ASX Announcement

Resource Update for Gabanintha Vanadium Deposit including Cobalt, Nickel and Copper

Highlights:

- Total Mineral Resource revised to 175.5Mt at 0.77% vanadium pentoxide (V_2O_5) consisting of:
  - Measured Mineral Resource of 10.1Mt at 1.11% V_2O_5,
  - Indicated Mineral Resource of 24.0Mt at 0.63% V_2O_5, and
  - Inferred Mineral Resource of 141.4Mt at 0.77% V_2O_5.
- The revised Gabanintha Mineral Resource includes a distinct massive magnetite high-grade zone of 93.6 Mt at 1.00% V_2O_5 consisting of:
  - Measured Mineral Resource of 10.1Mt at 1.11% V_2O_5,
  - Indicated Mineral Resource of 4.9Mt at 1.09% V_2O_5, and
  - Inferred Mineral Resource of 78.6Mt at 0.98% V_2O_5.
- The Mineral Resource now includes an estimation of cobalt, nickel and copper:
  - Initial Inferred Mineral Resource is 12.5 Mt at 206 ppm Co, 659 ppm Ni and 222 ppm Cu.
  - Estimation of cobalt, nickel and copper content follows bench scale test work and generation of sulphide flotation concentrates containing 3.8% – 6.3% base metals including 1.54% – 2.02% cobalt, 1.36% – 2.58% nickel and 0.82% – 1.70% copper.
  - The potential sale of a by-product cobalt, nickel and copper sulphide concentrate to increase revenue at Gabanintha.
- Revised weathering profiles to include oxide, transitional and fresh zones supporting Pre-Feasibility Study (PFS) work.
- Metallurgical test work completed with excellent and repeatable recoveries from transitional and fresh massive vanadium bearing magnetite.
- Oxide test work indicates successful magnetic concentration options.
- PFS base case nearing completion.
- Further detailed work on PFS technical aspects and risk analysis to be ongoing until end of 2018.

05 July 2018

ASX ANNOUNCEMENT

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Projects:

Gabanintha - Vanadium
Blesberg,South Africa - Lithium/Tantalum
Nowthanna Hill – Uranium/Vanadium
Coates - Vanadium

Australian Vanadium Limited (ASX: AVL, "the Company" or AVL") is pleased to announce an updated Mineral Resource for its Gabanintha Vanadium Project near Meekatharra in Western Australia. The revised estimate has been conducted following a re-interpretation of the weathering profiles to include a transitional zone in addition to the oxide and fresh zones.

The updated Measured, Indicated and Inferred Mineral Resource is **175.5 million tonnes (Mt) at 0.77% V_2O_5** which includes a Measured and Indicated Mineral Resource of 34.1Mt at 0.77% V_2O_5. Table 1 includes a detailed updated Mineral Resource table and Appendix 1 includes a table of the Mineral Resource broken down by the oxidation category.

The revised Mineral Resource estimate includes a geologically distinct massive vanadium bearing magnetite high-grade zone that is the focus of economic studies. The Measured, Indicated and Inferred Mineral Resource estimate for the high-grade zone (HG10 in Table 1) is **93.6Mt at 1.00% V_2O_5** which includes 10Mt at 1.11% V_2O_5 in the Measured Resource category, 4.9Mt at 1.09% V_2O_5 in the Indicated Resource category and 78.6Mt at 0.98% V_2O_5 in the Inferred Mineral Resource category.

The Mineral Resource of the high-grade zone has increased by 0.8Mt (0.9%) and the overall Mineral Resource has decreased by 5Mt (2.3%) of mainly low-grade material. These changes are due to a revised distribution of the regression-calculated density values resulting from a more detailed oxidation interpretation. The density relationships across all of the Gabanintha mineralisation are strongly correlated to the rock type and in the case of magnetite bearing rocks, the iron content.

There is high potential to convert Inferred Resources located along the Company's 11km of strike length at Gabanintha (see Figure 1) to the Measured and Indicated categories with additional targeted drilling.

In addition, an Inferred Mineral Resource of 12.5Mt containing 202ppm Cobalt, 659ppm Nickel, 222ppm Copper[1] and 0.14% Sulphur has been estimated. The Inferred Mineral Resource is contained exclusively within the fresh massive high-grade zone (HG10) in Fault Block 20 of the resource model. (See Figure 2 – Panel images). The base metal sulphide Mineral Resource is considered to be potentially economically recoverable following metallurgical test work conducted by the Company. The base metal sulphide mineralisation has consistently reported to the non-magnetic fraction during the separation of the vanadium bearing magnetite. This has effectively concentrated sulphide minerals enabling further concentration by flotation methods, (see ASX release 22 May 2018: Cobalt added to Vanadium at Gabanintha and this report).

The revised Mineral Resource estimate, including the estimation of sulphide base metals content, provides an improved basis for the PFS currently being undertaken by the Company.

Management Comment

AVL's Managing Director Vincent Algar said that the release of the initial cobalt, nickel and copper resource and modifications to the vanadium resource added confidence and reduced risk in the Gabanintha resource base. The addition of the key base metal values and important geo-metallurgical parameters to the resource model added significantly to the quality of the mine plan that will emerge from the PFS. The increased understanding and confidence strengthened Gabanintha's position as a world-class vanadium project in the size, grade and metallurgical recovery parameters of the Mineral Resource.

[1] Nickel and Copper credits to Bryah Resources Limited (ASX:BYH)

"This important revision to the Gabanintha resource further de-risks the foundations on which we can build an outstanding Australian project," Mr Algar said.

"We have developed a unique understanding of the deposit, and our very strong vanadium team will enable us to utilise this knowledge as we advance the project. Our timing in respect to supplying the rising vanadium market looks to be ideal."

"We will develop the metallurgical and economic aspects of the project in our PFS, looking to include the needs of potential steel industry offtake and that of the rapidly emerging Vanadium Redox Flow Battery Industry."

Details of the current Mineral Resource estimate for Gabanintha are contained in this release. The information that refers to Mineral Resources in this statement was prepared and last revised under the JORC Code 2012 on 5th September 2017 by independent consultants Trepanier Pty Ltd and is compared in this ASX announcement in Table 3. Additional data and lithological interpretations have now been incorporated and modelled into a revised and updated resource estimate.

Activities focused on advancing Gabanintha towards feasibility

The release of the updated Mineral Resource statement supports the activities of the Company to advance the Gabanintha vanadium project. Key activities currently underway include:

- A Pre-Feasibility Study under the management of Wood Mining and Metals, external consultants and members of the AVL technical team.
- Initial metallurgical test work and process circuit design work are well advanced.
- Work is ongoing on the geo-metallurgical understanding of the mineralised domains to support processing circuit design, performance prediction and mine scheduling.
- Metallurgical test work has identified the opportunity to produce a base-metal rich sulphide (Co, Ni, Cu) concentrate by flotation from the non-magnetic tailings stream. Further work will be conducted to refine the resource opportunity, concentrate quality and economic benefit.
- A detailed mining study including pit optimisation and a preliminary assessment of an initial mine schedule is well advanced.
- Preparation is underway for ongoing optimization of the initial base case proposition.
- Determination of environmental constraints to the project and progress towards completion of a Native Title Mining Agreement and approval of a Mining Lease.

The Company will also incorporate results from additional research it will be conducting on vanadium electrolyte for use in vanadium redox flow batteries (VRFB). The manufacture of electrolyte is a process that can be achieved as part of the processing of vanadium ore. It offers the Company an opportunity to value-add to the project and develop a greater presence in the VRFB market.

PFS Progress Update

Solid progress is being made on a robust PFS utilising a combination of in-house expertise and external consultants. The base case scenario is nearing completion and will be reported when available. This is the first step in a series of activities that will allow the Company to deliver a realistic and achievable study, supporting future investment decisions.

One of the aims of the PFS is to define a low-risk, low-cost process for production of high purity vanadium products. The Company has begun to build relationships with end users and interim product producers such as those making vanadium carbon nitride (VCN) and vanadium electrolyte for vanadium redox flow batteries. Testwork undertaken on the non-magnetic tailings has further identified potentially economically recoverable cobalt, nickel and copper that are being incorporated into the PFS.

The Company's intention is to produce a high quality PFS with a well-defined process flowsheet and is focused on de-risking the project to allow future investment. The PFS will include a robust options study to assure that the most viable, lowest cost mining and processing operation is pursued. The Company is basing the study on conservative economic assumptions and proven technologies. The goal is to develop a vanadium operation that is low-risk, low-cost and profitable in all business conditions.

Detailed option analysis to maximise economic returns and reduce capital and operating costs will continue during 2018. Favourable outcomes will allow the Company to advance the project to a Definitive Feasibility Study.

Key focuses for the Company are minimising environmental impacts, identifying and mitigating process and project risks at an early stage, developing a clear pathway to a timely design and to build a world class, long-life vanadium operation.

2018 Mineral Resource Estimation (JORC 2012)

The updated Mineral Resource estimate has been conducted following a re-interpretation of the weathering profiles. The weathering profile re-interpretation was based on sectional interpretation of the base of complete oxidation and base of partial oxidation surfaces using loss on ignition (LOI) and magnetic susceptibility data, with additional SATMAGAN[2] analysis on some select samples in the high-grade zone (model zone 10). The SATMAGAN values are indicative of the amount of magnetite present in the rock and is a proxy for the degree of weathering. The relationship of SATMAGAN to LOI and magnetic susceptibility was used to increase confidence in the modelling of the weathering surfaces. In addition, Co, Ni, Cu and S were estimated. The potential exists for a sulphide concentrate as a revenue source following positive metallurgical testwork results.

The updated Mineral Resource estimate completed and reported in compliance with the JORC Code 2012 standard for the project incorporated 97% of the existing drilling data (see Table 2) including data from the Company's 2009 and 2015 RC and diamond drilling programs. This included 233 RC and 17 Diamond Core holes for 20,086 metres over an 11 kilometre strike length at AVL's Gabanintha vanadium, titanium and iron deposit. Of these, 16,287m were used in the grade estimate.

The estimation was carried out by Trepanier Pty Ltd, resulting in the estimation of Measured, Indicated, and Inferred Mineral Resources. All mineralised domains were constructed using geological information and considering a nominal cutoff for inclusion of above 0.4% V_2O_5 for the low-grade ore zones and above 0.7% V_2O_5 within the high-grade zone in the Mineral Resource estimate (see Table 1) for a total resource of:

- **175.5 million tonnes at 0.77 % V_2O_5** containing 1,348,300 tonnes of V_2O_5;
- A discrete high-grade zone of **93.6 million tonnes at 1.00% V_2O_5** containing 936,000t V_2O_5;
- Discrete low-grade zones of 77.5 million tonnes at 0.50% V_2O_5 containing 384,000t V_2O_5.
- Combined Measured and Indicated Mineral Resources of 34.1 million tonnes at 0.77% V_2O_5 in low and high-grade domains containing 263,000t V_2O_5, suitable to underpin a long life, low cost, high grade feed, open-cut mining operation.

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[2] SATMAGAN (Saturation Magnetic Analyser) is a laboratory method to determine the proportion of magnetic iron oxide (Fe_3O_4) present.

