

Ph.D. Candidate

Simon David Craggs

Graduate Academic Unit

Earth Sciences

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**February 22, 2022**

**2:00 p.m.**

**Virtual Defence**

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Examining Board:

Dr. Chris McFarlane (Earth Sciences)

Dr. Adrian Park (Honorary Research Associate – Earth Sciences)

Dr. John Kershaw (Forestry and Environmental Management)

Dr. Joseph Clancy White (Earth Sciences) Supervisor

Dr. David Lentz (Earth Sciences) Supervisor

External Examiner: Dr. Stephen Johnston
Earth & Atmospheric Sciences
University of Alberta

The Oral Examination will be chaired by:

Dr. Patricia Evans, Associate Dean of Graduate Studies

BIOGRAPHY

Universities attended (with dates & degrees obtained):

2008 – present Ph.D. candidate, University of New Brunswick
2008 MSc, Earth Sciences, University of New Brunswick
2004 BSc (Hons), Geological Sciences, University of Leeds

Publications:

Craggs, S.D., Keighley, D., Waldron, W.F., and Park, A. 2017. Salt tectonics in an intracontinental transform setting: Cumberland and Sackville basins, southern New Brunswick, Canada. Basin Research, 29: 266-283

Selected Conference Presentations:

Craggs, S.D. 2016. Structural evolution of the Keno Hill mining district. Margins Through Time GAC-MAC, Whitehorse, Yukon, Canada.

Craggs, S.D., Keighley, D., Park, A., and Waldron, W.F. 2013. Stratigraphy and salt tectonics of Mississippian–Pennsylvanian strata of the northern Cumberland Basin, Maringouin Peninsula, southeastern New Brunswick. Atlantic Geoscience, Antigonish, Nova Scotia, Canada.

Craggs, S.D., Lentz, D.R., and White, J.C. 2011. Structural evolution of the Keno Hill Ag-Pb-Zn mining district, Yukon. AMEBC Roundup, Vancouver, BC, Canada.

Craggs, S.D. 2010. Polyphase deformation and vein/fracture geometry in the Keno Hill Ag-Pb-Zn mining district. Yukon Geoscience Forum, Whitehorse, Yukon, Canada.

Craggs, S.D., and Lentz, D.R. 2010. Petrographic, geochemical, and pseudochemostratigraphic analysis of metamafic intrusions in the Keno Hill Ag-Pb-Zn mining district, Yukon, Canada. Yukon Geoscience Forum, Whitehorse, Yukon, Canada.

Craggs, S.D., Lentz, D.R., and White, J.C. 2010. Polyphase folding in the Keno Hill Ag-Pb-Zn mining district, Yukon, Canada. GAC-MAC Joint Annual Meeting, Calgary, Alberta, Canada.

Craggs, S.D., and Lentz, D.R. 2009. A petrological, geochemical and chemostratigraphic analysis of metamafic intrusions in the Keno Hill Ag-Pb-Zn mining district, central Yukon. Yukon Geoscience Forum, Whitehorse, Yukon, Canada.

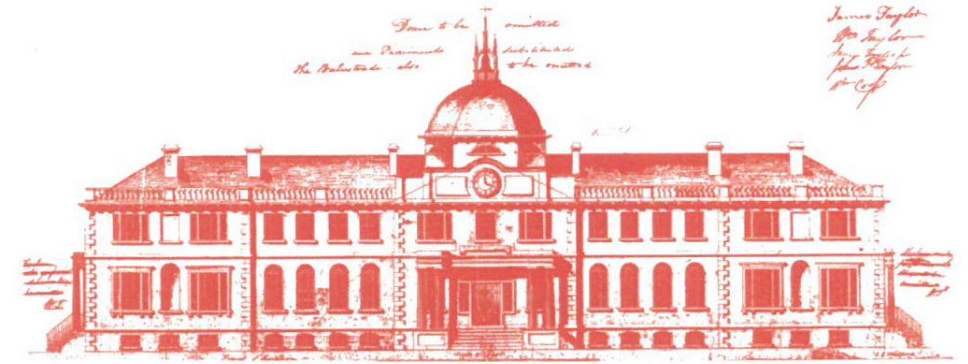
Structural Geological Controls And Timing Of Ag-Pb-Zn Mineralisation At The Keno Hill Deposit, Yukon

Abstract

The structural history of the Keno Hill district is comprised of three discrete phases of deformation that record the ductile to brittle-ductile deformation, exhumation, and subsequent brittle deformation of the Keno Hill district between at least the Early Cretaceous (likely Early Jurassic) and the Eocene. Pre-Ag-Pb-Zn-mineralisation, D1 deformation is characterised by ductile to brittle-ductile structural elements and is associated with greenschist facies metamorphism. Syn-Ag-Pb-Zn-mineralisation, D2 deformation is characterised by ENE-striking, sinistral strike-slip faults, and NE- to NNE-striking, sinistral-normal oblique-slip linking faults that developed in a regional sinistral strike-slip fault system. Ag-Pb-Zn mineralisation is associated with fault dilation along NE- to NNE-striking fault segments with additional high-grade zones at D2 fault intersections. Post-Ag-Pb-Zn-mineralisation, D3 deformation is characterised by unmineralised SE-striking faults that are associated with development of the Cenozoic Tintina Fault.

Ag-Pb-Zn-mineralisation occurred coevally with D2 fault propagation, and mineralisation is primarily controlled by the complex interplay between fault geometry and orientation, and the rheological contrast between varying rock types in the district. F1 fold and thrust repetition thickened units prior to D2 fault propagation and provided a larger volume of preferential host rock that focussed brittle deformation and localised economic Ag-Pb-Zn deposits. $^{40}\text{Ar}/^{39}\text{Ar}$ (sericite) geochronological data from D2 associated rocks produce two sets of dates at circa 81 to 78 Ma and circa 69 Ma, respectively. These represent mica growth during the Ag-Pb-Zn-mineralising event, and a subsequent hydrothermal overprinting event.

Airborne magnetic data indicates that the Keno Hill district is located within a left-stepping, releasing bend of a major sinistral strike-slip fault system. Palinspastic restoration of remote sensing data to its position pre-Tintina fault movement indicates the presence of a through-going ENE-trending, lineament that extends east of the Selwyn Basin margin. The lineament is coincident with, and may indicate a structural link between numerous deposits, including the Keno Hill, and the Fort Knox IGRS deposits.



Home of the School of Graduate Studies, Sir Howard Douglas Hall was designed by J.E. Woolford in 1825 and is the oldest university building in Canada still in use.

The University of New Brunswick recognizes that the university sits on traditional Wolastoqey territory. The river that runs right by our university – the St. John River – is also known as Wolastoq, along which live the Wolastoqiyik -- the people of the beautiful and bountiful river.

UNIVERSITY OF NEW BRUNSWICK SCHOOL OF GRADUATE STUDIES

ORAL EXAMINATION

Simon David Craggs

**IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF**

DOCTOR OF PHILOSOPHY