Paleozoic ironstones of the Canadian Appalachians

G. Yeo
Department of Geology, Acadia University, Wolfville, Nova Scotia B0P 1X0, Canada

The occurrence of an extraordinary number of ironstone deposits, ranging in age from Middle Cambrian to Early Devonian, in the northern Appalachians, requires some explanation. Although none are currently economic, most have been mined in the past. They fall into two classes according to age and paleolatitude:

(1) High latitude, Middle Cambrian to Early Ordovician ironstones:

McLean Brook Fm. (MC)	Cape Breton, N.S.
Ferrona Fm. (LC-EO)	Antigonish Highlands, N.S.
Wabana Gp. (LC-EO)	Conception Bay, Nfld.

(2) Low latitude, Silurian to Early Devonian ironstones:

McAdam Fm. (ES)	Antigonish Highlands, N.S.
Smyrna Mills Fm. (ES)	Woodstock area, N.B.
Torbrook Fm. (ED)	Annapolis Valley, N.S.

These episodes of iron deposition were punctuated by orogeny in the Early Cambrian, Middle Ordovician, and Middle Devonian. With one exception, Smyrna Mills, these deposits are oolitic, and were deposited in upward-shoaling, shallow marine settings on the Avalon block (including the Meguma Terrane) prior to its docking with North America. The manganiferous, Smyrna Mills ironstones were deposited in a relatively deep water, restricted basin on the Central/Gander block after it had docked.

Although a range of mechanisms may result in deposition of ironstone, most of these involve low clastic influx, continuous supply of iron, and sediment reworking. These were all factors during deposition of the northern Appalachian ironstones. Clastic sedimentation rates would have been reduced during periods of tectonic quiescence. Scarcity of carbonates or evaporites in the ironstone-bearing sequences suggests humid climates, which should favour chemical weathering and supply of dissolved iron to basins. Penecontemporaneous volcanism was a potential iron source during Ferrona, Smyrna Mills, and Torbrook times. Deposition during times of global sea-level rise (2nd order eustatic cycles) would favour reworking of older weathered sediments, while upward shoaling (3rd/4th order cycles) in the iron-rich successions would favour still-stand conditions and chemical sedimentation.