



Mines

**ADDITIONAL GEOCHEMICAL SAMPLES 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/2329

**St. John's, Newfoundland
August, 2020**

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SUMMARY

This Open File release contains whole-rock geochemistry for 199 samples collected in 2018, primarily from drillcore, but also includes several outcrop samples from the central portion of the Buchans–Roberts Arm belt (Figure 1). These samples were collected as part of deposit-level studies focusing on volcanogenic massive sulphide occurrences in the region (NTS 12H/01 and 12H/08). Samples targeted known occurrences of base-metal mineralization and included representative samples of both mineralized and altered material as well as relatively unaltered country rock. A discussion of some of this data and related occurrences can be found in Sparkes (2020). Geochemical data collected from outcrop samples related to this Open File can be found in Sparkes (2019).

NOTES ON THE DATABASE

This database contains the results of major-, trace- and rare-earth element analyses of 199 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 (N27; Zone 21) and NAD 83 (N83; Zone 21), along with brief sample descriptions (Appendix A).

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 (now Bureau Veritas) in

Ontario. The following represents a brief summary of select analytical procedures utilized in determining the elements included in this release.

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 four acid (HF-HCl-HNO₃-HClO₄) total digestion (Appendix C). The remaining trace elements are determined by ICP-MS following lithium tetraborate and metaborate fusion (Appendix D). Fluoride values are provided

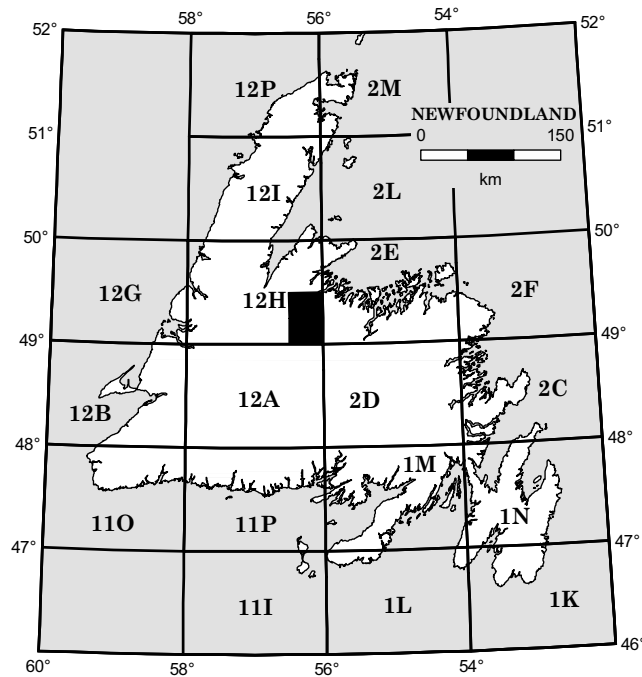


Figure 1. Location map of the study area in central Newfoundland.

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. Representative photographs of the rocks sampled for geochemistry are contained in Appendix H. A copy of Appendix A is included with the photographs in Appendix H, which contains columns listing the file name for each of the individual photographs (Photo) and a corresponding hyperlink to each of these files (Link_Photo).

Note that in the accompanying database some samples have high values of Ba and/or As, which result in higher than normal detection limits for certain elements, particularly with respect to the INAA analyses. All databases are available in digital format (*i.e.*, *.csv comma-separated value files) through the link provided in the Appendices section. A list of abbreviations used in the databases is provided in Table 1. A summary of the elements included in this release and the method by which they were determined is provided in Table 2.

Table 1. List of abbreviated terms used in this release

Abbreviation	Explanation
Au	Gold
-99	Sample was not analyzed for that element
BVL	Bureau Veritas Labs
Chl	Chlorite
Classific	Classification
Cpy	Chalcopyrite
Cu	Copper
DDH_Sta_ID	Diamond drill hole or outcrop station ID number
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	Magnetite
Mag. Sus.	Magnetic susceptibility (SI units); determined using a KT-10 magnetic susceptibility meter
Min1_2	Minerals determined by TerraSpec analysis

Table 1 (continued). List of abbreviated terms used in this release

Abbreviation	Explanation
Pb	Lead
Po	Pyrrhotite
ppb	Parts per billion
ppm	Parts per million
Py	Pyrite
Sph	Sphalerite
Std.	Standard
wt. %	Weight percent
Zn	Zinc

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, S, V, Zn	ICP-OES 4-acid
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	ICP-MS-FUS
As, Au, Ba, Br, Ce, Co, Cr, Cs, Eu, Fe, Hf, La, Lu, Mo, Na, Rb, Sb, Sc, Se, Sm, Ta, Tb, Th, U, W, Yb, Zr	INAA
Ag	ICP-OES-HNO ₃
F	ISE
FeO	Titration
Fe ₂ O ₃	Calculation
LOI	Gravimetric

REFERENCES

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2020: The style and setting of select VMS occurrences, central Buchans–Roberts Arm belt, Newfoundland. *In* Current Research. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Report 20-1, pages 207-233.

APPENDICES

Appendices A–G are available as digital comma-separated files (.csv) and Appendix H is available as digital images (.jpg) in a zip file through [this link](#).

Appendix A: Sample Locations and Description Data

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

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

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

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

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

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

Appendix H: Representative Sample Photographs