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Mines

INDICATOR MINERAL RESULTS FROM A 2019 TILL SAMPLING STUDY, NTS MAP AREA 13N, HOPEDALE BLOCK, LABRADOR

H.E. Campbell and M.B. McClenaghan

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St. John's, Newfoundland
November, 2020

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ABSTRACT

This report provides till indicator mineral results from a surficial sampling study conducted in 2019 in the Hopedale (NTS 13N) map area, to determine the extent of glacially dispersed bedrock material by identifying minerals in till overlying bedrock units of the Hopedale Block. This study will assist in ongoing exploration efforts in the region and aid in understanding paleo ice-flow south of the Nain Plutonic Suite. This study is part of a larger collaborative project undertaken to address geoscientific knowledge gaps in this region of Labrador. Results in this report complement those in previous open file reports (LAB/1743 and 013N/0156) from earlier studies that were conducted as part of a collaborative project between the Geological Survey of Canada (GSC) under its Geo-Mapping for Energy and Minerals (GEM) program, the Geological Survey of Newfoundland and Labrador (GSNL), and the Nunatsiavut Government.

The study area, between latitudes 55.034 and 55.424°N and longitudes 60.613 and 61.354°W, is located west of the air-and-sea-accessed coastal community of Hopedale, south of Big Bay, north of Udjoktok Bay, and east of Harp Lake. The Voisey's Bay Ni–Cu–Co mine is located 110 km north of the study area, west of the community of Nain.

Sample sites were accessed using a Bell 206 LR helicopter and chosen for possible mineral prospectivity based on the examination and processing of historical geochemical and recent geophysical datasets including lake-sediment geochemistry from the National Geochemical Reconnaissance (NGR) program, targeted GSNL lake-sediment surveys, till geochemistry data from the Geological Survey of Canada, indicator mineral studies, and a detailed airborne-magnetic survey flown in 2018. Data from 1:500 000 GSC and 1:50 000 GSNL surficial geology maps were used to further refine site locations. Additional samples were taken in areas remote from potentially mineralized rocks, to establish background contents of potential indicator minerals in till.

Fieldwork was carried out in July 2019. Fifteen samples were collected from till overlying bedrock of the Archean Hopedale Block east of the Harp Lake Intrusive Suite (including the ca. *2890 Ma granites and granodiorites of the Kanairiktok Plutonic Suite, and Late Archean (*ca. *2567 Ma) rocks of the Aucoin gold prospect. Till samples were collected in parts of NTS map areas 13N/02, 03, 06 and 07. Large (10–20 kg) till samples were collected for indicator mineral analysis, smaller (3–5 kg) samples for till matrix geochemical analysis, and pebbles (0.5–5 mm) for lithology identification and counts.*

The large till samples were submitted to Overburden Drilling Management Ltd. (ODM), in Ottawa, Ontario, where they were wet sieved to <2.0 mm, tabled, panned for gold grains, PGMs and other fine-grained metallic indicator minerals, then subjected to heavy-liquid separation (3.2 specific gravity) and picked for kimberlite indicator minerals (KIMs), and metamorphosed/magmatic sulphide indicator minerals (MMSIMs). In addition, the rock lithologies present in the pebble fraction of the till samples were identified and counted. The heavy mineral and pebble lithology data are presented in Microsoft Excel spreadsheets along with sample location data in Appendices A and B1–13 and will be discussed along with the results of the 2017 and 2018 samples in a subsequent report. The results from the 2019 till indicator mineral study will assist in future mineral exploration programs by identifying areas of higher mineral potential and mineral signatures dispersed from bedrock overlain by till.

