



AVALON
ADVANCED MATERIALS INC.

CRITICAL MINERALS FOR A SUSTAINABLE FUTURE

An Emerging Canadian Producer of Technology Metals: Lithium

February 2021

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President & CEO

TSX: AVL
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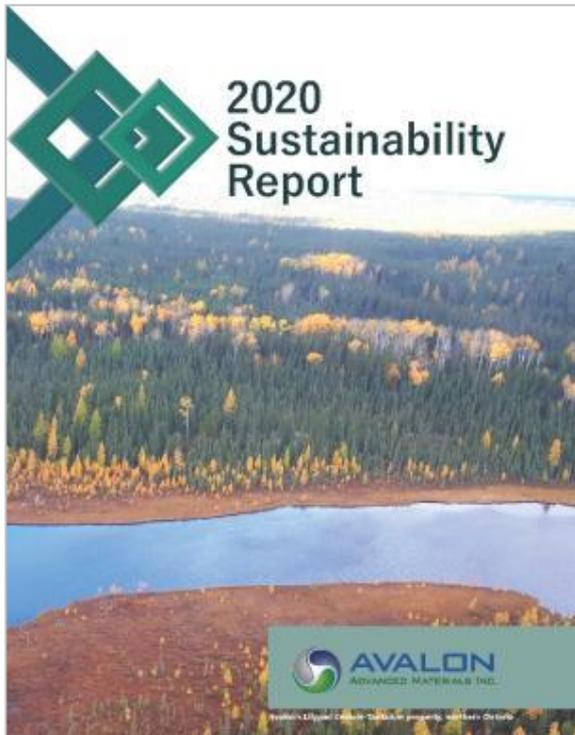


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Avalon Advanced Materials: Corporate Info



- › Toronto-based, operating in Canada since 1995
- › Listed: TSX (AVL), OTCQB (AVLNF), Frankfurt (OU5)
- › Market Cap: CAD\$110m (348m S/O, 381m fully-diluted) with over 20,000 shareholders worldwide
- › Working Capital: CAD \$3.5 million

Sustainability: committed to environmentally and socially responsible mineral resource development

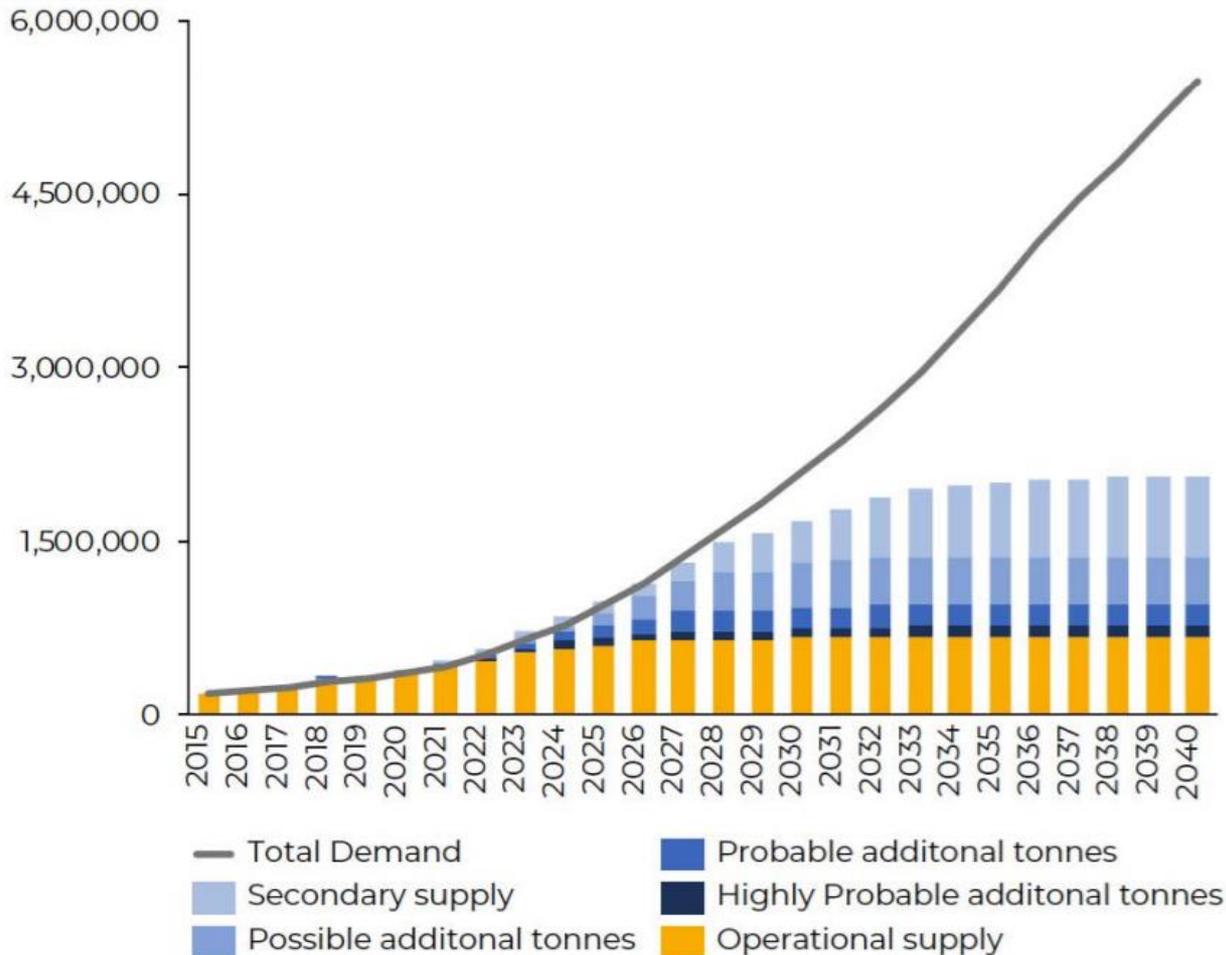
- › Avalon's 9th annual GRI compliant Sustainability Report released November 2020 - addresses GRI framework, UN 17 SDGs and MAC's TSM
- › Engaged Sustainalytics to audit Avalon's business practices and policies to obtain an ESG risk rating licence

