



## INVITATION TO QUOTE

**Title:** 2012 Northern Vancouver Island Drainage Sediment  
Sample Geochemical Analysis Project

**Date Issued:** October 19, 2012

**Solicitation Closes:** November 2, 2012 at 12:00 PM PST

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## Invitation to Quote

### 2012 Northern Vancouver Island Drainage Geochemical Survey

#### Summary

As part of Geoscience BC's continuing efforts to expand the British Columbia geochemical database, a full service analytical laboratory is required to prepare stream and moss mat sediment samples and to analyse the pulps for 53 elements with an aqua regia digestion followed by inductive coupled plasma mass spectrometry (ICP-MS), loss on ignition and fluoride ion concentration. The laboratory will also be required to analyse non-filtered, non-acidified water samples for fluoride ion concentration. Analytical laboratories responding to this invitation to quote (ITQ) must have their principle laboratory located in British Columbia, have a BC Certified Assayer on their staff, have had over 5 years experience and demonstrate the capacity to process a large number of samples. The laboratory must have established internal quality control and quality assurance measures and the ability to promptly report results in hardcopy and digital formats.

#### Service Requirement

Over the next several months approximately 650 stream sediment and moss mat samples will need preparation to recover a sufficient quantity of the minus 80 mesh (- 177 µm) fraction of the sediment for geochemical analysis. The resultant pulp is to be analysed for trace elements by an aqua regia digestion followed by inductive coupled plasma mass spectrometry ICP-MS; for loss on ignition and for fluoride. A similar number of unfiltered, un-acidified water samples in 125 ml PVC bottles are to be analysed for fluoride. It is expected that all analytical results will be made available no later than February 2013. The following are details of the preparation and analytical methods the must be used.

1. **Sample preparation:** Samples weighing one to two kg will be delivered to the laboratory in fabric bags. Samples must be completely dried at a temperature not exceeding 35°C. Any concretionary lumps in the sample should be broken down to particle size by gently pounding the sample, in its bag, with a hammer or pestle so as not break up actual pebbles or rock material. Dry moss mats must be disaggregated sufficiently to release all the fine sediment from the moss. Stream sediment and moss mat sediment samples are to be sieved through ASTM 18 and ASTM 80 mesh micron **stainless steel or nylon solder-free** sieves to completion. The recovered ASTM 80 material is then to be split into the following amounts: (1) 5 to 10 gram (2) 30 to 35 gram and (3) any excess of the minus 80 mesh fraction. The sieves must be thoroughly cleaned by brushing with a non-metallic paintbrush and blowing clean with a jet of compressed air. The oversized material will be the minus 18 to plus 80 mesh fraction and is to be stored in a fourth container. The plus 18 mesh fraction is to be discarded. The envelope with the 5 to 10 gram quantity of sediment is to be used for aqua regia-ICP-MS, LOI and F analysis. The other envelopes are to be returned to the technical authority in suitable boxes.
2. **Analysis of the minus 80 mesh fraction stream or moss sediment for minor and trace elements by aqua regia digestion - ICP-MS:** A measured weight of the sample pulp is to be leached with hot aqua regia and the concentration of 53 elements in a diluted solution from the digestion determined by inductively coupled plasma mass spectrometry (ICP-MS). The provided table of analytes plus minimum required detection levels and reporting units represents the basic 53-element package traditionally used by many provincial and federal government funded surveys.

This selection of elements and analytical parameters provides continuity with previous analytical work produced by the BC Regional Geochemical Survey (RGS), National Geochemical Reconnaissance (NGR) programs as well as Geoscience BC supported initiatives within BC.

3. **Loss on Ignition (LOI):** A 500 milligram sample of the minus 80 mesh sediment fraction is to be ashed in a furnace at 500°C for four hours and loss on ignition determined by the difference between initial and ashed weights. LOI detection limit is 0.1%.
4. **Sediment Fluoride ion concentration:** A 250 mg of sample is to be mixed with 1 g of flux (2 parts sodium carbonate: 1 part potassium nitrate, Wt:Wt) and fused until a clear melt is obtained. The cooled melt is to be leached with metal-free water, mixed with a citric acid buffer solution and the fluoride ion concentration of the sample solutions measured with a calibrated fluoride ion-reference electrode combination attached to a suitable meter. Fluoride detection limit is 10 ppm.
5. **Water Fluoride concentration:** Fluoride ion concentration in water samples is to be measured with a calibrated fluoride ion- reference electrode combination attached to a suitable meter. Fluoride detection limit 20 ppb. The water samples are to be preserved following analysis until the fluoride quality control data has been evaluated. The water may then be discarded on instruction from the technical authority.
6. **Quality Control Measures:** Following preparation of all sediment and moss samples the laboratory will be required to include blind duplicate and standard reference materials with the samples before analysis. Blind replicates will be selected randomly from each batch of twenty samples by laboratory staff and will be inserted as directed by the technical authority before any analysis is carried out. The standard reference materials will also be inserted with samples as directed by the technical authority.

This type of work has significantly improved the BC geochemical database by providing a wide range of new analytical information at improved detection levels. Strongly supported by the mining and exploration community, program results have played an important role in stimulating new exploration activities as well as complimenting other geoscience projects.

