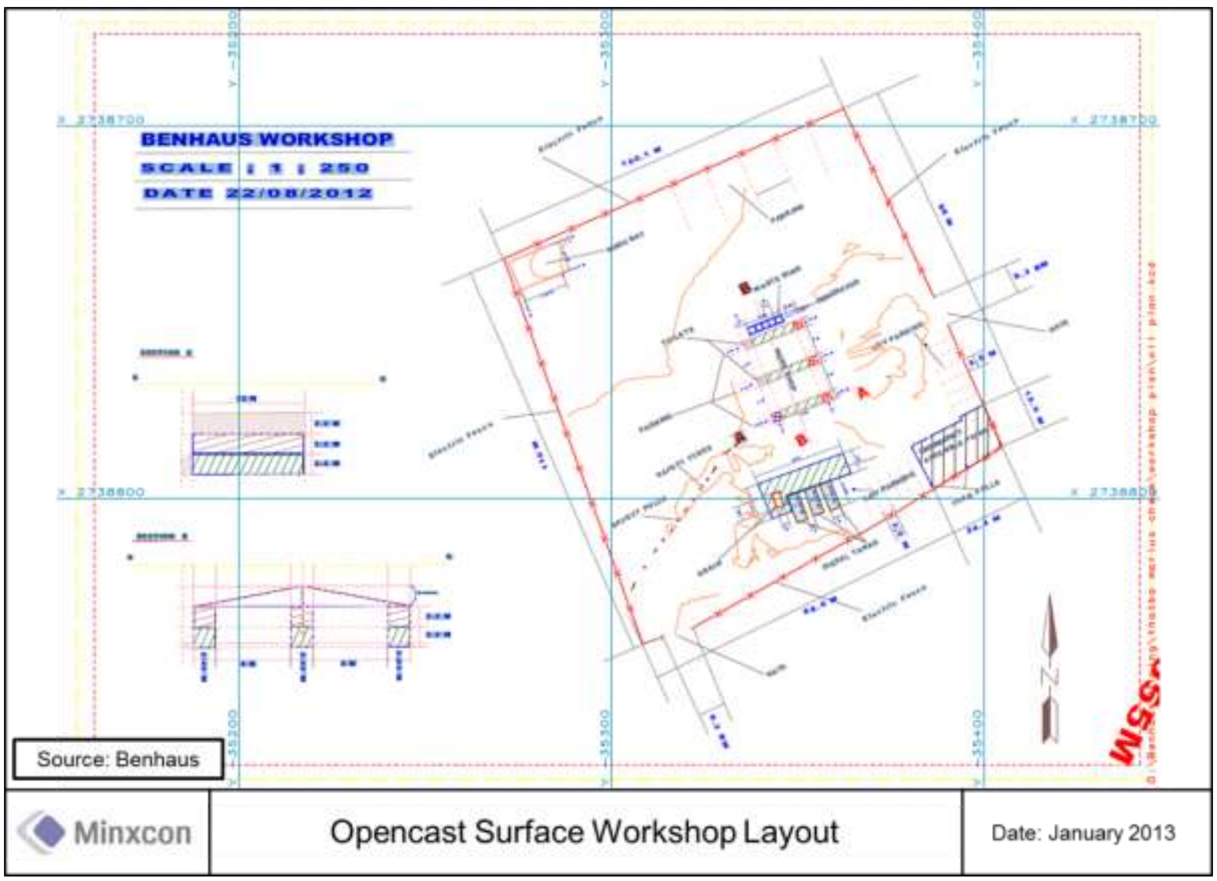
The new Klipfontein opencast operation will be mined on a contractual basis as agreed upon with the contractor, Benhaus.

A surface workshop will be established by the contractor adjacent to the opencast operation and will incorporate the following:-

- workshop;
- washbay;
- waste bins;
- diesel storage facility;
- security fence;
- parking; and
- power generation unit (300 kVA).

This workshop will be used for maintenance and servicing of the mining fleet and also to store any necessary spares. The basic workshop surface layout is illustrated in Figure 67.

Figure 67: Ga-Phasha Opencast Surface Workshop Layout



At all operations, there is the potential for hydro-carbon contamination. Diesel and oil drainage, oil separation systems and rain water collection should be controlled and maintained to minimise contamination of the surrounding environment.

Waste Removal

Waste removal of hazardous material and effluents from the operations is contracted to a company called Interwaste, and waste collection is done on a regular basis.

Item 18 (c) – SERVICES

Engineering Maintenance

Trackless mining takes place for underground development, and an effective maintenance programme is fundamental to meeting the planned production targets. At Brakfontein, cubbies are used for minor machine repairs. Fully-equipped surface workshops with multiple maintenance bays (Figure 68) can also be utilised for major services and/or repairs and scheduled machine overhauls.

Figure 68: Multiple Bays with EOT Crane

Minxcon | Multiple Maintenance Bays with Electrical Overhead Travelling Crane | Date: January 2013

The philosophy of entering into agreements with the Original Equipment Manufacturers ("OEM") for maintenance services needs to be continuously monitored against claimed repairs and/or damages. Any contract between the OEM and the mine necessitates consistent management, and the clear definition, inclusions and exclusions of what constitutes maintenance, wear and tear and all associated charges, as well as repair and replacement charges for damages need to be clearly stipulated and understood. This is fundamental in managing equipment running uninterruptedly and for monitoring ongoing maintenance costs.

The supply of fuel and lubrication should incorporate infrastructure, such as bunded areas and clearly marked tanks, for the decanting of fluids to the fleet of equipment. The removal of oil and other lubrication should be done in accordance with the applicable laws.

Ventilation

The ventilation infrastructure is based on reducing the underground work force for conventional mining, but to still cater for the hybrid mining method which requires sufficient ventilation for the operation of the trackless fleet, and also blast fumes. A ventilation balance is being undertaken to understand and rectify flow conditions throughout the mine, as the mine progresses. Ventilation doors have been installed to control the flow of air through the level stations of the various declines.

Figure 69: Ventilation Door and Access from Chairlift Decline to 3 Level

In addition, ventilation is to be sufficient to ensure a minimum of 15 m^3 for the raise lines (3 stopes).

Safety and Security

The Bokoni property and individual operations are guarded by security personnel from the Protection Department. There appears to be some form of access control pertaining to vehicles entering and exiting the property, thus reducing the potential for theft of Bokoni property. Light masts are present at the portals of the declines, allowing for illumination as required. Each shaft has a second egress, namely the ventilation shafts. The explosives yard is situated away from the operations, at a distance greater than 300 m (as per regulations) to the road and buildings. The yard is also fenced off.

Personnel is associated with three trade unions, namely the National Union of Mineworkers ("NUM"), Together Amalgamated Workers Union of South Africa ("Tawusa") and United Association of South Africa ("UASA"). In terms of the labour force and workers' unions, Bokoni is to receive a 48-hour notice period prior to the initiation of a strike, thus ensuring that safety measures for the operations, equipment and personnel can be activated.

Fire Protection and Security

Fire suppression systems are situated at the concentrators and at the Vertical Shaft. Feed tanks supply water via pipelines to fire hose reels via the main gravity reticulation system. At the Vertical Shaft, process water can be pumped into the hose reel system as a back-up. Substations are protected by CO_2 dry type fire extinguishers, positioned in key areas. At Brakfontein, nitrogen gas tanks are situated near the conveyors for fire suppression.

Communications

Landline, cellular and microwave communications are available at Bokoni.

Emergency Facilities

The operational clinic has five beds, and 25 staff members, including occupational therapists, radiologists and a pharmacist. At Brakfontein, the site layout is of such a nature that it provides easy access to all of the structures.

At Brakfontein, a series of refuge chambers exist at appropriate intervals between the conveyor and men/material declines. There are two entrances, thus allowing access from both declines.

Labour

The labour is split into three categories, namely mining (including equipment operators and material handling personnel), plant staff and central services. Contractors are also employed for specialised functions.

The working cycle consists of a 23-day production cycle, with one daily shift of eight hours, followed by a 'dead' shift of two hours for cleaning.

Recruitment and retrenchment of the workforce is the responsibility of the Human Resources Manager. Recruitment procedures are based on the policies of Amplats.

Mine Employees

The current staff complement is deemed stable and training programmes are in place for mining activities. Labour is split into categories, namely the main declines and ventilation/raw development, strike reef drives, raise/winze development and support services. The total number of personnel allocated to each of these activities is a function of mining equipment units in operation, number of stoping panels available, and support services required to supervise, control and support the mining operations.

The labour complement includes an additional 5.0% for leaves, and 9.5% for unavailable personnel and personnel away on training. This excludes senior mine management and shared service department staff.

Training

A training team is in place on the mine. The training of operators (and supervisors) to acceptable levels of competence is vital for the success of any mechanised operation and, therefore, it is imperative to implement training programmes.

Contractors

Contractors are present on site to drill the boreholes. Other contractors include service contractors for the mobile equipment. The service agreement requires a regular presence on the mine. The contractors are required to provide their own labour; skilled, as well as semi-skilled. No details are available on the contractors or amount of people employed by the contractor. The people to be employed by the contractor are largely skilled labour, with the ability to operate the equipment at the mine. An induction programme pertaining to safety or site-specific operational requirements is in place for all contractors. The new Ga-Phasha opencast operation will be mined on a contractual basis and all personnel will be subject to the Bokoni policies for contractors on site.

ITEM 19 – MARKET STUDIES AND CONTRACTS

Item 19 (a) – MARKET STUDIES AND COMMODITY MARKET ASSESSMENT

Global Economy Update

- The global economy has yet to shake off the fallout from the crisis of 2008-2009. Global growth dropped to almost 3% in 2012, which indicates that about a half a percentage point has been shaved off the long-term trend since the crisis emerged. This slowing trend will likely continue.
- Mature economies are still healing the scars of the 2008-2009 crisis. Unlike 2010 and 2011, emerging markets did not pick up the slack in 2012, and it is expected that they won't do so in 2013. Uncertainty across the regions – from the post-election "fiscal cliff" question in the U.S. to the Chinese leadership transition and reforms in the Euro Area – will continue to have global impacts in sluggish trade and tepid foreign direct investment.
- According to global economic research it is expected that global growth will build momentum over the next two years. Many of the larger developing nations have already implemented additional monetary and fiscal stimulus to maintain comparatively stronger growth trajectories in the absence of more robust conditions in the developed economies. It is believed that increased infrastructure spending will underpin demand for most commodities and keep prices at profitable levels.
- Global growth, however, remains comparatively soft and uneven heading into 2013. The developed nations are still stuck in the slow lane. Economic performances range from recession through much of Europe, to minimal growth in Japan and only moderate advances in Canada and the United States in 2013.
- The pace of growth in the developing countries is comparatively firmer. While activity is still relatively sluggish in Brazil, it is good in Mexico, India and South Korea and relatively solid in most of the other major Latin American and Asia-Pacific nations. Recent evidence suggests that China's economy is regaining momentum in response to renewed stimulus and improved domestic spending.
- In an environment where the major developed economies are underperformers, are savings-deficient, and have lower interest rates; their currencies will tend to have a weakening preference against many of the developing economies. The yen and euro are likely to underperform widely; whereas the USD is expected to underperform the Canadian and Australian dollars as well as the Scandinavian currencies, mainly on relative fiscal fundamentals, monetary policy and selective commodity price strength.
- Across the advanced economies, the Outlook predicts 1.3% growth in 2013, compared to 1.2% in 2012. The slight uptick is largely due to the Euro Area, which is expected to return to very slow growth of 0.2% after the -0.6% contraction in 2012. U.S. growth is expected to fall from 2.1% in 2012 to 1.8% in 2013.
- A more significant slowdown is expected for less mature economies over the next year – and beyond. Overall, growth in developing and emerging economies is projected to drop from 5.5% in 2012 to 4.7% in 2013, with growth falling in China from 7.8% to 6.9% and in India from 5.5% to 4.7%. From 2019-2025 emerging and developing countries are projected to grow at 3.3%.
- Global inflation remained nonthreatening during 2012, although marked increases in international grain prices and occasional upward pressures on the oil price had an adverse impact on the inflation trajectory. The large output gaps, contained rates of inflation and on-going fiscal consolidation in key over indebted nations provided room for monetary policy to remain accommodative in most parts of the world.

South African Economy – 2012 Review

As per the South African Reserve Bank Quarterly Bulletin December 2012 and Investec Bank:-

- In South Africa, economic activity suffered a setback in the third quarter of 2012 as the pace of growth in real gross domestic product more than halved to an annualised rate of 1.2%. This mainly reflected a pronounced contraction in the real output of the mining sector, which was severely impacted by prolonged and violent labour unrest at a major platinum mine. The unrest also spilled over to some other platinum mines, and to a number of gold, iron ore, coal and diamond mines, thereby weighing on production volumes.
- The lower growth rate also reflected a modest slowdown in agricultural production. By contrast, the real value added by manufacturing expanded in the third quarter of 2012, responding to an increase in domestic final demand and stronger exports in a number of manufacturing categories. Electricity production increased somewhat over the period, supported by a number of cold spells, higher exports to neighbouring countries, and the discontinuation of power buyback arrangements between Eskom and some of its industrial customers.
- Real gross domestic expenditure growth slackened notably in the third quarter of 2012, mainly reflecting a sharp slowdown in inventory accumulation. In turn this was largely brought about by the production disruptions noted above which resulted in producers, especially in the mining sector, having to fall back on inventories in order to satisfy demand. Growth in real domestic final demand, however, inched higher in the third quarter, led by government consumption which was temporarily boosted by the acquisition of military aircraft. Fixed capital spending also gained further momentum over the period.
- In the services sector real output growth decelerated in the third quarter as real value added lost momentum in most subsectors, impacted by factors such as a slowdown in household consumption expenditure and disruptions to road freight transport services due to industrial action. However, growth in real value added by general government and by the personal services subsector edged higher over the period.
- Consumer price inflation, having registered a recent low twelve-month rate of 4.9% in July 2012, regained momentum in the subsequent months, driven by the prices of petrol, electricity, education and food. Food inflation, which moderated in the first half of 2012, started accelerating again as international grain prices spiralled higher in the wake of climate-related setbacks to production.

Table 40: South African Economic Outlook for 2013

Economic Parameter	2012	2013
GDP (real, %)	2.50	3.00
Prime lending rate (%, year-end)	8.50	9.00
Current account (% GDP)	-5.60	-6.40
Current account (ZAR billion)	-179.80	-223.40
GBP/ZAR (average)	12.84	13.35
EUR/ZAR (average)	10.34	10.31
YEN/ZAR (average)	9.76	9.14
Budget deficit (% GDP)	-4.20	-4.20

Source: Investec Bank

2.1 Economic Parameters

According to South Africa's current economic policy, the New Growth Path, "the monetary policy stance will continue to target low and stable inflation but will do more to support a more competitive exchange rate and reduced investment costs through lower real interest rates. This will be accompanied by the measures proposed below to contain inflationary pressures and build competitiveness." Since the release of the New Growth Path in 2010, the differential between South Africa's repo rate and the CPI rate of inflation has fallen from 2.8% to -0.6 on a preference for low real interest rates.

According to Investec the year 2013 will see a new CPI inflation series for the South African Reserve Bank to base its monetary policy decisions and inflation targeting objectives on. With CPI inflation threatening to reach the upper limit of the 3-6% inflation band by year end, and exceed the target in 2013, the Reserve Bank's Monetary Policy Committee chose to leave interest rates unchanged in November 2012. However, as the new CPI series to be published by Statistics SA in 2013 meaningfully changes the weights of many of the prices of goods and services purchased by consumers, the inflation outcome for 2013 will likely differ to that expected under the current weighting system.

Table 41: Economic Outlook (Constant Money Terms)

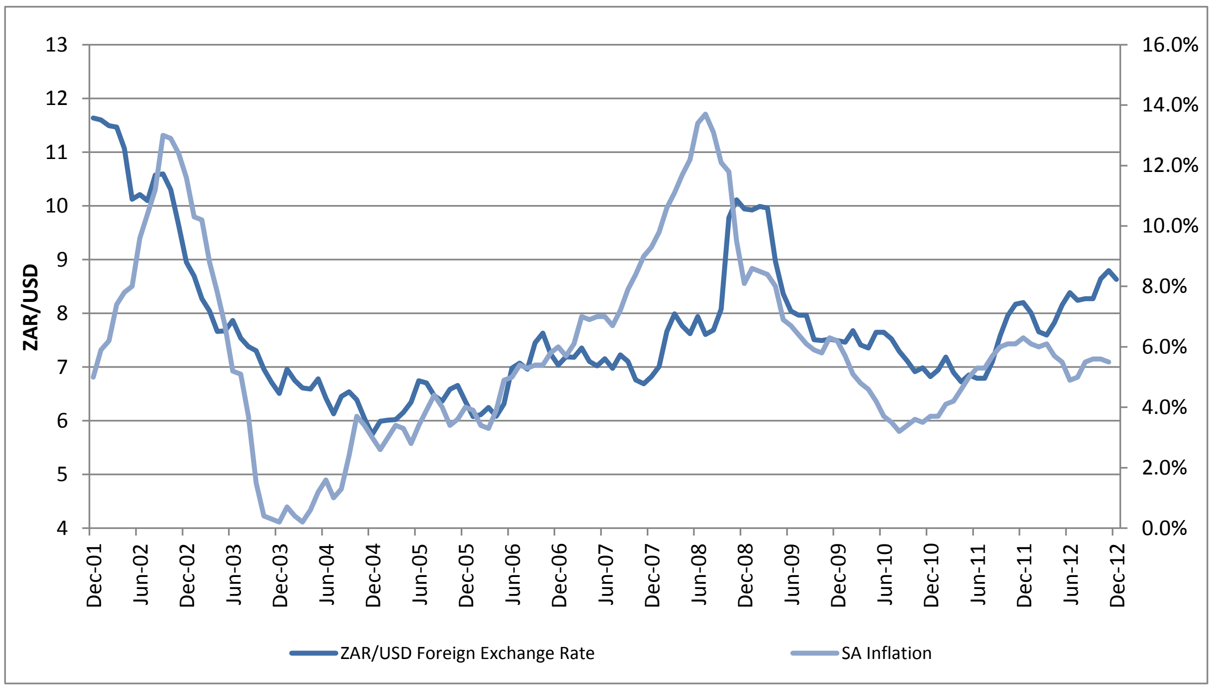
		2013	2014	2015	2016	2017
	Year	1	2	3	4	5
Exchange rate	ZAR/USD	8.37	8.55	8.74	8.93	8.75
Inflation rate	SA	5.50%	4.90%	4.60%	4.60%	4.60%
Inflation rate	US	1.94%	2.40%	2.40%	2.40%	2.50%

Source: Investec Bank (Dec 2012)

While the Rand has tracked back from ZAR8.97/USD and ZAR14.31/GBP, it is still well off levels experienced before the strike at Lonmin Platinum Mine in the Marikana area close to Rustenburg during August 2012. The strike in the platinum sector spread through the mining sector and entered the transport sector, threatening to spread to rail and port workers in 2012. Further strike action in 2013 and contagion into other sectors would result in a weakening trend of the Rand.