Aligns Avalon's operating philosophy with its cleantech customers and reduces social licence risk

Avalon is a leader in the implementation of sustainability in mineral development

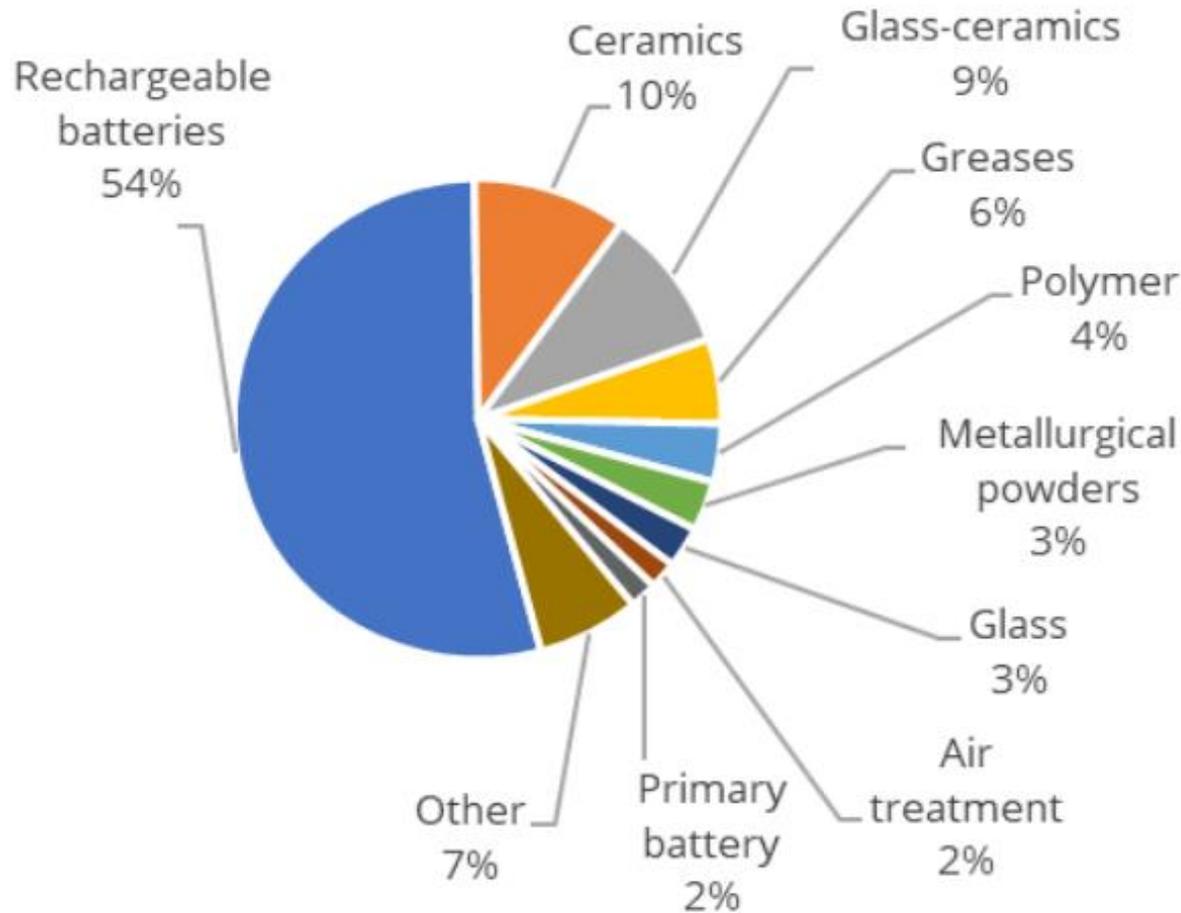
- › Focused on the supply of the critical materials that enable clean technology, such as:
 - renewable energy (tin, indium, REE)
 - energy storage (lithium, tin)
 - electric vehicle motors (REE)
 - space technology, drilling fluids (cesium)
- › Excellent track record for Indigenous community engagement and project participation
- › Sustainability principles fully integrated into corporate culture at all levels
- › Project development philosophy: staged approach to minimize environmental footprint and reduce risk
- › Management team well-experienced in social, environmental best practice and health and safety

