

Energy, Mines and Resources • *Yukon Geological Survey*

YUKON

EXPLORATION & GEOLOGY

2009



YUKON
EXPLORATION
& GEOLOGY
2009

Edited by
K.E. MacFarlane, L.H. Weston and
L.R. Blackburn

Yukon Geological Survey
Energy, Mines and Resources
Government of Yukon

Published under the authority of the Minister of Energy, Mines and Resources, Government of Yukon
<http://www.emr.gov.yk.ca>

Printed in Whitehorse, Yukon, 2010.

Publié avec l'autorisation du ministre de l'Énergie, des Mines et des Ressources du gouvernement du Yukon, <http://www.emr.gov.yk.ca>

Imprimé à Whitehorse (Yukon) en 2010.

© Minister of Energy, Mines and Resources, Government of Yukon

ISSN 1718-8326 (on-line version)

This, and other Yukon Geological Survey publications, may be obtained from:

Geoscience Information and Sales

Yukon Geological Survey

102-300 Main Street

Box 2703 (K-102)

Whitehorse, Yukon, Canada Y1A 2C6

phone (867) 667-3201, fax (867) 667-3198, e-mail geosales@gov.yk.ca

Visit the Yukon Geological Survey website at www.geology.gov.yk.ca

In referring to this publication, please use the following citation:

Yukon Exploration and Geology 2009. K.E. MacFarlane, L.H. Weston and L.R. Blackburn (eds.), 2010.

Yukon Geological Survey.

Papers from this document are available in colour on the Yukon Geological Survey website.

Production by K-L Services, Whitehorse, Yukon.

Front cover photograph: Altered limestone. View is to the northwest; Atlin Road in foreground, Marsh Lake in background. Photo by Nicolai Goepfel.

PREFACE

Yukon Exploration and Geology (YEG) continues to be the main publication of the Yukon Geological Survey (Energy, Mines and Resources, Yukon government). This is the 32nd volume of the series and marks the first time that it is only available digitally. Individual YEG papers, with colour images, can be downloaded from our website. The Yukon Exploration and Geology Overview remains a separate volume and is available in print and digital formats. As in previous volumes, YEG 2009 contains up-to-date information on mining and mineral exploration activity, studies by industry, and results of recent geological field studies. Information in this volume comes from prospectors, exploration and government geologists, mining companies and students who are willing to contribute to public geoscience for the benefit of the scientific community, general public, and mineral and petroleum industries of Yukon. Their efforts are appreciated.

Having accepted the position of Head, Technical Services for the Yukon Geological Survey (YGS) in 2009, I also inherited the title of Chief Editor of YEG. It was my first experience with this volume and I must thank Leyla Weston and Lauren Blackburn for their patience and assistance as co-editors. Their commitment and hard work in ensuring that this volume can be delivered to you speaks volumes to their abilities to work gracefully under pressure. Several of our colleagues at the YGS have contributed to this volume, both in preparing and reviewing manuscripts, and deserve a thank you as well.

Wynne Krangle and Peter Long of K-L Services continue to provide excellent service in putting this production together, including editing suggestions, design of diagrams, volume layout, and working under the pressure of a tight deadline. Chera Hunchuk of the Queen's Printer ensured that the publishing process went smoothly.

This year's Yukon Exploration and Geology is dedicated to the geologists, prospectors and colleagues who continue to live on in spirit. May they continue to inspire.

We welcome any input or suggestions that you may have to improve future YEG publications. Please contact me at (867) 667-8519, or by e-mail at karen.macfarlane@gov.yk.ca.

Karen MacFarlane



TABLE OF CONTENTS

Field notes on the Upper Devonian Imperial Formation (NTS map sheet 106L), Tetlit Creek, east Richardson Mountains, Yukon T.L. Allen	1
Deconstructing complex Au-Ag-Cu mineralization, Sonora Gulch project, Dawson Range: A Late Cretaceous evolution to the epithermal environment V. Bennett, C. Schulze, D. Ouellette and B. Pollries.....	23
U-Pb isotopic age dating by LAM ICP-MS, INCO Innovation Centre, Memorial University: Sample preparation methodology and analytical techniques V. Bennett and M. Tubrett.....	47
New U-Pb age constraints at Freegold Mountain: Evidence for multiple phases of polymetallic mid- to Late Cretaceous mineralization T. Bineli Betsi and V. Bennett.....	57
High-sulphidation epithermal Au-Ag-Cu mineralization at the McKay Hill property – a revised deposit model L.R. Blackburn	85
Pre-Reid surficial geology investigations in southwest J. Bond and P. Lipovsky.....	103
Preliminary description and slope stability analyses of the 2008 Little Salmon Lake and 2007 Mt. Steele landslides, Yukon M.-A. Brideau, D. Stead, P. Lipovsky, M. Jaboyedoff, C. Hopkinson, M. Demuth, J. Barlow, S. Evans and K. Delaney	119
Particle-size distribution of gold within the Sulphur and Dominion creek drainages, Klondike District, Yukon, and implications for gold winning and the formation of distal placers containing fine gold R.J. Chapman, D.P.G. Bond and W. LeBarge.....	135
The Duke River fault, southwest Yukon: Preliminary examination of the relationships between Wrangellia and the Alexander terrane R. Cobbett, S. Israel and J. Mortensen.....	143
Bedrock geology of southwest McQuesten (NTS 115P) and part of northern Carmacks (NTS 115I) map area M. Colpron and J.J. Ryan.....	159
Major- and trace-element composition of platinum group minerals and their inclusions from several Yukon placers Y. Fedortchouk, W. LeBarge, A.Y. Barkov, L. Fedele and R.J. Bodnar.....	185
Preliminary Quaternary geology of Coal River area (NTS 95D), Yukon K. Kennedy.....	197
Ar-Ar geochronology and Pb isotopic constraints on the origin of the Rau gold-rich carbonate replacement deposit, central Yukon S. Kingston, J.K. Mortensen, J. Gabites and M. Dumala.....	213

continued

Evaluation of titanite as an indicator mineral for tungsten-skarn mineralization R. Linnen and X. Che.....	223
Pressure-depth relationships of the Roop Lakes Stock and Keno Hill Ag-Pb-Zn veins G. Lynch.....	229
Upper Fifteenmile Group in the Ogilvie Mountains and correlations of early Neoproterozoic strata in the northern Cordillera F.A. Macdonald and C.F. Roots	237
Structural controls on hydrothermal gold mineralization in the White River area, Yukon D. MacKenzie and D. Craw	253
The Proterozoic Pinguicula Group: Stratigraphy, contact relationships and possible correlations K.P.R. Medig, D.J. Thorkelson and R.L. Dunlop.....	265
Preliminary O-S isotopic compositions of Cretaceous granitoids in the Cassiar Platform and Selwyn Basin, Yukon and Northwest Territories K.L. Rasmussen and G.B. Arehart	279
Soil reconnaissance of the Fort Selkirk volcanic field, Yukon (115I/13 and 14) P. Sanborn	293
Observations of polymetallic Ag-Pb-Zn (\pm Au \pm In) mineralization at the Eagle and Fisher vein-faults, airborne total field magnetics and identification of Tombstone age-equivalent aplite dykes in the Galena Hill area, Keno City, Yukon D. Tupper and V. Bennett.....	305