ASX ANNOUNCEMENT **10 FEBRUARY 2020**

AVL AWARDED $1.25 MILLION VANADIUM RESEARCH AND DEVELOPMENT GRANT

Federal Government CRC-P Grant awarded to AVL to partly fund a $4.9 million industry-leading critical metals research and development project.

KEY POINTS

- **AVL has been awarded a highly competitive Australian Federal Government CRC-P Grant to partly fund industry-leading critical metals research aimed at improving the efficiency of vanadium processing.**
- **The $4.9m research initiative will be undertaken by AVL in conjunction with world renowned industry and academic partners including Wood, ALS, Curtin University and the Australian Nuclear Science and Technology Organisation (ANSTO).**
- **Includes $1.25 million in direct grant funding on milestone achievements, with in-kind contributions from participating partners and a contribution of $2.5 million by AVL.**
- **AVL and its partners aim to develop innovative solutions that improve all aspects of vanadium production from Vanadium-Titanium-Magnetite (VTM) deposits, including:**
  - Development of an ultra-high purity vanadium pentoxide production path;
  - Extraction of valuable by-products including critical minerals such as titanium;
  - Increasing recoveries from mine to mill; and
  - Reduction of waste products from mining and processing.
- **These improvements are expected to have a positive impact on operating costs of The Australian Vanadium Project, helping AVL achieve its goal of becoming one of the world's lowest cost vanadium producers.**

Australian Vanadium Limited (ASX: AVL, "the Company" or "AVL") is pleased to announce that it has been awarded a $1.25 million Australian Federal Government Cooperative Research Centres Project (CRC-P) Grant for Critical Minerals, to fund world-leading research and development into significantly improving the vanadium processing route. The grant is subject to formal documentation which is currently in process.

The research and development project will complement the on-going metallurgical testwork currently being undertaken by the Company as part of the Definitive Feasibility Study ("DFS") on The Australian Vanadium Project ("the Project").

The research initiative has an overall value of $4.9 million, with in-kind contributions from participating partners and CRC-P Grant funding of $1.25 million over the life of the research project. AVL has committed to spend $2.5 million over the life of the project to achieve the defined goals. AVL's expenditure has been allowed for in the existing DFS budget.

***Figure 1* – AVL's Managing Director Vincent Algar with Brian McNab from Wood at ALS**

The CRC-P research project will address four opportunities in comparison to the conventional process for producing vanadium as vanadium pentoxide (V_2O_5).

1. **Roasting and leaching**: the standard rotary kiln roasting and vat leaching methodology used in the conventional process achieves an average of approximately 87% vanadium extraction. New processing equipment and approaches will be tested and evaluated under this project, to improve existing extraction results. This testwork will commence in February 2020 with a pyrometallurgical pilot test using a travelling grate kiln at the Metso Research and Test Center, located in the USA.
2. **Ultra-high-purity vanadium production**: standard leach and precipitation flowsheets limit final vanadium product quality and are not capable of producing ultra-high purity vanadium (as 99.95% V_2O_5) for use in battery, catalyst and aerospace applications without separate and costly upgrading. AVL will explore and test integrated hydrometallurgical processing technologies, with the aim of lowering the cost of ultra-high purity vanadium production for these critical applications.

3. **By-product development**: typical by-products from the conventional process are high in iron (48-60%) and titanium (4-12%) content. AVL has been active in undertaking bench-scale testwork on its iron and titanium rich calcine by-product[1] and this project will continue those successful testwork results to establish economically viable solutions which can recover the significant value of both the iron and titanium units. The research project also aims to develop economical processes to enable the recovery of additional by-products, such as chromium, from VTM ore, which would normally be rejected as waste during the conventional process.
4. **Alternative solutions for standard process waste streams**: sulphate salts are generated as by-products of vanadium pentoxide production. Alternate processing pathways and new advances in processing technology will be explored to create saleable by-products and reduce the need for sulphate salts disposal and mine closure reclamation activities.

The potential outcomes from the research and development project include:

1. **A pelletisation process** for vanadium concentrate, more economical than a standard rotary kiln design, that can target >90% vanadium extraction and achieve <1.0 Gj/t gas consumption (in comparison to the industry average of 1.5-2.5 Gj/t gas consumption).
2. **Pilot scale testing that can reliably produce** an ultra-high purity vanadium product of 99.95% vanadium pentoxide, improving on the industry standard grade of 98.5%.
3. **Economic recovery of the critical minerals,** titanium (from calcine) and chromium (from waste streams), as well as iron (from calcine).
4. **Development of a fully integrated geological, mining and processing model** for the Project, to enable a robust and reliable geo-metallurgical predictive system using Machine Learning (ML) to mitigate risk.