Lithium Demand forecast to 2040



Lithium Demand by Application (2019):

Batteries dominate with demand growing rapidly, but ceramics and glass and ceramics remain major markets that are also growing.



Advanced Ceramics Industry (US)

IBIS World, April 2020

- › Ceramics Industry Revenue: \$2.6 billion; advanced ceramics products account for 37% of total industry revenues
 - IBISWorld expects industry revenue to increase at an annualized rate of 1.5% to \$2.8 billion by 2025
- › Ceramics are one of three broad classes of materials used to produce **almost every product available today** (with metals and polymers)
- › **No viable substitutes** for applications that require semi-conductive properties or resistance to extreme heat, corrosion
- › Advanced ceramic components vital in aerospace, electronic and defence technology products
- › Increased demand expected to be supported by high-tech and innovative markets, such as semi-conductor and circuit manufacturing
 - CoorsTek Inc. plans to build a \$120m R&D facility for advanced ceramics, other companies expected to follow



Lithium is not just a battery material: *also critical for high strength glass-ceramic products*

- › Lithium additions create thermal shock resistance in: Stovetops, Corningware® Cookware, Fireplace Shields
- › Now being used in many new high strength glass products, such as Corning's Gorilla Glass (display screens and automotive) and high strength flexible glass
- › Glass-ceramic products are also being used in advanced aerospace and defense technologies (hermetic seals)
- › **Petalite, as a very high purity lithium aluminum silicate mineral, is the ideal form of lithium addition to the batch**
 - Petalite is a very rare mineral and Separation Rapids is the only potential large supply source in North America
- › Lithium additions can also strengthen traditional container glass formulations to extend the life of the container

Petalite is used in many high-strength glass applications, such as electronic screens

Separation Rapids Lithium: Avalon's most advanced project

A large LCT pegmatite enriched in the rare lithium mineral petalite



Discovery outcrop after clearing for mapping in 1998

10 million tonne resource amenable to open pit mining, discovered in 1996

- › Pre-Feasibility Study completed in 1999 on model to produce petalite for glass-ceramics.
- › New Preliminary Economic Assessment model created in 2016 to produce lithium battery materials. Further updated in 2018 based on new glass-ceramic markets.
- › Secure Tenure under Lease: 100% owned plus 6,000 acres of exploration lands
- › Located close to transportation (road access) and power infrastructure, including clean hydropower
- › No undesirable environmental impacts
- › Strong local community support

