

REPORT ON MINERAL ACTIVITIES IN QUÉBEC 2015

DV 2016-02

Report on Mineral Activities in Québec 2015

Disclaimer

The data compiled in this report comes from several sources, including questionnaires addressed to prospectors, to directors of regional First Nations and Inuit exploration funds, and to representatives of mining and exploration companies, as well as from their press releases. The accuracy and reliability of this information depend solely on these sources.

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Richmond Mines: 1 and 3

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A word from the Minister



I am pleased to present the 2015 edition of the Report on Mining Activities in Québec.

One of the highlights of the year was the launch of the new Plan Nord. This new version includes measures that would facilitate access to the territory, improve telecommunications infrastructure, provide clean energy at competitive rates and expand our scientific knowledge of this vast land. These measures will help create a favourable context for mining development by focusing on the diversity of mineral resources in Québec.

The adoption of the Act respecting transparency measures in the mining, oil and gas industries was also one of the measures in 2015 that aimed to implement greater transparency in the industry and gain greater social acceptability for projects among host communities.

In addition, the Government of Québec continues to work on its Strategic Vision for Mining Development in Québec. This vision covers the full range of the mining sector, from exploration and extraction, to suppliers and equipment manufacturers, to primary metal manufacturing.

Finally, Québec still ranks among the world's top ten most attractive jurisdictions for mining investments according to the annual survey by the Fraser Institute. This is a sign that the structuring measures of the last few years have helped build a strong foundation for mining investments to the benefit of all Québécois.

Enjoy your reading!

A handwritten signature in black ink, appearing to read 'Pierre Arcand', written in a cursive style.

Pierre Arcand

Minister of Energy and Natural Resources and Minister responsible for the Plan Nord



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The mining sector in Québec in 2015 – A few highlights

Plan Nord Toward 2035

In April 2015, the Government of Québec unveiled Plan Nord Toward 2035 and its 2015-2020 Action Plan, a new version of the Plan Nord with an updated vision, policy directions and governance.

The priority actions that concern mining industry development are as follows:

Objectives for 2035	Priority actions for 2015-2020
Promote the responsible development of natural resources in the North.	Acquire basic knowledge for the area covered by the Plan Nord to ensure the responsible development of our mineral resources for current and future generations.
Focus on the diversity of natural resources, particularly those in the mining domain.	For diversification purposes, support projects to develop minerals such as diamonds, apatite, ilmenite, graphite and rare earths.
Promote private investment Increase the amount of Northern resources processed and transformed in Québec.	Use the capital fund for mining and fossil fuels (Fonds Capital Mines Hydrocarbures) to acquire interest in companies that extract mineral substances on public land or that process such substances in Québec.
Maximize the economic benefits for the area covered by the Plan Nord and throughout the rest of the province.	Use the communication platform provided by the Québec Mines convention to inform, consult and promote discussions between the mining industry, the government, regional decision-makers and the general public on questions relating to mineral exploration and extraction.

The economic context of the mining sector

The year 2015 was marked by the slowdown in China's economic growth, the world's leading consumer of raw materials. The transition of the Chinese economy toward a services-driven economy had a significant impact on the prices of most mineral commodities. In fact, the global mining sector was affected by two contradictory factors: the reduction in the growth of the Chinese economy and a notable improvement in the American economy. Nevertheless, whether the outcome was positive (the U.S. turnaround) or negative (the Chinese economy), the result was the same: a slowdown in demand and a decline in mineral commodity prices.

The last few years have also seen a growing interest in several commodities that are either not currently produced in Québec or only in small quantities. Such is the case for lithium, rare earths, diamonds, phosphate and graphite, as reflected in exploration expenditures of \$150 million in 2012 compared to only \$10 million in the early 2000s. Nevertheless, the backlash from the global mining market affected the level of investment for these new commodities. From the high of \$150 million in 2012, investments were down to \$33 million in 2015, a reduction of 78%.



