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**Metamorphism of impure marble and calc-silicate rocks  
from southwestern Baffin Island: implications for  
regional sapphire exploration**

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Impure marble and calc-silicate rocks from the Lake Harbour Group, southwestern Baffin Island, exhibit complex mineralogical and textural evidence of high-grade thermal and/or fluid-driven metamorphism. The marbles contain two mineral associations corresponding to their degree of purity. Relatively pure carbonate-rich marbles contain the assemblage forsterite + humite + spinel + calcite + dolomite, and appear texturally equilibrated. Relatively impure silicate-rich marbles contain the mineral association forsterite + diopside + nepheline + phlogopite + calcite, and vary texturally from compositionally foliated to nodular. Inclusion relationships and core-mantle textures indicate the progressive appearance (in relative order) of calcite and phlogopite, diopside, forsterite, and nepheline. Calc-silicates at the contact between the marbles and intruded monzogranites contain two mineral associations. Foliated, essentially monomineralic zones comprising the association diopside + pargasite + calcite are truncated by brittle fractures containing the association scapolite + phlogopite + calcite + clinozoisite. It remains to be determined whether these assemblages resulted from regional granulite-facies metamorphism during the Trans-Hudson Orogeny; contact metamorphism and/or metasomatism during monzogranite emplacement; subsequent fluid-infiltration; or a combination of these. At Kimmirut on southern Baffin Island, intense alteration of nepheline and scapolite has been linked to sapphire formation in calc-silicate lenses within stratigraphically correlative marbles. The scapolite + nepheline association described here may represent a precursor assemblage, suggesting that metacarbonates of the Lake Harbour Group in southwestern Baffin Island may be good targets for regional gemstone exploration.