



**BRITISH  
COLUMBIA**

**Ministry of Employment and Investment  
Energy and Minerals Division  
Geological Survey Branch**

# **GEOLOGICAL FIELDWORK 1996**

**A Summary of Field Activities  
and Current Research**

**Editors: D.V. Lefebure, W.J. McMillan and  
J.G. McArthur**

**PAPER 1997-1**

# ENERGY AND MINERALS DIVISION

## Geological Survey Branch

Parts of this publication may be quoted or reproduced if credit is given. The following is the recommended format for referencing individual works contained in this publication:

D.A. Brown, C. Lowe, R.B.K. Shives and M.E. Best (1996): East Kootenay Geophysical Survey, Southeastern British Columbia (82F, G, K): Sullivan - North Star Area; in *Geological Fieldwork 1996*, Lefebure, D.V., McMillan, W.J. and McArthur, J.G., Editors, *British Columbia Ministry of Employment and Investment*, Paper 1997-1, pages 3-16

### British Columbia Cataloguing in Publication Data

Main entry under title:

Geological fieldwork: - 1974 -

Annual.

Issuing body varies.

Vols. for 1978-1996 issued in series: Paper / British Columbia. Ministry of Energy, Mines and Petroleum Resources; vols. for 1997- , Paper / British Columbia. Ministry of Employment and Investment.

Includes bibliographical references.

ISSN 0381-243X = Geological fieldwork

1. Geology - British Columbia - Periodicals. 2. Mines and mineral resources - British Columbia - Periodicals. 3. Geology, Economic - British Columbia - Periodicals. 4. British Columbia. Geological Survey Branch - Periodicals. I. British Columbia. Geological Division. II. British Columbia. Geological Branch. III. British Columbia. Geological Survey Branch. IV. British Columbia. Department of Mines and Petroleum Resources. V. British Columbia. Ministry of Energy, Mines and Petroleum Resources. VI. British Columbia. Ministry of Employment and Investment. VII. Series: Paper (British Columbia. Ministry of Energy, Mines and Petroleum Resources). VIII. Series: Paper (British Columbia. Ministry of Employment and Investment).

QE187.G46

553'.09711

C76-083084-3 (Rev.)



VICTORIA  
BRITISH COLUMBIA  
CANADA  
JANUARY 1997

## FOREWORD

Geological Fieldwork: A Summary of Fieldwork and Current Research, 1996 is the twenty-second edition of this annual publication. It contains reports of Geological Survey Branch activities and projects during the last year. The base budget of the Branch for the 1996-97 fiscal year is \$5.5 million, down slightly from the previous year. This budget has been supplemented by \$1.1 million to offset the impact of the ending of the federal-provincial Mineral Development Agreement, \$180 000 under the Mineral Potential Initiative and \$60 000 for MINFILE and earthquake studies from the Corporate Resource Inventory Initiative. Overall funding therefore was essentially the same as in 1995-95.

As before the contents of this year's volume reflect the emphasis of Branch programs. Highlights are completion of the bedrock mapping and geochemical survey of the northern Gataga Belt, continuation of the Nechako Plateau NATMAP project, which is a collaborative effort with the Geological Survey of Canada and various universities, and regional geochemical sampling of two 1:250 000 map-sheets in north central British Columbia. The SEDEX-oriented Gataga project traced favorable lithologic units northward from Terminus Mountain to the Yukon border and conducted a lake sediment and water geochemical survey of the same area. The Branch focus within the Nechako project is the Babine porphyry belt, with its important mineral potential. The regional geochemical survey covered the congruent Toodoggone River and McConnell Creek sheets. As well, a new regional mapping project extended existing coverage of the Toodoggone volcanic belt southward to the area of the Kemess deposit. A new multidisciplinary study which keys on surficial geology, geochemistry and mineral deposits began in the Eagle Bay area; its focus is volcanogenic massive sulphide deposits.

A variety of mineral deposits are profiled in this year's Fieldwork volume, including the geological setting of Canada's first precious opal deposit. Other articles on Harper Creek (VMS), Nipple Mountain (opal), Taurus (bulk gold), Huckleberry (porphyry copper), Mount Mather Creek (sodalite), Mount Brussiloff (magnesite), Atlin (in skarn) and other locations profile more of the province's attractive mineral resources. Three interesting articles on coal and coalbed methane provide more documentation on the single most important mineral commodity in the province. The metallogenetic study in the Tatogga Lake area completed its third and final year of mapping by defining the volcanic successions in the region and identifying the two main styles of mineralization.

The Mineral Potential project has completed coverage of all the province except the Queen Charlotte Islands. Much information from the project is posted on the Internet on the Ministry site (address: <http://www.ei.gov.bc.ca/pages/geosmin.htm>). The intent of the project is to have geology, geological tracts and mineral potential estimates available; at this time, the geology layer is not yet ready for posting. The geology, mineral assessment results and associated datasets are available for downloading in an Arc Export format which allows viewing and manipulation with the freeware Arcview1 program. Interactive viewing of the geology and other major datasets will be available in 1997.

