From the Mineral Inventory Files

The New Ross Manganese Mines: Square Peg in a Round Hole

A few years ago I did some work at the New Ross Manganese Mines, north of New Ross, Lunenburg County (Fig. 1). From a global perspective, manganese (Mn) deposits are almost always confined to sedimentary rocks and formed by near-surface sedimentary processes that are intrinsic to the formation of their host rocks. My attempt to fit what I was finding at New Ross into existing genetic models for Mn deposits was like ramming a square peg into a round hole. You see, the New Ross deposits occur in granites of the South Mountain Batholith, as lenses and pods of the Mn-oxides pyrolusite, manganite and psilomelane in northeast-trending fault zones. They are rare among Mn deposits: New Ross and the Romanèche Mn deposit in the Massif Centrale of France are the only locations in the world where I have been able to find that Mn deposits occur in granite in mineable proportions. In fact, the New Ross deposits are still the deepest and most extensive underground Mn mines in Canada.

Discovered in 1891, manganese was mined at two sites, 3 km apart (Fig. 1). The Cain and Riddle mine opened in the late 1890s and produced from two shafts 60 and 30 m deep. The Dean and Chapter mine opened in 1907 and produced predominantly from three shafts 70, 51 and 51 m deep. Both mines closed in 1921, but the Dean and Chapter mine operated again from 1929 to 1936. A total production figure for both mines of 3,000 tons of 50-60% Mn is considered a minimum given that production figures prior to 1918 were sketchy, at best, as it wasn't until that year that Mn was formally declared a mineral under the *Mines Act*.

Diamond-drilling with some 1940s and 50s exploration programs substantially extended the mineralized zones along strike at both mines. An estimate of 15,000 tons of probable and 41,000 tons of possible high purity Mn-oxide was also made. In 1958, Marpic Explorations Limited sank a 54 m deep shaft on two pyrolusite veins northeast of the Cain shaft and underground diamond-drilling confirmed Mn-oxide to 104 m depth (Fig. 1).

In 1985 the Department of Mines and Energy drilled three diamond-drill holes of 123, 220 and 452 m depth below the Dean and Chapter workings to examine the 'roots' of the mineralized zone. The drill core showed that intense argillic and hematite alteration typically associated with the Mn mineralization extends to great depth and grades into higher temperature alteration facies such as mica-episyenite, silicification and albitization. In addition, a leucogranite intrusion was encountered at depth which is believed to have played either a direct (fluid and metal input) or indirect (heat for fluid convection) role in formation of the Mn deposits.

The New Ross deposits, being hosted in fault zones within granite and associated with low- to high-temperature alteration, are clearly are not classic 'sedimentary Mn deposits'. The late-stage leucogranites acted as a source of magmatic fluids and heat to run a convective hydrothermal system. Magmatically derived fluids, escaping from the late-stage granites, migrated out through the carapace of previously crystallized granite along fault zones. Alteration of the previously crystallized granite carapace released, among other elements, large amounts of Fe, Mn, Si, P and F. The fluids met and mixed with deep formational waters and, eventually, with highly oxidized, near-surface, meteoric waters. This resulted in massive dumping of Fe and Mn in the form of Fe- and Mn-oxides within the fault zones. Now the peg is rounded and fits quite nicely.

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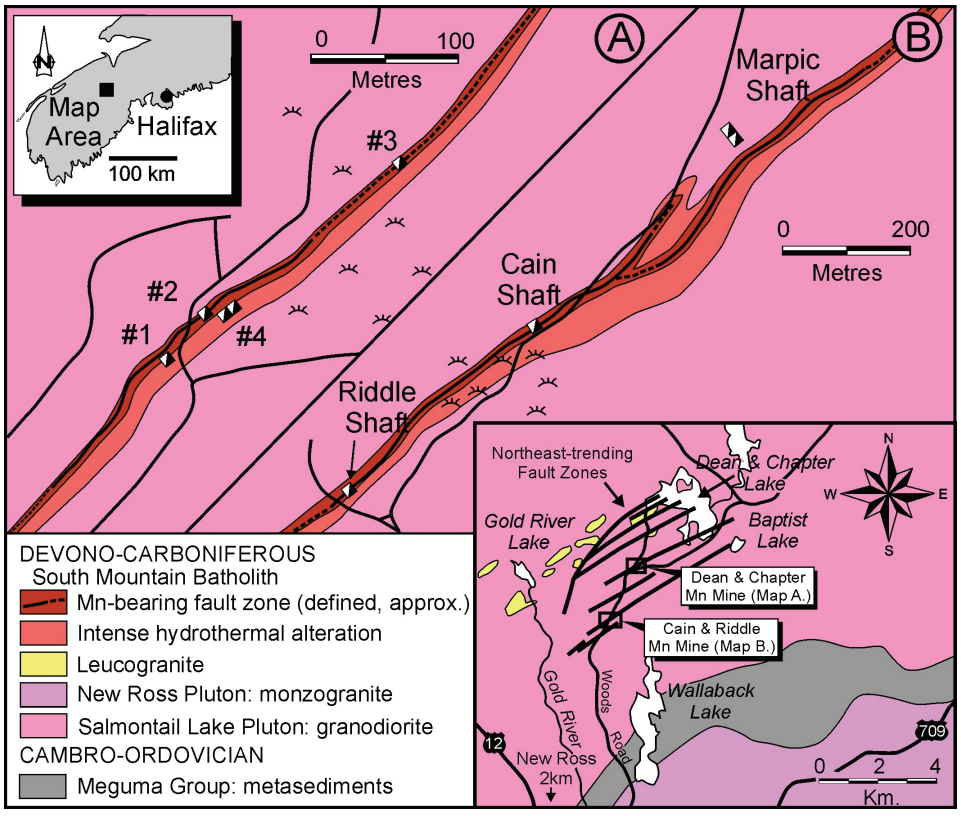

Figure 1. *Geology of the former New Ross manganese mines, Lunenburg County. Inset shows the geology of the central region of the South Mountain Batholith.*