Biotite analysis of felsic intrusive rocks near the Sisson Brook W-Mo-Cu deposit, west-central New Brunswick

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Four intrusive units have been found in the vicinity of the Sisson Brook W-Mo-Cu deposit: (1) medium-grained, equigranular muscovite-biotite granite with brown biotite that is slightly altered to chlorite along the rim and foliation; (2) biotite granite with ca. 20% greenish- brown to reddish-brown biotite and accessory zircon, apatite, monazite, magnetite, titanite, sulphide, and ilmenite; (3) biotite-bearing granite dykes with similar mineralogical features as the biotite granite, except these dykes are more highly evolved (higher Zr/TiO_2) and have apatite as the main accessory mineral as inclusions in biotite; and (4) porphyry dykes with phenocrysts consisting of approximately 23% plagioclase up to 1 cm, 10% quartz up to 7 mm, 8% biotite up to 0.3 mm in length, and 7% K-feldspar. The distinctive colour of the biotite in the biotite granite sub-class may signify that the magma crystallized under variable redox conditions.

The electron probe micro-analyzer (EPMA) data of

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biotite phenocrysts from all units indicates >0.5 Fe/(Fe + Mg) and a large range of ∑Al values. Compared to the Nashwaak pluton, biotite in the highly evolved, altered dykes has lower TiO_2, Zn, K_2O, Na_2O, and higher Al_2O_3. The Mn and Ca contents are generally low and constant. These biotite compositions are consistent with biotites from the entire Gander Zone of New Brunswick and are similar to biotite from I-SCR (strongly contaminated and reduced I-type) granites. On the MgO-FeO*-Al_2O_3 diagram, the biotite analyses plot in the calc-alkaline and peraluminous fields, which may be related to subduction and collision regimes, respectively. In these environments, the biotite composition is controlled by substitution of Mg-Fe and 3Mg-2Al. The fHF/fHCl ratio of all of the biotites are higher than porphyry Cu deposits and lower than porphyry Mo deposits, but similar to the CanTung tungsten deposit.