Québec Mines convention

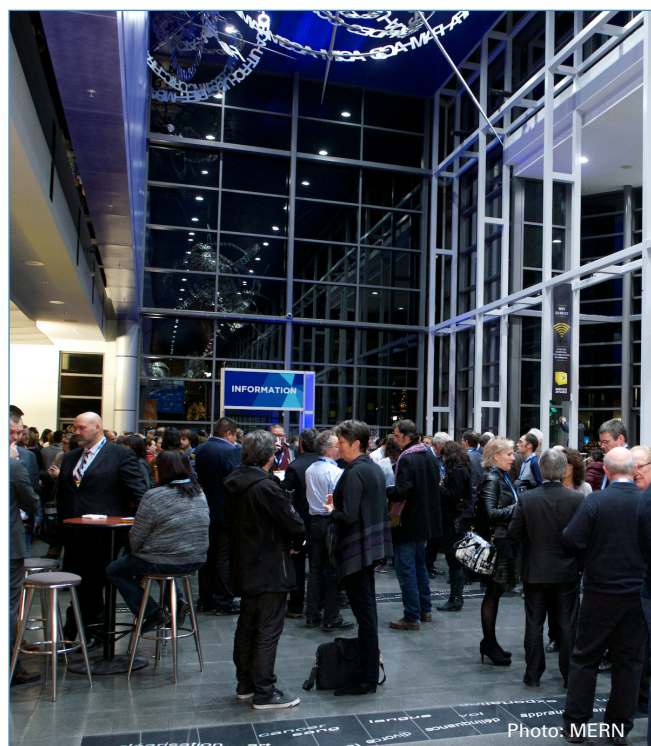
A dynamic gathering of the highest calibre

Some 2,275 participants gathered together in November 2015 at the *Centre des Congrès* in the city of Québec to discuss mining development in the province from every angle.

The success of the 2015 Québec Mines convention can be attributed to several factors, including the quality and diversity of its program, the wide variety of networking activities and the enthusiasm of the delegates. But what distinguished it above all was its inclusive character, touching on all aspects of mining development, from all viewpoints. The 2015 edition was notable for the following:

- The excellent quality of the program. One example would be the resounding success of the “Nickel Event,” which brought together world leaders in nickel exploration.
- The activities held by the First Nations of Québec and Labrador Economic Development Commission under the theme “A partnership venture with the First Nations is a unifying force.” These activities demonstrated the active involvement of Aboriginal communities in mining development.
- The spotlight on social acceptability, particularly during a lunchtime conference featuring Minister Pierre Arcand; and
- The multitude of networking opportunities in several forms, activities that were greatly appreciated by those in attendance.

In summary, Québec Mines 2015 provided a rich and relevant program in a welcoming environment full of memorable moments.



The mining sector in Québec

Greater transparency for better social acceptability!

Act respecting transparency measures in the mining, oil and gas industries

On October 21, 2015, the National Assembly of Québec adopted the *Act respecting transparency measures in the mining, oil and gas industries* (CQLR, chapter M-11.5). This Act reflects the importance that Québécois ascribe to matters of transparency.

The Act makes it obligatory for any mining, oil or gas company to declare all payments for their project within the same category of payment that are made to different levels of government if the total is \$100,000 or more. It also stipulates that these declarations shall be made public.

In an effort to streamline the administrative process, the Act has been harmonized with similar laws around the world and includes provisions to recognize the requirements of another jurisdiction as an acceptable substitute to the requirements of the Québec law when the same objectives would be met. In these cases, companies need only produce one declaration, thereby avoiding duplication.



Photo: MERN

Regulation to amend the Regulation respecting mineral substances other than petroleum, natural gas and brine

The *Regulation to amend the Regulation respecting mineral substances other than petroleum, natural gas and brine* (2015, G.O.2, 1303) came into force on December 31, 2015. The regulation also triggered the coming into force of seven provisions of the *Act to amend the Mining Act* (2013, chapter 32), including the following requirements:

- A notification of a claim must be sent to the landowner and the local municipality after obtaining the claim;
- The declaration of any discovery of mineral substances containing 0.1% or more of triuranium octaoxide;
- A public consultation initiated by the proponent in the case of certain mining projects;
- The creation of a monitoring committee to foster the involvement of the local community in the mining project as a whole.

Project to develop an Aboriginal community consultation policy specific to the mining sector

The *Act to Amend the Mining Act* adopted in 2013 obliges the Minister of Energy and Natural Resources to develop and make public an Aboriginal community consultation policy specific to the mining sector.