- Table 1 summarises the results of the current Mineral Resource estimate by High-Grade (HG), Low Grade domains (LG2-5) and Transported domains (Trans 6-8)

Table 1 Gabanintha Project – Mineral Resource estimate 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_2O_5 %	Fe %	TiO_2 %	SiO_2 %	Al_2O_3 %	LOI %
HG 10	Measured	10.1	1.11	42.7	12.6	10.3	8.0	4.0
	Indicated	4.9	1.09	43.3	12.1	10.5	7.8	3.7
	Inferred	78.6	0.98	42.4	11.2	11.4	7.6	3.4
	Sub-total	**93.6**	**1.00**	**42.5**	**11.4**	**11.3**	**7.6**	**3.5**
LG 2-5	Measured	-	-	-	-	-	-	-
	Indicated	19.1	0.51	23.9	7.0	27.8	18.1	8.7
	Inferred	58.5	0.49	25.5	6.7	27.5	16.5	7.4
	Sub-total	**77.5**	**0.50**	**25.1**	**6.8**	**27.5**	**16.9**	**7.7**
Transported 6-8	Measured	-	-	-	-	-	-	-
	Indicated	-	-	-	-	-	-	-
	Inferred	4.3	0.65	28.1	7.2	24.7	16.7	8.5
	Sub-total	**4.3**	**0.65**	**28.1**	**7.2**	**24.7**	**16.7**	**8.5**
Total	Measured	10.1	1.11	42.7	12.6	10.3	8.0	4.0
	Indicated	24.0	0.63	27.9	8.0	24.2	16.0	7.7
	Inferred	141.4	0.77	35.0	9.2	18.5	11.5	5.2
	Sub-total	**175.5**	**0.77**	**34.5**	**9.3**	**18.8**	**11.9**	**5.5**

Table 2 Drilling at Gabanintha

Company	Hole Number	Drill Type	Number of Holes	Metres
Historic to Oct 2007	GRC001 – 090	RC	90	6,867
YRR to July 2008	GRC091 – 147	RC	57	3,744
YRR to Dec 2009	GRC148 – 158	RC	11	1,233
YRR to Dec 2009	GDH901 – 909	DD	9	1,526
HISTORICAL		***Sub-Total***	***167***	***13,370***
YRR to March 2015	GRC159 – 221	RC	63	5,955
YRR to March 2015	GDH 910 – 917	DD	8	761
2015 PROGRAMME		***Sub-Total***	***71***	***6,716***
ALL DRILLING TO DATE		**TOTAL**	**238**	**20,086**

Note: The 2017 Mineral Resource Estimation excluded some older (pre-2007) RC holes (GRC001 to GRC017) due to uncertainty about assay quality assurance. This had minor impact on the wireframe estimations for volume and grade as more recent, better quality holes were drilled nearby. YRR refers to previous company name for AVL.

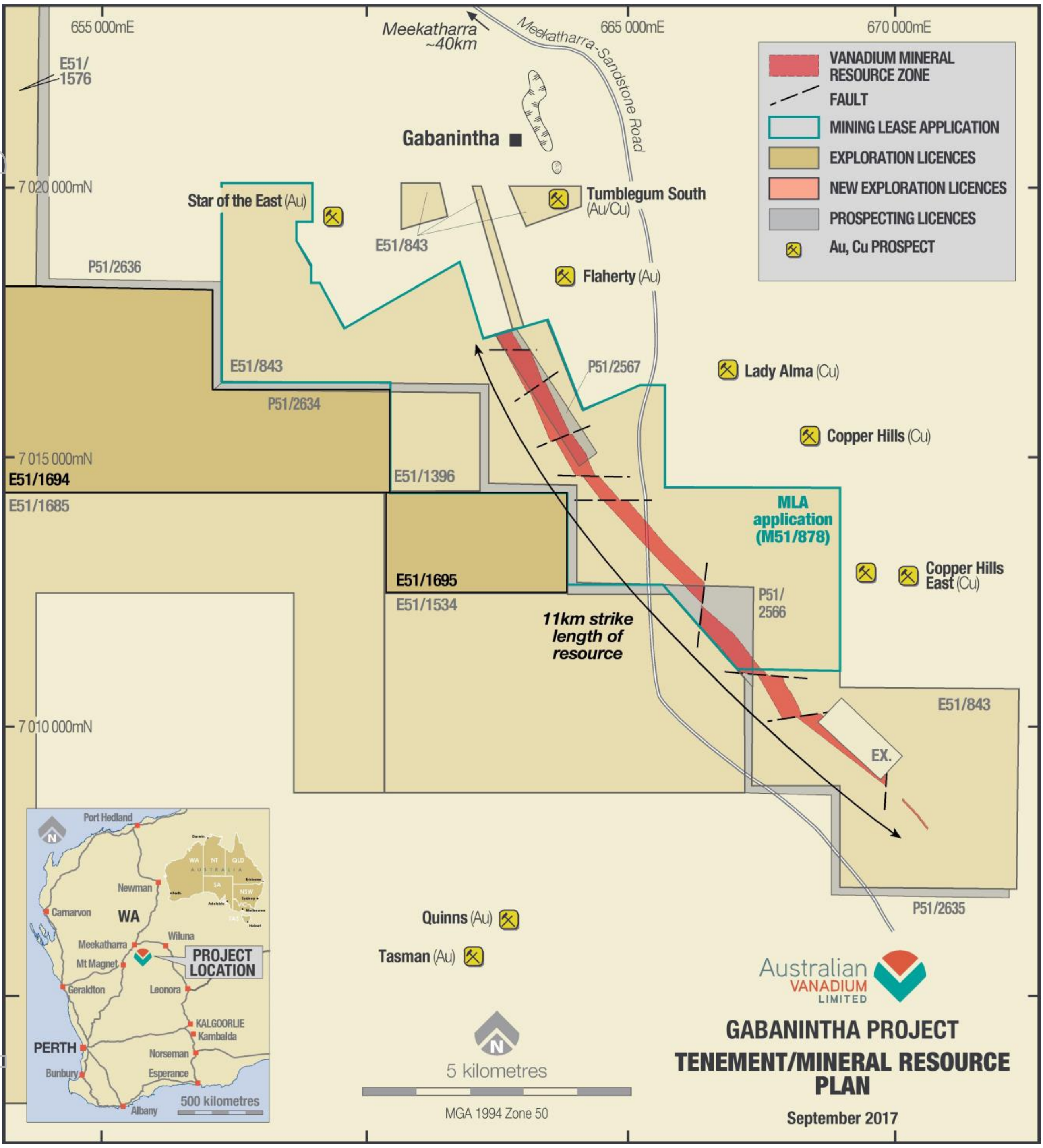

Figure 1 Location Diagram of the Gabanintha Project.

Comparison with 2017 Mineral Resource Estimation

The updated Mineral Resource has little impact on overall tonnage and Measured and Indicated Resource categories but does include domains for oxide (completely weathered), transitional (partially weathered) and fresh rock (no weathering). The degree of weathering determines the extent to which the high-grade vanadium domain can be beneficiated through magnetic separation prior to roasting. Work conducted by the Company has demonstrated vanadium recovery from oxide materials (see Section p18, this report). The Company has previously demonstrated successful magnetic separation of vanadium for transitional and fresh rock. The distinction and successful identification of the oxidation state of the ore is considered an important aspect in the resource definition and subsequent processing.

The principal differences between the 2017 mineral resource estimation and the current 2018 estimation are listed below:

- Re-interpretation of the oxide, transition and top of fresh surfaces using magnetic susceptibility, LOI and SATMAGAN data.
- Based on oxide coding changes, refinement of the bulk density assignment.
- Estimation of cobalt, nickel, copper and sulphur values within the measured and indicated part of the deposit.

Table 3 Comparison Table 2018 and 2017 and 2015 Mineral Resource Estimates by Resource Category

		Mt	V_2O_5 %	Fe %	TiO_2 %	SiO_2 %	Al_2O_3 %	LOI %
Total 2018	Measured	10.1	1.11	42.7	12.6	10.3	8.0	4.0
	Indicated	24.0	0.63	27.9	8.0	24.2	16.0	7.7
	Inferred	141.4	0.77	35.0	9.2	18.5	11.5	5.2
	Sub-total	**175.5**	**0.77**	**34.5**	**9.3**	**18.8**	**11.9**	**5.5**
Total 2017	Measured	10.2	1.06	41.6	12.0	11.6	8.6	4.2
	Indicated	25.4	0.62	27.7	7.9	24.9	15.8	7.5
	Inferred	144.1	0.75	34.4	9.0	19.2	11.7	5.2
	Sub-total	**179.6**	**0.75**	**33.8**	**9.0**	**19.6**	**12.1**	**5.4**
Total 2015	Measured	7.0	1.09	43	12	10	8	3.4
	Indicated	17.8	0.68	28	8	23	16	7.7
	Inferred	66.7	0.83	37	10	17	11	4.1
	Sub-Total	**91.4**	**0.82**	**35**	**10**	**18**	**11**	**4.8**

Oxidation zone re-interpretation and changes to bulk density assignment

To feed into geo-metallurgical modelling for future mining and processing study work, the interpretation of the oxidation profile was refined into three zones – oxide, transition and fresh (See Figure 6 panel diagrams - oxidation). The previous reported Mineral Resource from 2017 was only coded into oxide and fresh. The re-interpretation was facilitated using geological logging, element assays, core photos, magnetic susceptibility logs plus LOI and SATMAGAN data. The need to achieve a better understanding of the oxidation boundaries is driven by the following factors:

- Metallurgical test work indicates that the degree of oxidation directly affects the recovery of iron and vanadium.

- Higher levels of oxidation result in increased silica and alumina being retained in the resulting magnetic concentrate.
- Process design criteria and plant optimisation, and
- Mine scheduling to satisfy plant production capacity.

Based on the reinterpreted oxidation coding, the assignment of the bulk densities for the different zones was also reviewed and refined. Clear correlations of bulk density versus Fe_2O_3 were chosen as the most appropriate estimation methods of bulk density for the different parts of the oxidation profile. Details of the revised density assignment based on 313 bulk density measurements are outlined in Appendix 2, JORC Table 1, Section 2. The Table 1 in Appendix 1 shows the total Mineral Resource by oxidation state. Table 2 in Appendix 1 shows the high-grade massive magnetite zone reported by oxidation state.

Mineral Resource Estimation - Base Metals and Sulphur

On the 22nd May 2018 (see ASX release 22 May 2018: Cobalt added to Vanadium at Gabanintha), AVL announced the successful recovery of cobalt, nickel and copper in a sulphide concentrate, adding another saleable battery metal opportunity. To evaluate the available sulphide hosted base metal content (cobalt, nickel and copper), the updated resource model includes the estimation of these elements and sulphur in the fresh material.

An Inferred base metal Mineral Resource has been defined at Gabanintha containing 12.5Mt containing 202ppm Cobalt, 659ppm Nickel, 222ppm Copper and 0.14% Sulphur. The Inferred Mineral Resource is contained exclusively in the fresh massive high-grade magnetite zone (model zone HG10) in Fault Block 20 of the resource model. (See Fig 6 – Panel images). Due to a lower number of informing samples for the fresh zone, the classification of sulphide hosted base metal material in the resource is Inferred. The Inferred base metal resource is constrained to the high-grade massive magnetite zone in Fault Block 20, which is the area of the highest drilling density of holes that penetrate into fresh material. Table 4 below shows the sulphide hosted base metal material classified as Inferred Resources. The location of the Inferred base metal resource is indicated in Figures 2, 3, 4 and 6

The base metal sulphide mineral resource is potentially economically recoverable following metallurgical test work conducted by the Company. The base metal sulphide mineralisation has been found to consistently report to the non-magnetic fraction during the separation of the vanadium bearing magnetite, enabling further sulphide concentration by flotation.

Table 4 Gabanintha Project – Mineral Resource for sulphidic base metals (cobalt, nickel and copper) constrained to Domain 10 (high-grade vanadium domain) for Fault Block 20 fresh material

Zone	Classification	Mt	Co ppm	Ni ppm	Cu ppm	S %
High-grade	Measured	-	-	-	-	-
Fault Block 20	Indicated	-	-	-	-	-
Fresh material	Inferred	12.5	206	659	222	0.14
	Total	**12.5**	**206**	**659**	**222**	**0.14**

The continuity along strike and down dip of the sulphide hosted base metals is strongly supported by the geological model and the vanadium resource estimation model, but does not yet have the sample support in the fresh material of other fault blocks to allow further classification of mineral resources. The Company intends to conduct further exploration to increase and improve the definition of the base metal resource at Gabanintha.

