

# VanadiumCorp is on the board and back in the news again.

As we head into Christmas the big news of the year, especially the last few months would have to be vanadium. Soaring prices and demand particularly in China through new standards on construction has caused the vanadium price to rise about 3 fold in 2018, currently at US\$27.50/lb (China spot).

VanadiumCorp Resource Inc. (TSXV: VRB) is back in the news and have announced, alongside Electrochem Technologies & Materials Inc., that Ultra Power Systems Pty Ltd. have signed a Patent Option Agreement (POA) to purchase an exclusive license, of the VanadiumCorp-Electrochem Processing Technology (VEPT). VEPT describes a novel chemical process that addresses the recovery of vanadium, iron, titanium, and silica feedstock's.

Ultra Power Systems plans to utilize the Australian license of VanadiumCorp-Electrochem Processing Technology to expedite construction of the world's first dedicated vanadium processing facility in Australia. Ultra's core objective is to directly integrate low-cost battery grade vanadium electrolyte into vanadium redox batteries from virtually any source in a fraction of the time and capital requirements of current vanadium extraction processes. The VEPT dramatically reduces emissions associated with vanadium extraction as well as substantially offsetting the operating cost through the production of valuable by-products. The resultant vanadium electrolyte has a minimal carbon footprint, is significantly cheaper, and offers an exceedingly lengthy usage life.

Adriaan Bakker, CEO of VanadiumCorp stated: "This agreement represents a new chapter for VanadiumCorp with the benefit of cash flow and a realistic commercialization pathway for VanadiumCorp and Electrochem's jointly developed green processing technology. Our vision to establish the most

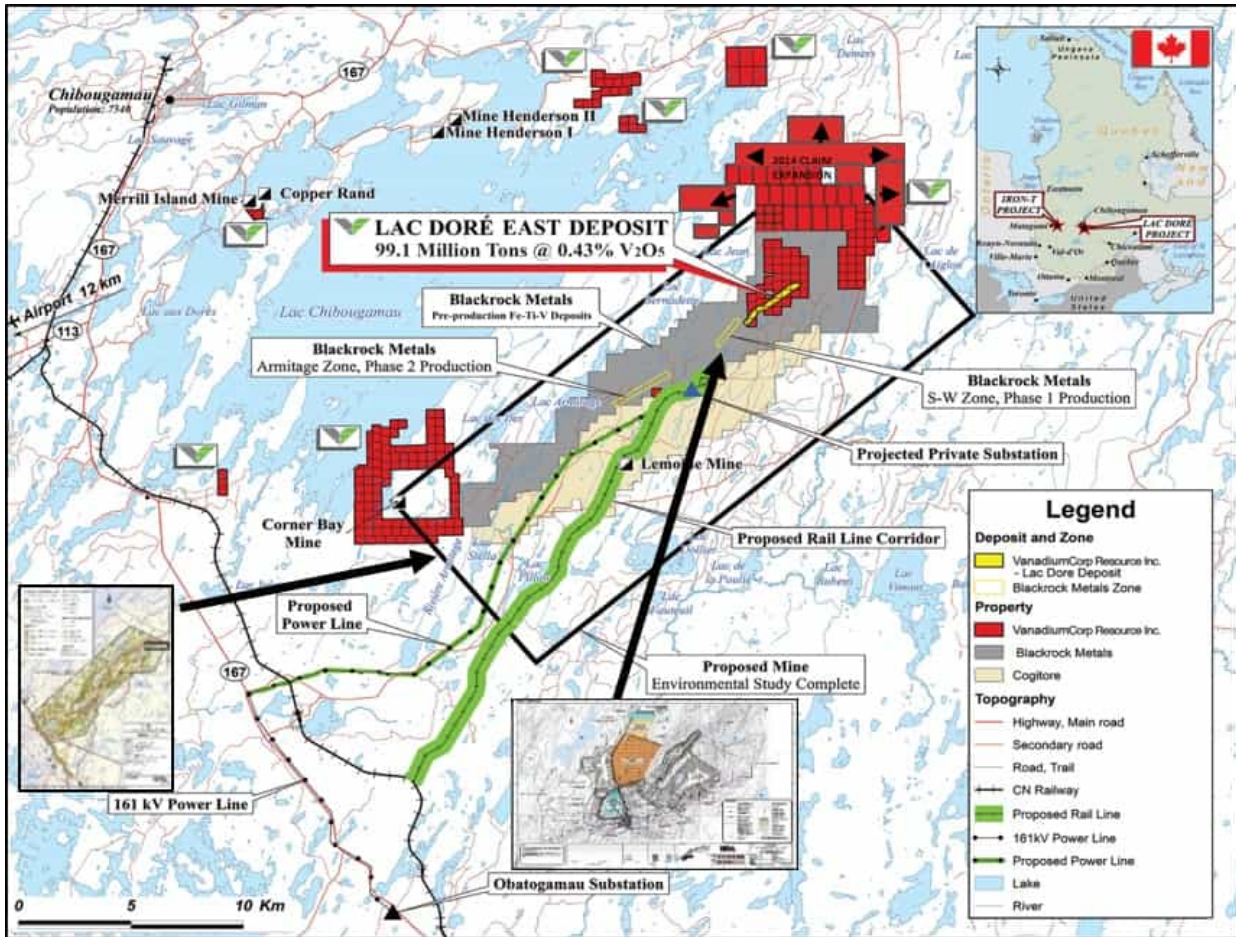
efficient and sustainable solution for energy storage is within reach years sooner than anticipated.”