Rand weakness would intensify the cost of living in 2013. According to Investec the Rand is expected to continue to pull back towards ZAR8.00/USD, which is its estimated fair value, but not average ZAR8.00/USD as the overhang of the risk of further deterioration in the sovereign debt crisis in Europe leads to an added risk premium.

Figure 70: Historical ZAR/USD Exchange Rate and SA Inflation



Source: Minxcon

Platinum

According to Johnson Matthey (2012), the gross demand for platinum in the global autocatalyst sector was forecast to be 35,000 oz (1%) lower than in 2011, at 3.07 million ounces. Underlying this trend was a drop in the production of vehicles in Europe together with a slight decrease in the market share of diesel cars in that region. There was, however, increasing production at those manufacturers that still use platinum in three-way catalysts ("TWCs") and higher demand in heavy-duty diesel after treatment systems in other regions.

Growth in light-duty vehicle production in India is expected to moderate this year at about 6%, following several years of double-digit increases as high interest rates and sluggish GDP growth dampened consumer purchasing. In Mexico, production of light-duty diesel trucks for export is set to benefit from an uptick in sales in the US market, further boosting platinum demand.

Gross platinum jewellery demand worldwide was expected to increase by 10% to 2.73 million ounces in 2012 as a result of a strong performance from the Chinese market and growth in India. Platinum demand in the rest of the world was expected to show another strong year-on-year increase as the fast-growing Indian market continues to see expansion in jewellery manufacturing and retailing. There are now 550 authorised retailers of platinum in India, a number of which are large, regional department stores, all of which carry stock.

Table 42: Platinum Supply and Demand

'000 oz		2005	2006	2007	2008	2009	2010	2011	2012
Supply									
South Africa		5,115	5,295	5,070	4,515	4,635	4,635	4,855	4,250
Russia		890	920	915	805	785	825	835	790
North America		365	345	325	325	260	200	350	340
Zimbabwe		155	165	170	180	230	280	340	360
Others		115	105	120	115	115	110	100	100
Total Supply		**6,640**	**6,830**	**6,600**	**5,940**	**6,025**	**6,050**	**6,480**	**5,840**
Demand by Application									
Autocatalyst		3,795	3,905	4,145	3,655	2,185	3,075	3,105	3,070
Chemical		325	395	420	400	290	440	470	450
Electrical		360	360	255	230	190	230	230	200
Glass		360	405	470	315	10	385	555	225
Investment		15	-40	170	555	660	655	460	490
Jewellery*		2,465	2,195	2,110	2,060	2,810	2,420	2,480	2,725
Medical & Biomedical		250	250	230	245	250	230	230	240
Petroleum		170	180	205	240	210	170	210	200
Other		225	240	265	290	190	300	355	470
Total Gross Demand		**7,965**	**7,890**	**8,270**	**7,990**	**6,795**	**7,905**	**8,095**	**8,070**
Recycling									
Autocatalyst		-770	-860	-935	-1,130	-830	-1,085	-1,225	-1,035
Electrical		0	0	0	-5	-10	-10	-10	-10
Jewellery		-500	-555	-655	-695	-565	-735	-810	-785
Total Recycling		**-1,270**	**-1,415**	**-1,590**	**-1,830**	**-1,405**	**-1,830**	**-2,045**	**-1,830**
Total Net Demand		**6,695**	**6,475**	**6,680**	**6,160**	**5,390**	**6,075**	**6,050**	**6,240**
Movements in Stocks		**-55**	**355**	**-80**	**-220**	**635**	**-25**	**430**	**-400**

Source: Johnson Matthey

Platinum demand in industrial applications was expected to soften in 2012, by 13% to 1.79 million ounces, as a result of lower purchasing in glass manufacturing and in electrical devices. This decline will be offset to a degree by higher demand in non-road emissions control.

Investment demand for platinum was forecast to remain positive in 2012; new investment is expected to be 30,000 oz higher than in 2011, at 490,000 oz.

The large Japanese investment bar market reacted to type in the first nine months of 2012 – with the exception of January and August; there was disinvestment in a rising price environment and net investment during periods of falling prices. Investment outweighed liquidation overall, particularly in the second quarter of 2012. For the year as a whole, investment was to remain positive.

Platinum Outlook

According to Johnson Matthey the severe disruption to precious group metals ("PGM") mining in South Africa combined with firm demand has shifted the balance of the platinum market in 2012, turning the surplus which was forecasted into a significant deficit. In 2013, platinum demand is expected to hold up well but supplies might continue to be affected by labour disruption and its aftermath, as well as possible restructuring of the industry.

Supplies of platinum are unlikely to rise substantially in 2013. Depending on prices, supplies could be supplemented by substantial returns of metal to the market from open-loop recycling. Gross demand is expected to see modest growth overall, with a solid performance from autocatalyst and industrial applications.

Global supplies of platinum are forecast to remain subdued in 2013. The tense labour situation and the possible closure of marginal operations pose threats to supply, while those operations which have experienced illegal strikes are likely to take time to return to normal production levels.

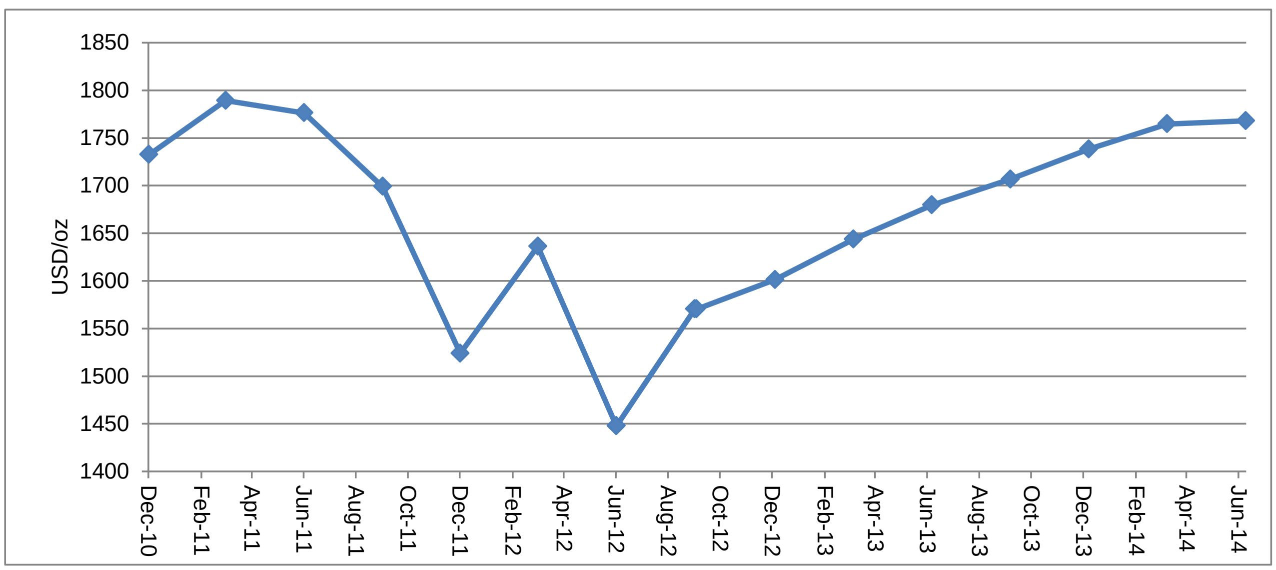
In the automotive sector, vehicle manufacturing in Europe in 2013 is forecast to see another difficult year. With the previously strong markets of France and Germany expected to experience low growth and Italy in recession, vehicle sales are likely to continue to be dampened, and there could be further erosion in the market share of diesel cars as consumers go for cheaper gasoline vehicles.

Prospects for industrial demand in 2013 are slightly improved on the previous year as return to higher purchasing in a number of applications characterised by cyclical demand is anticipated. The glass industry, after experiencing new buying being offset by returns from decommissioned plants, is expected to return to net growth. Demand for glass fibre in the construction sector is expected to drive growth in sales of platinum to manufacturing plants, particularly in Asia.

Current indications are that interest rates will remain at low levels in the major developed markets into 2013. This, together with the possibility that supply concerns could result in higher prices, leads to the view that physically-backed platinum investment demand will remain positive in the next six months, although the precise level of this demand will be determined by price volatility.

Platinum's price made a promising start in quarter one of 2012, but drifted lower in the months following, dragged down by a combination of perceived weak demand, oversupply, a falling gold price and macroeconomic anxiety surrounding the Eurozone. Reaching a low of USD1,391 on 25 July 2012, prices staged a swift and sudden recovery in mid-August on the back of labour disruption in South Africa. Supply concerns put the platinum price on a generally upwards trajectory throughout September, supported by a surge in speculative and physical investment interest.

Figure 71: Consensus Platinum Price Forecast (Nominal)



Source: Consensus Economics Inc. (Dec 2012)

Palladium

Gross demand for palladium in the autocatalyst sector was forecast to grow by 7% in 2012 and reached a record high of 6.48 million ounces. Use of palladium in exhaust after treatment is set to benefit from an acceleration of growth in vehicle production. Most of this growth will come from higher numbers of gasoline vehicles being manufactured for sale in the USA, Japan and China where palladium makes up the largest share of PGM in after-treatment systems. Continuing substitution of platinum with palladium in both light and heavy-duty diesel systems was anticipated to result in further demand growth in 2012.

Registrations of new vehicles were higher in each of the first eight months of 2012 compared with 2011, and locally-produced vehicles dominated the top-selling models. In this mainly gasoline market, palladium demand was predicted to rise in response, helping raise demand in the Rest of the World region as a whole by 30,000 oz to 1.37 million ounces.

Gross palladium jewellery demand was forecast to dampen by 11% in 2012 to 450,000 oz. This was expected to be mainly the result of lower purchasing by the jewellery trade in China, where palladium continues to suffer generally from a lack of positioning and effective marketing, as well as increasing competition from alternatives at similar price points.

Table 43: Palladium Supply and Demand

'000 oz		2005	2006	2007	2008	2009	2010	2011	2012
Supply									
South Africa		2,605	2,775	2,765	2,430	2,370	2,640	2,560	2,400
Russia									
Primary		3,135	3,220	3,050	2,700	2,675	2,720	2,705	2,600
Stock Sales		1,485	700	1,490	960	960	1,000	775	250
North America		910	985	990	910	755	590	900	890
Zimbabwe		125	135	135	140	180	220	265	280
Others		145	135	150	170	160	185	155	150
Total Supply		**8,405**	**7,950**	**8,580**	**7,310**	**7,100**	**7,355**	**7,360**	**6,570**
Demand by Application									
Autocatalyst		3,865	4,015	4,545	4,465	4,050	5,580	6,030	6,480
Chemical		415	440	375	350	325	370	455	530
Dental		815	620	630	625	635	595	550	540
Electrical		1,275	1,495	1,550	1,370	1,270	1,410	1,380	1,210
Investment		220	50	260	420	625	1,095	-565	385
Jewellery		1,490	1,140	950	985	775	595	505	450
Other		265	85	85	75	70	90	105	130
Total Gross Demand		**8,345**	**7,845**	**8,395**	**8,290**	**7,750**	**9,735**	**8,450**	**9,725**
Recycling									
Autocatalyst		-625	-805	-1,015	-1,140	-965	-1,310	-1,655	-1,525
Electrical		-305	-290	-315	-345	-395	-440	-480	-520
Jewellery		-60	-135	-235	-130	-70	-100	-210	-195
Total Recycling		**-990**	**-1,230**	**-1,565**	**-1,615**	**-1,430**	**-1,850**	**-2,345**	**-2,240**
Total Net Demand		**7,355**	**6,615**	**6,830**	**6,675**	**6,320**	**7,885**	**6,105**	**7,485**
Movements in stocks		**1,050**	**1,335**	**1,750**	**635**	**780**	**-530**	**1,255**	**-915**

Source: Johnson Matthey

Despite higher purchasing in the chemical sector and in the control of non-road emissions, softer sales to electrical applications were to dampen industrial demand for palladium by 70,000 oz (3%) to 2.41 million ounces in 2012. In electrical applications, palladium demand declined this year by 12% to 1.21 million ounces. The use of palladium in multi-layered ceramic capacitors destined for mass-market electronics has been declining for several years due to competition from cheaper base metal alternatives. A 950,000 oz swing in identifiable net physical investment demand for palladium was forecasted as the market returned to net positive investment in 2012 following heavy liquidation in 2011.

Total palladium exchange traded fund ("ETF") holdings continued to rise between late February and mid-May 2012 even as the price was on a downwards trend, in contrast to platinum holdings which fell generally along with the price during this time. The divergence of investor sentiment towards the two metals may be explained by the fundamental picture for palladium still looking strong, together with lower prices than in 2011 representing a buying opportunity. Cumulative investment volumes reached the highest since September 2011 in early June before experiencing light selling as the price fell towards a nine-month low in late July.

As PGM prices tracked upwards in response to supply disruptions in South Africa in the second half of August and into September 2012, there was initially net investment. This soon gave way to a sell-off that took cumulative holdings back to their level of six months prior, of just over two million ounces, considerably down on the record level in early 2011 of more than 2.4 million ounces. The behaviour of investors in the palladium ETF market contrasted with that in platinum ETFs, which reached record holdings in September, perhaps reflecting investors seeking exposure to the upside brought about by disruption in South Africa.

Palladium Outlook

According to Johnson Matthey, supplies of palladium are expected to fall in 2013 with lower output from Russia and the diminishing likelihood of significantly higher output from South Africa. Johnson Matthey forecasts another year of solid autocatalyst and industrial demand, and higher returns from end-of-life vehicle recycling.

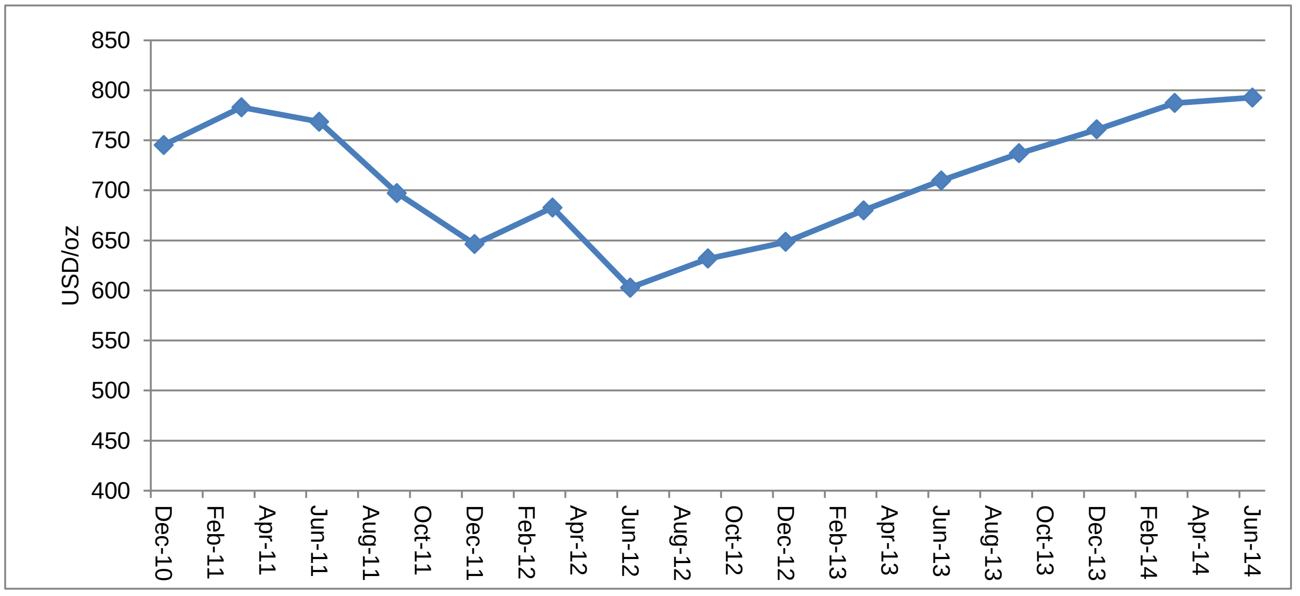
Recent declining Russian output together with a slow ramp-up following disruption in South Africa, and continuing threats to the commercial viability of certain operations in that country, leads to the forecast that global supplies of palladium will fall in 2013. Higher recovery of the metal from autocatalyst recycling in 2013 is anticipated, helping to provide a useful secondary source of palladium which will supplement falling primary supplies.

