A New Look at Mineral Occurrences Associated with the South Mountain Batholith, Southwestern Nova Scotia

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Recent interest in the closed East Kemptville tin mine by Avalon Advanced Materials, as well as the current explosion in exploration for lithium (both nationally and internationally), has drawn renewed interest in the specialized-granite-associated deposits of the peraluminous South Mountain Batholith (SMB). Historically, this area was mostly known for its tin deposits at East Kemptville and at smaller showings and mines in the New Ross and other areas. Furthermore, there is a broad diversity of other commodities associated with the SMB, ranging from industrial minerals, such as fluorite, to valuable metals, including copper, zinc, lead, tungsten, molybdenum and gold. This demonstrates a clear need to better understand the scale and character of these granite-related occurrences. Although mapping and considerable research has previously been conducted on the batholith (e.g. MacDonald, 2001 and references within), detailed deposit-scale research with modern geochemical analysis has not been conducted on many of the reported mineral occurrences since the 1980s, when this mapping occurred. In fact, many occurrences had not been field checked since the mapping program and have never had sample descriptions or geochemistry of any kind made available in the Mineral Occurrence Database (MODB) (O'Reilly et al., 2016). Consequently, as the first year of a new field program focussed on SMB-related mineralization, the emphasis in 2016 was on finding, sampling and describing many of the neglected mineral occurrences across the region.

In the first year of the program, emphasis was placed on areas with high densities of often diverse mineral occurrences, with the principal objective of finding a way to connect these many types of mineralization to one another. Specifically, this resulted in a focus on the many occurrences in the New Ross area, Lunenburg County (previously studied in detail by O'Reilly et al., 1982); some deposits in the East Kemptville area, Yarmouth County; and in the St. Margarets Bay and Mahone Bay areas, where many deposits had not been examined at least since the mid 1980s during the original mapping of the SMB. Due to the large amount of time since the original identification of these deposits, most of which were last studied prior to the availability of GPS data, not all occurrences could be located, and many of those that were found were some distance from the co-ordinates reported in the MODB. Of the occurrences that could be located, those that revealed significant mineralization were predominantly historical mine sites, where most of the identified mineralized samples had been collected from the waste rock and muck piles beside abandoned mine pits and shafts. Locating occurrences was further exasperated by the extensive glacial cover and, where exposed, by substantial weathering of outcrop.

Of the numerous sites that could be located and from which mineralized material was sampled, 15 sites were selected for detailed, comprehensive lithogeochemical analysis, as was a series of new occurrences identified in roadcuts at the South Canoe Lake Wind Farm in New Russell, Lunenburg County. Samples were submitted to Activation Laboratories (ActLabs) of Ancaster, Ontario, for comprehensive geochemical analysis, including 58 elements by 4-acid total digestion inductively coupled plasma-mass spectrometry (ICP-MS), fusion x-ray fluorescence (XRF) analysis of major-element oxides, fluorine analysis, and Au fire assay. Additionally, samples with the possibility of tin mineralization were analyzed by pressed pellet XRF because most methods of digestion do not properly dissolve cassiterite, the principal Sn mineral associated with the SMB.

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Many samples proved to be above the upper detection limits of conventional analysis of Cu, Zn, Pb, Ag, As, Bi, Mo, Li and Sn. These samples have been resubmitted for full, high-concentration assay by peroxide fusion total digestion ICP-MS. Additionally, samples that were submitted for lab analysis were also prepared for polished thin sections at Acadia University in order to make them available for future work, such as SEM, microprobe, XRF mapping or laser ablation ICP-MS analysis. Updated location co-ordinates, geochemical results, and detailed site and sample descriptions will be added to the MODB as they become available.

Among the mineral occurrences with new data (all names are from the MODB) are the following:

- Lunenburg County
  - Turner Tin Prospect
  - Wallaback or Grassy Brook Tin
  - Walker Mo Prospect
  - Fox Point Fe-Cu-Zn-As Occurrence
  - Long Lake Mo, W, Cu Prospect
  - Upper New Cornwall As-W-Zn-Au
  - The new South Canoe Lake Wind Farm Cu-F-Li-Be Occurrence
- Halifax Regional Municipality
  - Ingram River Cu, Sn Occurrence
- Hants County
  - Castle Frederick Pb, Zn, Ag Occurrence
- Kings County
  - East Dalhousie Cu-Sn Prospect
- Annapolis County
  - Falkland Ridge Cu-Mo Occurrence
- Digby County
  - Meteghan Pb, Zn, Ag Prospect
  - Clayton Hill Mo, Cu Occurrence
  - Kenney Shore Sn, Cu Skarn
- Yarmouth County
  - Kempt Snare Lake Prospect
  - Pinkney Point Cu-Mo-W-Sn-As Occurrence

Preliminary results from these analyses have revealed several new discoveries at some of these occurrences. Most notably, a sample of a quartz-arsenopyrite vein at the Fox Point occurrence, Lunenburg County, was found to contain 1.4% Sn by portable XRF (Olympus x5000), although final assay results are pending. Also noteworthy is the discovery of a low-level Au anomaly of 150 ppb from an altered granite sample from the roadcut at the new Highway 103 interchange (westbound off-ramp) at Ingram River, which changes this occurrence from a Cu-Sn occurrence to a Cu-Sn-Au-F occurrence. The several new occurrences found at the South Canoe Lake Wind Farm in New Russell, Lunenburg County, offer a diversity of granite-related mineralization, which has included new copper occurrences (chalcopyrite, malachite and minor azurite), fluorite and beryl. Lab analyses have further shown that samples from this location are uniformly anomalous in Li (four out of five samples contained greater than 400 ppm Li, with full assay results pending).

At the end of the first year of this program, mineral occurrences in southwest Nova Scotia have been provided with updated location co-ordinates, lithogeochemical data, and full site and sample descriptions. These digitally captured base-line data are needed to create a genetic model for these diverse and geographically dispersed occurrences.

References

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