Natural Resources Canada | Ressources naturelles Canada

GEOLOGICAL SURVEY OF CANADA
OPEN FILE 8501

Whole-rock lithogeochemistry of the gold-bearing mineralized zones of the Horne 5 deposit, Quebec

A. Krushnisky, P. Mercier-Langevin, P.S Ross,
V. Bécu, K. Lauzière, and J. Goutier

2019

Canada

GEOLOGICAL SURVEY OF CANADA
OPEN FILE 8501

Whole-rock lithogeochemistry of the gold-bearing mineralized zones of the Horne 5 deposit, Quebec

A. Krushnisky[1], P. Mercier-Langevin[2], P.-S. Ross[1], V. Bécu[2], K. Lauzière[2], and J. Goutier[3]

[1] Institut national de la recherche scientifique – Centre Eau, Terre et Environnement, 490 rue de la Couronne, Québec, Quebec G1K 9A9
[2] Geological Survey of Canada, 490 rue de la Couronne, Québec, Quebec G1K 9A9
[3] Ministère de l'Énergie et des Ressources naturelles du Québec, 70 avenue Québec, Rouyn-Noranda, Quebec J9X 6R1

2019

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources, 2019

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.rncan@canada.ca.

Permanent link: https://doi.org/10.4095/314545
This publication is available for free download through GEOSCAN (http://geoscan.nrcan.gc.ca/).

Recommended citation

Krushnisky, A., Mercier-Langevin, P., Ross, P.-S, Bécu, V., Lauzière, K., and Goutier, J., 2019. Whole-rock lithogeochemistry of the gold-bearing mineralized zones of the Horne 5 deposit, Quebec; Geological Survey of Canada, Open File 8501, 1 .zip file. https://doi.org/10.4095/314545

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 gold-bearing mineralized zones of the Horne 5 deposit, 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 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 210 samples from the gold-bearing mineralized zones of the Horne 5 deposit. These samples were collected during the 2016 and 2017 field seasons as part of a Masters study by the senior author (Krushnisky, 2018) at the Institut National de la Recherche Scientifique, Centre Eau, Terre, Environment (INRS-ETE) in Quebec City. Research on gold-bearing mineralized zones of the Horne 5 deposit was conducted under the Gold project under the System Controls on Gold Through Space and Time (source to trap) theme. The geochemical data is presented in a format easily importable in a geographic information system (GIS). Samples were collected from drillcore to document host units, the alteration zones and the ore. Interpretations are presented in Krushnisky (2018) and Krushnisky et al. (2017, 2018). Sample information and geochemical results are presented in Appendices 1 and 2 (worksheet "Results") respectively. The results worksheet combines 3 reports done in 2016 and 2017.

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 www.actlabsint.com/methods_can.htm. 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 (ICP-MS; *FUS-MS*). Trace and rare earth elements were determined by a combination of lithium metaborate-tetraborate and total digestion (four acids) followed by inductively coupled plasma mass spectrometry (ICP-MS; *FUS-MS*) and inductively coupled plasma atomic emission spectrometry (ICP-OES; *FUS-ICP*). FeO was determined by titration using a cold acid digestion (ammonium metavanadate and hydrofluoric acid) in an open system (*TITR*).

For chalcophile elements a four-acid digestion ICP-MS (*TD-MS*) method was preferred. Aqua regia (*AR-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*).

Gold and silver were measured by a combination of atomic absorption (*FA-AA*), fire assay, and gravimetry (*FA-GRAV*). High-grade ore zone samples were re-analyzed with a combination of fire assay and gravimetric methods for gold and silver (*FA-GRAV*) and aqua regia dissolution (*ICP-OES*) or sodium peroxide fusion (*FUS-Na2O2*) with ICP-OES depending on the analyte.

CO_2 and Total (S) were determined by combustion infrared analysis (*IR*).

Fluorine was determined by lithium metaborate and tetraborate fusion and fluoride ion electrode analysis (*FUS-ISE*). Chlorine was determined by instrumental neutron activation analysis (*INAA*). Mercury was determined by cold vapour flow injection (*FIMS*) following 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.
Total1 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 "Lab_Standards", "Lab_Duplicates" and "Lab_Blanks" . In addition to these laboratory quality control measures, blind internal standards were also included to monitor analytical reliability.

Precision estimated from internal standards and duplicates are within 10% of the mean standard value for most elements except for W_FUS-MS, B_PGNAA, Zr_FUS-ICP, Te_AR-MS, Se_AR-MS and Tl_FUS-MS. Limitations include insufficient material for analysis of some standards. Blank sample analyses show minimal contamination between samples except in blank analysis respectively for Cr_TD-MS and Au_FA-MS_ppb.

References

Krushnisky, A., 2018, Controls on gold enrichment at the Horne 5 Archean VMS deposit, Abitibi greenstone belt, Québec; Unpublished MSc thesis, Institut national de la Recherche scientifique, Centre Eau, Terre et Environnement, Québec, Québec, 198 p.

Krushnisky, A., Mercier-Langevin, P., Ross, P.-S., Goutier, J., McNicoll, V.J., Moore, L., Pilote, C., and Bernier, C.,2018, Controls on the distribution, style,composition and timing of the gold-bearing mineralized zones of the Horne 5 deposit, Abitibi greenstone belt, Quebec; in Targeted GeoscienceInitiative: 2017 report of activities, volume 1, (ed.) N. Rogers; Geological Survey of Canada, Open File 8358, p. 95–98. http://doi.org/10.4095/306439

Krushnisky, A., Mercier-Langevin, P., Ross, P.-S., McNicoll, V., Goutier, J.,Moore, L., Pilote, C., and Bernier C., 2017. Au-Ag-Cu-Zn-bearing mineralized zones at the Horne 5 deposit, Rouyn-Noranda, Quebec — new observations and preliminary results; Geological Survey of Canada, Scientific Presentation 62, 1 poster. doi:10.4095/300665

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