

NUNAVUT

MINERAL EXPLORATION, MINING & GEOSCIENCE

KIVALLIQ REGION



Kivalliq Region Geology

The Kivalliq region of Nunavut is underlain by rocks of the Canadian Shield, which are some of the oldest rocks in Canada. These rocks consist of metamorphosed granitic, sedimentary, and volcanic rocks that formed during the Precambrian period, the time from when the Earth formed (about 4.5 billion years ago), until the beginning of the Paleozoic era (540 million years ago). In the Kivalliq, the granite-intruded sedimentary rocks and volcanic greenstone belts have experienced several episodes of large-scale folding and faulting. This tectonic activity has enriched some of these rocks with metals such as gold, silver, nickel, or copper. A large continental basin formed later, accumulating thick layers of sandstone on top of the ancient Shield rocks in the western part of the Kivalliq. Mineralization occurred later within these sandstones to form large uranium deposits, similar to the ones found in northern Saskatchewan.

Much of the bedrock in the Kivalliq region is hidden beneath a thick layer of clay-rich and sandy sediment called till, which was left behind as glaciers disappeared. Traces of harder minerals, including minerals associated with diamonds, can be found in the sediments and tracked back to their source in the bedrock. Ground investigations and airborne geophysical surveys can be

used to discover the locations of various metal or diamond deposits. Prospecting for gold is possible by looking for rocks rich with quartz veins or rusty-coloured weathering.

Selected Mining and Exploration Highlights

Agnico Eagle Mines Limited owns the **Meadowbank** gold mine, located 80 km north of Baker Lake. It has a workforce of approximately 700 people. A total production of approximately 320,000 oz of gold is anticipated at Meadowbank for 2017 as the mine approaches its end-of-life in late 2018. Agnico Eagle's Amaruq gold project, northwest of Meadowbank, is a satellite operation to the mine and will utilize the existing Meadowbank mill facilities via a 64 km all-weather road between the two sites which were linked in August 2017. Agnico Eagle planned over \$22 million on exploration drilling program at Amaruq in 2017. The company anticipates production from an open pit at Amaruq's Whale Tail deposit could begin in 2019. In June 2017, Agnico Eagle and the Kivalliq Inuit Association signed an Inuit Impact and Benefit Agreement for the Whale Tail project to ensure the protection of Inuit values, culture, and language, and to promote Inuit training and employment.

Number	Project	Operator	Status
◆ Diamonds			
◆ 205	Kahuna	Dunedin Ventures Inc.	Active
◆ 207	Naujaat	North Arrow Inc.	Active
◇ 209	Luxx	North Arrow Inc.	Inactive
◇ 210	Nanuq	Peregrine Diamonds Ltd.	Inactive
▲ Gold			
▲ 301, 302	Amaruq - 301 , Meadow River - 302	Agnico Eagle Mines Limited	Active
▲ 312-315	Cone Hill - 312, Fox - 313, Parker - 314, Peter Lake - 315	Agnico Eagle Mines Limited	Active
▲ 317	Gibson MacQuoid	Auryn Resources Inc.	Active
▲ 318, 319	Greyhound - 318, White Hills - 319	Agnico Eagle Mines Limited	Active
▲ 322, 323	Hard Cash - 322, Nigel - 323	Silver Range Resources Ltd.	Active
▲ 327	Kiyuk	Cache Exploration Inc.	Active
▲ 328	Kuulu	NxGold Ltd.	Active
▲ ✂ 329	Meadowbank Mine	Agnico Eagle Mines Limited	Active
▲ 330	Meliadine	Agnico Eagle Mines Limited	Active
▲ 331-333	Noomut - 331, Quartzite - 332, Yandle - 333	Silver Range Resources Ltd.	Active
▲ 334	Pistol Bay	Northquest Ltd.	Active
● Uranium			
● 501	Angilak	Kivalliq Energy Corporation	Active
⬡ 503, 504	Kiggavik - 503, St. Tropez - 504	AREVA Resources Canada Inc.	Inactive
● Nickel-Copper-PGE			
○ 601	Ferguson Lake	Canadian North Resources Development Corp.	Inactive

Please refer to the map on the cover for the location of active and inactive projects in the Kivalliq region. Bold text signifies a major project.

Agnico Eagle also owns the **Meliadine** advanced gold project, which is connected to Rankin Inlet by a 25 km all-weather road. The project had a budget of \$96 million in 2016, mostly focused on expanding the underground development. The company plans mine start-up by 2019 and anticipates production of up to 405,000 oz of gold per year for up to 14 years. Agnico Eagle has also undertaken exploration at four projects, **Parker Lake, Peter Lake, Fox Lake** and **Cone Hill**, covering the extension of the Meliadine regional fault and the Gibson McQuoid greenstone belt. The scale of the programs at each property varied but involved prospecting, sampling, geophysical surveying, and diamond drilling; no results have been released.

The **Greyhound** precious and base metals project is located 41 km north of Baker Lake along the road linking that community to the Meadowbank gold mine. Agnico Eagle has earned a 51 per cent interest in the property by completing phase one of its option agreement with Aura Silver Resources Inc., which retains 49 per cent interest in Greyhound. Agnico Eagle completed 2,262 m of diamond drilling and discovered gold mineralization at a target previously located using a geophysical survey. Agnico Eagle is the sole owner of the nearby White Hills property at which it conducted a 315 m drilling program, a geophysical survey, and prospecting. No results from that program have been released.

