

## ASX/Media Release

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Yarmony
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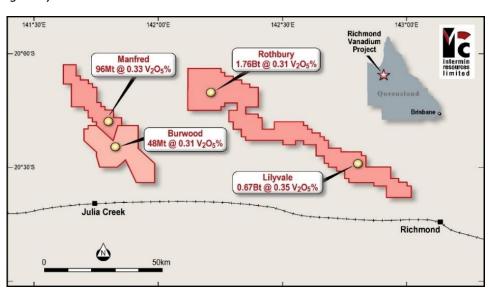
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## INTERMIN ANNOUNCES WORLD-CLASS VANADIUM RESOURCE

#### **HIGHLIGHTS**

- The Richmond Project covers 1,520km² in central north Queensland and is close to existing infrastructure including a gas pipeline, major highway and railway linked to Townsville Port
- Project in Joint Venture with Chinese backed AXF Vanadium Pty Ltd ("AXF") whereby AXF can earn
  up to 75% interest by spending A\$6m by 2021 inclusive of a Feasibility Study<sup>1</sup>
- Updated Mineral Resource Estimate compiled to account for tenement boundary changes and to ensure compliance with JORC 2012 Reporting
- The global Inferred Mineral Resource for Richmond totals 2,579Mt grading 0.32% V₂O₅ at a 0.29% cut-off grade, making it one of the largest Vanadium deposits in the world²
- Richmond also contains valuable molybdenum, nickel and copper mineralisation
- The resource remains open in all directions and is amenable to low cost, open cut mining with the resource located within 15m of surface and hosted in a soft marine sediment
- Initial development focus on the shallow higher grade 671Mt Lilyvale Mineral Resource<sup>2</sup>
- More than 220,000m of drilling has been completed in the project area along with extensive metallurgical testwork on pre-concentration and metal extraction<sup>3</sup>
- Run of Mine oxidised ore (5-15m depth) upgradable by simple sizing separation with over 90% of contained metal in the -38 $\mu$ m fraction, yielding a ~1%  $V_2O_5$  concentrate <sup>3</sup>
- Additional metallurgical test work underway to confirm historic results with initial results expected in the June Quarter 2018
- Infill drilling planned to upgrade the resource to the Measured JORC category as part of the concept / scoping study



**Figure 1: Richmond Vanadium Project tenement locations** 

Commenting on Richmond project, Intermin Managing Director Mr Jon Price said:

"The Richmond Project hosts a globally significant Vanadium resource amenable to low cost, shallow open cut mining in close proximity to existing road, rail and ports. With vanadium prices reaching ten year highs on the back of tightening supply and surging demand in the grid-scale battery market, Richmond has the potential to become a major supplier of Vanadium to the energy storage and steel markets.

"The Company looks forward to supporting AXF as the JV completes infill drilling and metallurgical test work to assess the most economic and efficient pathway to commercial production."

 $<sup>^1</sup>$ As announced to the ASX on 9 September 2016  $^2$  See Table 1 and 2, Competent Persons statement and JORC tables on Page 3, 14, 15 and 16  $^3$  As announced to the ASX on 30 July 2007 and 20 September 2017

#### **Overview**

Intermin Resources Limited (ASX: IRC) ("Intermin" or the "Company") is pleased to announce an updated JORC (2012) Mineral Resource for the Richmond Vanadium Project, located in central north Queensland (Figure 1). The project lies on the Flinders Highway and Great Northern railway, 500km west of the Townsville port and 250km east of Mt Isa (Figure 2). The project comprises four main prospects (Figure 1) in the Richmond and Julia Creek districts covering an area of 1,520km<sup>2</sup>.

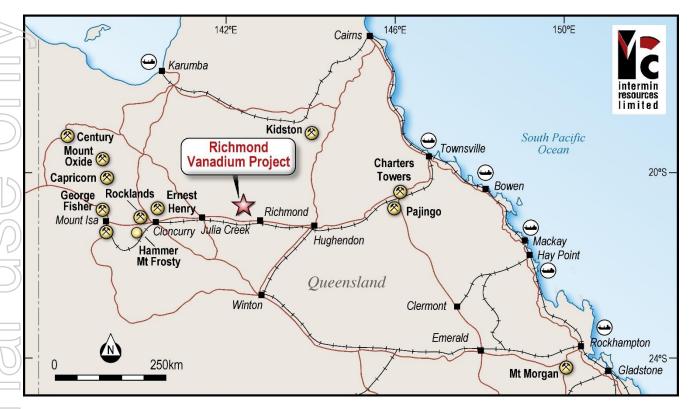


Figure 2: Richmond Vanadium Project location and surrounding infrastructure

Intermin owns 100% in five Mineral Exploration Permits (EPM25163, EPM25164, EPM25258, EPM26425 and EPM26426) covering 481 Blocks near Richmond and 100% of the metal rights to Global Oil Shale Plc's Julia Creek (Burwood) MDL 522 (Figure 1).

As announced to the ASX on 19 September 2017, Intermin has completed a formal Joint Venture agreement with AXF over the Richmond project. AXF brings considerable technical expertise to the project and has extensive business relationships throughout Southeast Asia.

Details of the agreement between the parties include:

- An earn-in Joint Venture whereby AXF can earn 25% of the project area by spending A\$1m within a one year period and maintaining the project in good standing
- AXF to solely contribute to further expenditure of A\$5m on the projects to earn a further 50% over a three year period, inclusive of the completion of a Feasibility Study on part or all of the project area
- AXF to invest A\$430,000 in equity in Intermin at 12c per share with 1:2 option with a strike of 17c and expiry of 31 August 2018 (completed)
- During the sole funding period, AXF will manage the exploration program and tenure with direction from the JV committee comprising representatives from both parties
- Upon AXF satisfying the earn-in terms, each party will contribute to ongoing expenditure in accordance with its respective percentages
- AXF has now notified Intermin of its intent to move to the A\$5m second stage commitment

## **Richmond Project Mineral Resource**

An updated Mineral Resource has now been compiled to take into account changes to tenement boundaries and to ensure compliance with the JORC Code (2012). Table 1 below summarises the updated Mineral Resource and should be read in conjunction with the Competent Persons Statement and the JORC Tables in Appendix 1 on Page 10.

The Mineral Resource for the Richmond Project area now stands at:

• 2,579Mt at 0.32%  $V_2O_5$  at a 0.29% lower cut-off grade

Table 1: Richmond Project - Summary of Mineral Resources > 0.29% (see also Appendix 1 on Page 15)

Category	Tonnage (Mt)	Grade % V₂O₅	Grade g/t MoO₃	Notes
Inferred (1)	1,764	0.31	253	(1) Rothbury prospect
Inferred (2)	671	0.35	274	(2) Lilyvale prospect
Inferred (3)	96	0.33	358	(2) Manfred prospect
Inferred (4)	48	0.31	264	(2) Burwood prospect (100% metal rights)
TOTAL	2,579	0.32	262	

The information in this table that relates to Mineral Resources is based on information compiled by Messrs David O'Farrell and Andrew Hawker. Both are Members of the Australasian Institute of Mining and Metallurgy and are consultants to Intermin Resources Limited. The information was prepared and first disclosed under the JORC Code 2004 and has been updated to comply with the JORC Code 2012. Messrs O'Farrell and Hawker have sufficient experience that is relevant to the style of mineralisation, type of deposit under consideration and to the activity that they are undertaking to qualify as a Competent Person as defined in the 2012 edition of the 'Australasian Code for Reporting of Exploration, Results, Mineral Resource and Ore Reserves'. Messrs O'Farrell and Hawker consent to the inclusion in this report of the matters based on their information in the form and context in which they appear.

## Richmond project Vs current global resource peers

The scale of the project places it as one of the largest undeveloped vanadium resources in the world (Figure 3), is close to surface and remains open in all directions. Historic metallurgical testwork has demonstrated the ability to preconcentrate and increase the processed grade of the resource to  $^{\sim}1\% \text{ V}_2\text{O}_5$  and testwork is ongoing<sup>1</sup>. The Richmond Mineral Resource is hosted in soft oxidised marine sediments as opposed to many hard rock resources around the world.