Francois Cardarelli, President of Electrochem Technologies & Materials Inc., continued: “This Patent Option Agreement is in line with our corporate strategy to monetize our patents that will require large-scale operations.”

This fully executed agreement was signed on November 23 by all parties involved and includes a 6 month option to acquire the exclusive license of VEPT for the jurisdiction of Australia. License terms exercisable in the POA includes a minimum annual payment, financing fees, and a gross royalty due upon production, applicable to all vanadium products, ferrous sulphate heptahydrate (copperas), titanium products, and other by-products for a project duration of 25 years.

### **VanadiumCorp’s flagship Lac Dore’ project**

VanadiumCorp intends to become the leading vanadium supplier to the emerging vanadium battery market for grid level and renewable energy storage. The Company’s 100% owned flagship Lac Dore’ project spans over 45 km<sup>2</sup> and is located 35 km from the mining center of Chibougamau, Quebec, Canada. Mineralisation is accessible at surface and confirmed by the largest geophysical footprint in the region. VanadiumCorp’s current NI 43-101 vanadium resource measures 621 million lbs V2O5 from VTM concentrate grading 1.08% V2O5.



With a partnered patented processing technology and a good size/grade resource in a safe location, VanadiumCorp has so much potential in the vanadium space. The demand for vanadium with its steel hardening properties and use in redox flow batteries can only continue to grow.

VanadiumCorp is set to resume trading today, now that the cease trade order has been revoked. Given the spectacular rise of vanadium the past 6 months it will be interesting to see what the stock does once trading again.

