21 July 2014

BUSHVELD MINERALS LIMITED

Bushveld Vanadium Project – Scoping Study Results

Bushveld Minerals Limited today presented a summary of the Scoping Study for the development of its Bushveld Vanadium Project in Limpopo Province, South Africa.

Two different processing routes were considered for the development of the Project – the salt roast and the pig-iron smelting route. The Scoping Study has helped the Company to select the salt roast processing route as the best fit with the Company's criteria for the development of its projects, being: first quartile cost curve position, proven path to near-term production, low capital expenditure and scalability.

Scoping Study Highlights

For a base case production scenario of 1 Mtpa Run-of-Mine producing 10,370 tonnes of V_2O_5 flakes, the Scoping Study delivers robust post-tax economics (i.e after a corporate tax of 28%, a withholding tax of 15% and a royalty tax of 5%):

- **Low capital expenditure of US$261.5 million;**
- **Pre-tax NPV of US$561.9 m and post-tax NPV of US$263.6 m (at 10% discount rate);**
- **Pre-tax IRR of 35.6% and real post-tax IRR of 24.1% with a low project risk profile;**
- **Low operating costs (~US$5.99 / kg or US$ 2.72 / lb of V_2O_5 flakes);**
- **>60% operating margins;**
- **Long life-of-mine: 30 years, exploiting 58% of a resource with significant growth upside; and**
- **Payback: 4 years and 4 months from start of mining.**

The Scoping Study was led by independent consultants with extensive experience in titano-magnetite processing, including experience with commercial operations in South Africa and the rest of the world that utilise the same Salt-Roast processing flowsheet as envisaged for the Bushveld Vanadium Project.

A 2017 price of US$7.50 / lb (US$16.53 / kg) of V_2O_5 flakes, >98% purity, was estimated by the Company and assumed in this Scoping Study, based on information gathered from 2013 Roskill and CRU Strategies' vanadium reports.

About the Bushveld Vanadium Project

The project has a large, JORC-compliant 52 Mt vanadium mineral resource on the Main Magnetite Layer ("MML"), consistent along a 5.5 km strike length. Resource and project characteristics include:

- World class vanadium grades (~1.48% V_2O_5 in situ, 2.0% V_2O_5 in concentrate) for a total contained vanadium resource of ~760 000 tonnes of V_2O_5

- Outcropping on surface, with a thickness of over 7 m and gently dipping, presenting a low cost open pit mining proposition
- Current JORC resource based on only one of three high-vanadium containing zones, and estimated currently to 120 m vertical depth (there is scope for further resource upgrades at depth and from defining a mineral resource on the MML-Hanging Wall package)
- Processing route uses proven beneficiation technologies already in use in commercial operations in South Africa and globally to produce high value V_2O_5 flakes
- Sufficient, existing paved road and rail infrastructure options to transport expected product volumes
- Power requirements which can be met by an existing transmission line 25 km from the Project area, and sufficient water resources available to meet the Project's water requirements

Bushveld has a number of opportunities to further improve the project economics from those today presented by the Bushveld Vanadium Project Scoping Study. These include:

- Potential to extract additional value from the ~650,000 tonnes per annum of iron-rich calcine dumps (~54% Fe, 0.27% V_2O_5, 11.4% TiO_2)
- Ability to convert V_2O_5 flake output to higher value product such as ferro-vanadium
- Scope for processing the high-grade ore contained in the Main Magnetite Layer's hanging wall, which is currently treated as waste in determining the project's stripping ratio. The presented mineral resource does not yet include a ~60 m zone within the MML hanging wall which is expected to have average in-magnetite V_2O_5 grades of between 1.5% and 1.7%. Bushveld is evaluating this zone with a view to incorporating it into an updated JORC resource for the project.
- Additionally, there is scope to access additional tonnages at a greater depth than the 80 m assumed in the Scoping Study

The metallurgical test work and the geological work already completed on the Project are sufficient for a Pre-feasibility study. The Company has already commenced with other components of a Pre-Feasibility Study, including Detailed Mine Design and Scheduling, Infrastructure Capital & Cost Estimates, Environmental Impact Assessments and the Social and Labor Plan. The intention is to complete and release the results of the Pre-Feasibility Study during 2015.

Bushveld Minerals CEO, Fortune Mojapelo, said:

"The Scoping Study announced today is a significant milestone that brings us one step closer towards unlocking the value of this world-class vanadium resource. We are pleased that it has been completed just eight months after the Bushveld Vanadium Project was established as a standalone platform.

The Project enjoys robust economics with significant upside opportunities, which will be investigated further during the Pre-feasibility Study that has already commenced. The salt roast processing flowsheet selected is well known in South Africa and considered commercially favourable. There are at least three operations making use of this process – including Glencore's Rhovan and Evraz's Vametco operations.

At 10,370 tonnes per annum utilizing a modest capex of US$262m, the project will be one of the world's largest, low-cost primary vanadium producers with very attractive economics on a post-tax basis. The post-tax numbers did not assume any tax incentives in South Africa that may exist in support of in-country beneficiation. We believe that, given South Africa's intent to promote in-country beneficiation, there could be tax incentives available to the project, which would improve these economics.

