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GEOCHEMICAL AND HYPERSPECTRAL DATA FROM GOLD OCCURRENCES IN THE GLOVER ISLAND AND GRAND LAKE AREAS, WESTERN NEWFOUNDLAND (NTS MAP AREA 12A/12)

J. Conliffe

Open File 012A/12/1845

St. John's, Newfoundland
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NOTE

DISCLAIMER

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SUMMARY

This Open File release includes Glover Group lithogeochemical and hyperspectral data collected from drillcore and outcrop samples on Glover Island and east of Grand Lake, in western Newfoundland (NTS map sheet 12A/12; Figure 1). These samples were collected between June and August 2019 from known gold occurrences, as part of a multi-year project investigating the geology and mineral potential of the Glover Island and Grand Lake areas.

Whole-rock geochemistry results are included for 60 samples, which were collected from historic trenches, and drillcore, stored at the GSNL core-storage facility in Pasadena and at the Mountain Lake Resources camp on Glover Island. Hyperspectral data is also included from drillcore samples from five occurrences on Glover Island (Kettle Pond South, Lunch Pond North, Lunch Pond South East, Meadow Brook Zone, and 2700 Zone), as well as outcrop samples from other gold occurrences.

Interpretation of the lithogeochemical and hyperspectral data, as well as information on the regional geological setting and descriptions of gold occurrences in the study area, are found in Conliffe (2021).

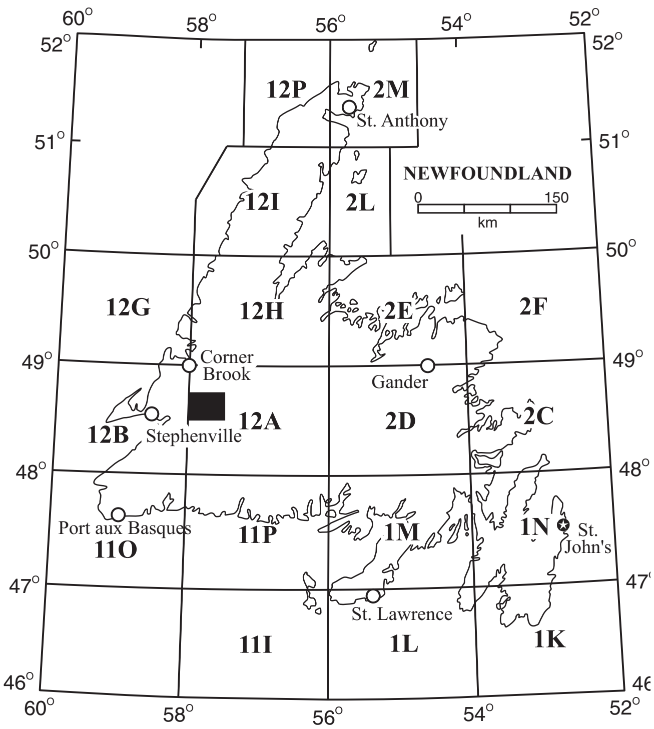

Figure 1. *Location map of study area in western Newfoundland.*

NOTES ON DATABASE

LITHOGEOCHEMICAL DATA

This database includes the results of whole-rock major-element, trace-element and rare-earth-element (REE) analyses of 60 samples. Also included are the sample location data and brief sample descriptions. The location data for samples are presented in Appendix A, with locations reported as Universal Transverse Mercator (UTM) eastings and northings (zone 21, NAD27). The data are available in digital format (*i.e.*, *.csv comma-separated values files) in Appendices B to F.

All samples selected for geochemical analysis were prepared at the Geological Survey of Newfoundland and Labrador's (GSNL) geochemical laboratory in St. John's. Samples were milled using ceramic mills. Most analyses were carried out at the GSNL geochemistry laboratory, and the analytical methods used in this study are described in Finch *et al.* (2018) and summarized in Table 1. Additional analyses (for trace elements including Au) of selected samples were conducted by Bureau Veritas.

Table 1. Analytical methods for geochemical analyses

Analysis	Analytical Method	Preparation/Digestion
SiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, Na_2O, K_2O, TiO_2, MnO, P_2O_5, Ba, Be, Cr, Sc, Zr	Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)	50-50 Lithium Tetraborate Lithium Metaobrate Fusion
As, Cd, Co, Cu, Li, Mo, Ni, Pb, Rb, S, V, Zn	Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)	HF-HCl-HNO_3-$HClO_4$ (total digestion)
Bi, Ce, Cs, Dy, Er, Eu, Ga, Gd, Ge, Hf, Ho, La, Lu, Nb, Nd, Pr, Sm, Sn, Sr, Ta, Tb, Th, Tl, Tm, U, W, Y, Yb	Inductively Coupled Plasma Mass Spectrometry (ICP-MS)	50-50 Lithium Tetraborate Lithium Metaborate Fusion
F	Ion Selective Electrode (ISE)	Na_2CO_3 and KNO_3 fusion
Ag	Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)	HNO_3 digestion
Au, Sb, As, Ba, Br, Ce, Co, Cs, Cr, Eu, Fe, Hf, La, Lu, Mo, Rb, Sm, Sc, Se, Na, Ta, Tb, Th, U, W, Yb, Zr	Instrumental Neutron Activation	Irradiation
LOI	Gravimetric (Grav) at 1000°C	None