SUMMARY

Surface till samples were collected at 15 locations over the 1:250 000 Hopedale (NTS 13N) map area, as part of an ongoing regional sampling and mapping study, and to continue sampling southwest and west of regions covered by sampling programs conducted in 2017 and 2018 (Campbell and McClenaghan, 2019a, b). Prospective regions were identified by assessing the results of: 1) historical NGR lake-sediment geochemical datasets (Hornbrook *et al.*, 1979; Hornbrook and Friske, 1990; Friske *et al.*, 1993); 2) historical kimberlite indicator mineral data (Ryan and McConnell, 1995; McConnell and Ryan, 1996); 3) till matrix geochemistry data (Klassen and Bolduc, 1986; Klassen and Knight, 1995); 4) recent till indicator mineral data (Campbell and McClenaghan, 2019a, b) and; 5) historical and recent geophysical datasets (Teskey *et al.*, 1982; Coyle, 2019a–d). Sample sites (Figure 1) were further refined by inspecting the surficial geology of the area (Ricketts, 1984, 1988, 2011a, b; Klassen *et al.*, 1992; Batterson, 1995, 1996, 1999, 2000a–d) and satellite imagery, in order to avoid sampling in regions covered by glaciofluvial and glaciomarine sediments, as these glacial deposits have a more complex depositional history (McClenaghan *et al.*, 2013). Most of the samples from the 2019 season were col-