We are proud that this project will make a significant contribution to South Africa's stated interests to grow the minerals beneficiation industry in the country and we look forward to taking the project forward with an accelerated Pre-Feasibility Study"

BUSHVELD VANADIUM PROJECT
SCOPING STUDY

EXECUTIVE SUMMARY

INTRODUCTION

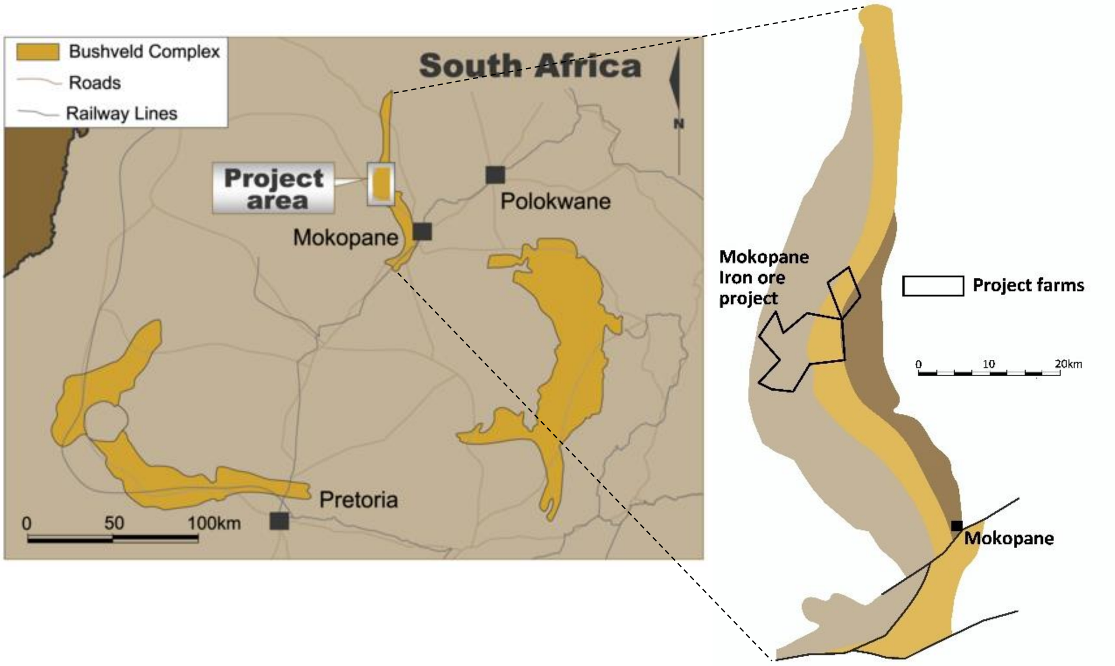
On the 27th November 2013, Bushveld Minerals announced a new vanadium platform based on its vanadiferous titaniferous magnetite ("VTM") deposit, which is contained in three units associated with the Main Magnetite Layer ("MML") of the Company's project, located on the Bushveld Complex. The new platform, named the Bushveld Vanadium Project, was established to focus on accelerated development of a world-class vanadium resource in the MML, with the potential to become one of the world's largest vanadium producing operations.

The vanadium resource potential of the MML was known to Bushveld Minerals from the inception of the platform and, subsequent to the completion of the Scoping Study on its adjacent PQ-Zone iron ore and titanium deposit (April 2013), Bushveld initiated the Scoping Study on its MML deposit.

The Scoping Study work-streams were completed by a group of respected consulting firms including Process Engineering Solutions Company ("PESCO"), Hatch Goba, Hindsight Financial and Commercial Solutions, in addition to Bushveld Minerals' technical team. Extractive metallurgical test-work was undertaken by SGS SA, and Resource Estimations were all carried out by the MSA Group. Previously commissioned reports by SRK Consulting, First Tech International Limited and Mott McDonald were relied upon for the desktop hydrogeological, potential power source and logistics studies respectively. Additionally, 2013 CRU Strategic and Roskill vanadium reports were utilized for the market studies.

PROJECT LOCATION

The Bushveld Vanadium Project is located approximately 65 km west of Polokwane and 45 km north-northwest of Mokopane in the Mokopane District, Limpopo Province, South Africa. It is easily accessible via a network of paved regional and national roads. The project mineral resource is situated approximately 2 km east of the Company's PQ-Zone iron ore and titanium deposit, and is based on a licence area comprising a group of five adjacent farms namely Vogelstruisfontein 765LR, Vliegekraal 783LR, Vriesland 781LR, Schoonoord 786LR and Bellevue 808LR.



Location of the Mokopane Iron Ore Project in relation to the Bushveld Complex and infrastructure

GEOLOGY

The Project is based on three mineralized layers associated with the main magnetite layer ("MML"), found near the base of the stratigraphy of the Upper Zone of the Bushveld Complex. These are the M

ML, the MML Hanging Wall, and the AB Zone, which is found approximately 100 m lower than the MML in the stratigraphy. The layers are north-south trending with a strike in excess of 5.5km and dipping in a westerly direction at approximately 18° to 22°. They are parallel to and outcrop approximately 2 km east of the P-Q Iron Ore Deposit.

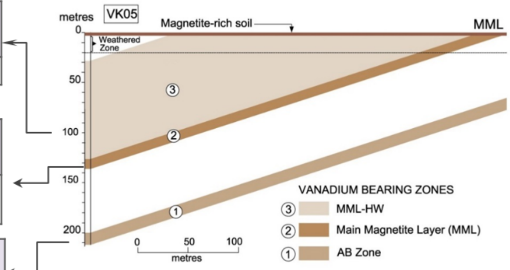
The MML is the only mineralised unit being considered for this Scoping Study, and consists of two VTM-rich intervals or layers – the upper VTM-rich interval (MAG3) which is an average 4.09 m thick and the lower interval (MAG4), which averages 3.59 m in thickness. The two intervals are separated by a VTM-poorer leucogabbronorite parting of about 2.16 m thickness. This internal stratigraphy is consistent along strike and down dip. The total MML package has an average true thickness of 9.84 m, including the 2.16 m thick parting. An initial mineral resource of 52 Mt has been established on the MML (excluding the parting), which was announced on 6 March 2013, and forms the basis for this Scoping Study

The consistency of the mineralisation and significant width of the parting allows for the physical separation of the parting from the MAG3 and MAG4 layers during mining. Consequently, the average feed grade into the concentrator plant is higher than would be if the parting was included, and ultimately allows for higher plant output of iron and vanadium units.

