ASX ANNOUNCEMENT **13TH DECEMBER 2021**

HIGH PURITY 99.5% V_2O_5 PRODUCED IN FINAL PHASE OF METALLURGICAL WORK FOR BFS

Production of V_2O_5 market samples is the final step in demonstrating the metallurgical process at pilot scale for The Australian Vanadium Project.

KEY POINTS

- **High purity V_2O_5 averaging 99.5% produced as an end-product from sequential beneficiation, pyrometallurgy and hydrometallurgy pilot programs.**
- **Testwork confirms that the ammonium metavanadate precipitation process is optimal for the Australian Vanadium Project.**
- **Results validate exceptional product quality and finalise BFS process engineering design.**
- **Vanadium product is suitable as high-purity critical mineral product for defence steel alloys and the battery market.**
- **Work was conducted at ALS Metallurgy in Balcatta, Perth – a research partner in AVL's Cooperative Research Centre Projects (CRC-P) scheme which is partly funded by the Australian Government.**

Australian Vanadium Limited (ASX: AVL, "the Company" or "AVL") is pleased to announce that it has produced high-purity 99.5% V_2O_5 marketing samples in the final stage of metallurgical testing for the bankable feasibility study (BFS).

The V_2O_5 was recovered from leach solutions generated in AVL's recent hydrometallurgy pilot program[1] via the ammonium metavanadate (AMV) process. This work in turn followed the pyrometallurgy pilot runs conducted at Metso Outotec's Dansville facilities in the USA[2] and the beneficiation pilot program conducted at ALS Metallurgy in Perth[3]. The feed materials for this

---

[1] See ASX announcement dated 8th June 2021 *"High Vanadium Extractions Confirmed in Pellet Leach Pilot as BFS Progresses"*

[2] See ASX announcement dated 10th March 2021 *"Final Pyrometallurgy Results Confirm World Leading Vanadium Extraction"*

[3] See ASX announcement dated 17th March 2020 *"Pilot Study Programme Confirms High Vanadium Recoveries and Concentrate Quality"*

sequence of pilot programs comprised two composites of drill core, designed to be indicative of the average first five years of production and life of mine production[4]. A sample of V_2O_5, alongside AVL's pelletised vanadium concentrate and a sample of ore is shown in Figure 1.

Figure 1. Sample of V_2O_5 precipitate generated from pilot program alongside roasted pellets and a vanadium ore sample.

Managing Director, Vincent Algar comments, *"AVL differentiates itself from its peers by demonstrating a detailed technical understanding of the proposed processes we intend to build. The ability to produce V_2O_5 at this purity opens markets for AVL's vanadium in both critical minerals and battery minerals markets. Samples of our own V_2O_5 product generated from our planned process can now find their way to customers for validation and completion of offtake agreements for long term supply."*

The AMV precipitation process was selected over other options due to its applicability to high-purity leach solutions, such as those generated in AVL's pilot program. It is conducted at ambient temperature, near-neutral pH and has simple process control requirements. Silica is removed

---

[4] See ASX announcement dated 21st January 2019 *"Metallurgical Drilling Commences at Gabanintha Vanadium Project."*

beforehand by a well-established method known as "desilication", achieved by the addition of aluminium sulfate to the leach solution, leading to selective silica precipitation and removal.

The final metallurgical process is to heat the AMV precipitate at 650°C to convert it to high-purity V_2O_5. The suite of assays for the V_2O_5 product is shown in Table 1.

Table 1. Assays for V_2O_5 product (%)

	V_2O_5	Fe	Cu	Zn	Pb	Cr	Si	Mg	Al	K	Na
Sample 1	99.25	0.000	0.001	0.001	0.002	0.033	0.001	0.000	0.207	0.002	0.070
Sample 2	99.60	0.020	0.003	0.001	0.004	0.036	0.000	0.000	0.133	0.000	0.020
Sample 3	99.60	0.000	0.004	-0.001	0.002	0.039	0.000	0.000	0.157	0.000	0.020

The V_2O_5 generated in this pilot program meets market specifications for the production of high-strength steel alloys. The high purity achieved for this product simplifies continuing work with AVL's research partners in the CRC-P to further increase the product purity for the battery industry. This will lead to the design of an ultra-high purity process to feed AVL's future electrolyte plant, for which a grant was awarded through the Federal Government's Modern Manufacturing Initiative[5].

Supply and quality of V_2O_5 are critical for the development of the vanadium redox flow battery (VRFB) market which is expected to grow rapidly in coming years. Estimates vary between 27,000 tonnes V_2O_5 per annum by 2030 from Roskill and 44,000 tonnes V_2O_5 per annum by 2025 from TTP Squared, the latter approximately 15% of the expected global vanadium market in 2025. AVL intends to produce 11,000 tonnes of V_2O_5 per annum, with a portion dedicated to the battery market. AVL has signed MOUs with a number of VRFB manufacturers such as CellCube, E22 and VFlow Tech to help meet demand.

This work concludes the metallurgical testwork program for the BFS. The work was partly funded by the Australian Government's Cooperative Research Centre Projects scheme. Work under this scheme is continuing outside the BFS on programs such as downstream electrolyte production and value-adding to process waste streams.

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.

