



Natural Resources
Canada

Ressources naturelles
Canada

**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 8709**

**Whole-rock lithochemistry of the upper Rouyn-Pelletier
Formation, Rouyn-Noranda, Quebec**

P. Mercier-Langevin, C. Boudreau, V. Bécu, K. Lauzière, and J. Goutier

2020

Canada 



**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 8709**

**Whole-rock lithochemistry of the upper Rouyn-Pelletier
Formation, Rouyn-Noranda, Quebec**

P. Mercier-Langevin¹, C. Boudreau^{2,3}, V. Bécu¹, K. Lauzière¹, and J. Goutier⁴

¹Geological Survey of Canada, 490, rue de la Couronne, Québec, Quebec G1K 9A9

²Département de géologie et de génie géologique, Université Laval, 1065 avenue de la Médecine,
Québec, Quebec G1X 4X4

³WSP, 1600 boulevard René-Lévesque Ouest, Montréal, Quebec H3H 1P9

⁴Ministère de l'Énergie et des Ressources naturelles du Québec, 70 avenue Québec, Rouyn-Noranda,
Quebec J9X 6R1

2020

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources, 2020

Information contained in this publication or product may be reproduced, in part or in whole, and by any means, for personal or public non-commercial purposes, without charge or further permission, unless otherwise specified.

You are asked to:

- exercise due diligence in ensuring the accuracy of the materials reproduced;
- indicate the complete title of the materials reproduced, and the name of the author organization; and
- indicate that the reproduction is a copy of an official work that is published by Natural Resources Canada (NRCan) and that the reproduction has not been produced in affiliation with, or with the endorsement of, NRCan.

Commercial reproduction and distribution is prohibited except with written permission from NRCan. For more information, contact NRCan at nrcan.copyrightdroitdauteur.nrcan@canada.ca.

Permanent link: <https://doi.org/10.4095/322188>

This publication is available for free download through GEOSCAN (<https://geoscan.nrcan.gc.ca/>).

Recommended citation

Mercier-Langevin, P., Boudreau, C., Bécu, V., Lauzière, K., and Goutier, J., 2020. Whole-rock lithochemistry of the upper Rouyn-Pelletier Formation, Rouyn-Noranda, Quebec; Geological Survey of Canada, Open File 8709, 1 .zip file. <https://doi.org/10.4095/322188>

Publications in this series have not been edited; they are released as submitted by the author.

Table of Contents

Foreword/Context	1
Summary	1
Analytical Methods.....	1
Quality assurance and quality control (QA/QC).....	2
References.....	2

Whole-rock lithogeochemistry of the upper Rouyn-Pelletier Formation, Rouyn-Noranda, Quebec

Foreword/Context

The Targeted Geoscience Initiative (TGI) is a Government of Canada-led collaborative geoscience research program directed towards providing next generation knowledge and methods that will facilitate more effective targeting of mineral deposits. The objective of the program is to improve the effectiveness of exploration for Canada's major mineral systems by resolving foundational geoscience problems to constrain the geological processes that liberate metals from their source region, transport these ore metals and control their eventual deposition.

Through TGI4 (2010-2015), five of Canada's major ore systems were studied, including a project on lode gold deposits. Three main research themes defined the Lode Gold project: 1) banded iron formation-hosted gold deposits; 2) intrusion-related and stockwork-disseminated gold deposits; and 3) crustal-scale fault zones fertility (Dubé et al., 2015).

Through TGI5 (2015-2020), five of Canada's major ore systems were studied, including a major project on gold. Two complementary research themes define the Gold project: 1) System controls on gold through space and time (source to trap); and 2) Tectonic influences on gold (tectonic drivers and conduits). These two subprojects are complementary and divided into a series of thematic and/or regional activities in many of the gold-bearing Canadian geological provinces (Mercier-Langevin et al., 2017).

Summary

This report releases whole-rock geochemical and assay results of 20 samples from the upper Rouyn-Pelletier Formation and one sample from the Horne Formation in the Rouyn-Noranda area of the Abitibi greenstone belt. These samples were collected in 2012 as part of a GSC-supported B.Sc. thesis study (Boudreau, 2013) at the Université Laval, Quebec. The lithogeochemical data is presented in a format easily importable into a geographic information system (GIS) application. The samples were collected to document the volcanic facies, hydrothermal alteration and the nature of sulphide clast-bearing volcanoclastic units of the uppermost part of the Rouyn-Pelletier Formation. Sample information and geochemical results are presented in Appendices 1 and 2 (worksheet "Results"), respectively. The results worksheet is from a data report produced in 2012 and one sample comes from an earlier report in 2010.

Analytical Methods

Whole-rock analyses were performed at Activation Laboratories Ltd. in Ancaster, Ontario, using a combination of their standard preparation and analytical packages, the details of which can be found at <https://actlabs.com/geochemistry>. Methods and detection limits are reported for oxides and elements in Appendix2-worksheet "DetectionLimit" while method abbreviations appear in *italic* below.

