

# Forging Opportunities Through Earth Science Partnerships

**Innovative, independent and relevant public earth science** is needed for a strong and sustainable economy that attracts new investment. Geoscience BC efficiently and cost-effectively generates research and data on British Columbia's minerals, energy and water resources that supports responsible economic development and complements the work of provincial and federal geological surveys and government scientists.

**Combined with our collaboration** with the resource sectors, academia, communities, Indigenous groups and government, Geoscience BC provides the people of BC with a responsive model for public earth science that advances knowledge, informs responsible development, encourages investment and stimulates innovation.



227

completed and current  
earth science projects

- Minerals – 156
- Energy – Oil & Gas 30
- Energy – Geothermal 12
- Water – 29



\$56 Million  
committed to research

+



\$31 Million  
in additional partner  
contributions

=



Almost  
\$87 Million  
invested in public  
earth science

\$4.80

exploration investment reported  
to government for every

\$1

spent on Geoscience BC  
minerals research<sup>i</sup>



“Geoscience BC produces solid, publicly-available earth science that helps to build a stronger economy.”

Joel McKay, CEO  
Northern Development Initiative Trust



**British Columbia's competitive advantages** include significant deposits of critical minerals and metals such as copper, zinc, gold, silver and molybdenum that make a clean electrified future possible. BC also has major deposits of important steelmaking (metallurgical) coal and industrial minerals.

Public mineral-related earth science drives economic development. It is used by prospectors, mineral explorers, mine developers, governments, community leaders and Indigenous groups to inform evidence-based decisions and brings new investment, mitigates risk and stimulates innovation.

Responsible mineral exploration projects and mining operations in BC continue to benefit communities, provide thousands of jobs and contribute billions of dollars in economic activity.



**Geoscience BC is an innovative research hub.** We provide independent data that serves the public good by guiding clean, responsible energy development; identifying and mitigating risks; addressing specific environmental and social questions; and attracting investment. This includes addressing many of the questions and recommendations in the 2019 *Scientific Review of Hydraulic Fracturing in British Columbia* report.

Natural gas development and future liquified natural gas exports to Asian countries will contribute to the economy and to reducing global greenhouse gas emissions through the use of less carbon intensive sources of electricity generation. Geoscience BC's credible public research supports informed energy resource decisions and boosts investor confidence.

Geothermal may play a significant role as we transition to alternative sources for electricity and heat. Our research reduces investment risk and cost at high-potential sites to encourage long term geothermal development.



**Water is essential for our environment, economy and ways of life.** Geoscience BC water research is principally related to energy and mineral development in BC.

Water became a separate Geoscience BC strategic focus area in 2018 following significant public engagement in the development of our *Strategic Plan 2018-2022*.

With input from a Strategic Task Force on Water, our Board of Directors approved a series of four water research goals in June 2019: *improve baseline surficial geology; assess watershed dynamics in relation to climate change; characterize groundwater and aquifers; and measure local and regional water balance.*

Geoscience BC research follows **strategic objectives** .....> set out in our *Strategic Plan 2018-2022*. These inform a *Scientific Project Plan* that is guided by independent expert technical advice, so that our research is credible, responsive and relevant.

The digital datasets available on BC help make it an exceptional place to do mineral exploration.

**Pacific Empire Minerals Corporation**<sup>ii</sup>

Geoscience BC's research on groundwater, safe fluid disposal zones and seismicity has been invaluable.

**Tim McMillan, President and CEO, Canadian Association of Petroleum Producers**<sup>iii</sup>

Being involved early in Geoscience BC research in our territory, and understanding the data from past projects, puts the Tahltan Nation at the forefront of research in our territory.

**Chad Norman Day, President, Tahltan Central Government**<sup>iv</sup>

GHGMap... exemplifies the independent measurement data needed for informed decisions.

**Susannah Pierce, Director Corporate Affairs, LNG Canada**<sup>v</sup>

Geoscience BC has a track record of excellent science combined with a proven ability to build, coordinate and mobilize.

**Dr. Pascal Spothelfer, President and CEO, Genome BC**<sup>vi</sup>

## OUR FUNDING

Geoscience BC's core funding is received from the Province of British Columbia's Ministry of Energy, Mines and Petroleum Resources. This funding leverages significant additional partner funding and contributions from other sources.

In May 2019, Minister Michelle Mungall announced \$5 million in one-year bridge funding to Geoscience BC to support further earth science research in British Columbia.



“The research that will come from this funding will attract the investment necessary for resource development that makes a clean electrified economy possible.”

