



# **REGIONAL STREAM SEDIMENT AND WATER GEOCHEMICAL DATA**

**VANCOUVER ISLAND, BRITISH COLUMBIA**

(parts of NTS 92B, C, E, F, G, K, L & 102I)

## **REPORT 2011-04**

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# REGIONAL STREAM SEDIMENT AND WATER GEOCHEMICAL DATA

## VANCOUVER ISLAND, BRITISH COLUMBIA

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## INTRODUCTION

Government-funded reconnaissance-scale regional geochemical surveys have been conducted in British Columbia since 1976<sup>1</sup>. Currently, more than 62 700 drainage sediment and water samples have been collected and sample sites cover approximately 75% of BC at an average density of one sample for every 12 km<sup>2</sup> (Figure 1). Compiled results from these surveys have provided a comprehensive multi-element geochemical database that delineates regional geochemical patterns and provides baseline information that is being used to guide and support mineral exploration activities.

Efforts to maximize the utility of the BC regional geochemical database are ongoing and include both new sampling and enhancements to available analytical information. In 2010, Geoscience BC supported the reanalysis of moss-trapped stream sediment samples originally collected in the late 1980s from creeks located on Vancouver Island. These samples have now been recovered from storage and analyzed for 51 elements by aqua-regia digestion followed by inductively coupled plasma–mass spectrometry (ICP-MS) and Pt and Pd by fire assay<sup>2</sup>.

This report, Geoscience BC Report 2011-04, contains results of the 2010 Vancouver Island Reanalysis project plus previously published data for gold, fluorine and loss on ignition in stream sediments and fluoride, uranium and pH in stream waters. This information has been provided in a variety of digital formats. PDF files include survey descriptions and details regarding methods, field and analytical data listings, summary statistics, sample location map, geology map and maps for individual metals. Raw digital data of original field and analytical information plus new reanalysis results are included in Excel (XLS) format.

<sup>1</sup> Lett, R.E.W. (2005): Regional Geochemical Survey database on CD; BC Ministry of Forests, Mines and Lands, GeoFile 2005-17, CD-ROM.

<sup>2</sup> Jackaman, W. (2011): British Columbia Regional Geochemical Survey: new analytical data and sample archive upgrades; *in* Geoscience BC Summary of Activities 2010, Geoscience BC, Report 2011-1, p. 181–187.

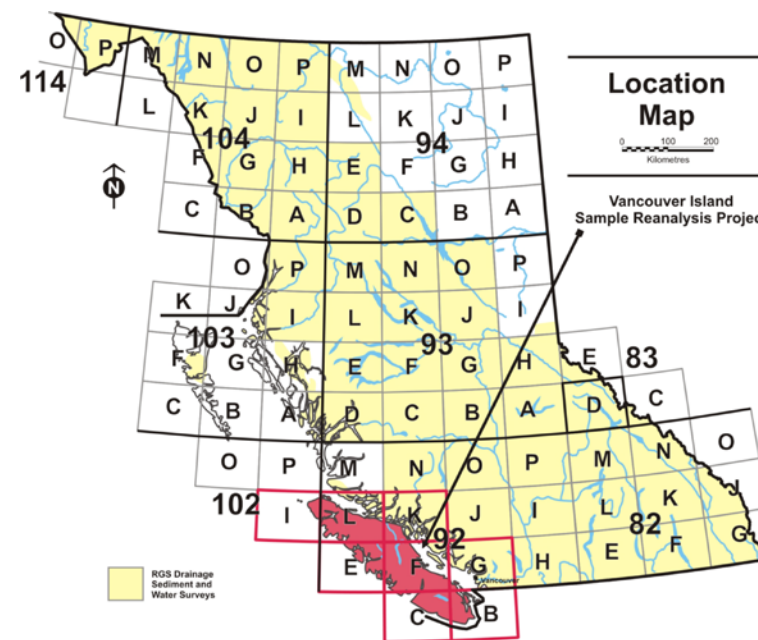


Figure 1. Location of the Vancouver Island sample reanalysis study areas, southwest British Columbia.