In collaboration with other ministries concerned, the *Ministère de l'Énergie et des Ressources naturelles* (MERN) has developed a policy project that aims to address the concerns of Aboriginal communities regarding mining development; to outline consultation procedures; to help coordinate government actions; and to strengthen relations and promote dialogue between Québec, Aboriginal communities and project proponents in matters of mineral resource development.

On November 24, 2015, the MERN launched a consultation on the policy project that will continue until spring 2016.



Photo: MERN

Geoscientific work

A program focused on development in the North

The MERN's geoscientific work acquires new knowledge across Québec with the aim of promoting the province's mineral potential.

Each year, the MERN invests \$12 million into geoscientific knowledge acquisition, mainly in the Plan Nord territory. In its 2015-2016 budget, the Government of Québec stated it would invest an extra \$3 million per year in the MERN's characterization work in the Plan Nord territory over the next three years (2015 to 2018). This addition to the budget will improve geological knowledge in the Plan Nord territory and stimulate investments.

Geoscientific work plays an important role for exploration companies. Among other things, it helps them reduce the risks inherent to mineral exploration.

Target identification is the first step in discovering new mineral deposits.
In 2015, 126 new exploration targets¹ were identified in Québec.



Mineral exploration

The mining sector is a cornerstone of Québec's economic development. However, the reduction in exploration investments is having a stronger impact. To ensure that Québec remains in the best possible position to benefit from the eventual recovery of metal prices, the 2015-2016 budget provides the following measures to stimulate mineral exploration:

- a one-year delay in the rate increase for mining titles;
- a two-year reduction in the minimum for statutory work on a claim;
- a renewed mandate for SIDEX (*Société d'investissement et de diversification de l'exploration minière*);
- an extension to SIDEX's Field-Action program;
- improved geoscientific knowledge acquisition in the Plan Nord territory;
- more support for research on valorizing mine tailings and sustainable development in the mining industry; and
- widening of the definition of exploration fees to include certain types of expenditures related to environmental studies and community consultations.



1 - Exploration target: a zone favourable to mineral exploration as determined by geoscientific data obtained through field work carried out by the MERN or its partners, such as universities or research centres.

Mining projects and active mines

Over the course of 2015, twenty-five (25) mining projects attained or continued to work towards the deposit appraisal stage, and two (2) other projects at the mining development stage commenced or continued construction work, for a total of twenty-seven (27) mining projects.

On December 31, 2015, there were twenty-six (26) active mines in the province. Five (5) of these carried out expansion work at their mine site.

Two mine sites ceased operations and were placed into care and maintenance mode, whereas another mine was shut down temporarily.

Decree regarding the issuance of a Certificate of Authorization (CA) for the opening and operation of a mine

In 2015, the Government of Québec authorized the following projects:

- February 18, 2015: the Arnaud project (apatite) of Mine Arnaud;
- June 25, 2015: the Dumont project (nickel) of Royal Nickel Corporation;
- December 16, 2015: the Lac à Paul project (apatite) of Arianne Phosphate.

Publication of feasibility studies for mining projects

The following companies published a feasibility study for their mining project:

- April 23, 2015: Lac Otelnuk Mining for the Lac Otelnuk project (iron); and
- November 9, 2015: Mason Graphite for the Lac Guéret project (graphite).

Active mines: openings and closures

In 2015, two gold mines reached the commercial production stage and two mines ceased mining activities.

On April 1, 2015, Goldcorp's subsidiary Mines Opinaca announced it had achieved commercial production at the Éléonore mine. The company employs approximately 900 people, and the mine life is 10 years.

The company Abcourt Mines, which operates the Elder mine, achieved commercial production at the end of the fourth quarter in 2015. The mine employs about 50 people.

Richmont Mines ceased operations at the Monique mine in 2015.

The Lac Herbin mine of QMX Gold Corporation shut down temporarily in March 2015, starting up again in September 2015.



Photo: Agnico Eagle Mines



Photo: Minalliance

Mine site rehabilitation

Rehabilitation nearing completion at the abandoned Barvue mine site

By the end of 2015, the rehabilitation work at the Barvue mine site was almost finished. It represents the biggest mine site rehabilitation project by the Government of Québec to date. The work began in 2012 and more than \$34 million has been invested since then. In spring 2016, the last area was revegetated, and post-rehabilitation environmental monitoring may now begin.



