

From the Mineral Inventory Files

The Brazil Lake Albite-Spodumene Pegmatite

A interesting occurrence of albite-spodumene pegmatite at Brazil Lake, Yarmouth County, is currently being explored for its rare-metal potential. Pegmatites are very coarse-grained granitic rocks which form during the last stages as a granitic magma crystallizes. Pegmatites tend to contain unusual minerals made up of rare elements like Ta-Nb-Be-Sn-Rb-Cs-Mo-W-Li-F, which are not used when the common minerals that make up a granite (e.g. quartz, feldspar and mica) crystallize. As a result, these rare elements concentrate in the magma until the final stages of crystallization. By then, they have to come out of the magma in some form, and do so by either forming unusual minerals, or by escaping from the magma chamber dissolved in hydrothermal fluids. Pegmatites are referred to as late-stage or highly evolved granitic rocks, and albite-spodumene pegmatites are a sub-class known to be among the most evolved. Spodumene ($\text{LiAlSi}_2\text{O}_6$), formally known as lithium-aluminum pyroxene, is often used as a source of Li for the ceramics market, and is also keenly sought by mineral collectors.

In 1960, local residents discovered boulders and an outcrop of spodumene-bearing pegmatite adjacent to the Holly Road at Brazil Lake, a community approximately 25 km northeast of Yarmouth (Fig. 1). F. C. Taylor of the Geological Survey of Canada (GSC Memoir 349) mapped the site in 1967 and found one large pegmatite outcrop south of the road and two more to the north. He surmised that two parallel dykes of pegmatite occur within interbedded, highly deformed and metamorphosed schist, quartzite and metavolcanic rocks of the White Rock Formation. Recent geological mapping has shown that this area lies within the regional Deerfield Shear Zone, which may have played a role in localizing the pegmatite intrusions.

A 272 kg sample of Brazil Lake pegmatite was tested in 1971 at the Technical University of Nova Scotia. Grade (34.4% spodumene) and Li content (6-7.5% Li_2O_8) were favourable, but it was deemed that the Fe content (0.18-0.30%) of the spodumene was too high for market standards. Shell Canada Resources Limited carried out a mapping, sampling and mineralogical examination of the pegmatite in 1982, and made first mention of the presence of anomalous levels of Ta, Sn and Be. Shell also noted that the surrounding country rocks have a superimposed tourmaline and silica alteration halo.

The Department of Natural Resources drilled five holes (580 m) in the area of the two outcrops north of the Holly Road in 1993 (Fig. 1). These drill-holes showed that the dyke in that area is a single, sub-vertical, zoned pegmatite with a minimum strike length of 100 m and ranging from 10 to 25 m thick to a minimum depth of 75 m. A detailed mineralogical study indicated that the spodumene is generally associated with coarse- to fine-grained cleavelandite (a variety of albite) and a host of minor minerals including tantalite, cassiterite, garnet, tourmaline, rutile, epidote, lithiophilite, fillowite, amblygonite and cookeite.

In 1999, Gwalia Consolidated Limited of Australia, the world's largest Ta producer, sampled and analyzed all the pegmatite intersections in the Brazil Lake drill core. Their data returned interesting intersections of rare metals: for example, 113 ppm Ta_2O_5 over 18 m,

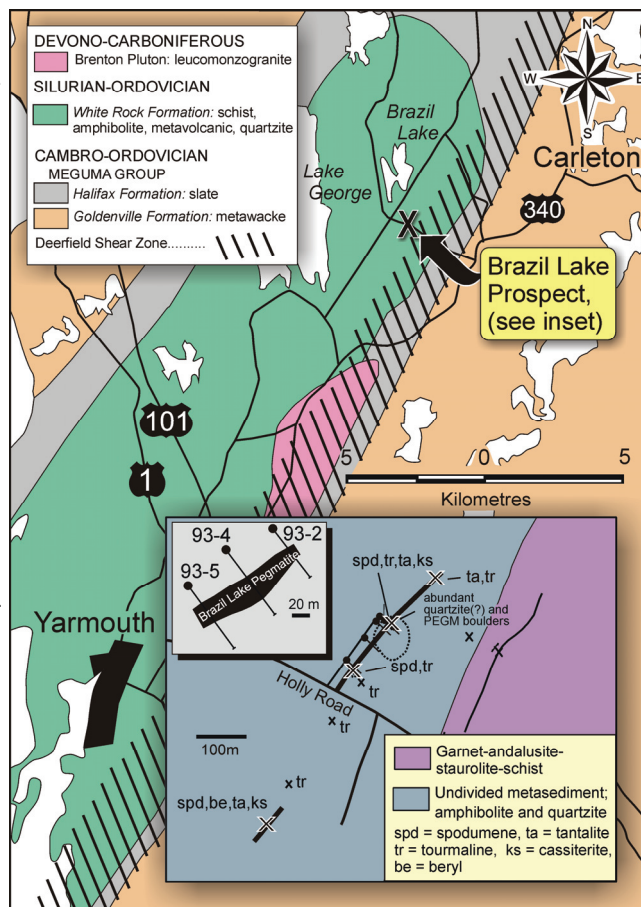


Figure 1. Geology map of the Yarmouth area. Inset shows the Brazil Lake pegmatite.

zones of BeO averaging up to 0.1% over 9 m, and sporadic Sn samples up to 1.8%. These results confirmed that the Brazil Lake property is a *bona fide* rare-metal exploration target.

The area has potential for other pegmatite intrusions. In 1982, Shell Canada noted several albite-spodumene pegmatite boulder fields and small outcrops in areas some distance from the original showing. All of these sites are spatially associated with the northeast-trending Deerfield Shear Zone (Fig. 1), suggesting that this fault zone has a high potential to host rare-metal deposits.

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