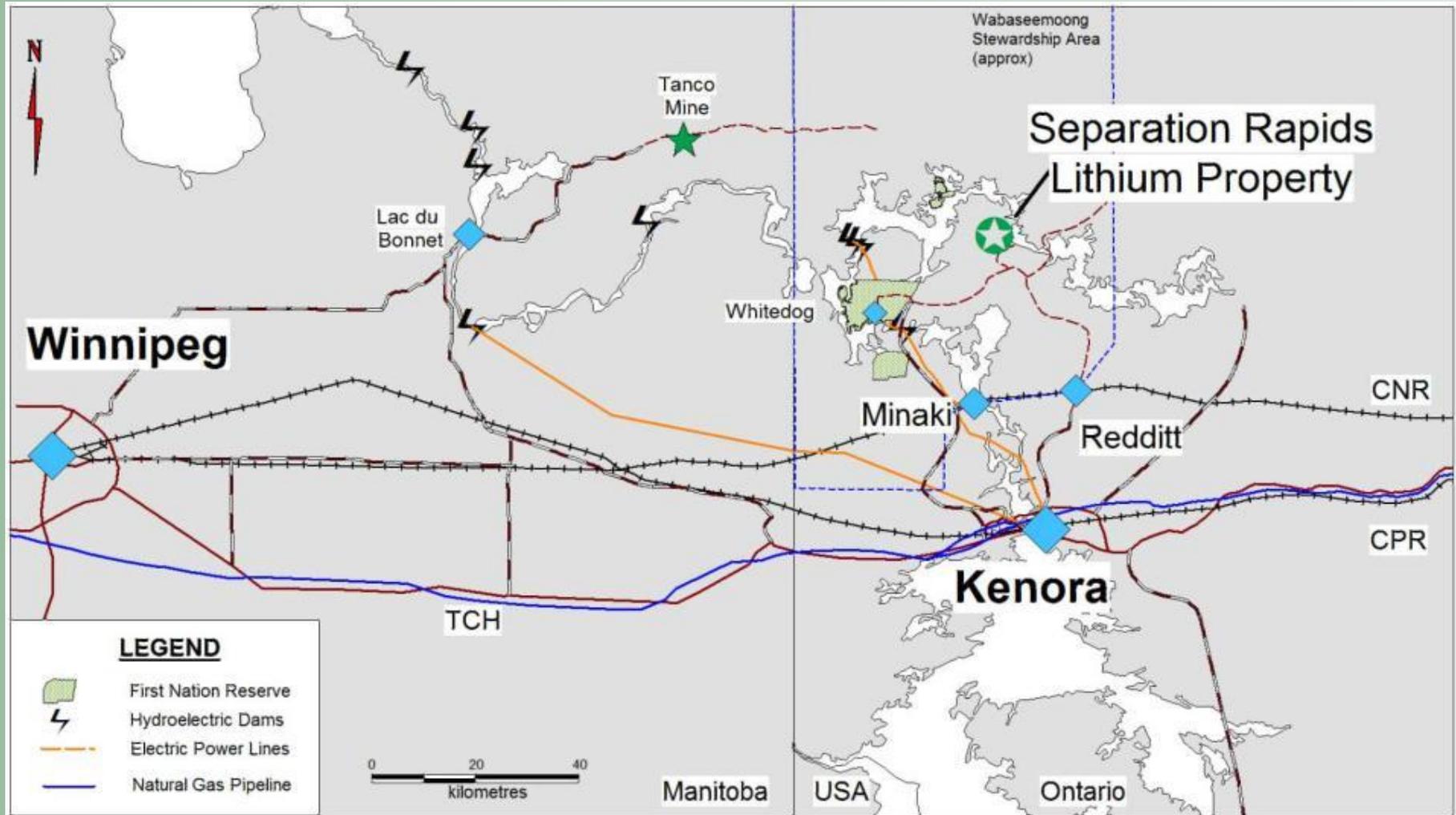
First Nations Relationships: Separation Rapids Lithium Project



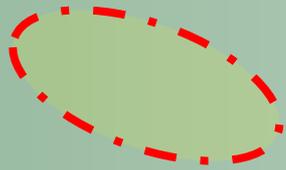
Original MOU signing in 1999

- › 2013: Renewed MOU with Wabaseemoong Independent Nations (WIN) first signed in 1999
- › Committed to maximizing business & partnership opportunities for WIN during operations and post closure
- › WIN leadership are supportive of the Project
- › Community members continue to have active involvement

