

# Nunavut

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## Mining Journal

A supplement to Mining Journal

### Canada's rising star



# Nunavut: an emerging force in Canadian exploration and mining

Canada's remote and sparsely populated Nunavut Territory is on a trajectory to capture global attention as a mining and exploration destination. And with its population explosion, it's also gearing up to put that industry to work by creating jobs and business opportunities for its residents.

With encouraging support for mineral development from both national and local governments and progressive mining policies established by the territory's majority indigenous population (the 'Inuit'), Nunavut is attracting significant mineral investment. Projected expenditures of nearly C\$400 million make Nunavut the fourth-largest minerals investment destination in Canada in 2011.

With robust exploration and a wide portfolio of mineral targets including gold, silver, iron, diamonds, copper, zinc and uranium, optimism is high for mining growth in Nunavut. Subject to market conditions and regulatory approvals, mining projects hold the potential to invest nearly C\$7 billion in Nunavut over the next 10 years in constructing new mines and associated infrastructure. In recognition of this, the NWT & Nunavut Chamber of Mines has commissioned this supplement, which aims to provide up-to-date information on the Nunavut minerals industry.

## Young territory, growing population

Nunavut is young, politically and demographically.

Created in 1999, Nunavut was carved out of the Northwest Territories by referendum to create a new autonomous territory, which in the Inuit language of Inuktitut means 'Our Land'. The territory comprises nearly 20% of Canada's 9,970,610km<sup>2</sup> land mass. Its capital city, Iqaluit (pronounced 'ee-kal-oo-weet') is its largest community, with a population of 7,250. The 'place of many fish', Iqaluit is located just south of the Arctic Circle, and about 2,000km north of Canada's capital city, Ottawa.

Nunavut is flanked to the west by the Northwest Territories, to the east by Greenland, and to the south by the provinces of Manitoba, Ontario and Quebec. The climate is subject to large fluctuations in seasonal temperatures, from -30° in January to 8° in

July, with less than 25cm of precipitation per year, mostly in the form of snow. Parts of the territory experience 24 hours of daylight in June and round-the-clock darkness in December. Nunavut is treeless and mostly uninhabited, although settlements stretch as far north as Ellesmere Island.

As a virtually new political jurisdiction, the economy of Nunavut is, in many respects, still in a development phase. Self-reliance in the economy is a key objective for both the territorial and federal governments, the attainment of which, however, is met with certain challenges. While Nunavut's unemployment rate has dropped from the previous year, it is still more than twice the Canadian average at 16.6%. The lack of qualifications and education are cited as factors.

But Nunavut is young in demographics too and hosts the youngest, fastest-growing population in Canada. The median age is 24.6 years and the population grew from 26,600 in 1999 to 33,300 in 2011. Population growth is attributed about equally between a 'baby boom' and people moving from other provinces to take advantage of growing opportunities in Nunavut.

Mining holds great promise to help pave the way to Nunavut's economic self-reliance. Mineral production

Purple saxifrage, the official flower of Nunavut



Photo: Elizabeth Kingston

from its first mine already accounts for nearly a fifth of the gross domestic product. More than C\$395 million was spent on exploration and development in 2011. With additional investments in mineral exploration, the Nunavut mining industry boosted real GDP by 3.3% in 2011. In comparison, the public sector grew moderately by only 1.9%, despite making up over 40% of the economy.

These investments present significant training and employment opportunities. It is estimated several thousand jobs will emerge over the coming years, making the mining industry Nunavut's largest private-sector employer. As well, the government recognises the substantial role that the minerals industry plays in developing Nunavut's infrastructure. With new transportation networks such as roads, port facilities, and airstrips, Nunavut will be able to provide easier and cheaper access to not only support expanding exploration programmes and new mining development, but also lower the cost of living for communities.



