

ASX ANNOUNCEMENT

28TH OCTOBER 2019

QUARTERLY ACTIVITIES REPORT

Period ending 30th September 2019

HIGHLIGHTS

The Australian Vanadium Project

- Major Project Status awarded to the Project by the Federal Government.
- Excellent concentrate quality of 1.44% V₂O₅ generated from initial pilot scale testing of a weathered composite blended vanadium-rich magnetite feed, reflecting the planned first 5 years of mine process feed.
- World-leading kiln supplier, Metso, selected to conduct vanadium pilot roast testwork using pellet approach.
- Vanadium roast using pellets demonstrated increased vanadium extraction significantly above PFS assumptions.
- Testwork showed potential for the generation of an iron and titanium rich calcine by-product with an average of 66% Fe.
- Positive results from pilot collection drilling confirmed further consistency of width, grade and the depth extent of The Australian Vanadium Project.
- New programs of Resource drilling underway targeting significant mine life extensions.

Energy Storage

- MOU signed with engineering, procurement and construction company Metrowest Power Systems.
- Sale of a 20kW/80kWh vanadium redox flow battery (VRFB) to an orchard in Pakenham, Victoria.
- MOU signed with Nomads Charitable & Educational Foundation.
- Regional Economic Development Grant applied for to install solar and VRFB at Strelley Community School in the Pilbara.

Corporate

- Corporate presentations undertaken in London, Switzerland and China.
- Benchmark Minerals Conference presentations undertaken in Sydney, Melbourne and Perth.
- Successful capital raising undertaken, raising \$6.6m through a Share Purchase Plan and Placement.
- Refund of \$249k granted under Research & Development Tax Incentive Scheme.

Management Comment

The September quarter has seen significant progress in the development of The Australian Vanadium Project. The Federal Government recognised the importance of the Project to Australia through the grant of Major Project Status. AVL's shareholders demonstrated their support of the Company through a successful capital raising, placing the Company in a strong cash position. Testwork resulted in a saleable grade of iron calcine by-product being demonstrated and pilot studies further defined the engineering design of the Project's vanadium product processing. Work in the December quarter includes ongoing pilot scale work and drilling to increase the Resource base. The objective is to increase the lifespan of the Project, which will assist with offtake and joint venture partner discussions around the world.

Activities for the quarter ended 30th September 2019 for Australian Vanadium Limited (“AVL” or “the Company”) are as follows:

THE AUSTRALIAN VANADIUM PROJECT

Vanadium Drilling Results [\(ASX Announcement, 18 July 2019\)](#)

Positive results from pilot study drilling at The Australian Vanadium Project demonstrated further consistency of the Project’s geology and target mineralisation. Key points from the July 2019 announcement are as follows:

- 30 large diameter diamond core holes were completed at the Project in April 2019 for use in ongoing pilot scale test work.
 - Material from 14 of the holes was used primarily for high-priority DFS pilot scale processing;
 - Assay results from 16 successful depth-extension holes targeting mineralisation below the base of the PFS life of mine pit have been received.
- A high-grade vanadium-rich zone grading over 1.2% V₂O₅ is identified consistently at depths below previous drilling, supporting previous work.
- Best intersections include;
 - 18m at 1.17% V₂O₅ and 73.4% Fe₂O₃ from 109m in 19MTDT004;
 - 11.67m at 1.20% V₂O₅ and 75.5% Fe₂O₃ from 129.65m in 19MTDT011;
 - 5m at 1.23% V₂O₅ and 61.2% Fe₂O₃ from 101m in 19MTDT015; and
 - 17m at 1.17% V₂O₅ and 61.3% Fe₂O₃ from 20.2m in 19MTDT016.
- Program was focused on development area in northern 2km of total 11.5km of AVL held deposit strike.
- Pilot scale metallurgical test program underway to confirm details of processing circuit for final DFS design.
- Hydrology drilling, DFS engineering and environmental approval support work ongoing.



Figure 1 Diamond drill rig on site at The Australian Vanadium Project

Vanadium Pilot Scale Study Update [\(ASX Announcement, 9 August 2019\)](#)

Testwork was undertaken on approximately 6 tonnes of oxide and transitional material for crushing, milling and beneficiation (CMB) during the quarter. It confirmed the production of an excellent magnetite vanadium 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 were completed and averaged 95% vanadium extraction for pelletised concentrate which was a significant improvement from PFS estimates.