Deposit	Potential Resource (Mt)	Fe%	TiO_2 (%)	V_2O_5 (%)	V_2O_5 in magnetite	Est. V tonnes
MML-HW	>250*	10-15*	2-3*	0.3-0.4*	1.5-1.7%*	> 750 kt*

Deposit	Resource Category	Mt	Fe%	TiO_2 (%)	V_2O_5 (%)	V_2O_5 in magnetite	Total V tonnes
MML	Indicated	51.81	44.7	9.7	1.48	2.01%	766.7 kt

Deposit	Potential Resource (Mt)	Fe (%)	TiO_2 (%)	V_2O_5 (%)	V_2O_5 in magnetite	Est. V tonnes
AB Zone	TBC	28.8*	6.15*	1.17 *	2.38%	TBC



*Grades are estimates based on boreholes drilled and do not represent a resource statement

Cross-section showing showing grades and tonnages of three vanadium-rich horizons, namely the MML, MML-Hanging Wall, and AB Zone

Mineral Resource

The following table summarizes the initial JORC compliant mineral resource on the MML

Layer Name	Thick-ness (m)	Million Tonnes	SG (t/m3)	Fe (%)	Fe Metal (Mt)	TiO_2 (%)	TiO_2 Metal (Mt)	V_2O_5 (%)	V_2O_5 contained (kt)	SiO_2 (%)	Al_2O_3 (%)	P_2O_5 (%)	S (%)
MAG3	4.09	27.50	4.08	45.5	12.51	10	2.75	1.50	412.5	10.6	7.8	0.01	0.12
MAG4	3.59	24.31	4.00	43.9	10.66	9.3	2.26	1.46	354.9	11.8	8.9	0.01	0.24
TOTAL	**7.68**	**51.81**	**4.04**	**44.7**	**23.17**	**9.7**	**5.01**	**1.48**	**767.4**	**11.2**	**8.3**	**0.01**	**0.18**

Combined MML Indicated Mineral Resources, <120 m vertical depth, as at 6 March 2013

Below is a chart comparing the Bushveld Vanadium deposit to its vanadium-producing or exploring peers globally:

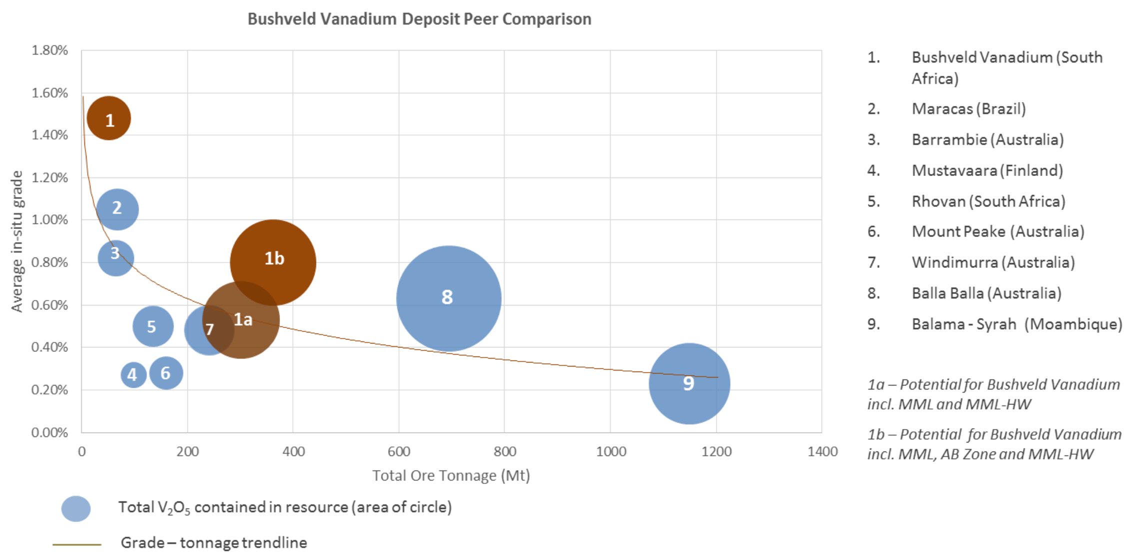


Chart showing Bushveld's vanadium grade and tonnage in comparison to global peers

Production Scenarios

Two distinct processing flowsheet options were considered for the beneficiation of the MML ore, each proven and used in existing commercial operations:

a) **Option 1: A Salt Roast** flow sheet to produce a primary vanadium product, similar to the process employed by Glencore Rhovan and the Evraz Vametco operations in South Africa;

b) **Option 2: A Pig Iron** flow sheet to produce pig iron and a vanadium bearing slag and FeV product, similar to the process employed at the Evraz Highveld Steel & Vanadium plant in South Africa.

The Salt Roast process flowsheet was chosen on account of its significantly lower capex and better overall economics, as well as its relatively short path to production while retaining options for further processing of the iron–rich calcine to produce pig iron at a later stage.

Two production scenarios of Option 1 were investigated, namely:

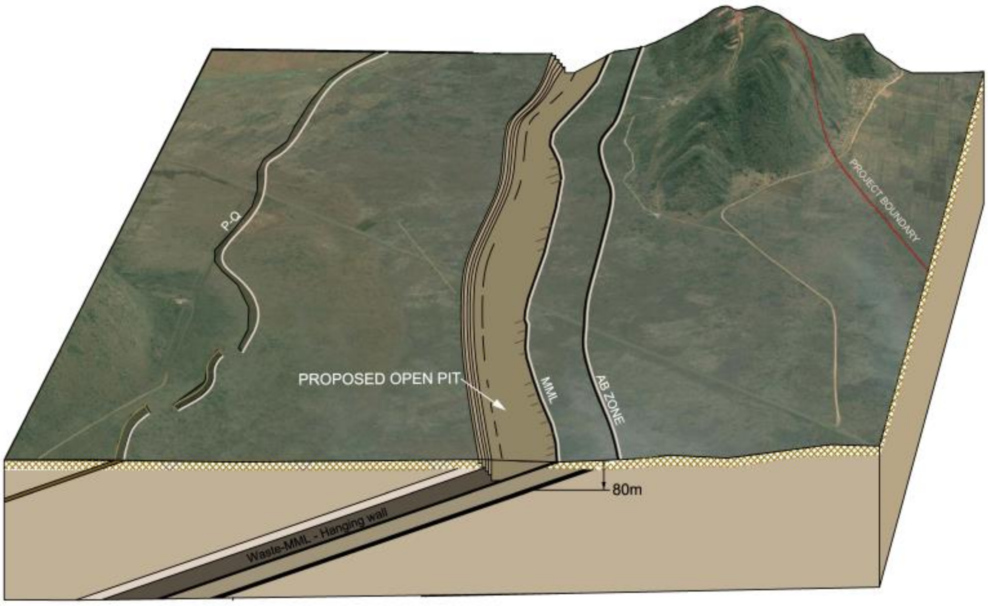
a) A **1 Mtpa ROM** scenario producing 10,350 tpa of V_2O_5 flakes (Base Case)