Research and development

Fonds de recherche du Québec – Nature et technologies (FRQNT)

In its 2015-2016 budget, the Government of Québec allocated the sum of \$500,000 per year over three years, drawn from the Mining Heritage component of the Natural Resources Fund, to stimulate research into mine waste valorization as part of the FRQNT's Joint Research Program on Sustainability in the Mining Sector. The call for proposals was launched on December 17, 2015.



Chapter 1

The mining sector economy in 2015

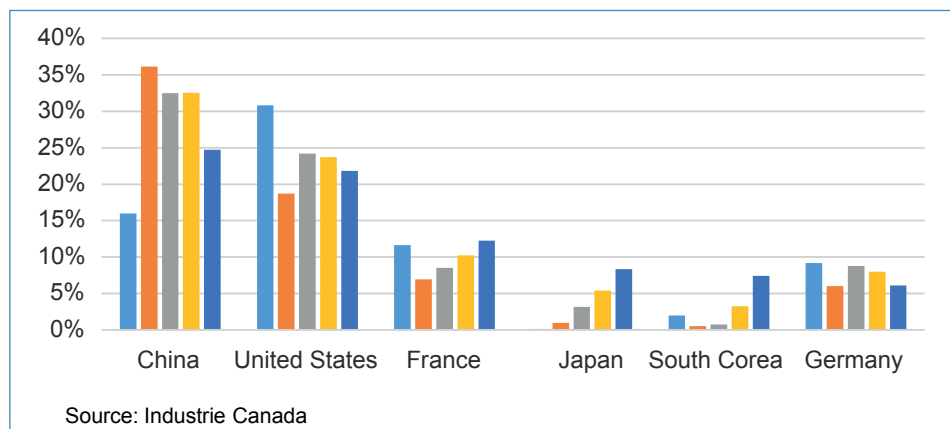
The performance of Québec’s mining sector is strongly tied to the global economy. Since the beginning of the 2000s, more than 50%² of the province’s mineral production has been sold on world markets.

The year 2015 was marked by a slowdown in China’s economic growth, the world’s leading consumer of raw materials. The Chinese economy’s transition toward a services-driven economy had a significant impact on the prices of most mineral commodities.

The other major event of 2015 was the U.S. economic turnaround, which was excellent news for the global economic outlook. On the other hand, strong gains in the U.S. dollar had a negative effect on the prices of various mineral commodities. Since these commodities are traded in U.S. dollars, the strengthening greenback diminished the buying power of other currencies and, in so doing, dampened the growth in global demand. Even though the price of most commodities, expressed in U.S. dollars, declined over the course of 2015, the sharp drop in the Canadian dollar softened the blow to Québec’s mining sector.

The two principal destinations for Québec’s mineral shipments – 41%³ (2014) of the value of all the province’s exports are China and the United States, which were responsible for the lower commodity prices in 2015 due to the slowdown in China’s economic growth and the rising U.S. dollar.

Figure 1.1
Principal destinations for Québec’s mineral shipments from 2010 to 2014.



Each commodity evolved within its own market and was influenced to various degrees by global economic forces. The text below provides an overview of the economic situation for the main commodities produced in Québec in 2015.