Small Inukshuk at Sylvia Grinnell Park, Iqaluit

Photo: Elizabeth Kingston

## CONTENTS

An emerging force in exploration and mining	2
Young territory, growing population	2
Diverse geology spells mineral potential	3
Minerals administration & policy	4
Geography and infrastructure	5
Supportive investment climate	5
Mining past and present	6
Key exploration projects	7
Doing business in Nunavut	back cover
<b>Advertisements:</b>	
Chamber of Mines	6
Government of Nunavut's Department of Economic Development & Transportation	4
Kivalliq Energy Corporation	5
Peregrine Diamonds	7

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# Diverse geology spells mineral potential

**N**unavut's diverse geology makes it prospective for gold, silver, iron, diamonds, uranium and base metals. The territory encompasses most of the Canadian Shield, also known as the Laurentian Plateau, a crust of ancient rocks 500 million years old. The region is split into three geological provinces: the Archean, the Proterozoic, and the Phanerozoic.

## Archean

Rocks of Archean age are exposed throughout Nunavut, and undoubtedly underlie much of the territory covered by younger rocks. They are characterised by granite-greenstone terranes, similar in most respects to Archean cratons globally. Nebulitic migmatitic gneisses, which range from granodiorite to quartz monzonite, are among the oldest rocks in Nunavut and exposed in parts of northern Baffin Island, the Melville Peninsula, and southwest across the mainland.

Late Archean supracrustal rocks comprise the greenstone belts that host much of the gold and base-metal endowment of Nunavut. Western Nunavut's Slave Geological Province hosts numerous gold vein deposits, eg Ulu, George Lake, and Boston; and iron-formation hosted gold as at the former Lupin Gold Mine. A number of volcanogenic massive sulphide deposits are known, including Izok and High

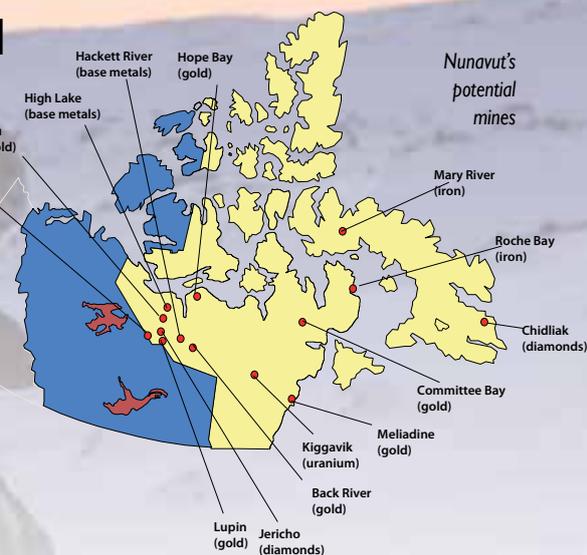
Lake. The Slave Province also hosts younger kimberlite intrusions, some of which are significantly diamond-bearing, eg at Nunavut's Jericho diamond mine and just across the Nunavut boundary in the Northwest Territories, where three mines make that territory the fourth-largest producer of diamonds by value in the world.

Archean rocks in south-central Nunavut in the western Churchill Geological Province host many of the same deposit types, like those at Victory Lake, Noomut, Heninga Lake, and the Meliadine deposits.

In the northern part of the Churchill Province, ultramafic volcanic rocks, quartzite and iron formation characterise the Woodburn and Prince Albert groups.

While the former hosts the Meadowbank gold deposits, the less-explored Prince Albert group also holds significant potential for gold mineralisation, eg Three Bluffs deposit.

Rocks of the Prince Albert Group continue northeast across the Melville Peninsula and onto northern Baffin Island, where they are represented by the Mary River Group. Some of the richest iron deposits in the world are found in these rocks at Mary River and Roche Bay.



## Proterozoic

Much of the Churchill Province was covered by extensive siliciclastic deposits in the earliest Proterozoic. Younger siliciclastic and carbonate rocks of the Penrhyn Group on the southern Melville Peninsula, and their along-strike correlatives of the Piling Group (central Baffin Island) represent a continental margin succession deposited on Archean crust. These rocks are revealing elevated base-metal and gold mineralisation.