Samples were initially dried (60°C) and crushed to at least 90% (<2mm) in a steel jaw crusher. A mechanically split fraction was pulverized in a chromium-free steel mill until 95% of the sample material passed through a 74 µm mesh. Major elements were determined by lithium metaborate-tetraborate fusion followed by inductively coupled plasma mass spectrometry (*FUS-ICP*) and by 4-acid "near total" digestion (TD-MS). Trace and rare earth elements were determined by a combination of lithium metaborate-tetraborate and near total digestion (four acids) followed by inductively coupled plasma mass spectrometry (*FUS-MS*; TD-MS) and inductively coupled plasma atomic emission spectrometry (*FUS-ICP*; *ICP-OES*). FeO was determined by titration using a cold acid digestion (ammonium metavanadate and hydrofluoric acid) in an open system (*TITR*).

For chalcophile elements, a 4-acid "near total" digestion ICP-MS (*TD-MS*) method was preferred. Nitric Peroxide acid (*NP-MS*) digestion coupled with ICP-MS was chosen to analyze As, Sb, Bi, Se and Te.

Boron was determined by gamma neutron activation analysis (*PGNAA*).

Preferred method for Au included the combination of fire assay with an atomic absorption (*FA-AA*) finish. For Ag, various digestion/finish methods were used, including aqua regia-ICP-OES, metaborate-tetraborate-ICP-MS, and 4-acid-ICP-MS.

CO₂ and Total (S) were determined by combustion infrared analysis (*IR*). Mercury was measured by cold vapor-atomic absorption using a flow injection mercury system (*FIMS*) after aqua regia digestion.

Actlabs reports LOI, LOI2, Total and Total 2. LOI is determined by weighing a small amount of the sample before and after ignition. However, because FeO was measured, it was possible to adjust LOI to take into account the weight gain resulting from oxidation of FeO to Fe₂O₃. This adjusted value of LOI is LOI2.

Reported Total is the total of all major oxides using Fe₂O₃(T) and LOI, whereas Total2 includes LOI2.

Quality assurance and quality control (QA/QC)

Activation Laboratories internal QA/QC system under ISO 17025 or ISO 9001:2008 accreditation, quality control materials (certified standards and duplicates and Blanks) are reported in Appendix 2 in worksheets “LabStandards”, “Duplicates” and “Blanks”.

Precision estimated from internal standard and duplicates are within 10% of the mean standard value for most elements except for Nb_TD_MS_ppm and Te_NP-MS_ppm. Limitations include insufficient material for analysis of some standards. Blank sample analyses show no contamination between samples.

References

Boudreau, C., 2013. Caractérisation des unités volcaniques à fragments de sulfures de la Formation Rouyn-Pelletier, Rouyn-Noranda, Québec; B.Sc. thesis, Université Laval, Quebec, Canada, 48 p.

Dubé, B., Mercier-Langevin, P., Castonguay, S., McNicoll, V.J., Bleeker, W., Lawley, C.J.M., De Souza, S., Jackson, S.E., Dupuis, C., Gao, J.-F., Bécu, V., Pilote, P., Goutier, J., Beakhouse, G.P., Yergeau, D., Oswald, W., Janvier, V., Fontaine, A., Pelletier, M., Beauchamp, A.-M., Katz, L.R., Kontak, D.J., Tóth, Z., Lafrance, B., Gourcerol, B., Thurston, P.C., Creaser, R.A., Enkin, R.J., El Goumi, N., Grunsky, E.C., Schneider, D.A., Kelly, C.J., and Lauzière, K., 2015. Precambrian lode gold deposits — a summary of TGI-4 contributions to the understanding of lode gold deposits, with an emphasis on implications for exploration; *in* Targeted Geoscience Initiative 4: Contributions to the understanding of Precambrian lode gold deposits and implications for exploration, (ed.) B. Dubé and P. Mercier-Langevin; Geological Survey of Canada, Open File 7852, p. 1–24.

Mercier-Langevin, P., Rogers, N., Dubé, B., Bleeker, W., Castonguay, S., McNicoll, V.J., Chapman, J.B., Lawley, C.J.M., Bellefleur, G., Houlé, M.G., Pinet, N., Jackson, S.E., Davis, W.J., Bécu, V., Peter, J.M., Paradis, S., Potter, E.G., Bjerkelund, C., Villeneuve, M.E., and Evans, R., 2017. Targeted Geoscience Initiative: 2016 Report of Activities – An overview; *in* Targeted Geoscience Initiative – 2016 Report of Activities, (ed.) N. Rogers; Geological Survey of Canada, Open File 8199, p. 7-16. doi:10.4095/299573