2022 Annual Meeting Update Presentation

February 24, 2022
Don Bubar, President & CEO
Safe Harbour Statement

Forward looking information

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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$50m (389.5m S/O, 462m fully-diluted) with over 20,000 shareholders worldwide
› Working Capital: CAD $1.6 million

2021 Sustainability Report

Sustainability: committed to environmentally and socially responsible mineral resource development

› Avalon’s 10th annual GRI compliant Sustainability Report released November 2021 - addresses GRI framework, UN 17 SDGs and MAC’s TSM
› Received an excellent Sustainalytics ESG risk rating licence following audit Avalon’s business practices and policies

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

CRITICAL MINERALS FOR A SUSTAINABLE FUTURE
Experienced Management Team and Diversified Board of Directors

MANAGEMENT

› Jim Andersen, CA, CPA  
  V.P. Finance, CFO & Corporate Secretary

› Donald S. Bubar, M.Sc., P.Geo.  
  President & CEO

› Cindy Hu, CA, CPA  
  Controller

› Zeeshan Syed, M.Sc.  
  V.P. External Affairs

› Mark Wiseman, B.Sc., MBA  
  V.P. Sustainability

› Chris Wildman, Operations Co-ordinator

› Amin Dhillon, Director of Communications

BOARD of DIRECTORS

› Donald S. Bubar, P.Geo.  CEO

› Alan Ferry, CFA  
  Chair and Audit Committee Chair

› John Fisher, B.Sc., M.B.A

› Naomi Johnson, LL.B.

› Marilyn Spink, P.Eng.

› Chief Harvey Yesno
Avalon’s Strategy for Growth and Value Creation in Critical Minerals

**Staged development**: Create a platform for growth with a demonstration scale production facility to prove process and introduce products to cleantech customers for approval

› Achieve initial production and positive cash flow at a small scale with scalability to increase production as product demand grows

**Product design**: Work with our customers to create quality products to serve their needs at attractive prices

› Target cleantech and high tech growth industries, such as aerospace, where energy efficiency and “light-weighting” are key drivers on demand

**Innovative metallurgy**: Design an efficient process flowsheet utilizing new technology to produce the best quality products at the lowest cost, while minimizing waste

› Ore-sorting technology to reduce water use and lower costs & innovate new hydromet processes for lithium battery materials

Rare earth magnets create efficiency in electric motors for EVs and generators for wind turbines
The Challenges Ahead

› Production of Critical Minerals is more like an advanced manufacturing business where it is about recognizing the market opportunity & designing an appropriate extraction process to make a product that will meet the needs of the end-users.

› Mining Regulations need to adapt to fundamental differences from traditional mining as it is not simply about tons and grade. Production rates are defined by market size not resource size and should be designed to be scalable as demand grows.

› Therefore bulk sampling and process testwork at an early stage are critical to establishing the business opportunity and securing offtake commitments.

› This is why mine wastes offer such an interesting opportunity, the mining is already done!
Many historical mining operations were developed to produce one bulk commodity such as copper, but the resource contained critical minerals that were discarded as waste (as there was no market then).

These historical wastes can now be treated as opportunities to sustainably recover critical minerals using new technologies, while remediating the long term environmental liability.

Avalon has been looking at several such opportunities including East Kemptville Tin-Indium and the Cargill past-producing phosphate mine site with concentrations of rare earths, scandium and zirconium in the tailings.

Can contribute to establishing the “circular economy” in the mining industry.
The Critical Minerals Opportunity for Canadian First Nations

› Many opportunities exist to develop new resources for critical minerals in the north including mine wastes
› Many occur in northern regions offering isolated First Nations new economic development opportunities
› Can be developed at a small scale involving minimal environmental impacts and requiring relatively small initial capital investments compared to a typical new mine
› Indigenous business can participate directly in implementing environmentally and socially responsible cleantech materials development in northern Canada
› Additional opportunities for creating new downstream value-added clean technology businesses in the supply chain including lithium battery materials

Rare earths and other critical minerals are essential for effective wind turbine motors and solar panel technology
Growing interest in establishing new critical minerals supply chains in Canada especially for lithium battery materials. Global lithium supply shortage has resulted in much higher lithium prices. Tin prices at record highs making East Kemptville an even more attractive re-activation opportunity for recovering value from the wastes.