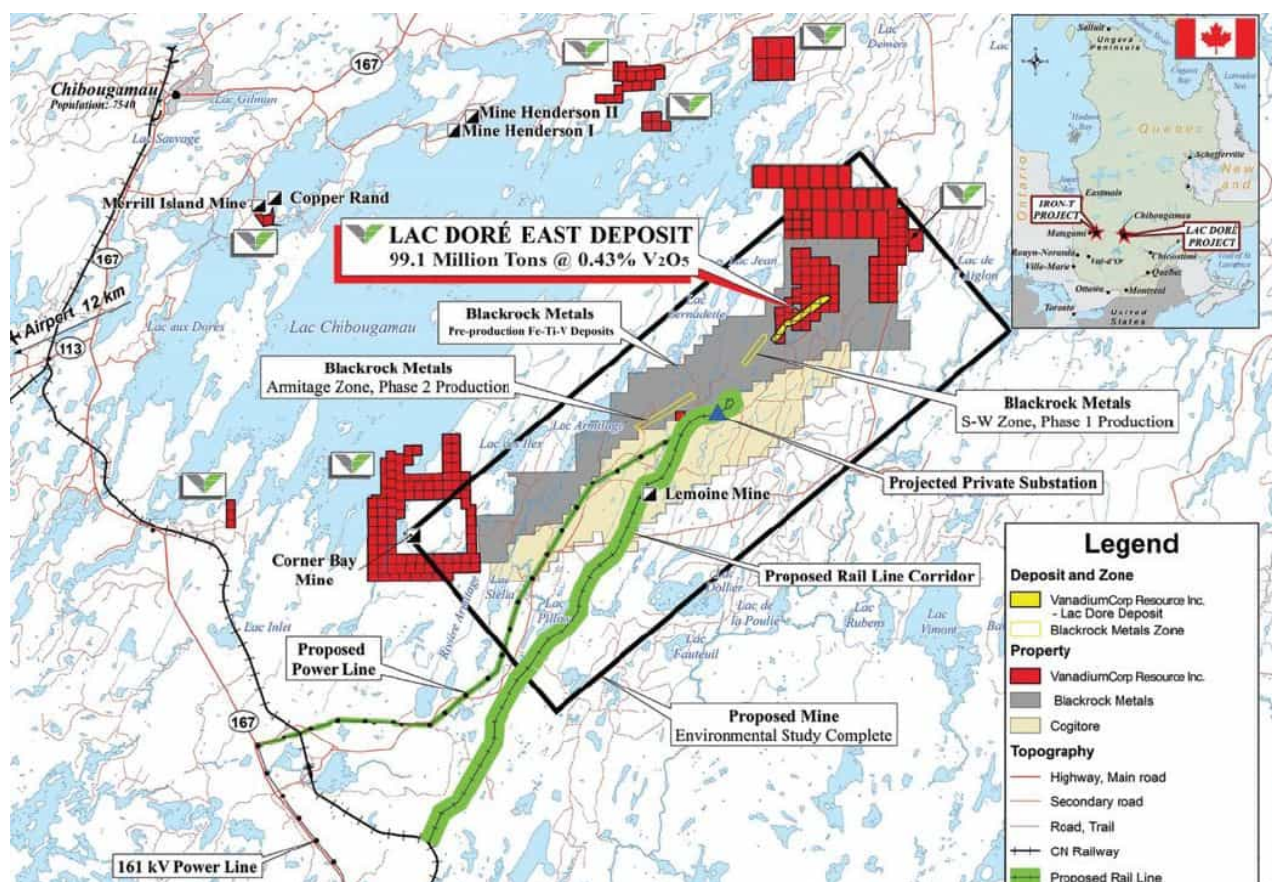
**New processing technology**

# recovers 95%+ of VanadiumCorp's metal value

VanadiumCorp Resource Inc. (TSXV: VRB) 100% owns the Lac Dore Vanadium-Iron-Titanium project in Quebec, Canada. The Company also has another smaller project known as the Iron-T Vanadium Project also in Quebec, and royalties on the Raglan Nickel-PGM mine.

The Company is looking to take a vertically integrated approach. They are also developing leading process technologies 'VanadiumCorp-Electrochem Processing Technology' and 'Electrochem globally patented Electrowinning' technology.

The Lac Dore project spans over 45<sup>2</sup> km as shown below.



Lac Dore location map

The NI 43-101 vanadium resource estimate is 99.1Mt @ 0.43%



$V_2O_5$  (Inferred), or 1.08%  $V_2O_5$  in magnetite concentrate. Mineralization is at surface and open at depth and along strike. The contained vanadium resource is 282,370 tonnes  $V_2O_5$  in magnetite concentrate. Vanadium recovery from magnetite concentrate is 95% indicating favorable metallurgy.

VanadiumCorp's 100% owned Vanadiferous titanomagnetite ('VTM') resource at the Lac Dore Project represents ideal feed stock for the new carbon free and efficient process developed by VanadiumCorp & Electrochem. Of significance, the conventional primary process recovery from magnetite concentrate averages 1.0%  $V_2O_5$ , and the new process recovers 95%+ of ALL metal value including titanium and iron. Clearly this is very helpful towards the project's economics.



Adriaan Bakker, CEO of VanadiumCorp states, "The advantage of monetizing all three metals from VTM provides a distinct advantage for our 100% owned VTM resources in Quebec and joint licensing opportunity of the technologies worldwide. Our collaboration with Electrochem first began by addressing the industry need for a better process method for vanadium electrolyte. Utilizing a custom reactor and combining technologies, Phase II testing and trial production subsequently confirmed the ability to process magnetite regardless of origin and various feed stocks that many companies had considered waste until now."