550kg of magnetic concentrate (see Figure 2) generated from the pilot test was utilised for roast leach optimisation testwork, with pilot scale oxidative roast leach testwork to follow in the December quarter.

The low silica content of the concentrate, at 1.37%, combined with an improved V_2O_5 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, meaning that lower silica is a benefit.



Figure 2 Magnetic concentrate sample from the initial 6 tonne pilot test

World-Leading Kiln Supplier to Conduct Vanadium Pilot Roast Work for AVL

[\(ASX Announcement, 30 August 2019\)](#)

AVL's vanadium roast pilot will be undertaken at world-leading kiln supplier Metso at their Danville, Pennsylvania pyrometallurgical testing facilities in the USA. The work will commence in November upon completion of the magnetic concentrate pilot in Perth.

The Metso Grate Kiln (GK) is an efficient, low risk and proven technology for pelletising iron ore which is in global use and can be adapted for salt roasting.

AVL and Metso are committed to working together to develop an improved thermal processing solution involving pelletising of the vanadium rich iron concentrate produced at the Australian Vanadium Project. The solution will involve pelletising the concentrate and processing it through a GK system. Pelletising has been used previously in Europe and China for the processing of primary Vanadium-Titanium-Iron ores.

The benefits of pelletising include:

- improved roasting reaction;
- minimal dusting; and
- reduced build-up of residues within the kiln.

The proposed use of pelletised roasting technology distinguishes AVL and offers significant benefits to the Project (see Figure 3).



Figure 3 Vanadium rich iron concentrate pellets produced during bench-scale roast testing

Major Project Status Awarded to The Australian Vanadium Project

[\(ASX Announcement, 6 September 2019\)](#)

On September 6th, the Minister for Industry, Science and Technology, The Hon Karen Andrews MP, in conjunction with the Minister for Resources and Northern Australia, Senator the Hon Matthew Canavan, announced that The Australian Vanadium Project was awarded Major Project Status.

The award provided formal recognition of the national strategic significance of the Project, through its contribution to:

- Economic growth of the Australian vanadium market for steel and battery markets
- Economic growth for the Mid-West region through direct and indirect jobs including opportunities for regional and national suppliers
- Significant new job creation for the Mid-West region of Australia
- Vanadium being on the critical minerals list for Australia and the US

Major Project Status designation is expected to promote international investment by providing increased confidence in the permitting pathway. Major Project Status recognises the strategic significance of The Australian Vanadium Project to Australia, with only 15 other projects in Australia currently holding this status, none of which are vanadium projects.

AVL Tests Confirm Potential for Significant Iron By-Product

[\(ASX Announcement, 9 September 2019\)](#)

During the quarter, project testwork focused on iron ore by products, proved the potential for generation of an iron and titanium rich calcine by-product from the tailings stream outlined in the PFS.

Benchscale testing by Australian Vanadium Limited successfully upgraded the calcine iron content from 54% Fe to an average of 66% Fe. Calcine grading >62% Fe could be sold into the global iron

ore market and the Company is actively sourcing interested parties to establish an offtake agreement for the product.

Calcine sales could add significant additional revenue over the life of the project. As a result of this successful testing, work is now underway to physically separate a portion of the titanium, which will further upgrade the calcine material and improve its value.

