

Till-geochemistry Sampling and Surficial Mapping as a Part of the New Geoscience Initiative in Epithermal Gold in the Cobequid Highlands

D. M. Brushett

Introduction

Surficial geological mapping and sampling were undertaken during autumn 2016 as a component of the renewed bedrock and mineral deposit research on the epithermal gold potential of the Byers Brook and Diamond Brook formations. These activities provide a framework for assessing the mineral potential of the eastern Cobequid Highlands and complement concurrent and previous bedrock mapping by MacHattie (2013; this volume) and Baldwin (2016), and stream sediment sampling initiated in autumn 2016 (Baldwin, this volume).

The primary objectives of the surficial component of this program are to

- conduct surficial geological mapping at the 1:10 000 scale;
- document the local glacial history and sediment dispersal of the map area; and
- conduct a till-geochemistry sampling survey, establish regional background data on till composition and geochemistry, and identify prospective areas and suitable sampling media for further geochemical exploration.

In the first of this multiyear surficial geology program, surficial mapping and associated till sampling were conducted in the Tatamagouche map area (NTS 11E/11) of the eastern Cobequid Highlands. Previous mapping by Stea and Finck (1988) and Stea et al. (1986) identified regions of complex ice-flow chronologies with a minimum of four ice-flow phases over this area of Nova Scotia, and a multitude of surficial deposit types throughout the Cobequid Highlands.

Methods

Field observations, such as surficial units (e.g. till veneer, bedrock, glaciofluvial sediment), ice-flow indicators (e.g. striations) and surficial landforms (e.g. crag-and-tail forms, drumlins, ribbed moraine, eskers), were recorded at each sample site. Surficial mapping using these observations, in addition to topographic data obtained from remote sensing systems (including lidar and Shuttle Radar Topography Mission), is being completed (1:10 000 scale) and will supplement existing regional (1:100 000 scale) mapping (Stea and Finck, 1988).

To date, 26 till samples have been collected from the C-horizon (~ 80 cm depth) of test pits and roadcuts, following sampling protocols outlined by Spirito et al. (2011) and McClenaghan et al. (2013) (Fig. 1). Sample spacing was controlled by access and presence of till but was generally one sample every 1 km along all primary and secondary roads. A ~ 3 kg sample was collected from each site for till-matrix geochemical analysis, grain-size analysis, Munsell colour determination and archiving. Where possible, paleo-ice-flow indicators, such as striae and grooves, were measured to assist in determining and constraining ice-flow directions and chronologies.

Till-matrix geochemical analyses are ongoing. An aliquot of each sample was removed for processing and analysis, and the remainder was archived. Sample splits were dried and then sieved to separate the silt/clay fraction (< 0.063 mm) for geochemical analysis. Geochemical samples have been submitted to Activation Laboratories (Actlabs) for analyses by INAA, ICP-MS, and ICP-OES with 'near total' extraction techniques (code UT3) for

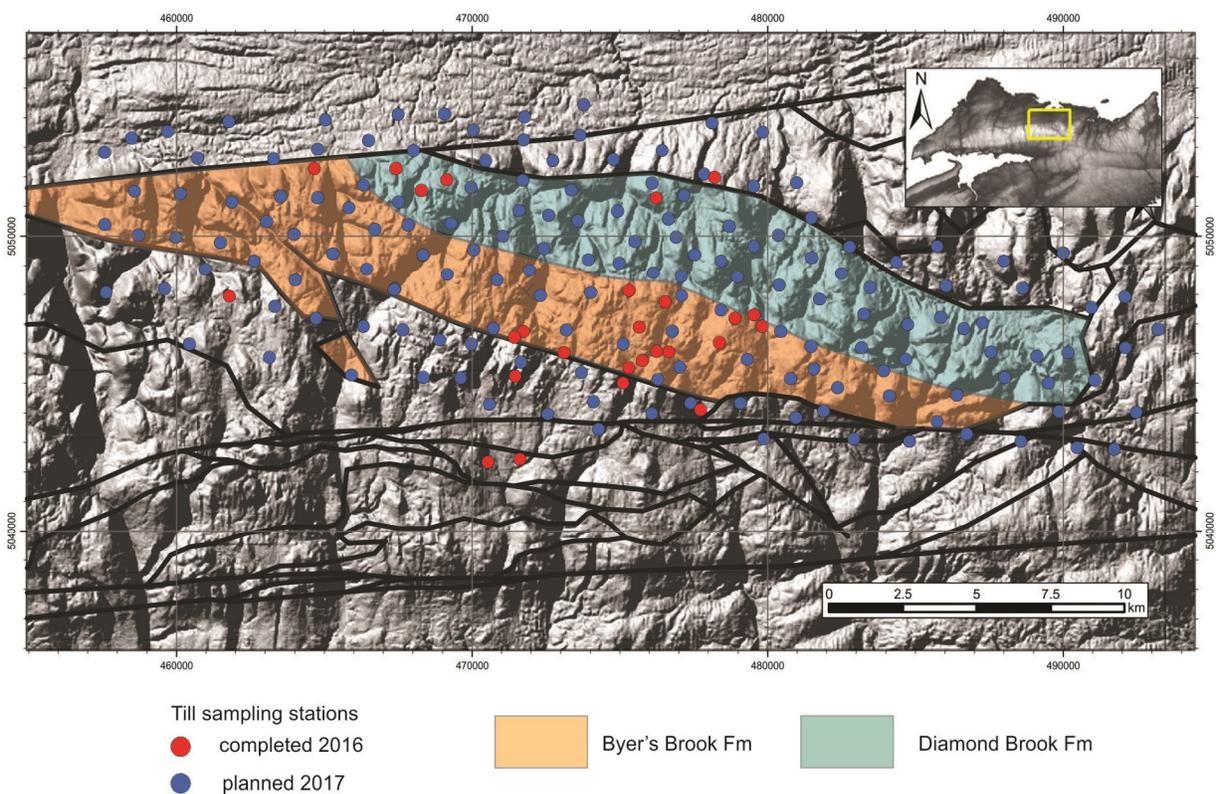


Figure 1. Sample location and geology map of the Byers-Diamond Brook volcanics in the eastern Cobequid Highlands, Nova Scotia. Till samples collected in 2016 and proposed till sampling sites to be completed in 2017 are indicated by red and blue dots, respectively.

Ag, Al, As, Au, Ba, Be, Bi, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, Na, Nb, Nd, Ni, P, Pb, Pr, Rb, Re, S, Sb, Sc, Se, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn and Zr.

Lithological analysis of till samples is also being conducted on the clast component of each sample where clasts sized between 2 and 10 cm in diameter are categorized based on rock type; these results will be presented as percent concentrations of specific rock types relative to the total clast count.

Future Work

Fieldwork will continue in 2017 with additional till sampling and analyses, surficial mapping and examination of till stratigraphy where possible. An estimated 170 sample sites will be visited, which will provide an approximate 1 km² sampling and mapping grid extending over the Byers Brook-Diamond Brook volcanic belt (Fig. 1). Results of

geochemical analyses of till samples, till-clast lithology and grain-size analysis, field observations, individual element contour maps and surficial maps are anticipated to be released in March 2018. These results will provide baseline geological data for future mineral exploration activities and identify anomalous areas that warrant further investigation.

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