Summary of Resource Estimate and Reporting Criteria

As per ASX Listing Rule 5.8 and the 2012 JORC reporting guidelines, a summary of material information used to estimate the Mineral Resource is detailed below, (for more detail please refer to Table 1, Sections 1 to 3 included below in Appendix 2).

Geology and geological interpretation

The Gabanintha deposit, located 40km south of the town of Meekatharra in Western Australia, is a layered intrusive body smaller than, but displaying similar characteristics to, the Igneous Bushveld Complex in South Africa. Some of the world's most significant platinum, vanadium and chromite deposits are hosted by the Bushveld Complex.

The deposit is also similar to the Windimurra vanadium deposit and the Barrambie vanadium-titanium deposit located 260km south and 150km southeast of Gabanintha respectively. The mineral deposit consists of a basal massive magnetite zone (10m - 15m in drilled thickness), overlain by up to five magnetite banded gabbro units between 5m and 30m thick, separated by thin, very low grade mineralisation (<0.3% V_2O_5) waste zones. The sequence is overlain in places by a lateritic domain, a transported domain (occasionally mineralised) and a thin barren surface cover domain.

Eight mineralised domains were defined during the logging, interpretation and statistical modelling process which were composed of:

- One high grade domain (split on oxide, transition and fresh boundary).
- Four low grade domains (split on oxide, transition and fresh boundary).
- One laterite domain, and
- Two transported domains.

The north-northwest striking deposit is affected by a number of regional scale faults which offset the entire deposit (See Figure 1 – location diagram), breaking the deposit into a series of kilometre scale blocks. The larger blocks show relatively little signs of internal deformation, with strong consistency in the layering being visible in drilling and over long distances between drillholes (see sections in Figures 2-4). The total magnetic intensity geophysical image shows clearly the trace of the high grade massive magnetite zone, as well as the location of the faults. This image was used to guide the modelling of the mineralized domain layers and define the faults blocks which form the boundaries of the extrapolated domains (Figure 5).

Gabanintha differs from both the Barrambie and Windimurra deposits by the consistent presence along strike of the 10-15m thick basal massive magnetite zone and the higher overall grade of the Gabanintha deposit[1]. (Gabanintha 0.77% V_2O_5 overall[3], Windimurra 0.48% V_2O_5 and Barrambie 0.63% V_2O_5[4]). The grades observed in drilling allow extremely favourable comparison with other vanadium deposits globally.

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3 Details of the current Mineral Resource estimate for Gabanintha are contained in this release. The information that refers to Mineral Resources in this announcement was prepared and first disclosed under the JORC Code 2004. Additional drilling in 2015 was incorporated and modelled into a revised and updated resource estimate to comply with the JORC Code 2012. The Gabanintha Mineral Resource was last revised in September 2017.

4 Details of the Barrambie Deposit from the NeoMetals website www.neometals.com.au, Windimurra Deposit information from the Atlantic Limited website www.atlanticltd.com.au

The high-grade domain modelling focused on the discrete high-grade layer at the base of the westerly dipping mineralised package as well as defining several continuous low-grade mineralisation units above the main zone. The mineralised zones were modelled using a combination of geological, geochemical and grade parameters, focused on continuity of zones between drill holes on section and between sections.

The average strike of the high-grade domain is approximately 140-150º and generally dip 45º to 65º to the south-west, with the smaller and shallower (transported and lateritic) domains dipping 5º to 10º also to the south-west. Cross sections through the resource model showing drilling and grade interpolation are shown in Figures 2-4.

The high and low-grade domains are split by the base of complete oxidation and the base of partial oxidation, to define oxide, transition and fresh zones.

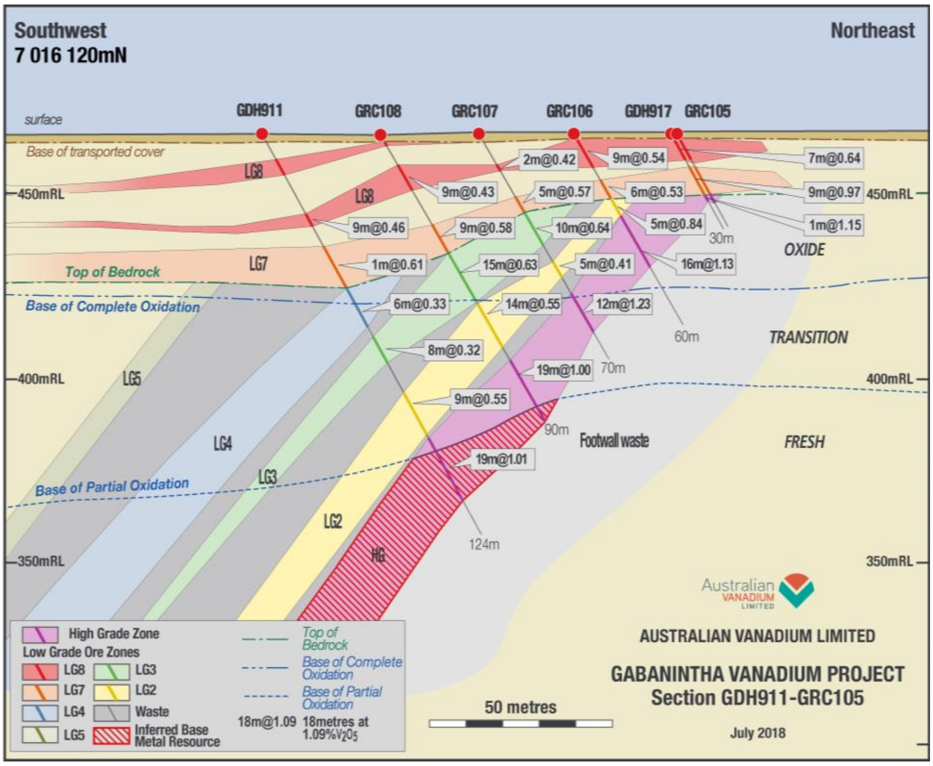

Figure 2: Cross Section at Northing 7016120m Showing Drill Intercepts, High-Grade and Low-Grade Domains, Weathering Profiles

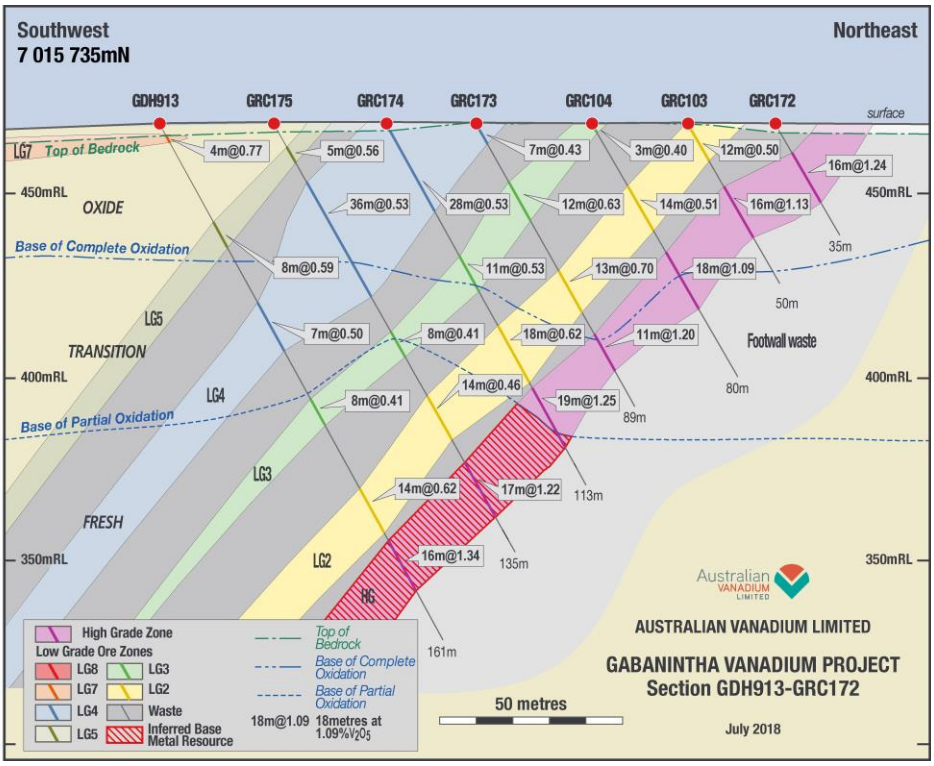

Figure 3: Cross Section at Northing 7015735m Showing Drill Intercepts, High-Grade and Low-Grade Domains, Weathering Profiles.

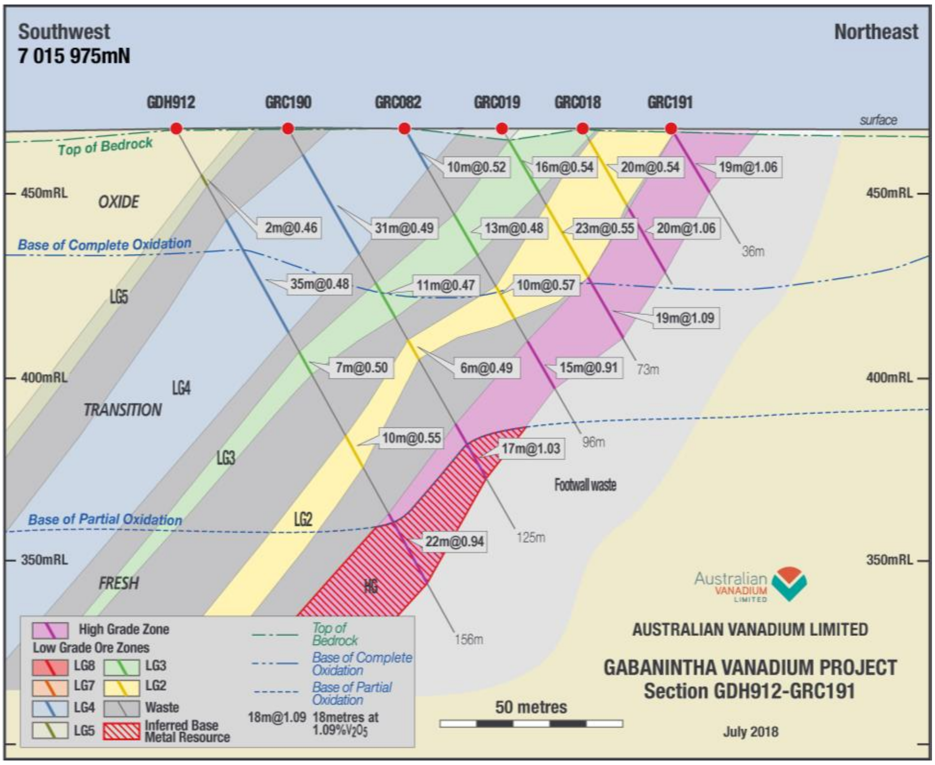

Figure 4: Cross Section at Northing 7015975m Showing Drill Intercepts, High-Grade and Low-Grade Domains, Weathering Profiles