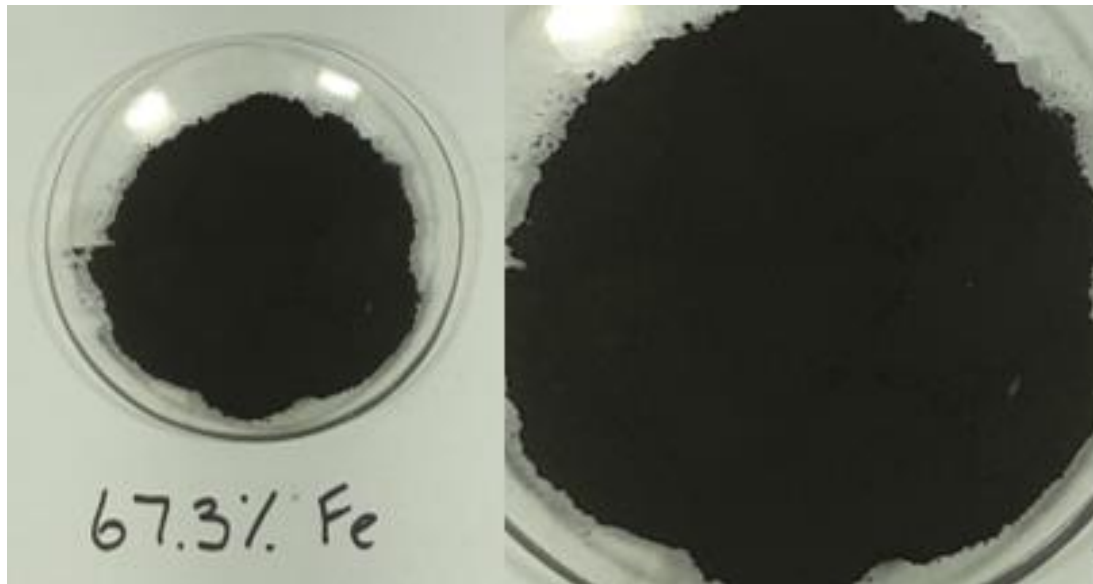


Figure 4 Calcine Test Program Work 67.3% Iron Product

Drilling Commences at The Australian Vanadium Project ([ASX Announcements, 10 October 2019](#) and [25 October 2019](#))

The Company is targeting significant mine life extensions with its new programs of Resource drilling. The first of these drill programs has been completed at the Project.

The drilling will further define the high-grade zone, with new infill drilling programs planned over southern portion of Inferred Resource base. A Mineral Resource update will be completed at the end of each drill program, with results from the pilot study drilling program to be incorporated.

Currently the southern resource blocks within AVL's leases contain Inferred Resources of 55.3Mt at 0.97% V_2O_5 . Infill drilling is planned to further define and where possible, re-categorise vanadium bearing mineralisation to the Indicated Resource category. There is a low cost of conversion of Resources, with the focus on shallow infill drilling. An increase in Indicated Resources will provide opportunity and flexibility for scheduling during mining.

Due to the extended strike the Company has available, there is potential to significantly increase the current 17 year planned mine life and scale of the Project. Feedback from potential investors and offtake partners has demonstrated the importance of maximising the Project life.