- Still planning to establish a new lithium battery materials refinery in Thunder Bay. Lots of interest from international consumers of lithium battery materials and planning a partnership arrangement.
- Still high demand for the petalite product for high strength glass-ceramics.
- Still working to hard to get access to closed mine sites to recover critical minerals from the wastes now focusing on East Kemptville Tin-Indium.
- Re-activated Lilypad Cesium-Tantalum Project due to global shortage of cesium.
Separation Rapids Lithium: Avalon’s Most Advanced Project

A large LCT pegmatite enriched in the rare lithium mineral petalite

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

- PFS initially completed in 1999 on model to produce petalite for glass-ceramics. New PEA 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

- Road access, with proximity to clean hydro-power to allow low carbon intensity lithium production with little waste and no significant environmental impacts

- Strong local community support

Discovery outcrop after clearing for mapping in 1998

70 meters
Separation Rapids is located close to transportation and power infrastructure.
Separation 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.
The geological mapping and sampling program on the northwest claims to follow-up on the 6 metre wide Snowbank petalite pegmatite outcrop discovered in 2018 was completed as planned in late September.

The strike length of the Snowbank pegmatite dyke was extended by 50% from 85 to 127m.

Assays of over 2% Li₂O in grab samples (50% of rock is petalite) with channel samples yielding assays of up to 1.61% Li₂O / 2.3m.

2021 mapping indicated it to be a less deformed, more zoned LCT pegmatite than the BWP with potential for significant enrichment in tantalum and cesium at depth.

Follow-up drilling program in 2022 being planned to begin to assess the size potential of Snowbank. $1 million in flow-through funding raised in December to fund the program, but still waiting on the permit approval.
The Lithium Battery Materials Supply Chains Opportunity in Northwestern Ontario

- NWO is blessed with hundreds of lithium pegmatites of various sizes and mineralogy.
- To get production started the key next step is to have a centrally located Lithium Refinery that can purchase concentrates produced locally to make the battery material products.
- Thunder Bay is ideally located with excellent transportation infrastructure to serve both provincial and international markets with numerous industrial sites available for locating a new refinery.
- Avalon plans to help establish a refinery in T-Bay as a separate business with partners with flexibility to accept concentrates from any new producer in NWO.
- Ontario government now committed to establishing more EV and battery manufacturing capacity along with the supply chains as part of a new Industrial Strategy for Ontario on advanced manufacturing.
Product Recovery
-Lithium Hydroxide Production Flowsheet

Petalite/Lepidolite → Decrepitation → Roasting → Water Leach

Roasting → Impurity Removal → Filtration → Metal Hydroxides

Evaporators → Dilute H₂SO₄ → Alkali

Impurity Removal → Al- Silicate "Potential" Market

Filtration → Zero Sulphate Waste

Conc. H₂SO₄
Separation Rapids Lithium Project
PEA Model Highlights ($CAD)

- Assumes open pit mining at 950,000 tpy with concentrator at site to recover petalite and hydromet plant in Kenora to make Li hydroxide
- Minimum 10 year life lithium, 20 years for feldspars
- 14,600 tpy lithium hydroxide and 100,000 tpy feldspars
- Prices: US$11,000/tonne LiOH and US$170/tonne feldspar
- Average lithium hydroxide production cost: US$4900/tonne
- F/X US$1.00 = CAD$1.30
- IRR: 19% pre-tax, 16% after-tax
- NPV (8% Discount rate): $343 million pre-tax, $228 million after-tax
- CAPEX: $514 million (including $93 million in contingencies and sustaining capital)

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.
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
Petalite Production - Using Ore Sorting & Dense Media Separation (DMS)

ROM Ore → 2-Stage Crush → Screen → Crushed Ore Stockpile

2-Stage Crush: <40mm

Screen: <12mm

Crushed Ore Stockpile: Crushed Ore

Ore Sorter: <40mm >12mm

Tertiary Crush: <40mm >12mm

Screen: <1mm

DMS: Mill Feed

Milling & Flotation: Glass-Ceramic Product

Rejects to Waste Rock: Rejected material not suitable for further processing.
Separation Rapids Next Steps: Moving toward Phase 1 Production Facility

› **2020-21 work**: Continued process optimization work and secured permit to recover 5,000 tonne bulk sample which was collected in March, 2021
  - Determined that Thunder Bay is ideally situated to locate battery materials refinery

› **2022**: $10 million program planned to begin small scale DMS processing of bulk sample to produce petalite product samples for glass-ceramics
  - Secure off-take agreements and arrange project financing to expand production
  - Complete Feasibility Study-level cost estimates, project engineering and pilot plant work to optimize lithium battery materials process flowsheet & costs for T-Bay refinery
  - Complete environmental assessments and project permitting
  - Continued exploration to define additional petalite resources on NW part of property

› **2022-4**: Begin small scale commercial operations with sales of petalite and mineral by-products while new battery materials facility is constructed

› **2025**: Begin battery materials production
East Kemptville Tin: a closed minesite with value in the wastes

› In production from 1985-92 by Rio Algom then operated as a closed mine site since 1992 with water treatment to manage acid mine drainage

› During the early years of operation, tin recoveries were less than 50% and other base metals ore minerals (copper-zinc) were not recovered.

› Host rocks also contain significant Lithium as well as Indium, with potential for Gallium & Germanium.