On southern Baffin Island, similar contemporaneous stratigraphy (the Lake Harbour Group) contains ultramafic sills that have recently been investigated for their nickel potential. In southernmost Nunavut, basal clastic rocks and overlying volcanic and carbonate units are well exposed on the Belcher Islands in southern Hudson Bay, as are Superior-type banded iron formations.

## Phanerozoic

Paleozoic rocks cover about one-third of Nunavut. Strata lying west and northwest of Fury and Hecla



Below: mines and promising Nunavut mine projects 2012. Above: aerial view of the Izok Lake camp and drilling at Meadowbank

Project	Owner(s)	Commodity	Description	Status
Meadowbank Gold Mine	Agnico-Eagle Mines	Gold	Open-pit mine located in the Kivalliq Region, 300km west of Hudson Bay and 70km N of Baker Lake. Mine jobs: 450	Mill began commercial production in March 2010. Paid first royalty payment to NTL.
Mary River	Baffinland Iron Mines	Iron	Proposed open-pit mine with railway and port; 936km N of Iqaluit with 5 known deposits. Estimated construction jobs: 3,500; Estimated mine jobs: 715	Submitted application for Type B Water Licence; Class A Land Use Permit and; 2012 Work Plan on January 12, 2012.
Kiggavik	AREVA Resources	Uranium	Proposed uranium mine 80km W of Baker Lake. Estimated Construction jobs: 600; Estimated mine jobs: 500	Draft EIS submitted on December 21, 2011; IIBA negotiations begin January 27, 2012.
Doris North/ Hope Bay	Newmont Mining Corp	Gold	Proposed gold mines 130km S of Cambridge Bay; covers most of the Hope Bay Greenstone Belt. Estimated mine jobs: 300	Work postponed indefinitely while project under review; Company has approved 'Care and Maintenance' funding for the Hope Bay site.
Jericho Diamond Mine	Shear Diamonds Ltd	Diamonds	Project to reassess viability of reopening the former diamond mine, 255km SSE of Kugluktuk. Estimated mine jobs: 150-200	Recovered first 200 ct of diamonds from mine; Type A Water Licence 8-year renewal approved on December 22, 2011.
Meliadine Gold	Agnico-Eagle Mines	Gold	Possible gold mine, 5 deposits, the largest of which is the Tiriganiaq deposit, 25km NE of Rankin Inlet. Estimated construction jobs: 600; Estimated mine jobs: 350-400	Plan to complete feasibility study in 2013.
Hackett River	XStrata Zinc Canada	Zinc, silver, copper, lead and gold	One of largest undeveloped VMS massive sulphide deposits in the world. 104km SSW of Bathurst Inlet. Estimated mine jobs: 300	Sabina announces sale of Hackett River to Xstrata in June 2011.
Back River	Sabina Gold & Silver Corp.	Gold	About 60km from Hackett River; adjacent to the Wishbone Greenstone belt. Consists of the George and Goose Lake deposits, holding significant gold resources.	Goose camp anticipated to open early February, 2012; anticipated that 8 core drills will be in operation at Back River and Wishbone.
High Lake	MMG Resources Inc	Copper, zinc, gold, silver	1,710ha, copper-zinc-silver-gold property, 190km ESE of Kugluktuk. Estimated mine jobs: 500	NIRB required that MMG provide a comprehensive project update by early January 2012.
Izok Lake	MMG Resources Inc	Copper, zinc, gold, silver	High-grade zinc-copper-lead-silver deposit, 255km SW of Kugluktuk. Estimated mine jobs: 760	Plan to advance to full feasibility study and permitting phase by end of 2012.
ULU & Lupin	Elgin Mining Inc	Gold	Located SE of Kugluktuk. Lupin mine: past production; 3.7Moz. ULU deposit: indicated mineral resource; 751,000t	Elgin purchased both properties from MMG Resources in July, 2011. Winterisation of work camp at Lupin; Phase I drilling later this year.
Roche Bay	Advanced Exploration	Iron	Indicated resource of 323Mt located next to a natural deep water harbour on the east coast of the Melville Peninsula.	Completed Tuktuk I drill programme. Plan to enter feasibility study by end of 2012.
Chidliak	Peregrine Diamonds Ltd	Diamonds	Located 180km S of Pangnirtung. Contains 59 known diamond-hosting formations.	Peregrine purchased remaining 51% participating interest in Chidliak from BHP. Preliminary bulk sampling delayed.