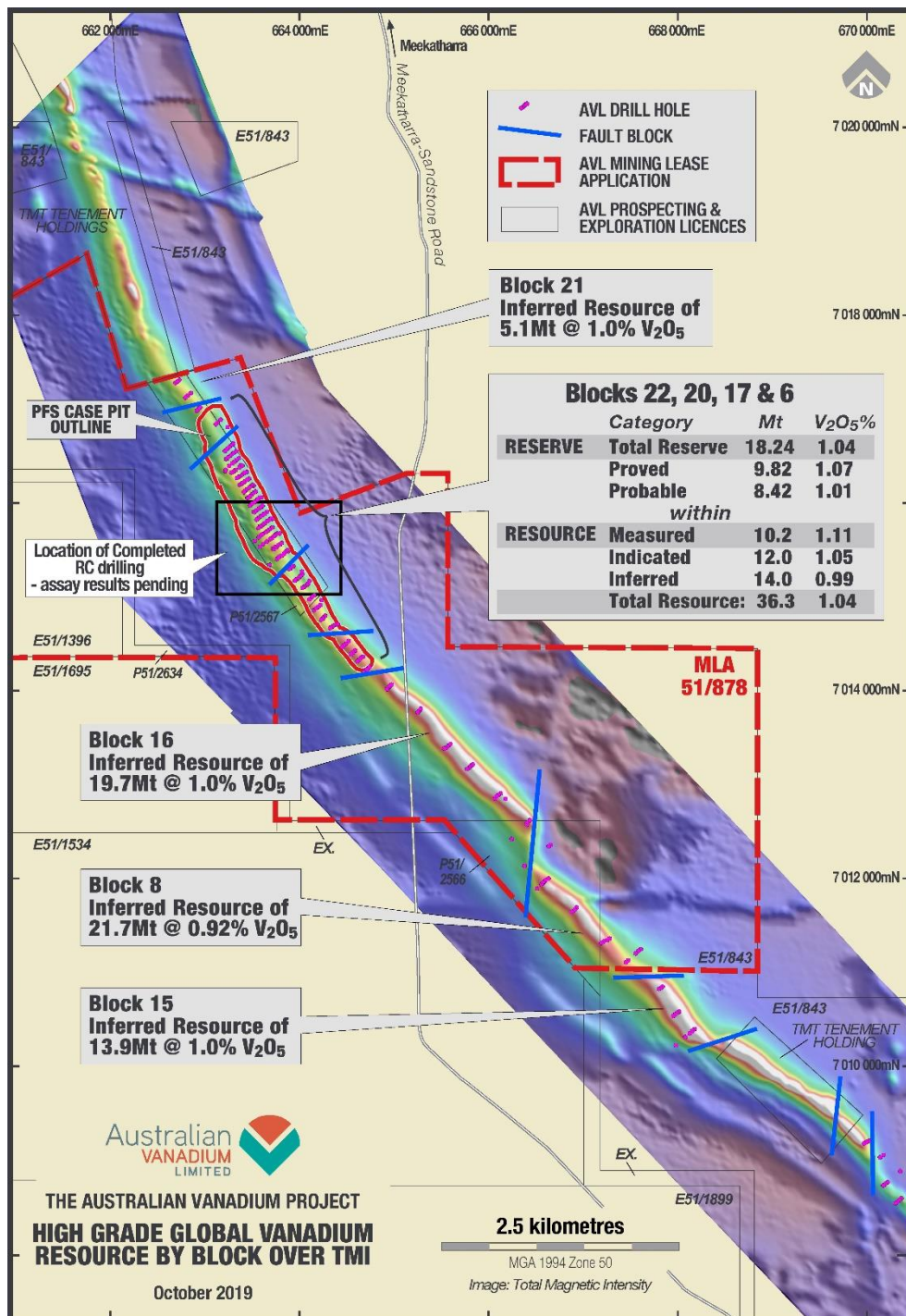


Figure 5 Total Magnetic Intensity Showing Location of Completed Drilling and Mineral Resources by Major Fault Block

Project Path Forward

Pilot Study

Crushing, milling, and beneficiation pilot work is underway and will provide magnetic concentrate for bench and pilot work downstream.

Environmental work/water

Discussions are ongoing with Westgold Resources regarding Life-of-Mine water requirements for the Australian Vanadium Project. An environmental study has been conducted along the proposed

pipeline route, with no significant flora or fauna detected. The water resource study has been completed by hydrology consultant AQ2.

Feasibility Studies

Results from the Pilot Study are providing input into the feasibility studies which will provide potential project financiers with the information they require to make an investment decision. Discussions with companies in Australia and overseas who are interested in either joint venture or project investment continue to progress.

Heritage Mining Agreement

The Company continues to work with the legal representatives of the Yugunga-Nya people to negotiate an agreement that works for both parties. The State Government and DMIRS are assisting with discussions and a resolution should be achieved by the end of the year.

ENERGY STORAGE

MOU for Vanadium Redox Flow Battery Project Collaboration in Australia

[\(ASX Announcement, 20 August 2019\)](#)

AVL and its 100% owned subsidiary, VSUN Energy signed an MOU with engineering, procurement and construction company Metrowest Power Systems. Metrowest has a strong background in Engineering, Procurement and Construction (EPC) and a deep knowledge in the power industry.

Metrowest's proven track record and wealth of connections in industrial and utility sectors, combined with the financial, marketing and technical capabilities of AVL and VSUN Energy, will give the team the ability to tackle larger projects and to be considered as equals to some of the more prominent participants in the market.

The MOU is for an initial term of 12 months, during which time the parties will investigate the potential to formalise the partnership.

VSUN Energy alongside Metrowest will continue to offer VRFB from a variety of manufacturers, with joint projects being focused on 250kW/1MWh up to the multi-megawatt size.

AVL Secures Vanadium Redox Flow Battery Sale [\(ASX Announcement, 4 September 2019\)](#)

VSUN Energy secured an order for an 20kW/80kWh VRFB to be installed at an orchard in Pakenham, Victoria.

The system will be attached to an existing 60kW solar array which will be expanded by a further 100kW of solar. Increased renewable energy supply and reliability is the key driver for the client.

The agricultural sector provides a strong client base for reliable, safe and long-duration energy storage. The orchard, owned by Priest Bros, is located in Pakenham on the edge of the Gippsland region of Victoria. The family owned and operated orchard covers around 80 acres over three properties and produces many different varieties of apples. Priest Bros' goal is to reduce the emissions generated via energy use for the orchards and to provide a reliable and renewable source of power to the site, particularly the irrigation system and packing sheds.