---

[5] See ASX announcement dated 21st July 2021 *"AVL Awarded $3.69M Federal Government Manufacturing Grant"*

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 most advanced vanadium projects being developed globally, with 239Mt at 0.73% vanadium pentoxide (V_2O_5), containing a high-grade zone of 95.6Mt at 1.07% V_2O_5, reported in compliance with the JORC Code 2012 (see ASX announcement dated 1st November 2021 *'Mineral Resource Update at the Australian Vanadium Project'* and ASX announcement dated 22nd 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.

APPENDIX 1

The Australian Vanadium Project – Mineral Resource estimate by domain and resource classification using a nominal 0.4% V_2O_5 wireframed cut-off for low-grade and nominal 0.7% V_2O_5 wireframed cut-off for high-grade (total numbers may not add up due to rounding).

2021 Nov	**Category**	**Mt**	**V_2O_5 %**	**Fe %**	**TiO_2 %**	**SiO_2 %**	**Al_2O_3 %**	**LOI %**
HG	Measured	11.3	1.14	43.8	13.0	9.2	7.5	3.7
	Indicated	27.5	1.10	45.4	12.5	8.5	6.5	2.9
	Inferred	56.8	1.04	44.6	11.9	9.4	6.9	3.3
	Subtotal	**95.6**	**1.07**	**44.7**	**12.2**	**9.1**	**6.8**	**3.2**
LG 2-5	Indicated	54.9	0.50	24.9	6.8	27.6	17.1	7.9
	Inferred	73.6	0.48	25.0	6.4	28.7	15.3	6.6
	Subtotal	**128.5**	**0.49**	**24.9**	**6.6**	**28.2**	**16.1**	**7.2**
Trans 6-8	Inferred	14.9	0.66	29.0	7.8	24.5	15.1	7.8
	Subtotal	**14.9**	**0.66**	**29.0**	**7.8**	**24.5**	**15.1**	**7.8**
Total	Measured	11.3	1.14	43.8	13.0	9.2	7.5	3.7
	Indicated	82.4	0.70	31.7	8.7	20.7	12.0	5.4
	Inferred	145.3	0.71	33.0	8.7	20.7	12.0	5.4
	Subtotal	**239.0**	**0.73**	**33.1**	**8.9**	**20.4**	**12.3**	**5.6**

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 – EXPLORATION RESULTS AND 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) and Ms Gemma Lee who is employed by Australian Vanadium Ltd as a Resource Geologist. Mr Davis is a member of the Australasian Institute of Mining and Metallurgy and Ms Lee is a member of the Australian Institute of Geoscientists. Both Mr Davis and Ms Lee 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 Davis and Ms Lee consent to the inclusion in this report of the matters based on their information in the form and context in which they appear.

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.

FORWARD-LOOKING STATEMENTS

This release may contain certain forward-looking statements with respect to matters including but not limited to the financial condition, results of operations and business of AVL and certain of the plans and objectives of AVL with respect to these items.

These forward-looking statements are not historical facts but rather are based on AVL's current expectations, estimates and projections about the industry in which AVL operates and its beliefs and assumptions.

Words such as "anticipates," “considers,” "expects," "intends," "plans," "believes," "seeks," "estimates", "guidance" and similar expressions are intended to identify forward looking statements and should be considered an at-risk statement. Such statements are subject to certain risks and uncertainties, particularly those risks or uncertainties inherent in the industry in which AVL operates.

These statements are not guarantees of future performance and are subject to known and unknown risks, uncertainties, and other factors, some of which are beyond the control of AVL, are difficult to predict and could cause actual results to differ materially from those expressed or forecasted in the forward-looking statements. Such risks include, but are not limited to resource risk, metal price volatility, currency fluctuations, increased production costs and variances in ore grade or recovery rates from those assumed in mining plans, as well as political and operational risks in the countries and states in which we sell our product to, and government regulation and judicial outcomes. For more detailed discussion of such risks and other factors, see the Company's Annual Reports, as well as the Company's other filings.

AVL cautions shareholders and prospective shareholders not to place undue reliance on these forward-looking statements, which reflect the view of AVL only as of the date of this release.

The forward-looking statements made in this announcement relate only to events as of the date on which the statements are made.

AVL will not undertake any obligation to release publicly any revisions or updates to these forward-looking statements to reflect events, circumstances or unanticipated events occurring after the date of this announcement except as required by law or by any appropriate regulatory authority.

