Geoscience BC Report 2017-04

2016 RGS Sample Reanalysis Project

Digital Data Files

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Summary

Reconnaissance-scale regional geochemical surveys (RGS) are designed to produce high-quality information that can be used to guide mineral exploration activities. These government-funded programs have been conducted throughout British Columbia since the early 1970s. Opportunely, the original survey design included archiving representative splits of all samples collected. Having access to these materials saved from previous RGS field programs has contributed to the long-term viability and utility of the resulting geochemical database.

Ongoing efforts by Geoscience BC and government-funded agencies to update and maintain the geochemical databases established by the British Columbia Regional Geochemical Survey (BCRGS) and the National Geochemical Reconnaissance (NGR) programs have produced one of the most comprehensive collections of field information and multi-element analytical data in Canada (Jackaman, 2017). To date, thousands of archived samples have been successfully reanalyzed using modern analytical techniques such as inductively coupled plasma–mass spectrometry (ICP-MS). The methods are cost effective and provide significant upgrades to original analytical data reports (McCurdy et al., 2014). They include lower detection levels for base and precious metals as well as pathfinder and rare-earth elements. They also generate improved data continuity between surveys completed at different times and samples analyzed by different commercial laboratories.

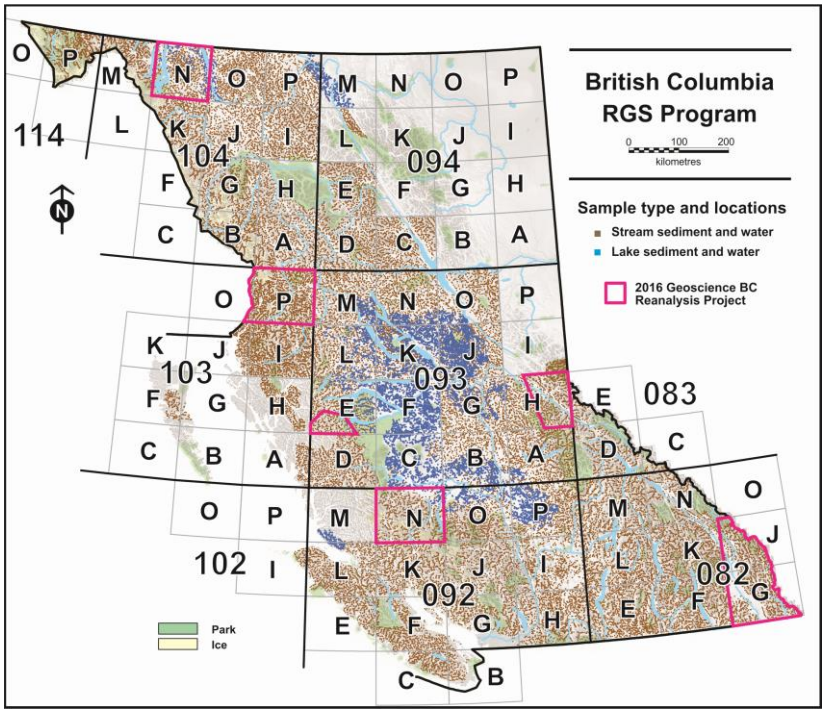

Figure 1. Distribution of all British Columbia regional geochemical survey (RGS) samples and location of survey areas targeted by the 2016 reanalysis project.

Geoscience BC Report 2017-04 presents results of a Geoscience BC–funded reanalysis project that was conducted in 2016. The samples acquired for reanalysis originated from surveys conducted in NTS map areas 082G, 082J, 092N, 093E, 093H, 103O, 103P and 104N (Figure 1; Tables 1 and 2). Specific details regarding the methods and specifications utilized during original RGS programs can be found in Rukhlov and Naziri (2015).

METHODS

Original sample pulps that were air-dried and sieved through an -80 mesh screen (<0.177 mm) are maintained in storage facilities in Ottawa, Ont. Permission to access and recover a portion of the saved material was provided by Natural Resources Canada (NRCan). A total of 5547 pulps were successfully acquired for reanalysis. Pulps from samples collected within areas currently designated park land were excluded and 152 samples were not recovered due to an insufficient quantity of available material. Tables 1 and 2 summarize the status of the samples targeted for the 2016 ICP-MS reanalysis project.

Table 1. List of stream sediment regional geochemical surveys targeted in the 2016 reanalysis project, total number of samples recovered for reanalysis and samples excluded.

Survey Name	NTS Map Sheet	Collection Year	Total Samples	2016 ICP-MS Pulps	Previous ICP-MS	Samples in Park	Missing Samples
Fernie	082G	1990	978	963	0	13	2
Kananaskis Lakes	082J	1990	623	515	0	106	2
Mt. Waddington	092N	1991	868	683	0	155	30
Whitesail Lake	093E	1986	951	224	436	288	3
McBride	093H	1984\85	1185	643	357	179	6
Nass River	103O/P	1978	1880	1692	0	112	76
Atlin	104N	1977	933	827	0	73	33

Table 2. List of stream sediment regional geochemical surveys targeted in the 2016 reanalysis project, year of data releases and the source of data compiled for each survey.

