Contamination of plutons by manganiferous country rock in the Governor Lake area, north-central Meguma terrane, Nova Scotia

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The Governor Lake area, north-central Meguma terrane, is underlain mainly ca. 373 Ma granitoid rocks that intruded metasedimentary rocks of the Meguma Supergroup. Garnet is abundant in contact-metamorphosed Beaverbank Formation and its enclaves in the granitoid rocks, as well as in the Twin Lakes granodiorite and Bog Island Lake tonalite, where it forms crystals up to 3 cm in diameter. Based on petrographic examination and electron microprobe analyses, four garnet types have been identified. Type 1 garnet, generally associated with coticule xenoliths, forms small spessartine-rich (Sps_{19-70}) grains that are concentrated in irregular to planar aggregates. Crystals range from homogeneous (Type 1A) to zoned towards

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Mn-enriched rims (Type 1B). Type 2 garnet in the country rocks forms small, spessartine-rich (Sps_{22-71}) grains that are zoned from Mn-rich cores to Mn-poor rims. Type 3 garnets contain abundant metamorphic inclusions (e.g., sillimanite) and commonly have distinct inclusion-rich cores with inclusion-poor, euhedral rims. Type 3A has Mn-rich cores (Sps_{21-52}) while Type 3B has Mn-rich rims (Sps_{15-21}). Type 4 garnets are large, euhedral crystals with abundant inclusions of apatite, ilmenite, and plagioclase interpreted to be of igneous origin. Type 4A is spessartine-poor (Sps_{5-16}) and weakly zoned, with local Mn-enrichment in rims adjacent to retrograde biotite. Zoning in Type 4B garnets suggest that Mn-poor cores (Sps_{8-16}) were partially resorbed and overgrown by Mn-rich rims (Sps_{15-25}). Based on the combination of textural and compositional data, Types 1A, 1B, 2, and 3B are interpreted to be xenocrystic, Type 3A to have xenocrystic cores overgrown by magmatic rims, and Types 4A and 4B to be magmatic. Whole-rock geochemistry shows slight MnO-enrichment in samples containing garnet and/or xenolithic material. The presence of xenocrystic garnet in granitic samples and supporting geochemistry suggest that the Twin Lakes and Bog Island Lake plutons were contaminated by manganiferous country rocks, probably by incorporation and assimilation of xenolithic material derived from the Beaverbank Formation.