

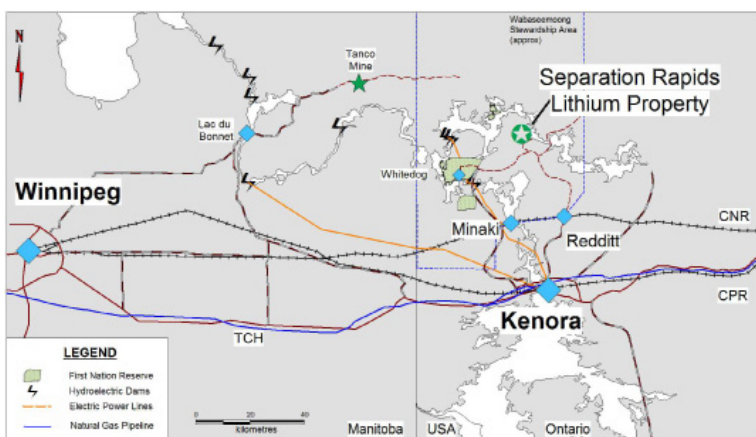
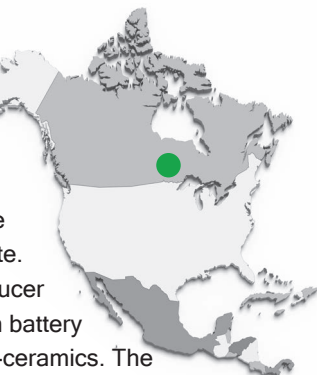
# SEPARATION RAPIDS LITHIUM PROJECT

*A unique, giant deposit of the rare lithium mineral petalite*

*As at June 13, 2017*

## Project Overview

The 100% owned Separation Rapids property is host to one of the largest “complex-type” lithium-cesium-tantalum pegmatite deposits in the world, unusual in its enrichment in the rare, high purity lithium mineral petalite. Separation Rapids is a potential producer of lithium chemicals for the lithium ion battery market and lithium minerals for glass-ceramics. The property is situated close to road, rail and power infrastructure approximately 70 km north of Kenora, Ontario, Canada.



## Potential Products

- High purity lithium compounds for batteries (lithium hydroxide and/or lithium carbonate)
- Lithium mineral (petalite) concentrates for glass-ceramics
- By-products rubidium, tantalum, cesium, high-purity silica and feldspars

## Development Stage

Originally drilled in 1997-2001 and Pre-Feasibility Study on lithium mineral production for glass-ceramics completed in 2000. Preliminary Economic Assessment on producing lithium hydroxide from petalite completed September 2016. Now at pilot plant stage, preparing for construction of a 50,000tpy demonstration plant in 2017-18. Approximately \$10 million has been invested in the property to date.

## Strategy

- Product design:** Working with customers to create the best quality products to serve their needs at attractive prices
- Innovative metallurgy:** Designing an efficient process to produce the best quality product at the lowest cost
- Staged development:** Start with a demonstration plant to prove process and scale up after products are optimized
- Minimizing environmental impacts:** Recycling of reagents and creating markets for by-products
- Sustainable development:** Utilize renewable energy and maximize use of the ore body

## Next Steps

### 2017-18

- Identify customers for lithium chemical products
- Piloting lithium mineral flotation flowsheets and lithium chemicals production processes
- Continue glass-ceramics market development
- Define potential by-products
- Drilling and exploration to increase mineral resources
- Upgrade access road
- Complete new Technical Report
- Establish 50,000tpy demonstration plant to generate products and serve as interim small-scale production facility
- Complete engineering and Feasibility Study