b) A **528 ktpa ROM** scenario producing 5,470 tpa of V_2O_5 flakes

Mining

The MML orebody is approximately 10 m thick, shallow-dipping, and tabular with over 5.5 km of strike, which makes it ideal for open-cast mining. Conventional drilling, blasting, loading and hauling operations are envisaged. The ore can be readily accessed from surface after minimal overburden (soil) stripping. It is assumed that mining contractors will be used to undertake mining operations. Stripping ratios increase as depth increases, with a life-of-mine average stripping ratio of 4.39 for the 1 Mtpa ROM scenario, and 3.31 for the 528 ktpa ROM scenario. A significant portion of this strip comprises the MML hanging wall ("MML-HW"), an up-to-60 metres thick mineralised package that the Company is currently evaluating. This package has been assayed and is expected to have concentrate vanadium-in-magnetite grades averaging between 1.5% and 1.7% V_2O_5. Mineral resource estimation is now underway and the results will be announced in due course. Accordingly, this hanging wall will be stockpiled for further processing.

Although the total MML package is mined, the MAG3 and MAG4 layers are separated from the parting, and the parting diverted to a separate low-grade stockpile.



3D illustration of proposed open pit mine extracting MML ore

METALLURGY

Initially, the 528 ktpa ROM scenario was forecast to produce exactly 5,000 tpa of V_2O_5 flakes. Further testwork, however, subsequently improved the recovery metrics. The 1 Mtpa scenario was then investigated to determine the effects of economies of scale and was adopted by Bushveld as the base case.

Davis Tube tests were performed on milled MML material at different grind sizes (-212 µm, -106 µm, -75 µm, -53 µm, and -38 µm). Tests revealed that a higher Fe concentrate grade (56% Fe) can be achieved with the MML material than was achieved with the PQ-Zone material (55%Fe).

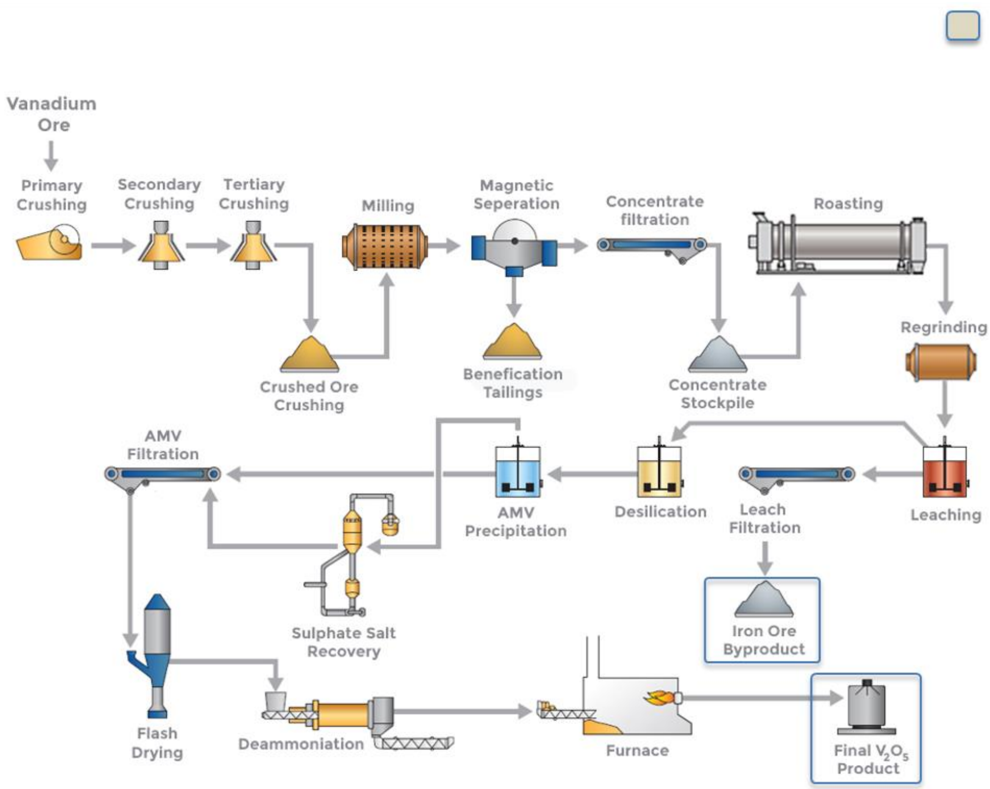
The proposed Salt Roast flowsheet is described below:

- ***Concentration****:* The ore is passed through three-stage crushing, milled with a conventional rodmill-ballmill combination produce a product 80% passing 53 microns and passed through a three-stage low intensity magnetic separation circuit to produce a concentrate product;
- ***Salt Roasting****:* The concentrate is roasted with sodium carbonate and sodium sulphate in a rotary kiln at temperatures of up to 1,150 ˚C to form water soluble vanadates. Solids exiting the rotary kiln are discharged directly into a rotary cooler that cools the solids to 350 ˚C;
- ***Leach milling and purification****:* The cooled calcine is fed to a wet ball mill, which grinds the agglomerated material for improved leaching and also acts as the first stage of leaching. The slurry from the mill is pumped to thickeners where desilication and concentration of the vanadium-bearing leach liquor takes place. Thickened tailings are conveyed to the tailings disposal facility.
- ***Ammonium metavanadate precipitation***: Ammonium sulphate (AMSUL) is added to the vanadium-bearing leach liquor which allows for the precipitation of vanadium in the form of ammonium metavanadate (AMV);

