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## 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 ore metals and control their eventual deposition.

The Targeted Geoscience Initiative 4 (TGI-4) was a five-year (2010-2015) research program by Natural Resources Canada to conduct collaborative, multidisciplinary, thematic, and knowledge-driven ore systems studies aimed at assisting in the discovery of future resources through more effective targeting of buried mineral deposits in Canada's established and emerging mining camps.

Seven of Canada's major ore systems were studied through TGI-4, including a major project on lode gold deposits. The TGI-4 Lode Gold project, which comprised numerous site-specific and thematic research activities, covered the entire spectrum of crustal settings for lode gold deposits, from orogenic banded iron formation-hosted and greenstone-hosted quartz carbonate vein-type gold deposits formed deep in the crust (>5 km), to intrusion-related deposits that are formed at shallower crustal levels (~2–5 km), and to deposits formed at or near the seafloor. The main findings of the Lode Gold project are summarized in Dubé et al. (2015, and references therein). The Vault deposit research activity contributed to the banded iron formation-hosted gold deposits and to the greenstone-hosted quartz carbonate vein-type gold deposits themes of TGI-4.

## Summary

This report releases 117 whole-rock geochemical and assay results from the gold-bearing mineralized zones of the Vault gold deposit, 7 km north of the Meadowbank Portage and Goose deposits (Janvier et al., 2013, 2015a, 2015b; Janvier 2016). Most samples were collected during the 2012 and 2013 field seasons. The geochemical data is presented in a format easily importable in a geographic information system (GIS). Samples were collected from drill core, outcrops and mine workings to document host units, the alteration zones, and the ore. Preliminary interpretations of the deposit are presented in Dupuis et al. (2014) and in Mercier-Langevin et al. (2017). Sample information and geochemical results are presented in Appendices 1 and 2 (worksheet "Results") respectively. The results worksheet combines 3 laboratory reports produced between 2012 and 2014 (A12-14152, A13-11195, and A14-00454).

## 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/lithogeochemistry-and-whole-rock-analyis. Methods and detection limits are reported for oxides and elements in Appendix 2-worksheet "DetectionLimit".

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). 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) and inductively coupled plasma atomic emission spectrometry (ICP-ES). FeO was determined by titration using a cold acid digestion (ammonium metavanadate and hydrofluoric acid) in an open system.

For chalcophile elements a four-acid digestion ICP-MS method was preferred. Aqua regia digestion coupled with ICP-MS was chosen to analyze As, Sb, Bi, Se and Te.

Boron was determined by gamma neutron activation analysis.

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

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

Fluorine was determined by lithium metaborate and tetraborate fusion and fluoride ion electrode analysis. Chlorine was determined by instrumental neutron activation analysis. Mercury was determined by cold vapour flow injection 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 $Fe_2O_3$. This adjusted value of LOI is LOI2.
Total1 is the total of all major oxides using $Fe_2O_{3(T)}$ 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 2 standard deviation (2σ) of the mean standard value Blank sample analyses show minimal contamination between samples.

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