

Vanadium Pilot Scale Study Update

Testwork demonstrates increased vanadium extraction

HIGHLIGHTS

- **Excellent concentrate quality of 1.44% V₂O₅ generated from initial pilot scale testing of a weathered composite blended feed, reflecting the planned first 5 years of mine process feed.**
- **New roast/leach benchscale tests averaging 95% vanadium extraction for pelletised concentrate, a significant improvement from PFS estimates.**
- **550kg of magnetic concentrate generated from pilot test is currently undergoing roast leach optimisation testwork.**
- **Pilot scale oxidative roast leach testwork will begin in September.**
- **Project environmental approval work, resource updates and economic mining studies all advancing steadily.**

Australian Vanadium Limited (ASX: AVL, “the Company” or “AVL”) is pleased to announce an update to ongoing bench and pilot scale testwork. Approximately 6 tonnes of oxide and transitional material have been tested for crushing, milling and beneficiation (CMB) at the ALS metallurgical laboratory in Perth. Results indicate higher than anticipated vanadium grades and exceptionally low grades of silica and alumina in concentrate, (Table 1).

Two larger CMB pilot runs of approximately 10 tonnes each will be processed in August, using refined parameters from the smaller run. Samples of the magnetic concentrate product generated will then undergo detailed roast-leach pilot testing.

9 August 2019

ASX ANNOUNCEMENT

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The Australian Vanadium Project – Vanadium
Blesberg, South Africa – Feldspar
Northanna Hill – Uranium/Vanadium
Coates – Vanadium





Figure 1 Magnetic concentrate sample from 6 tonne pilot

AVL’s target concentrate quality has a SiO₂ content <2% and V₂O₅ grade of 1.4% based on the Company’s pre-feasibility study, (see ASX announcement dated 19 December 2018 ‘Gabanintha Pre-Feasibility Study and Maiden Ore Reserve’).

Todd Richardson, AVL’s Chief Operating Officer comments, “The low silica content, at 1.37%, combined with an improved V₂O₅ grade of 1.44% is likely to reduce reagent usage and improve overall throughput in the refinery. Silica consumes soda ash in the roasting process, which also decreases vanadium recovery.”

Table 1 Weighted Average Magnetic Concentrate Analysis

MAGNETIC CONCENTRATE ANALYSIS (%)										
Al ₂ O ₃	CaO	Cr	Fe	K ₂ O	MgO	MnO	Na ₂ O	SiO ₂	TiO ₂	V ₂ O ₅
2.67	0.04	0.58	53.7	0.00	0.49	0.16	0.01	1.37	15.0	1.44

Benchscale testwork is now underway to determine the optimal flowsheet to maximise vanadium recovery. The initial pilot run highlighted the opportunity to recover additional vanadium units from the magnetic circuit tailings and several unit operations are being tested to identify the best technology and quantify the benefit to the flowsheet. Additionally, 280kg of milled material has been sent to Huate Magnet Australia for in-house testing of various magnetic separation technologies. A 20 tonne pilot scale study will commence once these results are confirmed.

Benchscale testwork is also underway for the roast leach operation. 550kg of magnetic concentrate generated from the initial pilot has been delivered to a Brisbane laboratory to confirm the optimal conditions for pelletisation and roasting prior to the pyrometallurgical pilot testing, which will begin in September of this year.

