



GEOSCIENCE BC SUMMARY OF ACTIVITIES 2015



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Geoscience BC (2016): Geoscience BC Summary of Activities 2015; Geoscience BC, Report 2016-1, 184 p.

ISSN 1916-2960 Summary of Activities (Geoscience BC)

Cover photo: J. Angen and J. Logan looking out from the top of the Capoose showing, TREK project area, central British Columbia

Photo credit: R. Kim, 2015

Acknowledgments

I would like to thank the government of British Columbia for its ongoing support of Geoscience BC and recognize the \$5 million investment made in 2015, allowing for our continued delivery of projects that generate new Earth science information for everyone. I would also like to express appreciation for the leaders in British Columbia's mineral exploration, mining and energy sectors who support our organization through their guidance, use and recognition of the information that we collect and distribute.

Robin Archdekin
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Foreword

Geoscience BC is pleased to present results from several of our ongoing geoscience projects in our eighth edition of the *Geoscience BC Summary of Activities*. The volume is divided into three sections, 'Minerals', 'Energy' and 'Scholarship Recipients', and contains a total of 22 papers.

The 'Minerals' section contains five papers from Geoscience BC minerals geoscience projects throughout BC. Three of the projects are part of the TREK and Search major project initiatives, while two of the projects are multiyear studies. Angen et al. provide a second year update for the three-year integrated bedrock and geology mapping initiative. The paper presents an updated bedrock map, detailed descriptions of rock units and mineral occurrences within the map area, and analytical results from rock samples. Jackaman and Sacco conducted a helicopter-supported biogeochemical survey within a relatively inaccessible part of the TREK project area. Samples were collected from the tops of spruce trees within a 1000 km² area centred to the south of the Blackwater gold-silver deposit. This paper presents the objectives of this project, as well as sampling and analytical methods. Results will be available in early 2016.

Bouzari et al. present the results of an ongoing project to assess potential geochemical and mineralogical targeting tools to identify metal-fertile plutons. The paper compares results for rock samples and select accessory minerals collected from both mineralized and unmineralized phases of three batholiths in south-central BC. Hoy reports partial results from a multiyear mapping program for the western part of the east Pentiction map area of southern BC. The paper provides new geology maps for two 1:20 000 scale TRIM map areas within the Kettle River area, and describes the component rock units, structures and mineralization.

Madu introduces the Search project: Geoscience BC's newest multiyear mineral geoscience initiative in west-central BC. Preliminary plans for four phases of work to be completed over three years are outlined, and details of the recently completed phase I airborne magnetic survey are provided. Results will be available in early 2016.

The 'Energy' section contains seven papers from Geoscience BC's oil and gas and geothermal projects throughout BC. Two papers, by Brown et al. and Hayes et al., discuss key projects that contribute to groundwater mapping of an area of northeastern BC, as part of the multiyear, collaborative Peace project. Brown et al. present the method and preliminary results of the recently completed SkyTEM airborne electromagnetic survey. Hayes et al. describes the method for interpretation of Quaternary sediments and depth to bedrock, using surficial geology maps and downhole data from petroleum boreholes. The results of this work will be used to calibrate airborne survey data, for subsequent processing and modelling of groundwater resources within the Peace project area.

Two papers, by Bustin and Bustin, and Letham and Bustin, highlight continuing work quantifying the gas- and liquid-in-place and flow capacity of important shales in northeastern BC. Bustin and Bustin present the compiled results of publicly available data and new laboratory results as a series of maps of thermal maturity trends and of the oil window for prospective horizons. Preliminary maps show the distribution of produced gas within the Montney Formation. Letham and Bustin report significant progress on better methods to quantify flow characteristics within fine-grained shale rocks. The paper discusses the impact of gas slippage on permeability and, ultimately, on production predictions.

Two papers, by Mahani et al. and Quinton et al., are from projects that address potential impacts of fluctuating water supply within the subsurface and surface of northeastern BC. Mahani et al. present an evaluation of the performance of a regional seismic network that is jointly funded and managed by Geoscience BC together with other members of the British Columbia Seismic Research Consortium. Quinton et al. highlight knowledge gaps in the current understanding of permafrost thaw, in Geoscience BC's new collaborative project with the Consortium for Permafrost Ecosystems in Transition. The paper introduces the scope and methods of this project, as well as results to date.