APPENDIX 1: JORC, 2012 Edition Table 1, Section 3

Section 3 - Estimation and Reporting of Mineral Resources

Criteria	JORC Code Explanation	Commentary
Database Integrity	Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.	All the drilling was logged into Microsoft Excel, or logged onto paper and then transferred to a digital form and loaded into a Microsoft SQL Server relational drill hole database using DataShed^{TM} management software. Logging information was reviewed by the responsible geologist and database administrator prior to final load into the database. All assay results were received as digital files, as well as the collar and survey data. These data were transferred directly from the received files into the database. All other data collected for the Australian Vanadium Project were recorded as Excel spreadsheets prior to loading into SQL Server. The data have been periodically checked by AVL personnel, the database administrator as well as the personnel involved in all previous Mineral Resource estimates for the project.
	Data validation procedures used.	The data validation was initially completed by the responsible geologist logging the core and marking up the drill hole for assaying. The paper geological logs were transferred to Excel spreadsheets and compared with the originals for error. Assay dispatch sheets were compared with the record of samples received by the assay laboratories. Normal data validation checks were completed on import to the SQL database. Data has also been checked back against hard copy results and previous mines department reports to verify assays and logging intervals. Both internal (AVL) and external (Schwann, MASS, CSA and AMC) validations are/were completed when data was loaded into spatial software for geological interpretation and resource estimation. All data have been checked for overlapping intervals, missing samples, FROM values greater than TO values, missing stratigraphy or rock type codes, downhole survey deviations of ±10° in azimuth and ±5° in dip, assay values greater than or less than expected values and several other possible error types. Furthermore, each assay record was examined and mineral resource intervals were picked by the Competent Person. QAQC data and reports have been checked by the database administrator, MRG. MASS & Schwann and CSA both reported on the available QAQC data for the Australian Vanadium Project.
Site Visits	Comment on any site visits undertaken by the Competent Person and the outcome of those visits.	The drill location was inspected by John Tyrrell of AMC in 2015 for the initial 2012 JORC resource estimation. Consulting Geologist Brian Davis of Geologica Pty Ltd has visited all the Australian Vanadium Project drilling sites since 2015 and has been familiar with the Australian Vanadium Project iron-titanium-vanadium orebody since 2006. AVL Resource Geologist, Gemma Lee, has visited site numerous times since early 2019, completing outcrop mapping and drilling supervision. Consulting Geologist Lauritz Barnes of Trepanier Pty Ltd visited the Australian Vanadium Project drilling sites in March 2019. The geology, sampling, sample preparation and transport, data collection and storage procedures were all discussed and reviewed with the responsible geologist for the 2015, 2017, 2018 and 2019 drilling. Visits to the BV laboratory and core shed in Perth were used to add knowledge to aid in the preparation of this Mineral Resource Estimate.
	If no site visits have been undertaken indicate why this is the case.	N/A

Criteria	JORC Code Explanation	Commentary
Geological Interpretation	Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.	The Australian Vanadium Project's vanadium mineralisation lies along strike from the Windimurra Vanadium Mine and the oxidised portion of the high-grade massive magnetite/martite mineralisation outcrops for almost 14km in the company held lease area. Detailed mapping and mineralogical studies have been completed by company personnel and contracted specialists between 2000 and 2019, as well as multiple infill drilling programmes to test the mineralisation and continuity of the structures. These data and the relatively closely-spaced drilling has led to a good understanding of the mineralisation controls. The mineralisation is hosted within altered gabbro and is easy to visually identify by the magnetite/martite content. The main high grade unit shows consistent thickness and grade along strike and down dip and has a clearly defined sharp boundary. The lower grade disseminated bands also show good continuity, but their boundaries are occasionally less easy to identify visually as they are more diffuse over a metre or so.
	Nature of the data used and of any assumptions made.	No assumptions are made regarding the input data.
	The effect, if any, of alternative interpretations on Mineral Resource estimation.	Alternative interpretations were considered in the current estimation and close comparison with the 2015 and 2018 resource models was made to see the effect of the new density data and revised geology model. Continuity of the low grade units, more closely defined from lithology logs, is now better understood and the resulting interpretation is more effective as a potential mining model. The near-surface alluvial and transported material has again been modelled in this estimation. The impact of the current interpretation as compared to the previous interpretation is a greater confidence in areas of infill drilling.
	The use of geology in guiding and controlling Mineral Resource estimation.	Geological observation has underpinned the resource estimation and geological model. The high grade mineralisation domain has a clear and sharp boundary and has been tightly constrained by the interpreted wireframe shapes. The low grade mineralisation is also constrained within wireframes, which are defined and guided by visual (from core) and grade boundaries from assay results. The low grade mineralisation has been defined as four sub-domains, which strike sub-parallel to the high grade domain. In addition there is a sub parallel laterite zone and two transported zones above the top of bedrock surface. The resource estimate is constrained by these wireframes. Domains were also coded for oxide, transition and fresh, as well as above and below the alluvial and bedrock surfaces. The extents of the geological model were constrained by fault block boundaries. Geological boundaries were extrapolated to the edges of these fault blocks, as indicated by geological continuity in the logging and the magnetic geophysical data.
	The factors affecting continuity both of grade and geology.	Key factors that are likely to affect the continuity of grade are: • The thickness and presence of the high grade massive magnetite/martite unit, which to date has been very consistent in both structural continuity and grade continuity. • The thickness and presence of the low grade banded and disseminated mineralisation along strike and down dip. The low grade sub-domains are less consistent in their thickness along strike and down dip with more pinching and swelling than for the high grade domain. • SW-NE oriented faulting occurs at a deposit scale and offsets the main orientation of the mineralisation. These regional faults divide the deposit along strike into kilometre scale blocks. Internally the mineralised blocks show very few signs of structural disturbance at the level of drilling.