Separation Rapids is located close to transportation and power infrastructure

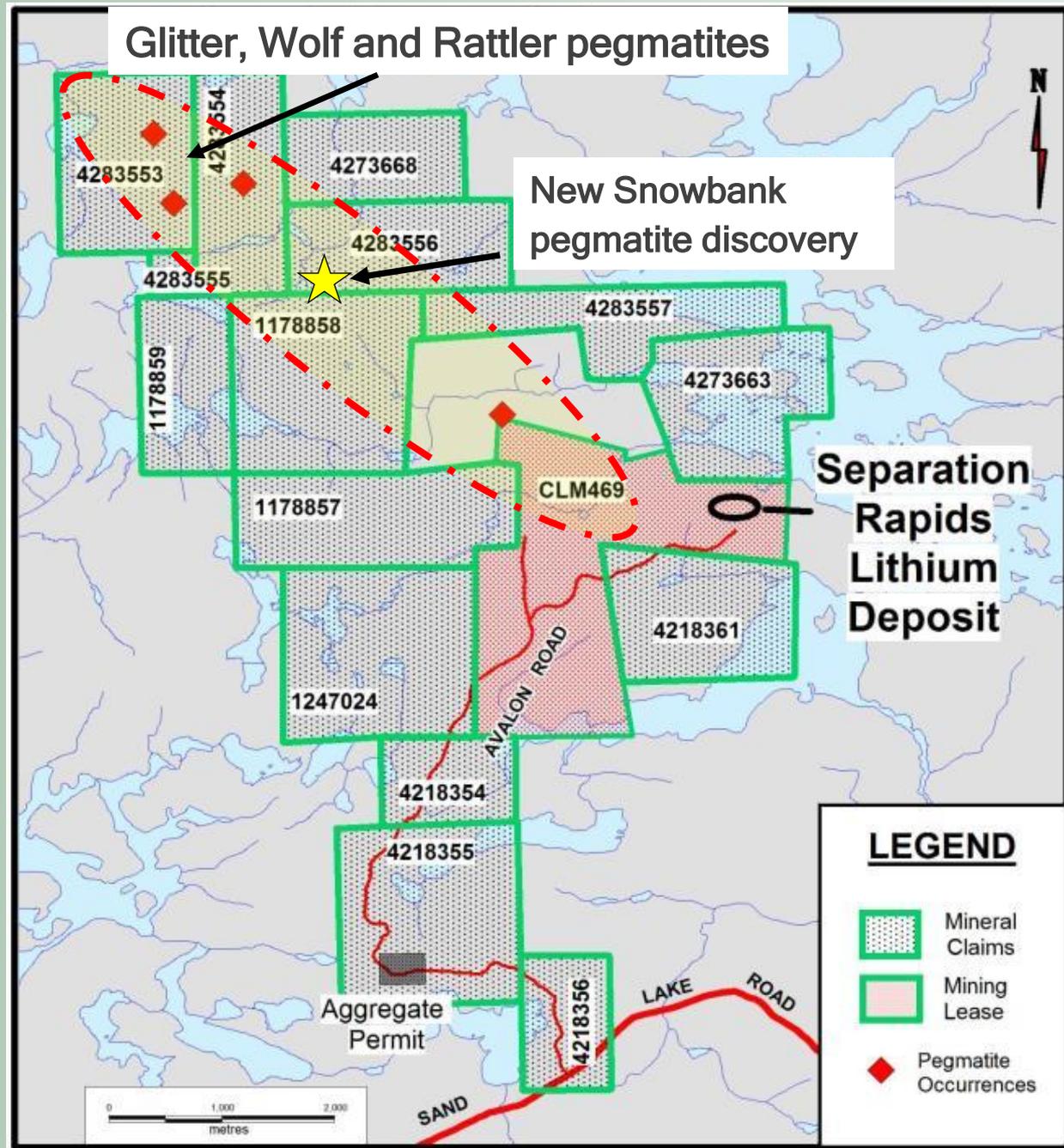


Separation Rapids Rapids Mineral Tenure and Regional targets



Regional trend of lithium pegmatites, where exploration commenced in summer 2018 and several new targets developed.

Map includes new claims acquired in 2017 to the north and west of existing land holdings



Lithium Minerals at Separation Rapids

- › There are two main lithium ore minerals in the Separation Rapids LCT pegmatite: petalite & lepidolite
- › Petalite is the predominant lithium mineral, with lepidolite occurring in distinct subzones comprising 20% of the resource
- › **Petalite** ($\text{Li Al Si}_4\text{O}_{10}$) typically contains 4.5% Li_2O with very low impurities
- › **Lepidolite** ($\text{K(Li,Al,Rb)}_2(\text{Al,Si})_4\text{O}_{10}(\text{F,OH})_2$) is a lithium mica containing other elements
- › They can each be concentrated to make saleable products:
 - Petalite can be used both as an industrial mineral for high strength glass and as a high purity feed to make battery grade lithium hydroxide or carbonate
 - Lepidolite concentrates are being used increasingly for production of battery grade lithium carbonate



Separation Rapids 2015-17 Work programs: *Focused on metallurgical process and lithium battery material product design*

- › Pilot plant produced 1 tonne of high purity petalite concentrate
 - Petalite product quality confirmed for high strength glass
- › New hydromet process produced high purity (99.9%) **lithium hydroxide** product from petalite
 - Confirmed by NRC lab to be suitable for NMC cathodes
 - Filed application for patent protection in 2017
- › Positive PEA prepared on petalite resource for 100% lithium hydroxide production scenario
 - Confirmed low production cost <US\$5,000/tonne, but had a high capital cost estimate of over \$500 million
- › Several by-products identified, including feldspars and lepidolite, a second lithium mineral that can also be used to produce lithium battery material (lithium carbonate)
- › Drilling to expand resource and map detailed lithium mineralogy

National Research Council of Canada's unique 2325-type coin cell technology/ components. Photo credit: National Research Council of Canada

Avalon's lithium hydroxide product successfully used as lithium ion battery cathode material