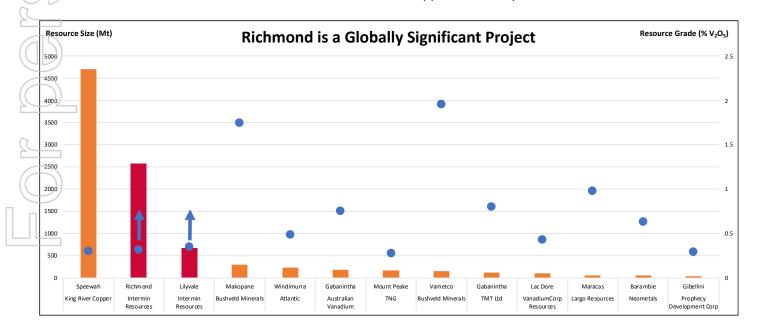


Figure 3: Peer comparison of Vanadium Resources globally (sourced from company announcements)

Bar denotes resource tonnage and blue point denotes grade. The arrow indicates the grade increase achieved in historic testwork.

 $<sup>^{\</sup>rm 1}\,\text{As}$  announced to the ASX on 30 July 2007 and 20 September 2017

## **Lilyvale Prospect**

Lilyvale is located 20km north west of the Richmond Township and in close proximity to the Flinders Highway and Great Northern Railway line. The current resource totals 671Mt grading 0.35% vanadium pentoxide, 274g/t molybdic oxide<sup>1</sup> and commercially significant copper and nickel mineralisation (Figure 4). The deposit is 10-12m thick, up to 5km wide and over 6km long and is open in all directions.

The mineralisation commences 5m from the surface and, as with all the prospects, occurs in two different facies:

- 1. Oxidised coarse limestone rich clay unit from surface to 15m depth where the oil has been leached out and enrichment of vanadium and other metals has occurred (Figure 4). Previous test work has shown that over 90% of the contained metal lies in the -38µm size fraction<sup>2</sup>
  - 2. Fresh fine grained carbonate clay oil shale unit containing vanadium, molybdenum, nickel, copper and significant oil content of 65-75 litres of oil per tonne of shale<sup>2</sup>

initial development work will focus on the upper mineralised zone at Lilyvale as it:

- Is the highest grade based on the drilling to date with the mineralisation 4-5m from surface
- Can be mined simply by free dig open cut mining at very low strip ratios
- Is amenable to low cost removal of the coarse fraction via scrubbing, trommelling, screening, cycloning and potentially flotation to produce a high grade intermediate feedstock  $\sim 1\%$  V<sub>2</sub>O<sub>5</sub>. Metallurgical testwork is underway at two research Laboratories in China to further assess the potential upgrade ratios<sup>3</sup>
- Has been subject to extensive downstream processing testwork for metal extraction. Further metallurgical test
  work is planned on completion of the pre-treatment work to determine the optimal processing pathway in
  terms of metal recoveries, capital and operating costs and product specification
- Is close to road and rail infrastructure

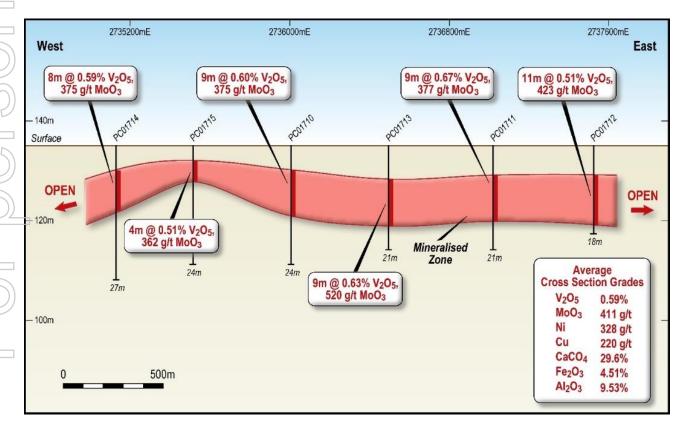


Figure 4: Lilyvale prospect area drill hole section showing average thickness and metal grades

<sup>&</sup>lt;sup>1</sup>See Table 1 and 2, Competent Persons statement and JORC tables on Page 3, 14, 15 and 16. <sup>2</sup> As announced to the ASX on 30 July 2007

<sup>&</sup>lt;sup>3</sup> As announced to the ASX on 20 September 2017

## **Project Geology**

The Richmond project is located within marine sediments of the Early Cretaceous Toolebuc Formation which is a stratigraphic unit that occurs throughout the Eromanga Basin central-northern Queensland. The Toolebuc sediments that consist predominantly of black carbonaceous and bituminous shale and minor siltstone, with limestone lenses and coquinites (mixed limestone and clays). It is composed of two distinct units representing two different facies; an upper coarse limestone-rich-clay-oil shale unit (coquina) and a lower fine grained carbonate-clay-oil shale unit.

The limestone within the Toolebuc Formation has an abundant fossil assemblage which has been extensively studied. Two main faunal assemblages have been recognised, corresponding to the upper coquina facies (shelly limestone and clay) and a lower fine grained carbonate shale facies. The organic matter in the fresh shale is predominantly lamellar and referred to by Hutton et al (1980) as 'lamosite' (lamellar oil shale). The organic compounds are described as Alginite B in order to distinguish them from the more generally recognised Alginite A, in which clear evidence of algal morphology can be observed.

Alginite B comprises elongate anastomosing films derived from benthonic algae that are referable to the Cyanophyceae genera of blue-green algae (Ozimic, 1986). High magnification scanning electron microscopy reveals the oil shale contains abundant micro fossils, dominated by small planktonic foraminifera and coccoliths (algal plates) believed to be derived from Cyanophta / blue- green algae. Average grain size of the lower oil shale calcareous nanofossils and clays are less than 5 to 7 microns.

The blue-green algae are interpreted to have formed extensive algal mats on the sea floor. The preservation of dead algal matter can be related to an oxidising-reducing boundary probably situated immediately below the base of the living algal mat layer and keeping pace with its upward growth. The clays and kerogen are derived from planktonic algae and blue-green benthonic algae with the calcite representing the inorganic component of the organisms.

Within fresh Toolebuc Formation the oil grade of the coquina based on Modified Fischer Assay varies between 7-45 litres/tonne, averaging approximately 24 litres/tonne. The formation is strongly oxidised down to 15-20m and negligible oil exists in the oxidised portions of the oil shale. In the Richmond project area outcrops of both the upper coquina and lower oil shale are strongly oxidised to approximately 15m deep.

The lower unit is the main oil shale horizon which, in the fresh rock, contains the majority of the oil. This fine-grained oil shale averages 5-10m thick and is principally composed of calcite, clays and kerogen. Pyritic sediments (1-2cm thick) may comprise approximately 5% of the rock mass. Oil grade within the fresh rock based on Modified Fischer Assay varies from 55-100 litres per tonne and averages between 65-75 litres/tonne. The oil is contained within the kerogen, which comprises approximately 18wt% of the fresh oil shale. The composition of the kerogen is about 75% carbon, 8% hydrogen, 5% sulphur, 2% nitrogen and 10% oxygen (Tolmie, 1987).

## Background on the Richmond – Julia Creek Project<sup>1</sup>

Exploration in the Richmond – Julia Creek area has been extensive and widespread over the last 40-50 years predominantly looking for oil within the unoxidised kerogen rich oil shale and limestone layers below 15m depth. Companies including CSR, CRA, ESSO and Fimiston Mining also identified significant vanadium and molybdenum mineralisation in the upper oxide zone from surface where the oil shale had been leached of the oil and enriched by vanadium, molybdenum, copper, nickel and other metals.