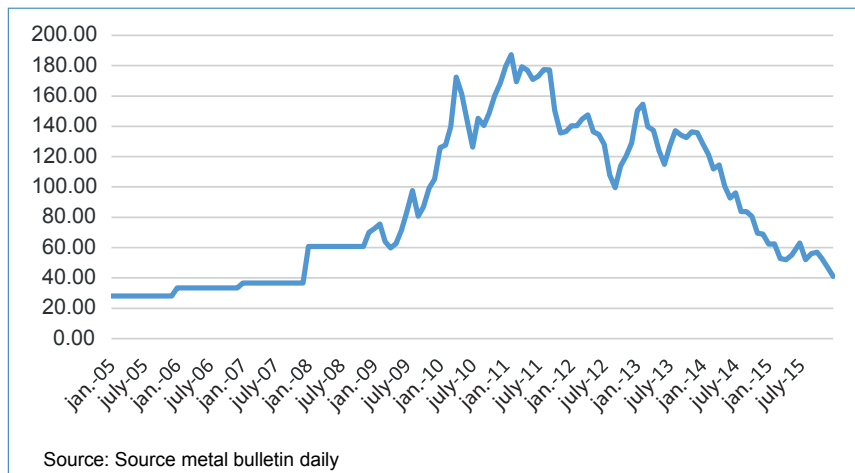
2 - Industry Canada

3- Ibid

Iron

The decline in the price of iron became more pronounced in 2015. A growing oversupply, combined with the slowdown in the growth of China's demand, exerted downward pressure on the price of iron. The Chinese demand for iron ore is based on the growth of the real estate market and the demand for steel products. The transition of the Chinese economy brought with it instability and uncertainty, resulting in diminished investments. The Chinese real estate market was affected and experienced a significant slowdown in 2015. To stimulate demand, Chinese authorities lowered their overnight lending rates. However, the impact of lower interest rates generally has a medium-term effect and the anticipated outcome has not yet materialized. In 2015, the steel market remained in a state of production overcapacity, resulting in lower demand for iron ore and a continued decline in the price of iron. The metal began 2015 at \$US62/t and ended the year at \$US42/t. Other iron-producing states also experienced this drop in price.

Figure 1.2
Price of iron in US\$/t (62% Fe)



Gold

The economic turnaround in the United States had a strong effect on the price of gold in 2015. The prospect of the U.S. Federal Reserve raising interest rates weighed heavily on the gold market, especially since the Reserve was candid about its firm commitment to start increasing rates during the year.

In October 2015, more jobs than predicted were created in the United States. This unexpected performance provided proof the economic turnaround was real. Backed by this conviction, the U.S. Federal Reserve increased its interest rates in October, which had a positive effect on the value of the American dollar.

A rise in the value of the U.S. dollar compared to other currencies resulted in a higher gold price and influenced demand. Gold became a safe haven against political and economic disruptions. However, once growth returns, higher interest rates will make it more profitable to hold fixed-income securities measured in U.S. dollars than bars of gold. Under these conditions, the price of gold will decline.

From January to December 2015, the price of gold expressed in U.S. dollars per troy ounce moved from \$US1,192 to \$US1,068. In spite of this, Québec's gold producers benefited from the fact that the Canadian dollar fell more rapidly than gold, leading to an increase in the price of gold expressed in Canadian dollars over the course of 2015. Based on the average exchange rates of January and December 2015, the price per troy ounce increased slightly from \$CA1,442 to \$CA1,462.

Figure 1.3
Price of gold in US\$/troy ounce

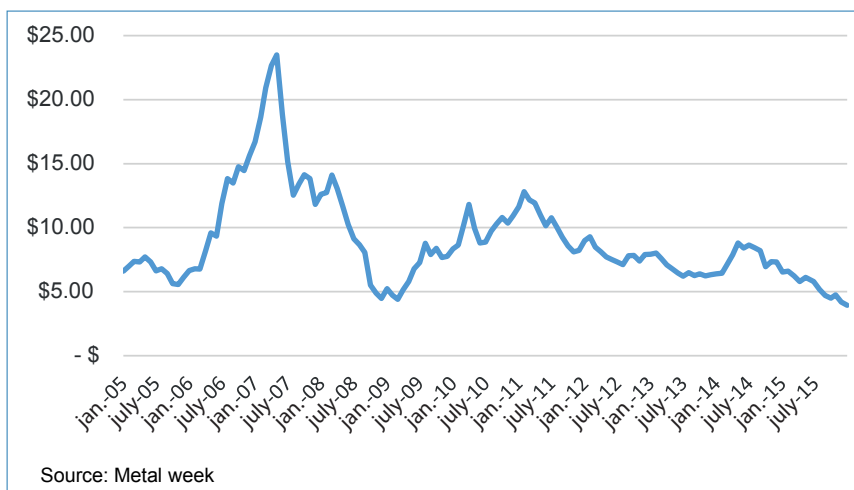


Nickel

Nickel sold for an average price of \$US7.66/lb in 2014, a 12% increase compared to the 2013 average. In 2015, the price of nickel fell sharply, losing more than three dollars per pound to end the year at \$US3.94. The stainless steel industry, which accounts for 66% of the nickel demand, went through an inventory disinvestment cycle after stockpiled inventories had reached uncomfortable levels in late 2014. The high inventory level in 2014 was mainly explained by the Indonesian embargo and the prediction that nickel supplies would fall sharply. The prospect of higher prices during a nickel shortage prompted producers to build their inventory.