Strait form part of the Arctic Platform that continues northward onto Ellesmere Island, whereas those to the southeast underlie the Foxe Basin and represent the northern continuation of the Hudson Platform.

During the Caledonian orogeny, uplift and erosion led to the deposition of a thick orogenic clastic wedge, with elevated potential for 'red bed'-type copper deposits.

In the late Devonian, east-west compression (Ellesmerian orogeny) may have been the driving force behind Mississippi-Valley type mineralising events that gave rise to the Polaris district zinc-lead deposits mined at the Polaris Mine in the central Arctic archipelago.

From the Carboniferous to the Cretaceous, renewed rifting led to the formation of the Sverdrup Basin in northernmost Nunavut characterised by the deposition of a thick clastic and carbonate succession. These strata host major reserves of gas and oil, including the past-producing Bent Horn light crude field.

In eastern Nunavut, a cluster of kimberlite pipes centres on Somerset Island, with exposures on the northern Brodeur Peninsula and northwestern Baffin Island. Several of the Somerset Island pipes are known to be diamondiferous.

The Chidliak diamondiferous kimberlites found much further south on Baffin Island's Cumberland Peninsula, often comprise magmatic or volcanoclastic rock and can contain abundant country rock and mantle xenoliths.

In western Nunavut, diamondiferous pipes such as Jericho occur in the northern continuation of the Lac des Gras field in the northern Slave Province. Numerous other pipes have been identified on Victoria Island as well.

## Minerals administration and policy

### Public and Private Lands

Nunavut became its own territory in 1999 via the *Nunavut Act* and the *Nunavut Land Claims Agreement Act*. Major land owners are the Federal and Territorial Governments, which hold Crown lands in trust for the public, and private lands owned by the Inuit, through their land claims organisation Nunavut Tunngavik Inc (NTI).

Both the territorial and federal governments, as well as NTI realise that the minerals industry has great potential to grow Nunavut's economy. To date, they have maintained a supportive policy framework, intended to welcome investment to the territory. NTI established a positive mining policy in 1997 followed by the Government of Nunavut in 2003.

Land tenure for minerals is administered by the federal government on public lands and by NTI on Inuit lands. Both government and the Inuit share resource management responsibilities which sanction exploration, provide regulatory approvals, and issue relevant permits and licences for exploration and mining.

Geological mapping of the remote and large territory does lag that of most of southern Canada. This is being addressed through geological surveys conducted by the Geological Survey of Canada and by the Canada-Nunavut Geoscience Office – a co-operative partnership between the Federal and Territorial governments and NTI. While Nunavut is



MMG's High Lake deposit. Right: a miner at Agnico-Eagle's Meadowbank operation

undermapped, it is also underexplored, improving the odds for exploration success.

Nunavut benefits from Canada's *Mineral Exploration Tax Credit*, which helps companies raise capital for mining and exploration by providing a tax incentive to individuals who invest in 'flow-through' shares issued to finance exploration.

To help make Nunavut's tax regime more competitive, the Government of Nunavut provides a tax incentive to mining and exploration to offset higher energy costs through the *Nunavut Fuel Tax* rebate.

Should a mine be developed, Nunavut mining companies can recover most of their initial capital investment before paying a significant amount of taxes. The income tax regime also provides rules to help mitigate the negative financial aspects of fluctuating prices. Tax and royalty regimes are also principally based on net production profits rather than on the net smelter return royalties commonly found in other countries.