Intermin acquired the project areas in 2004 and added to the project area in 2005 and 2006 and owned 100% interest in over 4,100km<sup>2</sup> at that time. The Company conducted several RC and diamond drilling programs with over 12,200m of drilling, to prove up the mineralisation and commence extensive metallurgical test work focussed on both ore pretreatment and metal extraction.

In total, over 220,000m has been drilled in the Project area and a number of metallurgical testwork programmes completed on both oil and metal extraction.

 $<sup>^{\</sup>rm 1}\,{\rm Sourced}$  from previous ASX releases by Intermin and publicly available information

Previous metallurgical test work on the coarse upper oxide zone from surface to 15m depth showed that the ore can be beneficiated into a high grade concentrate via wet scrubbing, trommelling and cycloning. Coarse shelly limestone, containing negligible vanadium and comprising up to 85% of the total mass, is removed by this process leaving a fine grained clay and iron oxide product (<10 microns) containing 85-90% of the original vanadium and other metals. Metal extraction by leaching of this concentrate dissolved up to 90% but with relatively high reagent consumption. Methods of separating the respective metals were also developed to recover vanadium as vanadium pentoxide, molybdenum as molybdite and nickel and copper as sulphide concentrates<sup>1</sup>.

The deeper fresh oil shale from 15m below surface contains significant quantities of oil with previous work estimating between 60-70 litres of oil per ton of ore and significant quantities of vanadium, molybdenum, nickel and copper. Previous work by Intermin on the project has focused on upgrading of the fresh oil shale by mineral dressing procedures that aim to produce a high grade Kerogen concentrate which can be further processed to release its oil content leaving an ash containing high levels of vanadium and molybdenum for metal recovery. Results to date warrant further test work to improve the selectivity of various mineral dressing approaches available.

Between 2006 and 2014, the tenement area was progressively rationalised with the vanadium prices of the day made further work prohibitive. The historic JORC 2004 Mineral Resource Estimate after this rationalisation was 3.3Bt grading  $0.40\% \ V_2O_5$  and  $295g/t \ MoO_3$  (as announced to the ASX on 12 November and 10, 11 December 2013).

In 2016, Intermin embarked on a new business model, made changes to the Board and management and focussed on building a gold business in the Western Australian goldfields. The Company entered into a number of gold and multi commodity joint ventures whereby third parties could earn in to certain projects and take management control. In December 2016, Intermin entered into an earn in JV with AXF Vanadium Pty Ltd, a wholly owned subsidiary of the AXF Group, who have a highly credentialed technical team and commercial networks in China.

## **Next Steps**

With the release of the global resource, work by the Joint Venture will now focus on the shallow higher grade Lilyvale prospect with work to include:

- Completion of the initial metallurgical test work on ore pre-treatment (due June Quarter 2018)
- Infill drilling at Lilyvale to define a JORC 2012 Measured Mineral Resource and to provide additional metallurgical samples for further pre-treatment tests and optimal downstream processing for metal extraction
- Completion of a concept / scoping study for Lilyvale including flowsheet development, capital and operating cost estimates and options for end product development including bulk concentrate, 98% vanadium pentoxide and vanadium electrolyte for vanadium redox flow batteries
- Market analysis for vanadium, molybdenum, nickel and copper
- Preliminary discussions with potential third party off-take partners
- Statutory approvals and stakeholder engagement

#### **About Vanadium**

Vanadium is used globally as an industrial element with a variety of common applications and its demand is growing due to the advancement of new technologies such as the energy storage industry whereby vanadium is a key component in the grid scale storage of solar and wind energy.

Vanadium is ductile with good structural strength, has a natural resistance to corrosion and stability against alkalis, acids and salt water. The most common uses for vanadium today are:

- Steel Alloys high strength low alloy steel (HSLA), high carbon steel alloys (HSS), rebar and structured beams and high speed tools and surgical instruments;
- <u>Chemicals</u> catalysts for sulphuric acid and synthetic rubber production, catalytic converters to remove sulphur dioxide and NO<sub>x</sub> catalysts;
- <u>Titanium Alloys</u> Ti-6Al-4V in airframes, jet engines, personal transports and dental implants; and
- <u>Energy Storage</u> vanadium electrolyte, grid scale vanadium redox flow batteries (VRFB), lithium-vanadium based batteries for electric vehicles.

## Vanadium supply and demand<sup>1</sup>

Traditionally the main uses for vanadium by volume is the steel industry because when alloyed with other metals it provides unrivalled hardness and strength. In recent decades with the development of VRFB's consumption of vanadium is forecast to increase significantly into the future to meet renewable energy sector demands. Lower vanadium prices in the last decade has contributed to supply falling below demand with the deficit leading to a rise in vanadium prices in recent times.

Currently, over 80% of the world's vanadium production (~90,000tpa) comes from China (55%), Russia (20%) and South Africa (15%) whether mined or as a by-product of steel making<sup>1</sup>. Recent changes in Chinese policy include the banning of imported metal slag containing vanadium and stricter environmental regulations on Chinese steel mills has seen a dramatic decline in production. This, together with further industry rationalisation has resulted in a significant tightening of supply.

Australia has a number of large scale vanadium resources predominantly hosted in titaniferous magnetite deposits in Western Australia and the Northern Territory. Intermin's Richmond project in Queensland differs from these deposits given its hosted in soft marine sediments. Australia has a significant opportunity to become globally relevant in the supply of vanadium and has the geographical advantage given its close proximity to Chinese and other Asian markets.

Against a backdrop of tightening supply, demand is forecast to grow significantly in the next 10-20 years from steel making and, in particular, renewable energy storage systems. In China alone, multiple 100MW scale VRFB's are being developed as part of the move away from coal fired power stations. Improving technology to deliver large grid scale systems for industrial, commercial and residential use is moving rapidly leading to improved efficiency and lower costs per kilowatt hour. Micro grid applications in the US are also predicted to transform the electricity industry to over 720MW by 2020.

Energy storage applications have the potential to increase global vanadium demand by more than 30,000t p.a. or more than 30% of the current market by 2020. As lithium has changed the world in terms of powering small devices and electric cars, larger scale vanadium redox flow batteries can revolutionise electricity grids and provide sustainable environmentally friendly power for future generations around the world.

The key factors for an emerging Australian market are competitors to supply (China, Russia, and South Africa), surety of demand, stability of pricing over the long term and capital and operating costs for developing a profitable vanadium business. A lot more work is required within the domestic vanadium sector, from all levels of government and from our world class research institutions to fully benefit from Australia's vanadium endowment, not only from a production perspective, but to lead the world in renewable energy generation and storage to the benefit of all Australians.

## Vanadium pricing

Vanadium is sold as vanadium pentoxide ( $V_2O_5$ ) and less commonly as vanadium trioxide ( $V_2O_3$ ) for non-steel applications and as the alloy ferrovanadium (FeV) for steel making. The most common FeV alloy is FeV80, but FeV40, FeV50 and FeV60 are also sold. In the future, we see vanadium electrolyte as a key commercial commodity in the energy storage market.

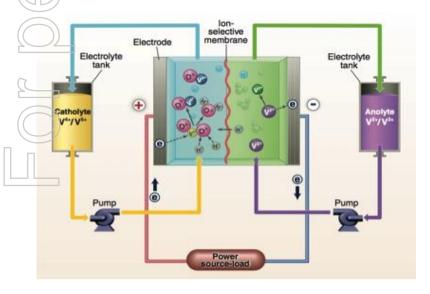
On the back of tightening supply and increased demand, vanadium prices have reached eight year record highs as shown in Figure 5 below for 98% vanadium pentoxide. The consensus view is a continuing strengthening in price amid short supply and the fact that a majority of available supply is tied up in long term contracts.



Figure 5: Vanadium pentoxide (98%) US\$/Ib

#### Vanadium Redox Flow Batteries

A VRFB is a type of rechargeable flow battery where rechargeability is provided by vanadium electrolyte dissolved in solution. Vanadium is both the cathode (-) and anode (+) in VRFB technology (Figure 6).