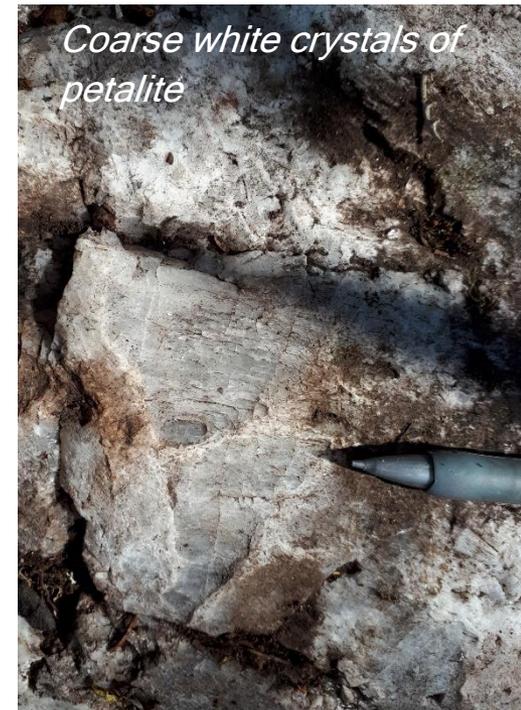
- › Proprietary two-step hydrometallurgical process:
 - Reduces Green House Gas generation and reagent use
 - Reduces waste produced
 - Reduces environmental risk and lowers productions costs
- › Elemental analysis of Avalon's product by the National Research Council of Canada (NRC) confirmed that it had low levels of metal impurities, within the range reported by commercial suppliers of battery grade lithium hydroxide materials
- › Avalon's lithium hydroxide product successfully used by the NRC in a NMC-type cathode and subsequently used to make a functional lithium ion battery

2017-19 Work program: Drilling and Metallurgical Process Optimization Work

- › Added cleaner stage to petalite flowsheet to produce a high grade (>4.5% Li_2O) and very low impurity “Super Petalite” concentrate for specialty glass applications
- › Produced quantities of petalite for marketing purposes
- › Optimized flotation flowsheet to improve recoveries of lepidolite concentrate to over 90% at a grade of 4.5% Li_2O
- › Now testing using DMS and sensor based ore-sorting as petalite pre-concentration methods to reduce costs
- › Drilling in 4 holes to increase resource and prepare updated mineralogy-based resource block model
- › Optimizing hydromet process by investigating alternative membrane technologies to improve energy efficiency & reduce costs

Snowbank Petalite Pegmatite Discovery

- › Large exposure of a new petalite pegmatite discovery averaging 6 metres wide and traceable for over 100 metres along strike open on both ends.
- › Assays of up to 2.51% Li_2O over 1.1m in channel (50% of rock is petalite)
- › Other preliminary channel sample highlights include:
 - 1.53% Li_2O / 2.6m
 - 1.61% Li_2O / 2.3m
 - 1.07% Li_2O / 2.9m
- › Located just 4km NW of Separation Rapids deposit



2018 Updated PEA Highlights

- › Simplified business model with initial focus on production of lithium mineral concentrates for glass and ceramics
- › Production of 71,500 tpa petalite, 11,800 tpa lepidolite
- › Initial CAPEX: C\$77.7 million (475,000 tpa mill capacity)
- › Feldspar circuit added in Year 6 (C\$13.7 million CAPEX)
- › 20 year operational life
- › Average Annual Revenues: C\$90 million
- › Average Annual Costs: C\$60 million
- › NPV pre-tax (8% discount rate): \$156 million
- › IRR (pre-tax): 27.1% IRR (post tax): 22.7%

The PEA is preliminary in nature, includes Inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized.

Separation Rapids Next Steps: *Moving toward Phase 1 Production Facility*

- › **2020 work:** Continued process optimization work and secured permit to extract up to 5,000 tonne bulk sample for pilot plant processing in 2021
 - Investigated sites for lithium battery materials refinery in northwestern Ontario
- › **2021-22:** \$3-5 million program planned to prepare for construction of mine and process plant in 2022 to produce lithium mineral concentrates
 - Bulk sample processing to produce more lithium mineral product samples and finalize process flowsheet and plant design parameters
 - Secure off-take agreements and arrange project financing (in progress)
 - Complete Feasibility Study-level cost estimates, project engineering and pilot plant work to confirm lithium hydroxide process flowsheet
 - Complete environmental assessments and project permitting
- › **2022-3:** Begin commercial operations with sales of petalite and by-products while new battery materials facility is constructed

Battery materials supply chains in Ontario



- › Ontario government now committing to establishing more EV and battery manufacturing capacity
 - Opportunity to take advantage of the mineral resource wealth in northern Ontario to build out the entire supply chain

November 2020: joint announcement between Avalon and Rock Tech Lithium Inc. to develop lithium battery materials refinery in Thunder Bay

- › Will be designed to accept lithium mineral concentrates from Separation Rapids and Rock Tech's Georgia Lake Project, and other Ontario sources, to produce various lithium products
- › Several potential sites available including on Fort William First Nation reserve lands who are very interested in partnering on this project
- › Good potential for government financial support

