



Natural Resources

Mines

**GEOCHEMICAL DATA RELATED TO VOLCANOGENIC
MASSIVE SULPHIDE MINERALIZATION, BUCHANS–
ROBERTS ARM BELT, CENTRAL NEWFOUNDLAND
(NTS MAP AREAS 12H/01 AND 08)**

G.W. Sparkes

Open File 012H/2293

**St. John's, Newfoundland
April, 2019**

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SUMMARY

This Open File release contains whole-rock geochemistry for 165 grab samples collected in 2017 from within the central portion of the Buchans–Roberts Arm belt (Figure 1). These samples were collected in relation to ongoing, deposit-level studies of volcanogenic massive sulphide occurrences in the region (NTS 12H/01 and 08). Sample sites are focused around known occurrences of base-metal mineralization and include representative samples of both mineralized and altered material as well as relatively unaltered country rock. A preliminary description of some of the occurrences sampled are found in Sparkes (2018).

NOTES ON THE DATABASE

This database contains the results of major-, trace- and rare-earth element analyses of 165 samples distributed along the central portion of the Buchans–Roberts Arm belt. The database includes sample location data in Universal Transverse Mercator (UTM) eastings and northings, provided in NAD 27 (Zone 21), along with brief sample descriptions (Appendix A). The data is available in digital format (*i.e.*, *.csv, comma-separated values files) through the links provided in the Appendices. A list of abbreviations used in the database is provided in Table 1.

Samples were prepared at the Geological Survey of Newfoundland and Labrador's (GSNL) Geochemistry Laboratory in St. John's. Internal analyses carried out at the GSNL laboratory follow the methods outlined by Finch *et al.* (2018). Select samples were also submitted for external Instrumental Neutron Activation Analysis (INAA) at Maxxam Analytics in Ontario. The following represents a brief summary of select analytical procedures utilized in determining the elements

included in this release; a more detailed description can be found in Finch *et al.* (2018). A summary of the elements included in this release and the method by which they were determined is provided in Table 2.

Major elements plus select trace elements were analyzed by inductively coupled plasma optical emission spectrometry (ICP-OES) following lithium tetraborate and metaborate fusion (Appendix B). Loss-on-ignition (LOI) and ferrous iron (FeO) values are also included with the major elements and are determined through gravimetric and titration methods, respectively (*cf.* Finch *et al.*, 2018). Select trace elements are also provided by ICP-OES following a 4-acid (HF-HCl-HNO₃-HClO₄) total digestion (Appendix C). The remaining trace elements are determined by ICP-MS after a 4-acid (HF-HCl-HNO₃-HClO₄) total digestion

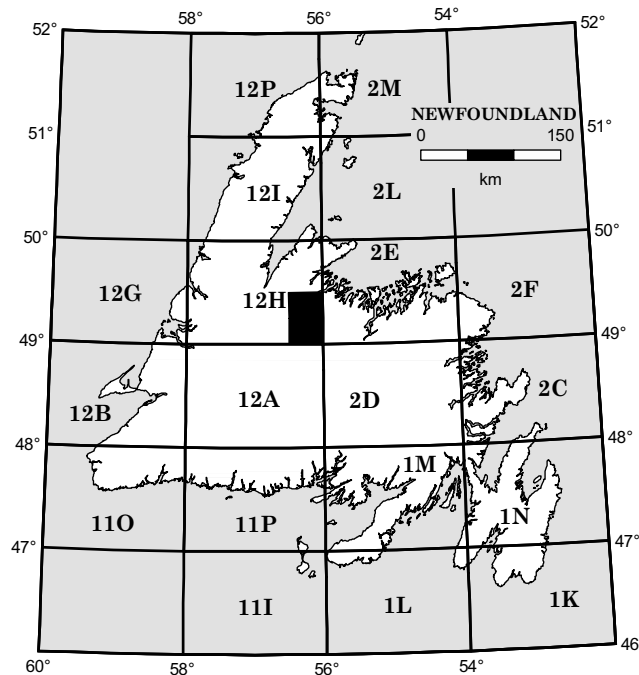


Figure 1. Location map of the study area in central Newfoundland.

