



REQUEST FOR PROPOSAL

Title: Horn River Basin Surface Water Monitoring Study

Date Issued: January 19, 2011

Solicitation Closes: 12:00 PM (Pacific), February 17, 2011

Enquiries to: Christa Sluggett,
Project Geologist and Communications Coordinator
Geoscience BC

Email: sluggett@geosciencebc.com

Geoscience BC
Suite 440 – 890
West Pender Street
Vancouver BC, Canada
V6C 1J9
Tel: 604-662-4147
Fax: 604 - 662 - 4107
www.geosciencebc.com

Request for Proposals

Horn River Basin Surface Water Study

1.0 INTRODUCTION

The Organization

Geoscience BC is an independent, not for profit organization with a mandate to attract new mineral and oil and gas investment to British Columbia through geoscience. Geoscience BC works in partnership with industry, academia, government, First Nations, and communities to fund applied innovative geoscience projects.

The Project

The Horn River Basin (HRB) is a world-class shale gas play in Northeast British Columbia (please refer to Appendix 1 for a map of the HRB area). Estimates of the total gas-in-place remain preliminary; however, current estimates place the HRB among the largest natural gas plays in North America. Development of the Horn River Basin will provide significant economic and employment benefits for British Columbia over the next several decades.

As with all areas of the province, water is a vital resource in the HRB, supporting a variety of domestic and commercial uses and activities, as well as First Nation traditional activities. Natural gas producers developing the HRB require water for hydraulic fracturing operations to stimulate natural gas production and support drilling camps and infrastructure development. A wide range of stakeholders including provincial ministries and agencies, local governments, commercial water users and First Nations, as well as the general public, need detailed and unbiased information about existing water resources to make appropriate policies, regulations and permit decisions as well as to support public discussion on issues related to water use.

In collaboration with the Horn River Basin Producers Group (HRBPG) Geoscience BC recently completed Phase I of the Horn River Basin Deep Saline Aquifer Study to identify and evaluate subsurface saline aquifers. These saline aquifers may be able to serve as a fracking water supply source and spent water disposal locations. However, suitable deep saline aquifers are not likely distributed evenly throughout the HRB, which may necessitate a range of water supply options including surface water, shallow ground water and deep aquifers. In addition, as the HRB develops and additional water is required, operators will require sustainable water supplies where and when it is needed.

To date, individual companies operating in the HRB are undertaking specific studies to better understand local surface and ground water. In addition, the Ministry of Energy

recently completed an initial evaluation of surface and ground water resources in the HRB, undertaken by Golder Associates (please refer to Appendix 2). As surface water supply will undoubtedly play a key role in the development of the basin, there is a need to establish hydrological conditions in the key watersheds and sub-watersheds within the basin. This will provide government, the public, First Nations and industry with a better understanding of the basin-wide water supply sources being used for the development of the shale gas reserves.

The recent study completed by Golder and Associates provided a preliminary assessment of surface water resources across the basin. As this was a desk based study using existing published data, there is a need to establish key monitoring stations so that current data is available to properly calibrate hydrologic and hydrogeologic models that may be required for assessing the impact of water use in the basin.

Geoscience BC and the HRBPG are seeking a proponent to undertake a surface water quality and hydrometric program. In addition, it is recognized that surface water may also be affected by shallow groundwater systems and therefore preliminary shallow groundwater assessment is also required.

2.0 DESCRIPTION OF SERVICES REQUESTED

This Request For Proposals (RFP) is focused on determining the quantity and quality of surface water sources (i.e. rivers and lakes) in the Horn River Basin and its availability for shale gas development purposes.

This RFP does not outline a required specific scope of work and budget to complete a HRB surface and groundwater hydrological program. Instead, proponents are invited to submit a scope of work and budget that would, in their opinion, provide appropriate hydrological information on the basin. The intent is not to generate the lowest cost approach, but to encourage innovation and a program that best meets the needs of all stakeholders. Proponents may wish to consider submitting more than one proposal to fully address potential research options.

Notwithstanding, responses should address the following:

Surface Water Monitoring and Water Chemistry:

Responses to this RFP should include: methodology for determination of flow rates, data handling and reporting, hydrologic modeling and predictions of seasonal and long term surface water availability, and establishment of surface water chemistry framework in the study area, as shown in the attached Appendix 1. The purpose of the surface water quality characterization is to allow comparison of surface water chemistry with, shallow groundwater, and formation water chemistry, and to provide hydrological data on water quality.