Two tanks of vanadium electrolyte, one side containing  $V^{2+}$  and  $V^{3+}$  ions, the other side containing  $V^{4+}$  and  $V^{5+}$  ions, are separated by a thin proton exchange membrane. Pumps on both sides circulate the electrolyte.

The electron differential between the two cells generates electric power.

There is no cross contamination in VRFB's like most batteries as electrolyte in the catholyte and the anolyte consists of 100% vanadium ions. The ion sensitive membrane separating both sides of the electrolyte tank allows only protons to pass.

Figure 6: Schematic VRFB

<sup>&</sup>lt;sup>1</sup> Source – Australian Geoscience, Australian vanadium, renewable energy world, Value and vanadium company websites

The advantages of the VRFB for these applications include:

- High energy efficiency, short response time and independently tune-able power rating and energy capacity
- Scalable due to the modular design of the tank based battery system for grid scale applications
- Completely non-flammable with no danger of thermal reactions
- Environmentally friendly, easy to manufacture and recyclable
- VRFB's can operate for decades and do not lose efficiency over time
- Improved costs with expected costs per kilowatt hour to reduce to US\$150

While the focus is on vanadium as the primary product, the Richmond project also contains significant quantities of molybdenum, nickel and copper. Prices for all these commodities have risen in the last 12 months and projected to remain strong into the future. These by-product metals have the potential to generate significant revenue in their own right to add value to the project. Metallurgical testing to extract and recover all metal types and produce saleable products will form part of the next phase of work on completion of the ore pre-treatment assessment.

In addition, the deeper fresh zone from 15-40m depth contained significant oil resources together with the above metals. Further test work on this zone will be completed in 2019 to assess optimal processing pathways and commercial viability.

## **Listing Rule 5.8.1 Disclosures**

#### **Geology and Geological Interpretation**

The Richmond project mineralisation is located within marine sediments of the Early Cretaceous Toolebuc Formation, a stratigraphic unit that occurs throughout the Eromanga Basin in central- northern Queensland.

The Eromanga Basin is a sub-basin of the Great Artesian Basin and consists of a number of thick sequences of non-marine and marine sedimentary units. The Toolebuc is part of the Rolling Downs Group of the Eromanga Basin that covers a wide but relatively shallow structural depression in eastern Australia, covering 1.5 million km<sup>2</sup>.

The basin was developed as a major downward on a basement of Proterozoic to Palaeozoic metamorphic and igneous rocks during the Jurassic to Cretaceous.

The Toolebuc Formation is a flat lying early Cretaceous (Albian  $\sim 100 \, \text{My}$ ) sediment that consists predominantly of black carbonaceous and bituminous shale and minor siltstone, with limestone lenses and coquinites (mixed limestone and clays). It is composed of two distinct units representing two different facies: an upper coarse limestone-rich-clay-oil shale unit (coquina) and a lower fine-grained carbonate-clay-oil shale unit.

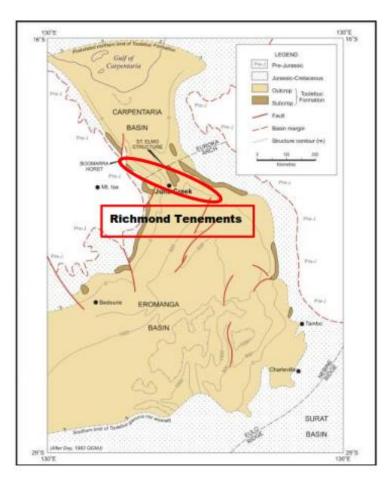
The Toolebuc Formation outcrops only at the margins of the Eromanga and Carpentaria basins, except at Richmond and Richmond where it is draped over an interpreted original basement high and has been structurally brought to the surface. Where the unit outcrops it forms low, rubbly, subtle topographic highs which have been the source of road building materials in many areas.

The limestone within the Toolebuc Formation has an abundant fossil assemblage which has been extensively studied. Two main faunal assemblages have been recognised, corresponding to the upper coquina facies (shelly limestone and clay) and a lower fine-grained carbonate shale facies. The organic matter in the fresh shale is predominantly lamellar and referred to by Hutton et al (1980) as 'lamosite' (lamellar oil shale). The organic compounds are described as Alginite B in order to distinguish them from the more generally recognised Alginite A, in which clear evidence of algal morphology can be observed. Alginite B comprises elongate anastomosing films derived from benthonic algae that are attributable to the Cyanophyceae genera of blue-green algae (Ozimic, 1986).

High magnification scanning electron microscopy reveals the oil shale contains abundant micro fossils, dominated by small planktonic foraminifera and coccoliths (algal plates) believed to be derived from Cyanophta / blue- green algae. Average grain size of the lower oil shale calcareous nanofossils and clays are less than 5-7 microns.

The blue-green algae are interpreted to have formed extensive algal mats on the sea floor. The preservation of dead algal matter can be related to an oxidising-reducing boundary probably situated immediately below the base of the living algal mat layer and keeping pace with its upward growth. The clays and kerogen are derived from planktonic algae and blue- green benthonic algae with the calcite representing the inorganic component of the organisms.

The episode of clear water calcareous sedimentation represented by the Toolebuc Formation ended when muddy conditions returned, preventing further growth of the benthonic fauna and leading to widespread deposition of the argillaceous sediments of the Allaru Mudstone (Ramsden, 1983).



#### Sampling and Sub-sampling

Samples were collected at the drill site using a stuffing box, then cone splitter into a calico bag with the larger reject sample being collected in a bucket and being placed on the ground. The samples presented for assaying can therefore be considered as being representative and uncontaminated. Intermin retain digital photos on file that detail the drilling and field sampling procedures.

## Sample Analysis Method

All of the samples used to construct the resource model were assayed at ALS Chemex:

- Sample preparation: Pulverise Entire Sample
- Sample Digest: 4 acid digest
- Analytical procedure: ICP-AES
- Samples Analysed for: Ag. Al, Ca, Cu, Fe, Mn, Mo, S, Ti, V, Zn, U, Ni

#### **Drilling Techniques**

All the holes within the resource model are vertical air core, RC and diamond holes, drilled to a nominal 20m depth, with hole depths ranging between 3m and 305m. RAB holes exist in the database, but are not present within the resource area. The following drilling statistics are as follows:

AC: 525 Holes for 70,809m
 RC: 305 holes for 41,112m
 Diamond: 23 holes for 3,062m
 RAB: 822 holes for 106,474m

Unknown: 488 holes for 66,043m. These holes appear to match mostly the prefixes used in the AC drilling

## **Estimation Methodology**

Each area, Burwood, Manfred, Rothbury and Lilyvale was interpreted separately and had models created separately due to sizes and lode orientations.

An evaluation of the statistical background was used for identifying the lower cut-off in the interpretation. A histogram of the lower values within Lilyvale and Manfred-Burwood was used in determining a background of  $0.1\%V_2O_5$  (Figures



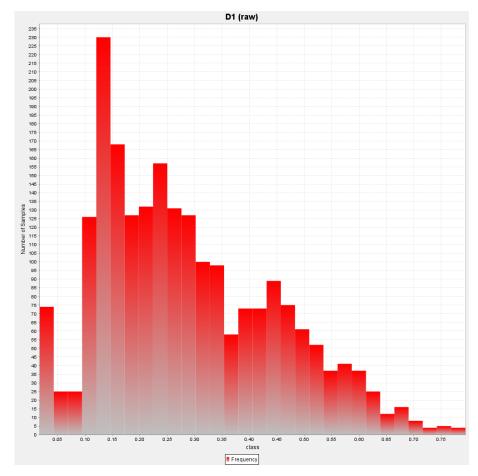


Figure 7: Histogram of all sample data from the Lilyvale area showing a distinct grade variation at the  $0.1\%V_2O_5$ .