Production of Geological Fieldwork to the camera-ready stage has been done in Microsoft WORD by the authors using a template prepared by Brian Grant. The Branch is now employing print-on-demand technology for its geoscience publications. Material will also be posted on the Ministry Internet site for viewing or downloading. Thanks are due to Dave Lefebure, Bill McMillan and Gib McArthur for editing and to Brian Grant for guiding the process to completion on schedule.

*W.R. Smyth  
Chief Geologist  
Geological Survey Branch  
Energy and Minerals Division*



# TABLE OF CONTENTS

		Page			Page
	<b>FOREWORD</b> .....	iii			
	<b>REGIONAL MAPPING</b>				
1	<b>D.A. Brown, C. Lowe, R.B.K. Shives and M.E. Best:</b> East Kootenay Geophysical Survey, Southeastern British Columbia (82F, G, K): Sullivan - North Star Area .....	3	13	<b>M.G. Mihalynuk, J.E. Gabites, M.J. Orchard and E.T. Tozer:</b> Age of the Willison Bay Pluton and Overlying Sediments: Implications for the Carnian Stage Boundary.....	171
2	<b>J.M. Logan:</b> U-PB Ages From the Selkirk Allochthon, Seymour Arm Map Area, Southeast British Columbia (82M/8 and 9).....	17		<b>ECONOMIC GEOLOGY</b>	
3	<b>J.M. Logan and C. Rees:</b> Northern Selkirk Project, Geology of the Laforme Creek Area (82M/1).....	25	14	<b>J. Nelson, S. Sibbick, T. Höy, P. Bobrowsky and M. Cathro:</b> The Paleozoic Massive Sulphide Project: An Investigation of Yukon-Tanana Correlatives in British Columbia.....	183
4	<b>D.G. MacIntyre and L.C. Struik:</b> Nechako Natmap Project - 1996 Overview .....	39	15	<b>A. Legun:</b> Sub-Basin Recognition in the Purcell Anticlinorium.....	187
5	<b>D.G. MacIntyre, I.C.L. Webster and M. Villeneuve:</b> Babine Porphyry Belt Project: Bedrock Geology of the Old Fort Mountain Area (93M/1), British Columbia .....	47	16	<b>T. Höy:</b> Harper Creek: A Volcanogenic Sulphide Deposit within the Eagle Bay Assemblage, Kootenay Terrane, Southern British Columbia (82M/12) .....	199
6	<b>F.C. Childe and P. Schiarizza:</b> U-PB Geochronology, Geochemistry and ND Isotopic Systematics of the Sitlika Assemblage, Central British Columbia.....	69	17	<b>B.N. Church:</b> Age of Mineralization, City of Paris Veins, Greenwood Area (92E/2E) .....	211
7	<b>P. Schiarizza and G. Payie:</b> Geology of the Sitlika Assemblage in the Kenny Creek - Mount Olson Area (93N/12, 13), Central British Columbia .....	79	18	<b>B.N. Church, J. Dostal and V. Gale:</b> Age of a Basalt Dike, Sustut Copper Deposit (94D/10E).....	215
8	<b>L.J. Diakow and P. Metcalfe:</b> Geology of the Swannell Ranges in the Vicinity of the Kerness Copper-Gold Porphyry Deposit, Attycelley Creek (94E/2), Toadoggonne River Map Area .....	101	19	<b>R.M. Friedman and S. Jordan:</b> U-Pb Ages for Intrusive Rocks at the Huckleberry Porphyry Copper Deposit, Tahtsa Lake District, Whitesail Lake Map Area, West-Central British Columbia (93E/11) .....	219
9	<b>F.C. Childe, R.M. Friedman, J.K. Mortenson and J.F.H. Thompson:</b> Evidence for Early Triassic Felsic Magmatism in the Ashcroft (92I) Map Area, British Columbia .....	117	20	<b>R.M. Friedman and A. Panteleyev:</b> U-Pb Age of Mineralized Feldspar Porphyry Sills at the Louise Lake Cu-Mo-Au-As Deposit, Smithers Map Area, West-Central British Columbia (93L) .....	227
10	<b>F. Ferri, C. Rees, J. Nelson and A. Legun:</b> Geology of the Northern Kechika Trough (94L/14, 15; 94M/3, 4, 5, 6, 12, 13; 104P/8, 9, 15, 16) .....	125	21	<b>G.E. Ray, I.C.L. Webster, S.B. Ballantyne, C.E. Kilby and S.B. Cornelius:</b> Geology and Mineral Chemistry of Tin-Bearing Skarns Related to the Surprise Lake Batholith, Atlin, Northern British Columbia .....	233
11	<b>J. Nelson:</b> Last Seen Heading South: Extensions of the Yukon-Tanana Terrane into Northern British Columbia.....	145	22	<b>A. Panteleyev, D. Broughton and D. Lefebvre:</b> The Taurus Project, A Bulk Tonnage Gold Prospect Near Cassiar, British Columbia, (104P/5) .....	255
12	<b>M.G. Mihalynuk and F. Cordey:</b> Potential for Kutcho Creek Volcanogenic Massive Sulphide Mineralization in the Northern Cache Creek Terrane: A Progress Report .....	157	23	<b>E.C. Grunsky:</b> Mineral Resource Estimation The Mineral Potential Project: An Evaluation of Estimator Responses for Selected Mineral Deposit Types for the Province .....	267
			24	<b>C.H. Ash, R.W.J. Macdonald and R.M. Friedman:</b> Stratigraphy of the Tatogga Lake Area, Northwestern British Columbia (104H/12 & 13, 104G/9 & 16) .....	283

