

# Scandium International Receives Two Patent Grants Relating to Scandium Recovery and Scandium Master Alloy Manufacturing

May 20, 2021 (Source) – Scandium International Mining Corp. (TSX:SCY) (“Scandium International” or the “Company”) received notice of two separate patent grants from the US Patent Office in late April 2021, pertaining to work done by the Company to reserve rights in the recovery of scandium from copper raffinate solutions via ion exchange techniques, and to reserve rights in the manufacture of aluminum-scandium master alloys via these defined techniques. Both of these patent grants are directly applicable to processes and projects the Company is currently engaged in, with the intent to produce scandium products for use in both aluminum alloys and other technical applications.

## **HIGHLIGHTS – “Extraction of Scandium Values from Copper Leach Solutions,”**

- Patent Number 10,988,828, granted April 27, 2021.
- Defines methods for recovering scandium from copper mine acidic solutions.
- Tailored specifically to oxide copper heap leach solvent extraction (SX) raffinates.
- Specifically employs ion-exchange technologies, pre or post copper recovery.

## **HIGHLIGHTS – “Scandium Master Alloy Production.”**

- Patent Number 10,988,830, granted April 27, 2021.
- Defines methods for manufacturing aluminum-scandium

master alloy (2%).

- Identifies a two-flux system, containing a fluoride and an alkali metal chloride.
- Allows for a rare earth element oxide addition, if desired.
- Further allows for other critical metal additions to master alloys, where those are demanded as metal additions in the final aluminum alloy.

**George Putnam, CEO of Scandium International Mining Corp. commented:**

“These patent grants add to our suite of patent protections, designed to give SCY a competitive advantage in critical metals recovery. The scandium ion exchange recovery patent grant meets a technical milestone for recovery of scandium from copper solutions. The unique master alloy production methods grant can be applied to enhance our scandium product offering for any of our potential scandium-source projects.”

#### **DISCUSSION:**

The Company announced in May 2020 that it was immediately focusing on critical metals recovery (“**CMR**”) from acid leachate solutions common to oxide copper recovery plants, initially in the USA. Two provisional patent applications were in place at the time of that public announcement, specific to copper systems and an entire suite of critical metals. This 2021 grant is the first of the two filings, and is specific to scandium.

The other pending final application is more encompassing with regard to metals targets identified and covered, including nickel, cobalt, copper, zinc, manganese, beryllium, aluminum, rhenium and scandium (and others), together with various recovery methods based on both ion exchange and solvent extraction methods. This broader patent application specifically covers copper systems where sulfuric acid

leachates are present, but has been expanded to also cover similar leachate solutions in primary lithium, vanadium, and nickel systems. The pending patent application is titled “Recovery of Critical Metals from SX-EW Copper Raffinate and other Solutions Derived from Leaching Ores with Sulfuric Acid.”

The scandium master alloy patent granted in April 2021 is a companion patent to an earlier master alloy patent granted to W. P. C. Duyvesteyn in 2018, and assigned to the Company. This patent was initially filed as a provisional application in 2015, granted in 2018 (US Patent number 10,450,634), titled “Scandium-Containing Master Alloy and Method for Making the Same.” The patent claimed capability for master alloy production from various scandium precursors (such as oxalates), defined processes by which either aluminum or magnesium master alloys could be made, and defined processes for manufacture. This patent also claimed capability to make aluminum or magnesium alloys containing scandium with direct additions of scandium precursors.

The 2021 patent grant goes further into aluminum-scandium master alloy production, is based on bench scale test work done by SCY and is supported by success achieved in those test programs. Specific test work results confirmed achievement of 2% scandium content in master alloy, at commercially acceptable recovery levels.

A third master alloy patent application remains under review by the US patent office, titled “Direct Scandium Alloying,” which employs a novel approach to fusing ground scandium oxide together with halides (fluorides) and chloride salts in a casting, which can be directly introduced into an aluminum or magnesium melt to manufacture final alloys. This alternative manufacture of direct scandium-containing flux/oxide additions avoids the high temperature processing and gas stirring that comes with traditional master alloy manufacture. This non-conventional product form for introducing scandium into

aluminum promises advantages in alloy production as well, with minimal stirring, no gas injection requirement, faster process times, and potentially improved recovery rates, from oxide to scandium in alloy.

Our sincere thanks are offered to the late Dr. Nigel J. Ricketts, a former member of the SCY technical team and the author and named inventor on both the 2021 granted master alloy patent and the remaining master alloy patent application discussed in this news release.

All of these patent grants and patent pending applications have direct use in projects the Company is currently considering. Our previous patent grants relating to flowsheet design for the Nyngan Scandium Project, (NSW, AUSTRALIA), regarding high pressure acid leaching and solvent extraction processes, remain relevant to that project today. In fact, the three patent grants we have on segments of Nyngan plant process have spawned other applications on ore leaching, which then guided us to CMR and solution-based extraction of scandium, and immediately also to other metals present in those same leachates. Our work on scandium master alloys began with initial studies in 2011 with the CSIRO in Australia, and has progressed to a capability to add product value to our scandium production sources, wherever we can develop them, globally.

Most importantly, our work on solution separation technologies using ion exchange and/or solvent extraction has widened our opportunity to pursue recovery of a suite of battery metals, along with a significant segment of the growing list of critical metals, as defined by governments, concerned customers, and industry groups.

#### **ABOUT SCANDIUM INTERNATIONAL MINING CORP.**

The Company is focused on developing its Nyngan Scandium Project, located in NSW, Australia, into the world's first

scandium-only producing mine. The Company filed a NI 43-101 technical report in May 2016, titled **“Feasibility Study – Nyngan Scandium Project.”** The project has received all key approvals, including a development consent and a mining lease, necessary to proceed with project construction.

The company is also currently discussing CMR opportunities with various copper industry groups, where we propose to employ ion-exchange technology to extract unrecovered critical metals from existing mine process streams. This program represents a fast-track concept to make battery-grade nickel and cobalt products, scandium master-alloy product, and other critical metals, from North American sources.

Willem Duyvesteyn, MSc, AIME, CIM, a Director and CTO of the Company, is a qualified person for the purposes of NI 43-101 and has reviewed and approved the technical content of this press release on behalf of the Company.

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*This press release contains forward-looking statements about the Company and its business. Forward looking statements are statements that are not historical facts and include, but are not limited to statements regarding any future development of the project. The forward-looking statements in this press release are subject to various risks, uncertainties and other factors that could cause the Company’s actual results or achievements to differ materially from those expressed in or implied by forward looking statements. These risks,*

*uncertainties and other factors include, without limitation: risks related to uncertainty in the demand for scandium, the possibility that results of test work will not fulfill expectations, or not realize the perceived market utilization and potential of scandium sources that may be developed for sale by the Company. Forward-looking statements are based on the beliefs, opinions and expectations of the Company's management at the time they are made, and other than as required by applicable securities laws, the Company does not assume any obligation to update its forward-looking statements if those beliefs, opinions or expectations, or other circumstances, should change.*