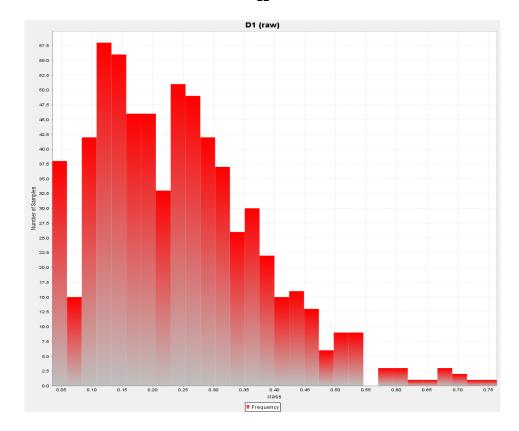
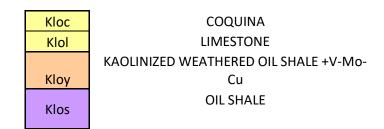


Figure 8: Histogram of all sample data from the Manfred-Burwood area showing a distinct grade variation at the  $0.1\%V_2O_5$ .

Although a statistical background identified a  $0.1\% \text{ V}_2\text{O}_5$  background value, there was flexibility in altering the lower cut-off based on geological interpretation to maintain lode continuity. Criteria used in the interpretations were:

- Interpretations were based on V<sub>2</sub>O<sub>5</sub>values only.
- A nominal  $0.1\% V_2O_5$  lower cut-off grade with flexibility for geological continuity.
- Sections extended 100m beyond the last interpreted section.
- Geology mostly comprises the following:



Interpretations were created in cross-sections to correlate with the drilling sections which varied for each resource area and within each area:

- Lilyvale: 1,000m line spacing from 680500E to 697000E for 6,500m and 3,000-5,500m wide, orientated in an east west orientation
- Manfred-Burwood: 2,000m to 5,000m spacings bearing 325 degrees for 18,600m and 2,100-11,000m wide.
- Rothbury: a few sections of 6,000-10,000m plus cross data and remnant drilling in the far south-east corner. Model area is: 7743000N 7777000N, 617000E 675000E orientated to 295°.

Although section spacing is extremely wide the continuity of assay data, interpretation widths and geological recognition identifies the lodes with relative precision.

The interpreted sections were wireframed to create a solid used in extracting composite data and creating the block models. Surpac macros were created to determine optimum block size, search distance and maximum samples within the upper and lower areas of Lode 3. The process involves selecting a point between drill sections within the ore boundaries, creating a single block, and graphically representing the Kriging efficiency and conditional bias slope. The maximum position where the slopes are closest to one and each other. Optimum results are listed in Table 2:

Table 2: Block Model Parameters and search distances

Location	Block Size	Max Samples	Max Search			
			search1	search2	search3	search4
Lilyvale	100m	10-30	900m	1,800m	3,000m	
Manfred-Burwood	50m	10-30	1,000m	2,500m	5,000m	
Rothbury	100m	10-30	3,650m	5,000m	10,000m	20,000m

The fourth pass for Rothbury was isotropic.

#### Resource Classification

The resource model uses a classification scheme based upon both block estimation parameters and other relevant modifying factors as determined by the Competent Person. The block estimation parameters initially used for classification guidance included average distance of points, closest points, number of points and standard deviation.

These inputs were used to derive relative confidence levels with a range of other modifying factor considerations as identified by the Competent Person including the geological understanding of the coquina mineralisation, zone geometries and the material types present. This was then used to guide resource reporting according to the guidelines for the JORC Code (2012 Edition). The resource is classified as Inferred.

#### Cut-off Grade

The cut-off grade of 0.1 % for the stated  $V_2O_5$  Mineral Resource Estimate is determined from economic and statistical parameters and reflects the current and anticipated mining practices. The 0.1% cut applies to the geological model wireframe envelopes. The model is considered valid for reporting and potential open pit mine planning. The quoted resource of 2.579 Mt @ 0.32%  $V_2O_5$  uses 0.29%  $V_2O_5$  as a cut-off grade. Grade cuts were applied and assessed at 0.2, 0.25, 0.26, 0.27, 0.28, 0.29, 0.30, 0.31, 0.32, 0.33 and 0.4%  $V_2O_5$ . 0.29% was chosen as it represented a fair balance between tonnes and grade and to account for the shallow oxide nature of the material.

#### Mining and Metallurgical Methods and Parameters and other modifying factors considered to date

Subject to satisfactory concentration and extraction techniques being developed, Intermin suggest that the vanadium mineralisation could be mined by open cut methods. The mineralisation is often less than 10m from the surface, tabular and thick. Significant volumes of testwork have been conducted on the Julia Creek and Richmond oil shales. Richmond hosts both vanadium-molybdenum and oil shale but the oil shale values at Julia Creek (Burwood, MDL522) are significantly higher than those at Richmond. Richmond is primarily a vanadium-molybdenum project and provides the initial focus for the ongoing development work

Beneficiation and extraction of vanadium and molybdenum from the Richmond deposit varied with the composition of the ore. Testwork to evaluate the vanadium/molybdenum (V/Mo) deportment conducted on air core samples from various deposit horizons included:

- Beneficiation by screening
- Beneficiation by flotation
- Acid leaching and solvent extraction
- High temperature chlorination

#### **About Intermin**

Intermin is a gold exploration and mining company focussed on the Kalgoorlie and Menzies areas of Western Australia which are host to some of Australia's richest gold deposits. The Company is developing a mining pipeline of projects to generate cash and self-fund aggressive exploration, mine developments and further acquisitions. The Teal gold mine is currently in production.

Intermin is aiming to significantly grow its JORC-Compliant Mineral Resources, complete definitive feasibility studies on core high grade open cut and underground projects and build a sustainable development pipeline.

Intermin has a number of joint ventures in place across multiple commodities and regions of Australia providing exposure to Vanadium, Copper, PGE's, gold and nickel/cobalt. Our quality joint venture partners are earning in to our project areas by spending over \$20 million over 5 years enabling focus on the gold business while maintaining upside leverage.

## Intermin Resources Limited – Summary of Gold Mineral Resources (at a 1g/t Au cut-off grade)

Deposit		Measured			Indicated			Inferred			Total Resource	
(1g/t cut-off)	Mt	Au (g/t)	Oz	Mt	Au (g/t)	Oz	Mt	Au (g/t)	Oz	Mt	Au (g/t)	Oz
Teal	0.33	2.56	27,423	0.61	1.98	38,760	0.55	2.25	38,260	1.49	2.18	104,443
Peyes Farm				0.15	1.74	8,300	0.36	1.72	19,980	0.51	1.73	28,280
Jacques Find							0.26	3.22	26,680	0.26	3.22	26,680
Goongarrie				0.20	3.30	21,321	0.07	1.64	3,707	0.27	2.86	25,028
Menzies				0.77	2.52	62,400	1.65	2.05	108,910	2.42	2.20	171,310
Anthill				0.99	1.85	58,666	0.43	1.42	19,632	1.42	1.72	78,000
TOTAL	0.33	2.56	27,423	2.71	2.17	189,447	3.32	2.04	217,169	6.36	2.12	433,741

## Intermin Resources Limited – Summary of Vanadium / Molybdenum Mineral Resources (at 0.29% V₂O₅ cut-off grade)

Category	Tonnage (Mt)	Grade % V₂O₅	Grade g/t MoO₃	Notes
Inferred (1)	1,764	0.31	253	(1) Rothbury
Inferred (2)	671	0.35	274	(2) Lilyvale
Inferred (3)	96	0.33	358	(2) Manfred
Inferred (4)	48	0.31	264	(2) Burwood (100% metal rights)
TOTAL	2,579	0.32	262	