## PROJECT DESCRIPTION

Regional geochemical surveys were originally conducted on Vancouver Island and the adjacent mainland in 1988 and 1989 under the direction of the British Columbia Geological Survey (BCGS) and the Geological Survey of Canada (GSC). Orientation studies recognized a limited availability of conventional stream sediments in Vancouver Island stream drainages<sup>3</sup>. As a result, sediment material trapped by moss growing in the

<sup>3</sup> Matysek, P.F., Day, S.J. and Gravel, J.L. (1988): Applied geochemistry subsection: highlights of 1988 activities; *in* Geological Fieldwork 1988, BC Ministry of Forests, Mines and Lands, Paper 1989-1, p. 579–583.

active stream channels was targeted for collection (Figure 2)<sup>4</sup>. A total of six individual surveys were completed (Table 1) and the published results included analytical data for up to 24 elements in stream sediment plus pH, uranium and fluoride in stream waters. By design, portions of sediment samples were saved on the understanding that future advances in laboratory methods would provide opportunities to further develop the associated geochemical databases.

Figure 2. Collection of stream sediment material that has been trapped in moss mats growing in the active stream channel located in northern Vancouver Island.



To generate the new analytical information, a total of 3369 moss-mat sediment samples collected from Vancouver Island and quality-control samples were reanalyzed for 51 elements by aqua-regia digestion (0.5 g) ICP-MS/ICP-AES analysis, and Pt and Pd by a lead fire assay (up to 30 g) with ICP-MS finish. In co-operation with the BCGS, the original samples were recovered from the storage facility in Victoria. A total of 32 g of material was systematically removed from each storage vial, placed in labeled sample bags and delivered to ALS Canada Ltd. (North Vancouver). Due to an insufficient amount of material, 8 samples were not included as part of the ICPMS work and 32

<sup>4</sup> Lett, R.E.W. (2008): A multi-media analysis of stream geochemistry on Vancouver Island, British Columbia: implications for mineral exploration, BC Ministry of Forests, Mines and Lands, GeoFile 2008-8, 53 p.

samples were not analyzed by fire assay. Original analytical duplicate and control reference samples were used to monitor and assess the accuracy and precision of the new analytical results. Additional control reference material applicable to this study was also added to the sample sequence prior to analysis. Table 2 provides a complete list of elements compiled in this report.

Table 1. List of BC RGS projects that included the collection of moss-trapped sediment samples from drainages located on Vancouver Island.

Year	NTS Map Sheet(s)	Map Area	Survey Type	Original Report
1989	092B/C	Victoria/Cape Flattery	stream survey	MEMPR RGS 24
1988	092E	Nootka Sound	stream survey	MEMPR RGS 21
1989	092F	Alberni	stream survey	MEMPR RGS 25
1989	092G	Vancouver	stream survey	MEMPR RGS 26
1988	092K	Bute Inlet	stream survey	MEMPR RGS 22
1988	092L/102I	Alert Bay/Cape Scott	stream survey	MEMPR RGS 23

## DATA PRESENTATION

Geochemical data compiled in this report includes results of the 2010 Vancouver Island Reanalysis Project plus site location information, field observations and a selection of analytical results for samples collected during regional stream surveys conducted on Vancouver Island in 1988 and 1989. Results from these activities have been determined to be accurate and complete. The data are presented in the following appendices and digital data files:

**Appendix ‘A’:** This appendix provides a complete listing of site location information, field observations and analytical results for 51 elements by ICPMS, Pt and Pd by fire assay, original Au, F and LOI in sediments, and F, U and pH in waters. The table preceding the data listings defines codes used for field observations.

**Appendix 'B':** This appendix presents summary statistics for individual elements. The calculations have been determined from the raw data and values reported by the labs at less than detection limit have been set to 1/2 the listed detection limit.