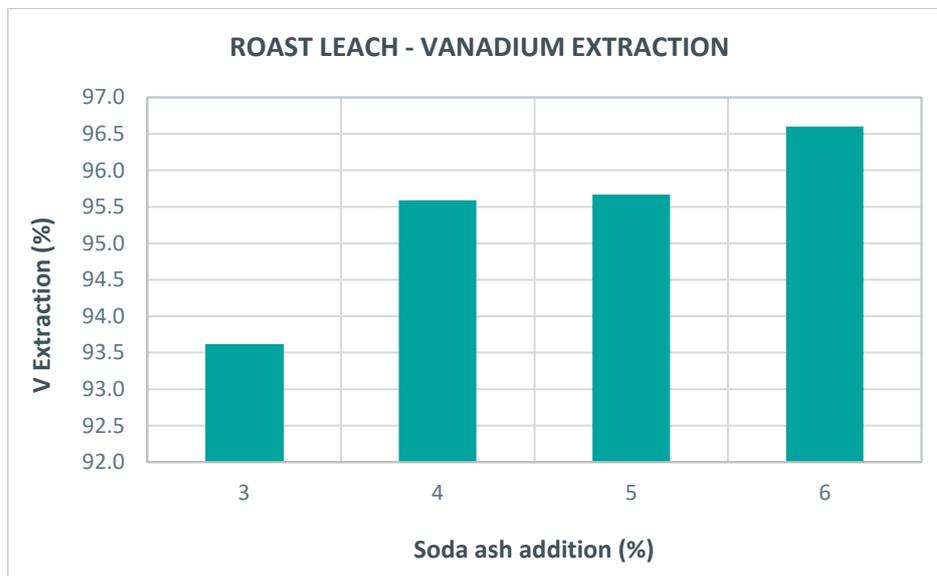


Figure 2 Total vanadium extraction at various soda ash addition rates

In preparation for the roast leach benchwork, four baseline pelletised salt roast tests were performed on magnetic concentrate generated during the 6 tonne pilot. Results are represented in Figure 2 and Table 2 and show vanadium recoveries ranging from 93.7% with a 3% soda ash addition, to 96.6% with 6% soda ash addition. This confirms the results from earlier roast leach tests which indicated vanadium extraction was significantly higher with pelletising prior to roasting. Previous roast leach tests averaged 92% vanadium extraction.

Table 2 Oxidative roast leach extraction results

	SODA ASH %	LEACH EXTRACTION % (METAL IN SOLUTION VS CALCULATED HEAD)								
		V	Fe	Si	Al	Ti	Mn	Ca	Mg	Ba
Test 1	3	93.61	0.00	0.41	0.68	0.00	0.05	13.47	0.23	1.24
Test 2	4	95.59	0.00	0.42	1.19	0.01	0.13	7.63	0.23	1.19
Test 3	5	95.67	0.00	0.45	1.42	0.01	0.05	7.77	0.24	1.26
Test 4	6	96.60	0.00	0.50	1.60	0.01	0.05	4.95	0.26	1.33
Average		95.37	0.00	0.45	1.22	0.01	0.07	8.45	0.24	1.26

Management Comment

The CMB pilot and ongoing benchscale testwork is providing incremental improvements in the lead up to the roast/leach pilot work due to commence in September at a US based laboratory.

This new work adds to the April 2019 announcement which indicated AVL's ability to produce a high purity 99.4% V₂O₅ as standard.

AVL is focused on delivering a final operating cost for the Project which is well inside the lowest quartile of vanadium producers.

As it advances the DFS, the AVL team is actively studying multiple avenues of value generation including capital cost improvements, by-product sales and energy savings.

The testwork being undertaken by AVL on its high-grade vanadium resource continues to confirm the quality of the deposit. The Company remains committed to reducing operating costs and improving vanadium recoveries by ensuring that the proposed flowsheet is robust and proven, which should enable success at scale.

Testwork will proceed as outlined above, in conjunction with ongoing work to establish financing and offtake agreements. Progress is being made in both areas and will be reported to the market as appropriate.

For further information, please contact:

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About Australian Vanadium

AVL is a resource company focused on vanadium, seeking to offer investors a unique exposure to all aspects of the vanadium value chain – from resource through to steel and energy storage opportunities.

AVL is advancing the development of its world-class Australian Vanadium Project. The Australian Vanadium Project is currently one of the highest-grade vanadium projects being advanced globally with 183.6Mt at 0.76% vanadium pentoxide (V₂O₅), containing a high-grade zone of 96.7Mt at 1% V₂O₅ with an Ore Reserve of 9.82Mt at 1.07% V₂O₅ Proved and 8.42Mt at 1.01% V₂O₅ Probable Resource, reported in compliance with the JORC Code 2012 (see ASX announcement dated 19 December 2018 'Gabanintha Pre-Feasibility Study and Maiden Ore Reserve').

AVL has developed a local production capacity for high-purity vanadium electrolyte, which forms a key component of vanadium redox flow batteries (VRFB).

AVL, through its 100%-owned subsidiary VSUN Energy Pty Ltd, is actively marketing VRFB in Australia.