25	<b>R.M. Friedman and C.H. Ash:</b> U-Pb Age of Intrusions Related to Porphyry Cu-Au Mineralization in the Tatogga Lake Area, Northwestern British Columbia (104H/12NW, 104G/9NE) .....	291
----	--	-----

### INDUSTRIAL MINERALS AND COAL

24	<b>Z.D. Hora and K.D. Hancock:</b> Some New Dimension Stone Properties in British Columbia, Part III.....	301
27	<b>D.T.A. Symons, M.T. Lewchuk, G.J. Simandl and D.F. Sangster:</b> Paleomagnetism of the Mount Brussilof Magnesite Deposit and its Cambrian Host Rocks, Southeastern British Columbia (82J/11, 12, 13).....	307
28	<b>Z.D. Hora and K.D. Hancock:</b> A New Sodalite Occurrence: Mount Mather Creek, British Columbia (82N/10W).....	317
29	<b>G.J. Simandl, K.D. Hancock, B. Callaghan, S. Paradis and R. Yorke-Hardy:</b> Klinker Precious Opal Deposit, South Central British Columbia, Canada - Field Observations and Potential Deposit-Scale Controls .....	321
30	<b>B.N. Church and Z.D. Hora:</b> New Splitstone and Opal Occurrences, Nipple Mountain, Beaverdell Area (82E/11E).....	329
31	<b>A. Legun:</b> Amber in British Columbia.....	333
32	<b>G.J. Simandl, K.D. Hancock, E. Lambert, P. Hudon, J. Martignole and W.W. Osborne:</b> The Empress Cu-Au-Mo Deposit - Gemstone and Industrial Minerals Potential .....	339
33	<b>A. Matheson, D. MacDougall, P.T. Bobrowsky and N. Massey:</b> Okanagan Aggregate Potential Project.....	347
34	<b>B.D. Ryan:</b> Coalbed Methane in the Comox Formation Tsable River Area, Vancouver Island ...	353
35	<b>B.D. Ryan:</b> Coal Rank Variations in the Cabinet Creek Area, Telkwa Coalfield, Central British Columbia (93L/11).....	365

36	<b>B.D. Ryan:</b> Coal Quality Variations in the Gething Formation Northeast British Columbia(93O,J,I) ...	373
----	--	-----

### ENVIRONMENTAL GEOLOGY AND GEOCHEMISTRY

37	<b>S. Cook, W. Jackaman, R. Lett and S. Sibbick:</b> Regional Geochemical Survey Program: Review of 1996 Activities.....	401
38	<b>A. Dixon-Warren, P.T. Bobrowsky, E.R. Leboe and A. Ledwon:</b> Eagle Bay Project: Surficial Geology of the Adams Plateau (82M/4) and North Barriere Lake (92M/5) Map Areas.....	405
39	<b>P.T. Bobrowsky, E.R. Leboe, A. Dixon-Warren and A. Ledwon:</b> Eagle Bay Project: Till Geochemistry of the Adams Plateau (82M/4) and North Barriere Lake (82M/5) Map Areas.....	413
40	<b>S.J. Sibbick, J.L. Runnells and R.E.W. Lett:</b> Eagle Bay Project: Regional Hydrogeochemical Survey and Geochemical Orientation Studies (82M/4 and 5) .....	423
41	<b>V.M. Levson, A.J. Stumpf, D.G. Meldrum, E.K. O'Brien and B.E. Broster:</b> Quaternary Geology and Ice Flow History of the Babine Copper Porphyry Belt, British Columbia (93L/NE, M/SE).....	427
42	<b>A.J. Stumpf, B.E. Broster and V.M. Levson:</b> Evaluating the Use of Till Geochemistry to Define Buried Mineral Targets: A Case Study from the Bell Mine Property (93L/16, 93M/1), West-Central British Columbia .....	439
43	<b>V.M. Levson, D.G. Meldrum, S.J. Cook, A.J. Stumpf, E.K. O'Brien, C. Churchill, A.M. Coneys and B.E. Broster:</b> Till Geochemical Studies in the Babine Porphyry Belt: Regional Surveys and Deposit-Scale Studies (93L/16, M/1, M/2, M/7, M8).....	457
44	<b>P.A. Monahan and V.M. Levson:</b> Earthquake Hazard Assessment in Greater Victoria, British Columbia: Development of a Shear-Wave Velocity Model for the Quaternary Deposits (92B/6 & B/11) .....	467