Growth in industrial demand for palladium is expected to be driven by the expansion of chemical manufacturing capacity, particularly in Asia, to meet growing demand for consumer products. Palladium use, however, is forecast to soften in applications where it faces long-term competition from cheaper alternatives, particularly in the electrical and dental sectors.

Gross palladium purchasing by the jewellery sector is likely to be robust in Europe and North America where it has become popular in men's jewellery. In China, it is likely to continue to see diminishing demand as it struggles in the face of competition from alternative metals targeted at similar price points in the market, including low-fineness white gold alloys.

The palladium price followed a broadly similar course to that of platinum in the first nine months of 2012. Like platinum, the average palladium price was more subdued than in the equivalent period in 2011 as a positive start to the year gave way to risk aversion and concerns about industrial demand. Palladium was briefly lifted by supply-side concerns during August and into September.

Figure 72: Consensus Palladium Price Forecast (Nominal)



Source: Consensus Economics Inc. (Dec 2012)

Rhodium

Gross demand for rhodium was forecast to strengthen in 2012 as a result of higher purchasing by the autocatalyst sector, a rise in physical investment demand and higher sales to the chemical industry. A fall in mined output of rhodium, together with lower volumes recovered from autocatalyst scrap, was predicted to push the market into a 43,000 oz deficit, the first for five years.

Supplies of rhodium were forecast to fall by 62,000 oz (8%) to 703,000 oz in 2012 as a result of reduced mine output in South Africa caused by labour stoppages and mine closures. Sales of refined rhodium from the other producing regions remained roughly flat. Lower volumes of rhodium being recovered from spent auto catalysts together with growth in gross demand are predicted to move the rhodium market into a deficit for the first time since 2007.

Table 44: Rhodium Supply and Demand

'000 oz		2005	2006	2007	2008	2009	2010	2011	2012
Supply									
South Africa		627	666	696	574	663	632	641	580
Russia		90	100	90	85	70	70	72	70
North America		20	17	20	18	15	10	20	21
Zimbabwe		13	14	14	15	19	19	29	30
Others		4	5	4	3	3	3	3	2
Total Supply		**754**	**802**	**824**	**695**	**770**	**734**	**712**	**703**
Demand by Application									
Autocatalyst		829	863	887	768	619	727	712	778
Chemical		48	49	63	68	54	67	72	84
Electrical		10	9	3	3	3	4	5	6
Glass		57	65	59	34	19	68	78	37
Other		20	23	24	24	21	21	39	68
Total Gross Demand		**964**	**1,009**	**1,036**	**897**	**716**	**887**	**906**	**973**
Recycling									
Autocatalyst		-137	-171	-192	-227	-187	-241	-280	-227
Total Recycling		**-137**	**-171**	**-192**	**-227**	**-187**	**-241**	**-280**	**-227**
Total Net Demand		**827**	**838**	**844**	**670**	**529**	**646**	**626**	**746**
Movements in Stocks		**-73**	**-36**	**-20**	**25**	**241**	**88**	**139**	**-43**

Source: Johnson Matthey

Rhodium Outlook

According to Johnson Matthey, supplies of rhodium will depend on the performance of South African producers in 2013. Rhodium demand and autocatalyst recycling are forecast to rise.

With near-flat output expected in all other producing regions, decisions on the future of platinum mining operations in South Africa will impact the shape of the rhodium market next year. We anticipate a return to growth in rhodium recycling in line with higher throughput of end-of-life vehicles from collectors.

On the demand side, modestly higher purchasing of rhodium for use principally in gasoline autocatalysts are anticipated. There may be a softening of purchases of rhodium by Japanese manufacturers as vehicle production moderates from the exceptional growth seen during 2012.

Sales of rhodium for industrial applications have the potential to increase in 2013 due to the changing dynamics of cyclical demand areas. If expansion of liquid crystal display glass manufacturing capacity continues as projected, while the pace of returns of old platinum-rhodium fabrications slows down, demand for rhodium will rise in 2013.

In physical investment, the growth during 2011 and 2012, it is anticipated that 2013 will be another year of positive demand, supported by low interest rates and perceptions of a tighter market.

The Market Studies were compiled by the Qualified Person, in compliance with the definitions and guidelines for the reporting of Exploration Information, Mineral Resources and Mineral Reserves in Canada, "the CIM Standards on Mineral Resources and Reserves – Definitions and Guidelines" and in accordance with the Rules and Policies of the National Instrument 43-101 – Standards of Disclosure for Mineral Projects, Form 43-101F1 and Companion Policy 43-101CP.

Item 19 (b) – CONTRACTS

Atlatsa has an agreement with Amplats to send float concentrate from the mine to the nearby Amplats smelter at Polokwane and refinery in Rustenburg. The refinery has a turnaround time of approximately 9 weeks. Payability of the different metals which takes into consideration the "toll costs of refining" is shown in the table below.

Table 45: Expected Payability of Commodities

Commodity	Payability
Platinum	86%
Palladium	86%
Rhodium	86%
Gold	86%
Iridium	55%
Ruthenium	55%
Nickel	75%
Copper	70%
Cobalt	35%

The payability terms are within industry norms for junior companies treating concentrate at refineries.

ITEM 20 – ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

Item 20 (a) – Relevant Environmental Issues and Results of Studies Done

Environmental Liabilities

Eight environmental authorisations have been approved for Richtrau No. 177 (Pty) Ltd's Lebowa Platinum Mines Limited ("LPM") now Bokoni Mine, by the Department of Minerals and Energy ("DME") Reference 6/2/2/318, since 1998. These eight authorisations covered various components and activities of the mine as it developed, and the report prepared by J9 Environmental Consultant CC, dated June 2009, is a consolidation of these documents into one environmental impact assessment report ("EIAR") and environmental management programme ("EMP").

In addition to consolidating the reports, the significant specialist studies were also updated, including surface water, groundwater, air quality, noise and archaeology. New specialist studies that were deemed crucial and had not been undertaken previously, included in the latest report, are a stormwater management plan and bio-monitoring assessment. No information has been received for the studies at Ga-Pasha.

Environmental Financial Liabilities

Environmental liability provisioning in the South African mining industry is a requirement of the MPRDA and must be agreed to with the relevant regulatory authorities (mainly the DMR and the Department of Water Affairs ("DWA"). For existing mines such as the Bokoni Mine operations, monies are accrued based on the estimated environmental rehabilitation costs, should the mine have to close, and over the operating life of a mine. Contributions are made to an environmental trust fund in this regard, which is approved by the South African Revenue Service.

Digby Wells Environmental ("Digby Wells") was appointed by Bokoni to update their environmental liability estimate at their Bokoni operations. Closure liability costs in their September 2011 Report were calculated by means of both the Department of Mineral Resources' ("DMR's") standard method for assessment of mine closure and the Digby Wells method of calculation. This has resulted in two separate closure liability costs for each of the mines. The total cost of the environmental liability, according to Digby Wells' rates is ZAR136,087,890.01. Currently, the most significant environmental liabilities that have been identified at Bokoni Mine are dust generation from the tailings dams and seepage of contaminated water from the settling dams.

The consolidated Merensky tailings dam at the Bokoni Mine has been identified as a major source of dust in this relatively arid area. At present, some remedial steps have been undertaken to allay the dust and these include partial vegetation of the slopes of the dam as well as constructing wind-screens on the top of the dam. Both are considered inadequate and in the longer term as legislation becomes stricter it is expected that the slopes and top of the tailings dams will have to be clad with rock and/or adequately vegetated.

Initial shallow underground mining at the Bokoni Mine intersected both weathered and fractured overlying aquifers and there is an on-going seepage of ground water into the workings from the Rapholo River. In addition, water from the decant water catchment dam below the tailings dam also seeps into the workings. Total ingress is in the order of 11,000 cubic metres per day. Subsequently there is on-going pumping of a significant amount of water out of the mines and into surface settling dams.

Item 20 (b) – Waste Disposal, Site Monitoring and Water Management

A water licence No. 24013835 was issued on 24/10/2008 which is valid for a period of 30 (thirty) years and will be reviewed every 5 (five) years. Waste removal of hazardous material and effluents from the operations is contracted to a company called Interwaste, and waste collection is done on a regular basis.

Environmental Groundwater Solutions CC, Groundwater Monitoring Services CC and ERM undertook various groundwater investigations at the mine since 2001. During 2008 and 2009, this work was reviewed by ERM, consolidated and updated to develop a conceptual and numerical hydrogeological model and groundwater management plan for the mine.

All relevant hydrogeological, water quality, leach characteristics (tailings material) and water balance (discharge, infiltration, storage) information, collected from the various reports and sources, were collated in a master data file. This information was used in the groundwater resource assessment, refinement of the conceptual model and as input parameters for the numerical model. Following the data collation and identification of data gaps, limited intrusive investigations were carried out and include the following:

- A borehole audit and hydrocensus;
- Drilling of shallow monitoring wells in the Rapholo River;
- Surface geophysical investigation;
- Drilling of additional groundwater monitoring boreholes; and
- Groundwater monitoring and environmental isotope sampling.

Item 20 (c) - Permit Requirements

The following licences/permits are still pending:-

- The surface lease for Umkoanesstad is still pending.
- Atlatsa will not apply for a surface lease for the Avoca farm. Currently, no surface infrastructure will be required at Avoca, due to the depth of mineralisation below surface on the Avoca property no mining will take place in the near future on this property. The surface lease for Umkoanesstad is still pending.
- A section 102 application to the DMR to incorporate Klipfontein and Avoca into the existing Bokoni Mining Right was submitted. As part of the application, an amended Mine Works Program ("MWP"), Environmental Management Program (EMP") and Social and Labour Plan ("SLP") were submitted for approval. The MWP and EMP include the opencast mining intended at Klipfontein.
- For other permits refer to Item 4 (g).

Item 20 (d) – Social and Community-Related Requirements

According to the Environmental Impact Assessment Reports, it is clear that the cumulative impacts from other land use options would have resulted in much higher negative pre and post-mitigation than mine development. Current cumulative socio-economic impacts leading to increased local, municipal and regional economic growth and social upliftment are of high positive impact significance. These impacts can be enhanced and managed in such a way as to increase in positive levels throughout the life of the operation.

A section 102 application to the DMR to incorporate Klipfontein and Avoca into the existing Bokoni Mining Right was submitted. As part of the application, an amended Mine Works Program ("MWP"), Environmental Management Program (EMP") and Social and Labour Plan ("SLP") were submitted for approval in May and June of 2012.

Archaeological/Heritage Sites

The Bokoni property does not contain any heritage sites or ancestral burial sites. Archaeological sites have been documented.

Item 20 (e) – Mine Closure Costs and Requirements

Minxcon was provided with documentation to the guarantee letter from Amplats for 2011, and workings supporting the calculation of the Anglo guarantee of ZAR87,027,110.

Also included was the Standard Bank statement indicating the balance of the environmental investment (ZAR27.7 million) as at 31.12.2012.

The Environmental Management Program includes a detailed 'Environmental Closure Assessment' detailing all areas of environmental liability. It is understood that Atlatsa will ensure that the Rehabilitation Trustfund is funded to cover the total environmental liability on closure of operations.

ITEM 21 – CAPITAL AND OPERATING COSTS

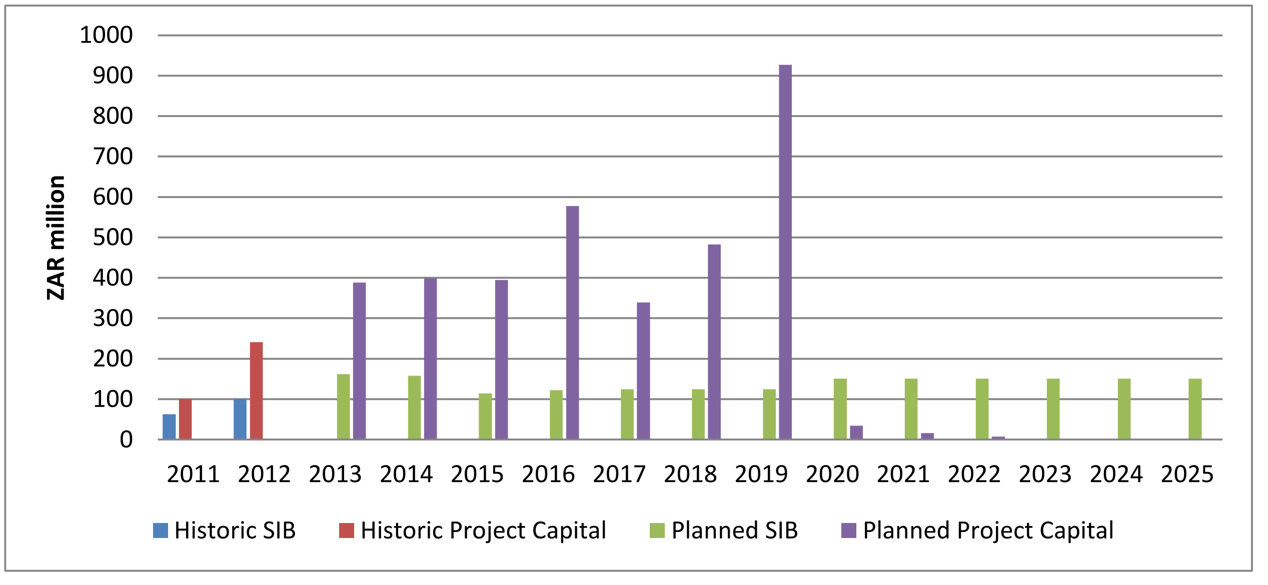
Item 21 (a) – CAPITAL COSTS

The capital expenditure of Bokoni Mine consists of on-mine project capital and on-mine stay in business ("SIB") capital and off-mine stay in business ("SIB") capital for the mine, plant and other infrastructure. On-mine capital refers to mining capital and off-mine capital refers to plant capital. All capital figures detailed are in 2013 real monetary terms.

Detailed capital planning was done per shaft and per concentrator. Infrastructure, services and equipment needed were planned per area or level. No contingencies on the capital were included in the financial model.

Figure 73 displays the capital expenditure until 2025. The high planned project capital from 2016 until 2019 is due to the planned construction of the new UG2 concentrator.

Figure 73: Historical and Planned Capital



Basis of Estimation

Bokoni Capital Summary

A summary of the capital costs are displayed in Table 46, together with a breakdown for the first ten years. Other infrastructure includes the capital expenditure planned for central services, which is based on the budget plan as received from Bokoni.

Table 46: Capex Summary ZAR million

Division	LOM	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mining	1,742	371	344	322	290	204	92	79	26	8	7
Plant	1,731	3	40	60	280	127	382	839	-	-	-
Other Infrastructure	90	15	14	13	8	8	8	8	8	8	-
Mining (SIB)	2,835	119	117	89	87	87	87	87	87	87	87
Plant (SIB)	1,459	17	19	13	23	26	26	26	51	51	51
Other (SIB)	417	25	22	13	13	13	13	13	13	13	13
Total	**8,274**	**550**	**556**	**510**	**701**	**465**	**608**	**1,052**	**185**	**167**	**158**

Processing Capital Costs

Provision was made in the financial model throughout the life of mine for each of the plants for renewal and replacement capital (stay in business capital).

Item 21 (b) – Operating Cost

Basis of Estimate

The operating cost is based on the production planned according to the mining plan. The shaft head cost (direct on-mine cash costs) of Bokoni will be detailed in this section. All shaft head cost figures are in 2013 real monetary terms. The cost components that make up the shaft head cost and the average planned LoM unit cost are labour, contractors, stores, utilities and sundries.

The cost components described above were broken down into fixed and variable costs. The fixed costs are based on a fixed amount throughout the year, which is independent on the production and shown as a ZAR input while the variable cost is directly dependant on the tonnes milled (ZAR/tonne milled). The split between the fixed and variable components were provided by Bokoni and verified by Minxcon for each of the operations and is described as percentages of the total operating cost in the table below.

Table 47: Costs Split between Fixed and Variable

Commodity	UM2	Brakfontein	Vertical	Middelpunt	Open Cast	Central
Fixed						
Labour	50%	50%	50%	50%		95%
Contractors	30%	30%	30%	30%	30%	90%
Stores	85%	85%	85%	85%	85%	100%
Utilities	50%	50%	50%	50%		100%
Sundries	90%	90%	90%	90%		95%
Variable						
Labour	50%	50%	50%	50%		5%
Contractors	70%	70%	70%	70%	70%	10%
Stores	15%	15%	15%	15%	15%	0%
Utilities	50%	50%	50%	50%		0%
Sundries	10%	10%	10%	10%		5%

The shaft head cost for Bokoni as illustrated in Figure 74 includes both historic, year to date ("YTD") and LoM planned costs. For the 2012 annual costs, the first 9 months were annualised to exclude the impact of the strike. The average planned shaft head cost over the LoM is ZAR710/tonne milled.

