

Rb/Sr and $^{40}\text{Ar}/^{39}\text{Ar}$ geochronological studies of the tin-bearing East Kemptville leucogranite, southwest Meguma Terrane, Nova Scotia: evidence for multiple episodes of tectono-thermal perturbations

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The East Kemptville tin deposit is hosted by a topaz-muscovite leucogranite which intrudes Cambro-Ordovician metasedimentary rocks of the Goldenville Formation. The presence of penetrative deformation within the leucogranite (S surfaces, C-S fabrics, mylonites) suggests that post-crystallization modification of both whole rock Rb/Sr (337 Ma) and $^{40}\text{Ar}/^{39}\text{Ar}$ (295 Ma) isotopic systems occurred; thus, neither age reflects the time of intrusion or tin mineralization as suggested by the respective authors. We report here results of a geochronological study designed to define the age of crystallization of the leucogranite and timing of the overprinting tectonic events.

Rb-Sr analyses of the least deformed and chemically pristine samples of leucogranite gave the following results: (1) 11 whole rock (WR) samples define an age of 353 ± 6 Ma (MSWD = 1.78, F-value = 2.72), Sr(i) = 0.7269; (2) 9 WR samples minus their muscovite (WRMMS) define an age of 368 ± 13 Ma (MSWD = 9.66, F-value = 2.83), Sr(i) = 0.7208; (3) 7 muscovite (MS) separates define an age of 334 ± 2 Ma (MSWD = 2.41; F-value

= 3.03), Sr(i) = 0.7462; (4) WR-WRMMS-MS ages for 7 samples define ages from 372 Ma to 324 Ma with a spread of Sr(i); and (5) WRMMS-K-feldspar-plagioclase(-quartz) ages for 7 samples define ages from 270 Ma to 249 Ma. A $^{40}\text{Ar}/^{39}\text{Ar}$ age spectrum for the most pristine muscovite available is discordant with the low temperature gas defining an apparent age of ca. 280 Ma. In contrast, a plateau age of ca. 338 Ma is defined by the high temperature gas fraction which includes 66% of the gas released.

The isotopic data are interpreted to indicate initial closure of the Rb/Sr whole rock system at ca. 353 Ma with subsequent resetting of the muscovite and feldspar mineral systems at ca. 334 Ma and ca. 260 Ma. The 334 Ma event completely outgassed the muscovite analyzed in this study, while an event of post 300 Ma age caused partial outgassing. The heterogeneous nature of the tectono-thermal events is reflected by the variable WR-WRMMS-MS and WRMMS-KF-QP Rb/Sr isochrons and variable $^{40}\text{Ar}/^{39}\text{Ar}$ muscovite age spectra thus far obtained at East Kemptville.