Criteria	JORC Code Explanation	Commentary
Dimensions	The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.	The massive magnetite/martite unit strikes approximately 14 km, is stratiform and ranges in thickness from less than 10m to over 20m true thickness. The low grade mineralised units are sub-parallel to the high grade zone, and also vary in thickness from less than 10m to over 20m. All of the units dip moderately to steeply towards the west, with the exception of two predominantly alluvial units (domains 7 and 8) and a laterite unit (domain 6) which are flat lying. All units outcrop at surface, but the low grade units are difficult to locate as they are more weathered and have a less prominent surface expression than the high grade unit. The high and low grade units are currently interpreted to have a depth extent of at least approximately 250m below surface. Mineralisation is currently open along strike and at depth.
Estimation and Modelling Techniques	The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.	Grade estimation was completed using Ordinary Kriging (OK) for the Mineral Resource estimate. Surpac™ software was used to estimate grades for V_2O_5, TiO_2, Fe_2O_3, SiO_2, Al_2O_3, Cr_2O_3, Co, Cu, Ni, S, magnetic susceptibility and loss on ignition (LOI) using parameters derived from statistical and variography studies. The majority of the variables estimated have coefficients of variation of significantly less than 1.0, with Cr_2O_3 being the exception. Drill hole spacing varies from approximately 80 m to 100 m along strike by 25 m to 30 m down dip, to 500 m along by 50 m to 60 m down dip. Drill hole sample data was flagged with numeric domain codes unique to each mineralisation domain. Sample data was composited to 1 m downhole length and composites were terminated by a change in domain or oxidation state coding. No grade top cuts were applied to any of the estimated variables as statistical studies showed that there were no extreme outliers present within any of the domain groupings. Grade was estimated into separate mineralisation domains including a high grade bedrock domain, four low grade bedrock domains and low grade alluvial and laterite domains. Each domain was further subdivided into a fault block, and each fault block was assigned its own orientation ellipse for grade interpolation. Downhole variography and directional variography were performed for all estimated variables for the high grade domain and the grouped low grade domains. Grade continuity varied from hundreds of metres in the along strike directions to sub-two hundred metres in the down-dip direction although the down-dip limitation is likely related to the extent of drilling to date.
	The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.	Prior to 2017, there had been five Mineral Resource estimates for the Australian Vanadium Project deposit. The first, in 2001 was a polygonal sectional estimate completed by METS & BSG. The subsequent models by Schwann (2007), MASS & Schwann (2008) and CSA (2011) are kriged estimates. AMC (2015) reviewed the geological interpretation of the most recent previous model (CSA 2011), but used a new interpretation based on additional new drilling for the 2015 estimate. In 2017 a complete review of the geological data, weathering profiles, magnetic intensity and topographic data as well as incorporation of additional density data and more accurate modelling techniques resulted in a re-interpreted mineral resource. This was revised in July and December 2018. A Mineral Resource update (adding magnetic susceptibility and new drill data) was completed in March 2020. No mining has occurred to date at the Australian Vanadium Project, so there are no production records. Additional infill drilling and extensional diamond core holes have resulted in further adjustments to the interpretation.

Criteria	JORC Code Explanation	Commentary
	The assumptions made regarding recovery of by-products.	Leached calcine of 54% Fe, 9% Ti, 1.1% Si and 1.5% Al has been generated from the pilot scale testwork and is considered an iron-titanium co-product when produced from AVL's relocated processing plant site at Tenindewa. Further characterisation testwork and exploration of avenues to improve the calcine product quality are under review. Test work conducted by the company in 2015 identified the presence of sulphide hosted cobalt, nickel and copper, specifically partitioned into the silicate phases of the massive titaniferous vanadiferous iron oxides which make up the vanadium mineralisation at the Australian Vanadium Project. Subsequent test work has shown the ability to recover a sulphide flotation concentrate containing between 3.8 % and 6.3% of combined base metals treating the non-magnetic tailings produced as a result of the magnetic separation of a vanadium iron concentrate from fresh massive magnetite. See ASX Announcements dated 22 May 2018 and 5 July 2018. Base metal sulphide recovery is not included in the BFS flowsheet.
	Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterization).	Estimates were undertaken for Fe_2O_3, SiO_2, TiO_2, Al_2O_3, and LOI, most of which are non-commodity variables, but are useful for determining process recoveries and metallurgical performance of the treated material. Estimated Fe_2O_3% grades were converted to Fe% grades in the final for reporting (Fe% = Fe_2O_3/1.4297). Estimates were also undertaken for Cr_2O_3 which is a potential deleterious element. The estimated Cr_2O_3% grades were converted to Cr ppm grades (Cr ppm = (Cr_2O_3*10000)/1.4615).
	In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed. Any assumptions behind modelling of selective mining units.	The Australian Vanadium Project block model uses a parent cell size of 40 m in northing, 8 m in easting and 10 m in RL. This corresponds to approximately half the distance between drill holes in the northing and easting directions and matches an assumed bench height in the RL direction. Accurate volume representation of the interpretation was achieved. Grade was estimated into parent cells, with all sub-cells receiving the same grade as their relevant parent cell. Search ellipse dimensions and directions were adjusted for each fault block. Three search passes were used for each estimate in each domain. The first search was 120m and allowed a minimum of 8 composites and a maximum of 24 composites. For the second pass, the first pass search ranges were expanded by 2 times. The third pass search ellipse dimensions were extended to a large distance to allow remaining unfilled blocks to be estimated. A limit of 5 composites from a single drill hole was permitted on each pass. In domains of limited data, these parameters were adjusted appropriately. No selective mining units were considered in this estimate apart from an assumed five metre bench height for open pit mining. Model block sizes were determined primarily by drill hole spacing and statistical analysis of the effect of changing block sizes on the final estimates.
	Any assumptions about correlation between variables.	All elements within a domain used the same sample selection routine for block grade estimation. No co-kriging was performed at the Australian Vanadium Project.
	Description of how the geological interpretation was used to control the resource estimates.	The geological interpretation is used to define the mineralisation, oxidation/transition/fresh and alluvial domains. All of the domains are used as hard boundaries to select sample populations for variography and grade estimation.
	Discussion of basis for using or not using grade cutting or capping.	Analysis showed that none of the domains had statistical outlier values that required top-cut values to be applied.