- ***De-ammoniation and fusion***: The AMV filter cake is dried in a diesel-fired flash dryer and calcined in a diesel-fired AMV calciner to produce V_2O_5. The calcined V_2O_5 powder is charged into a fusion furnace to form molten V_2O_5;
- ***Flaking**:* The molten V_2O_5 is continuously tapped and flows onto water-cooled flaking wheels forming a thin layer of V_2O_5, which solidifies and is then scraped off as the final product of V_2O_5 flakes;

The V_2O_5 product can be sold directly into the vanadium market or can be processed further into a 80% FeV (Ferrovanadium) product through a simple process using an aluminothermic reactor.

Vanadium plant designs for production of either ~10,350 ktpa V_2O_5 flakes (under the 1 Mtpa ROM scenario) or ~5,470 ktpa of V_2O_5 flakes (528 ktpa ROM scenario) were analysed and costed.



High-level illustrative block flow diagram of vanadium plant

RAIL, PORT, POWER, AND WATER INFRASTRUCTURE

The envisaged production of 10,350 tonnes per annum (or 863 tonnes per month) does not present infrastructure constraints. Moreover, the project area is well serviced with infrastructure, being located in a well-established mining district with existing world-class mining operations:

- ***Rail & Road***: The envisaged V_2O_5 product volumes (10,350 tonnes) can be transported to market easily either by road or rail. A well-serviced network of paved roads connects the project area to the ports of Richard's Bay (South Africa) or Matola (Mozambique). A rail line with sufficient capacity for the envisaged V_2O_5 production passes 45 km from the Project area. At 650,000 tonnes per annum, the calcine product could also be transported to the market without any significant infrastructure constraints;
- ***Port***: Options exist in the form of the Richard's Bay Terminal (KwaZulu Natal, South Africa) and the Matola Terminal (Maputo, Mozambique), both of which are undergoing capacity expansions;

- ***Power***: Power requirements for the 1 Mtpa Rom scenario and 528 ktpa scenario are low (~15 MW and ~8 MW respectively), and can be met by building transmission infrastructure connecting to the national grid via the Matimba / Witkop dual 400 kV lines from Matimba power station, or the 132 kV Witkop / PPRust line both passing ~25 km from the Project area;

  Moreover, power supply from the national grid will be supplemented by 9,600 MW with the progressive commissioning of both the Medupi and Kusile power stations over the next 5 years. Power supply is therefore not considered a constraint;

- ***Water***: Sufficient resources have been identified within the Bakenburg Rural Water Scheme (RWS), where studies have shown available groundwater potential exists in excess of the Project requirements of the required ~2 Megalitres per day. A potential groundwater resource has also been identified within the Project area with sufficient supply to meet Project requirements;
- ***Coal***: The project is ideally located within close proximity of coalfields that produce suitable coal for feed into the rotary kiln. It is envisaged that coal in the required volumes would be available from nearby mines.

MARKET ANALYSIS

Vanadium is a grey and soft ductile metal, the main uses of which are in the steel and chemicals industries, with the steel industry accounting for approximately 90% of vanadium consumption.

Vanadium is found primarily within vanadium-bearing magnetite, and is to a smaller extent present in fossil fuel deposits such as crude oil, coal and oil shale. Vanadium production is sourced mainly in the form of co-product slag from steel production, accounting for 67% of production, with primary vanadium ore processing accounting for 21% and secondary sources 12%.

Supply is geographically concentrated with 90% of a total 76,000 tons of global vanadium production coming from China (53%), South Africa (26%) and Russia (10%).

Vanadium Demand

While vanadium has several applications, two are dominant and significant in driving demand for vanadium.

i. Steel:
   a) Approximately 90% of vanadium produced today is consumed in the steel sector, where it is used as a strengthening and anti-corrosive additive, on account of having one of the highest strength to weight ratio of all metals. It is used as an additive in high strength rebar for the construction industry, as well as high-strength, low weight steel alloys used in the automotive and aerospace industries, among others. Approximately 0.2% vanadium content increases steel strength up to 100% and reduces final product weight by up to 30%. For example, using vanadium steel in the trailer chassis can reduce trailer chassis weight from 3,200 kg to 2,520 kg, corresponding to an overall weight reduction of 21%.
   b) Steel growth continues to be supported by ongoing urbanization and associated construction activities in China and emerging markets with large infrastructure build programmes. Vanadium-enhanced rebar provides buildings with the improved structural support necessary to better withstand the higher magnitude earthquakes so frequently seen in China
   c) Recent policy directives in favor of high strength steels in China are expected to further demand in the future.

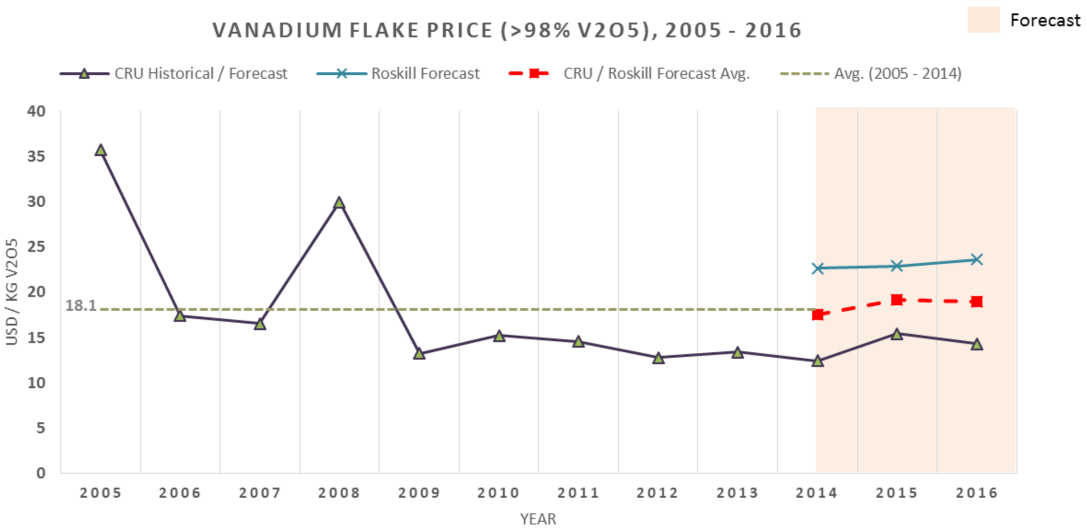
d) India, the world's second largest steel producer also produces low-quality steel and can be expected, over time, to shift its production towards higher strength steel as the economy develops.

