# Petrogenesis of the Archean Prestige leucogranite and associated pegmatites, Northwest Territories, Canada: insights from muscovite geochemistry and apatite U-Pb geochronology*

E.M.Palmer[1], D.R Lentz[1], C.R.M. McFarlane[1], and H. Falck[2]

*1. Department of Earth Sciences, University of New Brunswick, Fredericton, New Brunswick E3B 4G4, Canada*

*<epalmer@unb.ca>*

*2. Northwest Territories Geological Survey, Yellowknife, Northwest Territories X1A 2L9, Canada*

The Yellowknife pegmatite field is host to LCT-family rare-element pegmatites that are associated with Late Archean granitic magmatism. Studies of pegmatites in the district have documented occurrences of beryl, spodumene, columbite-tantalite, petalite, cassiterite, and rare microlite. The large Prosperous Suite, a plutonic assemblage composed of 14 muscovite-biotite S-type leucogranites, lies in the southwest quadrant of the pegmatite field. Although the geology in this domain is the most thoroughly documented in the Slave Province, the ages of the major plutonic suites are poorly constrained. Only two plutons of the Prosperous Suite have previously been reliably dated at 2596 ± 2 Ma and 2606 ± 2 Ma using U-Pb monazite.

The Prestige pluton is a small pluton in the Prosperous Suite that has previously been described with particular reference to its high Li contents. The pluton contains significantly higher Li concentrations (mean of 700 ppm) compared to other plutons in the area. Apatite U-Pb was used as a geochronometer and provides a concordant age of 2605.3 ± 6.4 Ma for the Prestige pluton, confirming that it is coeval with the plutons within the Prosperous suite. An upper intercept age of 2588.3 ± 6.3 Ma was determined for the pegmatites interior to the pluton, while an age of 2592.6 ± 6.2 Ma was found for the exterior pegmatites. The pegmatites associated with the Prestige pluton are enriched in incompatible elements, with averages of 22 ppm Sn, 9.5 ppm Ta, 19.6 ppm Nb, 21.0 ppm Cs, and 453 ppm Rb. Muscovite trace-element compositions, determined by LA-ICP-MS analysis, report elevated levels of Rb, Cs, and Sn within the granite and pegmatites. Whole-rock and muscovite geochemistry suggests increasing fractionation trends, shown by decreases in ratios of K/Rb, K/Cs, and Sr/Rb, from the pluton to the pegmatites. In general, there are slight increases in Li, Cs, Sn, Nb, and Ta in the rims of muscovite crystals that can be attributed to normal fractionation processes. Pegmatites interior and exterior to the pluton show similar trace-element concentrations; however, the Li content for the interior pegmatites is significantly greater (mean 270 ppm) than in the exterior pegmatites (mean 30 ppm). The geochronology coupled with the geochemical data indicate that pegmatite emplacement is unrelated to the Prestige granite. This observation applies to pegmatites both proximal to and cutting the pluton. Muscovite has proven to be a powerful fractionation indicator that may be used as an exploration vectoring tool in other applications.

***Winner of the AGS Graham Williams Award for best graduate student poster***

Atlantic Geology, 2017, Volume 53
Atlantic Geoscience Society Abstracts – 43rd Colloquium & Annual General Meeting 2017
doi: 10.4138/atlgeol.2017.006