Case History of a Heavy Indicator Mineral Survey, Nickel Exploration in Quebec

Mary E. Doherty
International Geochemical Consultants
Grant “Rocky” Osborne
WMC Exploration Ltd.
Québec Project Location
Québec 7 Conceptual Target

- WMC Interpreted Craton Margin
- Historically accepted Craton Margin
- WMC Quebec 7 Exploration Licenses

(After Margeson and Stollenwerk, 2002)
Québec 7, Papavoine Gossan

- Mafic sill ~400m thick
- Troctolite & Olivine-Gabbro
- Norite, 4 distinct units
- Mineralization at basal and hanging wall contacts
- Intercepts of 5 – 50 m
  2% combined Cu+Ni,
  50 - 300 ppb Pt+Pd
Québec 7, Papavoine Prospect

(McKinnon Matthews, 2000, Margeson and Stollenwerk, 2002)
Québec 7, Geochemistry

1. Geochemical response at known Papavoine prospect
2. Exploration for Ni-Cu-PGE mineralization
3. Geologic provenance information
   - Regional Lake sediment, public data
   - Fine fraction stream sediment survey
   - Heavy indicator mineral survey
   - Water chemistry
Regional Lake Sediment Geochemistry

Cu-Ni-Cr

Voiseys Bay
WMC 2000 Geochemical Sampling

1. Sediment Shoveled into screen and pan
2. Wet Sieve -2mm fraction, coarse discarded
3. 10 kg -2mm collected
4. Water poured off
5. Sample bagged for HMC mineralogy and analysis
Stream Water
pH
< 6.4
< 7
Fine Fraction Stream Sediment Geochemistry
Fine Fraction Stream Sediment Geochemistry
Mafic – ultramafic sills defined by chromite, fayalite (rare forsterite), Cr diopside

Sillimanite/staurolite/kyanite divide geologic domains
RIM – Papavoine Prospect

- RIM at Papavoine gossan
  - 20 km down-drainage (to major lake)
  - Chalcopryrite
  - Sillimanite
  - Orthopyroxene
  - Paucity of cumulus and hybrid alteration minerals (Averill)
- Water
  - Low pH
  - Au-Ni-Cu
- Stream sediments
  - Cu-Ni-Cr-Mg-Co
- Lake sediments
  - Cu-Ni (weak)
Lac Loquin Geochemistry

- RIM at Papavoine gossan
  - Regionally extensive anomaly (70 x 50km)
  - Chalcopyrite
  - Molybdenite, Aspy
  - Chromite
- Stream sediments
  - Cu-Ni-Cr-Al-Mg
- Water
  - Low pH
- Lake sediments
  - Cu-Ni-Cr-Au
Lac Loquin Rock & Soil Geochemistry

- AEM contours with magnetics (vd1, greyscale)
  Sinuous conductive horizon
- 35 x 7 km
- Pd, Pt concentrations elevated (30 ppb) along outer fringe of EM highs
- Au (200 ppb)
- Cu (350 ppm)
- Mo (100 ppm)
- S (5%)
- Cr (1000 ppm)

- Pyrrhotite-bearing, graphitic meta-sediments enriched in Cu-Pt-Pd-Au.
Resistate Indicator Mineral Survey

- Direct identification of diagnostic minerals indicating geologic provenance.
  - Permissive Mafic–ultramafic sills defined by chromite, fayalite (rare forsterite), Cr diopside.
  - Sillimanite/staurolite/kyanite divide geologic domains with sediment U-Th-REE

- Significant Ni mineralization identified at Papavoine gossan
  - Low pH, stream sediment Ni
  - Chalcopyrite, orthopyroxene (lack hercynite, alteration minerals)

- Minerals available for diagnostic mineral chemistry, evaluation of isotopic signatures (S) and fluid inclusion studies.