ii. Energy Storage:

a) Vanadium redox batteries (VRBs) are increasingly recognised for their long lifespan cycles (>20 years), high capacity, long duration energy storage capabilities and ability to integrate with power grids. In the race for the most effective grid energy storage solution, vanadium redox flow battery technology is gaining significant momentum relative to other solutions.

Vanadium consumption is forecast to grow at a significant rate of approximately 6.5% per annum to 2017, driven largely by the steel and energy storage sectors (Roskill, Feb 2013).

A price of US$7.50 / lb of V_2O_5 flakes, >98% purity, was assumed in this Scoping Study, for which the anticipated initial production year is 2017. This is ~9% less than the historical average of US$8.22 / lb (Jan 2005 – Jun 2014), less than Roskill's forecast 2017 price of US$10.95 / lb V_2O_5 (Roskill report, 2013) and more than CRU Strategies' forecast 2016 price of US$ 6.50 / lb (CRU report, 2013).



Historical and forecast price for vanadium flakes, 98% purity (Roskill, 2013; CRU Strategies, 2013)

FINANCIAL ANALYSIS

The Scoping Study has evaluated two ROM scenarios: 1 Mtpa ROM (10,350 tpa of V_2O_5 flakes) and 528 ktpa ROM (5,470 tpa of V_2O_5 flakes). There are sufficient project resources to sustain a 30-year life-of-mine operation in each scenario. The 1 Mtpa ROM scenario was chosen as the base case with the following parameters:

Financial Years Ending February		FY2017	FY2018	FY2019	FY2020	FY2021	Long Term
Top Soil Removal	kt		616	616	616	616	312
ROM ore	kt			1 000	1 000	1 000	1 000
V_2O_5 ROM grade (post-dilution)	%			1.41	1.41	1.41	1.41
Waste Mined	kt		945	1 890	1 890	1 890	4 077

Financial Years Ending February		FY2017	FY2018	FY2019	FY2020	FY2021	Long Term
Parting Mined	kt			190	190	190	190
Stripping ratio				2.70	2.70	2.70	4.39
Beneficiation Feed	kt			1 000	1 000	1 000	1 000
Beneficiation Mass Yield	%			69	69	69	69
V_2O_5 recovery - Beneficiation	%			98	98	98	98
Feed to Salt Roast Plant	kt			690	690	690	690
V_2O_5 recovery – Salt Roast	%			75	75	75	75
V_2O_5 Production	kt			10.35	10.35	10.35	10.35

Salient Metrics – 1 Mtpa ROM Scenario

Capital and Operating Expenditure

The following tables show the capital expenditure ("capex") and operating expenditure ("opex") applied to this Scoping Study. While a significant portion of the Scoping Study establishment capital expenditure estimates was generated using tender enquiry estimates from suppliers, with a high degree of confidence, capital expenditure contingencies were applied in line with Scoping Study confidence levels. Similarly, given the extensive experience with operational salt roast operations of the technical team involved in this Scoping Study the opex estimates applied during this Scoping Study carry a relatively high degree of confidence.

		Unit	Amount	Total
1.	**Prefeasibility and Feasibility study**	US$'m		**9.7**
2.	**Mining**			**3.8**
	Mine site establishment	*US$'m*	*0.4*	
	Pre stripping	*US$'m*	*3.4*	
3.	**Processing**			**216.6**
	Crushing and Screening	*US$'m*	*4.2*	
	Milling	*US$'m*	*22.5*	
	Magnetic Separation	*US$'m*	*2.7*	
	Product dewatering	*US$'m*	*8.7*	
	Water recovery	*US$'m*	*2.5*	
	Salt Roasting	*US$'m*	*132.3*	
	Balance of Plant	*US$'m*	*43.7*	
4.	**Infrastructure**			**31.4**
	Bulk power	*US$'m*	*4.2*	
	Well field for Water supply	*US$'m*	*1.6*	
	Other Infrastructure	*US$'m*	*5.4*	
	Calcine dump	*US$'m*	*9.3*	
	Corporate Infrastructure	*US$'m*	*10.9*	
	Total	**US$'m**		**261.5**
5.	**Sustaining Capital**	US$'m		**54.0**

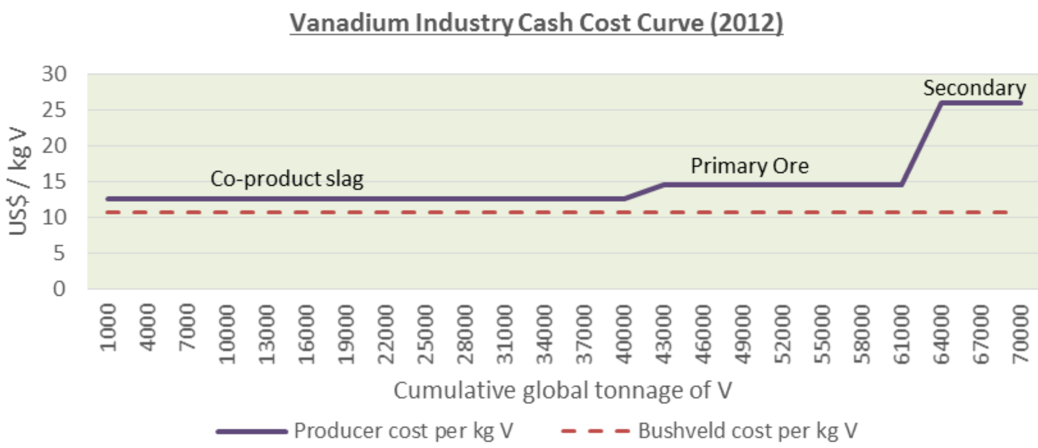
Capital Expenditure Costs – 1 Mtpa ROM Scenario