Table 3 – The Australian Vanadium Project – Mineral Resource estimate at November 2018 by domain and resource classification using a nominal 0.4% V₂O₅ wireframed cut-off for low grade and nominal 0.7% V₂O₅ wireframed cut-off for high grade (total numbers may not add up due to rounding)

Zone	Classification	Mt	V ₂ O ₅ %	Fe %	TiO ₂ %	SiO ₂ %	Al ₂ O ₃ %	LOI %
HG 10	Measured	10.2	1.11	42.7	12.6	10.2	8.0	3.9
	Indicated	12.1	1.05	43.8	11.9	10.6	7.6	3.5
	Inferred	74.5	0.97	42.1	11.2	11.6	7.6	3.4
	Sub-total	96.7	1.00	42.4	11.4	11.3	7.7	3.5
LG 2-5	Measured	-	-	-	-	-	-	-
	Indicated	28.6	0.50	24.6	6.9	27.5	17.9	8.6
	Inferred	53.9	0.49	25.3	6.7	27.5	16.4	7.3
	Sub-total	82.5	0.49	25.1	6.8	27.5	16.9	7.7
Transported 6-8	Measured	-	-	-	-	-	-	-
	Indicated	-	-	-	-	-	-	-
	Inferred	4.4	0.65	28.2	7.2	24.7	16.7	8.5
	Sub-total	4.4	0.65	28.2	7.2	24.7	16.7	8.5
Total	Measured	10.2	1.11	42.7	12.6	10.2	8.0	3.9
	Indicated	40.7	0.66	30.3	8.3	22.5	14.8	7.1
	Inferred	132.7	0.77	34.8	9.2	18.5	11.5	5.1
	Sub-total	183.6	0.76	34.3	9.2	18.9	12.1	5.5

Table 4 - Ore Reserve Statement as at November 2018, at a cut-off grade of 0.8% V₂O₅

Reserve classification	t	V ₂ O ₅ %	Co ppm	Ni ppm	Cu ppm	S %	SiO ₂ %	Fe ₂ O ₃ %	V ₂ O ₅ produced t
Proved	9,820,000	1.07	172	571	230	0.06	9.47	58.7	65,000
Probable	8,420,000	1.01	175	628	212	0.08	10.07	59.5	56,000
Total	18,240,000	1.04	173	597	222	0.07	9.75	59.1	121,000

Competent Person Statement — Mineral Resource Estimation

The information in this announcement that relates to Mineral Resources is based on and fairly represents information compiled by Mr Lauritz Barnes, (Consultant with Trepanier Pty Ltd) and Mr Brian Davis (Consultant with Geologica Pty Ltd). Mr Davis is a shareholder of Australian Vanadium Limited. Mr Barnes and Mr Davis are members of the Australasian Institute of Mining and Metallurgy (AusIMM) and Mr Davis is a member of the Australian Institute of Geoscientists, both have sufficient experience of relevance to the styles of mineralisation and types of deposits under consideration, and to the activities undertaken to qualify as Competent Persons as defined in the 2012 Edition of the Joint Ore Reserves Committee (JORC) Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Specifically, Mr Barnes is the Competent Person for the estimation and Mr Davis is the Competent Person for the database, geological model and site visits. Mr Barnes and Mr Davis consent to the inclusion in this announcement of the matters based on their information in the form and context in which they appear.

Competent Person Statement — Ore Reserves

The scientific and technical information in this announcement that relates to ore reserves estimates for the Project is based on information compiled by Mr Roselt Croeser, an independent consultant to AVL. Mr Croeser is a member of AusIMM. Mr Croeser has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a competent person as defined in the JORC 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Croeser consents to the inclusion in the announcement of the matters related to the ore reserve estimate in the form and context in which it appears.

Competent Person Statement – Metallurgical Results

The information in this announcement that relates to Metallurgical Results is based on information compiled by independent consulting metallurgist Brian McNab (CP. B.Sc Extractive Metallurgy), Mr McNab is a Member of AusIMM. Brian McNab is employed by Wood Mining and Metals. Mr McNab has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which is undertaken, to qualify as a Competent Person as defined in the JORC 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr McNab consents to the inclusion in the announcement of the matters based on the information made available to him, in the form and context in which it appears.