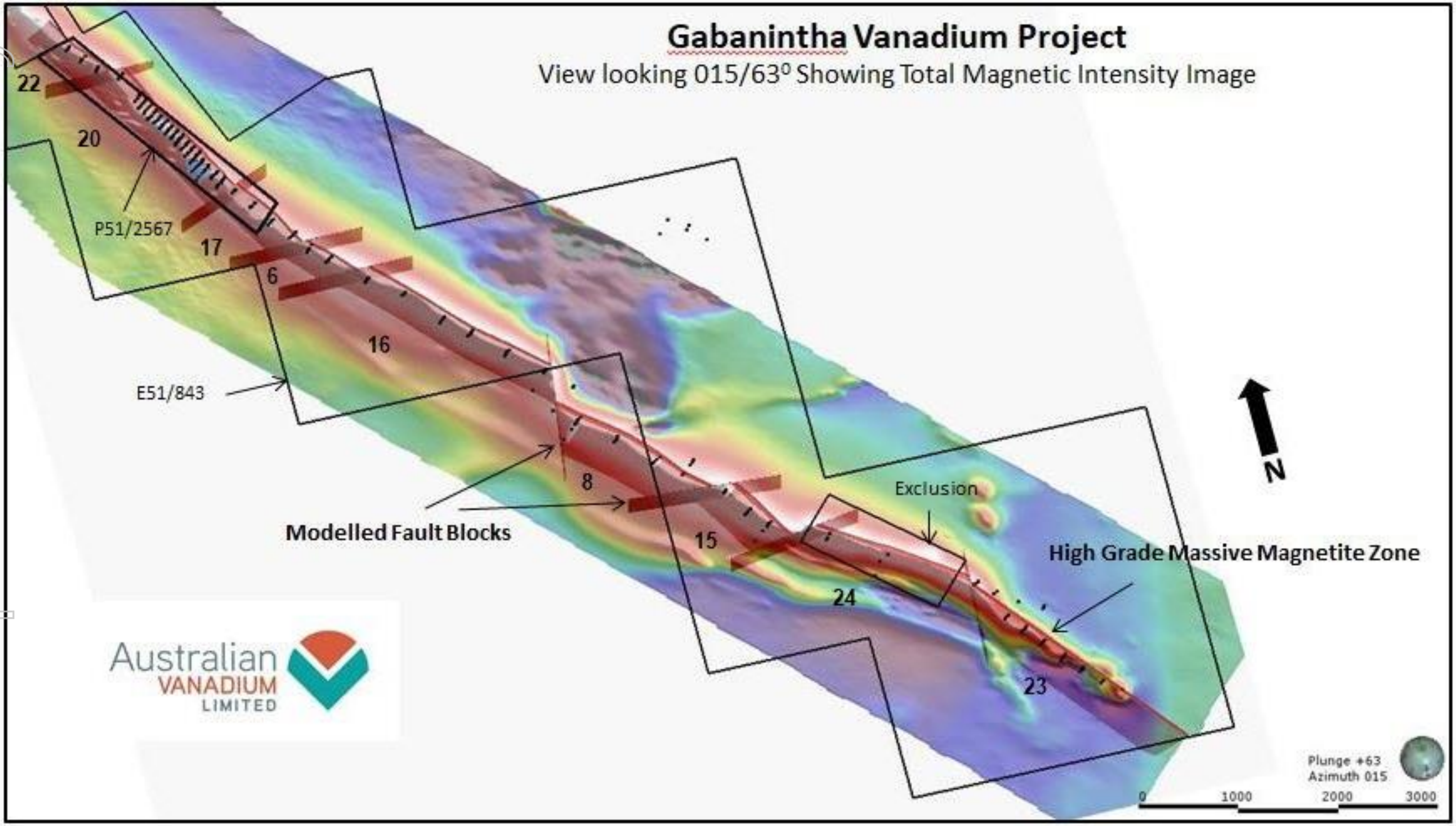

Figure 5: Oblique View Showing, High Grade Domain as broken up by Fault Blocks (labelled with black numbers to left of deposit) in relation to Total Magnetics. Drilling indicated by black points

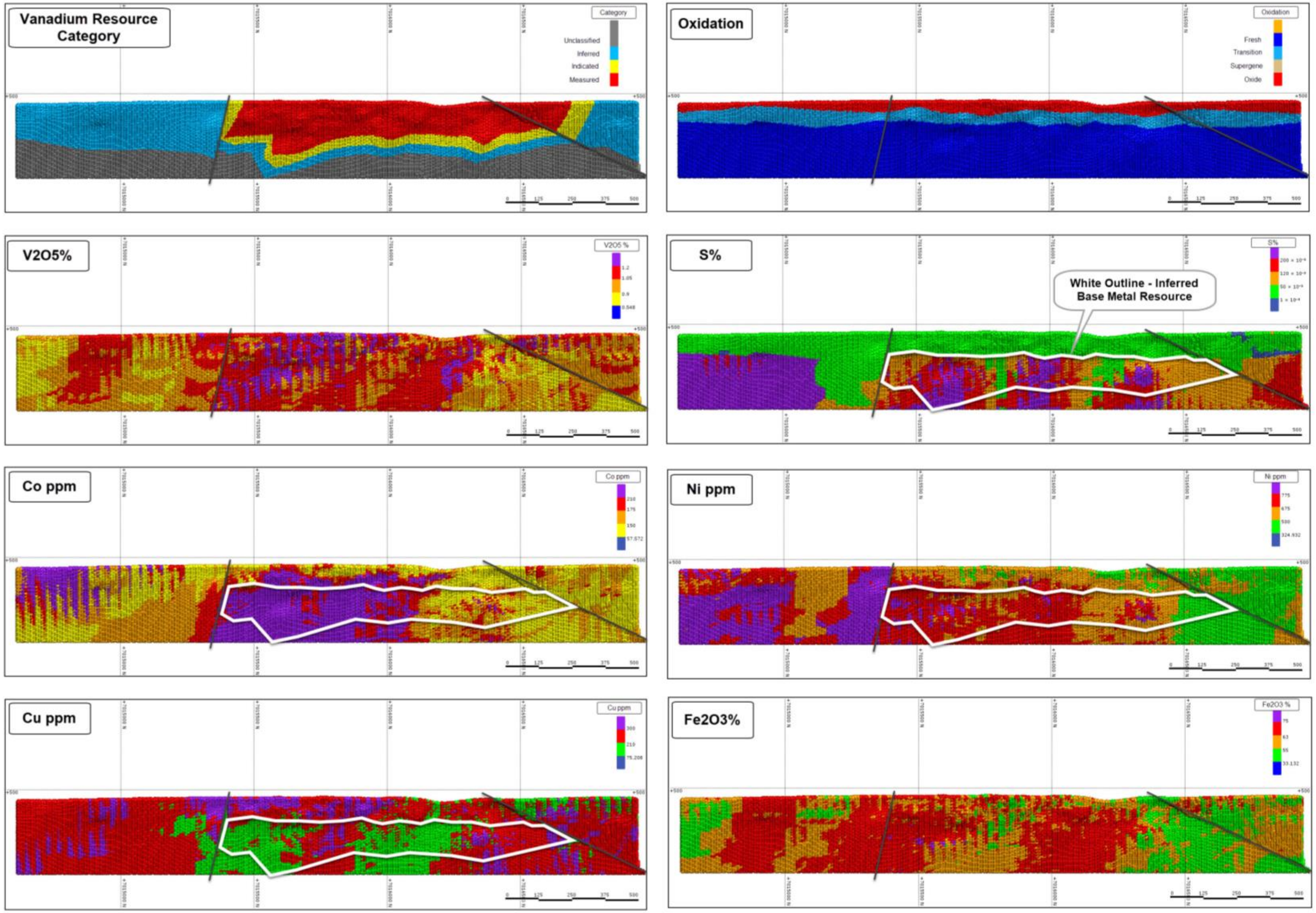

Figure 6: Collage image of Fault Blocks 17, 20 and 22 (left to right) showing a long section view of the Gabanintha deposit. The image shows the resource block model High Grade Massive Magnetite zone coloured by various parameters. The area selected is the location of the current Measured and Indicated Mineral Resources and the likely location of an open cut pit. The location of the Inferred Base Metal Resource (hosted in sulphide minerals) is shown in white outline on the relevant elements. The view is looking west, obliquely to the footwall of the deposit which trends southwest to northeast. North is to the right in all diagrams

Drilling techniques and hole spacing

Diamond drill holes account for 12% of the drill metres comprising HQ and PQ3 sized core. RC drilling (generally 135 mm to 140 mm face-sampling hammer) accounts for the remaining 88% of the drilled metres. Three of the diamond holes have RC pre-collars (GDH911, GDH913, GDH916), otherwise all holes are drilled from surface. The higher density drilled areas of the deposit have approximately 80m to 100m spacing by northing and 25m to 30m spacing by easting. Outside the main area of relatively close spaced drilling (approximately 7015400mN to 7016600mN), the drillhole spacing increases to several hundred metres in the northing direction but maintains roughly the same easting separation as the better drilled area.

Sampling and sub-sampling techniques

Diamond core was quarter-core sampled at regular intervals (usually one metre) and constrained to geological boundaries where appropriate. Most of the RC drilling was sampled at one metre intervals, apart from the very earliest programme in 1998. Diamond core was drilled predominantly at HQ size for the earlier drilling (2009), with the 2015 drilling at PQ3 size.

RC drilling samples were collected at one metre intervals and passed through a cone splitter to obtain a nominal 2-5kg sample at an approximate 10% split ratio. These split samples were collected in pre-numbered calico sample bags. The sample was dried, crushed and pulverised to produce a sub sample (~200g) for laboratory analysis using XRF and total LOI by thermo-gravimetric analysis.

Field duplicates, standards and blanks have been inserted into the sampling stream at a rate of nominally 1:25 for blanks, 1:11 for standards (including internal laboratory), 1:10 for field duplicates, 1:9 for laboratory checks and 1:74 for umpire assays.

Sample analysis method

All samples for Gabanintha were assayed for the full iron ore suite by XRF (24 elements) and for total LOI by thermo-gravimetric technique. The method used is designed to measure the total amount of each element in the sample.

Although the laboratories changed over time for different drilling programmes, the laboratory procedures all appear to be in line with industry standards and appropriate for iron ore deposits, and the commercial laboratories have been industry recognized and certified.

Samples are dried at 105^{o}C in gas fired ovens for 18-24 hours before RC samples being split 50:50. One portion is retained for future testing, while the other is then crushed and pulverised. Sub-samples are collected to produce a 66g sample that is used to produce a fused bead for XRF based analysing and reporting.

Further SATMAGAN analysis was conducted on 461 archive pulp samples from 2015 RC drilling, at Bureau Veritas laboratory in early 2018, to further characterize the weathering profile. SATMAGAN measures the amount of iron present as magnetic species, such as magnetite, maghemite and kenomagnetite. The amount of iron present as magnetite or other magnetic species is directly proportional to the degree of rock freshness.

Cut-off grades

The high-grade domain wireframe is defined by a nominal 1.0% V_2O_5 grade cut-off, with occasional intervals between 0.7% and 1.0% selected to ensure domain continuity. The wireframes for the low-grade domains are based on a nominal 0.4% V_2O_5 grade cut-off and comprised of eight sub-domains. A similar approach is used as in the high-grade domain regarding selection of samples for sub-domain continuity, with samples below 0.4% V_2O_5 being occasionally selected within the domain. Everything encapsulated within the defined wireframes is reported in the resource tables.

Estimation methodology

Trepanier completed ordinary kriged estimates for V_2O_5, TiO_2, Fe_2O_3, SiO_2, Al_2O_3, Cr_2O_3, Co, Cu, Ni, S and loss on ignition (LOI) using Surpac™ software. Potential top-cuts were checked by completing an outlier analysis, but in this instance, no top-cutting was required. Variograms were completed for the estimated variables in the high-grade domain and the combined low-grade sub-domains. Grade estimates are keyed on the combined fault block and domain codes for the high-grade domain and the combined low-grade sub-domains. Domains 6, 7 and 8 were interpreted to be shallow, flat lying alluvial material and are estimated separately. Grade is estimated into parent cells with dimensions of 40 mN, 10 mE and 5 mRL with sub-celling allowed to ensure accurate volume representation of the wireframed mineralisation interpretation. All sub-cells are assigned the same grade as its parent.

