

ASX ANNOUNCEMENT

11<sup>TH</sup> AUGUST 2021

# AVL SECURES VANADIUM ELECTROLYTE MANUFACTURING TECHNOLOGY

*AVL signs agreement with U.S. Vanadium LLC for high purity vanadium oxide supply and technology licence.*

## KEY POINTS

- **AVL has signed an MOU with U.S. Vanadium LLC (USV) for the supply of vanadium oxides for vanadium electrolyte production in Australia.**
- **MOU includes licence for low cost USV technology to convert vanadium oxides to vanadium electrolyte for use in vanadium redox flow batteries (VRFBs).**
- **MOU covers exclusivity over technology licence for Australia and New Zealand.**
- **USV is a global leader in the production of high purity vanadium oxide products and a key vanadium battery electrolyte supplier based in the USA.**
- **An initial order for USV vanadium oxides has arrived in Perth for conversion and will be used in a commercial flow battery deployment.**
- **Under the agreement, high purity vanadium oxides can be sourced from either USV or AVL and be used to produce vanadium electrolyte for Australian battery installations.**
- **Agreement enables AVL to commence commercial vanadium electrolyte production ahead of planned production of its own vanadium products, leading Australian VRFB market development.**
- **Technology and Supply agreement complements recently awarded Australian Government grant of \$3.69M to co-fund commercial vanadium electrolyte manufacturing plant development in WA.**

---

Australian Vanadium Limited (ASX: AVL, “the Company” or “AVL”) is pleased to advise that it has signed a second Memorandum of Understanding (MOU) with specialty chemical producer U.S. Vanadium LLC (USV) for the supply of high purity vanadium oxides and a licence for vanadium

electrolyte production. This agreement will allow AVL to commence local vanadium electrolyte production to support growing interest in the emerging Australian VRFB market.

AVL has recently been awarded a \$3.69M grant through the Australian Government’s Modern Manufacturing Initiative (MMI)<sup>1</sup> to develop a high purity vanadium production circuit, build and operate a 33MWh capacity vanadium electrolyte plant, and produce locally assembled prototype VRFB systems for domestic and stand-alone remote power systems.

This MOU complements the MOU already signed with USV regarding future offtake of vanadium from the Australian Vanadium Project (the Project)<sup>2</sup>, for use in the US critical metals market. Both MOUs will lead to a binding mutual vanadium supply and technology licence agreement between the two companies.

Vanadium electrolyte, manufactured from very high-purity vanadium oxides, is the key component in all VRFBs, which are the subject of growing attention for renewable energy storage.



**Figure 1 USV V<sub>2</sub>O<sub>5</sub> powder and vanadium electrolyte**

AVL’s Managing Director, Vincent Algar, comments, *‘Having a strong relationship with a company of USV’s calibre in the vanadium market enables AVL to secure a supply of the highest quality vanadium oxides, prior to bringing the Australian Vanadium Project into production. This will allow us to move quickly to build a vanadium electrolyte plant here in Australia to supply the growing VRFB market. The plant will be partially funded by the recently announced award of the MMI grant by the Federal Government. Our vanadium electrolyte plant will be capable of producing up to 33MWh of capacity each year and will enable AVL to secure supply deals for Australian VRFB implementations. Our 100% owned subsidiary VSUN Energy has already identified multiple projects suitable for locally produced vanadium electrolyte. This vertical integration strategy puts AVL in a strong position to secure financing for the Project and provides Australian employment opportunities in the downstream battery supply chain.’*

<sup>1</sup> See ASX announcement dated 21<sup>st</sup> July 2021 ‘AVL Awarded \$3.69M Federal Government Manufacturing Grant’

<sup>2</sup> See ASX announcement dated 2<sup>nd</sup> December 2020 ‘AVL Signs Strategic Offtake MOU with U.S. Vanadium LLC’

Mark A. Smith, CEO of US Vanadium commented, *“We are pleased to enter into this agreement with AVL, particularly given US Vanadium’s plans to rapidly emerge as a major U.S. producer of high-purity electrolyte for vanadium flow batteries. Partnering with AVL in order to serve the Australian market makes a lot of sense for US Vanadium, and we look forward to working with AVL toward these goals.”*

USV will grant AVL the exclusive use of its vanadium electrolyte technology in Australia and New Zealand, which will allow AVL to use either USV or its own vanadium products when available. The USV technology and expertise has a track record for being a low-cost method of production of balanced electrolyte, suitable for a wide range of VRFB manufacturers’ specifications. USV will provide technical support for the first two years at no cost to AVL, followed by technical support being available from USV at cost.

The agreement terminates if AVL has not built a vanadium electrolyte plant within 24 months. The licence will continue for a period of five years.

AVL will purchase vanadium pentoxide to manufacture the vanadium electrolyte using a pricing formula based on the Metal Bulletin Monthly Midpoint Average with a floor and ceiling included.