Major-element compositions (plus Ba, Be, Cr, Sc and Zr) were analyzed by ICP-OES methods, following lithium tetraborate and metaborate fusion. REE and selected trace elements were determined by ICP-MS analysis following an identical sample digestion procedure, whereas other trace elements (As, Cd, Co, Cu, Li, Mo, Ni, Pb, Rb, S, V and Zn) were analyzed by ICP-OES, after total 4-acid digestion. Volatiles are represented as loss-on-ignition (LOI) at 1000°C, which represents the breakdown of all minerals and release of all volatiles. The ferrous-iron content (FeO) of silicate rocks is determined by the Wilson Method (Wilson, 1960), as outlined by Finch *et al.* (2018). For silver analysis, 0.5 g of sample powder was weighed into a 15 ml digestion tube with 2 ml of concentrated nitric acid, and digested for two hours. The digested sample was analyzed by ICP-OES (Finch *et al.*, 2018). Finally, Appendix F presents additional concentrations of certain elements (including Au) determined by Instrumental Neutron Activation Analysis (INAA) for selected samples.

Major elements are reported in weight percent (wt. %), and minor and trace elements are reported in parts per million (ppm), except gold (Au), which is reported in parts per billion (ppb). A negative number indicates the concentration of the specific element in the sample was below the detection limit (*e.g.*, -0.01 indicates the measured value was below the detection limit of 0.01). Some samples analysed by INAA have elevated detection limits due to high Sb, Br or Au contents. Detection limits are listed for each element in the .csv files. The code -99 indicates the sample was not analyzed for that element.

Analytical duplicates were inserted at a frequency of one in 20, with the duplicate selected at random. In addition, a selection of reference standards was analyzed, also at a frequency of one in 20. The raw, unprocessed data from duplicates and standards is included in the appendices, and can be used by the reader to assess accuracy and precision.

HYPERSPECTRAL DATA

Hyperspectral data was collected from drillcore from five occurrences on Glover Island (Kettle Pond South, Lunch Pond North, Lunch Pond South East, Meadow Brook Zone and 2700 Zone), as well as from outcrop samples from the Jacomar, Lucky Smoke, Tomahawk, Discovery Vein and Noranda #1 occurrences. Location data and drillhole-collar information for holes referenced in this release are included in Appendix G, and the location of outcrop samples is included in Appendix A.

In total, 356 hyperspectral measurements were recorded using visible/infrared reflectance spectrometric (VIRS) analysis collected on, and exported from, a TerraSpec® Pro spectrometer (Appendix H). The downhole depths of the spectral measurements for individual drillholes are included in Appendix H, with measurements collected at downhole intervals of 2 m outside of the zone of observable hydrothermal alteration, and from 0.5 to 1 m in zones of moderate to strong observable alteration (note that some holes contain gaps in the spectral data due to missing core). Hyperspectral measurements on drillcore and outcrop samples were taken on clean cut surfaces (multiple measurements to record intra-sample variations). The TerraSpec® Pro spectrometer was optimized every 30 minutes using a white standard reference material to reduce instrument drift. Appendix I contains the spliced corrected spectral files presented in the "asd.sco" spectroscopy file format.

Spectral data was processed using the 'The Spectral Geologist' (TSG™) software program (version 7.1.0.062) (*see* Kerr *et al.*, 2011 for full methodology). The software facilitates estimation of the two most abundant alteration mineral phases within each sample (Min_1 and Min_2) by comparing the spectra to a spectral library in the TSG™ database (na indicates that no mineral species were identified). An estimate of the relative proportions of the two dominant mineral phases present within each spectra are also provided (Weight_1 and Weight_2), along with a corresponding error related to the overall 'fit' of the sample spectra relative to those in the TSG™ Pro spectral database. The location and depth of characteristic absorption features of short wave infrared-active alteration minerals was also calculated. These include the Al-OH absorption wavelength of white micas (2190–2225 nm) and the Fe-OH absorption wavelength of chlorite (2245–2265 nm), which are commonly used to track hydrothermal alteration associated with mineralization (*see* Conliffe, 2021 and references therein). The code -99 indicates the characteristic absorption features were not observed in that spectra.

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APPENDICES

Appendices are available as digital comma-separated value files (.csv) through this link.

Appendix A: Sample Location and Descriptions

Appendix B: Major-element ICP-OES FUS Data (including standards and duplicate samples)

Appendix C: Trace-element ICP-OES 4-Acid Data (including standards and duplicate samples)

Appendix D: Trace-element ICP-MS FUS Data (including standards and duplicate samples)

Appendix E: Silver (Ag) ICP-OES HNO_3 Data (including standards and duplicate samples)

Appendix F: Gold (Au) (and Additional Elements) INAA Data (including standards and duplicate samples)

Appendix G: Diamond-drillhole Collar Locations

Appendix H: TSG™ Pro Spectral Interpretation Results

Appendix I: Spliced Corrected ASD Spectral Data Files