Table 1. List of abbreviated terms used in this release

Abbreviation	Explanation
-99	Sample was not analyzed for that element
Dup.	Duplicate analysis
GSNL	Geological Survey of Newfoundland and Labrador
Grav.	Gravimetric
ICP-OES-FUS	Inductively Coupled Plasma Optical Emission Spectrometry; utilizes total digestion, lithium metaborate/tetraborate fusion technique
ICP-OES 4 acid	Inductively Coupled Plasma Optical Emission Spectrometry; utilizes HF-HCl-HNO ₃ -HClO ₄ acid digestion
ICP-MS-FUS	Inductively Coupled Plasma Mass Spectrometry; utilizes total digestion, lithium metaborate/tetraborate fusion technique
INAA	Instrumental Neutron Activation Analysis
ISE	Ion-selective electrode
LOD	Level of detection
LOI	Loss-on-ignition
Mag. Sus.	Magnetic susceptibility (SI units)
N/A	Not available
ppb	Parts per billion
ppm	Parts per million
Std.	Standard
wt. %	Weight percent

Table 2. List of elements contained within the database and the corresponding determining analytical method

Element	Analytical Method
SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ total, MgO, CaO, Na ₂ O, K ₂ O, TiO ₂ , MnO, P ₂ O ₅ , Ba, Be, Cr, Sc, Zr	ICP-OES-FUS
As, Cd, Co, Cu, Li, Mn, Ni, Pb, Rb, V, Zn	ICP-OES 4-acid
Bi, Ce, Cs, Dy, Er, Eu, Ga, Gd, Ge, Hf, Ho, La, Lu, Mo, Nb, Nd, Pr, Sm, Sn, Sr, Ta, Tb, Th, Tl, Tm, U, W, Y, Yb,	ICP-MS-FUS
Sb, As, Ba, Br, Ce, Cs, Cr, Co, Eu, Au, Hf, Fe, La, Lu, Mo, Rb, Sm, Sc, Se, Na, Ta, Tb, Th, W, U, Yb, Zr	INAA
Ag	ICP-OES-HNO ₃
F	ISE
FeO	Titration
LOI	Gravimetric

(Appendix D). Fluoride values are provided by ion-selective electrode analysis following alkaline fusion (Appendix E). Silver analyses are done through ICP-OES following a nitric acid digestion (Appendix F). The procedure for external INAA analysis is summarized in Finch *et al.* (2018); INAA data for select samples is provided in Appendix G.

Note that in the accompanying database, some samples have high Ba values, which result in higher than normal detection limits for certain elements, particularly with respect to the INAA analyses. The high Ba values in samples GS-17-045 and GS-17-175 in Appendix G are beyond the calibrated range for the INAA method and, therefore, the reported values for these samples should be taken as semi-quantitative.

REFERENCES

Finch, C., Roldan, R., Walsh, L., Kelly, J. and Amor S.

2018: Analytical methods for chemical analysis of geological materials. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Open File NFLD/3316, 67 pages.

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APPENDICES

The data are available as digital comma-separated files (.csv) through [this link](#).

APPENDIX A: Sample Locations and Description Data

APPENDIX B: Major-element ICP-OES-FUS Data (standard and duplicate samples)

APPENDIX C: Trace-element ICP-OES 4-Acid Data (standard and duplicate samples)

APPENDIX D: Trace-element ICP-MS-FUS Data (standard and duplicate samples)

APPENDIX E: Fluoride (F-) Ion-selective Electrode Data (standard and duplicate samples)

APPENDIX F: Silver (Ag) ICP-OES-HNO₃ Data (standard and duplicate samples)

APPENDIX G: Instrumental Neutron Activation Analysis (INAA) Data (standard and duplicate samples)