The surface water program would be conducted over 3 years. Year 1 would involve installation of appropriate hydrometric equipment to BC hydrometric standards and establishment of climate station(s) to BC climate station standards. Year 2, and Year 3,

would involve data management and hydrologic assessment/modeling in order to calibrate hydrologic predictions based on data collected. This hydrologic modeling would result in the development of water balances for target areas of shale gas development for the basin. This water balance planning data could then be used to assess available water use for natural gas development so that it can be sustainably managed.

Proponents should outline how the water quantity data is to be managed and reported and how information would be secured and shared. For the purpose of this proposal and associated cost estimates, describe how many monitoring points would be required for suitable monitoring of flow conditions and water levels, and provide a brief rationale and approach for a three-year program.

Components of the proposal work program should include, but are not limited to, the following:

Year 1 Activities

Water Quantity

- Review existing data and recommendations of the previous surface water study (Golder, 2010). Watercourses to be monitored may vary in width from about 10-50 m wide. Some locations have good site access and others could require aerial access.
- Propose the optimal number and location of monitoring sites (suggest reviewing Golder, 2010).
- Determine locations of data collection points (water quality and quantity) and cost/benefit for station telemetry and real-time access to data.
- Establishment of proper QA/QC measures for the flow and climate data.
- Design water level monitoring program including equipment standards and needs, timing and site access logistics, number of site visits, stage discharge curve development and maintenance protocols.
- Install appropriate devices for continuous water level monitoring, data collection, and transmission, handling and reporting.
- Install and monitor a climate station for precipitation and temperature.
- Monitor flow rates and water levels for at least one year and determine costs for continuous monitoring for year 2 and 3.
- Develop and maintain rating curves (water level versus flow relationships) for hydrometric gauge sites.
- Monitor stations, process and report data.

Water Quality

- Identify practical suite of water quality parameters (i.e. conductivity, temperature, turbidity, pH) and establish other critical parameters that relate to groundwater

chemistry as part of a preliminary evaluation of the linkages with shallow groundwater systems.

- Determination of appropriate monitoring points, analytical parameters and monitoring schedule to establish surface water quality framework and link to water quantity measurement program and determine parameters to be bottle sampled.
- Determine the need for telemetry for some or all water quality sampling parameters.
- Establishment of proper QA/QC measures for the water-sampling program.
- Establish data reporting mechanism and link to water quantity measurement program.
- Collect surface water samples in field and perform laboratory analysis.
- Analyze data, process and report.
- Preparation of monitoring report(s) to summarizing findings.

Year 2-3 Activities

- Operation and maintenance of existing stations.
- Addition of new stations (based on available budget).
- Prepare database of information for input to regional hydrologic model.
- Assess client data needs and locations for flow quantity trend prediction.
- Relate client needs and assess existing hydrologic model (Golder 2010) and determine if adjustment in model procedure is required.
- Input data into a regional hydrologic model to predict long-term trends.
- Assess surface water supply and seasonal variability relative to demand.

Standards for Monitoring:

Climate Stations:

- Climate stations shall be operated year round and should include the following parameters:
 - Total precipitation (via a heated precipitation gauge where power is available, or a collecting standpipe “all season” precipitation gauge where power is not available)
 - Temperature
 - Snow depth
 - Solar radiation (at a minimum of one site)
 - Relative humidity/evapotranspiration (lysimeter)

Hydrometric Stations:

- Hydrometric stations must be designed and operated according to BC Hydrometric Standards and include the following parameters:
 - Outline of the number of stations and specify locations.
 - Water level gauge accuracy and type of equipment.
 - Number of benchmarks.
 - Number of verticals in flow velocity measurements.
 - Number of measurements per year. [Suggest a minimum of 3-4 flow profiles per year, including high flows during spring freshet]
 - QA/QC methods on data collected.
 - Telemetry and data management method.

Quality Assurance/Quality Control:

Quality assurance is generally having a defined methodology, etc. to minimize the likelihood of errors occurring. Proponent should propose a QA methodology to conduct the work.

Quality control is providing sufficient confirmation that the data is correct and to what BC Data Standard, and the proponent should outline the approaches to deal with:

- Data corruption or loss of field data (or physical loss of data logger)
- Equipment Failure (e.g. sensor, logger, battery, etc.)
- Vandalism
- Response to equipment failure.

3.0 FIRST NATIONS ENGAGEMENT AND PARTICIPATION

Geoscience BC and the HRBPG value constructive and meaningful relationships with First Nations that have traditional territory within the HRB. Geoscience BC and the HRBPG view the Horn River Basin Water Monitoring Study as an opportunity to work with First Nations to identify research priorities and provide opportunities for First Nations to participate in the study.