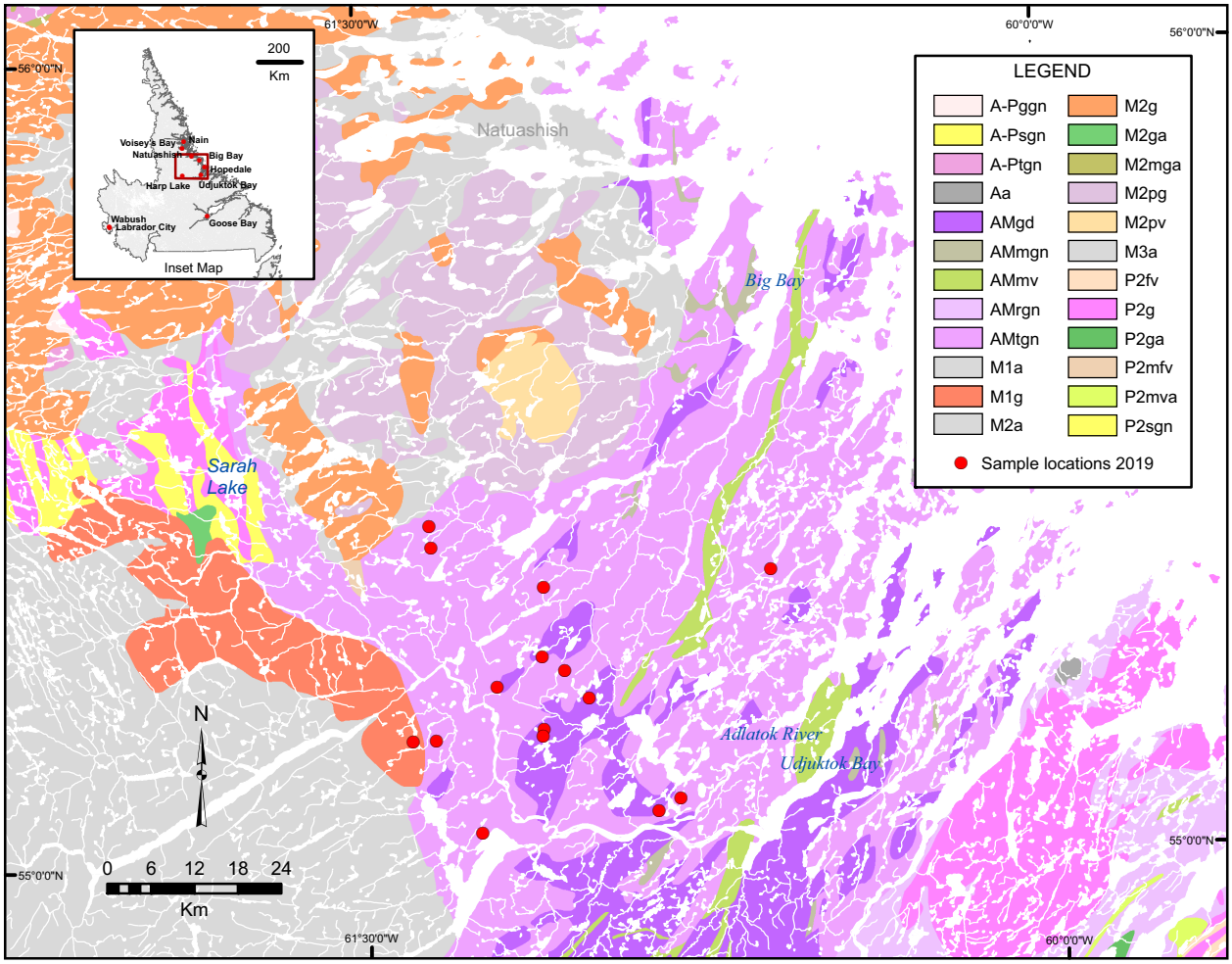

Figure 1. *Sample locations plotted on bedrock geology (*see *Wardle* et al.*, 1997). The study area is indicated by the box in the regional inset map.*

lected in till overlying: 1) *ca.* 2890 to 2825 Ma granodiorites and tonalites (AMgd) of the Kanairiktok Plutonic Suite (Ermanovics, 1993; Wasteneys *et al.*, 1996; James *et al.*, 2002) located east of the Harp Lake Intrusive Suite; 2) *ca.* 2567 Ma syenites, monzodiorites and monzogabbros that host the Aucoin prospect (Sandeman and McNicoll, 2015) and; 3) the Mesoarchean tonalites, diorites and granodiorite gneisses and mafic granulites of the Hopedale Block (Figure 1: Wardle *et al.*, 1997). These sites were chosen in order to: 1) determine the geochemical characteristics of till overlying airborne magnetic anomalies in the region, south and southeast of the Aucoin prospect and west of the Hunt River Belt (HRB); 2) sample up-ice of areas known to contain pristine gold grains in till southwest of the HRB in 2018, and; 3) to determine the southern and southeastern extent of glacial dispersal from the Ingrid Lake area and Aucoin (gold) prospect.

Fifteen bulk till samples, weighing between 8 and 20 kg, were extracted from hand-dug pits, along with 3–5 kg till samples and pebbles, using GEM Program sampling procedures (*see* Spirito *et al.*, 2011a and McClenaghan *et al.*, 2013). Till samples were placed in large plastic bags and sealed with electrical tape to prevent leakage. The samples were double bagged, taped (to ensure that the bag did not rip during transport), and put in buckets for ferry transport to Goose Bay, Labrador and shipped by truck to ODM in Ottawa, Ontario, for indicator mineral processing (Figure 2). Two GSC heavy-mineral Bathurst blanks (samples 19HC4017 and 19HC4018), containing few to no indicator minerals (Plouffe *et al.*, 2013), were inserted in the batch to monitor for possible cross-contamination. One blank was inserted at the beginning of the batch to detect cross-contamination from previously processed sample batches (*ibid.*). The second blank was inserted into the sequence immediately following a sample collected from an area where till was suspected of containing higher amounts of indicator minerals (*e.g.*, down-ice of the Aucoin prospect).

At ODM, the samples were processed using a combination of sieving, tabling, panning and heavy liquid separation at a specific gravity of 3.2. All samples were processed using a shaking table and the table preconcentrates were panned to recover gold, Platinum Group Minerals, and fine-grained metallic indicator minerals. These grains were counted, measured and returned to the table preconcentrates. The samples were then further processed using heavy liquid and magnetic separation techniques following procedures described in McClenaghan *et al.* (2017) and Plouffe *et al.* (2013). A schematic of the sample processing flow sheet is shown in Figure 2.

This report includes: Appendix A1, a metadata sheet for the samples collected in this project; Appendix A2, a listing of the sample location data, and Appendices B1–13, the raw data as reported by the heavy mineral lab with samples listed in the order that they were processed. Interpretations of the data will be presented in a subsequent report.