The current estimate uses only bulk density measurements which include an additional 231 bulk density samples from the diamond core as determined by the Archimedes method. A total 313 bulk density measurements were used to calculate average densities. Samples were subdivided according to their position in relation to the ore zones and the oxidation surface. Correlation charts were created for each element, with a very strong positive correlation defined for bulk density and Fe_2O_3 content. From this analysis a regression was assigned based on the Fe_2O_3 grade of each block dependent on oxide code.

Classification Criteria

The estimate is classified according to the guidelines of the 2012 JORC Code as Measured, Indicated and Inferred Mineral Resource. The classification has taken into account the relative confidence in tonnage and grade estimations, the reliability of the input data, the Competent Person's confidence in the continuity of geology and grade values and the quality, quantity and distribution of the drillhole and supporting input data.

In applying the classification, Measured Mineral Resource has generally been restricted to the oxide, transition and fresh portion of the high-grade domain where the drillhole line spacing is less than 80 mN to 100 mN. Indicated Mineral Resource is generally restricted to the oxide, transition and fresh high-grade and low-grade in the same area of relatively closely-spaced drilling. The remainder of the modelled zones to the north and south of the Measured and Indicated Resource with supporting drilling, mapping and geophysical data have been classified as Inferred Mineral Resource. The classification applied relates to the global estimate of V_2O_5 and at the reported cut-off grades only. At different V_2O_5 grade cut-offs, the applied classification scheme may not be valid.

Mining and metallurgical methods and parameters

Optimisation studies have commenced as part of the pre-feasibility study that is currently under way. They indicate open pit mining would be an appropriate mode of extraction through the fault blocks that have Indicated and Measured resources defined.

Metallurgical testwork has identified four main types of mineralised high-grade material for processing, defined as oxide, transition, fresh and fresh with high sulphur. Metallurgical testwork (see ASX Releases; 20 February 2018, 24 April 2018), has demonstrated the basal high grade massive magnetite zone can be concentrated through levels of magnetic separation processes (oxide, transition and fresh) achieving varying degrees of recovery of vanadium and removing silica and alumina from the feed. The concentrates achieved are considered suitable for processing via industry standard roast-leach processes to be confirmed by subsequent test work.

Potential recovery of base metals

The non-magnetic material separated from the fresh magnetite feed contain significant base metals in the silicate phase of the layered mafic intrusion. The Company has successfully extracted sulphide concentrate containing up to 6.3% base metals (cobalt, nickel and copper) from the non-magnetic tail produced when preparing the magnetic vanadium concentrate (See ASX announcement 22 May 2018). The sulphides are preferentially located in the interstitial silicate minerals of the magnetite rich layers.

The Company carried out metallurgical testwork on three high-vanadium grade magnetite samples for the recovery of both a magnetic concentrate and a sulphide concentrate. Sample 2 Fresh (Fr) (25kg) and sample 7 Fresh (Fr) (25kg) and a bulk-composite (90kg containing equal parts of fresh samples 1, 3, 4, 5, 6, 7, 8, 9 10) were used in the evaluation.

Each sample was ground to P_{80} 106 µm and underwent wet magnetic separation using a low intensity (1500 Gauss) magnetic separation drum. The non-magnetic stream was dried, sub-split and provided feed for bench-scale sulphide flotation testwork.

Table 6 compares magnetic separation and flotation test data for the three samples. The flotation concentrate chemistry presented represents analysis of the first rougher or cleaner concentrate in open circuit testwork and so provides an indication of the potential chemistry of a sulphide concentrate.

A summary of the key findings from the sulphide recovery testwork are outlined below;

- The flotation results demonstrate the potential to generate a sulphide concentrate containing 4 to 6% combined colbalt, nickel and copper from massive magnetite material proposed as feed to the Gabanintha vanadium recovery process.
- Preliminary mineralogy work indicates the cobalt in the flotation concentrate is hosted in solid solution in pyrite (Co)FeS_2 and in the cobalt nickel mineral, Siegenite ($CoNi_2S_4$).
- There is reasonable potential to further improve the concentrate quality in the samples tested as with other fresh massive iron mineralisation with high cobalt grade in the non-magnetic fraction.

Table 6: Sulphide recovery testwork - magnetic separation and flotation test data

	Fresh Magnetite Sample		
	Sample 2	Sample 7	Bulk Composite
Feed Grades[1]			
V_2O_5 %	1.34	1.23	1.09
S %	0.19	0.23	0.17
Co ppm	240	260	210
Ni ppm	940	1020	740
Cu ppm	230	280	180
Magnetic Stream V_2O_5 Grade (%)	1.44	1.37	1.36
Non Magnetic Stream Mass Recovery (%)	10.2	12.5	25.7
Non Magnetic Stream Grades[1] (%)			
S %	1.63	1.58	0.68
Co %	0.13	0.13	0.05
Ni %	0.18	0.21	0.09
Cu %	0.07	0.10	0.04
Flotation test reference	2 Fr 4113/2	7 Fr 4113/3	BC 4113/2
Flotation Concentrate [1] Grades (%)			
S %	26.5	31.0	31.5
Co %	1.71	2.02	1.54
Ni %	1.61	2.58	1.36
Cu %	0.82	1.70	0.94
Total Base Metals in Cleaner Concentrate [1] (%)	4.14	6.30	3.84

[1] Feed and non-magnetic stream grades are calculated based on measurements of the downstream product streams

High Grade Magnetite Oxide Recovery Test Work

The updated resource estimate includes a classification of oxide material. This material consists of rocks in which the magnetite has variably been oxidized to hematite and maghemite. No loss of the vanadium content has occurred during weathering.

Due to its less magnetic nature, the response to low intensity magnetic separation (LIMS) is lower and further higher intensity magnetic techniques are required to separate the vanadium bearing iron minerals. A summary of preliminary benchscale testwork results on five oxide samples (average calculated head grade of 1.23% V_2O_5) is outlined below and presented graphically within Figure 7.

Highlights of Magnetic Tests on Oxide Samples

- a weighted average concentrate grade of 1.38% V_2O_5, 52.7% Fe, 15.2% TiO_2, 3.28% Al_2O_3 and 1.70% SiO_2.
- an average mass yield of 37.5%.
- a weighted vanadium recovery of 45.3%.
- concentrate grades of up to 1.47% V_2O_5 (Sample 23) and 1.40% V_2O_5 (Sample 20 and 21).
- the specific gravity of the magnetic concentrate generated from Sample 24 was measured at 4.05.

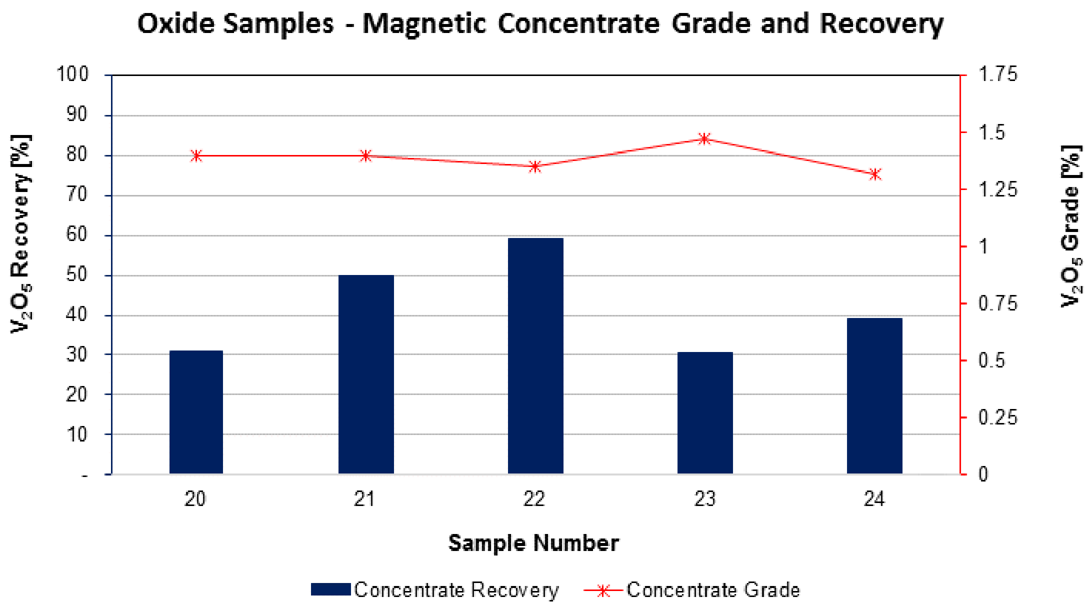

Figure 7 V_2O_5 recovery and concentrate grade for magnetic separation tests on oxide high grade metallurgical samples

Competent Person's Statement

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.

The information in this report 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 and 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 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 statement 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 The Australasian Institute of Mining and Metallurgy. 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 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'.

Mr McNab consents to the inclusion in the report of the matters based on the information made available to him, in the form and context in which it appears.

Details of the current Mineral Resource estimate for Gabanintha are contained in this release. The information that refers to Mineral Resources in this statement was prepared and first disclosed under the JORC Code 2004. Additional drilling in 2015 was incorporated and modelled into a revised and updated resource estimate to comply with the JORC Code 2012. The Gabanintha Mineral Resource was last revised under the JORC Code 2012 on 5th September 2017 by independent consultants Trepanier Pty Ltd and is compared in this ASX announcement in Table 3. Additional data, particularly metallurgical, sulphide and base metal assays as well as revised interpretations of lithological, weathering profile and density data have now been incorporated and modelled into a revised and updated mineral resource estimate.

Vanadium Market Developments

Demand for Vanadium for use in steel products and more recently use in vanadium redox flow battery technology is undergoing a rapid rise at the present time. This has led to a significant price increase from all-time lows in 2015 to ten-year high pricing at the time of writing. This increase beyond the long-term average prices is currently being driven by a number of factors:

- Long term supply disruption (particularly South African) after long low price and demand periods;
- Changes to usage of vanadium in China rebar;
- Limited or slow new mine production, and
- Chinese smelter environmental shutdowns.

AVL, as a potential vanadium producer, recognises the importance of the steel markets, but is also actively seeking to link the use of its products to the rise of this globally significant use of vanadium battery technology.

AVL recently signed an MOU with a Chinese producer and developer of Vanadium Carbo-Nitride (VCN) products, a rapidly growing industry in China focused on the consumption of vanadium for inclusion into rebar steel. Recent changes to official requirements in the increased use of vanadium micro-alloyed steel are driving a new market for VCN

AVL has continued to advance its opportunities in the VRFB market by forming relationships with key players. The Company has formed a battery focused subsidiary, VSUN Energy Pty Ltd, which is developing the VRFB market in Australia. Opportunities focus on a range of sectors including residential, businesses, off grid opportunities, utilities, agriculture and electric vehicle charging stations.

The rapid acceleration in the development of renewable energy projects on a global scale is being accompanied by rapidly growing interest and need for grid and off-grid storage technologies. The uptake of VRFB technology along with other storage technologies could have a significant effect on the vanadium market, as the use of V_2O_5 electrolyte is a large component (up to 50% of current cost) of the battery units. Research is also being undertaken into the use of vanadium, with its unique ability to transfer electricity without conducting heat, in other battery types such as lithium.

The unique characteristics of VRFBs, specifically their scalability, long lifespan cycles and the use of one battery element, make them a strong candidate to earn up to 30% of the growing energy storage market, which is expected to grow from a current 0.4GW to 40GW in just the next 7 years.

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APPENDIX 1

Mineral Resource Table. Classification by Interpretation of Oxidation State.

