

## WORLD-LEADING KILN SUPPLIER TO CONDUCT VANADIUM PILOT ROAST WORK FOR AVL

*AVL's vanadium roast pilot to be undertaken at Metso's Danville, Pennsylvania facilities in the USA.*

### KEY POINTS

- DFS bench-scale pelletised roasting tests have shown a substantial increase in vanadium extraction, averaging 95.4% compared to standard rotary kiln extractions of 85-88% considered in the PFS.
- The Metso Grate Kiln is an efficient, low risk and proven technology for pelletising iron ore in global use that can be adapted for salt roasting.
- The pyrometallurgical roasting process uses a travelling grate and dramatically improves processing efficiency.
- The proposed use of pelletised roasting technology distinguishes AVL and offers significant benefits to the project.
- Pilot testing will commence in October at Metso's pyrometallurgical testing facilities in the USA upon completion of the magnetic concentrate pilot in Perth.

Australian Vanadium Limited (ASX: AVL, "the Company" or "AVL") is pleased to announce the selection of Metso Corporation ("Metso") for the next phase of Definitive Feasibility Study pilot testing. Metso is a world-leading industrial company offering equipment and services for the sustainable processing of natural resources in the mining and process industries and was chosen because of its world-renowned expertise in Grate Kiln (GK) processing solutions.

AVL and Metso are committed to working together to develop an improved thermal processing solution involving pelletising of the vanadium rich iron concentrate produced at the Australian Vanadium Project. The solution will involve pelletizing the concentrate and processing it through a GK system. Pelletising has been used previously in Europe and China for the processing of primary Vanadium-Titanium-Iron ores. The benefits of pelletizing include:

- improved roasting reaction;
- minimal dusting; and
- reduced build-up of residues within the kiln.

Bench-scale tests have already been completed by AVL on its pelletised vanadium rich iron concentrate (see Figure 1) and have confirmed that pelletised concentrate roasting offers a substantial advantage to the traditional rotary kiln technology currently employed by all primary vanadium producers. AVL's pelletised roasting tests have shown vanadium extraction results averaging 95.4%, versus a rotary kiln extraction of 85-88%, which is typical of standard vanadium roasting technologies<sup>1</sup>.

<sup>1</sup> see ASX announcement dated 28<sup>th</sup> May 2019 'High Purity Vanadium Pentoxide Produced



*Figure 1: Vanadium rich iron concentrate pellets produced during bench-scale roast testing*

The next phase calls for pilot scale testing to simulate and optimize the GK process. The GK system is a combination of a travelling grate furnace for pre-processing with a rotary kiln for final roasting. The feed concentrate is formed into pellets of a particular size that are well-suited for the process. The pellets are then loaded onto the traveling grate and pass through multiple furnace heating zones where progressively hotter and hotter gases from the kiln are forced through the bed of pellets. This process accomplishes gradual and controlled drying and preheating of the pellets while recouping much of the energy from the hot kiln exhaust gases. The rotary kiln is then dedicated to the final roasting of the pellets after they've been dried and preheated and can be controlled independently to achieve thermal profiles which result in higher levels of vanadium extraction. Although the GK technology is more commonly used for indurating iron ore pellets, it has also been successfully applied to similar roasting applications because of its unique ability to improve upon conventional rotary kiln processing. The pilot scale testing will be conducted at Metso's Pyro Technology laboratory located in Danville, Pennsylvania, USA, where over 120 GK testing programs have previously been performed.

Todd Richardson, AVL's Chief Operating Officer comments, "Vanadium roasting technology has not changed much since the 1930s, when cement kiln technology was adapted for salt roasting vanadium bearing ores. Since that time, the technology has gone largely unchanged. By partnering with Metso, a world leader in pyrometallurgical processing, AVL is confident that the roasting process can be greatly improved.

Industry standard vanadium extraction is 87% in roasting, but AVL test work shows that much higher recoveries are possible by applying newer roasting technologies. Recovering these lost vanadium units has a large impact on project economics."

Managing Director, Vincent Algar adds, ‘The grate kiln offers a unique roasting option for vanadium, which has traditionally been undertaken almost exclusively in a rotary kiln. Use of this technology distinguishes AVL from other companies developing vanadium projects and holds promise to make a significant improvement to our vanadium processing through higher vanadium recoveries and more efficient roasting in general. The use of Metso’s grate kiln technology and expertise provides us with a crucial competitive advantage.’

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## CURRENT PROJECTS

Projects by Australian Vanadium Limited

### The Australian Vanadium Project

Vanadium

### Nowthanna Hill

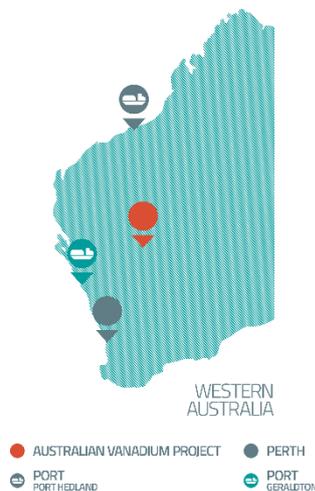
Uranium/Vanadium

### Coates

Vanadium

### Blesberg, South Africa

Feldspar



## COMPETENT PERSON STATEMENT – METALLURGICAL RESULTS

The information in this announcement that relates to Metallurgical Results is based on information compiled by independent consulting metallurgist Brian McNab (CP. B.Sc Extractive Metallurgy). Mr McNab is a Member of AusIMM. 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 JORC 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr McNab consents to the inclusion in the announcement of the matters based on the information made available to him, in the form and context in which it appears.