Hickson et al. introduce a new energy project that will determine the resource and development potential for direct-use geothermal energy in BC communities. The paper presents an example decision matrix, which will uniquely include both technical and community factors, to build a 'Road Map' as a resource to support communities with geothermal resource-related decisions.

The 'Scholarship Recipients' section presents 10 papers from Geoscience BC's 2015 student scholarship winners. The scholarships are awarded annually to postgraduate students working on thesis topics relevant to mineral, oil and gas, or geothermal exploration and development in BC.

Abadzadesahraei et al. present research objectives, field methods and data collected to date for the quantification of the water budget for the Coles Lake watershed. This work will provide baseline information for a hydrological model that will help decision-makers to balance the water needs of industry, communities and ecological systems in this area of northeastern BC.

Gegolick et al. and Prenoslo et al. present research goals for developing predictive models for identification of quality reservoirs within the Montney Formation of northeastern BC. Gegolick and Prenoslo plan to unravel the complex depositional scenario of bioturbated intervals in two areas of this formation: near Fort St. John in northeastern BC (Gegolick et al.), and near Dawson Creek along the northeastern BC border with Alberta (Prenoslo et al.).

Kim et al. present year 2 results for a postgraduate study that is part of Geoscience BC's TREK geology project. The paper includes four mapped type sections with descriptions and litho-geochemical results for volcanic rocks of the Late Cretaceous Kasalka Group—the host rock to the Blackwater gold-silver deposit. Geochronological results are pending. McGoldrick et al. present mapping results and detailed rock unit descriptions for two areas of the Nahlin ultramafic body, within the Cache Creek terrane of northwestern BC. Preliminary interpretations will be supported by biostratigraphic data and geochemical analyses of rock samples.

Bodnar and Winterburn, and Rich and Winterburn present study plans and preliminary mapping results aimed at providing an improved understanding of the processes controlling ion migration and associated geochemical patterns within the regolith cover of buried mineral deposits. Both research projects will integrate geochemical sample results, self-potential measurements and soil hydrocarbon results above known sulphide deposits: the Lara volcanogenic massive sulphide deposit on Vancouver Island (Bodnar and Winterburn) and the Deerhorn copper-gold porphyry deposit in central BC (Rich and Winterburn).

Granek and Haber present an example of mineral prospectivity mapping applied to Geoscience BC's QUEST dataset, using a support vector machine approach to general algorithms that preserves uncertainties within datasets. It was noted that some limitations to the approach, such as insensitivity to spatial patterns in the data, are an emerging area of research.

Harrichhausen et al. present a synthesis of preliminary field observations from detailed vein and structure mapping at the Brucejack gold deposit in northwestern BC. The structural relationships between the various observed structural elements, as well as vein infill of quartz, carbonate and electrum, are key to understanding the potential for colloidal deposition of gold. Rosset and Hart focus on the characterization and mapping of hydrothermal and alteration assemblages for the Kerr and Deep Kerr porphyry deposits on the KSM property. Next steps will be a review of analytical results from chip samples, to also characterize spatial and temporal distributions of alteration and mineralization.

Readers are encouraged to visit our website for additional information on all Geoscience BC-funded projects, including project descriptions, posters and presentations, previous *Summary of Activities* and *Geological Fieldwork* papers, and final datasets and reports. The website is launching an interactive web-mapping portal, which readers can use to explore all of Geoscience BC's public datasets, as well as select public geoscience databases. All papers in this and past volumes are available for download through Geoscience BC's website (www.geosciencebc.com). Limited print copies of past volumes are also available from the Geoscience BC office.