Northquest Ltd., a subsidiary of Nordgold SE, is the owner of the **Pistol Bay** project situated 35 km northwest of Whale Cove. The company complemented its extensive 2016 exploration program with a similar campaign in 2017 by conducting mapping, prospecting, sampling, diamond drilling (4,205 m in 24 holes) and a geophysical survey.

Cache Exploration Inc. signed an agreement with Montego Resources Inc. to acquire 100 per cent ownership of the **Kiyuk** property. During the 2017 field season Cache completed 1,172 m of drilling in six holes, with four holes intersecting multiple gold-mineralized zones at the Rusty and East Gold Point showings. Additional till sampling and prospecting led to the discovery of a new showing at Nansen, to the north of Kiyuk Lake.

The **Gibson MacQuoid** project was acquired by Auryn Resources Inc. covering 329,000 hectares within 19 prospecting permits over the Gibson MacQuoid greenstone belt. During the 2017 field season the company identified eight significant gold-in-till anomalies after collecting 2,548 till samples. Auryn also acquired high-resolution drone imagery of the geochemical survey areas and plans to conduct additional till sampling, mapping, and geophysical surveying in 2018 to identify targets for drilling.

Since 2014, Dunnedin Ventures Inc. has been exploring its **Kahuna** diamond project near Chesterfield Inlet. Analysis of samples collected from three kimberlites in 2016 returned clear and colourless commercial-sized (exceeding 0.85 mm) diamonds. In 2017, the company collected more than 3,000 till samples and staked additional mineral tenure, with plans for a 2017-2018 winter drilling program. Dunnedin will spin out Solstice Gold

Corporation to pursue gold potential of the property, notably, within the Kannuqa gold belt, which is less than 15 km east of the Meliadine project.

Silver Range Resources Inc. expanded its land position in Nunavut, staking two new properties, **Yandle** and **Noomut**, approximately 150 km northwest of Arviat. Exploration at Yandle consisted of mapping, sampling, and geophysical surveying, which confirmed the presence of gold mineralization along the contact between intrusive and volcanic rocks and nearby fault structures. Silver Range also staked the **Nigel** property, 405 km west of Arviat, which hosts three historical shows in a similar lode gold style of mineralization as its **Hard Cash** project, 15 km to the east. Exploration activity at Hard Cash was limited to sampling and ground geophysical surveying. Additionally, Silver Range's **Quartzite** project is located west of Whale Cove and covers 10 historic gold showings; several showings were sampled and returned strong gold mineralization.

Other Geological Programs And Studies

Nunavut Prospectors Program and Prospector Development

The Government of Nunavut's Economic Development and Transportation (EDT) department will hold its Introduction to Prospecting Course in Arviat, Chesterfield Inlet, Coral Harbour, Naujaat, and Whale Cove in 2018. 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 find opportunities to work as field assistants on mineral exploration projects.

Tehery Lake-Wager Bay bedrock mapping (Canada-Nunavut Geoscience Office (CNGO))

The third and final season of a multi-year project run by the Canada-Nunavut Geoscience Office and the Geological Survey of Canada project was completed in 2017, covering the area between Chesterfield Inlet and Wager Bay as part of the Geo-Mapping for Energy and Minerals (GEM 2) program. This detailed mapping project has upgraded and modernized the geoscience information in the Tehery Lake-Wager Bay area.

Western Hudson Bay permafrost study (CNGO)

The CNGO continued its study and monitoring of permafrost within a 50 km corridor along the western coast of Hudson Bay, the third season of work since the program began in 2014. The study will use satellite data for map compilation and interpretation to establish a baseline of information on the permafrost and its potential susceptibility to changing climate. Work on permafrost monitoring in the Rankin Inlet area was done in collaboration with Natural Resources Canada under the GEM 2 program.

Community Education and Training (Government of Nunavut)

EDT works with various stakeholders to coordinate mining-related education and training programs, as well as supporting partners in community engagement activities. EDT works with the Department of Education, Nunavut Arctic College, the Government of Canada, regional Inuit associations and industry partners on a number of initiatives to facilitate the participation of Nunavummiut in the opportunities mining activities bring to Nunavut. This includes the Nunavut Mine Training Fund, which provides support to participating partners to develop, coordinate and execute mining training programs for Nunavummiut. EDT contributes up to \$200,000 per year. For 2017-2018, projects included in the Kivalliq included the Arviat Work Readiness Program and Class 3Q Driver Training. For more information, please contact 867-857-2920 or arviatjobs@gmail.com.

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 operation of extracting a vertical sample of bedrock or other surface material such as glacial till or clay in order to examine the occurrence of rock types and understand the geological structure. Diamond drilling produces a cylindrical core of rock, while reverse circulation drilling produces rock chips.

Exploration – the process of searching for mineral deposits.

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

Greenstone belt – a linear zone or “belt” of metamorphosed volcanic rocks that often host deposits of gold and other valuable metals. The characteristic colour comes from several different green minerals that make up the volcanic rocks. Greenstone belts can be tens to hundreds of kilometres in length and are found in multiple places across Nunavut.

Kimberlite – a type of igneous rock that sometimes contains diamonds. Kimberlites can be composed of intrusive rock (which forms inside the earth) and extrusive rock (which forms on the earth’s surface).

Mineral – a naturally-occurring solid substance with a defined chemical formula, crystal structure, and distinct physical properties, that forms as a result of geologic processes.

Mineralization – the geological process by which a mineral is introduced into a rock and forms a mineral deposit.

Prospecting – the search for outcrops or surface exposures of mineral deposits with economic potential. Prospecting takes place by walking on the land and observing it for evidence of mineral occurrences. Once an occurrence is found, further work is necessary to determine if a deposit is present at the location.

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.



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