Figure 74: Bokoni Mine - Shaft Head Cost (2012 Real Terms)

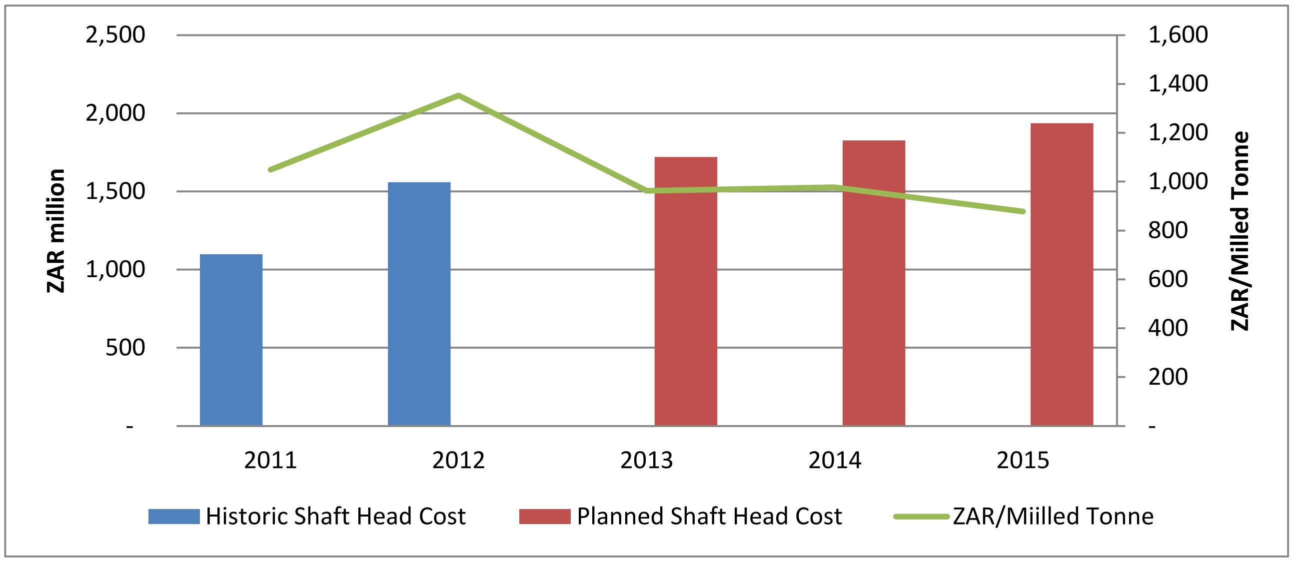


Figure 74, it is evident that the planned shaft head cost starts off higher than the actual YTD forecast cost and then increases for the next two years. The reason for the increase from 2012 to 2013 is the inclusion of the opencast costs from 2013. The following years' increases are due to the fact that Brakfontein and Middelpunt will increase their number of employees for the next two years as the production schedule builds up. An estimated total of 771 employees extra will be allocated to the two shafts. The resultant economies of scale and the start-up of the opencast has a positive impact on unit costs

Another factor contributing to the increase in prices is the increase in the ESKOM power costs of 16% per annum for the next five years that was also taken into consideration.

Labour makes up the majority of the shaft head cost followed by stores, contractors, sundries and utilities. The shaft head cost, broken down into the different components used to calculate the shaft head cost, is detailed in Table 48 as percentages of the total shaft head cost.

Table 48: Shaft Head Cost Breakdown (2011 Real Terms)

Description of Components	LoM Average
Labour	46.05%
Contractors	12.79%
Stores	24.43%
Utilities	6.02%
Sundries	10.72%
Shaft Head Cost	**100.00%**

Basis of Estimate

Bokoni Head Cost

A summary of the operating costs are displayed in Table 49. Other costs include the central services.

Table 49: Operating Cost Summary

Net Turnover	**ZAR/Milled tonne**	**1,743**
Mine Cost	ZAR/Milled tonne	710
Plant Costs	ZAR/Milled tonne	186
Cash Operating Costs	**ZAR/Milled tonne**	**895**
Royalties	ZAR/Milled tonne	71
Total Cash Costs	**ZAR/Milled tonne**	**966**
Other Costs	ZAR/Milled tonne	149
Total Production Costs	**ZAR/Milled tonne**	**1,115**
EBITDA	ZAR/Milled tonne	628
Capex	ZAR/Milled tonne	120
Notional Cost	**ZAR/Milled tonne**	**1236**
EBITDA Margin	%	36%
NCE Margin	**%**	**29.11%**
Platinum Equivalent	oz	7,332,706
Notional Cost	**USD/ Platinum oz.**	**1269**
Palladium Equivalent	oz	16,374,179
Notional Cost	**USD/ Palladium oz.**	**568**

Processing Operating Costs

The following section details the historic operating costs ("opex") for the Merensky and UG2 plants at Bokoni for 2012. In the months where zero tonnes were processed, the unit costs (ZAR/t) are shown as zero. In this section the opex costs are presented as follows:

- Merensky plant (Table 50);
- UG2 plant (Table 51);
- shared costs (Table 52); and
- total processing opex (Table 53).

Table 50: Merensky Operating Costs (January to December 2012)

Item	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Opex (ZAR'000)												
Total labour	626.68	652.91	461.73	565.17	574.61	570.30	646.11	688.07	602.90	366.60	408.05	682.13
Stores	2,186.37	2,959.05	2,821.92	3,697.65	2,301.51	2,478.85	2,835.44	3,011.64	3,630.27	553.66	1,064.62	1,954.44
Utilities	1,332.66	1,361.46	1,498.77	1,711.72	1,709.03	3,153.12	3,201.57	3,313.78	2,032.73	642.05	193.51	425.62
Contractors	78.31	62.64	116.36	54.81	-	46.27	47.26	56.05	(14.98)	54.37	6.04	-
Group Centralised Costs	83.36	73.65	101.06	96.34	119.49	119.06	96.48	99.80	111.69	17.54	(3.92)	12.63
Sundries	910.10	299.81	941.22	1,223.95	2,226.86	1,443.41	1,609.81	1,415.08	1,386.96	568.18	591.74	768.27
Process Materials	310.69	948.46	547.93	736.41	556.29	426.19	1,005.11	1,369.36	2,184.66	97.17	918.31	812.99
Chemical Materials	236.28	199.81	229.04	211.31	292.68	362.50	268.90	144.99	238.12	-	-	-
Total Opex	**5,764.46**	**6,557.79**	**6,718.03**	**8,297.35**	**7,780.46**	**8,599.71**	**9,710.67**	**10,098.77**	**10,172.36**	**2,299.56**	**3,178.34**	**4,656.08**
Feed Tonnes (tonnes)	49,395.23	47,888.24	63,642.33	57,406.00	65,875.05	72,103.07	65,109.66	68,065.65	71,980.46	1,101.45	-	5,217.45
Opex (ZAR/t)												
Total Labour	12.69	13.63	7.26	9.85	8.72	7.91	9.92	10.11	8.38	332.83	-	130.74
Stores	44.26	61.79	44.34	64.41	34.94	34.38	43.55	44.25	50.43	502.66	-	374.60
Utilities	26.98	28.43	23.55	29.82	25.94	43.73	49.17	48.68	28.24	582.91	-	81.58
Contractors	1.59	1.31	1.83	0.95	-	0.64	0.73	0.82	(0.21)	49.36	-	-
Group Centralised Costs	1.69	1.54	1.59	1.68	1.81	1.65	1.48	1.47	1.55	15.93	-	2.42
Sundries	18.42	6.26	14.79	21.32	33.80	20.02	24.72	20.79	19.27	515.84	-	147.25
Process Materials	6.29	19.81	8.61	12.83	8.44	5.91	15.44	20.12	30.35	88.22	-	155.82
Chemical Materials	4.78	4.17	3.60	3.68	4.44	5.03	4.13	2.13	3.31	-	-	-
Total Opex	**116.70**	**136.94**	**105.56**	**144.54**	**118.11**	**119.27**	**149.14**	**148.37**	**141.32**	**2,087.76**	**-**	**892.40**

Source: Bokoni

Before October 2012, the Merensky unit costs varied between ZAR105 and ZAR150 per tonne as a result of monthly variations in stores costs.

Table 51: UG2 Operating Costs (January to December 2012)

Item	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Opex (ZAR'000)												
Total Labour	368.01	422.03	748.75	482.55	498.41	533.70	539.18	554.92	543.69	326.38	361.89	549.39
Stores	1,672.80	1,601.35	1,767.65	1,549.44	2,665.98	2,047.27	1,943.14	2,190.51	1,972.78	203.85	545.28	1,794.55
Utilities	784.86	802.58	905.90	956.56	1,030.74	1,544.40	2,236.73	1,920.73	1,135.95	192.41	82.31	144.11
Contractors	23.43	24.00	24.00	(0.23)	24.00	23.66	-	24.00	49.00	-	-	-
Group Centralised Costs	8.47	39.35	86.43	42.18	69.41	50.84	75.62	58.27	62.25	32.61	(28.14)	-
Sundries	1,802.47	2,203.49	1,820.07	1,957.11	1,906.04	2,902.16	2,166.50	2,258.24	1,821.99	1,064.25	1,357.27	905.31
Process Materials	844.37	239.17	318.52	646.58	1,094.73	631.67	470.93	911.53	530.22	(2.74)	111.28	514.60
Chemical Materials	138.07	123.36	160.73	128.99	139.27	248.41	436.36	347.36	378.83	57.12	-	-
Total Opex	**5,642.48**	**5,455.33**	**5,832.04**	**5,763.19**	**7,428.57**	**7,982.10**	**7,868.47**	**8,265.56**	**6,494.71**	**1,873.86**	**2,429.88**	**3,907.97**
Feed Tonnes (tonnes)	26,414.35	24,906.21	30,808.48	29,378.40	37,949.78	26,863.28	43,773.85	39,701.41	36,096.49	-	-	-
Opex (ZAR/t)												
Total Labour	13.93	16.94	24.30	16.43	13.13	19.87	12.32	13.98	15.06	-	-	-
Stores	63.33	64.30	57.38	52.74	70.25	76.21	44.39	55.17	54.65	-	-	-
Utilities	29.71	32.22	29.40	32.56	27.16	57.49	51.10	48.38	31.47	-	-	-
Contractors	0.89	0.96	0.78	(0.01)	0.63	0.88	-	0.60	1.36	-	-	-
Group Centralised Costs	0.32	1.58	2.81	1.44	1.83	1.89	1.73	1.47	1.72	-	-	-
Sundries	68.24	88.47	59.08	66.62	50.23	108.03	49.49	56.88	50.48	-	-	-
Process Materials	31.97	9.60	10.34	22.01	28.85	23.51	10.76	22.96	14.69	-	-	-
Chemical Materials	5.23	4.95	5.22	4.39	3.67	9.25	9.97	8.75	10.49	-	-	-
Total Opex	**213.61**	**219.04**	**189.30**	**196.17**	**195.75**	**297.14**	**179.75**	**208.19**	**179.93**	**-**	**-**	**-**

***Source*:** Bokoni

The UG2 plant opex unit costs are higher because of the low tonnages. The UG2 unit costs were mostly stable at about ZAR200 per tonne, except in June 2012 where ZAR297.14 was recorded. The higher opex in June was mainly due to increased sundries and utility costs.

The shared operating costs detailed in Table 52 are made up of administrative and overhead costs required for the operating of both plants.

Table 52: Shared Process Operating Costs (January to December 2012)

Item	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Opex (ZAR'000)												
Total labour	2,050.84	1,932.61	2,031.26	2,233.14	2,101.20	1,880.10	2,190.62	2,538.55	2,805.51	2,230.14	2,153.03	2,168.23
Stores	34.73	52.85	90.57	73.74	205.74	301.02	134.10	139.22	49.61	38.51	-	129.34
Sundries	632.01	(795.53)	1,054.53	983.73	628.27	1,780.75	1,041.35	762.60	1,998.05	1,233.28	256.72	238.87
Total Opex	**2,717.58**	**1,189.93**	**3,176.36**	**3,290.61**	**2,935.20**	**3,961.87**	**3,366.06**	**3,440.36**	**4,853.18**	**3,501.92**	**2,409.75**	**2,536.44**

***Source*:** Bokoni

Table 53: Total Process Operating Costs (January to December 2012)

Item	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Opex (ZAR'000)												
Total Labour	3,045.53	3,007.55	3,241.74	3,280.85	3,174.22	2,984.09	3,375.91	3,781.54	3,952.11	2,923.11	2,922.97	3,399.75
Stores	3,893.90	4,613.26	4,680.14	5,320.82	5,173.23	4,827.13	4,912.68	5,341.37	5,652.66	796.01	1,609.90	3,878.33
Utilities	2,117.53	2,164.04	2,404.67	2,668.29	2,739.77	4,697.52	5,438.30	5,234.50	3,168.69	834.45	275.82	569.73
Contractors	101.74	86.64	140.36	54.58	24.00	69.93	47.26	80.05	34.02	54.37	6.04	-
Group Centralised Costs	91.83	113.00	187.49	138.52	188.89	169.90	172.10	158.07	173.94	50.15	(32.06)	12.63
Sundries	3,344.58	1,707.77	3,815.82	4,164.80	4,761.16	6,126.33	4,817.65	4,435.91	5,207.00	2,865.71	2,205.73	1,912.45
Process Materials	1,155.06	1,187.63	866.45	1,382.99	1,651.01	1,057.86	1,476.04	2,280.89	2,714.89	94.43	1,029.59	1,327.60
Chemical Materials	374.35	323.17	389.76	340.30	431.94	610.91	705.26	492.35	616.95	57.12	-	-
Total Opex	**14,124.52**	**13,203.05**	**15,726.43**	**17,351.14**	**18,144.23**	**20,543.68**	**20,945.20**	**21,804.69**	**21,520.25**	**7,675.35**	**8,017.98**	**11,100.48**
Feed Tonnes (tonnes)	75,809.59	72,794.45	94,450.81	86,784.40	103,824.83	98,966.35	108,883.51	107,767.06	108,076.95	1,101.45	-	5,217.45
Opex (ZAR/t)												
Total Labour	40.17	41.32	34.32	37.80	30.57	30.15	31.00	35.09	36.57	2,653.87	-	651.61
Stores	51.36	63.37	49.55	61.31	49.83	48.78	45.12	49.56	52.30	722.69	-	743.34
Utilities	27.93	29.73	25.46	30.75	26.39	47.47	49.95	48.57	29.32	757.60	-	109.20
Contractors	1.34	1.19	1.49	0.63	0.23	0.71	0.43	0.74	0.31	49.36	-	-
Group Centralised Costs	1.21	1.55	1.99	1.60	1.82	1.72	1.58	1.47	1.61	45.53	-	2.42
Sundries	44.12	23.46	40.40	47.99	45.86	61.90	44.25	41.16	48.18	2,601.76	-	366.55
Process Materials	15.24	16.31	9.17	15.94	15.90	10.69	13.56	21.17	25.12	85.73	-	254.45
Chemical Materials	4.94	4.44	4.13	3.92	4.16	6.17	6.48	4.57	5.71	51.86	-	-
Total Opex	**186.32**	**181.37**	**166.50**	**199.93**	**174.76**	**207.58**	**192.36**	**202.33**	**199.12**	**6,968.40**	**-**	**2,127.57**

Source: Bokoni

The total operating cost for both plants at Bokoni was ZAR220.17 between January and December 2012. The high unit costs for October and December are as a result of the low tonnages and high fixed cost component.

ITEM 22 – ECONOMIC ANALYSIS

Item 22 (a) – PRINCIPAL ASSUMPTIONS

The valuation date for the Discounted Cash Flow is 1 January 2013.

The cash flow approach was used on the total Reserves stated to determine a value for the Reserves.

Basis of Valuation of the Mining Assets

In generating the financial model and deriving the valuations, the following was done:

- The DCF valuation was set up in calendar years ending December.
- A weighted average cost of capital (WACC) of 9.73% (in real terms) was assumed for the discount factor.
- The impact of the Mineral Royalties Act using the formula for unrefined metals was included.
- Sensitivity analyses were performed to ascertain the impact of discount factors, commodity prices, total working costs and capital expenditures.
- Valuation of the tax entity was performed on a stand-alone basis.
- The full value of the operation was reported – no attributable value was calculated.

Macro-economic Forecasts

All economic criteria that have been used for the study are described in the section below, together with the macro-economic and commodity price forecasts for the operations over the LoM. Forecast data is based on projections for the different commodity prices and the country-specific macro-economic parameters and is presented in calendar years.

The domestic annual inflation rate was applied to constant term Opex and Capex figures in the nominal cash flow model. Both the ZAR/USD exchange rate and USD commodity prices are in constant money terms. These numbers were inflated in the DCF valuation using the US inflation rate for the commodity prices and purchasing power parity ("PPP") for the Rand devaluation.

Table 54 illustrates the forecasts for the first five years. The price forecasts are based on forecasts sourced from consensus economic forecast. The exchange rate forecast is based on the Investec forecast.

Table 54: Marco-Economic Forecasts and Commodity Prices over the LoM

		2013	2014	2015	2016	2017	Long-Term
	Year	**1**	**2**	**3**	**4**	**5**	**6**
Exchange rate	ZAR/USD	8.61	8.50	8.84	8.90	8.94	9.19
Inflation rate	SA	5.63%	5.30%	4.90%	4.60%	4.60%	4.60%
Inflation rate	US	1.94%	2.40%	2.40%	2.40%	2.50%	2.50%
Gold	USD/oz	1,794	1,675	1,545	1,364	1,281	1,220
Platinum	USD/oz	1,692	1,727	1,755	1,740	1,731	1,801
Palladium	USD/oz	722	780	797	791	797	806
Rhodium	USD/oz	1,545	1,639	1,732	1,746	1,774	1,741
Nickel	USD/t	18,363	20,074	20,913	21,458	21,036	20,377
Copper	USD/t	8,122	7,866	7,340	6,888	6,515	5,875
Ruthenium	USD/oz.	85	85	85	85	85	85
Iridium	USD/oz.	1,025	1,025	1,025	1,025	1,025	1,025
Cobalt	USD/t	14,900	14,900	14,900	14,900	14,900	14,900

Source: Consensus Economics Inc., Johnson Matthey, Investec

Payability

Atlatsa has an agreement with Amplats to send float concentrate from the mine to the nearby Amplats smelter at Polokwane and refinery in Rustenburg. The refinery has a turnaround time of approximately 9 weeks. Payability of the different metals which takes into consideration the "toll costs of refining" is shown in the table below.

