Qikiqtani Region

The Qikiqtani region includes Baffin Island and the other islands of the Canadian Arctic archipelago, the northern part of the Melville Peninsula, and the Belcher Islands. Some of the oldest rocks in Canada are found in this region. They are part of the Canadian Shield and are exposed on Baffin Island and the Melville Peninsula. They also form the bedrock of eastern Devon Island and parts of Ellesmere Island. These granitic, volcanic, sedimentary and metamorphic rocks formed during the Precambrian period, the time from when the Earth was formed (about 4.5 billion years ago) until the beginning of the Cambrian period (540 million years ago). The metamorphic rocks in the region are highly folded, faulted, and deeply eroded. Spectacular folds, large enough to be seen from space, outline the present-day shape of the Belcher Islands.

In the west and the far north, the Qikiqtani region is made up of thick Paleozoic (540-252 million year old) sedimentary rock, originally deposited on an ancient seabed and continental margin. The layers of rocks occasionally contain coal seams and preserve many types of fossils, from marine shells and fish to terrestrial animals and plants. These gently folded and tilted rocks are exposed on many of the Arctic islands and rise up to form the rugged mountains of Ellesmere and Axel Heiberg Islands. The widening of the ocean basin between Greenland and Nunavut is, in part, responsible for this mountain building and is one of the most recent tectonic events in Nunavut’s geologic history.

Tens of thousands of years ago, thick ice sheets covered the entire territory and created the steep-walled fiords located on eastern Baffin Island and Ellesmere Island, where glaciers and ice caps remain to this day. Minerals left behind by the glaciers’ erosion of the landscape help prospectors and geologists locate possible metal or diamond deposits. The Qikiqtani region hosts many kinds of mineral deposits and occurrences, including iron, gold, nickel, copper, lead, zinc, platinum, and diamonds. Clues about the location of these deposits can be found using ground or airborne geophysical surveys, by prospecting for minerals that are associated with certain types of deposits, or by looking for rusty weathered sulphide-rich rocks.

The Mary River iron mine, owned by Baffinland Iron Mines Corporation and located near the community of Pond Inlet, has been in production since late 2014. In 2017, the company transported an estimated 4.1 million tonnes of iron ore to the Milne Inlet port by truck, using the Milne Inlet tote road. The ore was stockpiled at the port and shipped in the months of August through October during the open water season. The company is seeking an amendment, termed the Phase 2 Development proposal, to its project certificate. If approved, this proposal would allow the construction of additional infrastructure at the Milne Inlet port including a larger ore-loading dock that would triple the amount of ore that could be shipped at the port during the open water season. The company is also seeking to construct a rail line along the tote road to transport an increased volume of ore to the port.

Aston Bay Holdings Ltd. ran a summer exploration program on the Storm property in 2017, including surface reconnaissance and a property-wide geophysical survey. This work follows on results generated through the $4 million 2016 drilling and regional soil-sampling programs. The results from this work were released in January 2017 and included the discovery of new soil anomalies, as well as significant findings of copper and silver mineralization from drilling. In December, the company announced an initial inferred resource for the Seal property of 1.006 million tonnes (Mt) of zinc ore.

Peregrine Diamonds Ltd. completed a work program in September 2017 on its 100 per cent owned Chidliak project on southern Baffin Island. The program focused on drilling at the CH-6 kimberlite, as well as geotechnical drilling, environmental baseline studies, and follow-up work to support the preliminary economic assessment (PEA) of Chidliak released in 2016. A total of 9.32 carats in 213 diamonds greater than 0.85 mm were recovered from the 1,936 kilograms (kg) of kimberlite material sampled in the 2017 program. Information gathered from this season’s field results will be used to update the PEA and further refine the design of the open pit mine plan.

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Qikiqtani Region

Other Geological Programs And Studies

Qirnirktaaluk Project,
Canada Nunavut Geoscience Office (CNGO)
This project is taking place on the northwestern portion of Baffin Island, with the goal of finishing bedrock and surficial geology map coverage of the island. The project is expected to be completed by 2020, and will cover about 40,000 km². In 2017, a regional airborne geophysical survey was done to provide some basic geological information before the mapping begins in 2018. The CNGO held meetings in Arctic Bay and Igloolik in early 2017 to introduce the project to those communities and to engage with local residents and hunters who have knowledge of the area.