Final configuration is dependent on results of grant application. The VRFB solution for this project is being supplied by battery manufacturer Avalon Battery. The VRFB's strengths are its longevity; lack of performance degradation over time; thousands of cycles; 100% depth of discharge and the ability to re-use the non-flammable vanadium electrolyte at the end of the battery's life. Avalon Battery has recently entered into an agreement with South African vanadium producer, Bushveld Minerals, to provide a leasing option for vanadium electrolyte. This reduces the capex of the VRFB and provides security of electrolyte disposal in the future.



Figure 6 Avalon Battery VRFBs

MOU Signed for Remote Renewable Energy System ([ASX Announcement, 13 September 2019](#))

VSUN Energy signed an MOU with Nomads Charitable & Education Foundation to apply for a government grant for installation of a VRFB and solar PV system at Strelley Community School in the Pilbara region of Western Australia. The renewable energy system will provide installation, operation and maintenance training opportunities. One of the project's goals is to establish long-term Indigenous employment opportunities in the Pilbara region.

Strelley Community School is the oldest continually operational Independent Aboriginal Community School in Australia. It commenced operation in 1976. The smaller of the two campuses at Strelley requires power infrastructure upgrades.

The Regional Economic Development Grant was applied for in September 2019.

Potential additional renewable energy opportunities in the region are to be evaluated by the parties.



Figure 7 Existing diesel generator location at Strelley Community School

VSUN Energy Sells Vanadium Redox Flow Battery to Victorian Dairy Farmer

[\(ASX Announcement, 17 October 2019\)](#)

VSUN Energy secured an order for an 80kW/320kWh vanadium redox flow battery for installation at a dairy farm in Meredith, Victoria. The system will be attached to a 450kW solar array installed in partnership with Profit Share Power.

Meredith Dairy's goal is to have a sustainable operation with full power being supplied via onsite renewable generation. Having a battery capable of supplying many hours of power with high cycling capability was crucial in the decision-making process when selecting the energy storage technology.

The dairy has been paying a premium to receive renewable energy from the grid, but the VRFB plus solar installation will provide cost security and reliability of supply at a lower price than it buys its power for currently.

The VRFB solution for this project is being supplied by battery manufacturer Avalon Battery. The VRFB's strengths are its longevity, lack of degradation in performance over time with many thousands of cycles, non-flammability, 100% depth of discharge and the ability to re-use the vanadium electrolyte at the end of the battery's life.

Future Battery Industries Co-operative Research Centre

The Future Battery Industries Co-operative Research Centre (FBICRC) is currently working through a shortlist of six projects for the first round of projects to be supported. AVL and VSUN Energy are both involved in projects in this first and subsequent rounds. The successful projects will be announced before the end of 2019.

CORPORATE

Capital Raised

A successful and well supported Share Purchase Plan and subsequent placement was undertaken by the Company, raising \$6.6m.

The funds raised, combined with existing funds on hand, enables AVL to advance The Australian Vanadium Project.

Patersons Securities Limited acted as underwriter to the SPP and Lead Manager to the Placement.

R&D Refund

AVL received \$249,000 under the Federal Government Research and Development Tax Incentive Scheme for the 2017/18 tax year.

AVL's R&D work for the period was focused on continued development of processing techniques to produce vanadium pentoxide from a poly-metallic ore for vanadium redox flow batteries (VRFB) and steel applications. Metallurgical testwork has been a key research component for this project.

The Company is in the process of submitting a claim for the 2018/19 period which covers further work on these R&D activities and additional processing research and development work related to the recovery of vanadium products from the Australian Vanadium Project.

Marketing

Presentations were made to potential project and company investors in London, Switzerland and China.

Vincent Algar presented at the Benchmark Minerals conference in Sydney, Melbourne and Perth. The conference is part of a global series of events run by the highly regarded battery mineral supply chain specialists, Benchmark Minerals. AVL was the first vanadium company to be included in the event's schedule which has subsequently included vanadium producer Bushveld Minerals from South Africa.

Director Daniel Harris represented the Company at the Vanitec meeting in London in early October. He presented a paper on the re-use of vanadium electrolyte.