**Proponents are requested to:**

1. briefly outline previous experiences delivering this type of work
2. demonstrate a capacity to complete the work by February, 2013
3. briefly outline the labs internal quality control and assurance procedures
4. describe in detail the aqua regia digestion procedure that will be used
5. summarize the instrumentation that would be used for all of the sediment and water analysis
6. suggest any modification to the proposed methods that might improve sensitivity and lower detection limit.
7. provide a list of elements and associated parameters to be reported including any limitations and/or other concerns

**Proponents must:**

1. have a principle laboratory based in British Columbia and have British Columbia Certified Assayer permanently on staff, and
2. provide a total per sample price quote for the analysis by ICP-MS, loss on ignition, fluoride in sediments and fluoride in waters.

Proponent submittals will be initially assessed on demonstrated technical ability to complete the requirements as outlined in this ITQ and secondly, per sample price. Lowest price does not guarantee proponent selection.

Table 1. List of required ICP-MS elements, minimum required detection levels and required reporting units.

#	Element	Detection Levels	Units	#	Element	Detection Levels	Units
1	Ag	2 to 100,000	ppb	20	Mo	0.01 to 2,000	ppm
2	Al	0.01 to 10	%	21	Na	0.001 to 5	%
3	As	0.1 to 10,000	ppm	22	Ni	0.1 to 10,000	ppm
4	Au	0.2 to 100,000	ppb	23	P	0.001 to 5	%
5	B	20 to 2,000	ppm	24	Pb	0.01 to 10,000	ppm
6	Ba	0.5 to 10,000	ppm	25	S	0.02 to 5	%
7	Bi	0.02 to 2,000	ppm	26	Sb	0.02 to 2,000	ppm
8	Ca	0.01 to 40	%	27	Sc	0.1 to 1,00	ppm
9	Cd	0.01 to 2,000	ppm	28	Se	0.1 to 1,00	ppm
10	Co	0.1 to 2,000	ppm	29	Sr	0.5 to 10,000	ppm
11	Cr	0.5 to 10,000	ppm	30	Te	0.02 to 1,000	ppm
12	Cu	0.01 to 10,000	ppm	31	Th	0.1 to 2,000	ppm
13	Fe	0.01 to 40	%	32	Ti	0.001 to 5	%
14	Ga	0.1 to 100	ppm	33	Tl	0.02 to 1,000	ppm
15	Hg	5 to 100,000	ppb	34	U	0.05 to 2,000	ppm
16	K	0.01 to 10	%	35	V	2 to 10,000	ppm
17	La	0.5 to 10,000	ppm	36	W	0.05 to 100	ppm
18	Mg	0.01 to 30	%	37	Zn	0.1 to 10,000	ppm
19	Mn	1 to 10,000	ppm				
#	Element	Detection Levels	Units	#	Element	Detection Levels	Units
38	Be	0.1 to 1,000	ppm	46	Rb	0.1 to 2,000	ppm
39	Ce	0.1 to 2,000	ppm	47	Re	1 to 1,000	ppb
40	Cs	0.02 to 2,000	ppm	48	Sn	0.1 to 100	ppm
41	Ge	0.1 to 1,00	ppm	49	Ta	0.05 to 2,000	ppm
42	Hf	0.02 to 1,000	ppm	50	Y	0.01 to 2,000	ppm
43	In	0.02 to 1,000	ppm	51	Zr	0.1 to 2,000	ppm
44	Li	0.1 to 2,000	ppm	52	Pt	2 to 100,000	ppb
45	Nb	0.02 to 2,000	ppm	53	Pd	10 to 100,000	ppb

## **Enquiries/Time Extension to the ITQ Closing Date**

All enquiries and other communications related to this ITQ throughout the solicitation period and until contract award shall be directed in writing only to the Technical Authority by email [raylett@shaw.ca](mailto:raylett@shaw.ca).

To ensure the equality of information among proponents, answers to enquiries which are relevant to the quality of quotes will be posted on Geoscience BC's website. Such enquiries must be received at least two (2) working days before the closing date.

A request for a time extension to the Quote closing date WILL NOT be considered.

## **Submission of Quotes**

Quotes will be accepted in the form of electronic submissions in PDF format to [sluggett@geosciencebc.com](mailto:sluggett@geosciencebc.com) by the time and date indicated on page 1 of this ITQ document.

Proposals submitted in response to this ITQ will not be returned, and will be kept confidential.

## **Validity of Quote**

Any quote must remain open for acceptance for a period of not less than ninety (90) days after the closing date of the ITQ. After the ITQ closing date, no amendments to the proposal will be accepted. However, during the evaluation, the Technical Authority may require clarification from or conduct interviews with Bidders.

## **Applicable Laws**

The Contract shall be interpreted and governed, and the relations between the Parties determined, by the laws in force in the province of British Columbia and the parties attorn to the jurisdiction of the British Columbia courts.

## **Rights of Geoscience BC**

Geoscience BC reserves the right to:

- a) reject any or all quotes received in response to this ITQ;
- b) enter into negotiations with one or more Bidders on any or all aspects of its quote;
- c) accept any proposal in whole or in part;
- d) cancel and/or reissue this requirement at any time;
- e) award one or more contracts;
- f) verify any or all information provided with respect to this requirement;
- g) award contracts without competition for follow-on work, if any, to the successful proponent for this requirement.

## **Incurring of Cost**

No costs incurred before receipt of a signed contract or specified written authorization from Geoscience BC can be charged to any resulting contract.