The November 2017 PEA resulted in an after-tax Net Present Value (NPV) of C\$814M, post inflation but not discounted. The after-tax Internal Rate of Return (IRR) is 15.42%. Life of

Mine (LOM) is 20 years, requiring 64% of the presently known inferred resources with an after-tax payback period of 6 years after start-up. CapEx is estimated at C\$321m. The Company plans re-filing an amended PEA technical report for its Lac Dore Project by early June 2018.

The Lac Dore project is close to all infrastructure (road, rail, 161Kv power, workforce, water, and airport). It is also close to the mining town of Chibougamau, located in mining friendly Quebec, Canada.

Near term catalysts include the amended PEA, further developments with Ultra Power Systems Limited to pursue the joint interest of commercializing and deploying Vanadium Redox Flow Batteries (VRFB) for microgrid applications. Other possible catalysts would include any off-take announcements or project financing as well as any licensing agreements.

Market Cap is currently C\$23m. The resource size is good, with exploration upside and the PEA is currently being amended. For now the market is not really giving any value for their patented technology, which once proven successful at scale will add significant value.

In conclusion, VanadiumCorp has an excellent growing resource in the safe and mining friendly jurisdiction of Quebec Canada. Additionally, VanadiumCorp offers a new processing technology that recovers 95%+ of all the metal value in their ore, and has potential for licensing revenues. All eyes will be on the updated PEA to be out very soon.

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# VanadiumCorp sets sights on Battery Revolution

A number of operations worldwide are currently striving to achieve primary vanadium supply in order to, in part, meet the needs of the growing market for vanadium redox flow batteries (VRBs). The technology enables vastly greater energy capacity for industrial and grid storage applications over conventional lithium ion setups, yet the electrolytic solution on which they rely is prohibitively expensive to produce, currently comprising almost half of the cost of a battery unit. The world is in waiting for a method of mass-producing this vanadium-bearing liquid as the need for increasingly large grid energy storage systems continues to climb.

VanadiumCorp Resource Inc. (TSXV: VRB) (“VanadiumCorp”) is working on a proprietary breakthrough process which can manufacture vanadium electrolyte solutions with unprecedented efficiency and cost-effectiveness, and with 100% ownership of two of the purest vanadium deposits in the world, the company potentially represents a complete solution, even having the inventor of the VRB, Dr. Maria Skyllas-Kazacos, on the team serving as a scientific advisor. Dr. Skyllas-Kazacos filed the first patent for an all-vanadium battery technology back in 1986, so her involvement in the project inspires great confidence.

VanadiumCorp is working with industrial electrochemists, Electrochem Technologies & Materials Inc, to finalise a process that converts the primary concentrate, vanadiferous titanomagnetite (VTM), into a useable vanadium electrolyte (VE) without the need for slagging, smelting or roasting. This significantly lowers the cost of VE production as well as entirely eliminating greenhouse gas emissions due to the fact that the process is electrochemical. Furthermore, since the project is located in Quebec, it has access to cheap Canadian

hydroelectricity to boot.

The company has the ability to produce a great VTM product from its two mining operations currently in development, and is already issuing samples of its VE solution to prospective customers. In fact, the flagship resource, Lac Dore, is a former Quebec government project which managed to achieve a 99.9% pure VE solution via a pilot plant operation in 2002; the groundwork has already been laid, and VanadiumCorp plans to construct a pilot plant of its own this year, which would be a major step towards full commercialisation of the company's pioneering technology.

China produces around 58% of the global vanadium supply, but this is mostly as a co-product from Chinese steel mills. If VRB technologies are to become popular, the world will need many additional producers to come online, and while some primary sources currently exist, none have so far managed to create an economical method of mass-producing battery-grade vanadium electrolytic solutions. VanadiumCorp is the leading entity in this regard, having a real chance of gaining a stranglehold on an emerging market.

Demand for vanadium in traditional applications is projected to grow at a CAGR of 6% per year through 2020 as a result of growth rates in global steel production and ongoing substitution of manganese steel with vanadium bearing steels, but energy storage applications have the potential to increase global vanadium consumption by more than 27,000 MTV per year, or more than 30% of the current market, by 2020.

At the same time as supply deficits are beginning to emerge, the number of uses for vanadium continues to climb. No doubt the market will respond and fill the gaps, but VanadiumCorp may be the only company able to provide the solution necessary to make all-vanadium battery technologies a reality. Keep an eye on this team, they may be quite disruptive.