### Land Claims Agreement

The Nunavut Land Claims Agreement (between the Inuit of the Nunavut Settlement Area and the Government of Canada) is the largest Aboriginal land settlement in Canadian history. The agreement gives Inuit fee simple title to 356,000km<sup>2</sup> of land. There are 944 parcels of Inuit-Owned Lands (IOL), where Inuit hold surface title only.

The Government of Canada or 'the Crown' retains the mineral rights to these lands. Inuit also hold fee simple title – including mineral rights – to 150 parcels of subsurface IOL, which total 38,000km<sup>2</sup> and represent around 2% of the territory.

In essence, the Nunavut Land Claims Agreement provides Inuit with a combination of surface and subsurface rights, cash and the right to participate in the management and regulation of (land and water) surface rights, wildlife, land and water use, and environmental impact reviews.

Inuit also receive a high level of certainty through the legal requirement of the land claim for major project developers to negotiate with them *Inuit Impact & Benefit Agreements* (IIBAs), which address such benefits as training, employment and business for all major projects. When combined with clarification of title and guaranteed participation in resource management and development, IIBAs have helped encourage many native peoples to support mining development.



Photo courtesy of Agnico-Eagle Mines Ltd.



Some 40% of all Agnico-Eagle's Meadowbank employees are Inuit

Photo: Agnico-Eagle Ltd

# NUNAVUT

## Mining & Mineral Exploration

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"The Government of Nunavut provides a tax incentive to mining and exploration"

## Geography and infrastructure

Supplying infrastructure to the vast, remote territory of Nunavut is costly. Most of what is available has come about as a direct result of mining. The mining sector has contributed not only to horizontal and vertical assets such as roads, bridges, buildings and even recreational facilities through community relations initiatives, but also has begun development of broader asset classes such as power, telecommunications and data-transfer stations, ports, airstrips and railways.

### Shipping

The Canadian Coast Guard has several 'heavy' and 'medium' ice breakers in their fleet, which are capable of year-round operation in the high Arctic. Service covers the entire Canadian Arctic archipelago from 60°N latitude, toward the North Pole and those waters of Ungava Bay and Hudson Bay, south of the parallel of 60°N latitude.

These ships also provide ice-breaking assistance to the Sealift 'dry cargo' ships which move general merchandise on behalf of Nunavummiut and ensure that transportation requirements of private and all federal government agencies are met. Canada's (and the world's) only ice-breaking ore-carrying ship, the MV *Arctic*, was built to service the Nanisivik and Polaris mines. Ongoing hydrographic surveys, combined with experience gained at these sites, confirm that marine shipping is now both economically and environmentally viable throughout most of the Arctic Islands.

### Roads

Though most of the communities in Nunavut have a local network of unpaved roads, there are currently no existing highways connecting communities to one another or to southern Canada. This is due to the enormous distances between communities, their remoteness, and the existence of permafrost, which makes construction of roads difficult and expensive.

The largest and most promising road development is the proposed Manitoba-Nunavut Highway. The

