

Vita

Candidate's name: Steven Lawrence Esmond Rossiter

Universities
Attended: University of New Brunswick (2017)
Bachelors of Engineering
Geological

University of New Brunswick (2019)
Masters of Science
Earth Science

Presentations:

Rossiter, S., Broster, B.E., and Allard, S. 2019. A Tale of Two Tills in the McDougall Lake area, Southwestern New Brunswick. Atlantic Geoscience Society 45th Colloquium.

Rossiter, S. and Broster, B.E. 2018. A Portable X-Ray Fluorescence Spectrometry Investigation of Till in the McDougall Lake and Rolling Dam Areas. New Brunswick Energy, Mining and Petroleum Conference.

Rossiter, S. and Broster, B.E. 2018. Using Ex Situ Portable X-ray Fluorescence Spectrometry to Investigate Granulometric Element Partitioning in Basal Till in Southwestern New Brunswick, Canada. AMQUA-CANQUA Joint Meeting.

Rossiter, S. and Broster, B.E. 2018. Portable X-Ray fluorescence investigation of terminal grade in basal till south of the Mount Pleasant deposit, New Brunswick. Atlantic Geoscience Society 44th Colloquium.

Allard, S., Pronk, A.G., Gilmore, W., and Rossiter, S. 2017. Follow-up till geochemical investigations and surficial mapping to aid mineral exploration in New Brunswick. New Brunswick Energy, Mining and Petroleum Conference.

Allard, S. and Rossiter, S. 2017. The use of portable X-ray fluorescence technology and till geochemistry to aid mineral exploration in the McDougall Lake area, south of the Mount Pleasant deposit. New Brunswick Energy, Mining and Petroleum Conference.

Portable X-Ray Fluorescence Spectrometry Investigation of Till in the McDougall Lake Area, Southwestern New Brunswick

UNIVERSITY OF NEW BRUNSWICK
THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Steven Rossiter

in the Department of Earth Science

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

**Tuesday, April 23rd, 2019
9:00 a.m.**

Forestry/Geology Building, Room 104

Examining Committee

Dr. Bruce Broster
Dr. Don Fox HRA
Dr. Paul Arp
Dr. Joseph C. White

Supervisor
Internal Examiner
External Examiner
Chair of Oral Examination

Abstract

Basal till samples were collected at 274 locations across the eastern half of the McDougall Lake area (NTS: 21 G/07) and geochemically analyzed at a commercial laboratory by 59-element Sodium Peroxide Fusion Inductively Coupled Plasma-Mass Spectrometry and Optical Emission Spectrometry, and at the University of New Brunswick by a relatively new method, 40-element Portable X-Ray Fluorescence Spectrometry. With respect to accuracy, precision, element suite, and limits of detection, commercial laboratory geochemistry is a superior method, although it is relatively slower and more expensive. Testing suggests that the methods can produce results of similar quality for the purposes of mineral exploration; excellent agreement in accuracy and precision were demonstrated for As, Th, Zr, and others. Portable X-Ray Fluorescence Spectrometry data were also empirically calibrated to compensate for systematic error, which greatly improved data quality for Ba, Ca, U, and others.

This study recognizes two till populations: “granite-rich” and “reddish”. Within the McDougall Lake area, the occurrence of granite-rich till is widespread and common, while reddish till is generally limited to the Scoullar and Clarendon Hills, east of the Magaguadavic Highlands. Granite-rich till is often sandy, loose, and yellowish brown, while reddish till is often loamy, firm, and dark red. Geochemically, the granite-rich till population has a relatively variable concentration range for incompatible elements, which reflects the diverse plutonic bedrock composition of the McDougall Lake area. This study emphasizes that in the McDougall Lake area, variable bedrock geochemistry and the presence of two tills should be considered as important interplaying factors which can control till geochemistry.