Separation Rapids Lithium Deposit Mineral Resources Estimate (May 22, 2018)

Petalite Zone (PZ)

	Mt	% Li ₂ O	% Ta ₂ O ₅	% CsO	% Rb ₂ O
Measured	2.425	1.440	0.005	0.010	0.322
Indicated	3.992	1.391	0.006	0.012	0.338
Measured + Indicated	6.416	1.409	0.006	0.011	0.332
Inferred	1.308	1.351	0.007	0.017	0.342

Lepidolite-Petalite Zone (LPZ)

	Mt	% Li ₂ O	% Ta ₂ O ₅	% CsO	% Rb ₂ O
Measured	0.939	1.410	0.008	0.027	0.473
Indicated	1.049	1.402	0.009	0.025	0.469
Measured + Indicated	1.989	1.406	0.009	0.026	0.471
Inferred	0.483	1.346	0.008	0.020	0.427

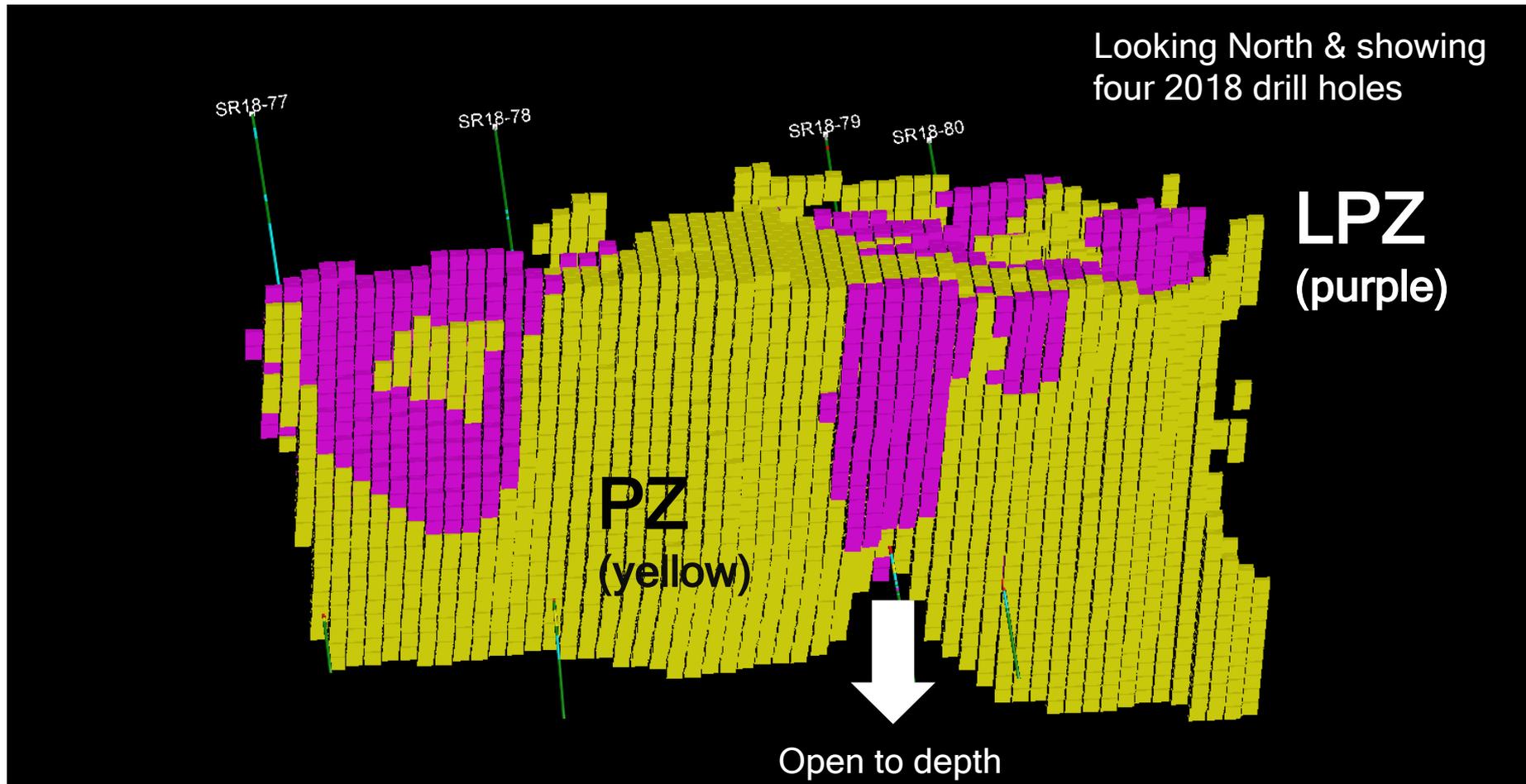
Total PZ+LPZ

	Mt	% Li ₂ O	% Ta ₂ O ₅	% CsO	% Rb ₂ O
Measured	3.364	1.431	0.006	0.015	0.365
Indicated	5.041	1.393	0.007	0.014	0.366
Measured + Indicated	8.405	1.408	0.007	0.015	0.365
Inferred	1.791	1.349	0.007	0.018	0.365