Criteria	JORC Code Explanation	Commentary
	The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.	Validation of the block model consisted of: • Volumetric comparison of the mineralisation wireframes to the block model volumes. • Visual comparison of estimated grades against composite grades. • Comparison of block model grades to the input data using swathe plots. As no mining has taken place at the Australian Vanadium Project to date, there is no reconciliation data available.
Moisture	Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.	All mineralisation tonnages are estimated on a dry basis. The moisture content in mineralisation is considered very low.
Cut-Off Parameters	The basis of the adopted cut-off grade(s) or quality parameters applied.	A nominal 0.4% V_2O_5 wireframed cut off for low grade and a nominal 0.7% V_2O_5 wireframed cut off for high grade has been used to report the Mineral Resource at the Australian Vanadium Project. Consideration of previous estimates, as well as the current mining, metallurgical and pricing assumptions, while not rigorous, suggest that the currently interpreted mineralised material has a reasonable prospect for eventual economic extraction at these cut off grades.
Mining Factors or Assumptions	Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	AVL completed a mining Scoping Study in October 2016 for the Australian Vanadium Project. The primary mining scenario being considered is conventional open pit mining. In September 2018, AVL released a base case PFS which included key assumptions supporting a planned open pit vanadium mining operation at the Australian Vanadium Project. The March 2020 Mineral Resource was the basis for new optimisation studies during 2020 for an open pit mine plan incorporating the additional Indicated resources, upon which a PFS Update released in December 2020 was based. The November 2021 Mineral Resource will be the basis for the BFS, pending full release prior to the end of 2021, including updated pit optimisations, mine schedule and financial modelling.
Metallurgical Factors or Assumptions	The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation	The metallurgical work conducted has been significant with programs designed to support a Bankable Feasibility Study (BFS) flowsheet. Lab work supporting the BFS is complete and reporting is being finalised. The work included bench scale variability testwork and pilot scale testwork on indicative process feed blends, to validate optimised beneficiation, pyrometallurgical and hydrometallurgical flowsheets. The pilot test programs have effectively generated a high quality V_2O_5 product (average 99.5% V_2O_5) and a FeTi co-product (54% Fe and 9% Ti) for use as marketing samples. Other metallurgical programs outside the scope of the BFS are continuing aimed at assessing routes to produce high purity vanadium products, further upgrade the Co-product and derive value from process waste streams. Metallurgical studies supporting the PFS (Q4 2018) focused on bench scale comminution and magnetic separation test work on 24 contiguous drill core intervals from the high-grade vanadium domain. These samples included 10 off from the

<table>
<tr><th>Criteria</th><th>JORC Code Explanation</th><th>Commentary</th></tr>
<tr><td></td><td>of the basis of the metallurgical assumptions made.</td><td>
<p>“fresh” rock zone, 9 off from the zone defined as “transitional” and 5 off from the near surface oxidised horizon, “oxide”. Some preliminary bench scale roast and leach testing was carried out and used to support process design criteria applied in the PFS.</p>
<p>Metallurgical studies supporting the PFS Update (Q4 2020) included bench scale variability tests on both diamond core and RC material and pilot testing of bulk samples made up from diamond drill core to represent average early years (0-5) and life of mine (LOM) process feed. The pilot testing of the optimised beneficiation circuit generated two controlled batches (total 2.2 tonne) of concentrate that were used to develop and optimise a Grate Kiln process, similar to a pelletisation process for iron ore. Significantly higher vanadium leach extraction was achieved relative to conventional processing of fine concentrate in a rotary kiln, as applied in the original PFS flowsheet. Testing in 2021 has included pilot scale leaching of roasted calcine and purification of the vanadium leach liquor to generate both a V_2O_5 and FeTi co-product marketing sample.</p>
<p>The following list provides a summary of the metallurgical testing supporting the November 2021 Mineral Resources statement.</p>
<table>
<tr><th></th><th>Type of test</th><th>Number of tests</th></tr>
<tr><td>Flowsheet Area</td><td></td><td></td></tr>
<tr><td>Concentration</td><td>Comminution</td><td></td></tr>
<tr><td></td><td>• Bond ball mill work index</td><td>31 tests</td></tr>
<tr><td></td><td>• Bond rod mill work index</td><td>15 tests</td></tr>
<tr><td></td><td>• UCS</td><td>12 tests</td></tr>
<tr><td></td><td>• SMC</td><td>30 tests</td></tr>
<tr><td></td><td>• JKDWi</td><td>3 tests</td></tr>
<tr><td></td><td>Bench scale silica reverse flotation</td><td>34 tests</td></tr>
<tr><td></td><td>Tails and concentrate thickening</td><td>20 tests</td></tr>
<tr><td></td><td>Concentrate filtration</td><td>12 tests</td></tr>
<tr><td></td><td>Pilot scale beneficiation</td><td>4 tests (optimised conditions)</td></tr>
<tr><td></td><td>Concentrate characterisation</td><td>2 size by assay tests</td></tr>
<tr><td></td><td></td><td>2 XRD tests</td></tr>
<tr><td></td><td>Variability test program</td><td>47 small scale WHIMS tests</td></tr>
<tr><td></td><td></td><td>32 DTR or DTW tests</td></tr>
<tr><td></td><td></td><td>26 REMS Stick tests</td></tr>
<tr><td></td><td></td><td>6 LMA tests</td></tr>
<tr><td></td><td></td><td>1 LIMS/WHIMS test</td></tr>
<tr><td></td><td></td><td>1 silica reverse flotation test</td></tr>
<tr><td></td><td></td><td>16 Qemscan analyses</td></tr>
<tr><td>Vanadium Extraction</td><td>Bench scale roast and leach</td><td>41 muffle furnace roast tests</td></tr>
<tr><td></td><td></td><td>6 pot roast tests</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Criteria</th><th>JORC Code Explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>5 agitated tank leach tests
3 bottle roll leach tests
5 counter current pellet leach tests</td></tr>
<tr><td></td><td>Pilot scale roasting</td><td>31 small batch pelletising tests
44 large batch pelletising tests
55 Grate Kiln roast tests and 47 batch water leach tests</td></tr>
<tr><td></td><td>Bond ball mill work index</td><td>1 calcine regrind test</td></tr>
<tr><td></td><td>Large scale batch leach</td><td>5 bulk static tank leach tests
1 bulk agitated tank leach test
3 spiral leach tests
13 off 1m column leach tests
1 off 5m column leach test</td></tr>
<tr><td>Vanadium Purification</td><td>Evaporation</td><td>14 tests</td></tr>
<tr><td></td><td>Bench scale desilication</td><td>3 tests</td></tr>
<tr><td></td><td>Bench scale AMV precipitation</td><td>10 tests</td></tr>
<tr><td></td><td>Bench scale APV precipitation</td><td>8 tests</td></tr>
<tr><td></td><td>Bench scale deammoniation</td><td>5 tests</td></tr>
<tr><td>Calcine Upgrading</td><td>Calcine characterisation</td><td>3 XRD tests
3 TGA tests
2 TCLP tests</td></tr>
<tr><td></td><td>Calcine upgrading</td><td>8 roast tests
12 DTR tests
4 Carpco magnetic fractionation tests</td></tr>
</table>
<p>Through the pilot scale testing and optimisation testwork undertaken in 2020 and 2021, the metallurgical understanding and confidence in the process design has improved considerably. The following metallurgical summary supports the Resource Statement and grounds for justifying reasonable prospects of eventual economic extraction.</p>

