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Dating alkali feldspar granites: revised age and tectonic interpretation of the Georgeville Granite, Antigonish Highlands, Nova ScotiaA.J. Anderson¹, J.B. Murphy¹, R.F. Cormier¹, and R.A. Creaser²¹*Department of Geology, St. Francis Xavier University, Antigonish, Nova Scotia B2G 2W5, Canada*²*Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton, Alberta T6G 2E3, Canada*

The Georgeville Pluton is exposed along the Northumberland Strait in the northernmost Antigonish Highlands of Nova Scotia, where it intrudes Neoproterozoic (ca. 618-610 Ma) arc-related volcanic and sedimentary rocks of the Georgeville Group. The epizonal pluton consists of alkali feldspar granite and cogenetic pegmatitic intrusions. The age of intrusion of the pluton has proved particularly challenging to determine, and most of these difficulties are due to the extreme degree of fractionation. The granites contain above average SiO₂ (> 76%), Th, Nb, Y and Zr, very low CaO, TiO₂, MgO, FeO, MnO and Sr and most notably by a positive REE profiles generated by extreme LREE depletion. Tectonic discrimination diagrams suggest a within-plate environment, with many but not all geochemical features resembling A-type granites. The earliest attempt to date the pluton using Rb-Sr whole-rock geochronology was made difficult by the very high Rb/Sr (20-100) and ⁸⁷Rb/Sr⁸⁶ (58-275) ratios. A reliable U-Pb age from zircons in the granite

was precluded by extreme Pb loss caused by the metamict character of the zircons. ⁴⁰Ar/³⁹Ar analysis of a single white mica, 1.5 mm in length, from a pegmatite vein yielded an age of 579 ± 2.2 Ma. The undisturbed nature of the plateau, together with the epizonal nature of the pluton, and the sample location within a thin dyke led to the interpretation that the muscovite cooled rapidly and that this age represented the crystallization age of the pluton. This age suggested that the granite post-dated the main phase of arc-related magmatism in the Antigonish Highlands, and a petrogenetic model involving partial melting of a depleted, dehydrated crust following the cessation of arc activity was proposed. However, a preliminary Re-Os age of ca. 617 Ma obtained from molybdenite from within the granite has cast doubt on the crystallization age and the petrogenetic model. As a result, the intrusive age of the Georgeville Pluton is now re-interpreted to be coeval with the main phase of arc magmatism and with the adjacent ca. 610 Ma mafic Greendale Complex.