Geoscience BC Publications 2015

In addition to this *Summary of Activities* volume, Geoscience BC releases interim and final products from our projects as Geoscience BC reports. All Geoscience BC data and reports can be accessed through our website at www.geosciencebc.com/s/DataReleases.asp. Geoscience BC datasets and reports released in 2015 are:

- 21 technical papers in the *Geoscience BC Summary of Activities 2014* volume
- **Investigation of Tree Sap as a Sample Medium for Regional Geochemical Exploration in Glacial Sediment Covered Terrains: A Case History from the Endako Area, North-Central BC (NTS 093F/14, /15, 093K/02, /03)**, by D.R. Heberlein, C.E. Dunn and E. Hoffman (Geoscience BC Report 2015-02)
- **Characterization of Belloy and Debolt Water Disposal Zones in the Montney Play Fairway, Northeast BC**, by Petrel Robertson Consulting Ltd. (Geoscience BC Report 2015-03)
- **Catchment Analysis Applied to the Interpretation of New Stream Sediment Data, Northern Vancouver Island, Canada (NTS 102I, 092L)**, by D. Arne and O. Brown, CSA Global (Geoscience BC Report 2015-04)
- **Historical Exploration Data Capture Pilot Project, Northwestern British Columbia (NTS 093L)**, by C.E. Kilby, Cal Data Ltd. (Geoscience BC Report 2015-06)

- **A Geo-Exploration Atlas of the Endako Porphyry Molybdenum District (NTS 093K)**, by F.A.M. Devine, M. Pond, D.R. Heberlein, P. Kowalczyk and W. Kilby (Geoscience BC Report 2015-08)
- **Geochemical Reanalysis of Archived Till Samples, TREK Project, Interior Plateau, Central BC (Parts of NTS 093C, B, F, K)**, by W. Jackaman, D. Sacco and R.E. Lett (Geoscience BC Report 2015-09)
- **Preliminary Geological Map of the TREK Project Area, Central British Columbia (Parts of NTS 093B, C, F, G)**, by J.J. Angen, E. Westberg, C.J.R. Hart, R. Kim and M. Rahami (Geoscience BC Map 2015-10-01, also as Geoscience BC Report 2015-10)
- **Economic Viability of Selected Geothermal Resources in British Columbia**, by Kerr Wood Leidal Associates Ltd. and GeothermEx Inc. (Geoscience BC Report 2015-11)
- **Regional Geochemical and Mineralogical Data, TREK Project – Year 2, Interior Plateau, British Columbia (Parts of NTS 093B, C, F, G)**, by W. Jackaman, D.A. Sacco and R.E. Lett (Geoscience BC Report 2015-12)
- **The Structural Controls of the Kimberley Gold Trend, East Kootenay District, Southeast British Columbia (Parts of 082F, G)**, by M. Seabrook and T. Höy (Geoscience BC Report 2015-13)
- **Characterization of Belloy and Debolt Water Disposal Zones in the Montney Play Fairway, Northeast BC, Phase 2**, by Canadian Discovery Ltd. (Geoscience BC Report 2015-14)
- **Toward an Improved Basis for Beneath-Cover Mineral Exploration in the QUEST Area, Central British Columbia: New Structural Interpretation of Geophysical and Geological Datasets (NTS 093A, B, G, H, J, K, N)**, by M. Sánchez, T. Bissig and P. Kowalczyk (Geoscience BC Report 2015-15)
- **Tracing the Source of Anomalous Geochemical Patterns in Soil, Water and Seepage Gas Near the Nazko Volcanic Cone, BC (NTS 093B/13)**, by R. Lett and W. Jackaman (Geoscience BC Report 2015-16)
- **Use of a Field Portable Photometer for Rapid Geochemical Analysis of Stream and Spring Waters: A Case History from Poison Mountain, British Columbia (NTS 092O/02)**, by R. Yehia and D.R. Heberlein (Geoscience BC Report 2015-17)

All releases of Geoscience BC reports and data are announced through our website and e-mail list. If you are interested in receiving e-mail regarding these reports and other Geoscience BC news, please contact info@geosciencebc.com.

Acknowledgments

Geoscience BC would like to thank all authors and reviewers of the *Summary of Activities* papers for their contributions to this volume. RnD Technical is also thanked for their work in editing and assembling this volume.

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