Table 55: Expected Payability of Commodities

Commodity	Payability
Platinum	86%
Palladium	86%
Rhodium	86%
Gold	86%
Iridium	55%
Ruthenium	55%
Nickel	75%
Copper	70%
Cobalt	35%

The payability terms are within industry norms for junior companies treating concentrate at refineries.

Recoveries

For this Project, it was assumed that the ore will be treated at the existing float plant with float recoveries as illustrated in Table 56.

Table 56: Plant Recovery Factors

Commodity	UM2	Brakfontein	Vertical	Middelpunt	Open Cast
Platinum	89%	92%	91%	86%	71%
Palladium	90%	93%	92%	87%	72%
Rhodium	90%	94%	92%	86%	72%
Gold	69%	71%	70%	80%	55%
Iridium	81%	84%	82%	74%	62%
Ruthenium	74%	77%	76%	70%	56%
Nickel	43%	46%	44%	44%	22%
Copper	68%	71%	69%	60%	34%
Cobalt	17%	18%	17%	6%	8%

Working Capital - Debtor and Creditor Days

All commodities debtors' days were calculated at 63 days and Creditor days at 30.

Table 57: Debtor and Creditor Days

	Unit	Totals
All Commodities	Days	63
Creditors Days	Days	30

Discount Rate

The Capital Asset Pricing Model was used to first calculate the cost of equity. A Debt equity ratio of 90:10 was then applied to finally calculate the Weighted Average Cost of Capital ("WACC"). This generated a nominal discount rate of 14.83% or 9.73% real.

Table 58: Discount Rate

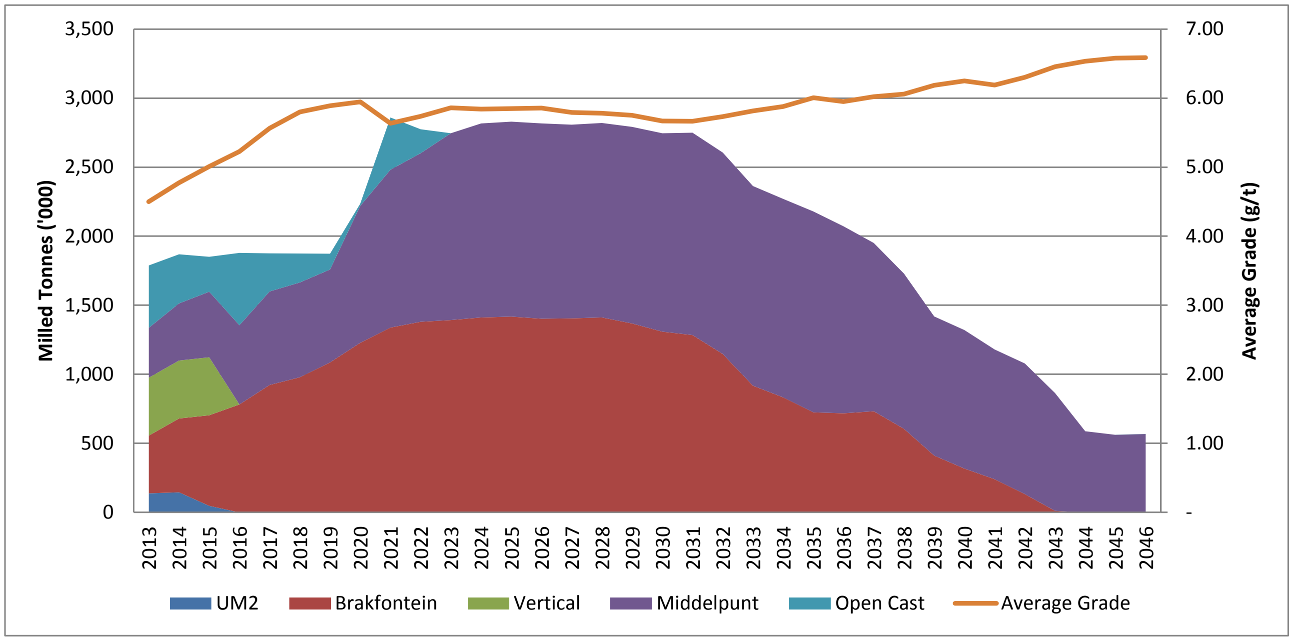
CAPM Calculation	
Risk free rate	7.25%
Risk premium of market	6.0%
Base beta	1.47
Cost of equity (CAPM)	16.07%

WACC	
WACC (Nominal)	14.83%
WACC (Real)	9.73%

Item 22 (b) – Cash Flow Forecast

The following graphs illustrate the production profile for the milled tonnes against the average head grade.

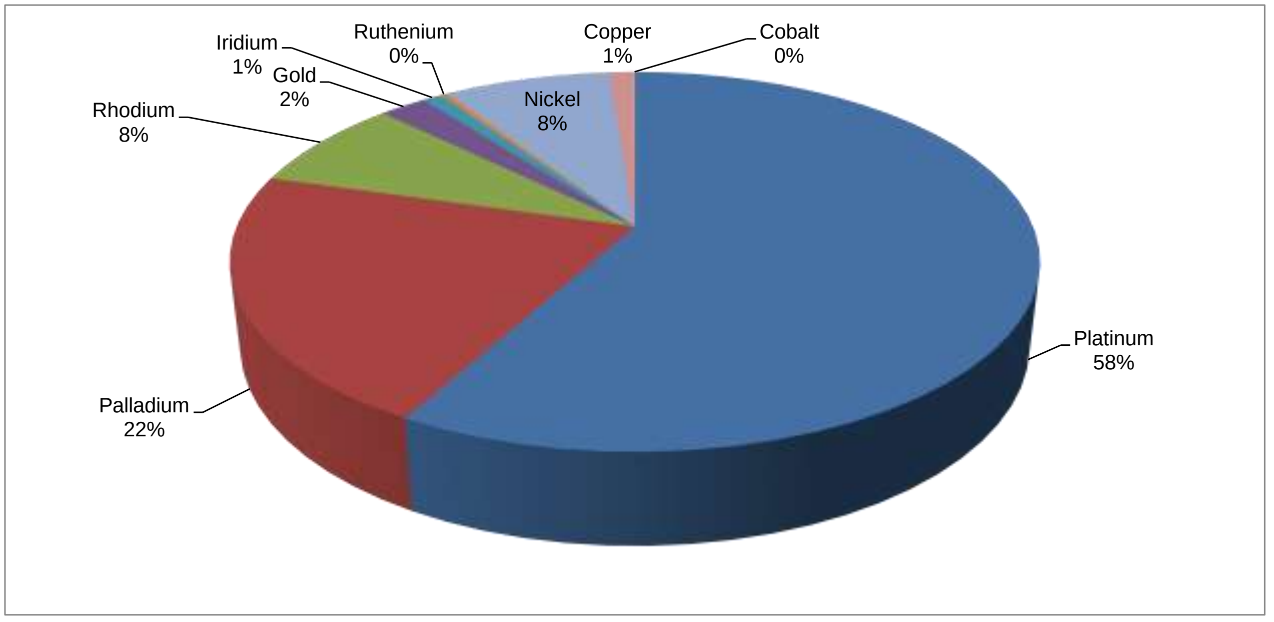
Figure 75: Production – LoM (Milled Tonnes)



The financial model was cut in year 2046 (34 years) when the cash flow turns negative. The Reserve tonnes not reported in the DCF are 1.714 million tonnes.

A split of the revenue generated by the different commodities is displayed in Figure 76. Platinum and Palladium make up 80% of the revenue generated.

Figure 76: Revenue Split



Although iridium, ruthenium, nickel, copper and cobalt are produced, income generated from these commodities only accounts for 2.5% of the revenue.

Table 59: Saleable Product

Tonnes Produced			Cut Model
Tonnes to mill		tonnes	68,754,334
Mill Head grade	Precious metals (4E)	4E g/t	5.77
Recovered grade			
Recovered grade	Precious Metals (4E)	g/t	4.97
Metal recovered		**oz**	
Metal recovered	Platinum	oz	5,010,897
Metal recovered	Palladium	oz	3,929,150
Metal recovered	Rhodium	oz	654,611
Metal recovered	Gold	oz	296,226
Metal recovered	Iridium	oz	199,279
Metal recovered	Ruthenium	oz	906,433
Metal recovered	Nickel	tonnes	68,771
Metal recovered	Copper	tonnes	37,920
Metal recovered	Cobalt	tonnes	994

Prill splits shown are from the budget plan received from Bokoni.

Table 60: Platinum Group Metal Prill Splits and Base Metal Average Grades

Commodity	UM2	Brakfontein	Vertical	Middelpunt	Open Cast
Platinum	54.7%	54.7%	54.7%	36.7%	55.9%
Palladium	27.1%	27.1%	27.1%	40.3%	25.6%
Rhodium	3.6%	3.6%	3.6%	7.5%	3.0%
Gold	5.4%	5.4%	5.4%	1.5%	6.4%
Iridium	1.3%	1.3%	1.3%	2.6%	1.3%
Ruthenium	7.9%	7.9%	7.9%	11.3%	7.9%
Mill Head Grade 4E (g/t)	3.93	5.34	4.35	6.34	3.81
Nickel Mill Head Grade	0.19%	0.25%	0.20%	0.21%	0.21%
Copper Mill Head Grade	0.07%	0.09%	0.08%	0.08%	0.08%
Cobalt Mill Head Grade	0.01%	0.01%	0.01%	0.01%	0.01%

Operating Costs

A summary of the capital costs are displayed in the table below. Other costs include the central services.

Table 61: Operating Cost Summary

Net Turnover	ZAR/Milled tonne	1,743
Mine Cost	ZAR/Milled tonne	710
Plant Costs	ZAR/Milled tonne	186
Cash Operating Costs	**ZAR/Milled tonne**	**895**
Royalties	ZAR/Milled tonne	71
Total Cash Costs	**ZAR/Milled tonne**	**966**
Other Costs	ZAR/Milled tonne	149
Total Production Costs	**ZAR/Milled tonne**	**1,115**
EBITDA	ZAR/Milled tonne	628
Capex	ZAR/Milled tonne	120
Notional Cost	**ZAR/Milled tonne**	**1236**
EBITDA Margin	%	36%
NCE Margin	**%**	**29.11%**
Platinum Equivalent	oz	7,332,706
Notional Cost	**USD/ Platinum oz.**	**1269**
Palladium Equivalent	oz	16,374,179
Notional Cost	**USD/ Palladium oz.**	**568**

Capital Cost Summary

A summary of the capital costs are displayed in the table below, together with a breakdown for the first ten years. Other infrastructure includes the capital expenditure planned for central services and is based on the budget plan as received from Bokoni.

Table 62: Capex Summary ZAR million

Division	LOM	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mining	1,742	371	344	322	290	204	92	79	26	8	7
Plant	1,731	3	40	60	280	127	382	839	-	-	-
Other Infrastructure	90	15	14	13	8	8	8	8	8	8	-
Mining (SIB)	2,835	119	117	89	87	87	87	87	87	87	87
Plant (SIB)	1,459	17	19	13	23	26	26	26	51	51	51
Other (SIB)	417	25	22	13	13	13	13	13	13	13	13
Total	**8,274**	**550**	**556**	**510**	**701**	**465**	**608**	**1,052**	**185**	**167**	**158**

Discounted Cash Flow

Minxcon's in-house discounted cash flow ("DCF") model was employed to illustrate the net present value ("NPV") for the Project in real terms. The DCF is included in **Error! Reference source not found.**. The NPV was derived from post royalties and tax, pre-debt real cash flows, using the techno-economic parameters, commodity price and macro-economic projections. To accommodate taxation and unredeemed Capex, a nominal financial model was populated and the final free cash flow was de-escalated to real terms prior to discounting.

This valuation is based on a free cash flow and measures the economic viability of the orebody (Mineral Reserves only) to demonstrate if the extraction of the Mineral Reserves is viable and justifiable under a defined set of realistically assumed modifying factors. The model is based on financial years running from January to December and commences on 1 January 2013.

The annual and cumulative cash flow forecast for the LoM are displayed in Figure 77. Peak annual cash flow is during 2021.

Figure 77: Annual and Cumulative Cash Flow

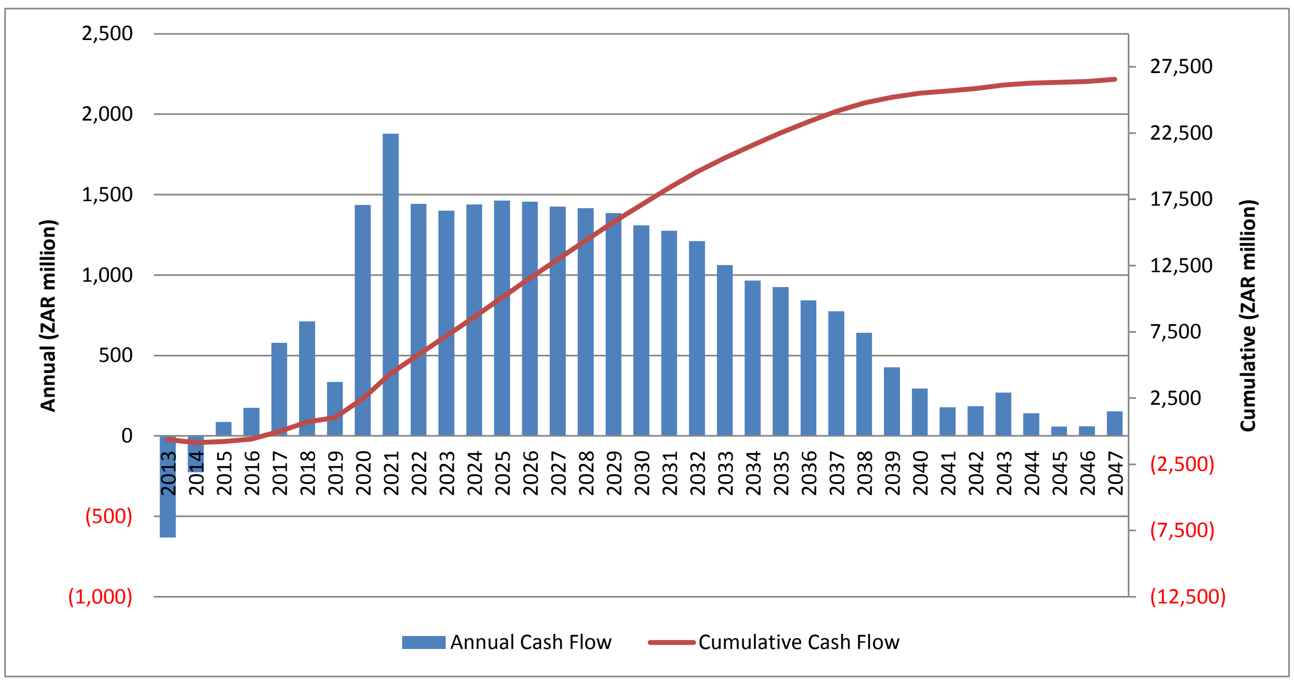


Table 63: Real DCF

Project Title: **Bokoni Platinum Mine**
Client: Atlatsa
Project Code: M12-159

Project Valuation Schedule					
Project Valuation Date (Base Date)	01-Jan-13	Commodity Price	100%	Fixed Costs	100%
Financial Year End (month and year)	31-Dec-13	Exchange Rate	100%	Variable Cost	100%
First Year	0	Grade	100%	Mining Capex	100%
Days remaining	364			Plant Capex	100%

