Evidence for intrusion-related, precious metal mineralization in the Northeastern Mount Peyton Intrusive Suite: regional implications
Outline

- Brief summary of historical work in the study area
- Summary of the geology of the 2 main locations and a few others
- New, U-Pb geochronology
- Geochemistry of intrusive rocks of the Mount Peyton Intrusive suite mineralized and unmineralized
- Metal associations and tenors, regional and economic implications, future work on Dog Bay Line
Regional geology, claims and mineral occurrences
Regional geology and mineral occurrences, and map unit/boundary issues.
Regional geology and previous mapping
History of mineral-exploration-research

- Regional mapping GSC surveys of 1960’s and 70’s (Williams, 1962; Anderson & Williams, 1972)
- All early work prior to the 1980’s focused on base metals, Cr and Asbestos in ophiolitic rocks of the Gander River complex
- 1:50,000-scale GSNL mapping (Blackwood 1981; 1982; Evans et al. 1992; Dickson, 1996a & b; Dickson et al. 2000)
- Exploration for gold started in late 1980’s accompanying a higher price for gold and positive market conditions
- Late 1980’s led to discovery of many new gold, silver and antimony occurrences
Mineral-exploration-research continued

- Including the BeaverBrook Sb mine in 1989
- Salmon River mineralization discovered 1989-90 by Noranda Exploration (Tallman, 1990)
- Slip showing discovered 1993 (Forex Resources: J. Clarke, pers. comm., 2016)
- Late 1990’s and 2000’s increased exploration interest from Altius Minerals, Rubicon Minerals and numerous others.
- detailed aeromagnetic surveys flow over parts of NE MPIS and Indian Islands Group
- More showings discovered since 2005 including Cherry Hill, Contact, O’Reilly, Yellow Fox, Clarks brook East and West.
Location of the study area
Airborne magnetics detail and regional
Industry detailed aeromagnetic surveys on regional 800m line spacing (GSC)
Legend and Key

- Indian Islands Group
- Botwood Group
- Botwood Group
- Badger Group
- Cambro-Ordovician
  - Davidsville Group
  - Exploits Group
  - Gardar River Complex
  - Gardar Group

- Mount Peyton Intrusive suite (monzogranite)
- Mount Peyton Intrusive suite (gabbro-diorite)
- Corsair studied gold showing
gold showing
U-Pb zircon age (this study)
U-Pb zircon age (literature)

- road
- woods road
- normal fault
- thrust fault (approximate)
geological contact (approximate)

Legend and Key

NE MPIS (2D/14, D/15, 2E/3, E/4)
northwest to southeast
Norris Arm gabbro

Norris Arm Gabbro
(422.3 ± 1.2 Ma) Norris Arm, western access road
The Slip showing: Neyles Brook quarry
The Slip: Neyles Brook Quarry

- 5 distinct rock types
  - 1) gabbrodiorite
  - 2) granophyric monzogranite
  - 3) granodiorite
  - 4) miarolitic monzogranite
  - 5) young (Jurassic?) alkaline lamprophyre dykes
The Slip showing: continued

The Slip gabbro-diorite
5 cm thick irregular granodiorite dyke, penetrating and interfingering with gabbro-diorite. Note pegmatitic cavity on right.
The Slip showing: continued

Miarolitic monzogranite
Jurassic lamprophyre dyke

A

B

2 mm
Hurricane-Corsair zones: Salmon River
Salmon River mineralization in core
Salmon River mineralization core thin sections

A

B

C

Ank

Rt

Apy

Qtz

Mu

Py
Salmon River mineralization MLA

Mineral Key:
- Quartz
- Muscovite
- Feldspar
- Pyroxene
- Py-Arsenian
- Siderite
- Biotite-Fe
- Rutile
- Hematite-Fe
- Limonite
- Zircon
- Arsenopyrite
- Unknown

A

B

Ab+Qtz
Mu
Py+Ap
renmant Cpx?
Mineralized and non-mineralized fractures and joints

n = 12
Mean Principal Orientation = 42/73
Mean Resultant dir'n = 65-086
Mean Resultant length = 0.64
(Variance = 0.36)
Calculated. girdle: 172/25
Avg. Population A: 275/82
Avg. Population B: 033/68
Dihedral Angle: 65 degrees
Geochronology sample locations

- 422.3 ± 1.2 Ma (93GD08)
- 418 ± 1.6 Ma (02GDNBMM)
- 411 ± 5 Ma
- 411 ± 3 Ma
- 421 ± 2 Ma

Dominant ice flow direction

Mount Peyton Trend
Salmon River area

Geological Survey
U-Pb zircon geochronology

A. Miarolitic monzogranite (02GD-NBMM)
   The Slip
   418 ± 1.6 Ma

B. Gabbro-diorite (93GD08)
   Norris Arm
   422.3 ± 1.2 Ma

C. Gabbro (LD91-63-1)
   Rolling Pond
   423.6 ± 1.8 Ma
Classification
(Wilson, 1989; Strekeisen, 1976; Pearce, 1996; Ross & Bedard, 2009)

Lithogeochemical Classification
Variation diagrams
multi-element diagrams
(Normalized to Sun and McDonough, 1989)
Trace element constraints on their petrogenesis
Metal associations in mineralization
Summary chronostratigraphy

Series/Epoch  Stage/Age  numerical age (Ma)

Devonian
  Lower
    Lochkovian  382.7 ± 1.6
    Pragian   387.7 ± 0.8
    Emsian  393.3 ± 1.2
  Middle
    Eifelian
    Givetian

Silurian
  Llandovery
    Telychian
    Aeronian
    Rhuddanian
  Wenlock
    Homerian
    Sheinwoodian
  Ludlow
    Gorstian
  Pridoli
    Ludfordian

References: 1) This study; 2) Dunning and Manser (1993); 3) O’Driscoll and Wilton (2005); 4) Dickson et al. (2007); 5) McNicoll et al. (2006); 6) Reynolds et al. (1981); 7) Boyce and Dickson (2006).
Summary:

- Mount Peyton trend is anomalous in Au, Ag, As and Sb (common element association in region).
- Cpx-Bt-Hbl gabbro-diorite at Norris Arm and Rolling Pond are constrained at 422.3 ± 1.2 and 423.6 ± 1.8 Ma.
- Broadly northwest-trending miarolitic monzogranite at Slip is 418 ± 1.6 Ma and contains granite-related mineralization.
- Near Slip, quartz veins in gabbro-diorite also contain similar mineralization and metal associations.
- Salmon River mineralization trends NE and consists of broad Py-Apy-quartz-muscovite-siderite alteration envelopes around thin quartz-carbonate veinlets in diorite.
Summary continued:

- Similar metal associations and tenors, but a distinct geological setting.
- Salmon River mineralization may therefore represent more ‘distal’ vein-wall-rock mineralization above miariolitic granite dykes and cupolas.
- Other showings in the region with the metals As±Au±Ag±Sb±Hg±Cd±Te commonly exhibit epithermal, epizonal styles of mineralization (void-filling textures and hydrothermal breccias).
- The majority are likely ‘intrusion-related’, structurally controlled examples of similar mineralization.
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