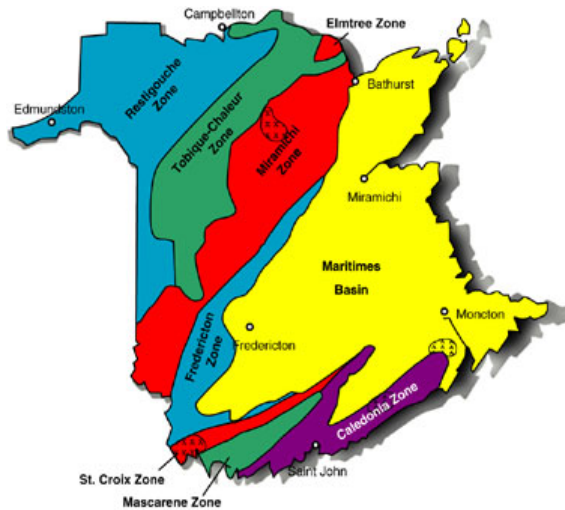


## Nickel-Cobalt-Copper, PGE & Titanium Deposits



### St. Croix and Miramichi Zones

Ni, Co, Cu Deposits

- Host Rocks: Early Devonian, layered, mafic to ultra-mafic intrusions emplaced in Ordovician, sulphide-rich metasedimentary rocks.
- Tectonic Setting: Deep-seated magmas emplaced in extensional settings following the Acadian Orogeny.
- Genetic Model: Contamination of relatively primitive magma by sulphide-rich metasedimentary (including exhalite) rocks and/or by siliceous magma resulted in sulphur saturation and deposition of sulphides within ultramafic host rocks.
- Ore Controls/Guides to Exploration: (1) Most significant (massive) zones appear to be remobilized and are associated with noritic to dioritic rocks. (2) Proximity to the sulphide-rich, metasedimentary pendants, xenoliths and/or contacts. (3) Ultramafic layers or zones with cumulus silicates at depth.
- Examples: St. Stephen: Rogers Farm Zone contains 400 000 t averaging 1.0% Ni, 0.4% Cu and 0.05-0.15% Co; the best intersection in the C Zone is 2.98% Ni, 0.93% Cu and 0.1% Co over 5.5 m; and in the Hall-Carroll Zone is 0.91% Ni and 0.79% Cu over 24.1 m. Overall Co grades in these zones average about 0.07%. The depth potential remains largely untested. Goodwin Lake: the best reported intersection is 0.53% Cu, 0.88% Ni and 0.12 % Co over 2.1 m.



### Caledonia Zone

PGE Deposits

- Host Rocks: Late Neoproterozoic, layered, ultramafic to mafic intrusions emplaced in a coeval volcanic pile.
- Tectonic Setting: Bimodal magmatism associated with an extensional event within older arc rocks of the Caledonia Zone.
- Genetic Model: PGE-bearing, sulphide-rich liquids formed as a result of sulphur saturation during normal fractional crystallization.
- Ore Controls/Guides to Exploration: (1) PGE-bearing assemblages segregated in favourable ultramafic layers within the rhythmically layered intrusion. (2) Layers

exhibiting large amounts of phlogopitic alteration, especially those with cumulus phases.

- Examples: Mechanic Settlement: grab samples with up to 1.07 g/t Pt, 4.6 g/t Pd and 0.02 g/t Au; a channel sample yielded 1.3 g/t combined Pt+Pd over 3 m with highest values of 4.7 g/t over 1 m.

#### Ti, P Deposits

- Host Rocks: Neoproterozoic or younger anorthosites spatially associated with Early Devonian granitoids.
- Tectonic Setting: Little is known about the host or country rocks because the only deposit discovered to date is unconformably overlain by Carboniferous rocks.
- Genetic Model: Segregation of oxide-rich, Ti- and P-rich ferrogabbroic phases by density settling and/or immiscibility, following differentiation from a mafic magma. Interstitial ilmenite and apatite crystallized in these differentiates and in residual anorthosites.
- Ore Controls/Guides to Exploration: (1) Aeromagnetic and gravity surveys. (2) Unconformities with mineralized zones of saprolitic weathering or Carboniferous cover rocks containing ilmenite-bearing pebbles. Examples: At Lower Coverdale, one hole intersected several mineralized zones (e.g., 7.4% TiO<sub>2</sub> over 127.4 m and narrower, higher-grade intervals). Another intersected a wide zone (24.7 m) with high Ti and P values, and highest-grade sections ranging from 14.92% to 23.95% TiO<sub>2</sub> and 8.66% to 12.30% P<sub>2</sub>O<sub>5</sub>

M.J. McLeod & S.R. McCutcheon, 1998