Lilypad Cesium-Tantalum Project

As at December 29, 2020

Avalon’s 100%-owned Lilypad Cesium-Tantalum Property consists of 14 claims totaling 3,108 ha covering a field of cesium, tantalum and lithium (LCT) granitic pegmatite dykes. The property is located 150 km northeast of Pickle Lake, Ontario near the Eabametoong First Nation community of Fort Hope. It is presently only accessible by air or winter road and has seen very little modern exploration. Avalon is committed to negotiating mutually beneficial partnership agreements with its First Nation neighbours.

Economic resources of the cesium ore mineral pollucite (Cs,Na)$_2$Al$_2$Si$_4$O$_{12}$·2H$_2$O are very rare. Lilypad hosts one of the very few known significant pollucite resources in the world and is unusual in that the pollucite is widely distributed throughout the host LCT pegmatites.

With declining production from traditional sources, new cesium producers are needed to meet growing demand. As a result, Avalon re-activated the project with a sampling program in October 2020 to begin testwork to define a process to efficiently concentrate the pollucite mineralization. The dykes also contain significant associated tantalite, lepidolite and spodumene mineralization that will be important by-products.

The cesium-rich Pollucite Dyke was drilled by Avalon in 2001 and a preliminary historic resource was estimated in 2001 to contain roughly 340,000 tonnes grading 2.294% Cs$_2$O and 0.037% Ta$_2$O$_5$ based on 9 holes drilled to a maximum vertical depth of 250 metres. The resource is open to depth and along strike for expansion. Historic drilling on the Rubellite Dyke also revealed cesium potential with an intercept of 0.83% Cs$_2$O over 32 metres (drill hole LRD-19). Other similar pollucite-bearing LCT pegmatite dykes on the property remain untested.

*Cautionsary note: the Lilypad resources described above are considered historic under NI43-101 guidelines and have not been verified by an independent QP and therefore should not be relied upon. The Company is not treating the historic estimate as a current resource. The resource estimate is quoted in the 2001 drilling technical report filed with the Ontario government, but the details of the methodology are not available. Avalon is in process of preparing a new resource estimate under CIM definitions.

**Lilypad Claim Map with known LCT Pegmatites**

Cesium

Cesium is a rare element that is highly reactive and the least electro-negative element on the periodic table. Its unique properties give it enormous potential as an advanced material in many new technologies. For example, cesium is used in extremely accurate atomic clocks, where the latest versions are more accurate than 1 part in 1015, about 1 second in 20 million years! Cesium atomic clocks regulate the timing of cell phone networks and the internet.

Other important uses include specialty drilling fluids (cesium formate); photoelectric cells in solar panel technology; electric power devices that convert heat to energy; photoelectric cells for medical devices and videography; and in ion engines designed for space crafts on extended missions. Cesium is also used to make special optical glass, as a catalyst promoter, in vacuum tubes and in radiation monitoring equipment and has many other potential glass applications if there was more abundant supply.

Cesium products often sell at prices from US$200-2,000/kg. More than two-thirds of the world’s reserves of pollucite are found in Canada, with reserves also found in Zimbabwe, China, Namibia and, recently, Australia. However, most commercial production is as a minor by-product of lithium and/or tantalum producing operations.
Lithogeochemical Survey

Rock units adjacent to the pegmatites are highly anomalous in cesium over a broad area suggestive of a large source.

Tantalum

Tantalum is another rare element that is highly conductive of heat and electricity and is renowned for its resistance to corrosion by acids.

The majority of tantalum produced is used in the manufacture of electronic capacitors, which are fundamental to all modern electronic products. Tantalum’s properties enable manufacture of small capacitors that has facilitated the miniaturization of aviation electronics, and reduction in size of computers to desktop and laptops and of all hand-held electronic devices such as cell phones. Furthermore, tantalum’s resistance to corrosion by chemicals and its non-allergenic character lend to its use in surgical appliances and prosthetic implants.

Tantalum prices averaged US$162/kg Ta₂O₅ in 2019 and are currently reported at around US$175/kg Ta₂O₅. Current tantalum producers are found in Rwanda, the DRC, Nigeria, Australia, China and Ethiopia. Sources in Central Africa often see production by guerrilla groups through child labour, leading to its designation as a conflict mineral.

Next Steps in 2021

• Explored for tantalum primarily in 2001
• Staked by Avalon in 1999
• Discovered exceptional cesium enrichment in a field of tantalum-lithium pegmatite dykes, yet to be followed up
• Completed geophysical surveys, detailed mapping and sampling and 2,786 metres of drilling in 18 holes
• Reviewed process testwork on 250 kg bulk sample collected in 2020, including Selfrag electric pulse disaggregation and sensor-based ore-sorting technologies as efficient methods for pre-concentration of pollucite
• Block modelling of the resource delineated in the 2001 drilling program on the Pollucite Dyke and preparation of updated NI 43-101 resource estimate
• Once field work resumes, complete biogeochemical and soil surveys over covered areas plus lithogeochemical sampling, particularly on the northern part of property, to identify new drill targets
• Diamond drilling to expand resources and test new targets along with additional sampling