Table 1 Gabanintha Project – Mineral Resource estimate by oxidation profile 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)

Zone	Classification	Mt	V_2O_5 %	Fe %	TiO_2 %	SiO_2 %	Al_2O_3 %	LOI %
Oxide	Measured	2.5	1.11	41.3	12.9	10.6	9.1	4.7
	Indicated	5.7	0.53	23.8	7.3	26.8	18.5	9.8
	Inferred	18.4	0.66	30.8	8.1	22.4	14.5	7.3
	Sub-total	**26.7**	**0.67**	**30.3**	**8.4**	**22.3**	**14.9**	**7.6**
Transition	Measured	3.7	1.09	41.8	12.6	11.1	8.5	4.2
	Indicated	8.3	0.54	25.0	7.2	27.1	17.5	8.5
	Inferred	23.8	0.71	33.2	8.8	20.4	12.6	6.0
	Sub-total	**35.8**	**0.71**	**32.2**	**8.8**	**21.0**	**13.3**	**6.4**
Fresh	Measured	4.0	1.12	44.4	12.5	9.5	7.0	3.3
	Indicated	9.9	0.76	32.7	9.2	20.2	13.3	5.8
	Inferred	99.1	0.80	36.2	9.6	17.3	10.7	4.6
	Sub-total	**113.0**	**0.81**	**36.2**	**9.6**	**17.3**	**10.8**	**4.7**
Total	Measured	10.1	1.11	42.7	12.6	10.3	8.0	4.0
	Indicated	24.0	0.63	27.9	8.0	24.2	16.0	7.7
	Inferred	141.4	0.77	35.0	9.2	18.5	11.5	5.2
	Total	**175.5**	**0.77**	**34.5**	**9.3**	**18.8**	**11.9**	**5.5**

Table 2.Gabanintha Project – High Grade Massive Magnetite zone (Model Zone 10 only) Mineral Resource estimate by oxidation profile and resource classification using nominal 0.7% V_2O_5 wireframed cut-off for high grade (total numbers may not add up due to rounding)

Zone	Classification	Mt	V_2O_5 %	Fe %	TiO_2 %	SiO_2 %	Al_2O_3 %	LOI %
Oxide	Measured	2.5	1.11	41.3	12.9	10.6	9.1	4.7
	Indicated	0.3	1.10	43.1	12.2	10.7	7.6	4.3
	Inferred	5.4	0.98	41.4	11.4	12.3	8.4	4.0
	Sub-total	**8.2**	**1.02**	**41.5**	**11.8**	**11.8**	**8.6**	**4.2**
Transition	Measured	3.7	1.09	41.8	12.6	11.1	8.5	4.2
	Indicated	0.5	1.09	42.2	12.4	10.9	8.8	4.7
	Inferred	10.7	0.99	42.4	11.4	11.6	7.7	3.6
	Sub-total	**14.8**	**1.02**	**42.2**	**11.7**	**11.4**	**7.9**	**3.8**
Fresh	Measured	4.0	1.12	44.4	12.5	9.5	7.0	3.3
	Indicated	4.2	1.08	43.4	12.1	10.4	7.7	3.5
	Inferred	62.4	0.98	42.5	11.2	11.3	7.5	3.3
	Sub-total	**70.6**	**0.99**	**42.7**	**11.3**	**11.2**	**7.5**	**3.3**
Total	Measured	10.1	1.11	42.7	12.6	10.3	8.0	4.0
	Indicated	4.9	1.09	43.3	12.1	10.5	7.8	3.7
	Inferred	78.6	0.98	42.4	11.2	11.4	7.6	3.4
	Total	**93.6**	**1.00**	**42.5**	**11.4**	**11.3**	**7.6**	**3.5**

Australian VANADIUM LIMITED

Section 1: Sampling Techniques and Data

Criteria	JORC Code Explanation	Commentary
Sampling techniques	Nature and quality of sampling (e.g. cut channels, random chips, or specific specialized industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.	The Gabanintha deposit was sampled using diamond core and reverse circulation (RC) percussion drilling from surface. A total of 233 RC holes and 17 diamond holes (3 of which are diamond tails) were drilled into the deposit. 68 of the 250 holes were either too far north or east of the main mineralisation trend, or excised due to being on another tenancy. One section in the southern part of the deposit (holes GRC0156, GRC0074, GRC0037 and GRC0038) was blocked out and excluded from the resource due to what appeared to be an intrusion which affected the mineralised zones in this area. Of the remaining 182 drillholes, one had geological logging but no assays. The total metres of drilling available for use in the interpretation and grade estimation was 16,287m at the date of the resource estimate. The initial 17 RC drillholes were drilled by Intermin Resources NL (IRC) in 1998. These holes were not used in the 2015 and 2017 estimates due to very long unequal sample lengths and a different grade profile from subsequent drilling. 31 RC drillholes were drilled by Greater Pacific NL in 2000 and the remaining holes for the project were drilled by AVL Australian Vanadium Ltd (Previously YRR) between 2007 and 2015. This drilling includes 17diamond holes (3 of which are diamond tails) and 57 RC holes, for a total of 17,144m drilled. All of the drilling sampled both high and low-grade material and were sampled for assaying of a typical Iron Ore suite, including Vanadium and Titanium plus base metals and sulphur.
	Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	For the most recent drilling, in 2015, the drillhole collars were originally set out using hand held GPS and on completion the collars were surveyed by survey contractors using high precision digital GPS. The earlier drilling programmes were retrospectively surveyed using DGPS at the remaining collar PVC pipe positions. Only a few of the very earliest drilled holes (1998) were not able to have their collars accurately surveyed, as they had been rehabilitated and their position was not completely clear. Downhole surveys were completed for all of the diamond holes, using gyro surveying equipment, as well as the RC holes drilled in 2015 (from GRC0159). All of the other RC holes were given a nominal -60° dip measurement. These older RC holes were almost all 120m or less in depth. Diamond core was quarter-core sampled at regular intervals (usually one metre) and constrained to geological boundaries where appropriate. Most of the RC drilling was sampled at one metre intervals, apart from the very earliest programme in 1998.

Criteria	JORC Code Explanation	Commentary
	Aspects of the determination of mineralisation that are Material to the Public Report.	RC drilling samples were collected at one metre intervals and passed through a cone splitter to obtain a nominal 2-5kg sample at an approximate 10% split ratio. These split samples were collected in pre-numbered calico sample bags. The sample was dried, crushed and pulverised to produce a sub sample (~200g) for laboratory analysis using XRF and total LOI by thermo-gravimetric analysis. Diamond core was drilled predominantly at HQ size for the earlier drilling (2009), with the 2015 drilling at PQ3 size. Field duplicates, standards and blanks have been inserted into the sampling stream at a rate of nominally 1:25 for blanks, 1:11 for standards (including internal laboratory), 1:10 for field duplicates, 1:9 for lab checks and 1:74 for umpire assays.
Drilling techniques	Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).	Diamond drillholes account for 12% of the drill metres and comprises HQ and PQ3 sized core. RC drilling (generally 135 mm to 140 mm face-sampling hammer) accounts for the remaining 88% of the drilled metres. Three of the diamond holes have RC pre-collars (GDH911, GDH913 & GDH916), otherwise all holes are drilled from surface. No core orientation data has been recorded in the database.
Drill sample recovery	Method of recording and assessing core and chip sample recoveries and results assessed.	Diamond core recovery is measured when the core is recovered from the drill string. The length of core in the tray is compared with the expected drilled length and is recorded in the database. For the recent (2015) drilling, RC chip sample recovery was gauged by how much of the sample was returned from the cone splitter. This was recorded as good, fair, poor or no sample. The older drilling programmes used a different splitter, but still compared and recorded how much sample was returned for the drilled intervals. All of the RC sample bags (non-split portion) from the 2015 programme were weighed as an additional check on recovery. An experienced AVL geologist was present during drilling and any issues noticed were immediately rectified. No significant sample recovery issues were encountered in the RC drilling.
	Measures taken to maximize sample recovery and ensure representative nature of the samples.	Core depths are checked against the depth given on the core blocks and rod counts are routinely carried out by the drillers. Recovered core was measured and compared against driller’s blocks. RC chip samples were actively monitored by the geologist whilst drilling. All drillholes are collared with PVC pipe for the first metre or two, to ensure the hole stays open and clean from debris.

Criteria	JORC Code Explanation	Commentary
	Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	No relationship between sample recovery and grade has been demonstrated. Two shallow diamond drillholes drilled to twin RC have been completed to assess sample bias due to preferential loss/gain of fine/coarse material. Geologica Pty Ltd is satisfied that the RC holes have taken a sufficiently representative sample of the mineralisation and minimal loss of fines has occurred in the RC drilling resulting in minimal sample bias.
Logging	Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.	All diamond core and RC chips were geologically logged. Diamond core was geologically logged using predefined lithological, mineralogical and physical characteristics (such as colour, weathering, fabric, texture) logging codes and the logged intervals were based on lithological intervals. RQD and recoveries were also recorded. Minimal structural measurements were recorded (bedding to core angle measurements) but have not yet been saved to the database. The logging was completed on site by the responsible geologist. All of the drilling was logged onto paper and was transferred to a SQL Server drillhole database using DataShed^{TM} database management software. The database is managed by Mitchell River Group (MRG). The data was checked for accuracy when transferred to ensure that correct information was recorded. Any discrepancies were referred back to field personnel for checking and editing. All core trays were photographed wet and dry. RC chips were logged generally on metre intervals, with the abundance/proportions of specific minerals, material types, lithologies, weathering and colour recorded. Physical hardness for RC holes is estimated by chip recovery and properties (friability, angularity) and in diamond holes by scratch testing. The recent drilling also had magnetic susceptibility recorded, with the first nine diamond holes (GDH901-GDH909) having readings taken on the core every 30 cm or so downhole. Holes GDH910 to GDH917 had readings every 50 cm and RC holes GRC0159 to GRC0221 had readings for every one metre green bag. All of the diamond core and RC samples have been logged to a level of detail to support Mineral Resource estimation to and classification to Measured Mineral Resource at best.
	Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography.	Logging was both qualitative and quantitative in nature, with general lithology information recorded as qualitative and most mineralisation records and geotechnical records being quantitative. Core photos were collected for all diamond drilling.
	The total length and percentage of the relevant intersections logged.	All recovered intervals were geologically logged.

Criteria	JORC Code Explanation	Commentary
Sub-sampling techniques and sample preparation	If core, whether cut or sawn and whether quarter, half or all core taken.	Diamond core was cut in half and then the right hand side of the core (facing downhole) was halved again using a powered core saw. Quarter core samples were sent to the laboratories for assaying. Sample intervals were marked on the core by the responsible geologist considering lithological and structural features. No core was selected for duplicate analysis.
	If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry.	RC drilling was sampled by use of an automatic cone splitter for the 2015 drilling programme; drilling was generally dry with a few damp samples. Older drilling programmes employed riffle splitters to produce the required sample splits for assaying. One in 40 RC samples was resampled as field duplicates for QAQC assaying.
	For all sample types, the nature, quality and appropriateness of the sample preparation technique.	The sample preparation techniques employed for the diamond core samples follow standard industry best practice. All samples were crushed by jaw and Boyd crushers and split if required to produce a standardised ~3kg sample for pulverising. The 2015 programme RC chips were split to produce the same sized sample. All samples were pulverised to a nominal 90% passing 75 micron mesh and sub sampled for assaying and LOI determination tests. The remaining pulps are stored at an AVL facility. The sample preparation techniques are of industry standard and are appropriate for the sample types and proposed assaying methods.
	Quality control procedures adopted for all sub-sampling stages to maximize representivity of samples.	Field duplicates, standards and blanks have been inserted into the sampling stream at a rate of nominally 1:25 for blanks, 1:11 for standards (including internal laboratory), 1:10 for field duplicates, 1:9 for lab checks and 1:74 for umpire assays. Also for the recent sampling at BV, 1 in 20 samples were tested to check for pulp grind size.
	Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.	To ensure the samples collected are representative of the in-situ material, a 140mm RC hammer was used to collect one metre samples and either HQ or PQ3 sized core was taken from the diamond holes. Given that the mineralisation at Gabanintha is either massive or disseminated magnetite/martite hosted vanadium, which shows good consistency in interpretation between sections and occurs as percentage values in the samples, Geologica Pty Ltd considers the sample sizes to be representative. Core is not split for duplicates, but RC samples are split at the collection stage to get representative (2-3kg) duplicate samples. The entire core sample and all the RC chips are crushed and /or mixed before splitting to smaller sub-samples for assaying.