Project Duration		Unit	Totals											
Calendar Years				2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Financial Years		years	34	1	2	3	4	5	6	7	8	9	10	11
Macro-Economic Factors (Real Terms)														
Currency		ZAR /USD	9.13	8.608	8.498	8.840	8.900	8.944	9.192	9.192	9.192	9.192	9.192	9.192
Inflation	ZAR Inflation Rate	%	4.66%	5.63%	5.30%	4.90%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%
Inflation	US Inflation Rate	%	2.47%	1.94%	2.40%	2.40%	2.40%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Inflation	Cost Inflation	%	4.66%	5.63%	5.30%	4.90%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%
Inflation	Capex inflation	%	4.66%	5.63%	5.30%	4.90%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%
Commodity prices	Platinum	USD/oz.	1,791	1,692	1,727	1,755	1,740	1,731	1,801	1,801	1,801	1,801	1,801	1,801
Commodity prices	Palladium	USD/oz.	802	722	780	797	791	797	806	806	806	806	806	806
Commodity prices	Rhodium	USD/oz.	1,733	1,545	1,639	1,732	1,746	1,774	1,741	1,741	1,741	1,741	1,741	1,741
Commodity prices	Gold	USD/oz.	1,266	1,794	1,675	1,545	1,364	1,281	1,220	1,220	1,220	1,220	1,220	1,220
Commodity prices	Iridium	USD/oz.	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025
Commodity prices	Ruthenium	USD/oz.	85	85	85	85	85	85	85	85	85	85	85	85
Commodity prices	Nickel	USD/tonne	20,376	18,363	20,074	20,913	21,458	21,036	20,377	20,377	20,377	20,377	20,377	20,377
Commodity prices	Copper	USD/tonne	6,091	8,122	7,866	7,340	6,888	6,515	5,875	5,875	5,875	5,875	5,875	5,875
Commodity prices	Cobalt	USD/tonne	14,900	14,900	14,900	14,900	14,900	14,900	14,900	14,900	14,900	14,900	14,900	14,900
Operating Statistics														
ROM		tonnes	68,754,334	1,788,305	1,868,999	1,850,993	1,879,146	1,875,977	1,874,635	1,873,293	2,235,270	2,859,505	2,774,379	2,745,724
ROM	(Max)	tonnes/mnth	238,292	147,388	155,750	154,249	156,596	156,331	156,220	156,108	186,272	238,292	231,198	228,810
Mill Head grade	Precious metals	6E g/t	5.77	4.50	4.77	5.01	5.23	5.56	5.80	5.89	5.95	5.64	5.74	5.86
Mill Head grade	Nickel	%	0.23%	0.22%	0.22%	0.22%	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%
Mill Head grade	Copper	%	0.09%	0.08%	0.08%	0.08%	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%
Mill Head grade	Cobalt	%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Tonnes to mill		tonnes	68,754,334	1,788,305	1,868,999	1,850,993	1,879,146	1,875,977	1,874,635	1,873,293	2,235,270	2,859,505	2,774,379	2,745,724
Recovered grade	Precious Metals	g/t	4.97	3.77	4.05	4.31	4.39	4.77	5.01	5.14	5.20	4.83	4.96	5.10
Recovered grade	Nickel	%	0%	0.08%	0.09%	0.09%	0.09%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
Recovered grade	Copper	%	0%	0.05%	0.05%	0.05%	0.05%	0.05%	0.06%	0.06%	0.06%	0.05%	0.06%	0.06%
Recovered grade	Cobalt	%	0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Metal recovered	Platinum	kg	155,856	3,483	3,905	4,064	4,121	4,397	4,617	4,745	5,540	6,618	6,520	6,527
Metal recovered	Palladium	kg	122,210	2,096	2,371	2,527	2,671	2,965	3,107	3,170	3,967	4,689	4,737	4,904
Metal recovered	Rhodium	kg	20,361	311	354	383	410	465	488	497	640	751	768	806
Metal recovered	Gold	kg	9,214	251	278	284	285	293	307	315	350	426	410	397
Metal recovered	Iridium	kg	6,198	99	113	121	130	145	152	154	197	232	236	246
Metal recovered	Ruthenium	kg	28,193	493	558	594	625	692	725	740	922	1,090	1,099	1,135
Metal recovered	Platinum	oz	5,010,897	111,992	125,558	130,658	132,498	141,361	148,432	152,560	178,128	212,784	209,626	209,845
Metal recovered	Palladium	oz	3,929,150	67,382	76,220	81,260	85,862	95,324	99,894	101,910	127,553	150,749	152,290	157,683
Metal recovered	Rhodium	oz	654,611	9,983	11,377	12,300	13,184	14,959	15,682	15,971	20,585	24,146	24,676	25,909
Metal recovered	Gold	oz	296,226	8,071	8,937	9,124	9,163	9,413	9,859	10,133	11,245	13,700	13,170	12,778
Metal recovered	Iridium	oz	199,279	3,198	3,619	3,881	4,167	4,662	4,879	4,961	6,321	7,470	7,584	7,910
Metal recovered	Ruthenium	oz	906,433	15,866	17,941	19,092	20,086	22,240	23,315	23,806	29,634	35,033	35,332	36,498
Metal recovered	Nickel	tonnes	68,771	1,510	1,654	1,724	1,669	1,813	1,855	1,921	2,335	2,770	2,796	2,854
Metal recovered	Copper	tonnes	37,920	864	944	981	942	1,019	1,042	1,082	1,303	1,549	1,558	1,583
Metal recovered	Cobalt	tonnes	994	27	30	30	28	30	31	32	37	44	44	43
Financial														
Revenue		**ZAR**	**119,861,863,135**	**2,228,543,285**	**2,546,368,625**	**2,816,551,753**	**2,867,125,472**	**3,095,223,099**	**3,397,871,976**	**3,487,626,603**	**4,165,712,640**	**4,958,681,741**	**4,930,449,352**	**4,992,423,081**
Revenue	Platinum	ZAR	70,590,512,088	1,402,685,307	1,584,395,295	1,742,831,959	1,765,055,972	1,882,640,742	2,113,698,046	2,172,474,336	2,536,574,687	3,030,073,683	2,985,104,166	2,988,235,427
Revenue	Palladium	ZAR	24,843,138,366	360,077,327	434,663,025	492,328,608	520,159,896	584,120,305	636,597,045	649,448,068	812,859,315	960,683,946	970,502,871	1,004,871,521
Revenue	Rhodium	ZAR	8,951,326,435	114,150,404	136,271,606	161,946,511	176,198,468	204,122,780	215,823,246	219,805,394	283,301,034	332,320,766	339,612,841	356,581,653
Revenue	Gold	ZAR	2,937,982,513	107,172,789	109,370,809	107,161,480	95,651,543	92,778,820	95,085,757	97,730,168	108,454,568	132,137,520	127,019,169	123,237,765
Revenue	Iridium	ZAR	1,028,042,881	15,518,728	17,338,853	19,340,842	20,908,804	23,508,103	25,279,417	25,705,366	32,754,016	38,708,612	39,299,380	40,985,166
Revenue	Ruthenium	ZAR	387,640,764	6,384,542	7,127,893	7,890,097	8,357,160	9,299,223	10,018,456	10,229,457	12,733,721	15,053,799	15,182,361	15,683,439
Revenue	Nickel	ZAR	9,609,132,266	179,059,041	211,688,478	239,105,555	239,074,976	255,819,288	260,511,020	269,802,995	328,018,540	389,059,862	392,743,639	400,930,962
Revenue	Copper	ZAR	1,466,758,656	42,269,978	44,196,809	44,543,748	40,419,582	41,546,573	39,395,754	40,890,403	49,252,576	58,533,863	58,895,763	59,830,469
Revenue	Cobalt	ZAR	47,329,166	1,225,168	1,315,857	1,402,953	1,299,071	1,387,265	1,463,235	1,540,416	1,764,182	2,109,690	2,089,161	2,066,678
Mining cost		%	**(48,804,214,236)**	**(1,481,844,284)**	**(1,595,169,824)**	**(1,577,207,609)**	**(1,390,203,390)**	**(1,419,968,817)**	**(1,428,485,012)**	**(1,442,168,097)**	**(1,610,993,368)**	**(1,842,624,917)**	**(1,829,182,277)**	**(1,778,247,169)**
Fixed Cost		ZAR	(18,722,630,293)	(701,211,778)	(755,417,316)	(796,285,404)	(616,482,241)	(616,482,241)	(616,482,241)	(616,482,241)	(616,482,241)	(616,482,241)	(616,482,241)	(559,543,209)
Variable Cost		ZAR	(30,081,583,942)	(780,632,506)	(839,752,508)	(780,922,205)	(773,721,149)	(803,486,575)	(812,002,771)	(825,685,856)	(994,511,126)	(1,226,142,675)	(1,212,700,035)	(1,218,703,960)
Plant cost			**(12,754,883,425)**	**(222,273,798)**	**(273,211,442)**	**(282,137,299)**	**(284,009,654)**	**(283,798,893)**	**(283,709,639)**	**(283,620,388)**	**(307,694,339)**	**(349,210,326)**	**(343,548,891)**	**(500,676,453)**
Fixed Cost		ZAR	(8,176,443,991)	(114,821,924)	(131,630,036)	(159,033,336)	(159,033,336)	(159,033,336)	(159,033,336)	(159,033,336)	(159,033,336)	(159,033,336)	(159,033,336)	(318,066,673)
Variable Cost		ZAR	(4,578,439,434)	(107,451,874)	(141,581,406)	(123,103,963)	(124,976,318)	(124,765,557)	(124,676,303)	(124,587,051)	(148,661,003)	(190,176,989)	(184,515,554)	(182,609,780)
Cash Operating Costs		**ZAR**	**(61,559,097,661)**	**(1,704,118,082)**	**(1,868,381,266)**	**(1,859,344,909)**	**(1,674,213,044)**	**(1,703,767,710)**	**(1,712,194,651)**	**(1,725,788,485)**	**(1,918,687,707)**	**(2,191,835,242)**	**(2,172,731,168)**	**(2,278,923,622)**
Royalty Act No 28 of 2008		ZAR	(4,875,652,516)	(11,142,716)	(12,731,843)	(14,082,759)	(14,335,627)	(15,476,115)	(16,989,360)	(62,868,860)	(215,439,049)	(276,779,435)	(276,907,826)	(273,140,044)
Total Cash Costs		**ZAR**	**(66,434,750,176)**	**(1,715,260,799)**	**(1,881,113,109)**	**(1,873,427,667)**	**(1,688,548,672)**	**(1,719,243,825)**	**(1,729,184,011)**	**(1,788,657,345)**	**(2,134,126,756)**	**(2,468,614,677)**	**(2,449,638,993)**	**(2,552,063,667)**
Rehabilitation		ZAR	(106,413,117)	(5,849,476)	(3,467,712)	(3,441,441)	(3,415,171)	(3,388,900)	(3,362,630)	(3,336,359)	(3,310,089)	(3,283,818)	(3,257,547)	(3,231,277)
Other Cost Fixed		ZAR	(7,619,274,009)	(225,958,080)	(217,891,649)	(224,232,009)	(224,232,009)	(224,232,009)	(224,232,009)	(224,232,009)	(224,232,009)	(224,232,009)	(224,232,009)	(224,232,009)
Other Costs Variable		ZAR	(2,531,130,520)	(63,681,730)	(66,737,366)	(65,983,362)	(67,025,615)	(68,077,246)	(69,552,861)	(69,964,006)	(83,504,009)	(104,971,985)	(102,443,963)	(101,950,358)
Total Production Costs		**ZAR**	**(76,691,567,823)**	**(2,010,750,085)**	**(2,169,209,835)**	**(2,167,084,479)**	**(1,983,221,466)**	**(2,014,941,981)**	**(2,026,331,511)**	**(2,086,189,719)**	**(2,445,172,862)**	**(2,801,102,489)**	**(2,779,572,513)**	**(2,881,477,310)**
EBITDA		**ZAR**	**43,170,295,312**	**217,793,200**	**377,158,789**	**649,467,274**	**883,904,006**	**1,080,281,118**	**1,371,540,465**	**1,401,436,884**	**1,720,539,778**	**2,157,579,253**	**2,150,876,840**	**2,110,945,771**
Capital expenditure		ZAR	(8,275,676,794)	(550,163,212)	(556,146,757)	(508,805,122)	(699,827,421)	(463,753,477)	(607,192,377)	(1,051,261,874)	(184,484,454)	(166,484,454)	(157,484,454)	(150,484,454)
EBIT		**ZAR**	**34,894,618,518**	**(332,370,012)**	**(178,987,967)**	**140,662,152**	**184,076,585**	**616,527,641**	**764,348,088**	**350,175,010**	**1,536,055,324**	**1,991,094,799**	**1,993,392,386**	**1,960,461,317**
Taxation		ZAR	(8,346,719,445)	0	0	0	0	0	0	0	0	0	(554,418,982)	(548,929,169)
Income after tax		ZAR	26,547,899,073	(332,370,012)	(178,987,967)	140,662,152	184,076,585	616,527,641	764,348,088	350,175,010	1,536,055,324	1,991,094,799	1,438,973,404	1,411,532,148
Working capital changes		ZAR	7,000,001	(299,425,325)	(46,942,031)	(53,050,382)	(9,081,473)	(36,854,689)	(51,424,117)	(14,340,800)	(100,071,900)	(112,653,666)	3,095,007	(10,400,571)
Net Cash Flow	Annual cash flow	ZAR	**26,554,899,073**	(631,795,337)	(225,929,998)	87,611,769	174,995,112	579,672,952	712,923,972	335,834,210	1,435,983,424	1,878,441,133	1,442,068,411	1,401,131,577
Cumulative Net Cash Flow	Cumulative cash flow	ZAR		(631,795,336)	(857,725,334)	(770,113,565)	(595,118,453)	(15,445,502)	697,478,470	1,033,312,679	2,469,296,103	4,347,737,236	5,789,805,648	7,190,937,225
Discount Rate	Real	%	**9.73%**	1.0000	1.0973	1.20	1.32	1.45	1.59	1.75	1.92	2.10	2.31	2.53
Net Present Value after Dividends		ZAR	**7,230,506,411**	(631,795,337)	(205,897,823)	72,764,267	132,452,294	399,847,566	448,159,383	192,394,239	749,711,915	893,759,006	625,297,310	553,678,261

Item 22 (c) - NET PRESENT VALUE

Table 64 illustrates the value of the Project under the current scenario:

Table 64: Project Valuation at Various Discount Rates

Discount Rate	NPV (ZAR million)
15.0%	4,020
12.5%	5,275
10.0%	7,006
9.73%	**7,230**
7.5%	9,450
5.0%	13,001
2.5%	18,318

A best estimate NPV of ZAR7,230 million was calculated at a WACC of 9.73%. The cash flow reflects an ongoing operation, hence the IRR and payback periods are irrelevant.

A range of values was calculated for the DCF valuation by determining an upper and lower range. The upper and lower ranges were determined by applying a maximum and minimum standard deviation on the following input parameters with the lower confidence categories having a wider variance:-

- Exchange Rate (ZAR/USD);
- Commodity Price (USD/Pt oz);
- Grade (g/t);
- Fixed Cost;
- Variable Cost;
- Mining Capex; and
- Plant Capex.

By applying these ranges, a lower and upper value was determined for the DCF, as displayed in Table 65.

Table 65: Range of Values

Valuation Method	Tonnage '000	Oz ('000)	USD/oz	Lower Value (ZARm)	Best Estimated Value	Higher Value (ZARm)
Discounted Cash Flow	68,754	10,997	62.5	4,472	7,230	9,423

Item 22 (d) – REGULATORY ITEMS

Royalties

The Mineral and Petroleum Resources Royalty Act came into effect on 1 March 2010. Under the legislation, passed in 2008, companies will have to pay extra taxes proportional to their profitability after Capex. The law requires all companies extracting minerals in South Africa to pay royalties at a rate of between 0.5% and 7% based on gross sales, less their allowable deductions, depending on the refined condition of the Mineral Resources. Therefore, companies are taxed on either the refined or unrefined formula.

- Refined mineral formula = 0.5 + [EBIT/Gross sales x 12.5] x 100
- Unrefined mineral resource formula =0.5 + [EBIT/Gross sales x 9] x 100

The unrefined mineral formula was used, since the tailings are classified as untreated material, and are undergoing further refining at Amplats. Due to large, unredeemed Capex, the minimum rates applied for a large part of the life of the operation.

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Other costs also included in the model are:-

- Penalties (Net Revenue x 0.5%);
- Sample costs (Milled Tonnes x ZAR0.74); and
- Treatment costs (Milled Tonnes x ZAR21.6).

Environmental Considerations

Mining companies are required to make financial provision for mining-related environmental rehabilitation. Digby Wells completed an environmental assessment in September 2011 and estimated a quantum of ZAR119.38 million (excluding tax) required for the rehabilitation of the Bokoni Mine. There is currently ZAR27.7 million provided for in the trust account.

Taxes and Royalties

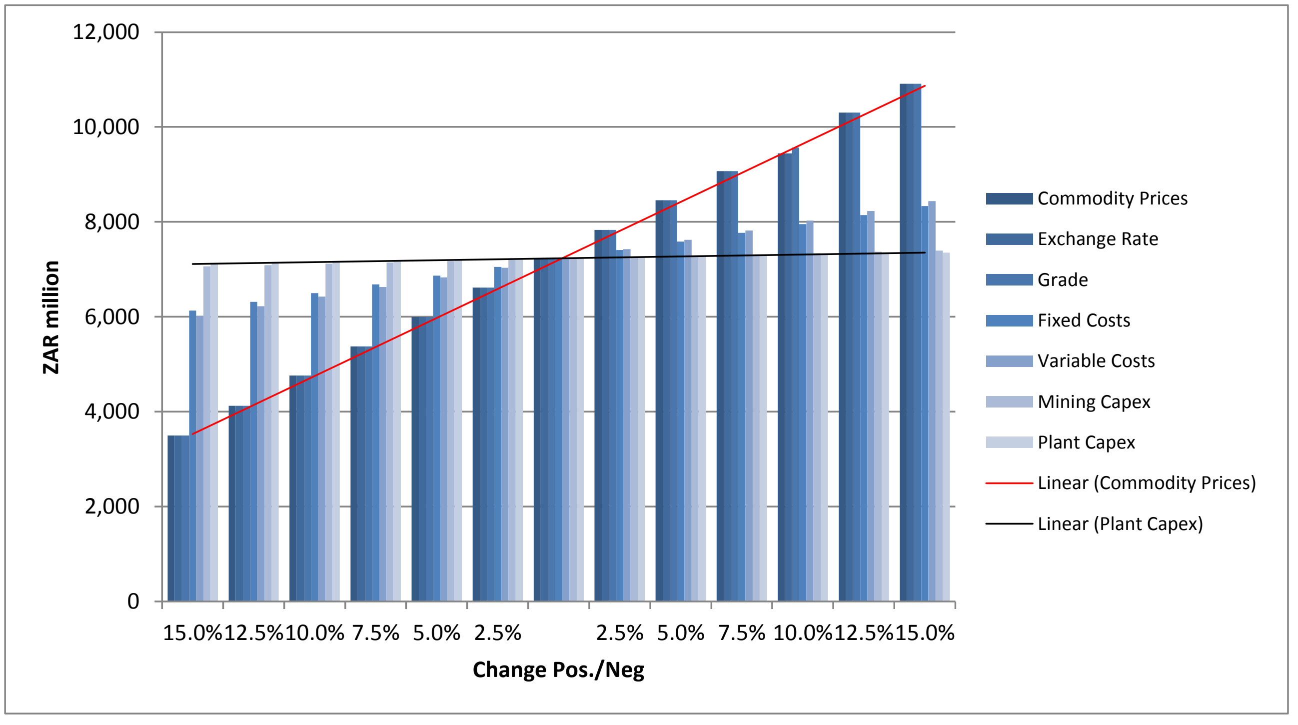
The normal company tax formula of 28% was applied. In addition to the normal provisions, which apply to general companies, capital expenditure was allowed as a deduction from mining income. For all mines, capital expenditure incurred may be redeemed immediately against mining profits, and not at 20% over five years, as is the case with manufacturing concerns. Bokoni currently has an unredeemed capital allowance of ZAR1.283 billion and assessed losses of ZAR1.465 billion, which can be utilised against tax.