### Supportive investment climate

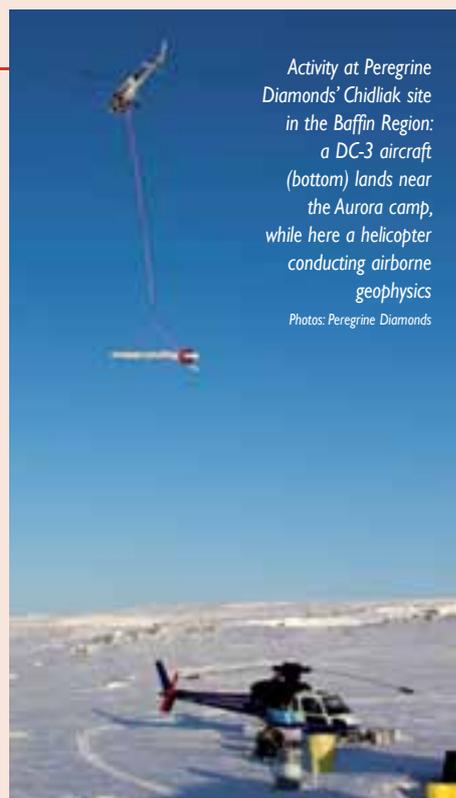
According to the Conference Board of Canada's 2011 Territorial Outlook, the economic future of Nunavut is positive. Strong resource-sector exploration and development contributes to economic growth. Thanks to its relatively healthy fiscal situation, Nunavut will not have to cut back to the same extent as many other governments in Canada (and elsewhere). Nunavut's economy is less exposed to the same risks as provinces. Current developments in the north are tied more to robust demand for raw materials in emerging markets, such as China and India, than to a recovery in the US or other advanced economies.

Nunavut has managed to avoid the stops and starts that have marked the economic recovery of the provinces. Thanks to growing demand for raw materials, Nunavut has forged ahead at an impressive pace, and was ranked fourth in Canada for mineral potential on the latest survey of mining companies conducted by the Fraser Institute. High commodity prices have rejuvenated investor interest in the region. A number of companies are preparing to develop mines, re-examine known mineral deposits, and make new discoveries.

proposed 1,475km route from Churchill, Manitoba to Rankin Inlet, includes as many as 63 bridges, and has an estimated cost of C\$1.3 billion, with C\$7 million in annual maintenance costs. The development of road networks is seen as key to fostering mineral production and would bring long-term economic benefit to Nunavut on the whole.

### Airports

While shipping remains one of the most important means of transportation, particularly for cargo, air travel is viewed as the most expedient. While a number of exploration sites are relatively close to



Activity at Peregrine Diamonds' Chidliak site in the Baffin Region: a DC-3 aircraft (bottom) lands near the Aurora camp, while here a helicopter conducting airborne geophysics

Photos: Peregrine Diamonds

government-owned, community airports, most mining sites have developed airstrips of their own. These sites vary in length and surface-type, but can accommodate various sizes of aircraft from helicopters to Twin Otter and Dash-8 aircraft to larger Hercules transport aircraft and Boeing 737 jets.

The government clearly recognises the substantial role that the minerals industry can play in Nunavut's development. Nor has this fact been lost on the Inuit. With new and improved infrastructure, Nunavut will be able to provide easier and cheaper access to support expanding exploration programmes and to assist in bringing new mines into production.

## Mining past and present

**W**ith its large land mass and diversity of geological provinces, recognition of its potential for base metals (such as copper, iron, nickel, silver, lead, zinc), precious materials (gold and diamonds), hydrocarbons (oil and gas) and radioactive elements (uranium) had already been detected in various locations of the territory in the years leading to Nunavut's creation in 1999. Zinc had the highest value of all the metals produced, totalling C\$267.8 million in 1998. Canada's total zinc production was C\$1.5 billion in the same year.

### North Rankin Inlet nickel mine (1957)

The first mine in Nunavut operated from 1957 to 1962. Early in the 1950s, nickel deposits were discovered on the shores of what was to become Rankin Inlet in the Hearne (Churchill) Province. The Korean War had caused the world price of nickel to rise sharply, and this mine shipped its first ore in 1957. This operation was significant not only for its mineral output, but for pioneering the use of sea transport in the high Arctic. Local Inuit made up 70% of the workforce for the North Rankin nickel mine. These Inuit were the first professional miners to work in Nunavut, and played a key role in Canada's mining history.

### Nanisivik lead-zinc mine (1976)

The Nanisivik lead-zinc mine was likely the last community mine built in Canada. Nanisivik, wholly owned by Conwest Exploration, lies at the northern end of Baffin Island, near the community of Arctic Bay. The mine was managed by Strathcona Mineral Services. Production began in 1976 using mainly room-and-pillar underground mining methods with open-pit operations at various satellite deposits later in its life. Although the site ceased operation in 1990s, the mine continues to maintain a water licence and its

airstrip was the main transportation link to the community of Arctic Bay, until the community established its own airport in 2010.