It is mandatory that responses to this RFP include a plan for First Nations participation in implementation planning and opportunities for First Nations to directly participate in the study. Proponents may not contact First Nations with Traditional Territory located within the Horn River Basin to discuss proposals. Any Proponent contacting First Nations to discuss proposals may have their proposal rejected.

4.0 STUDY AREA

The study area is regional in scope and includes the area of northeast BC generally described as the Horn River Basin shale gas play (see attached map).

5.0 ENQUIRIES/TIME EXTENSION TO THE RFP CLOSING DATE

All enquiries and other communications related to this RFP throughout the solicitation period shall be directed in writing only to the Technical Authority (Ms. Christa Sluggett) by email.

To ensure the equality of information among proponents, answers to enquiries which are relevant to the quality of the proposals will be posted on Geoscience BC's website. Such enquiries must be received at least five (5) working days before the closing date. A request for a time extension to the RFP closing date WILL NOT be considered.

6.0 SUBMISSION OF PROPOSALS

Proposals will be accepted in the form of electronic submissions in PDF format to sluggett@geosciencebc.com by the time and date indicated on page 1 of this RFP document. Proposals submitted in response to this RFP will not be returned, and be kept confidential.

7.0 VALIDITY OF PROPOSAL

Any cost estimates associated with the proposals must remain valid for acceptance for a period of not less than ninety (90) day after the closing date of the RFP. After the RFP 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 Proponents.

8.0 APPLICABLE LAWS

Any contracts subsequently negotiated and awarded with respect to this RFP 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.

9.0 RIGHTS OF GEOSCIENCE BC

Geoscience BC reserves the right to:

- a) Reject any or all proposals received in response to this RFP

- b) Enter into negotiations with one or more Bidders on any or all aspects of its proposal;
- 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.

10.0 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.

11.0 INFORMATION PROVIDED BY GEOSCIENCE BC

No representation or warranty, expressed or implied, is made and no responsibility of any kind is accepted by GBC, or its advisors, employees, consultants or agents, for the completeness or accuracy of any information contained in the RFP Documents or that is provided during the RFP process or contract negotiation process, or under a contract that may be entered into, if any.

12.0 CHANGES TO THE RFP DOCUMENTS

GBC may, prior to the Submission Deadline, without liability, cost or penalty, alter the Submission Deadline and amend or supplement the RFP Documents by Addenda only. No other communications of any kind whatsoever will modify the RFP Documents.

13.0 COSTS OF PROPOSAL

The Proponent shall bear all costs and expenses with respect to the preparation and submission of its Proposal and any other activity pertaining to its Proposal, including its participation in the RFP process and contract negotiation, if any. GBC shall not be liable to pay any such costs/expenses regardless of the conduct or the outcome of the RFP process.

14.0 CONFIDENTIALITY

GBC and its partners will take all reasonable precautions to maintain the confidentiality of the information submitted by the Proponents, subject to any disclosure required by law. GBC reserves the right, however, to disclose the Proposal to employees, servants, agents, advisors and consultants of GBC and its partners and affiliates for the purpose

of assisting GBC in evaluating the Proposal. The employees, servants, agents, advisors and consultants of GBC and its partners and affiliates will not be liable for any damages resulting from any disclosure before, during or after the issuance of this RFP and the submission of a Proposal.

Proponents will take all reasonable precautions to maintain the confidentiality of the information submitted by GBC, subject to any disclosure required by law. Proponents reserve the right, however, to disclose the Proposal to employees, servants, agents, advisors and consultants of the Proponent and its affiliates for the purpose of assisting Proponents in preparing the Proposal. The employees, servants, agents, advisors and consultants of the Proponent and its affiliates will not be liable for any damages resulting from any disclosure before, during or after the issuance of this RFP and the submission of a Proposal.

15.0 NO PUBLIC STATEMENTS

Recipients of or Proponents to this RFP shall not issue any public statement or news release pertaining to this RFP without the prior written consent of GBC.