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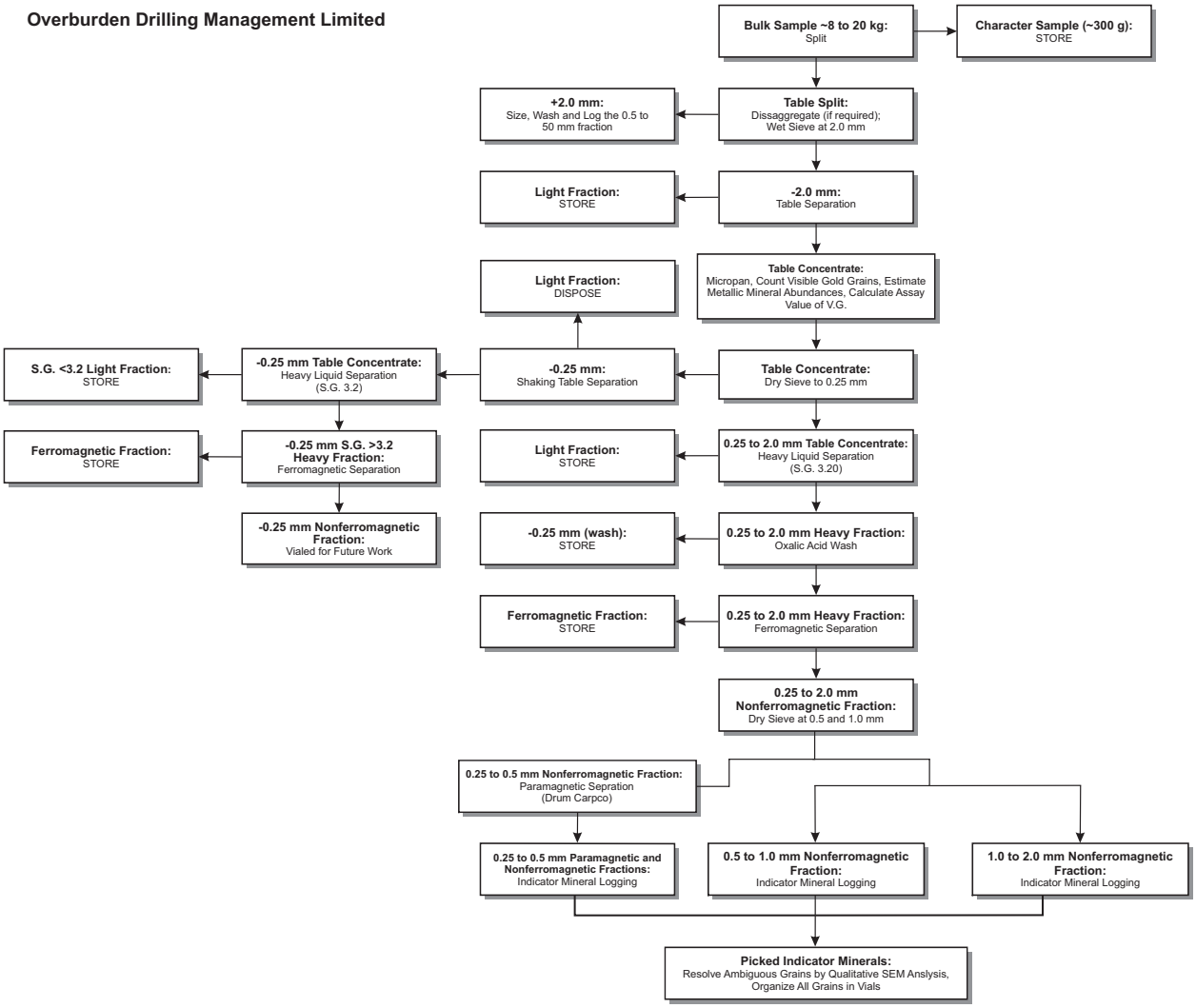

Figure 2. *Processing flow chart used by Overburden Drilling Management Limited for the 19HC samples. Samples were processed for gold grains, kimberlite indicator minerals (KIMs) and metamorphosed/magmatic sulphide indicator minerals (MMSIMs). A detailed logging of the rock lithologies present in the pebble fraction was also performed.*

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APPENDICES

Appendices A1–B13 are available as pdfs or digital excel files (.xlsx) through this link.

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