### Polaris lead-zinc mine (1982)

Polaris, on Little Cornwallis Island, was the world's most northerly base-metal mine. The joint venture company included exploration properties and was owned by the operator Cominco (77.5%) and Teck Corp. (22.5%). Cominco undertook 21 years of high Arctic exploration before bringing the mine into production in 1981. Extraction of the zinc and lead concentrate was from underground using mechanized, longhole and sub-level open stoping, with access to the workings by a ramp.

By 1999, the Polaris and Nanisivik sites were the two remaining operating mines in Nunavut. Although located in the high Arctic, they were viable in large part due to their location near tidal water. They became some of the lowest-cost zinc producers in the world at that time, and made the region the largest producer of zinc in Canada.

### Lupin gold mine (1982)

The Lupin gold mine was the world's most northerly gold mine outside Russia, 88km south of the Arctic Circle and 287km southeast of Kugluktuk (formerly Coppermine). Despite its remote location, it was the



The Meadowbank mine has gold reserves of 3.7Moz and employs over 700 people

fifth-largest gold producer in Canada. In 1994, it produced 3.4t of gold, 71.5t since start-up. Ore reserves contained more than 22t of gold, with a limited prospect of significantly adding to them.

Lupin had made a number of changes in mining techniques to overcome the challenges of mining at depth, including a new mining method; sublevel retreat under consolidated fill. Further improvements followed, in a continuous effort to limit the increase in mining costs with depth.

### Jericho diamond mine (2006)

The original Jericho mine was the first diamond mine to open in Nunavut. The original site was built by Tahera Diamond Corp for C\$200 million. The property was located in the Kitikmeot Region (northern Slave craton). A total of 1.6Mt of kimberlite was mined between 2006 and 2008. An additional 65,000ct remained accessible in a 156,000t surface stockpile at the time of its closure.

### Meadowbank gold mine (2010)

The best-known gold deposits are at the Meadowbank mine. Early in 2010, Agnico-Eagle Mines Ltd commissioned Nunavut's first gold mine, 75km north of Baker Lake in the Kivalliq Region (Churchill Province). The mine is expected to extract 8,500t/d (350,000oz/y) gold until 2019, and has a gold reserve of 3.7Moz (32.2Mt at 3.5g/t). The mine employs 738 people (of whom nearly 40% are Inuit), and supports a variety of secondary businesses in Baker Lake and elsewhere in Nunavut.

## KEY EXPLORATION PROJECTS

Despite Nunavut's huge size and remote location, the territory is experiencing a boom of exploration revealing many mineral deposits.

### Gold

Significant gold exploration includes the Meliadine project, also owned by Agnico-Eagle Ltd. This project is favourably located on the coast of Hudson Bay, 20km northeast of the jet-serviced community of Rankin Inlet. There are five known deposits, the largest of which is the Tiriganiaq deposit.

The Hope Bay project has proposed gold mines 170km southwest of Cambridge Bay and covers most of the Hope Bay Greenstone Belt area (northeast Slave structural province). Significant gold deposits on this property include the Doris, Madrid and Boston deposits. Sabina Gold & Silver Corp's Back River Project, also in the Kitikmeot Region, is adjacent to the Wishbone Greenstone belt and consists of the George and Goose Lake deposits. Both of these sites hold significant gold resources.

The Lupin gold deposit, recently bought by Elgin Mining Inc, was in production from 1982 to 1998 and then again from 2000 to 2005. Its past production is estimated at more than 3.7Moz of gold at an average

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grade of 0.259oz/t. Several of the Lupin zones have not yet been mined, with at least five additional zones warranting follow-up exploration.

