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**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 8978**

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Meadowbank gold deposit, western Churchill Province,
Nunavut, Canada**

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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 these ore metals and control their eventual deposition. The Phase 4 of the Targeted Geoscience Initiative 4 (2010-2015) aimed more particularly 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 were summarized in Dubé et al. (2015, and references therein). The Meadowbank deposit research activity contributed to the banded iron formation-hosted gold deposits and led to several publications to date (Janvier et al., 2013, 2015a, b) and a graduate thesis by the main author (Janvier, 2016).

Summary

This report releases 813 whole-rock geochemical results of 801 samples from the BIF-hosted Meadowbank gold deposit, Kivalliq region, Nunavut. The samples were collected during the 2011 to 2014 field seasons as part of a PhD study by the senior author (Janvier, 2016) at the Institut national de la Recherche scientifique, Centre Eau, Terre, Environnement (INRS-ETE) in Quebec City. Research at the Meadowbank deposit was conducted under the Lode Gold project and analytical data is presented in a format easily importable in a geographic information system (GIS). Samples were collected from drill core ("Borehole" samples), outcrops and mine workings ("Mine, Surface" samples). Samples were selected to document host units, their petrogenesis, the alteration assemblages and the ore. Interpretations are presented in Janvier (2016). Sample information and geochemical results are presented in Appendices 1 and 2 (worksheet "Results") respectively.

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

CO₂ 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 2 standard deviations of the mean standard value for most elements except for Sb_AR_ICPMS, As_AR_ICPMS, As_FUS_ICPMS, Bi_AR_ICPMS, Sb_FUS_ICPMS, As_FUS_ICPMS in certificate A13-13438 that gave values higher (>mean +2σ) than expected. Limitations include insufficient material for analysis of some standards. Blank sample analyses show minimal contamination between samples except in blank analysis Fe_TITR in certificate A12439 and Total-S_IR_% in report A12-13407.

Acknowledgements

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