The oxide, transitional and fresh materials are similar in comminution behaviour and exhibit a moderate rock competency and ball milling energy demand. The abrasiveness of the massive iron mineralisation (vanadium enriched zone) is on average low, indicating grinding media and wear liner unit consumption rates will be low when processed.
Most of the vanadium exists within massive iron mineralisation which can effectively be recovered to a magnetic concentrate at a grind size P_{80} ranging 106 to 160 µm. A positive and consistent response to magnetic separation has been shown from Davis Tube recovery (DTR) testing of fresh un-oxidised material within the high-grade domain. The degree of weathering impacts the magnetic susceptibility of the mineralisation and therefore the response to magnetic separation. Testwork has confirmed wet high intensity magnetic separation (WHIMS) to be an effective scavenger for upper profile transitional and well oxidised material.
Lower vanadium grade assay intervals (0.4 to 0.7% V_2O_5) are common at the boundary of the high-grade massive iron zone but are observed to be more related to inclusion of mafic rock (gangue), often intercalated. Lower vanadium grade material representing the expected mine dilution was included in the pilot testwork feed blends and when individually tested has recovered a magnetic concentrate. There are reasonable grounds to propose that eventual economic extraction of low-grade material (0.4 to 0.7% V_2O_5) could be viable at least at the end of the project via a preconcentration step not yet within the beneficiation flowsheet.

</td></tr>
</table>

Criteria	JORC Code Explanation	Commentary
		• The processing of blends of fresh and variably oxidised material can achieve a low silica (1.8% SiO_2) and alumina grade (2.8% Al_2O_3) concentrate when the magnetic concentrate is reground to P_{80} 75 µm and cleaned in a silica reverse flotation circuit. • The beneficiation flowsheet adopted has been validated by pilot scale testwork which involved processing two blends of diamond core material designed to be indicative of average scheduled process feeds. The optimised flowsheet includes medium intensity magnetic separation (MIMS), a scavenger WHIMS circuit, combined magnetic concentrate regrinding and final cleaning via a silica reverse flotation circuit. Concentrates from the pilot plant of 1.4% V_2O_5 were achieved at 69 and 76% vanadium recovery for the years 0-5 and LoM blends respectively. The higher vanadium recovery sample contained a component of fresh material (45% by mass). • Optimised pilot scale testing of a Grate Kiln process with mixes of concentrate, sodium salt and a binder in the form of green pellets, has achieved vanadium water leach extraction of 92 to 93%. • Pilot scale leaching with a rotating drum and columns has achieved a total vanadium extraction from the roasted concentrate of 91%. • Bench scale testing of desilication and ammonium meta vanadate (AMV) precipitation has proven vanadium in leach liquor generated by the pilot testing can be purified to generate a 99.5% V_2O_5 product. The product chemistry is considered acceptable as a high-purity critical mineral product for defence steel alloys and the battery market. This traditional vanadium hydrometallurgical purification path has been adopted for the flowsheet and is similar to leach liquor purification flowsheets applied at Largo Resources Maracas vanadium project in Bahia, Brazil and in Xstrata's Windimurra flowsheet in Western Australia. • Leached calcine of 54% Fe, 9% Ti, 1.1% Si and 1.5% Al has been generated from the pilot scale testwork and is considered an iron-titanium co-product when generated from AVL's relocated processing plant site at Tenindewa. Further characterisation testwork and exploration of avenues to improve the calcine product quality are under review.
Environmental Factors or Assumptions	Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfield project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.	Environmental studies and impact assessment are currently being undertaken for Feasibility and approvals work. For the PFS Update (December 2020) it was assumed that the tails stream from the concentrator can be effectively stored and rehabilitated within an integrated mine waste landform. Tailings seepage characterisation at Gabanintha are near completion, with controls required to prevent adverse impacts from tailings seepage into subterranean fauna habitat well considered. Waste streams from the processing plant at Tenindewa, including calcine residue and a sodium sulphate rich bleed solution are proposed to be managed within a lined storage facility.
Bulk Density	Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet	Multiple campaigns of Archimedes SG determinations have been completed, on diamond core ranging from HQ to PQ size, and either whole, half or quarter core. The majority of Archimedes measurements (SG = Weight in Air/(Weight in Air – Weight in Water)) were completed on plastic wrapped core to account for porosity. The measurements are assumed to be dry mass basis.