#### Notes:

- 1. <u>Competent Persons Statement</u> The information in this report that relates to Exploration results, Mineral Resources or Ore Reserves is based on information compiled by Messrs David O'Farrell, Simon Coxhell and Andrew Hawker. All are Members of the Australasian Institute of Mining and Metallurgy and are consultants to Infermin Resources Limited. The information was prepared and first disclosed under the JORC Code 2004 and has been updated to comply with the JORC Code 2012. Messrs O'Farrell, Coxhell and Hawker have sufficient experience that is relevant to the style of mineralisation, type of deposit under consideration and to the activity that they are undertaking to qualify as a Competent Person as defined in the 2012 edition of the 'Australasian Code for Reporting of Exploration, Results, Mineral Resource and Ore Reserves'. Messrs O'Farrell, Coxhell and Hawker consent to the inclusion in this report of the matters based on their information in the form and context in which they appear.
- 2. Forward Looking Statements No representation or warranty is made as to the accuracy, completeness or reliability of the information contained in this release. Any forward looking statements in this release are prepared on the basis of a number of assumptions which may prove to be incorrect and the current intention, plans, expectations and beliefs about future events are subject to risks, uncertainties and other factors, many of which are outside of Intermin Resources Limited's control. Important factors that could cause actual results to differ materially from the assumptions or expectations expressed or implied in this release include known and unknown risks. Because actual results could differ materially to the assumptions made and Intermin Resources Limited's current intention, plans, expectations and beliefs about the future, you are urged to view all forward looking statements contained in this release with caution. The release should not be relied upon as a recommendation or forecast by Intermin Resources Limited. Nothing in this release should be construed as either an offer to sell or a solicitation of an offer to buy or sell shares in any jurisdiction.

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#### **Forward Looking and Cautionary Statements**

Some statements in this report regarding estimates or future events are forward looking statements. They include indications of, and guidance on, future earnings, cash flow, costs and financial performance. Forward looking statements include, but are not limited to, statements preceded by words such as "planned", "expected", "projected", "estimated", "may", "scheduled", "intends", "anticipates", "believes", "potential", "could", "nominal", "conceptual" and similar expressions. Forward looking statements, opinions and estimates included in this announcement are based on assumptions and contingencies which are subject to change without notice, as are statements about market and industry trends, which are based on interpretations of current market conditions. Forward looking statements are provided as a general guide only and should not be relied on as a guarantee of future performance. Forward looking statements may be affected by a range of variables that could cause actual results to differ from estimated results, and may cause the Company's actual performance and financial results in future periods to materially differ from any projections of future performance or results expressed or implied by such forward looking statements. These risks and uncertainties include but are not limited to liabilities inherent in mine development and production, geological, mining and processing technical problems, the inability to obtain any additional mine licenses, permits and other regulatory approvals required in connection with mining and third party processing operations, competition for among other things, capital, acquisition of reserves, undeveloped lands and skilled personnel, incorrect assessments of the value of acquisitions, changes in commodity prices and exchange rate, currency and interest fluctuations, various events which could disrupt operations and/or the transportation of mineral products, including labour stoppages and severe weather conditions, the demand for and availability of transportation services, the ability to secure adequate financing and management's ability to anticipate and manage the foregoing factors and risks. There can be no assurance that forward looking statements will prove to be correct.

Statements regarding plans with respect to the Company's mineral properties may contain forward looking statements in relation to future matters that can only be made where the Company has a reasonable basis for making those statements.

This announcement has been prepared in compliance with the JORC Code (2012) and the current ASX Listing Rules.

The Company believes that it has a reasonable basis for making the forward looking statements in the announcement, including with respect to any production targets and financial estimates, based on the information contained in this and previous ASX announcements.

## Appendix 1 - Richmond Vanadium Project

## JORC Code (2012) Table 1, Section 1, 2 and 3

Exploration results at Richmond were reported by Intermin and released to the ASX during 2016. Mr David O'Farrell, Exploration Manager of Intermin compiled the information in Section 1 and Section 2 of the following JORC Table 1 and is the Competent Person for those sections. Mr Andrew Hawker, an independent consultant to Intermin compiled the information in Section 3 of the following JORC Table 1 and is the Competent Person for that section.

The following Table and Sections are provided to ensure compliance with the JORC Code (2012 edition) requirements for the reporting of Mineral Resources.

## Section 1 Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
Sampling Pechniques	Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised 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 deposit has been drilled using Rotary Air Blast (RAB), Air Core (AC), Reverse Circulation (RC) and Diamond (DD) drilling over numerous campaigns by several companies over the past 40 years. Nearly all of the historic and Intermin drill holes are vertical. Intermin routinely took 4m composite samples taken with a 450mm x 50mm PVC spear being thrust to the bottom of the sample bag. 1m single splits were taken using riffle splitter. Average sample weights were about 1.5-2.5 kg.
15	<ul> <li>Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.</li> </ul>	<ul> <li>Regular air &amp; manual cleaning of cyclone to remove hung up clays. Samples were mostly dry. Standards &amp; replicate assays taken by, and reported by, the laboratory. Sample procedures followed by historic operators are assumed to be in line with industry standards at the time.</li> </ul>
	Aspects of the determination of mineralisation that are Material to the Public Report. In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types	<ul> <li>RC chips were geologically logged over 1m intervals, initially sampled over 4m composite intervals and then specific anomalous intervals were sampled over 1m intervals. Depending on the hole depth, the maximum interval was 4, and minimum was 1m.</li> <li>All of the samples used to construct the resource model were assayed at ALS Chemex</li> <li>Sample preparation: Pulverise Entire Sample</li> <li>Sample Digest: 4 acid digest</li> <li>Analytical procedure: ICP-AES</li> <li>Samples Analysed for: Ag. Al, Ca, Cu, Fe, Mn, Mo, S, Ti, V, Zn, U, Ni</li> </ul>

	Criteria	JORC Code explanation	Commentary
		(e.g. submarine nodules) may warrant disclosure of detailed information.	
	Drilling techniques	<ul> <li>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).</li> </ul>	<ul> <li>RC drilling used a 4.75" face sampling hammer bit. Diamond drilling was NQ-HQ and PQ bit sizes. Aircore drilling used an 89mm bit.</li> </ul>
	Drill sample recovery	<ul> <li>Method of recording and assessing core and chip sample recoveries and results assessed.</li> </ul>	<ul> <li>AC/RC recovery and meterage was assessed by comparing drill chip volumes (sample bags) for individual meters.</li> <li>Estimates of sample recoveries were recorded. Routine check for correct sample depths are undertaken every rod (3 or 6m)</li> </ul>
	5	<ul> <li>Measures taken to maximise sample recovery and ensure representative nature of the samples.</li> </ul>	AC/RC sample recoveries were visually checked for recovery, moisture and contamination. The cyclone was routinely cleaned ensuring no material build up.  Plus to the generally good drilling according to a provide the control of the control o
		<ul> <li>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.</li> </ul>	<ul> <li>Due to the generally good drilling conditions around the sample interval (dry) the geologist believes the samples are representative, some bias would occur in the advent of poor sample recovery (which was not seen). At depth there were some wet samples and these were recorded on geological logs.</li> </ul>
AF MAREA	Logging	<ul> <li>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.</li> <li>Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.</li> <li>The total length and percentage of the</li> </ul>	<ul> <li>Drill chip logging was completed on one metre intervals at the rig by the geologist. The log was made to standard logging descriptive sheets, and transferred into Micromine computer once back at the office.</li> <li>Logging was qualitative in nature.</li> </ul>
	Sub-sampling techniques and sample preparation	<ul> <li>relevant intersections logged.</li> <li>If core, whether cut or sawn and whether quarter, half or all core taken.</li> <li>If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.</li> </ul>	<ul> <li>AC/RC samples taken.</li> <li>AC/RC samples were collected from the drill rig by spearing each 1m collection bag and compiling a 4m composite sample. Single splits were automatically taken by emptying the bulk sample bag into a riffle splitter. Samples collected in mineralisation were nearly all dry.</li> <li>For Intermin samples, 4m composites were taken for the hole. Composite samples typically contained &gt;0.1 % V2O5, these</li> </ul>
		<ul> <li>For all sample types, the nature, quality and appropriateness of the sample</li> </ul>	were then individually picked up and dispatched to ALS (QLD). Samples were consistent size and weighed approximately 1.5-2.5 kg, it is common practice to review 1m results and then review sampling procedures to suit.