**Diamonds**

Known locally as 'the little diamond mine that could', the Jericho Diamond project was recently purchased by Shear Diamonds Ltd. The property, covering around 26,300ha, lies 255km south-southeast of Kugluktuk. The presence of high-Cr G10 garnets in some of the dispersions suggests there may be undiscovered kimberlites in close proximity to Jericho that are likely diamondiferous. Shear's continuing review of historical datasets has confirmed compelling evidence of undiscovered kimberlites in certain areas outside the immediate mine area.

In the eastern Arctic, Peregrine Diamonds Ltd's 100%-owned Chidliak project is located on the Hall Peninsula of Baffin Island, 120km north-northeast of Iqaluit. The majority of the 59 kimberlites discovered at the project to date are associated with magnetic high anomalies. Peregrine expects to begin collecting a bulk sample from several key kimberlites in 2013 to obtain parcels of diamonds for valuation.

**Base metals**

Base-metal mining has been made possible owing to the availability of transportation. Originally, production had come from the Polaris and Nanisivik mines, both MVT deposits.

Exploration in the northern Slave Province has identified several Archaean volcanogenic massive sulphide (VMS) deposits, although the remoteness of these deposits has impeded their development. Experience gained in operating the world's only ice-breaking ore-carrier to the Polaris and Nanisivik mines, complemented by new hydrographic surveys, has revealed that commercial marine shipping from the North Slave coast is viable. The implications of this are enormous for the long-term development of the region's base-metal deposits.

The Izok deposit, discovered in 1974, is the largest known undeveloped zinc-copper deposit in North America. Located 90km west of the Lupin mine, it is owned by MMG Resources Inc. Exploration has revealed at least 18.5Mt of polymetallic reserves, including the newly discovered Inukshuk deposit with grades of 14.6% zinc, 2.5% copper, 1.6% lead and 77.7g/t silver. The 1,710ha High Lake base-metal deposit, 190km south-southeast of Kugluktuk, includes 21 potential polymetallic zones adjacent to the site.



One of the largest undeveloped VMS massive sulphide deposits in the world is the Hackett River deposit, located 104km south-southwest of Bathurst Inlet in the Kitikmeot region. The project was recently purchased by Xstrata Zinc, and includes four potential open-pit mine zones.

**Uranium**

The Kivalliq region has seen unprecedented growth in mineral exploration activity over the past few years. Although much of this is directed at gold, the discovery of deposits of uranium 80km west of Baker Lake are thought to have significant potential. The Proterozoic Thelon Basin is considered to have the potential to host uranium deposit similar to those in the Athabasca Basin. AREVA Resources Canada Inc's proposed project is undergoing environmental assessment. The components include three mine sites (Kiggavik, End and Andrew), milling facilities, an access road from site to Baker Lake, and a dock site at Baker Lake.

*Above: exploration camp sites at the Izok and High Lake base-metal deposits, both owned by MMG Resources*  
Photos: MMG Resources

*A DC-3 aircraft landing near Aurora camp, Chidliak project*  
Photo: Peregrine Diamonds



**Iron**

During 2011, several iron exploration projects were active primarily in the Qikiqtaaluk (Baffin) Region. Baffinland Iron Mines Corp's (ArcelorMittal Group) Mary River has been intermittently explored since its initial discovery in 1962.

The deposit is still working towards development, with several new high-grade iron occurrences discovered showing surface sample grades of 61-70% iron. Successful bulk sampling and subsequent blast-furnace testing in 2009 proved the Mary River ore to be of world-class quality. This site, 936km north of Iqaluit, includes a proposed open-pit mine with future development of a railway and ports.

Across the Foxe Basin, Advanced Exploration Inc forged strategic alliances with two major steel and iron-ore consumers in China in order to advance its Roche Bay magnetite-iron project. The project has an indicated resource of 323Mt at 28.07% iron and lies next to a natural deep-water harbour on the east coast of the Melville Peninsula.





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Chidliak project, May 2011, Baffin Island, Nunavut, Canada

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