Historically, STC was levied at the rate of 10% on the net amount of dividends declared by the company. The Government, however, proposed to phase out STC and replace it with a new tax on dividends. In the 2011 Budget Speech, the Minister of Finance indicated that implementation of the new Dividend Tax will take place on 1 April 2012. The formal legal liability for dividend tax will be moved from the company paying the dividend to the shareholder receiving it. The tax cost, therefore, shifts off the company's income statement and becomes a cost to the shareholder. STC was, therefore, not considered in the calculation.

Item 22 (e) – Sensitivity Analysis

Based on the real cash flows calculated in the financial model, Minxcon reported a DCF valuation and performed single-parameter sensitivity analyses to ascertain the impact on the NPV. The metal prices and exchange rates have the biggest impact. Despite the large capital expenditure amount upfront, the impact thereof over the LOM is insignificant with a minor impact on the NPV.

Figure 78: Sensitivity



Sensitivities are illustrated in the following tables. The sensitivity of the price is based on the USD/Pt oz basket price.

Table 66: Sensitivity to Prices and ZAR/USD Exchange Rates (ZAR million)

Basket Price USD/Pt oz		**2,227**	**2,293**	**2,359**	**2,424**	**2,490**	**2,555**	**2,621**	**2,686**	**2,752**	**2,817**	**2,856**	**2,948**	**3,014**
ZAR/USD		-15.0%	-12.5%	-10.0%	-7.5%	-5.0%	-2.5%		2.5%	5.0%	7.5%	9.0%	12.5%	15.0%
7.76	-15.0%	-185	472	1,097	1,701	2,289	2,866	3,426	3,987	4,539	5,081	5,405	6,174	6,710
7.99	-12.5%	472	1,115	1,736	2,341	2,932	3,506	4,087	4,651	5,206	5,770	6,109	6,882	7,429
8.22	-10.0%	1,097	1,736	2,358	2,965	3,556	4,152	4,731	5,301	5,883	6,458	6,798	7,586	8,156
8.44	-7.5%	1,701	2,341	2,965	3,573	4,184	4,779	5,366	5,964	6,553	7,132	7,479	8,298	8,880
8.67	-5.0%	2,289	2,932	3,556	4,184	4,795	5,398	6,012	6,616	7,210	7,808	8,169	9,006	9,603
8.90	-2.5%	2,866	3,506	4,152	4,779	5,398	6,028	6,647	7,257	7,871	8,487	8,855	9,713	10,318
9.13		3,426	4,087	4,731	5,366	6,012	6,647	7,273	7,903	8,534	9,163	9,541	10,411	11,021
9.36	2.5%	3,987	4,651	5,301	5,964	6,616	7,257	7,903	8,550	9,195	9,839	10,219	11,096	11,718
9.58	5.0%	4,539	5,206	5,883	6,553	7,210	7,871	8,534	9,195	9,855	10,503	10,888	11,780	12,432
9.81	7.5%	5,081	5,770	6,458	7,132	7,808	8,487	9,163	9,839	10,503	11,157	11,546	12,479	13,138
9.95	9.0%	5,405	6,109	6,798	7,479	8,169	8,855	9,541	10,219	10,888	11,546	11,951	12,893	13,560
10.27	12.5%	6,174	6,882	7,586	8,298	9,006	9,713	10,411	11,096	11,780	12,479	12,893	13,856	14,544
10.50	15.0%	6,710	7,429	8,156	8,880	9,603	10,318	11,021	11,718	12,432	13,138	13,560	14,544	15,249

Table 67: Sensitivity Tables

Nominal Discount Rate Change		NPV (ZAR'million) 7,231
-14.0%	0.8%	**51,490**
-12.0%	2.8%	36,796
-10.0%	4.8%	26,894
-8.0%	6.8%	20,059
-6.0%	8.8%	15,232
-4.0%	10.8%	11,751
-2.0%	12.8%	9,191
	14.8%	7,273
2.0%	16.8%	5,812
4.0%	18.8%	4,683
6.0%	20.8%	3,797
8.0%	22.8%	3,093
10.0%	24.8%	2,527
12.0%	26.8%	2,067
14.0%	28.8%	1,690

Fixed Costs Change		NPV (ZAR'million) 7,231
15.0%	115.0%	6,120
12.5%	112.5%	6,318
10.0%	110.0%	6,511
7.5%	107.5%	6,702
5.0%	105.0%	6,893
2.5%	102.5%	7,083
	100.0%	7,273
-2.5%	97.5%	7,463
-5.0%	95.0%	7,657
-7.5%	92.5%	7,853
-10.0%	90.0%	8,047
-12.5%	87.5%	8,240
-15.0%	85.0%	8,432

Commodity Prices Change		NPV (ZAR'million) 7,231
-15.0%	85.0%	3,426
-12.5%	87.5%	4,087
-10.0%	90.0%	4,731
-7.5%	92.5%	5,366
-5.0%	95.0%	6,012
-2.5%	97.5%	6,647
	100.0%	7,273
2.5%	102.5%	7,903
5.0%	105.0%	8,534
7.5%	107.5%	9,163
9.0%	109.0%	9,541
12.5%	112.5%	10,411
15.0%	115.0%	11,021

Variable Costs Change		NPV (ZAR'million) 7,231
15.0%	115.0%	6,021
12.5%	112.5%	6,235
10.0%	110.0%	6,445
7.5%	107.5%	6,652
5.0%	105.0%	6,860
2.5%	102.5%	7,066
	100.0%	7,273
-2.5%	97.5%	7,479
-5.0%	95.0%	7,688
-7.5%	92.5%	7,900
-10.0%	90.0%	8,110
-12.5%	87.5%	8,319
-15.0%	85.0%	8,528

Exchange rate Change		NPV (ZAR'million) 7,231
-15.0%	85.0%	3,426
-12.5%	87.5%	4,087
-10.0%	90.0%	4,731
-7.5%	92.5%	5,366
-5.0%	95.0%	6,012
-2.5%	97.5%	6,647
	100.0%	7,273
2.5%	102.5%	7,903
5.0%	105.0%	8,534
7.5%	107.5%	9,163
9.0%	109.0%	9,541
12.5%	112.5%	10,411
15.0%	115.0%	11,021

Mining Capex Change		NPV (ZAR'million) 7,231
15.0%	115.0%	7,097
12.5%	112.5%	7,126
10.0%	110.0%	7,155
7.5%	107.5%	7,185
5.0%	105.0%	7,214
2.5%	102.5%	7,244
	100.0%	7,273
-2.5%	97.5%	7,302
-5.0%	95.0%	7,332
-7.5%	92.5%	7,361
-10.0%	90.0%	7,391
-12.5%	87.5%	7,420
-15.0%	85.0%	7,449

Grade Change		NPV (ZAR'million) 7,231
-15.0%	85.0%	3,426
-12.5%	87.5%	4,087
-10.0%	90.0%	4,731
-7.5%	92.5%	5,366
-5.0%	95.0%	6,012
-2.5%	97.5%	6,647
	100.0%	7,273
2.5%	102.5%	7,903
5.0%	105.0%	8,534
7.5%	107.5%	9,163
9.5%	109.5%	9,666
12.5%	112.5%	10,411
15.0%	115.0%	11,021

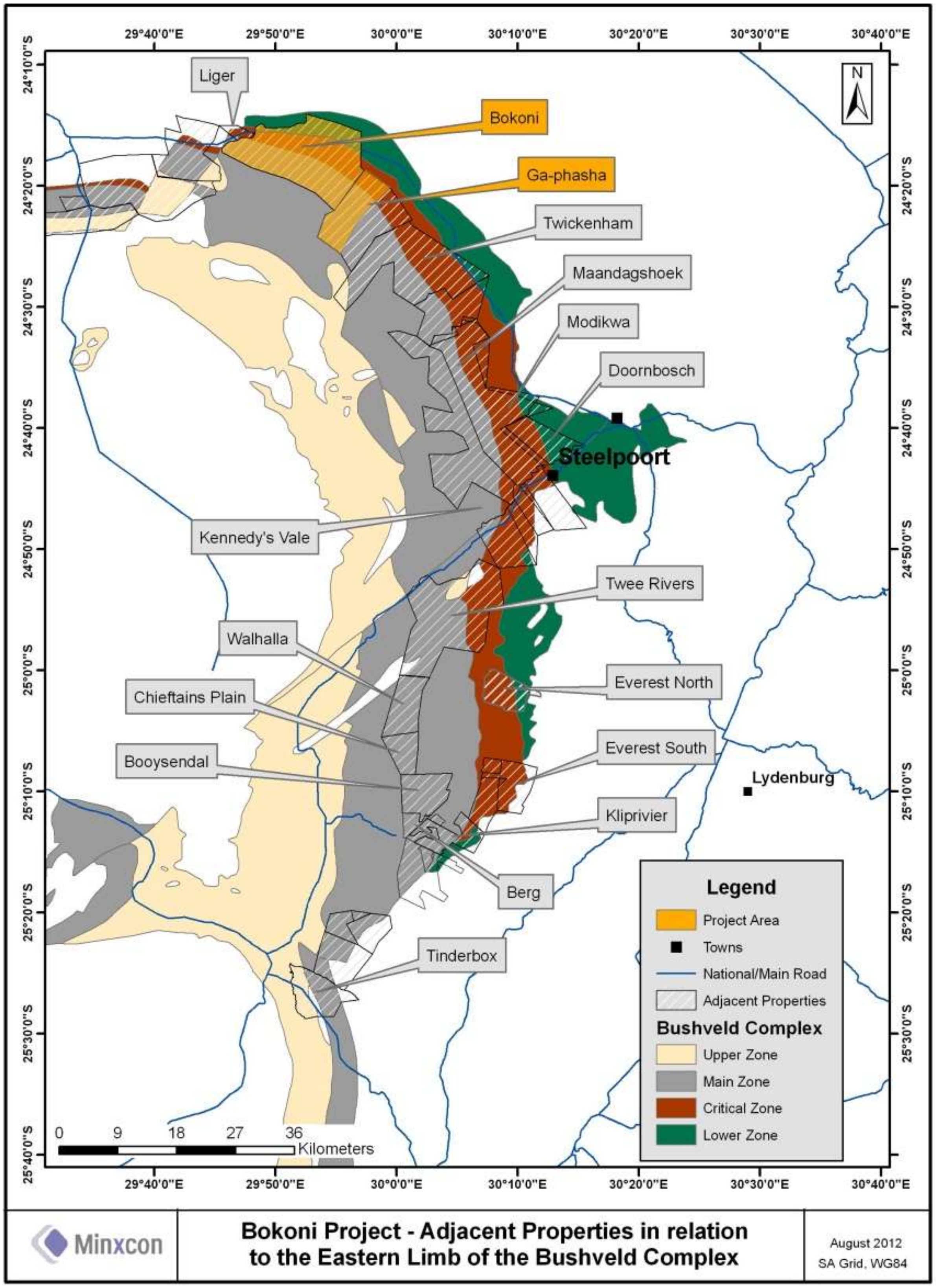
Plant Capex Change		NPV (ZAR'million) 7,231
15.0%	115.0%	7,149
12.5%	112.5%	7,170
10.0%	110.0%	7,190
7.5%	107.5%	7,211
5.0%	105.0%	7,232
2.5%	102.5%	7,252
	100.0%	7,273
-2.5%	97.5%	7,294
-5.0%	95.0%	7,314
-7.5%	92.5%	7,335
-10.0%	90.0%	7,355
-12.5%	87.5%	7,376
-15.0%	85.0%	7,397

ITEM 23 – ADJACENT PROPERTIES

Item 23 (a) – Public Domain Information

The adjacent properties to Bokoni, showing common mineralised structures, are displayed in Figure 79.

Figure 79: Adjacent Properties



Item 23 (b) – Source of the Information

N/A

Item 23 (c) – Verification of Information

N/A

Item 23 (d) – Applicability of Adjacent Property's Mineral Deposit to Project

N/A

Item 23 (e) – Historical Estimates of Mineral Resources or Mineral Reserves

N/A

ITEM 24 – OTHER RELEVANT DATA AND INFORMATION

Item 24 (a) – UPSIDE POTENTIAL

Upside potential exists for the both the Ga-Phasha opencast and underground mining operations, as Resource drilling still needs to be completed.

ITEM 25 – INTERPRETATION AND CONCLUSIONS

Minxcon has reviewed all the information and has made the following observations regarding the Bokoni Platinum Mine:

Mineral Resources

- This Technical Report and the technical work on which it is based, provide a compliant Mineral Resource estimate. An estimated block model has been constructed and can be used as a tool to guide future exploration and mining decisions.
- ExplorMine Consultants, Minxcon and Atlatsa geologists collectively have extensive experience in the geology of the Bokoni Mine Bushveld Complex style of mineralisation and the estimation thereof. The estimation was based on all available historic and recent exploration and mining data.
- A combination of historic and recent desurveyed surface drillhole reef intercepts and an aeromagnetic survey completed by Amplats were used by ExplorMine Consultants in a complete first principles structural interpretation.
- The Mineral Resource estimate presented in this Report for the Merensky and UG2 Reefs is based on several sets of data. This data was collected over an extended period of time from the 1960s to the present. The data set includes surface and underground diamond drillholes represented by electronic databases, geophysical data and underground channel sampling data. ExplorMine Consultants has completed its own assessment and validations on primary data, and considers the validity and quality of the historic and recent data to be reasonable. The data complies with acceptable standards and norms and is considered of sufficient quality for use in Mineral Resource estimates.
- Geological modelling recognises two distinct geological zones in the UG2 Reef. These zones have been used as a basis for geostatistical modelling.
- ExplorMine Consultants has in preparation of this Report on the Mineral Resource estimate, collated and compiled a single comprehensive composite database consisting of surface and underground drillhole composites and chip sampling composites. All composite data has been corrected for dip and therefore true width has been accounted for. All of the composites were coded for project area, source type (drillholes and channel sampling), reef type, facies and reef disturbance (pothole or bifurcation).
- Although the majority of the drillhole data, historic and recent, is already stored in electronic format, database codes and protocols are not standardised. In addition, the channel sampling database on site does not have the capacity to store individual prill splits; only the 4E value is stored.
- A block modelling process was undertaken to allow estimation of the UG2 Reef in Datamine™. The resultant block models are designed to facilitate the use of mineral optimisation software.
- A complete re-evaluation of the Mineral Resources has been performed based on the database that has been electronically captured, completely checked and corrected. It is intended to perform an evaluation that will give a spatial expression of value distribution, so that the extraction of the Mineral Resources can be planned efficiently.
- Kriging was affected into a geological block model, which produced a spatial distribution of low and high-grade in reef structural blocks, which enables the design of single reef mining. Ordinary kriging was applied to Measured, Indicated and Inferred Mineral Resource categories.

Mining

- The 2012 LoM plan is deemed realistic and achievable.
- The modifying factors that were applied to the Mineral Resources to convert it to Mineral Reserves are realistic.
- The life of mine is long, approximately 39 years for the UG2 reef and 28 years for the Merensky reef.
- It is a mature, well-established operation.
- There is upside potential by including the Klipfontein portion in future LoM planning and Mineral Reserve estimations.

Processing

- The ore metallurgy is well-known and understood. No foreseeable changes in ore mineralogy is expected.
- The two plants at Bokoni are reasonably designed and can perform at a higher level if adequately maintained and managed.
- The Merensky plant, on average, had a higher recovery than the UG2 plant which is typical of most orebodies in the Bushveld Igneous Complex.

- Higher unit costs were recorded for the UG2 plant due to lower tonnages.
- The overall financial performance before the October labour strikes was stable. An overall opex of ZAR220/t was recorded for 2012.

Market Valuation

- The Bokoni Operation has a significant mineral resource with a long LOM on both the Merensky reef and UG2 reef.
- A DCF value range of ZAR4.47 billion to ZAR9.42 billion with a best estimated value of ZAR7.23 billion is placed on the LOM based on Reserve only.
- Cumulative cash flow remains negative until 2017.
- The operation has a high profitability and an NCE margin of 29% based on economic parameters provided.
- Cash flow turns negative in 2047 in the planned area and this will need to be considered in the long-term planning of the mine. As a result, the cash flow was trimmed back to year 2046 – a life of mine of 34 years.
- The operation is highly sensitive to commodity prices and the ZAR/USD exchange rate.