Criteria	JORC Code Explanation	Commentary
	Whether sample sizes are appropriate to the grain size of the material being sampled.	As all of the variables being tested occur as moderate to high percentage values and generally have very low variances (apart from Cr_2O_3), the chosen sample sizes are deemed appropriate.
Quality of assay data and laboratory tests	The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.	All samples for Gabanintha were assayed for the full iron ore suite by XRF (24 elements) and for total LOI by thermo-gravimetric technique. The method used is designed to measure the total amount of each element in the sample. Some 2015 RC samples in the oxide profile were also selected for SATMAGAN analysis that is a measure of the amount of total iron that is present as magnetite (or other magnetic iron spinel phases, such as maghemite or kenomagnetite). SATMAGAN analysis was conducted at Bureau Veritas (BV) Laboratory in early 2018. Although the laboratories changed over time for different drilling programmes, the laboratory procedures all appear to be in line with industry standards and appropriate for iron ore deposits, and the commercial laboratories have been industry recognized and certified Samples are dried at 105ºC in gas fired ovens for 18-24 hours before RC samples being split 50:50. One portion is retained for future testing, while the other is then crushed and pulverised. Sub-samples are collected to produce a 66g sample that is used to produce a fused bead for XRF based analysing and reporting. Certified and non-certified Reference Material standards, field duplicates and umpire laboratory analysis are used for quality control. The standards inserted by AVL were designed to test the V_2O_5 grades around 1.94%, 0.95% and 0.47%. The internal laboratory standards used have varied grade ranges, but do cover these three grades as well. Most of the laboratory standards used show an apparent underestimation of V_2O_5, with the results plotting below the expected value lines; however the results generally fall within ± 5-10% ranges of the expected values. The other elements show no obvious material bias. Standards used by AVL generally showed good precision, falling within 3-5% of the mean value in any batch. The standards were not certified however, but compared with the internal laboratory standards (certified) they appear to show good accuracy as well. Field duplicate results from the recent drilling (2015) all fall within 10% of their original values. The BV laboratory XRF machine calibrations are checked once per shift using calibration beads made using exact weights and they performed repeat analyses of sample pulps at a rate of 1:20 (5% of all samples). The lab repeats compare very closely with the original analysis for all elements.

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Criteria	JORC Code Explanation	Commentary
	For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.	The only geophysical readings taken for the Gabanintha core and RC samples and recorded in the database were magnetic susceptibility. This was undertaken using an RT1 hand magnetic susceptibility meter (CorMaGeo/Fugro) with a sensitivity of 1 X 10–5 (dimensionless units). The first nine diamond holes (GDH901 – GDH909) were sampled at approximately 0.3m intervals, the last eight (GDH910 – GDH917) at 0.5m intervals and the RC chip bags for every green bagged sample (one metre). Four completed diamond drillholes were down hole surveyed by acoustic televiewer (GDH911, 912, 914 and 915) as a prequel to geotechnical logging.
	Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.	QAQC results from both the primary and secondary assay laboratories show no material issues with the main variables of interest for the recent assaying programmes.
Verification of sampling and assaying	The verification of significant intersections by either independent or alternative company personnel.	Diamond drill core photographs have been reviewed for the recorded sample intervals. Geologica Pty Ltd Consultant, Brian Davis, visited the Gabanintha project site and the BV core shed and assay laboratories in September 2015 and on multiple occasions over a 10 year period. Whilst on site, the drillhole collars and remaining RC chip samples were inspected. All of the core was inspected in the BV facilities in Perth and selected sections of drillholes were examined in detail in conjunction with the geological logging and assaying.
	The use of twinned holes.	Two diamond drillholes (GDH915 and GDH917) were drilled to twin the RC drillholes GRC0105 and GRC0162 respectively. The results show excellent reproducibility in both geology and assayed grade for each pair.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	All primary geological data has been collected using paper logs and transferred into Excel spreadsheets and ultimately a SQL Server Database. The data were checked on import. Assay results were returned from the laboratories as electronic data which were imported directly into the SQL Server database. Survey and collar location data were received as electronic data and imported directly to the SQL database. All of the primary data have been collated and imported into a Microsoft SQL Server relational database, keyed on borehole identifiers and assay sample numbers. The database is managed using DataShed TM database management software. The data was verified as it was entered and checked by the database administrator (MRG) and AVL personnel
	Discuss any adjustment to assay data.	No adjustments or calibrations were made to any assay data, apart from resetting below detection limit values to half positive detection values.

Criteria	JORC Code Explanation	Commentary
Location of data points	Accuracy and quality of surveys used to locate drillholes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.	For the 2015 drilling, all of the collars were set out using a Trimble real-time kinematic (RTK) GPS system. After completion of drilling all of the collars were re- surveyed using the same tool. Historical drillholes were surveyed with RTK GPS and DGPS from 2008 to 2015, using the remaining visible collar location positions where necessary. Only five of the early drillholes, drilled prior to 2000, had no obvious collar position when surveyed and a best estimate of their position was used based on planned position data.
	Specification of the grid system used.	The grid projection used for Gabanintha is MGA_GDA94, Zone 50. All reported coordinates are referenced to this grid.
	Quality and adequacy of topographic control.	High resolution Digital Elevation Data was supplied by Landgate. The northern two thirds of the elevation data is derived from ADS80 imagery flown September 2014. The data has a spacing of 5M and is the most accurate available. The southern third is film camera derived 2005 10M grid, resampled to match it with the 2014 DEM. Filtering was applied and height changes are generally within 0.5M. Some height errors in the 2005 data may be +/- 1.5M when measured against AHD but within the whole area of interest any relative errors will mostly be no more than +/- 1M. In 2015 a DGPS survey of hole collars and additional points was taken at conclusion of the drill program. Trepanier compared the elevations the drillholes with the supplied DEM surface and found them to be within 1m accuracy.
Data spacing and distribution	Data spacing for reporting of Exploration Results.	The closer spaced drilled areas of the deposit now have approximately 80m to 100m spacing by northing and 25m to 30m spacing by easting. Occasionally these spacings are closer for some pairs of drillholes. Outside of the main area of relatively close spaced drilling (approximately 7015400mN to 7016600mN), the drillhole spacing increases to several hundred metres in the northing direction, but maintains roughly the same easting separation as the closer spaced drilled area.
	Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.	The degree of geological and grade continuity demonstrated by the data density is sufficient to support the definition of Mineral Resources and the associated classifications applied to the Mineral Resource estimate as defined under the 2012 JORC Code. Variography studies have shown very little variance in the data for most of the estimated variables and primary ranges in the order of several hundred metres.
	Whether sample compositing has been applied.	All assay results have been composited to one metre lengths before being used in the Mineral Resource estimate. This was by far the most common sample interval for the diamond drillhole and RC drillhole data.
Orientation of data in relation to geological structure	Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.	The grid rotation is approximately 45o to 50o magnetic to the west, with the holes dipping approximately 60o to the east. The drill fences are arranged along the average strike of the high grade mineralised horizon, which strikes approximately 310o to 315o magnetic south of a line at 7015000mN and approximately 330o magnetic north of that line. The mineralisation is interpreted to be moderate to steeply dipping, approximately tabular, with stratiform bedding striking approximately north-south and dipping to the west. The drilling is exclusively conducted perpendicular to the strike of the main mineralisation trend and dipping approximately 60o to the east, producing approximate true thickness sample intervals through the mineralisation.

Criteria	JORC Code Explanation	Commentary
	If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.	The orientation of drilling with respect to mineralisation is not expected to introduce any sampling bias. Drillholes intersect the mineralisation at an angle of approximately 90 degrees.
Sample security	The measures taken to ensure sample security.	Samples were collected onsite under supervision of a responsible geologist. The samples were then stored in lidded core trays and closed with straps before being transported by road to the BV core shed in Perth (or other laboratories for the historical data). RC chip samples were transported in bulk bags to the assay laboratory and the remaining green bags are either still at site or stored in Perth. RC and core samples were transported using only registered public transport companies. Sample dispatch sheets were compared against received samples and any discrepancies reported and corrected.
Audits or reviews	The results of any audits or reviews of sampling techniques and data.	A review of the sampling techniques and data was completed by Mining Assets Pty Ltd (MASS) and Schwann Consulting Pty Ltd (Schwann) in 2008 and by CSA in 2011. Neither found any material error. AMC also reviewed the data in the course of preparing a Mineral Resource estimate in 2015. The database has been audited and rebuilt by AVL and MRG in 2015. In 2017 geological data was revised after missing lithological data was sourced. Geologica Pty Ltd concludes that the data integrity and consistency of the drillhole database shows sufficient quality to support resource estimation.

Section 2: Reporting of Exploration Results

Criteria	JORC Code Explanation	Commentary
Mineral tenement and land tenure status	Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.	Exploration Prospects are located wholly within Lease P51/2567 and E51/843. The tenements are 100% owned by Australian Vanadium Ltd. The tenements lie within the Yugunga Nya Native Title Claim (WC1999/046). A Heritage survey was undertaken prior to commencing drilling which only located isolated artefacts but no archaeological sites *per se.* Mining Lease Application M51/878 covering most of E51/1843 and the vanadium project is currently under consideration by the Department of Mines and Petroleum. AVL has no joint venture, environmental, national park or other ownership agreements on the lease area. A Mineral Rights Agreement has been signed with Bryah Resources Ltd for copper and gold exploration on the AVL Gabanintha tenements.
	The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	At the time of reporting, there are no known impediments to obtaining a licence to operate in the area and the tenement is in good standing.
Exploration done by other parties	Acknowledgment and appraisal of exploration by other parties.	The Gabanintha deposit was identified in the 1960's by Mangore P/L and investigated with shallow drilling, surface sampling and mapping. In 1998, Drilling by Intermin Resources confirmed the down dip extent and strike continuation under cover between outcrops of the vanadium bearing horizons. Additional RC and initial diamond drilling was conducted by Greater Pacific NL and then AVL Australian Vanadium up until 2015. Previous Mineral Resource estimates have been completed for the deposit in 2001 (Mineral Engineering Technical Services Pty Ltd (METS) and Bryan Smith Geosciences Pty Ltd. (BSG)), 2007 (Schwann), 2008 (MASS & Schwann), 2011 (CSA) and 2015 (AMC).

Criteria	JORC Code Explanation	Commentary
Geology	Deposit type, geological setting and style of mineralisation.	The Gabanintha Project is located approximately 40kms south of Meekatharra in Western Australia and approximately 100kms along strike (north) of the Windimurra Vanadium Mine. The mineralisation is hosted in the same geological unit as Windimurra, which is part of the northern Murchison granite greenstone terrane in the north west Yilgarn Craton. The project lies within the Gabanintha and Porlell Archaean greenstone sequence oriented approximately NW-SE and is adjacent to the Meekatharra greenstone belt. Locally the mineralisation is massive or bands of disseminated vanadiferous titano-magnetite hosted within the gabbro. The mineralised package dips moderately to steeply to the west and is capped by Archaean acid volcanics and metasediments. The footwall is a talc carbonate altered ultramafic unit. The host sequence is disrupted by late stage dolerite and granite dykes and occasional east and northeast -southwest trending faults with apparent minor offsets. The mineralisation ranges in thickness from several metres to up to 20 to 30m in thickness. The oxidized weathering surface extends 50 to 80m below surface and the magnetite in the oxide zone is usually altered to Martite.
Drillhole Information	A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drillholes: easting and northing of the drillhole collar elevation or RL (Reduced Level – elevation above sea level in metres) of the drillhole collar dip and azimuth of the hole down hole length and interception depth hole length.	Refer drilling intercepts table in Appendix 1 of this announcement.
Data aggregation methods	In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.	Length weighed averages used for exploration results are reported in Appendix 1 of this announcement. Cutting of high grades was not applied in the reporting of intercepts.