Oil and gas studies, Baffin Bay
and eastern Arctic Islands (CNGO)
The Scott Inlet Basin, located offshore of Baffin Island, north of Clyde River, has potential to be an economic source of oil and gas. Geological knowledge of the area is limited, so further research is being done to determine the source of oil seeps in the area. At the Mel project on the Melville Peninsula, North Arrow Minerals Ltd. announced the discovery of diamondiferous kimberlite. The discovery, named ML-8, was found at the termination of a well-defined train of kimberlite indicator minerals, and consists of kimberlite material up to 0.5 m in size. A 62.1-kg sample taken from kimberlite boulders found at the surface produced 23 diamonds larger than 0.106 mm in size.

The Baffin Gold property was acquired from Commander Resources Ltd. by Kivalliq Energy Corporation in May 2017. Kivalliq Energy’s summer field program included grab and channel sampling, till geochemistry, and drone-acquired high-resolution imagery of new and existing targets. The company discovered gold mineralization in a surface sample from the Malrok target and in a channel sample at the Kanosak targets.

Prospecting on the Storm Copper property. Courtesy of Aston Bay Holdings Ltd

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Glossary of Terminology

Deposit – a natural accumulation of a metal, gemstone or other valuable mineral substance, which may be economically viable but whose characteristics require more detailed study to be classified as a resource.

Drilling – the extraction of rock or surface material using a rotary drill. Drills can extract cylinder-shaped cores of rock using a synthetic diamond drill bit, or chips of rock using a jackhammer-type drill bit. Geologists study these cores and chips to better understand the underground geological structure of an area and determine the presence or absence of ore minerals.

Exploration – the process of searching for mineral deposits.

Geochemical survey – the chemical analysis, in a laboratory, of soil, rock, or water from a defined area to identify unusually high concentrations of chemical elements that indicate the presence of economic metals or gemstones. Also known as geochemical exploration.

Geophysical survey – the collection of information associated with bedrock using sensors that record electric, magnetic, or other kinds of data. The survey can be conducted from the air or the ground and is used by mineral exploration companies to detect physical properties of rocks such as magnetism, gravity or conductivity.

Prospecting – the search for outcrops or surface exposures of mineral deposits with economic potential.

Resource – a published estimate of the amount of naturally occurring metal, gemstone, or other mineral substance in a mineral deposit that could allow for economic extraction of the material in the future. Classifying a resource within a deposit indicates there is moderate confidence in the quantity and quality of ore in that deposit. Specific legal criteria exist to classify a deposit as a resource.

Scott Inlet area. Results, to date, suggest that younger, Mesozoic-age sedimentary rocks of Scott Inlet are not the source of the oil seeps and that they may originate from older, deeper Paleozoic-age sedimentary rocks.

Hudson Ungava Project (CNGO)
Akpatok Island, located south of Baffin Island in Ungava Bay, has exposed rocks of Paleozoic age that may make good source rocks for oil and gas. As part of the final season of this program, geologists from CNGO are studying those rocks to see how they match up with rocks of the same age in Hudson Bay and Foxe Basin, using geochemical studies and other methods.

Paleozoic Stratigraphy, Boothia Peninsula (CNGO)
The rocks of the Boothia Peninsula are believed to be similar to those found on the islands of the high Arctic. In 2017, the CNGO participated in a larger Natural Resources Canada study, the GEM 2 Boothia-Somerset Integrated Geoscience Project. CNGO’s work consisted of sampling Ordovician-age carbonate rocks (485-444 million years old) to provide data on age, rock unit, and oil and gas source rock potential.

Nunavut Prospectors Program and Prospector Development
The Government of Nunavut’s Economic Development and Transportation department held its Introduction to Prospecting Course in Iqaluit in 2017. The course introduces participants to basic prospecting skills and provides an introduction to geological concepts. To date, more than 1,200 Nunavummiut have successfully completed the course. Graduates of the course may qualify for financial and technical assistance through the Nunavut Prospectors Program to pursue their own projects, and some find opportunities to work as field assistants on mineral exploration projects. This course is planned to be held in Hall Beach and Sanikiluaq in 2018.