Criteria	JORC Code explanation	Commentary
	<ul> <li>preparation technique.</li> <li>Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.</li> <li>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.</li> <li>Whether sample sizes are appropriate to the grain size of the material being sampled.</li> </ul>	<ul> <li>ALS Laboratory supplied standard and duplicate QA/QC data. This was considered adequate.</li> <li>Mineralisation is located is strongly weathered, oxidised clays. The samples were typically homogenous being 1m width. The sample collection size is standard practice in the exploration industry.</li> </ul>
Quality of assay data and laboratory tests	<ul> <li>The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.</li> <li>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.</li> <li>Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.</li> </ul>	<ul> <li>The 1m and 4m composite samples were assayed using by a 4 acid digest and ICP-AES analysis by ALS Chemex (QLD)</li> <li>No geophysical assay tools were used.</li> <li>Laboratory QA/QC involves the use of internal lab standards using certified reference material, blanks, splits and replicates as part of the in-house procedures. QC results (blanks, duplicates, standards) were in line with commercial procedures, reproducibility and accuracy.</li> </ul>
Verification of sampling and assaying	<ul> <li>The verification of significant intersections by either independent or alternative company personnel.</li> <li>The use of twinned holes.</li> <li>Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.</li> <li>Discuss any adjustment to assay data.</li> </ul>	<ul> <li>Work was supervised by senior ALS staff experienced in metal assaying. Internal QC data reports confirm the sample quality.</li> <li>No twin holes undertaken. However several IRC were drilled close to several historic holes. The grade and thickness comparison was considered satisfactory.</li> <li>Data storage as PDF/XL files on company PC in Perth office.</li> <li>No data was adjusted.</li> </ul>

Criteria	JORC Code explanation	Commentary
Location of data points	<ul> <li>Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.</li> <li>Specification of the grid system used.</li> <li>Quality and adequacy of topographic control.</li> </ul>	<ul> <li>All drill collar locations were initially surveyed using a hand held Garmin GPS, accurate to within 2-4m. These holes were later surveyed more accurately using a RTK-GPS system by a contracted surveyor and data used in the Mineral Resource Estimate. Holes were drilled on a close grid in places and wider in less advanced areas. The grid system used is MGA94 Zone 54. All reported coordinates are referenced to this grid. Despite the flat topography, a terrain dtm was created, which based on historic survey stations.</li> <li>Grid MGA94 Zone 54.</li> <li>Topography is very flat, small differences in elevation between drill holes will have little effect on mineralisation widths on initial interpretation. The topographic surface has been generated by using the hole collar surveys. It is considered to be of sufficient quality to be valid for this stage of exploration.</li> </ul>
Data spacing and distribution	<ul> <li>Data spacing for reporting of Exploration Results.</li> <li>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.</li> <li>Whether sample compositing has been applied.</li> </ul>	<ul> <li>Holes were variably spaced, but typically around 400m to 2500m and were consistent in style with industry standard resource style drilling. Line spacings varied from 1000m to 10,000m</li> <li>The hole spacing was determined by Intermin to be sufficient when combined with confirmed historic drilling results to define mineralisation classified as JORC 2012 compliant as stated in the Resource Summary Table 1. The sample spacing and the appropriateness of each hole to be included to make up data points for a Mineral Resource has been determined. These assays are from 1m length sample intervals down hole.</li> </ul>
Orientation of data in relation to geological structure	<ul> <li>Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.</li> <li>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.</li> </ul>	<ul> <li>All IRC drill holes were vertically drilled to achieve an appropriate intercept. Drill logs and coquina content was also incorporated into the resource models. These issues are routine in exploration, true widths are often calculated depending upon the geometry. In this case the intercept width is very close to the true width (90-100%)</li> <li>The relationship between the drilling orientation and the orientation of mineralised structures is not considered to have introduced a sampling bias. Given the style of mineralisation and drill spacing/method, it is the most common method for delineating gold resources in Australia.</li> </ul>
Sample security	The measures taken to ensure sample security.	Samples were collected on site under supervision of the responsible geologist. The work sites are located on farmland.     Visitors need permission to visit the site and go onto private property. Once collected samples were cable tied and transported to Townsville for assaying.
Audits or reviews	The results of any audits or reviews of sampling techniques and data.	No Audits have been commissioned. Hawker Geological Services Pty Ltd has reviewed the sampling procedure and approved its use.

# **Section 2 Reporting of Exploration Results**

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	<ul> <li>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.</li> <li>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.</li> </ul>	<ul> <li>Intermin owns the mineral rights (oil shale and metal) to EPM's 26425, 26426, 25163, 25164, 25258. MDL522 is owned by Global Oil Shale, but the metal rights have been assigned to Intermin Resources Ltd.</li> <li>Intermin has entered into a joint venture with AXF Resources. Earn in conditions are shown in the Overview section of this release.</li> <li>The tenements are in good standing and no known impediments exist.</li> </ul>
Exploration done by other parties	<ul> <li>Acknowledgment and appraisal of exploration by other parties.</li> </ul>	<ul> <li>Previous workers in the area include Aquitane (1969), CSR (1983), CSIRO (1973), CRA (1991), Fimiston (1998).</li> </ul>
Geology	<ul> <li>Deposit type, geological setting and style of mineralisation.</li> </ul>	Cretacious, sedimentary Toolebuc formation
Drill hole Information	<ul> <li>A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:</li> </ul>	Not applicable however Intermin drilling results have all been released and reported to the ASX.
	<ul> <li>easting and northing of the drill hole collar</li> <li>elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar</li> <li>dip and azimuth of the hole</li> </ul>	
	<ul> <li>down hole length and interception depth</li> <li>hole length.</li> <li>If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the</li> </ul>	No information is excluded.

Criteria	JORC Code explanation	Commentary
	report, the Competent Person should clearly explain why this is the case.	
Data aggregation methods	<ul> <li>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.</li> </ul>	No weighting or averaging calculations were made, assays reported and compiled on the "first assay received" basis.
10	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	<ul> <li>Cut off grades were routinely applied and reported accordingly and used in the construction of all resource calculations.</li> <li>No metal equivalent calculations were applied.</li> </ul>
	<ul> <li>shown in detail.</li> <li>The assumptions used for any reporting of metal equivalent values should be clearly stated.</li> </ul>	
Relationship between mineralisation widths and intercept lengths	<ul> <li>These relationships are particularly important in the reporting of Exploration Results.</li> <li>If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.</li> <li>If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').</li> </ul>	<ul> <li>Oxide mineralisation is predominantly flat lying (blanket like) while fresher mineralisation at depth is interpreted to be gently dipping to the south. The V₂O₅ mineralisation is of a kilometric scale.</li> <li>Drill intercepts and true width appear to be very close to each other, or within reason allowing for the minimum intercept width of 1m. Intermin estimates that the true width is variable but probably close to 90-100% of the intercepted width.</li> <li>Given the nature of AC/RC drilling, the minimum width and assay is 1m. Diamond core is best used to determine cm scale mineralisation widths. True intercepts are not known however the downhole intercepts appear to represent very close to true width given the orientation of the vertical drilling and the flat stratigraphy.</li> </ul>
Diagrams	<ul> <li>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 drill hole collar locations and appropriate sectional views.</li> </ul>	Summary maps and figures have been included in this release to describe the locations and orientations of the Mineral Resource Estimates.
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	• For compilation of resource estimates all data is evaluated from the database to form the basis of mineralisation outlines which have been determined nominally $>0.1~\%~V_2O_5$ .