<table>
<tr><th>Criteria</th><th>JORC Code Explanation</th><th>Commentary</th></tr>
<tr><td></td><td>or dry, the frequency of the measurements, the nature, size and representativeness of the samples.</td><td>Samples were selected from all bedrock rock types at the deposit. Samples were selected from all oxidation states within the bedrock geology.
Additional data sets collected were pycnometry (problematic due to no account for porosity); Down hole Compensated Density logs (gamma gamma method with two collimated detectors short and long distances from with source, with an eccentric arm to hold the tool against the wall of the hole, with measurements that account for hole rugosity, fluids in hole and porosity); and ‘XSG’ data that is a regression developed from Compton values to measured Archimedes SG determinations, applied to portions of diamond holes where continual XRF scanning was applied. All methods are determinations, rather than assumptions, with varying precision and accuracy.
The following table lists all density determinations applied at the project:
<table>
<tr><th>Year</th><th>Data Type</th><th>Sample Count</th><th>Company</th><th>Description/ Comments</th></tr>
<tr><td>2010</td><td>Archimedes Method - HQ Core</td><td>97</td><td>Spectro Laboratory</td><td>Assumed unwrapped</td></tr>
<tr><td>2015</td><td>Archimedes Method - PQ Core</td><td>26</td><td>Bureau Veritas</td><td>Wrapped</td></tr>
<tr><td>2015</td><td>Pycnometry - RC Samples</td><td>200</td><td>Bureau Veritas</td><td>No porosity factor</td></tr>
<tr><td>2016</td><td>Archimedes Method – Half PQ Core</td><td>200</td><td>Bureau Veritas</td><td>Wrapped</td></tr>
<tr><td>2016</td><td>Pycnometry – PQ or HQ Half Core</td><td>100</td><td>Bureau Veritas</td><td>To determine porosity factor – samples measured with wrapped Archimedes Method prior to crushing and pycnometry</td></tr>
<tr><td>2018</td><td>Archimedes Method - HQ half core</td><td>13</td><td>Bureau Veritas</td><td>Wrapped</td></tr>
<tr><td>2019</td><td>Archimedes Method - PQ whole core or quarter core</td><td>486</td><td>AVL - SG Station</td><td>Wrapped, with check measurements unwrapped on 193 of the samples</td></tr>
<tr><td>2020</td><td>Down-hole Compensated Density Log Survey</td><td>16,766</td><td>Surtech Systems</td><td>10 cm readings over 1,674.8 metres on 18 holes</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Criteria</th><th>JORC Code Explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>2021</td><td>XSG data from Minalyze XRF Scanning</td><td>467</td><td>Minalyze</td><td>1m composite SG measurements collected from portions of 15 core holes</td></tr>
</table>
</td></tr>
<tr><td></td><td>The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc.), moisture and differences between rock and alteration zones within the deposit.</td><td>
<p>The Archimedes method (SG = Weight in Air/(Weight in Air – Weight in Water)) was used for direct core measurements; all 725 of the latest measurements have been done using sealed core, the previous 97 measurements were not wrapped.</p>
<p>Downhole Compensated Density Logs (gamma-gamma survey) are calibrated (compensated) to account for rock porosity (voids) and fluids down hole.</p>
<p>XSG data, being calibrated to wrapped Archimedes SG determinations, also account for voids.</p>
<p>Sample selection for all of the bulk density determinations covered all bedrock units and all oxidation states.</p>
</td></tr>
<tr><td></td><td>Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.</td><td>
<p>The average regression-derived bulk density values by domain for all classified Mineral Resource at the Australian Vanadium Project are:</p>
<table>
<tr><th>Domain</th><th>Ox. State</th><th>Bulk Density</th></tr>
<tr><td>10 (High Grade)</td><td>Low Magnetics (Oxide)</td><td>3.51</td></tr>
<tr><td>10 (High Grade)</td><td>Moderate Magnetics (Transition)</td><td>3.70</td></tr>
<tr><td>10 (High Grade)</td><td>High Magnetics (Fresh)</td><td>4.02</td></tr>
<tr><td>2 - 5; 9 (Low Grade Bedrock)</td><td>Oxide</td><td>2.41</td></tr>
<tr><td>2 - 5; 9 (Low Grade Bedrock)</td><td>Transition</td><td>2.72</td></tr>
<tr><td>2 - 5; 9 (Low Grade Bedrock)</td><td>Fresh</td><td>3.16</td></tr>
<tr><td>20 - 25 (Gabbro Waste)</td><td>Oxide</td><td>2.31</td></tr>
<tr><td>20 - 25 (Gabbro Waste)</td><td>Transition</td><td>2.45</td></tr>
<tr><td>20 - 25 (Gabbro Waste)</td><td>Fresh</td><td>2.68</td></tr>
<tr><td>6 - 8 (Transported Low Grade)</td><td>Oxide</td><td>2.53</td></tr>
<tr><td>27 (Transported Waste)</td><td>Oxide</td><td>2.16</td></tr>
</table>
<p>All values are in t/m3.</p>
<p>Regressions used to determine bulk density based on iron content are as follows:</p>
<table>
<tr><th>SG Lith Type</th><th>Block Model Domains</th><th>Oxidation State</th><th>2021 Regression Formula</th></tr>