The results from the research are expected to have a positive impact on operating costs for The Australian Vanadium Project by decreasing processing costs, improving the quality of vanadium products and enabling the extraction of valuable by-products, including other critical minerals. Improvements to the extraction of vanadium and valuable by-products could provide significant additional revenue over the Project's life.

[1] See ASX Announcement dated 9 September 2019 *'AVL Tests Confirm Potential for Significant Iron By-Product'*

The research will also offer significant benefits to downstream applications of ultra-high purity vanadium products, such as in master alloys and vanadium redox flow batteries (VRFB). These applications are a growing segment of the vanadium market. AVL's fully owned subsidiary, VSUN Energy Pty Ltd is actively focused on growing the VRFB market in Australia and beyond.

These research outcomes represent a significant, enduring economic benefit to Australia as well as a strong strategic boost to Australia's critical minerals capability. Because of this, the Australian Federal Government's contribution of $1.25 million to the CRC-P has the potential to be returned in value many times over.

AVL's Chief Operating Officer, Todd Richardson comments, "Being awarded this highly competitive grant further demonstrates the quality of the team we have at AVL and in the partners we have chosen to work with. The results of this research and development project will have far reaching benefits in the vanadium market globally and will enable us to develop and operate a low cost, fully integrated vanadium operation here in Western Australia."

Research project activities are expected to commence in February 2020 and to be completed in December 2022. Completion of the CRC-P project is expected to align with the start-up, commissioning and ramp-up of The Australian Vanadium Project, which was awarded Major Project Status by the Australian Federal Government in September 2019.

PROJECT PARTNERS

AVL will be conducting the research in conjunction with Curtin University, the Australian Nuclear Science and Technology Organisation (ANSTO), Wood and ALS Metallurgy Laboratory (ALS). AVL will oversee all project research, including design of programmes, risk management, due diligence, costs and governance of all participants.

Curtin University is Australia's leading mining research organisation and will bring specialised knowledge in the metallurgy processes potentially applicable to VTM ore. Curtin will bring specialised leaching technology to the CRC-P, which may be further developed for application to VTM ores. Curtin will also investigate the recovery of valuable potassium salts produced from the vanadium pentoxide production process.

ANSTO is one of Australia's largest scientific organisations and its minerals business unit has specialist experience in the hydrometallurgical processing of critical metals, including vanadium and titanium. ANSTO offers laboratories, piloting facilities and expert personnel to undertake robust research and continuous testing of new technologies for the vanadium industry.

Amec Foster Wheeler Australia Pty Ltd ("Wood") is a leader in project delivery, engineering and technical services and has specific high-end vanadium ore concentrate experience. Wood has an on-going role working with AVL on the Project and will bring this expertise to the CRC-P collaboration.

Ammtec Unit Trust ("ALS") is the laboratory and service provider for the CRC-P collaboration and will allocate specialised staff for conducting research and testwork in the following areas to maximise the critical mineral potential for VTM:

1. Low grade vanadium ore and scree beneficiation;
2. Comparison of ammonium polyvanadate (APV) precipitation with the standard technique of desilication and ammonium metavanadate precipitation; and
3. Investigation of the recovery and production of the critical mineral chromium.

AVL and its subsidiary VSUN Energy are also members of the Future Battery Industries CRC[2] (FBICRC) which is providing industry-led research capability to grow Australia's competitiveness and contribution to the global battery industries' value chain. This relationship is separate to the CRC-P grant, although the results of this AVL-led research will complement some of the work being undertaken through the FBICRC.

The ongoing assistance and support of the Perth R&D team at Ernst and Young for their assistance in the grant application is noted.

For further information, please contact:

Vincent Algar, Managing Director
Tel: +61 8 9321 5594

This announcement has been approved in accordance with the Company's published continuous disclosure policy and has been approved by the Board.

[2] See ASX Announcement dated 20th November 2018 *'Future Battery Industry CRC Involvement'*

ABOUT AUSTRALIAN VANADIUM LIMITED

AVL is an Australian owned resource company focused on production of high value vanadium products in Australia. AVL is 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 and intends to produce a value-added vanadium product in Australia prior to sale to steel, battery and specialty chemical customers.

The Australian Vanadium Project is currently one of the highest-grade vanadium projects being advanced globally with 183.6Mt at 0.76% vanadium pentoxide (V_2O_5), containing a high-grade zone of 96.7Mt at 1% V_2O_5 with an Ore Reserve of 18.24Mt at 1.04% V_2O_5 comprised of a Proved Reserve of 9.82Mt at 1.07% V_2O_5 and a Probable Reserve of 8.42Mt at 1.01% V_2O_5, reported in compliance with the JORC Code 2012[3].

The company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Mineral Resources or Ore Reserves, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.

AVL has developed a local production capability for ultra-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 the VRFB in Australia.

[3] See ASX Announcement dated 19 December 2018 *'Gabanintha Pre-Feasibility Study and Maiden Ore Reserve'*