ABSTRACT

The McHone pegmatite is one of a limited number of mineralogically diverse and chemically evolved dikes located in the Spruce Pine pegmatite district, North Carolina and is unusual in two respects: (1) the presence of spodumene + pollucite with amazonite + fluorite is extremely atypical of pegmatites from either LCT (lithium, cesium, tantalum) or NYF (niobium, yttrium, fluorine) granite-pegmatite suites and (2) the highly fractionated nature is uncharacteristic of pegmatites belonging to the muscovite - rare-element class. Primary assemblages show LCT-like rare-element mineralization in the form of microlite and manganocolumbite (Nb, Ta), schorl (B), beryl (Be), spodumene (Li), and rare pollucite (Cs). Late stage enrichment in F, as indicated by the crystallization of fluorite, and the presence of amazonite are consistent with NYF-like mineralization. Amazonitization of microcline-perthite apparently postdates the crystallization of primary assemblages.

The McHone pegmatite exhibits levels of trace-element enrichment similar to pegmatites of both NYF- and LCT-family populations. The high levels of Rb (maximum of 5789 ppm in microcline-perthite and Cs (maximum of 37020 ppm in beryl) encountered in the McHone pegmatite are more typical of LCT-affiliated systems than NYF family or muscovite – rare-element class pegmatites. By comparison, the enrichment of Pb in the McHone microcline-perthite (maximum of 2109 ppm) and Zn in muscovite (maximum of 3949 ppm) and beryl (maximum of 2222 ppm) is more characteristic of pegmatites with a NYF geochemical signature. The enrichment patterns of rare alkalis, Pb and Zn in the pegmatite and the resultant mixed geochemical signature appear to be the product of magmatic fractionation rather than contamination by exterior sources or overprinting by hydrothermal fluids.