		US$ / tonne	Unit	Cost / tonne V_2O_5 flakes
Mining		**4.69**	***Per tonne mined***	**1,161**
Waste Mining Cost	*2.18*		*Per tonne mined*	
Ore Mining Cost	*2.51*		*Per tonne mined*	
Processing – Concentrator Plant		**3.21**		**682**
Crushing	*1.58*		*Per tonne Plant feed*	
Milling	*1.13*		*Per tonne Plant feed*	
Magnetic Separation	*0.30*		*Per tonne Plant feed*	
Tailings Disposal	*0.20*		*Per tonne Plant feed*	
Processing - Salt Roast Plant		**60.35**	***Per tonne concentrate***	**3,754**
Roasting & leaching	*56.31*		*Per tonne concentrate*	

Utilities	*2.06*		*Per tonne Plant feed*	
Labour	*1.98*		*Per tonne Plant feed*	
General & Administration		**2.26**		**316**
General	*1.96*		*Per tonne ore mined*	
Rehabilitation	*0.30*		*Per tonne Waste mined*	
Logistics		**80.91**	***Per tonne sales***	**81**
Logistics cost to rail siding	*5.91*		*Per tonne sales*	
Loading, rail and port	*45.00*		*Per tonne sales*	
Shipping	*30.00*		*Per tonne sales*	
Total Operating Cost per tonne of V_2O_5 flakes				***5,994***

Operating Costs – 1 Mtpa ROM Scenario

The above operating cost is competitive relative to industry cost curve and places the Bushveld Vanadium Project in the first quartile of the vanadium cost curve, competitive with co-product vanadium slag producers.



Vanadium Industry Cash Cost Curve (TTP Squared Inc, 2012)

Financial Model Results

The results of the financial evaluation illustrate that the base case scenario of producing approximately 10,350 tpa vanadium pentoxide flakes has attractive economics, with an estimated post-tax NPV of US$263.6 m and a real post-tax IRR of 24.1%. Key financial metrics are summarised below:

Bushveld Vanadium Project – Salt Roast 1 Mtpa ROM Scenario		
Item	**Unit**	**Value**
Resource	Mt	52
Life of Mine	Yrs	30
V_2O_5 production	kt	10,350
Gross Revenue	LOM US$'m real	5 133
Royalty	%	5%
	LOM US$'m real	241
Net Revenue	LOM US$'m real	4 892
Operating Costs	LOM US$'m real	1 861
	US$ / kg V_2O_5 flakes (US$/ lb V_2O_5 flakes)	5.99 (2.72)

Capital Costs	Initial	US$'m real	261.5	
	Sustaining	US$'m p.a.	1.90	
Cash flow		LOM US$'m real	1 612	
			Pre Tax	***Post-Tax***
Economics	NPV @ 8% real	US$'m	751.6	370.0
	NPV @ 10% real	**US$'m**	**561.9**	**263.6**
	NPV @ 12% real	US$'m	425.6	187.4
	IRR real	%	35.57	24.10
Payback (based on discounted cash flow) from start of mining		Yr	4 years and 4 months	

DCF Valuation Model – 1 Mtpa ROM Scenario Financials

Sensitivity Analysis

A sensitivity analysis was undertaken to test the robustness of the project and the results thereof are shown in the table below for the parameters with the most impact:

2014 Real V_2O_5 Flakes Price CIF	**NPV US$'m**	**Processing Opex**	**NPV US$'m**	**Plant Capital**	**NPV US$'m**	**Discount Rate**	**NPV US$'m**
75%	**92.5**	**85%**	**236.1**	80%	**234.8**	6.5%	**478.7**
87.5%	**177.1**	**95%**	**254.4**	90%	**249.0**	8.0%	**370.0**
BASE (US$16.53/KG V_2O_5)	**263.6**	**BASE (US$46/T ROM)**	**263.6**	**BASE (US$261M)**	**263.6**	**BASE (10%)**	**263.6**
112.5%	**349.7**	**105%**	**272.6**	110%	**277.6**	12.0%	**187.4**
125%	**435.9**	**115%**	**290.7**	120%	**291.7**	13.5%	**144.0**

Sensitivity Analysis

CONCLUSION

Bushveld is confident that its Bushveld Vanadium Project is highly prospective. The Scoping Study on the Bushveld Vanadium Project, and specifically for the Salt Roast Process, has calculated NPVs and IRR, which suggest that the Project has robust economic credentials (a post-tax NPV of US$263.6 m and a real post-tax IRR of 24.1%). This is as a result of the following positive features and low risk nature of the Project:

- A large quality resource base which is consistent along a significant strike length, outcrops on surface, has a relatively low down-dipping angle and has a wide ore package (approximately 8.2 m for the MAG3 and MAG4 horizons excluding the parting);
- A high in-situ V_2O_5 grade within the resource base (approximately 1.48%, 1.41% after dilution) and high vanadium content within the magnetite which results in a 2.0% V_2O_5 concentrate product;
- The ability to apply low risk, low capital expenditure and low cost open-cast mining methods to extract ROM material, and to use mining contractors to undertake project operations;
- The use of proven beneficiation technology to extract the high value V_2O_5 flakes for sale to the market;
- The limited logistical requirements for the transport of low product volumes to market;

- A relatively low capital expenditure requirement, compared, for example, to the pig-iron Highveld process, and in line with similar existing operations;
- A relatively low pre-production lead time;
- A positive longer term prognosis for the V_2O_5 market as demand is forecast to increase significantly;
- The low operating cost and high margin nature of the Project (operating margins in excess of 60%); and
- The relatively low requirement for bulk services (power and water) and the availability of sufficient supply thereof.