Criteria	JORC Code explanation	Commentary
	Exploration Results.	
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.	See details from previous ASX releases from Intermin Resources Limited (ASX IRC). These can be accessed via the internet.
Further work	<ul> <li>The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).</li> <li>Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.</li> </ul>	<ul> <li>Scoping or engineering studies have not yet been undertaken. Additional drilling, surveying and metallurgy is planned.</li> <li>Commercially sensitive.</li> </ul>

# Section 3 Estimation and Reporting of Mineral Resources

Criteria	JORC Code explanation	Commentary
Database integrity	<ul> <li>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.</li> <li>Data validation procedures used.</li> </ul>	<ul> <li>Field data has been collected using hand written logs. Historical drilling data has been captured from historical drill logs where available.</li> <li>The data is verified by company geologists before the data is transcribed into Micromine software and reviewed for accuracy against the planned details and validated using Micromine programs. The resource is based on a reasonable level of accuracy in the historical work, there have been several reports and independent due diligence and QA/QC studies that have lent credibility to the previous work.</li> </ul>
Site visits	<ul> <li>Comment on any site visits undertaken by the Competent Person and the outcome of those visits.</li> <li>If no site visits have been undertaken indicate why this is the case.</li> </ul>	<ul> <li>Company geologists have made numerous site visits to the project area to conduct the drilling for numerous drilling programs. David O'Farrell has visited the site and supervised while drilling programs have been undertaken. Inspections of procedures have been made throughout the Richmond exploration history. All procedures are deemed satisfactory.</li> <li>Not applicable</li> </ul>

Criteria	JORC Code explanation	Commentary
Geological interpretation	<ul> <li>Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.</li> <li>Nature of the data used and of any assumptions made.</li> <li>The effect, if any, of alternative interpretations on Mineral Resource estimation.</li> <li>The use of geology in guiding and controlling Mineral Resource estimation.</li> <li>The factors affecting continuity both of grade and geology.</li> </ul>	<ul> <li>The confidence in the geological interpretation is regarded as good, vanadium mineralisation is laterally continuous metal rich zones within the upper part of the weathering profile. The mineralisation horizon is typically defined by a 0.1% V<sub>2</sub>O<sub>5</sub> envelope which was then wireframed. Continuity between sections is considered reasonable and reliable.</li> <li>The data used to construct the geological model included was based on assay and geological data. This was imported into Micromine and converted to Surpac.</li> <li>The deposit consists of a flat dipping, horizontal lode. Infill drilling has supported and refined the historical model and the current interpretation is considered robust.</li> <li>Widespread drilling and geological mapping of old drill chips have supported the estimate.</li> <li>Infill drilling has confirmed geological and grade continuity.</li> </ul>
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.	• Four main vanadium resources occur at the Richmond project, all of these span several km's in length and width. The resource occurs between 5m to 50m depth. Individual vertical resource breakdowns on each resource using 10m spacings have been calculated. The resource is categorised as all inferred. The deposit is open along strike.
Estimation and modelling techniques	<ul> <li>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.</li> <li>The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.</li> <li>The assumptions made regarding recovery of by-products.</li> <li>Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).</li> </ul>	<ul> <li>Grade estimation using Ordinary Kriging (OK) and Inverse Distance squared (ID2) was completed using Surpac 6.6.2 modelling software for the resource interpolation. Drill grid spacing ranges is typically around 500-2500 metres.</li> <li>Drillhole sample data was flagged using domain codes generated from three dimensional mineralisation domains and then used to create the composite files. 1m assay composites were used. The influence of extreme grade outliers was not reduced by top-cutting. The top cut was reviewed using a combination of grade histograms, log probability plots and CV's. Wireframe domains were based on a 0.1 % V<sub>2</sub>O<sub>5</sub> mineralised envelope. The HGS OBM was compared to earlier Intermin (JORC2004) models and deemed satisfactory.</li> <li>V-Mo-Ni values were calculated. Several other metals are present also, but only in anomalous grades.</li> <li>Deleterious elements were not considered. Further metallurgical work is ongoing.</li> <li>There was strong correlation between metal variables.</li> <li>Geological interpretations were completed on grid lines. 3D wireframes where then constructed around these interpretations, creating 3 domains. In addition to these mineralised domains, a base of oxidation and top of fresh rock dtm was also created and used.</li> <li>No top grade cut was applied. Different models were viewed with little to no difference in global grade observed.</li> <li>No reconciliation data was available as all the resources are unmined.</li> </ul>

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	<ul> <li>the block size in relation to the average sample spacing and the search employed.</li> <li>Any assumptions behind modelling of selective mining units.</li> <li>Any assumptions about correlation between variables.</li> <li>Description of how the geological interpretation was used to control the resource estimates.</li> <li>Discussion of basis for using or not using grade cutting or capping.</li> <li>The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.</li> </ul>	
Moisture	Whether the tonnages are estimated or a dry basis or with natural moisture, and the method of determination of the moisture content.	retained. This specific gravity values is also consistent with industry standards for similar rock types.
Cut-off parameters	<ul> <li>The basis of the adopted cut-off grade(s or quality parameters applied.</li> </ul>	<ul> <li>The V-Mo-Ni mineral resources are reported inside the mineralisation wireframe that was constructed at a 0.1 % V<sub>2</sub>O<sub>5</sub> cut- off.</li> </ul>
Mining factors or assumptions	Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It 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.	

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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.	<ul> <li>No metallurgical assumptions are made. No satisfactory beneficiation and extraction process for the Richmond shale has been demonstrated. Metallurgical work is ongoing.</li> </ul>
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 greenfields 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.	<ul> <li>Environmental considerations have not yet been considered in detail given the early stage of the project. The project area has been cleared and the mining of the upper oxidised facie of the deposit could be to 15m depth in a seam style mining method.</li> <li>It is therefore assumed waste could be disposed in accordance with a site specific mine and rehabilitation plan similar to those in used in the Queensland coal industry.</li> </ul>
Bulk density	<ul> <li>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.</li> <li>The bulk density for bulk material must</li> </ul>	<ul> <li>Dry bulk density has been assumed. The basis for this was previous studies using 1.8 t/m3. This was believed to have been taken from some historic diamond core specific gravity measurements. The measurement method is not clear.</li> <li>Values for the oxide ore is 1.80 t/m3</li> </ul>

Criteria	JORC Code explanation	Commentary
Classification	<ul> <li>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.</li> <li>Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.</li> <li>The basis for the classification of the Mineral Resources into varying confidence categories.</li> <li>Whether appropriate account has been taken of all relevant factors (ie 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).</li> <li>Whether the result appropriately reflects the Competent Person's view of the deposit.</li> </ul>	<ul> <li>Mineral Resources have been classified on the basis of confidence in the geological and grade continuity using the drilling density, geological model, pass in which the gold was estimated and the distance to sample selections.</li> <li>All Richmond current resources are classified as JORC 2012 (Inferred). Overall the relative high drill density and number of holes defining a reasonably consistent ore zone(s), rather than ore type, plus the kilometric size is the main factor influencing the resource category.</li> <li>As described above the Mineral Resource classification has been based on the quality of the data collected (geology, survey and assay data) the density of the data, grade estimation quality and geological/mineralisation model.</li> <li>The reported resource estimates are consistent with the view of the deposits by the Competent Person.</li> </ul>
Audits or reviews	The results of any audits or reviews of Mineral Resource estimates.	<ul> <li>A review of the Andrew Hawker model has been carried out by David O'Farrell. The model is regarded sufficiently accurate for JORC guidelines and meets the criteria for an Inferred category. The analysis of the sections and wireframe validation, resource estimation methodology and validation is consistent with current day practices. A comparison with Intermins earlier JORC 2004 resource gave comparable results.</li> </ul>
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.	<ul> <li>The relative accuracy of the Mineral Resource Estimate is reflected in the reporting of the Mineral Resource as per the guideline of the 2012 JORC code. The classification is supported by a sound understanding of the geology of the deposit, the drill hole spacing, historic drill data and a reasonable dataset supporting the density used in the resource model. Both competent persons (Andrew Hawker and David O'Farrell) have over 20 years' experience.</li> <li>The statement relates to the global estimate of tonnes and grade.</li> <li>No historical production has occurred on the Richmond EPM's</li> </ul>

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	<ul> <li>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.</li> <li>Documentation should include assumptions made and the procedures used.</li> </ul>	
10	<ul> <li>These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.</li> </ul>	