Since the last quarterly was released, AVL and VSUN Energy have had articles in many publications, including The Australian, Sydney Morning Herald, WA Today, Mining Weekly, Business News, Mining Monthly, Energy Storage News, PV Magazine, QantasLink Spirit Magazine, Australian Manufacturing, Farm Weekly, International Mining, One Step Off the Grid and an interview with COO, Todd Richardson was shown on GWN7 News.

Vanadium Price

The global vanadium price was steady during the quarter and remains around its long-term (14 year) average price of US\$8.67/lb V₂O₅. European and Chinese holidays during the quarter have affected purchasing, as has stockpiling and some substitutions in China. Strong Chinese steel demand continues to support additional production and consumption, while European prices slipped during the period.

The current lower prices for V₂O₅ provide opportunities for the completion of VRFB sales which were put on hold during the very high price period of 2018. Increasing interest from VRFB companies in discussing vanadium supply has been a feature of conversations during the quarter.

Cash Position

As at 30th September 2019, the Company had \$8.1Million in cash and cash equivalents.

For further information, please contact:

Vincent Algar, Managing Director +61 8 9321 5594

MINERAL RESOURCE AND ORE RESERVE

Table 1 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 2 The Australian Vanadium Project Ore Reserve Statement as at December 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

Tenement Schedule

Tenement Information as Required by Listing Rule 5.3.3 For the Quarter Ended 30 September 2019					
Project	Location	Tenements	Economic Interest	Notes	Change in Quarter %
Western Australia	The Australian Vanadium Project	E51/843	100% Granted ¹		Nil
		E51/1396	100% Granted ¹		Nil
		E51/1534	100% Granted ¹		Nil
		E51/1576	Nil	Surrendered	100%
		E51/1685	100% Granted ¹		Nil
		E51/1694	100% Granted ¹		Nil
		E51/1695	100% Granted ¹		Nil
		P51/2566	100% Granted ¹		Nil
		P51/2567	100% Granted ¹		Nil
		P51/2634	100% Granted ¹		Nil
		MLA51/878		100% On application	Nil
		E51/1899		100% On Application	Nil
Western Australia	Nowthanna	M51/771	100% Granted		Nil
Western Australia	Peak Hill	E52/3349	0.75% NSR Production Royalty		Nil
Western Australia	Coates	E70-4924-I	100% Granted		Nil
South Africa	Blesberg	(NC) 940 PR	5%	Earning up to 26%	5%

Note 1: Australian Vanadium Limited retains 100% rights in V/U/Co/Cr/Ti/Li/Ta/Mn & iron ore on the Australian Vanadium Project. Bryah Resources Limited holds the Mineral Rights for all minerals except V/U/Co/Cr/Ti/Li/Ta/Mn & iron ore only.

Forward Looking Statements

Some of the statements contained in this report are forward looking statements. Forward looking statements include, but are not limited to, statements concerning estimates of tonnages, expected costs, statements relating to the continued advancement of Australian Vanadium Limited's projects and other statements that are not historical facts. When used in this report, and on other published information of Australian Vanadium Limited, the words such as 'aim', 'could', 'estimate', 'expect', 'intend', 'may', 'potential', 'should' and similar expressions are forward looking statements.

Although Australian Vanadium Limited believes that the expectations reflected in the forward-looking statements are reasonable, such statements involve risks and uncertainties and no assurance can be given that the actual results will be consistent with these forward-looking statements. Various factors could cause actual results to differ from these forward-looking statements including the potential that Australian Vanadium Limited's project may experience technical, geological, metallurgical and mechanical problems, changes in vanadium price and other risks not anticipated by Australian Vanadium Limited.

Australian Vanadium Limited is pleased to report this information in a fair and balanced way and believes that it has a reasonable basis for making the forward-looking statements in this report, including with respect to any mining of mineralised material, modifying factors, production targets and operating cost estimates.

COMPETENT PERSON STATEMENT – EXPLORATION RESULTS AND EXPLORATION TARGETS

The information in this report that relates to Exploration Results and Exploration Targets is based on and fairly represents information and supporting documentation prepared by Mr Brian Davis (Consultant with Geologica Pty Ltd). Mr Davis is a shareholder of Australian Vanadium Limited. Mr Davis is a member of the Australasian Institute of Mining and Metallurgy and has 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 Davis consents to the inclusion in this report of the matters based on his information in the form and context in which they appear.

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.