ITEM 26 – RECOMMENDATIONS

Minxcon recommends the following for the Bokoni Platinum Mine:

Mineral Resources

- As a consequence of the Mineral Resource estimate and associated review of source data for the estimate, as detailed in this report, ExplorMine Consultants recommend the following:
- In terms of the SABLE™ Data Warehouse surface drillhole database;
- The SABLE™ drillhole database has many exceptions which need to be resolved, including:
  - Missing collar co-ordinates;
  - Missing deviation surveys; and
  - Missing assays.
- The stratigraphic coding in the SABLE™ database has several generations of coding and nomenclature. The stratigraphic codes require standardisation.
- The identification of pothole and bifurcate Merensky Reef and UG2 Reef intersections is not clearly indicated in the SABLE™ database.
- The identification of the Merensky and UG2 Reef mining cuts is not standardised and have several iterations which differ.
- The flags in the database, which indicate the status of the data for use/non-use need to be revised. Additional flags should be introduced to indicate whether the data can be used for estimation and or geological modelling.
- Composites from previous resource estimations should be stored in the database.
- Regular database audits (internal/external) should be conducted to ensure exceptions are eliminated.
- In terms of the underground channel sampling:
  - Although the EBRL laboratory analyses each individual element comprising the 4E value, only the 4E value and composite value are stored in the Bokoni Mine GMSI MRM software. This precludes the use of channel sampling individual element data for geostatistical analysis.
  - The continuation of the practice of underground channel sampling should be reviewed in context of other possible alternatives such as underground drilling programmes from underground development.
- In terms of the geological zone/facies definition:
  - Although at least two geological zones or facies were defined for the UG2 Reef, ExplorMine Consultants recommends that mine geological staff attempt to define more detailed subdivisions for both the Merensky and UG2 Reefs based on geological attributes. If successful, geostatistical analysis and variography studies are likely to be improved.
  - In addition to the above, ExplorMine Consultants also recommends that a study of the vertical mineralisation profile for the Merensky Reef versus the lithology or stratigraphic profile be initiated. It is clear from initial studies that the mineralisation profile relative to the lithology profile changes from one geographic area to another. This may have implications for the determinations of "mining profiles or cuts".
  - Additional reconciliation protocols should be introduced where the annual Mineral Resource estimate is compared to actual mining results to ensure that resource estimation parameters are optimised.

Mining

- It is recommended that pit optimisations be conducted on the Klipfontein Opencast.

Processing

- It is recommended that tonnages be increased for the UG2 plant to ensure that unit costs are decreased. This is, however, dependent on supply of ore from the mine.
- The implementation of advanced process control software may increase overall plant stability during start-up, mill circuit and flotation circuit control enabling recovery improvements. It is recommended that advanced control be trialled at Bokoni to evaluate its viability.

ITEM 27 – REFERENCES

- Booth, R (2007), Project Geological Report.
- Digby Wells Environmental (2011).Environmental Liability Assessment for Bokoni Platinum Mines.
- Environmental Groundwater Solutions cc & Groundwater Monitoring Services cc 2003, Assessment of Impacts on Ground Water Resources at the Proposed Merensky Reef Shafts
- Brakfontein 464ks, Lebowa Platinum Mines, for Amplats.
- du Plessis SJ, Rompel AKK, Luck EC & Courtnage P 2004, Aeromagnetic Survey Interpretation and Correlation with other remotely sensed Data on Lebowa PM. (Geosciences Resource Group)
- ExplorMine Consultants (2012), Technical Report, The Mineral Resource Estimate for The Merensky and UG2 Reefs at The Bokoni Platinum Mine and Ga-Phasha West Area, Limpopo Province, Republic of South Africa.
- Harmer, RE & Sharpe, MR 1985, Field relations and strontium isotope systematics of the marginal rocks of the eastern Bushveld Complex, pp. 813-837 in Economic Geology 80.
- Jarman, DJ (2011), Comparison of rock density determination methods used in South African Platinum mines for resource planning purposes. University of Pretoria. King HL et. al. 2012, An Independent Qualified Persons' Report on the Bokoni Platinum Mine, Limpopo
- Landsat program, From Wikipedia, the free encyclopaedia, Last updated: 24 July 2012 at 09:01, accessed on 26 August 2012
- Province, South Africa, Anooraq Resources Corporation, pp. 170 Minxcon.
- Malysiak, V 2001, Middelpunt Hill testwork – report 1, Natural fines flotation, Amplats Mineral Processing Research
- Martinelli, E and Associates 1999, Report on Hydrogeology and Groundwater Resources of Klipfontein 465 KS/Brakfontein 464 KS and Umkoanesstad 419 KS, Martinelli, E. and Associates Consulting Hydrogeologists and Hydrogeophysicists.
- South African Committee for Stratigraphy (SACS) (1980), Lithostratigraphy of the Republic of South Africa, South West Africa/Namibia, and the Republic of Bophuthatswana Transkei and Venda, pp. 633, in Handbook Geological Survey South Africa 8
- Shamaila, S 08/10/2004, Metallurgical testwork on 7 UG2 drill cores from Zeekoegat Using a grind of 60% - 75µm
- Shamaila, S 20/10/2004, Metallurgical testwork on 7 UG2 drill cores from Zeekoegat Using a grind of 60% - 75µm
- Shamaila, S & Roberts, JR 2005, Mineralogy and metallurgical response of seventeen UG2 borehole intersections from Umkoanesstad, north-eastern Bushveld platinum project no. 197. Amplats Mineralogical & Minerals Processing Research Departments.
- Van der Kevie, B 2012. Technical support document Bokoni Platinum Mines – rock engineering.

Appendix 1: Qualified Persons' Certificates

CERTIFICATE of QUALIFIED PERSON - CJ Muller

I, Charles Muller, do hereby certify that:

1. I am a Director of Minxcon Consulting (Pty) Ltd
   Suite 5 Coldstream Office Park,
   2 Coldstream Street,
   Little Falls, Roodepoort, South Africa
2. I graduated with a BSc. (Geol.) degree from the Rand Afrikaans University in 1988. In addition, I have obtained a BSc. Hons. (Geol.) from the Rand Afrikaans University in 1994 and attended courses in geostatistics and advanced Datamine™ modelling and geostatistical evaluation through the University of the Witwatersrand.
3. I have worked as a Geoscientist for more than 25 years. As the former Chief Geologist for Goldfields South Africa, my specialisation lies within Mineral Resource modelling and management. I have completed a number of Mineral Resource estimates and reports pertaining to platinum group metals ("PGMs") deposits, using approaches described by the Canadian Code for reporting of Mineral Resources and Reserves – National Instrument 43-101 (Standards of Disclosure for Mineral Projects).
4. I am a member/fellow of the following professional associations, which meet all the attributes of a Professional Association or a Self-Regulatory Professional Association, as applicable (as those terms are defined in NI43-101):-

Class	Professional Society	Year of Registration
Member	Geostatistical Association of Southern Africa	2008
Member	South African Council for Natural Scientific Professions (Pr. Sci. Nat. Reg. No. 400201/04)	2004

5. I am responsible for the preparation of Item 7-12 & 14 of the Technical Report titled "Independent Qualified Persons' Report on the Bokoni Platinum Mine, in the Mpumalanga Province, South Africa", effective 28 November 2012
6. I have read the definition of "Qualified Person" set out in the Canadian Code for reporting of Resources and Reserves – National Instrument 43-101 (Standards of Disclosure for Mineral Projects), Form 43-101F1 and the Companion Policy Document 43-101CP ("NI 43-101") and certify that by reason of my education, affiliation with professional associations and past relevant work experience, I fulfil the requirements to be a Qualified Person for the purposes of this Qualified Persons' Report.
7. I have read the NI43-101 and this Report has been prepared in compliance with it.
8. As of the effective date, to the best of my knowledge, information and belief, the Report contains all scientific and technical information required to be disclosed to make the Report not misleading.
9. The facts presented in the Report are, to the best of my knowledge, correct.
10. The analyses and conclusions presented in the Report are limited only by the reported forecasts and conditions.
11. I have no present or prospective interest in the subject property or asset and have no bias with respect to the assets that are the subject of the Report, or to the parties involved with the assignment.
12. I have read this technical Report and NI43-101 Standards of Disclosure for Mineral Projects and this Report has been prepared in compliance with NI43-101.
13. My compensation, employment or contractual relationship with the Commissioning Entity is not contingent on any aspect of the Report.
14. I have not personally inspected the property, as the inspection was undertaken by other competent persons working on the project.
15. I have had no prior involvement with the property that is the subject of this Report.

Yours faithfully,

CJ MULLER

BSc. (Hons.) (Geol.), Pr. Sci. Nat., MGSSA

CERTIFICATE of QUALIFIED PERSON – D v Heerden

I, Daniel van Heerden, do hereby certify that:

1. I am a Director of **Minxcon Consulting (Pty) Ltd**
   Suite 5, Coldstream Office Park,
   2 Coldstream Street,
   Little Falls, Roodepoort, South Africa
2. I graduated with a B.Eng. (Mining) degree from the University of Pretoria in 1985 and an M.Comm. (Business Administration) degree from the Rand Afrikaans University in 1993. In addition, I obtained diplomas in Data Metrics from the University of South Africa and Advanced Development Programme from London Business School in 1989 and 1995, respectively. In 1989 I was awarded with a Mine Managers Certificate from the Department of Mineral and Energy Affairs.
3. I have worked as a Mining Engineer for more than 28 years with my specialisation lying within Mineral Reserve and mine management. I have completed a number of Mineral Reserve estimations and mine plans for platinum group metals ("PGMs") deposits using approaches described by the Canadian Code for reporting of Resources and Reserves – National Instrument 43-101 (Standards of Disclosure for Mineral Projects).
4. I am a member/fellow of the following professional associations, which meet all the attributes of a Professional Association or a Self-Regulatory Professional Association, as applicable (as those terms are defined in NI43-101):-

Class	Professional Society	Year of Registration
Member	Association of Mine Managers of SA	1989
Fellow	South African Institute of Mining and Metallurgy	1985
Professional Engineer	Engineering Council of South Africa (ECSA)	2005
Member	Engineering Council of South Africa (Pr. Eng. Reg. No. 20050318)	2005

5. I am responsible for the preparation of Item 15-16 & 18 of the Technical Report titled "Independent Qualified Persons' Report on the Bokoni Platinum Mine, in the Mpumalanga Province, South Africa", effective 28 November 2012
6. I have read the definition of "Qualified Person" set out in the Canadian Code for reporting of Resources and Reserves – National Instrument 43-101 (Standards of Disclosure for Mineral Projects), Form 43-101F1 and the Companion Policy Document 43-101CP ("NI 43-101") and certify that by reason of my education, affiliation with professional associations and past relevant work experience, I fulfil the requirements to be a Qualified Person for the purposes of this Qualified Persons' Report.
7. I have read the NI43-101 and this Report has been prepared in compliance with it.
8. As of the effective date, to the best of my knowledge, information and belief, the Report contains all scientific and technical information required to be disclosed to make the Report not misleading.
9. The facts presented in the Report are, to the best of my knowledge, correct.
10. The analyses and conclusions presented in the Report are limited only by the reported forecasts and conditions.
11. I have no present or prospective interest in the subject property or asset. I have no bias with respect to the assets that are the subject of the Report, or to the parties involved with the assignment.
12. I have read this technical Report and NI43-101 Standards of Disclosure for Mineral Projects and this Report has been prepared in compliance with NI43-101.
13. My compensation, employment or contractual relationship with the Commissioning Entity is not contingent on any aspect of the Report.
14. I made a personal inspection of the property on 7 January 2013. During this visit, the Life of Mine and infrastructure were reviewed. This visit also served as the Qualified Persons' visit of the Project Area.
15. I have had no prior involvement with the property that is the subject of this Report.

Yours faithfully,

D v HEERDEN

B.Eng. (Mining), M.Comm. (Bus. Admin.)

Pr. Eng., FSAIMM, AMMSA

CERTIFICATE of COMPETENT PERSON - D Clemente

I, Dario Clemente, do hereby certify that:

1. I am a Director of **Minxcon Consulting (Pty) Ltd**
   Suite 5, Coldstream Office Park,
   2 Coldstream Street,
   Little Falls, Roodepoort, South Africa
2. I graduated with an HND (Ext. Met.) from the University of the Witwatersrand in 1976. In addition, I have completed the Business Leadership Development Programme at (WBS)
3. I have more than 37 years' experience in the mining and metallurgical industry. This includes 15 years as a metallurgical manager and consultant as well as four years in mine management. I have completed various technical reports on metallurgical operations and have been co-author of a technical paper presented overseas. I have completed a number of assessments and technical reports pertaining to platinum group metals ("PGMs"), using approaches described by the Canadian Code for reporting of Resources and Reserves – National Instrument 43-101 (Standards of Disclosure for Mineral Projects).
4. I am a member/fellow of the following professional associations, which meet all the attributes of a Professional Association or a Self-Regulatory Professional Association, as applicable (as those terms are defined in NI43-101):-

Class	Professional Society	Year of Registration
Fellow	South African Institute of Mining and Metallurgy (FSAIMM Reg. No. 701139)	1995
Member	Mine Metallurgical Managers Association of South Africa (MMMA) No. (M000948)	1988

5. I am responsible for the preparation of Item 13 & 17 of the Technical Report titled "Independent Qualified Persons' Report on the Bokoni Platinum Mine, in the Mpumalanga Province, South Africa", effective 28 November 2012
6. I have read the definition of "Qualified Person" set out in the Canadian Code for reporting of Resources and Reserves – National Instrument 43-101 (Standards of Disclosure for Mineral Projects), Form 43-101F1 and the Companion Policy Document 43-101CP ("NI 43-101") and certify that by reason of my education, affiliation with professional associations and past relevant work experience, I fulfil the requirements to be a Qualified Person for the purposes of this Qualified Persons' Report.
7. I have read the NI43-101 and this Report has been prepared in compliance with it.
8. As of the effective date, to the best of my knowledge, information and belief, the Report contains all scientific and technical information required to be disclosed to make the Report not misleading.
9. The facts presented in the Report are, to the best of my knowledge, correct.
10. The analyses and conclusions presented in the Report are limited only by the reported forecasts and conditions.
11. I have no present or prospective interest in the subject property or asset and have no bias with respect to the assets that are the subject of the Report, or to the parties involved with the assignment.
12. I have read this technical Report and NI43-101 Standards of Disclosure for Mineral Projects and this Report has been prepared in compliance with NI43-101.
13. My compensation, employment or contractual relationship with the Commissioning Entity is not contingent on any aspect of the Report.
14. I made a personal inspection of the property on 12 October 2011, during which I conducted a plant review. After this visit I also conducted numerous follow-up visits.
15. I have had no prior involvement with the property that is the subject of this Report.

Yours faithfully,

D Clemente

NHD (Ext. Met.), GCC, MMMMA, FSAIMM

CERTIFICATE of COMPETENT VALUATOR - N J Odendaal

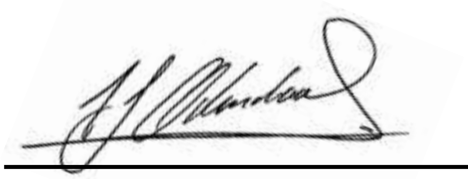
I, Johan Odendaal, do hereby certify that:

1. I am a Director of **Minxcon Consulting (Pty) Ltd**
   Suite 5, Coldstream Office Park,
   2 Coldstream Street,
   Little Falls, Roodepoort, South Africa
2. I graduated with a BSc (Geol.) degree from the Rand Afrikaans University in 1985. In addition, I have obtained a BSc (Hons.) (Mineral Economics) from the Rand Afrikaans University in 1986 and an MSc (Min. Eng.) from the University of the Witwatersrand in 1992.
3. I have worked as a Geoscientist for more than 25 years. As a former employee of Merrill Lynch, I was actively involved in advising mining companies and investment bankers on corporate-related issues, analysing platinum and gold companies. I completed a number of valuations on various commodities including platinum group metals (“PGMs”), using the valuation approaches described by the Standards and Guidelines for Valuation of Mineral Properties recommended by the Special Committee of the Canadian Institute of Mining, Metallurgy and Petroleum or Valuation of Mineral Properties (CIMVAL).
4. I am a member/fellow of the following professional associations, which meet all the attributes of a Professional Association or a Self-Regulatory Professional Association, as applicable (as those terms are defined in CIMVAL):-

Class	Professional Society	Year of Registration
Member	Geological Society of South Africa (MGSSA No. 965119)	2003
Fellow	South African Institute of Mining and Metallurgy (FSAIMM Reg. No. 702615)	2003
Member	Australasian Institute of Mining and Metallurgy (MAusIMM Reg. No. 220813)	2003
Member	South African Council for Natural Scientific Professions (Pr. Sci. Nat. Reg. No. 400024/04)	2003

5. I am responsible for the preparation of Item 1-6 & 19-22 of the Technical Report titled “Independent Qualified Persons’ Report on the Bokoni Platinum Mine, in the Mpumalanga Province, South Africa”, effective 28 November 2012
6. I have read the definition of “Qualified Person” set out in the Canadian Code for reporting of Resources and Reserves – National Instrument 43-101 (Standards of Disclosure for Mineral Projects), Form 43-101F1 and the Companion Policy Document 43-101CP (“NI 43-101”) and certify that by reason of my education, affiliation with professional associations and past relevant work experience, I fulfil the requirements to be a Qualified Person for the purposes of this Qualified Persons’ Report.
7. I am a Qualified Valuator as the terms are defined in CIMVAL for the purpose of the valuation and the Valuation Report.
8. I have read the NI43-101 and this Report has been prepared in compliance with it.
9. As of the effective date, to the best of my knowledge, information and belief, the Report contains all scientific and technical information required to be disclosed to make the Report not misleading.
10. The facts presented in the Report are, to the best of my knowledge, correct.
11. The analyses and conclusions presented in the Report are limited only by the reported forecasts and conditions.
12. I have no present or prospective interest in the subject property or asset and have no bias with respect to the assets that are the subject of the Report, or to the parties involved with the assignment.
13. My compensation, employment or contractual relationship with the Commissioning Entity is not contingent on any aspect of the Report.
14. I made a personal inspection of the property on 4 April 2012, during which I familiarised myself with the above-ground infrastructure and the Ga-Phasha project. I also visited the head office on several occasions (9, 24 & 31 January 2013) to discuss the financial model.
15. I have had no prior involvement with the property that is the subject of this Report.

Yours faithfully,



NJ ODENDAAL

BSc (Geol.), BSc (Hons.) (Min. Econ.), MSc (Min. Eng.)

Pr. Sci. Nat., FSAIMM, MGSSA, MAusIMM