

Vita

Candidate's name: Carlin Paul Edward Lentz

Universities
Attended: University of New Brunswick (2014)
Bachelors of Science Honours
Earth Science

University of New Brunswick (2020)
Masters of Science
Earth Science

Communications/Publications:

Lentz, C., Hanley, J.J., McFarlane, C., and Falck, H. (2015) Trace Element Chemistry and Fluid Inclusion Systematics of Skarn Minerals at the Cantung W-Cu Skarn, NWT. Yellowknife Geoscience Forum, talk abstract.

Lentz, C., McFarlane, C., Thorne, K., and Archibald, D. (2016) The Lake George polymetallic vein systems: new geochronologic results of various magmatic and hydrothermal events. Exploration, Mining, and Petroleum NB Conference, talk abstract.

Lentz, C., McFarlane, C., and Thorne, K. (2017) Petrogenesis of gold-bearing sulfides within the Lake George polymetallic system, southwestern New Brunswick: results from LA ICP-MS analyses and *in situ* sulphur isotopes. Atlantic Geoscience Society 43rd Colloquium, talk abstract.

Lentz, C., McFarlane, C., and Falck, H. (2017) Characterization of gold in the W-Cu skarns at Cantung, NWT: results from *in situ* LA ICP-MS, SEM, and Micro-XRF analyses. GAC-MAC Joint Annual Meeting, talk abstract.

Lentz, C., McFarlane, C., and Falck, H. (2017) Physiochemical Controls on Gold Mineralization in the Amber Zone at the Cantung Mine, Northwest Territories. 14th SGA Biennial Meeting, talk abstract.

Lentz, C., McFarlane, C., Falck, H. (2017) Scheelite-bearing high fluid-flux skarns at the metamorphic skarn front and their relationship to other mineralization at the Cantung W-Cu skarn, Northwest Territories. Yellowknife Geoscience Forum, talk abstract.

Lentz, C., McFarlane, C., and Falck H. (2018) *In situ* U-Pb Geochronology of Accessory Minerals at the Cantung W-Cu skarn, NWT: examining implications for various mineralizing events. Resources for Future Generations conference, talk abstract.

Lentz, C.P.E., McFarlane, C. R. M., and Falck, H. (2019) Gold mineralization at the Cantung W-Cu skarn: our present level of understanding. Yellowknife Geoscience Forum, talk abstract.

Lentz, C., Thorne, K., McFarlane, C., and Archibald, D. (2020) U-Pb, Ar-Ar, and Re-Os Geochronological Constraints on Multiple Magmatic-Hydrothermal Episodes at the Lake George Mine, Central New Brunswick. Minerals, publication.

Genesis of Gold Mineralization at the Cantung W-Cu skarn deposit, N.W.T.

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Carlin Paul Edward Lentz

in the Department of Earth Science

U.N.B., Fredericton, N.B.

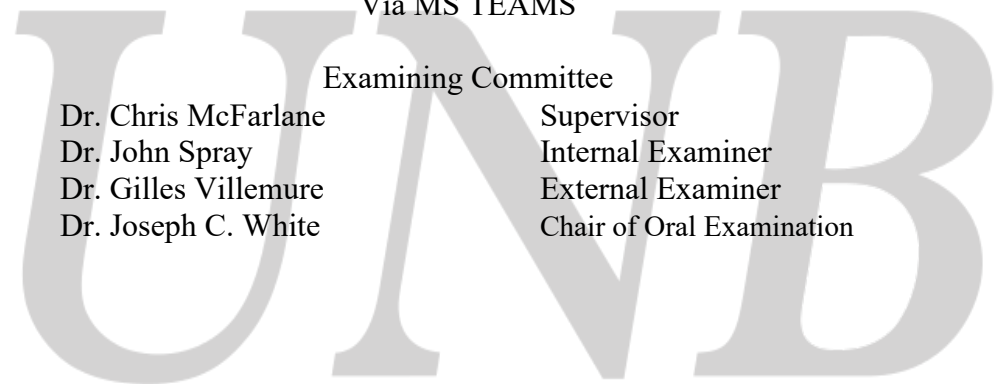
**Friday, October 30th, 2020
10:00 a.m.**

Via MS TEAMS

Examining Committee

Dr. Chris McFarlane
Dr. John Spray
Dr. Gilles Villemure
Dr. Joseph C. White

Supervisor
Internal Examiner
External Examiner
Chair of Oral Examination



Abstract

Cantung mine, Northwest Territories, is widely known as having one of the highest overall tungsten grades of any tungsten deposits. The diversity of metals present in the ore at Cantung (W, Cu, Bi, Au) enhanced the ability for the mine to operate during periods when tungsten prices were low. Although the origins of tungsten and copper mineralization have been well studied, the assemblages which host bismuth and gold mineralization are unknown. Gold and bismuth were both present in the copper concentrate, and although North American Tungsten Corporation Ltd. received smelting credit for the gold, they were penalized for the bismuth. For this reason, a comprehensive study was initiated to identify what phases host the gold mineralization, which skarn assemblages it is hosted within, the relationship between the tungsten and copper mineralization and the gold and bismuth mineralization, as well as the timing of these gold mineralizing events and their relationships to nearby intrusions.

This study began using information garnered from previous preliminary work on gold-bearing assemblages (Palmer 2013). Using detailed reflected light microscopy, the main gold-bearing phase was

identified as electrum (Au-Ag alloy) with an assemblage that included native bismuth, several bismuth telluride and selenide minerals, as well as silver and lead sulfosalts. The textures exhibited by these Bi-Au-Te-Se -bearing phases suggest they precipitated from aqueous solutions as polymetallic melts which remained molten throughout the growth of other skarn and vein minerals and ultimately exsolved from these melts. Other studies have proposed that precipitation of liquid bismuth from aqueous hydrothermal fluids can sequester gold from these solutions, without requiring them becoming saturated with gold. After ascertaining the skarn and vein assemblages hosting gold, U-Pb geochronology of allanite and titanite was conducted to determine the timing of these events. This was done to compare these ages to those of intrusions in the Cantung area to determine if any of these mineralizing events correlate with nearby intrusive activity.