### 2019-20

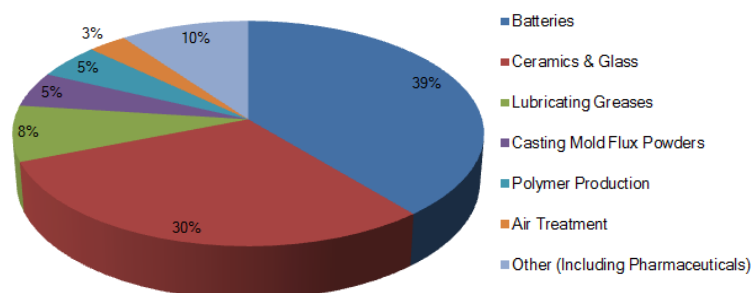
- Production scale-up

### 2020-21

- Begin full scale commercial operations

*Please note that the projected timeline is reliant on a positive Feasibility Study as well as offtake commitments, project financing, and timely receipt of all permits and environmental approvals.*

## Lithium Demand by Application



## Strategic Advantages

- High purity makes petalite amenable both for production of high purity lithium battery materials and for sale as an industrial mineral for glass-ceramics manufacturing
- Deposit also contains lithium micas, including lepidolite, which can be concentrated separately for production of battery grade lithium carbonate (not considered in PEA model)
- Large Resource: 8.0 million tonnes Measured & Indicated at 1.29% Li<sub>2</sub>O and 1.63 million tonnes Inferred at 1.42% Li<sub>2</sub>O, open for expansion laterally and to depth\*
- Potential for multiple by-products (feldspars, silica, tantalum, rubidium, cesium)
- Minimal environmental footprint, no hazardous waste materials
- Proximity to transportation, hydro power and community infrastructure

*\*Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the Mineral Resource will be converted into Mineral Reserves.*

**Purple lepidolite with K-feldspar. Lepidolite is known for its high lithium content.**



For more information:

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## 2016 PEA Development Concept

The 2016 PEA development concept is an open pit mine, potentially transitioning to underground mining in later years; with milling onsite to produce a lithium mineral concentrate and by-product feldspar. The lithium mineral concentrate would then be processed in a hydrometallurgical plant (presently contemplated for Kenora) to produce lithium hydroxide for the battery industry or sold directly into the ceramics industry. The current mineral resource\* would support an average mining rate of 950,000tpy yielding average annual production of 14,600 tonnes of lithium hydroxide for 10 years and 100,000tpy of feldspar mineral concentrate.

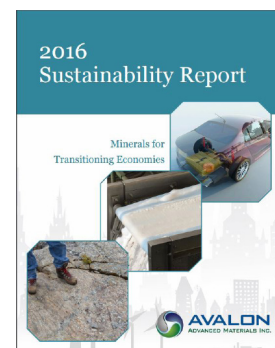
### Highlights of the PEA discounted cash flow analysis include:

- 19% IRR on a pre-tax basis and a 16% IRR on an after-tax basis, assuming 100% equity financing. The project NPV at an 8% discount rate is CAD\$343 million pre-tax and CAD\$228 million after-tax.
- Total CAPEX estimated at \$514 million, inclusive of \$86 million in contingencies and \$7 million in sustaining capital. This includes the mine, concentrator and a hydromet plant assumed to be in Kenora. The hydromet plant accounts for approximately 50% of the total CAPEX estimate.
- The average cost to produce lithium hydroxide was estimated at US\$4900/tonne versus a price assumption of US\$11,000/tonne. The CAD:USD exchange rate assumption was US\$1.00 = CDN\$1.30.

*Note the PEA is preliminary, includes inferred mineral resources considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the preliminary economic assessment will be realized.*

## Sustainability Reporting

At Avalon, sustainability means adopting leading industry standards for the management of health, safety and the environment, and engagement with local communities. In November 2016, Avalon released its fifth Sustainability Report in accordance with GRI G4 and MAC TSM standards. The full report can be downloaded from Avalon's website.



The technical information contained in this document has been reviewed and approved by Don Bubar, P.Geo. (ON), President & CEO, Avalon Advanced Materials, the qualified person for the purposes of National Instrument 43-101; the metallurgical information contained in this document has been reviewed and approved by David Marsh, FAusIMM (CP), Senior Vice President, Metallurgy and Technology Development of Avalon, the qualified person for the purposes of National Instrument 43-101.

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