› The stacked tailings, the main source of acid mine drainage, along with the stockpiles have very high contents of unrecovered metals that can now be recovered using new process technologies.

› Avalon’s model is to sustainably rehabilitate the site by processing low-grade stockpiles using ore-sorting technology, then re-processing the tailings.
Sensor-based Ore-sorting Technology

Advances in sensor technology now allow for detection of physical properties of minerals, such as specific gravity.

Minerals can be concentrated after crushing without using water or chemical reagents.
East Kemptville Location and Regional Infrastructure

- On paved highway
- Grid power on site
- Yarmouth (55 km) & other communities within commuting distance
- Ample water
- Skilled labour available locally
- Strong local community support (TREPA, AFN)

Power lines
- 69kV
- 138kV

East Kemptville location, 270 km west of Halifax


2015: Scoping Study completed on 10,000 tpd production re-start scenario.

2016: Small-scale (2,400 tpd) development concept created to utilize stockpiles to initially produce tin concentrates and integrate site remediation into business plan; gravity process flowsheet optimized.

2017: LOI signed with surface rights holder toward agreement to acquire full site tenure and provide financial assurance to the Province.

2019: After reaching agreement, new BHP management refused to sign

2021: NS government now supportive of Avalon re-activating the site
East Kemptville Site Layout & Tin Resources

Existing Tailings Dam with spare capacity, 18.8 M tonnes historical tailing

North Waste Pile: 1.29M tonnes @ 0.089% tin

Low-grade Stockpile Inferred Resource: 5.87M tonnes @ 0.112% tin*

In-ground resources:
- Measured: 0.58Mt @ 0.203% tin
- Indicated: 22.39Mt @ 0.152% tin
- Inferred: 14.25Mt @ 0.139% tin

(Resources as of May 7, 2018 for PEA
Bill Mercer (P.Geo) is QP)

*The stockpile resources are considered Inferred under NI43-101 guidelines and should therefore not be relied upon.
Two Composite Views of Low Grade Ore Stockpile at East Kemptville

6 million tonnes of previously-mined tin ore generating AMD since 1980’s

Can be re-processed to recover tin and remove need for perpetual water treatment
Metals Most Impacted by New Technology: 
*Tin is No. 1!*

![Graph showing the impact of new technology on various metals. The graph indicates that Tin is the most impacted.](#)

**Source:** MIT / Rio Tinto, March, 2018

Tin now in very short supply and trading at record high prices over US$43,000/t
Zinc concentrates are highly enriched in **Indium** (0.25%) from which an indium product could be derived.

Indium is in growing demand for use in solar panels, LED Lighting and LCD flat panels. Prices are increasing.

Along with Indium, the resource contains potentially recoverable **gallium** and **germanium** apparently associated with sulphides. Germanium is very rare and in demand for optical fibres.

The wallrocks also contain potentially recoverable **lithium** occurring in micas (polylithionite, zinnwaldite).

Several closed tin mines in Europe (Cornwall, UK and Czech Republic are now being evaluated as lithium opportunities.)
Avalon’s 100% owned Lilypad Project hosts a significant resource of the rare cesium mineral pollucite and recently re-activated the Project in June, 2021

What is Cesium and why is it important?

- Mainly used to create a low viscosity fluid for drilling deep oil wells called cesium formate

- With advances in technology, cesium is in growing demand because of its potential in many high-tech applications

- Atomic clocks & GPS, Specialty glasses, Ion-propulsion motors, High-density alkaline batteries, *to name a few*

- Production from traditional sources is in decline and there is a global supply shortage at present

- Cesium products now selling for up to $US 5,000/kg
Lilypad Pollucite Dyke

› 340,000 tonnes @ 2.294% Cs$_2$O and 0.037% Ta$_2$O$_5$ delineated in 2001-2003 drilling programs*

› Cesium grades increase with depth, open at 300m below surface

› “Western extension” new, undrilled zone of dykes 200m to southwest with two grab samples containing 4.62% and 2.11% Cs$_2$O

› Strong cesium lithogeochemical anomalies in surrounding volcanic outcrops

*Cautionary note: the resources described above are considered historic under NI43-101 guidelines and have not been verified by a QP and therefore should not be relied upon.
2020-21 Work Program

› 2020: Carried out short program to collect 250kg Pollucite Dyke sample for bench-scale process testwork to define pollucite concentration process
› Tested Selfrag and SB ore-sorting as methods for pre-concentration of pollucite which proved effective
› Prepared new block model of Pollucite Dyke resource estimate and confirmed historical data
› 2021: Geological mapping and sampling work resulting in discovery of several new pegmatites and an outcrop demonstrating a further 200 metre west extension of the Pollucite Dyke
› Biogeochemical and soil surveys over covered areas indicate other blind drill targets
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