*For further information, please contact:*

**Vincent Algar, Managing Director** +61 8 9321 5594

---

*This announcement has been produced in accordance with the Company’s published continuous disclosure policy and has been approved by the Board*

## ABOUT AUSTRALIAN VANADIUM LTD

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 at Gabanintha. The Australian Vanadium Project is currently one of the highest-grade vanadium projects being advanced globally, with 208.2Mt at 0.74% vanadium pentoxide ( $V_2O_5$ ), containing a high-grade zone of 87.9Mt at 1.06%  $V_2O_5$ , reported in compliance with the JORC Code 2012 (see ASX announcement dated 4<sup>th</sup> March 2020 ‘*Total Vanadium Resource at the Australian Vanadium Project Rises to 208 Million Tonnes*’ and ASX announcement dated 22<sup>nd</sup> December 2020 ‘*Technical and Financial PFS Update*’).

VSUN Energy is AVL’s 100% owned subsidiary which is focused on developing the market for vanadium redox flow batteries for energy storage.

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.

## ABOUT U.S. VANADIUM LLC

U.S. Vanadium LLC produces and sells a range of specialty vanadium chemicals, including the highest-purity  $V_2O_5$  in the world. The company is comprised of global leaders and investors in the specialty chemicals and strategic materials sectors, including in the mining, processing, purification, and sales and distribution of vanadium specialty chemicals.

## APPENDIX 1

The Australian Vanadium Project – Mineral Resource estimate by domain and resource classification using a nominal 0.4% V<sub>2</sub>O<sub>5</sub> wireframed cut-off for low-grade and nominal 0.7% V<sub>2</sub>O<sub>5</sub> wireframed cut-off for high-grade (total numbers may not add up due to rounding).

2020 Feb	Category	Mt	V <sub>2</sub> O <sub>5</sub> %	Fe %	TiO <sub>2</sub> %	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	LOI %
<b>HG</b>	Measured	10.1	1.14	43.9	13.0	9.2	7.5	3.7
	Indicated	25.1	1.10	45.4	12.5	8.5	6.5	2.9
	Inferred	52.7	1.04	44.6	11.9	9.4	6.9	3.3
	<b>Subtotal</b>	<b>87.9</b>	<b>1.06</b>	<b>44.7</b>	<b>12.2</b>	<b>9.2</b>	<b>6.8</b>	<b>3.2</b>
<b>LG 2-5</b>	Indicated	44.5	0.51	25.0	6.8	27.4	17.0	7.9
	Inferred	60.3	0.48	25.2	6.5	28.5	15.3	6.7
	<b>Subtotal</b>	<b>104.8</b>	<b>0.49</b>	<b>25.1</b>	<b>6.6</b>	<b>28.0</b>	<b>16.1</b>	<b>7.2</b>
<b>Trans 6-8</b>	Inferred	15.6	0.65	28.4	7.7	24.9	15.4	7.9
	<b>Subtotal</b>	<b>15.6</b>	<b>0.65</b>	<b>28.4</b>	<b>7.7</b>	<b>24.9</b>	<b>15.4</b>	<b>7.9</b>
<b>Total</b>	Measured	10.1	1.14	43.9	13.0	9.2	7.5	3.7
	Indicated	69.6	0.72	32.4	8.9	20.6	13.2	6.1
	Inferred	128.5	0.73	33.5	8.8	20.2	11.9	5.4
	<b>Subtotal</b>	<b>208.2</b>	<b>0.74</b>	<b>33.6</b>	<b>9.0</b>	<b>19.8</b>	<b>12.1</b>	<b>5.6</b>

The Australian Vanadium Project - Ore Reserve Statement as at December 2020, at a cut-off grade of 0.7% V<sub>2</sub>O<sub>5</sub>.

Ore Reserve	Mt	V <sub>2</sub> O <sub>5</sub> %	Fe <sub>2</sub> O <sub>3</sub> %	TiO <sub>2</sub> %	SiO <sub>2</sub> %	LOI%	V <sub>2</sub> O <sub>5</sub> production kt	Ore Reserve	Mt
Proved	9.8	1.08	59.9	12.4	8.7	3.5	63.2	Waste	244.5
Probable	22.4	1.04	61.7	11.8	8.3	2.8	158.9	Total Material	276.7
<b>Total Ore</b>	<b>32.1</b>	<b>1.05</b>	<b>61.2</b>	<b>12.0</b>	<b>8.4</b>	<b>3.0</b>	<b>222.1</b>	Strip Ratio	7.6

### 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 Barnes and Mr Davis are both members of the Australasian Institute of Mining and Metallurgy (AusIMM) and the Australian Institute of Geoscientists (AIG). 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 technical information in this announcement that relates to the Ore Reserve estimate for the Project is based on information compiled by Mr Ross Cheyne, an independent consultant to AVL. Mr Cheyne is a Fellow of the Australasian Institute of Mining and Metallurgy. He is an employee and Director of Orelogy Mine Consulting Pty Ltd. Mr Cheyne 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 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Cheyne 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. BSc Extractive Metallurgy). Mr McNab is a Member of AusIMM. He 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.