
**Late Paleozoic felsic volcanic rocks in southwestern
New Brunswick: relevance to uranium
mineralization in the region**

CAROLYN GARRETT¹, JARDA DOSTAL¹,
ANDREW MACRAE¹, MALCOLM J. MCLEOD²,
AND ASHLEY GARROWAY¹

*1. Department of Geology, Saint Mary's University, Halifax,
NS, B3H 3C3 Canada <carolyngarrett@hotmail.com>*

*2. Geological Surveys Branch, New Brunswick Department
of Natural Resources, PO Box 5040, Sussex, NB,
E4E 5L2 Canada*

Uraniferous felsic volcanic and volcanoclastic rocks of the Late Devonian Harvey Group occur along the northern margin of the Maritimes Basin in southwestern New Brunswick. The group crops out as an elongate belt 16 km long and 2 km wide, comprises the base of the Devono-Carboniferous basin in that area and has been stratigraphically and petrographically correlated the rocks of the Piskahegan Group of the Mount Pleasant Caldera on the southern margin of the basin.

The Harvey Group has been subdivided into three formations: York Mills, Cherry Hill and Harvey Mountain. The York Mills Formation (~60 m thick) includes sedimentary rocks, lithic tuffs and rhyolites frequently containing cavities lined with quartz and fluorite crystals. The Cherry Hill Formation (~100 m thick) contains mainly two ash-flow sheets accompa-

nied by ash-fall tuffs and quartz-feldspar porphyry. The Harvey Mountain Formation (75–150 m thick) is composed mainly of rhyolites that are intercalated with minor ash-fall tuffs and contains fluorite as a groundmass mineral and in cavities. The uranium mineralization mainly occurs in the Harvey Mountain Formation as pitchblende associated with sulphides in fluorite veins and veinlets.

The felsic volcanic rocks in the Harvey Mountain Formation are high-K peraluminous F-rich rhyolites. They are high in SiO_2 and alkalis with $\text{K}_2\text{O}/\text{Na}_2\text{O} > 1$ and low CaO , TiO_2 and P_2O_5 . Compared to typical calc-alkaline rhyolites, the volcanic rocks are enriched in Rb, U, Th, Nb and Y but depleted in Ba, Sr and Zr, in addition to Ca, Ti and P, features typical of highly evolved rhyolites. These felsic volcanic rocks share many similarities with uranium-rich topaz rhyolites of the southwestern USA and topaz granites that are commonly associated with U-mineralization, although topaz has not yet been found in the Harvey Mountain volcanic rocks. These features indicate the volcanic rocks could either represent more fractionated facies of the Piskahegan volcanic rocks or they are not co-magmatic.

The Harvey Mountain Formation felsic volcanic rocks are a result of an extensive fractional crystallization where fluid fractionation played an important role in late-stages of magmatic differentiation. Although not yet known, these rocks could be a source for uranium mineralization in the younger Carboniferous sedimentary strata upon their erosion. Continental tholeiitic basalts, which are associated with both the Harvey and Piskahegan felsic volcanics are mantle-derived. They probably represent a heat source which triggered a partial melting of metasedimentary crustal material producing felsic magma. Basaltic magma was probably emplaced into the crust at the early stages of lithospheric extension associated with the basin formation. The high K content and peraluminous nature of the felsic rocks also point to a metasedimentary source, probably containing metapelites.