16.0 ABSENCE OF CONTRACTUAL OBLIGATIONS DURING RFP PROCESS

- (a) GBC shall have no obligation to enter into a contract with a Proponent in respect of the provision of Services that are the subject of this RFP. GBC shall only have obligations to a Proponent if it decides to execute a written agreement with a Proponent and such obligations shall be in accordance with the terms and conditions of that agreement as finalized between GBC and the Proponent.
- (b) GBC may, in its sole discretion, for any reason and at any time, take any action in respect of the Proposals it receives including:
 - (i) Entering into further discussions or clarification meetings with one or more of the Proponents;
 - (ii) Entering into any contract or contract negotiations with one or more of the Proponents;
 - (iii) Inviting any of the Proponents to participate in another competitive process to carry out the Services;
 - (iv) Requesting one or more of the Proponents to supplement and resubmit their Proposal;
 - (v) Accepting or rejecting any Proposal;
 - (vi) Annulling this RFP process and rejecting all Proposals; or
 - (vii) Annulling this RFP process and commencing a new process;

at any time without incurring any liability to an affected Proponent and without any obligation to inform an affected Proponents of the reasons for GBC's actions. Nothing in this subsection (b) or elsewhere in the RFP Documents shall impact or affect the validity of subsection 9 (a) and (b) of this RFP.

17.0 SUBMISSION REQUIREMENTS

Confirmation of Interest

- (a) Each Proponent who intends to submit a Proposal in response to this RFP shall confirm its intention and provide a single point of contact, phone number, fax number and e-mail address to Christa Sluggett at Geoscience BC.

Contact: Christa Sluggett
E-Mail: *sluggett@geosciencebc.com*

Content of Proposal

- (a) The submission of standard business development or promotional materials, published corporate profiles, annual reports, standard marketing or sales brochures and other like materials is discouraged.
- (b) Each Proponent is solely responsible for conducting its own independent research, due diligence, and any other work or investigations and seeking any other independent advice necessary for the preparation of its Proposal. Nothing in this RFP is intended to relieve the Proponents from forming their own opinions and conclusions with respect to the matters addressed in this RFP.

Original and Copies

- (a) Each Respondent shall submit one copy of the Proposal in electronic form to
to Christa Sluggett at Sluggett@geosciencebc.com

Submission Deadline

- (a) Original Proposals shall be delivered by e-mail to GBC at the address set forth above no later than 12:00 pm (noon) Pacific Time **February 17, 2011.**
- (b) Original Proposals submitted after this deadline will not be accepted. Each Proponent shall be responsible for the timely delivery of its Original Proposal.
- (c) GBC may extend the Submission Deadline by issuing an Addendum prior to the Submission Deadline to prospective Proponents who have confirmed their intention to submit a Proposal.

18.0 FURTHER INFORMATION, CLARIFICATION AND CONTACT INFORMATION

Requests for further information, clarification or for any other purpose related to this RFP are to be made by e-mail to:

Christa Sluggett
E-Mail: sluggett@geosciencebc.com

- (a) Proponents are responsible for seeking any clarification that they require well in advance (at least 5 working days) of the Submission Deadline. GBC shall not be responsible for any misunderstanding of the RFP Documents.
- (b) For all purposes related to this RFP, Proponents shall not contact or attempt to contact:
 - (i) Any GBC officer, employee, subcontractor, agent, representative, consultant or volunteer with respect to this RFP, **other than the GBC contact set out in subsection (a) above; and**
 - (ii) Any other prospective Proponent except for the purpose of discussing the possibility of submitting a Proposal as a Joint Venture.

19.0 AMENDMENT OF PROPOSAL

- (a) A Proponent may amend its Proposal prior to the Submission Deadline by withdrawing its original Proposal and submitting a revised Proposal.

Clarification of Proposal by GBC

- (a) GBC may, in its sole discretion, seek clarification of any matter in a Proposal in any manner it considers appropriate including investigating the abilities and experience of the Proponents, seeking information from other parties about the Proponent, requiring the Proponents to submit supplementary documentation and seeking the Proponent's acknowledgement of GBC's interpretation of the Proponent's Proposal.

20.0 METHOD OF SELECTION

This RFP will be awarded based on qualifications, work plan and budget (in Canadian dollars). GBC shall, in its sole discretion, use any evaluation criteria (whether subjective or objective), it deems suitable to evaluate the Proposals. In the event that GBC selects a Proponent for the provision of the Services, GBC will notify each Proponent in writing, and GBC's method of selecting the Proponents will remain confidential to GBC.

21.0 AGREEMENTS

GBC will confirm the business arrangement in the form of a Project Agreement to be drafted after selection of the successful Proponent(s)

APPENDIX 2 – Golder Associates Study

Available as a separate document from Geoscience BC's website:

<http://www.geosciencebc.com/s/RequestsforProposals.asp?ReportID=438218>