**Appendix 'C':** This appendix includes a sample location map, simplified geology and mineral occurrence map, and proportional symbol maps for each element. For most element maps the symbol size and colour reflects data ranges that are based on percentile values as determined from the raw data. Maximum symbol size is assigned to highest values. Portraying high values with large, bold symbols, with background values represented by relatively smaller dots, helps highlight regional trends and anomalous sample sites. An inset map has also been provided that was produced by contouring the raw data using an inverse distance weighting (IDW) gridding method.

**Digital Data:** The data summary presented in this package is not considered exhaustive. In order to accommodate more detailed assessments, raw digital data files for each data set used in this package have been included in Excel (XLS) format.

## ACKNOWLEDGMENTS

R. Lett (formerly BC Geological Survey) and D. Lefebure (BC Geological Survey) are acknowledged for their ongoing support of the development and maintenance of the RGS Program. The Vancouver Island Reanalysis Project was funded by Geoscience BC<sup>5</sup>.

<sup>5</sup> Geoscience BC  
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<http://www.geosciencebc.com/s/Home.asp>

Table 2. List of elements compiled as part of this report.

Element	DL	Units	Mthd	Element	DL	Units	Mthd
Aluminum	0.01	%	ICPMS	Titanium	0.001	%	ICPMS
Antimony	0.02	ppm	ICPMS	Tungsten	0.05	ppm	ICPMS
Arsenic	0.1	ppm	ICPMS	Uranium	0.05	ppm	ICPMS
Barium	0.5	ppm	ICPMS	Vanadium	1	ppm	ICPMS
Bismuth	0.01	ppm	ICPMS	Zinc	0.1	ppm	ICPMS
Boron	10	ppm	ICPMS	Beryllium	0.05	ppm	ICPMS
Cadmium	0.01	ppm	ICPMS	Cerium	0.02	ppm	ICPMS
Calcium	0.01	%	ICPMS	Cesium	0.05	ppm	ICPMS
Chromium	0.5	ppm	ICPMS	Germanium	0.05	ppm	ICPMS
Cobalt	0.1	ppm	ICPMS	Hafnium	0.02	ppm	ICPMS
Copper	0.01	ppm	ICPMS	Indium	0.005	ppm	ICPMS
Gallium	0.05	ppm	ICPMS	Lithium	0.1	ppm	ICPMS
Gold	0.2	ppb	ICPMS	Niobium	0.05	ppm	ICPMS
Iron	0.01	%	ICPMS	Rubidium	0.1	ppm	ICPMS
Lanthanum	0.2	ppm	ICPMS	Rhenium	0.001	ppb	ICPMS
Lead	0.01	ppm	ICPMS	Tin	0.2	ppm	ICPMS
Magnesium	0.01	%	ICPMS	Tantalum	0.01	ppm	ICPMS
Manganese	1	ppm	ICPMS	Yttrium	0.05	ppm	ICPMS
Mercury	5	ppb	ICPMS	Zirconium	0.5	ppm	ICPMS
Molybdenum	0.01	ppm	ICPMS	Platinum	0.1	ppb	FA
Nickel	0.1	ppm	ICPMS	Palladium	0.5	ppb	FA
Phosphorus	0.001	%	ICPMS				
Potassium	0.01	%	ICPMS				
Scandium	0.1	ppm	ICPMS	<b>Original Data ...</b>			
Selenium	0.1	ppm	ICPMS	Gold	2	ppb	FA
Silver	2	ppb	ICPMS	Fluorine	40	ppm	ION
Sodium	0.001	%	ICPMS	Loss on Ignition	0.1	pct	GRV
Strontium	0.2	ppm	ICPMS				
Sulphur	0.02	%	ICPMS	<b>Waters ...</b>			
Tellurium	0.01	ppm	ICPMS	Uranium	0.05	ppb	LIF
Thallium	0.02	ppm	ICPMS	Fluoride	20	ppb	ION
Thorium	0.1	ppm	ICPMS	pH	0.1	pH	GCE

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