**Minister of Energy, Mines and Petroleum Resources  
Michelle Mungall**<sup>vii</sup>

<sup>i</sup> Taken from analysis of Assessment Report Index System (ARIS) reports conducted in 2018

<sup>ii</sup> [www.twitter.com/PEMC\\_V/status/98376935551985664](https://www.twitter.com/PEMC_V/status/98376935551985664)

<sup>iii</sup> Letter of Support for Geoscience BC, October 24, 2018

<sup>iv</sup> [www.geosciencebc.com/collaboration-agreement-between-geoscience-bc-and-tahltan-central-government/](http://www.geosciencebc.com/collaboration-agreement-between-geoscience-bc-and-tahltan-central-government/)

<sup>v</sup> Letter of Support for Geoscience BC, October 29, 2018

<sup>vi</sup> Letter of Support for Geoscience BC, November 15, 2018

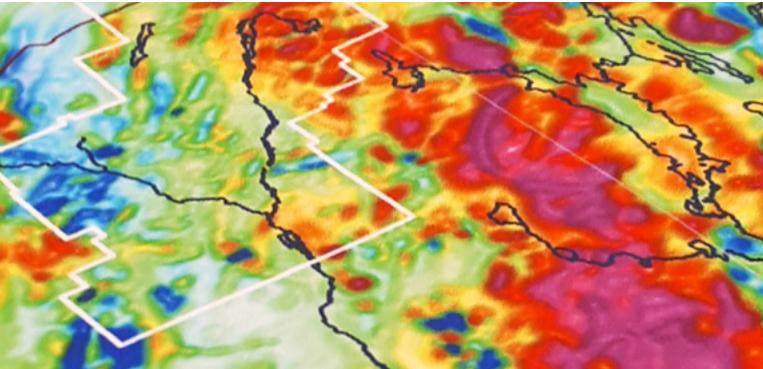
<sup>vii</sup> [www.geosciencebc.com/geoscience-bc-receives-5-million-in-bridge-funding-to-continue-minerals-energy-and-water-research/](http://www.geosciencebc.com/geoscience-bc-receives-5-million-in-bridge-funding-to-continue-minerals-energy-and-water-research/)

## STRATEGIC OBJECTIVE

## Identifying New Natural Resource Opportunities

We help to identify new natural resource opportunities relating to minerals and oil and gas development.

Our minerals research includes regional-scale datasets that help to target exploration for mineral deposits and encourage investment and responsible development. Our energy development collaborations include oil and natural gas resource assessments in northeastern British Columbia.



### Attracting Mineral Exploration Investment: Search Phase III Project

The 2017 *Search Phase III* mineral project surveyed 9,600 km<sup>2</sup> of north central BC. Data was released in January 2018 and within six months there were 64 new or updated mineral tenure claims in the area, with Serengeti Resources announcing follow-up fieldwork. The project was supported by Northern Development Initiative Trust, and engagement activity included a workshop with Carrier Sekani First Nations to share data.

### Targeting Energy Activity

The report *Quantification of the Gas and Liquids in Place and Flow Characteristics of Shale and other Fine-Grained Facies in Western Canada* was released in 2019 and summarized five years' research into the network of tiny fractures and pores that store and transport gas and liquid hydrocarbons in fine-grained sediments. The results help to more accurately target hydrocarbons and to increase production efficiency by improving reservoir characterization methods.

## STRATEGIC OBJECTIVE

## Advancing Science & Innovative Technologies

Earth science is evolving rapidly. Geoscience BC supports the development and application of innovative technologies, made-in-BC methods and next-generation public data to provide new data analysis, evaluation and modelling tools that improve economic and environmental performance.

### Capturing Carbon Dioxide in Rocks

The natural 'carbon mineralization' process captures the greenhouse gas carbon dioxide (CO<sub>2</sub>) in rocks containing magnesium silicate and hydroxide that are often associated with some types of mineral deposits. Our *Carbon Mineralization Potential Assessment for BC* project is identifying, mapping and analyzing rocks to create a 'Carbon Mineralization Potential Index' for BC. The work is part of a collaboration led by the University of British Columbia's Bradshaw Research Initiative for Minerals and Mining and Mineral Deposit Research Unit, with support from the British Columbia Geological Survey and the Geological Survey of Canada, to refine and commercialize the natural process.



### Mapping 'Sour Gas'

Sour gas is natural gas containing measurable amounts of hydrogen sulphide (H<sub>2</sub>S). The ability to predict sour gas is of paramount economic importance to natural gas developers, given the additional costs to facilities and pipelines which process sour gas. In some cases sweet gas production becomes sour, and facilities must be adapted to handle sour gas causing operational delays and cost overruns. We are predicting sour gas and hydrocarbon liquid distribution in parts of northeastern BC to reduce risks and improve project economics.

## STRATEGIC OBJECTIVE

### Facilitating Responsible Natural Resource Development

We are facilitating natural resource development with research projects that improve the understanding of coal and mineral resource development activities. We are also part of collaborative groups to mitigate risk and guide improvements to natural gas industry practices and regulation related to induced seismicity and methane emissions.