Criteria	JORC Code Explanation	Commentary
	Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.	There were negligible residual composite lengths, and where present these were excluded from the estimate.
	The assumptions used for any reporting of metal equivalent values should be clearly stated.	No metal equivalent values have been used.
Relationship between mineralisation widths and intercept lengths	If the geometry of the mineralisation with respect to the drillhole angle is known, its nature should be reported.	Drillholes intersect the mineralisation at an angle of approximately 90 degrees.
Diagrams	Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drillhole collar locations and appropriate sectional views.	See Figures 1-4
Balanced reporting	Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.	Comprehensive reporting of drilling details has been provided in Appendix 1 in this announcement.
Other substantive exploration data	Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	All meaningful & material exploration data has been reported
Further work	The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).	The decision as to the necessity for further exploration at Gabanintha is pending completion of mining technical studies on the currently available resource.
	Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	The decision as to the necessity for further exploration at Gabanintha is pending completion of mining technical studies on the currently available resource.

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 onto paper and has been transferred to a digital form and loaded into a Microsoft SQL Server relational drillhole database using DataShed™ 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 Gabanintha 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 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 drillhole 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 were/are 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 Gabanintha.

Criteria	JORC Code Explanation	Commentary
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 visited the Gabanintha project drilling sites in 2016 and 2017 and has been familiar with the Gabanintha iron-titanium-vanadium orebody since 2006. The geology, sampling, sample preparation and transport, data collection and storage procedures were all discussed and reviewed with the responsible geologist for the 2015 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
Geological interpretation	Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.	The Gabanintha 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 2015, as well as four separate 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 gabbros 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 resource model was made to see the effect of the new density data and revised geology model. The 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 also been more closely modelled in this estimation. The impact of the current interpretation as compared to the previous interpretation would be a greater volume of low grade mineralisation and a higher overall V_2O_5 grade for that mineralisation in the current estimate.

Criteria	JORC Code Explanation	Commentary
	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 kilometer 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 7and 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 approximately 200m 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^{TM} 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 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. Drillhole spacing varies from approximately 80 m to 100 m along strike by 25 m to 30 m down dip, to 500 m along by 25 m to 30 m down dip. Drillhole 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.

Criteria	JORC Code Explanation	Commentary
	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 have been five Mineral Resource estimates for the Gabanintha 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. No mining has occurred to date at Gabanintha, so there are no production records.
	The assumptions made regarding recovery of by-products.	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 mineralization at Gabanintha. Subsequent test work has shown the ability to recover a sulphide concentrate containing between 3.8 % and 6.3% of combined base metals using the flotation of the non-magnetic tailings produced as a result of the magnetic separation of a vanadium iron concentrate from fresh massive magnetite. Further work is underway to evaluate the economic value of the concentrate by-product. See ASX Announcement 22 May 2018.
	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, which are non-commodity variables, but are useful for determining 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).

Criteria	JORC Code Explanation	Commentary
	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 Gabanintha block model uses a parent cell size of 40 m in northing, 10 m in easting and 5 m in RL. This corresponds to approximately half the distance between drillholes 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 unfill blocks to be estimated. A limit of 5 composites from a single drillhole 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 drillhole spacing and statistical analysis of the effect of changing block sizes on the final estimates.
	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 Gabanintha block model uses a parent cell size of 40 m in northing, 10 m in easting and 5 m in RL. This corresponds to approximately half the distance between drillholes 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 unfill blocks to be estimated. A limit of 5 composites from a single drillhole 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 drillhole spacing and statistical analysis of the effect of changing block sizes on the final estimates.

Criteria	JORC Code Explanation	Commentary
	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 Gabanintha, but correlation studies on the composite data showed very good correlation (0.8 or above) between most variables, apart from Cr which has a correlation coefficient of 0.65 with V_2O_5.
	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.
	The process of validation, the checking process used, the comparison of model data to drillhole 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 Gabanintha 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 Gabanintha. 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 Gabanintha. The primary mining scenario being considered is conventional open pit mining. AVL has assumed, based on initial concept study work and the nearby presence of a similar project (Windimurra mine site), that the Gabanintha deposit is amenable to open-pit mining methods.

Criteria	JORC Code Explanation	Commentary
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 of the basis of the metallurgical assumptions made.	Metallurgical studies are at an early stage and have 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 “fresh” rock zone, 9 off from the zone defined as “transitional” and 5 off from the near surface oxidised horizon, “oxide”. (see table below) The comminution test work has included SMC, Bond ball mill work index and Bond abrasion index testing. Bench-scale magnetic separation test work has included Davis tube testing (1500 gauss) and a customised two stage separation using a hand held rare earth magnetic rod (2600 gauss at surface). 21 element XRF and LOI analysis has been carried out on the magnetic and non-magnetic products and selected magnetic concentrates underwent QXRD to determine the contained minerals and or QEMScan analysis to gain an understanding of the mineral associations, grains size, locking and liberation.

Metallurgical Sample	Drill hole origin	From (m)	To (m)	Interval (m)	Mass (kg)
1 Fr	GDH903	191	199	8	33
2 Fr	GDH903	199	209	10	47
3 Fr	GDH903	209	215.2	6.2	25
4 Fr	GDH911	98.9	105.5	6.6	59
5 Fr	GDH911	108	113.2	5.2	54
6 Fr	GDH912	124	129	5	52
7 Fr	GDH912	129	134.2	5.2	54
8 Fr	GDH912	134.3	141	6.7	69
9 Fr	GDH914	108	114	6	58
10 Fr	GDH914	114	121	7	75
11 Tr	GDH902	98	105.8	7.8	34
12 Tr	GDH902	105.8	111.1	5.3	31
13 Tr	GDH902	111.1	117.1	6	27
14 Tr	GDH911	105.5	108	2.5	27
15 Tr	GDH913	127.9	133.2	5.3	26
16 Tr	GDH913	133.2	140	6.8	47
17 Tr	GDH913	140	145.2	5.2	45
18 Tr	GDH916	132	139	7	32
19 Tr	GDH916	139	151.3	12.3	101
20 Ox	GDH901	38	45	7	29
21 Ox	GDH901	45	54	9	44
22 Ox	GDH915	12	18	6	44
23 Ox	GDH915	18	23	5	35
24 Ox	GDH917	14.1	21.1	7	44

Criteria	JORC Code Explanation	Commentary
		Some preliminary sulphide concentrate recovery testing has been undertaken on selected 25kg fresh samples and a 90kg fresh composite sample. These samples were ground to a P_{80} of 106 µm and underwent wet magnetic separation using a low intensity (1500 Gauss) magnetic separation drum. The non-magnetic stream was dried, sub split and provided feed for sulphide flotation testwork. The flotation testing has been carried out at benchscale using a scheme of typical sulphide flotation reagents. Rougher, scavenger and cleaner flotation has been tested with one concentrate (test BC 4113/2) reground prior to cleaning. The preliminary metallurgical investigation has demonstrated: - The oxide, transitional and fresh materials are similar in comminution behavior and exhibit a moderate rock competency and ball milling energy demand. - The abrasiveness is considered low to moderate. - A positive and predictable response to magnetic separation can be demonstrated from the fresh transitional material within the high-grade domain. The majority of vanadium exists within magnetic minerals which when separated at a grind size P_{80} of approximately 106 µm, generates a consistently high V_2O_5 grade, low silica and alumina grade concentrate. - Oxidised material responds to magnetic separation, albeit at lower vanadium recovery and concentrate quality. At this stage of metallurgical understanding a primary mill grinding to P_{80} 106 µm and application of magnetic drum separation is considered a reasonable flowsheet concept to produce a vanadium rich concentrate (>1.4% V_2O_5) from material classified as oxide, transitional and fresh within the high-grade domain. No test work has yet been undertaken in processing of the magnetic concentrate to extract vanadium. Given the indicated quality of the concentrate it is assumed that production of a saleable V_2O_5 product would be achieved via a traditional roast, leach and ammonium meta vanadate (AMV) flowsheet path, as was applied in the treatment of similar magnetic concentrate in Xstrata's Windimurra refinery flowsheet in Western Australia and at Largo Resources Maracas vanadium project in Bahia, Brazil.
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 are currently being undertaken for the scoping study and Pre-Feasibility work.

Criteria	JORC Code Explanation	Commentary
Bulk density	Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.	Bulk density determinations (using the Archimedes' method) were made on 15 diamond drillholes. Bulk density data from 313 direct core measurements were used to determine average densities for each of the mineralisation and oxide/transition/fresh domains. Bulk Density was estimated for HG, LG, Alluvial and waste material in Core taken to represent the main lithological units.
	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.	The water immersion method was used for direct core measurements; all 231 of the latest measurements have been done using sealed core, the previous 97 measurements were not wrapped. AMC's observation of the core indicates that observable porosity was not likely to be high for most of the core at the deposit.
	Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.	The average bulk density values for at Gabanintha are: **Domain** / **Oxidation State** / **Bulk Density** 10 (high grade) / Oxide / 3.39 10 (high grade) / Transition / 3.71 10 (high grade) / Fresh / 3.67 2-8 (low grade) / Oxide / 2.13 2-8 (low grade) / Transition / 2.20 2-8 (low grade) / Fresh / 2.62 Alluvial / Oxide / 2.63 (waste) / Oxide / 2.02 (waste) / Fresh / 2.45 All values are in t/m^3. Regressions used to determine bulk density based on iron content are as follows: • Oxide: BD = (0.0344 x Fe_2O_3 %) + 0.9707 • Transition: BD = (0.0472 x Fe_2O_3 %) + 0.3701 • Fresh: BD = (0.0325 x Fe_2O_3 %) + 1.4716 The final bulk density used for reporting of the Gabanintha Mineral Resource is based on the regression as it provides a more reliable local estimated bulk density.

Criteria	JORC Code Explanation	Commentary
Classification	The basis for the classification of the Mineral Resources into varying confidence categories.	Classification for the Gabanintha Mineral Resource estimate is based upon continuity of geology, mineralisation and grade, consideration of drillhole and density data spacing and quality, variography and estimation statistics (number of samples used and estimation pass). The current classification is considered valid for the global resource and applicable for the nominated grade cut-offs.
	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).	At Gabanintha, the central portion of the deposit is well drilled for a vanadium deposit, having a drillhole spacing from a nominal 80 m to 100 m x 25 m to 30 m in northing and easting. The lower confidence areas of the deposit have drillhole spacings ranging up to 500 m x 25 m to 30 m in northing and easting directions. In general, the estimate has been classified as Measured Mineral Resource in an area restricted to the fresh portion of the high grade domain where the drillhole spacings are less than 80 to 100m in northing. Indicated Mineral Resource material is generally restricted to the oxide high grade and oxide and fresh low grade in the same area of relatively closely spaced drilling. Inferred Mineral Resource has been restricted to any other material within the interpreted mineralisation wireframe volumes. The background waste domain estimate has not been classified, due to very low possibility of economic extraction and limited data.
	Whether the result appropriately reflects the Competent Person's view of the deposit.	Geologica Pty Ltd and Trepanier Pty Ltd believe that the classification appropriately reflects their confidence in the grade estimates and robustness of the interpretations.
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. Further investigation into bulk density determination and infill drilling will be required to further raise the level of resource classification.

	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 Gabanintha deposit to date.

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