<tr><td>HG10</td><td>10</td><td>Low Magnetics (Oxide)</td><td>bd_reg_21_sep = 0.0459 x Fe_2O_3 + 0.7228</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Criteria</th><th>JORC Code Explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>Moderate Magnetics (Trans)</td><td>bd_reg_21_sep = 0.0439 x Fe_2O_3 + 0.9306</td></tr>
<tr><td></td><td></td><td>High Magnetics (Fresh)</td><td>bd_reg_21_sep = 0.0358 x Fe_2O_3 + 1.6157</td></tr>
<tr><td>Low Grade And Gabbro Waste</td><td>1 - 5, 9 and 20 - 25</td><td>Oxide</td><td>bd_reg_21_sep = 0.0079 x Fe_2O_3 + 2.1326</td></tr>
<tr><td></td><td></td><td>Transition</td><td>bd_reg_21_sep = 0.0136 x Fe_2O_3 + 2.2381</td></tr>
<tr><td></td><td></td><td>Fresh</td><td>bd_reg_21_sep = 0.0156 x Fe_2O_3 + 2.5945</td></tr>
<tr><td>Barren Transp. Cover</td><td>27</td><td>Oxide</td><td>Assign bd_reg_21_sep value: 2.16</td></tr>
<tr><td>Transp. Low Grade</td><td>6 - 8</td><td>Oxide</td><td>bd_reg_21_sep = 0.0122 x Fe_2O_3 + 2.0255</td></tr>
</table>
<p>The final bulk density used for reporting of the Australian Vanadium Project Mineral Resource is based on the regression as it provides a more reliable local estimated bulk density.</p>
</td></tr>
<tr><td>Classification</td><td>The basis for the classification of the Mineral Resources into varying confidence categories.</td><td><p>Classification for the Australian Vanadium Project Mineral Resource estimate is based upon continuity of geology, mineralisation and grade, consideration of drill hole and density data spacing and quality, variography and estimation statistics (number of samples used and estimation pass).</p><p>The current classification is considered valid for the global resource and applicable for the nominated grade cut-offs.</p></td></tr>
<tr><td></td><td>Whether appropriate account has been taken of all relevant factors (i.e. relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).</td><td><p>At the Australian Vanadium Project, the central portion of the deposit is well drilled for a vanadium deposit, having a drill hole spacing from a nominal 80 m to 100 m x 25 m to 30 m in northing and easting in the zone of closest drilling, to 140 m x 25 m to 30 m in northing and easting throughout the rest of the Indicated Resource area. The lower confidence areas of the deposit have drill hole spacings ranging up to 500 m x 25 m to 30 m in northing and easting directions.</p><p>The estimate has partially been classified as Measured Mineral Resource in an area restricted to the oxide, transition and fresh portion of the high-grade domain where the drill hole spacings are less than 80 to 100m in northing, and 25 to 30m in the easting (Fault Blocks 15 and 20). Indicated Mineral Resource material is generally restricted to the oxide, transition and fresh of the high grade and low grade in the areas of drilling that are spaced at 100 to 150m in the northing, and 25 to 30m in the easting (portions of fault blocks 20, 30, 40, 50 and 60). Inferred Mineral Resource has been restricted to any other material within the interpreted mineralisation wireframe volumes and limited by constraining wireframes down-dip (all fault blocks, 10 to 70). The background waste domain estimate has not been classified, due to very low possibility of economic extraction and limited data.</p></td></tr>
<tr><td></td><td>Whether the result appropriately reflects the Competent Person’s view of the deposit.</td><td>Geologica Pty Ltd and Trepanier Pty Ltd believe that the classification appropriately reflects their confidence in the grade estimates and robustness of the interpretations.</td></tr>
</table>

Criteria	JORC Code Explanation	Commentary
Audits or Reviews	The results of any audits or reviews of Mineral Resource estimates.	The current Mineral Resource estimate has not been audited.
Discussion of Relative Accuracy/ Confidence	Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.	The resource classification represents the relative confidence in the resource estimate as determined by the Competent Persons. Issues contributing to or detracting from that confidence are discussed above. No quantitative approach has been conducted to determine the relative accuracy of the resource estimate. The Ordinary Kriged estimate is considered to be a global estimate with no further adjustments for Selective Mining Unit (SMU) dimensions. Accurate mining scenarios are yet to be determined by mining studies. No production data is available for comparison to the estimate. The local accuracy of the resource is adequate for the expected use of the model in the mining studies. Infill drilling will be required to further raise the level of resource classification in areas not yet in the Measured category.
	The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.	These levels of confidence and accuracy relate to the global estimates of grade and tonnes for the deposit.
	These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.	There has been no production from the Australian Vanadium Project deposit to date.