#### Seismic Research Consortium

Geoscience BC is a founding member of the Seismic Research Consortium, which was set up in 2012 to enhance the existing two-station Canadian National Seismographic Network so that it could more effectively monitor ground motion resulting from hydraulic fracturing operations. Other consortium members include Natural Resources Canada, the BC Oil & Gas Commission and the Canadian Association of Petroleum Producers (CAPP). The consortium was extended in 2017 and the network now has 22 monitoring stations. The result is a network that is able to detect lower magnitudes and that can more accurately locate the location and depth of events.

#### Ground Motion Potential in Northeastern BC

We fund research relating to seismicity and natural gas development in northeastern BC, especially in areas close to communities and infrastructure.

Researchers are assessing the potential for ground motion caused by hydraulic fracturing and fluid injection to be 'amplified' by the type of surface sediment in an area around Fort St. John and Dawson Creek. The publicly available results are used by industry, regulators, Indigenous groups and communities in the Peace River Regional District.



## STRATEGIC OBJECTIVE

### Enabling Clean Energy

We invest in research to identify and develop new ways to detect and mitigate greenhouse gas emissions associated with natural gas development. We are also supporting geothermal resource research that focuses on economically viable sites with high geothermal energy potential. Much of this research aligns closely with government's *CleanBC* commitments and the long term view of developing new sources of alternative energy.

#### Geothermal Potential in the Garibaldi Volcanic Belt

We are conducting a regional-scale assessment of the Garibaldi Volcanic Belt, which stretches from Squamish to north of Pemberton, with the Geological Survey of Canada. This project is using the latest geophysical and geological techniques to provide a modern assessment of one of Canada's largest geothermal hotspots.

## STRATEGIC OBJECTIVE

### Understanding Water



Geoscience BC's water research focuses on scientific and technical questions relating to energy and mineral development.

#### Regional Groundwater Mapping

The Peace Project was the largest regional groundwater and aquifer mapping project in the Peace region, an area of significant natural gas development. It included input from a wide range of groups including industry, Peace River Regional District and local First Nations.

#### Collaborating with First Nations

We have an agreement with Fort Nelson First Nation to manage a network of hydrometric monitoring stations. The network's data is available publicly as well as being used by Fort Nelson First Nation.

## INDEPENDENCE AND TRANSPARENCY

### Governance, Management & Finance



**STRATEGIC OBJECTIVE:** *Ensuring Transparency, Accountability & Responsibility*

**STRATEGIC OBJECTIVE:** *Building Future Opportunities*

Geoscience BC is a not-for-profit society incorporated under British Columbia's *Societies Act*. Our Governance, Management & Finance focus area is key to maintaining Geoscience BC's reputation as an independent provider of high-quality public earth science data.

Our nine staff are backed by at least 1,500 hours of support from more than 70 volunteers every year. This includes a diverse Board of Directors, and subject matter experts on our Minerals, Oil & Gas and Geothermal Technical Advisory Committees that identify, plan, develop, recommend and review projects.

Our structure maximizes expert input and applied research investment and minimizes administrative-related expenditures.

## OPEN DATA INFORMS GOOD DECISIONS

### Public Access & Data Management



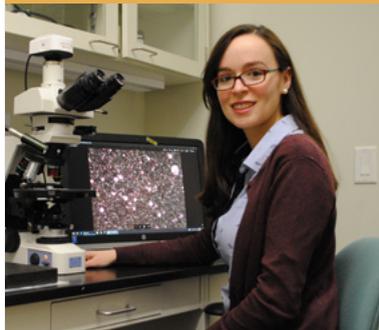
**STRATEGIC OBJECTIVE:** *Providing Public Access to Data*

**STRATEGIC OBJECTIVE:** *Maintaining Secure Digital Data*

Our Public Access & Data Management focus area supports data management and ensures reliable access to our research findings and data.

All project reports and data are on the Geoscience BC website, which also hosts our Earth Science Viewer online mapping application. Geoscience BC project information is also available through the British Columbia Geological Survey and the Ministry of Jobs, Trade and Technology's *BC Economic Atlas*.

Since 2007, we have invested \$570,000 in annual scholarships to support up to ten earth science or geoscience Masters (MSc) or Doctorate (PhD) students, with the aim of increasing BC's earth science literacy and capacity.



## RELATIONSHIPS BUILD TRUST

### External Relations & Communications



**STRATEGIC OBJECTIVE:** *Increasing Awareness & Expanding Collaborative Network of Partners*

**STRATEGIC OBJECTIVE:** *Demonstrating Research Value & Building Broader Support*

**STRATEGIC OBJECTIVE:** *Serving Technical & Academic Partners*

**STRATEGIC OBJECTIVE:** *Increasing Geoscience Literacy & Capacity*

Our External Relations & Communications focus area ensures we operate and communicate in a transparent manner; make our work easy to interpret and share; listen and respond to the needs of interest groups; and attract additional project funding and contributions.

We continue to build strong, respectful relationships with Indigenous groups. For example, in May 2019, we signed a Collaboration Agreement with Tahltan Central Government and our day-to-day work includes workshops with Indigenous communities, leadership and administrative staff.