Survey Name	Original Data Release	INAA Data Release	ICP-MS Data Release	Data Sources
Fernie	1991	1991	2017	Rukhlov and Naziri, 2015
Kananaskis Lakes	1991	1991	2017	Rukhlov and Naziri, 2015
Mt. Waddington	1992	1992	2017	Rukhlov and Naziri, 2015
Whitesail Lake	1987	N/A	2009/2017	Jackaman, 2009; Rukhlov and Naziri, 2015
McBride	1986	2002	2008/2017	Jackaman, 2008; Lett, 2011; Rukhlov and Naziri, 2015
Nass River	1979	1995	2017	Rukhlov and Naziri, 2015
Atlin	1978	1991	2017	Rukhlov and Naziri, 2015

Recovered sample pulps plus inserted quality-control reference materials were delivered to Bureau Veritas Minerals (Vancouver, BC), where they were analyzed for 56 minor and trace elements by ICP-MS following aqua regia digestion. Table 3 provides a complete listing of the analytes and associated method detection levels.

Table 3. List of elements and associated detection levels from ICP-MS analysis using aqua-regia digestion.

(Abbreviations: ppm, parts per million; ppb, parts per billion; pct, percent)

Element		Detection Levels	Units	Element		Detection Levels	Units
Gold	Au	0.2 to 100000	ppb	Selenium	Se	0.1 to 100	ppm
Silver	Ag	2 to 100000	ppb	Strontium	Sr	0.5 to 2000	ppm
Aluminum	Al	0.01 to 10	pct	Tellurium	Te	0.02 to 1000	ppm
Arsenic	As	0.1 to 10000	ppm	Thorium	Th	0.1 to 2000	ppm
Boron	B	20 to 2000	ppm	Titanium	Ti	0.001 to 5	pct
Barium	Ba	0.5 to 10000	ppm	Thallium	Tl	0.02 to 1000	ppm
Bismuth	Bi	0.02 to 2000	ppm	Uranium	U	0.1 to 2000	ppm
Calcium	Ca	0.01 to 40	pct	Vanadium	V	2 to 10000	ppm
Cadmium	Cd	0.01 to 2000	ppm	Tungsten	W	0.1 to 100	ppm
Cobalt	Co	0.1 to 2000	ppm	Zinc	Zn	0.1 to 10000	ppm
Chromium	Cr	0.5 to 10000	ppm	Beryllium	Be	0.1 to 1000	ppm
Copper	Cu	0.01 to 10000	ppm	Cerium	Ce	0.1 to 2000	ppm
Iron	Fe	0.01 to 40	pct	Cesium	Cs	0.02 to 2000	ppm
Gallium	Ga	0.1 to 100	ppm	Germanium	Ge	0.1 to 100	ppm
Mercury	Hg	5 to 50000	ppb	Hafnium	Hf	0.02 to 1000	ppm
Potassium	K	0.01 to 10	pct	Indium	In	0.02 to 1000	ppm
Lanthanum	La	0.5 to 10000	ppm	Lithium	Li	0.1 to 2000	ppm
Magnesium	Mg	0.01 to 30	pct	Niobium	Nb	0.02 to 2000	ppm
Manganese	Mn	1 to 10000	ppm	Rubidium	Rb	0.1 to 2000	ppm
Molybdenum	Mo	0.01 to 2000	ppm	Rhenium	Re	1 to 1000	ppb
Sodium	Na	0.001 to 5	pct	Tin	Sn	0.1 to 100	ppm
Nickel	Ni	0.1 to 10000	ppm	Tantalum	Ta	0.05 to 2000	ppm
Phosphorus	P	0.001 to 5	pct	Yttrium	Y	0.01 to 2000	ppm
Lead	Pb	0.01 to 10000	ppm	Zirconium	Zr	0.1 to 2000	ppm
Sulphur	S	0.02 to 10	pct	Platinum	Pt	2 to 100000	ppb
Antimony	Sb	0.02 to 2000	ppm	Palladium	Pd	10 to 100000	ppb
Scandium	Sc	0.1 to 100	ppm				

The resulting ICP-MS data have been carefully checked for analytical quality using blind duplicate samples and control reference material. When determined to be complete and reliable, the reanalysis data were merged with sample site location information and analytical data acquired from original survey publications (Lett, 2011; Rukhlov and Naziri, 2015).

DIGITAL DATA STRUCTURE

Digital data files that include new ICP-MS analytical results plus all previously published field information and analytical data have been provided in Microsoft® Excel (XLS) format. Each XLS file contains the following tabs:

TAB 1: Original field data

TAB 2: Original sediment and water analytical data

TAB 3: Original INAA sediment data

TAB 4: ***ICP-MS sediment re-analysis data***

TAB 5: Details of data structure, abbreviations and field observation codes

TAB 6: Reported analytical method detection levels

The following comments provide additional information on the file structure and data composition of the XLS data files included as part of *GBC Report 2017-04*.

- Original survey field and analytical data are provided as initially published.
- Data file structure has been standardized to accommodate all possible data reporting options for all completed surveys. As a result, data compiled by various government funded regional geochemical programs may not include information for all fields listed in the XLS file.
- Missing analytical data is reported as a '-9999' and missing field information is listed as a blank cell.
- New ICP-MS results are provided as reported by the lab. Data reported at less than the reported method detection levels is preceded by a '-' sign.
- Although efforts have been made to include all samples from the target survey area, there may be gaps in the final analytical data set due to missing archive material and samples intentionally excluded from the project (e.g. sample sites located in areas designated as park land).
- For more detailed descriptions regarding original survey sample collection methods, analytical techniques and element detection levels refer the original published reports at:

  URL <http://www.empr.gov.bc.ca/Mining/Geoscience/Geochemistry/Pages/default.aspx>

ACKNOWLEDGEMENTS

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Geoscience BC is an independent, non-profit organization that generates earth science in collaboration with First Nations, local communities, government, academia and the resource sector. Our independent earth science enables informed resource management decisions and attracts investment and jobs. Geoscience BC gratefully acknowledges the financial support of the Province of British Columbia.

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