Footnotes:

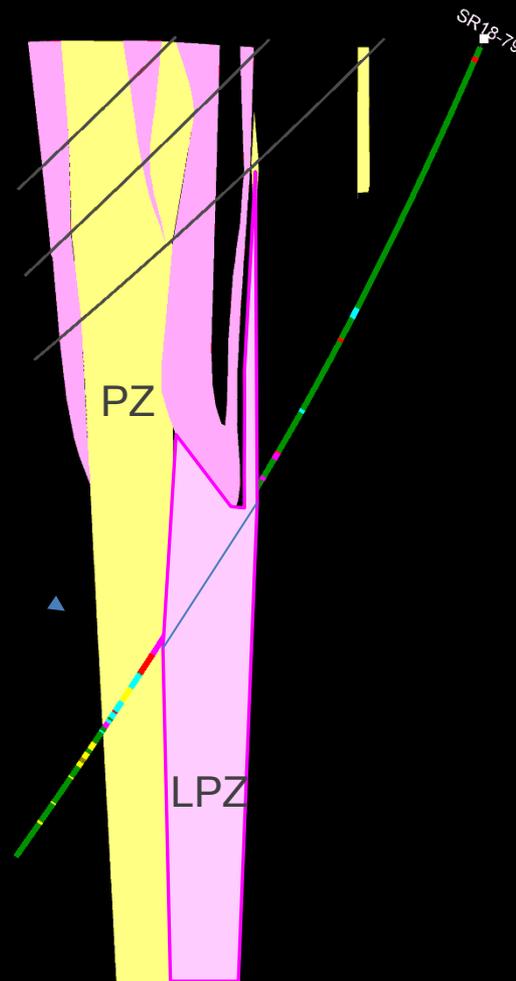
1. This resource estimate is valid as of May 22, 2018.
2. CIM definitions were followed for Mineral Resources.
3. The Qualified Person for this Mineral Resource estimate is William Mercer, PhD, P. Geo. (ON).
4. The resource estimate is based on Avalon's drilling of 74 previous holes totalling 11,644 metres drilled between 1997 and 2017 and a further four holes totalling 1,282 metres in 2018.
5. Drill data was organized in Maxwell DataShed and for estimation purposes was transferred to Geovia GEMS 6.8 software, wherein the block model was developed.
6. The geological units were modeled as outlined by drill core logs.
7. Resources were estimated by interpolating composites within a block model of 10 x 10 x 3 metre blocks oriented along the deposit strike.
8. Grade interpolation used the Ordinary Kriging method combined with variograms and search ellipses modeled for each rock unit. For PZ unit, search ellipses of 50 x 35 x 15 m and 175 x 125 x 45 m were used for Passes 1 and 2, respectively. For LPZ unit, search ellipses of 35 x 25 x 8, 75 x 50 x 15 and 115 x 75 x 25 were used for Passes 1, 2 and 3, respectively.
9. Measured material was defined as blocks interpolated using Passes 1 and 2, using composites from ≥ 4 drill holes and a distance ≤ 25 m to the nearest composite and additional blocks with excellent geological and grade continuity. Indicated material includes blocks interpolated with Pass 1 and 2 search ellipses, using ≥ 3 drill holes and a distance ≤ 35 m to the nearest composite and blocks with geological and grade continuity. Inferred material was defined as blocks interpolated with all Passes, composites from ≥ 2 drill holes and interpolated geological continuity up to 40 m below diamond drill holes.
10. Two metre composites were used and no capping was necessary.
11. The mean density of 2.65 t/m³ was used for unit 6ABC and 2.62 t/m³ for unit 6D.
12. The cut-off grade reported in this resource estimate, 0.6% Li₂O, is consistent with the previously published resource estimates by Avalon (Preliminary Economic Assessment, 2016; November 15, 2017 resource estimate).
13. Mineral resources do not have demonstrated economic viability and their value may be materially affected by environmental, permitting, legal, title, socio-political, marketing or other issues

Separation Rapids Lithium Deposit Block Model (May 22, 2018)





Geological Cross-Section (looking west) Hole SR 18-79



Hole 79 demonstrated increased widths of lepidolite-petalite (LPZ) mineralization below 200 metres

← 200 metres

PZ= Petalite Zone

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