Bushveld believes that there is scope to realize economic credit for the iron-rich calcine that is produced as a by-product in the Salt Roast process. Should Bushveld realise a US$15 per tonne credit from its approximate 680 ktpa of titanium-rich calcine, the post-tax NPV at a 10% real discount rate for its 1 Mtpa ROM option, will increase from US$263.6 m to US$304.6 m (with a real post-tax IRR of 26.3%). If it is possible to realise a $25 per tonne credit, the post-tax NPV subsequently increases to US$332.0 m (with a real post-tax IRR of 27.5%). Based on marketing studies undertaken to date, the Company is optimisitic that the calcine product can be sold into the market, notwithstanding the fact that the current Scoping Study ascribes **no** value to the calcine residue.

The 1 Mtpa ROM scenario, when compared to the 528 ktpa scenario, reflects significant economies of scale benefits from both capital expenditure and operating cost components. It is therefore optimal for Bushveld to maximise market penetration.

The results of the Scoping Study therefore support the progression of the Project to Pre-Feasibility Study stage.

In concluding the Scoping Study, Bushveld also conducted an exercise on a possible Pig Iron Process requiring pre-reduction, smelting, shaking ladles and casting of pig iron, and the production V_2O_5 slag or the production of ferro-vanadium. While the Pig Iron process has potential, the Company decided to concentrate on the Salt Roast process for the completion of the Scoping Study based on the following advantages:

- Significantly lower establishment capital expenditure (by a factor of at least three times);
- A lower lead time to production;
- A significantly smaller and relatively unconstrained logistics requirement;
- A less complex beneficiation process using proven technology; and
- Lower power consumption.

However, when determining an optimal business case during Pre-Feasibility, Bushveld would further study the capital cost, operating cost and market variables of the Pig Iron process which could potentially be used to process the iron-rich calcine dump into pig iron and a Ti-rich slag.

OPPORTUNITIES

There are significant opportunities associated with the project, which include optimisation during the Pre-Feasibility Study:

- A reduction in estimated capital expenditure of up to 15% – a significant portion of the Scoping Study establishment capital expenditure estimates was generated using tender enquiry estimates from suppliers, however capital expenditure contingencies were applied in line with Scoping Study confidence levels, despite the high level of confidence in the estimates;

- Additional economic value and market diversification which may be unlocked by adding a ferro-vanadium production stream onto the Salt Roast process;
- Increasing the resource base by proving up additional resources down-dip of 120 m below surface. Deeper resources could be exploited by applying room and pillar underground mining methods;
- Increasing the resource base by the acquisition of strike extensions to the ore body;
- Increasing the resource base by including the MML hanging wall zones. While having a lower grade, the exploitation of these hanging-wall horizons would reduce stripping ratios and reduce mining costs;
- Increasing V_2O_5 production, should market demand support increased sales, thereby extracting additional economic benefit;
- Incorporating the PQ iron ore project into the project to leverage economies of scale and the scope for some shared processing infrastructure (both resources utilize the same processing flow sheet for making concentrate)
- Extracting economic benefit from the significant quantities of iron and titanium-rich calcine which will be produced, and for which **NO** economic benefit has been assumed in the Scoping Study.

RECOMMENDATIONS

It is recommended that the Project move to a Pre-Feasibility Study as soon as possible. During such a Pre-Feasibility Study, the following work will be completed:

- Additional exploration and / or the extraction of necessary bulk samples;
- Updating of the Project resource base;
- The determination of an optimal business case – this will include:
  - determining the optimal mix between sales volumes and life of Project;
  - detailed analyses on the development of a Fe-V smelter to convert all or some of the V_2O_5 to Fe-V;
  - a further review of pursuing a Pig Iron Process as opposed to the Salt Roast Process OR a combined Pig Iron and Salt Roast Process, which together could produce a full range of products – pig iron, V_2O_5 flakes and Fe-V; and
  - a review of additional economic benefits of the iron and titanium credits within the MML resource.
- Reviewing establishment capital expenditure and operating cost estimates;
- Initiating an environmental impact assessment ("EIA") study and the commencement of environmental and water use licensing;
- A comprehensive commodity market review and market placement exercise;
- A comprehensive logistics review;
- Completing the mining schedule using a sophisticated mine planning package;
- A comprehensive review of infrastructure requirements, specifically water and electricity requirements;
- A social and labour study which will assist in the preparation of the Social and Labour Plan for the Mining Right application;

- Pursue the optimal mineral right licensing route to extend legal tenure beyond 2015, either the extension of the existing prospecting permit or the application of a mining right; and
- The preparation of a comprehensive Pre-feasibility study report.

Compiled by:

HG (Wally) Waldeck, Pr Eng
Independent Mining Consultant

Peer Reviewed by:

Dr Roger Paul
Metallurgical Consultant

Email: wallywaldeck@gmail.com

Contributing Authors:

- Wally Waldeck, *Pr Eng;*
- Prof. Morris Viljoen, *MSc, PhD (Wits), FSEG, FGSSA,FSAIMM, FRSSA, Pr. Sc. Nat;*
- Prof. Richard Viljoen, *MSc, PhD (Wits), FSEG, FGSSA, FSAIMM, FRSSA, Pr. Sc. Nat;*
- Dr. Luke Longridge, *BSc. Hon. Geol., PhD (Wits);*
- Resource Estimation and Competent Person's Report by the MSA Group
- Metallurgy and Concentrator Plant report by Mr. Jan Rabe (PESCO), *BSc. Hon. Metallurgy*
- Pyrometallurgy and Treatment Plant report by Dr Johannes Nel of Hatch GOBA
- Metallurgical testwork undertaken by SGS SA and MINTEK
- Financial Evaluation by Hindsight Financial and Commercial Solutions