In addition to a high inventory level, strong growth in Malaysia’s nickel production, which replaced Indonesian production, and a sharp reduction in China’s economic growth, created a situation of oversupply. Demand is weak given the reduction in inventory combined with China’s lower infrastructure investments. This unbalanced situation of weak demand and strong inventories created downward pressure on the price of nickel in 2015. This decline was also observed in other nickel-producing states.

Figure 1.4
Price of nickel in US\$/lb

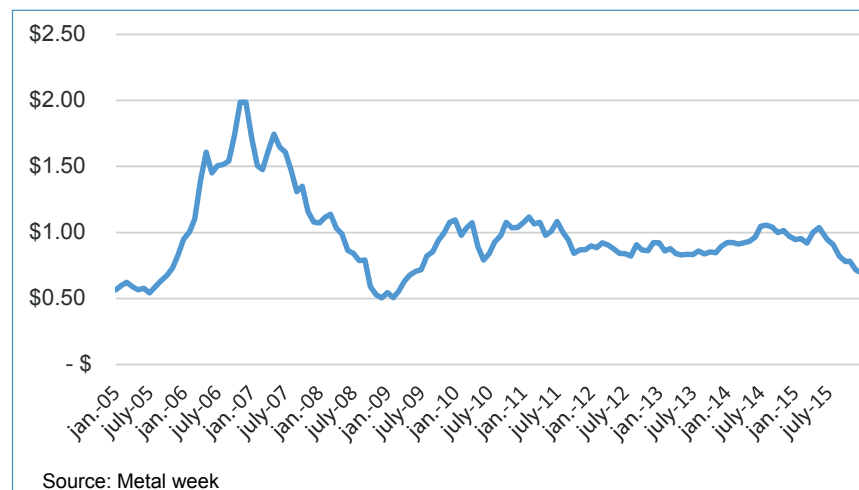


Zinc

In early 2015, the outlook for the zinc market was promising. The scheduled closure of several mines, including the Century mine in Australia, led to expectations of a medium-term zinc supply deficit. This deficit, combined with increasing demand, should have bolstered the price of zinc.

The price of zinc stood at a favourable level at the beginning of 2015. The price gained 10% during the first six months, climbing to \$US1.04/lb. It was in the second half of 2015 that the effect of China's reduced demand became evident. The price began to decline in June, ending the year at \$US0.69/lb.

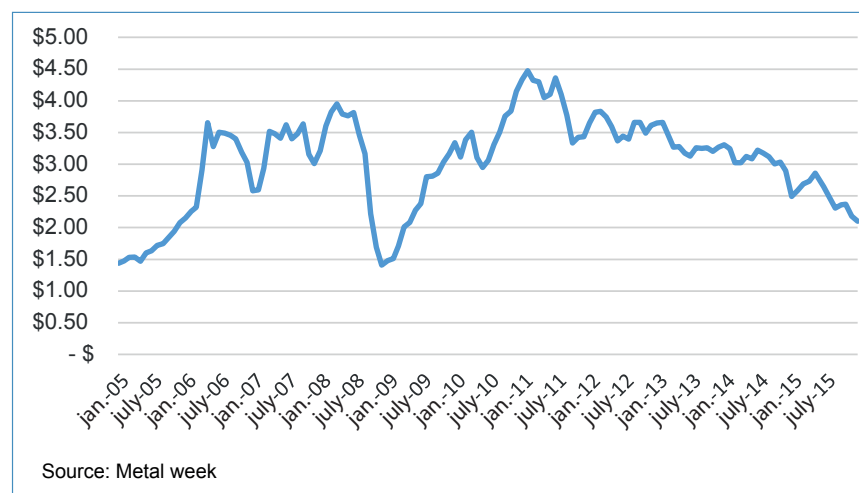
Figure 1.5
Price of zinc in US\$/lb



Copper

The price of copper ended 2015 at \$US2.02/lb. After reaching a peak of \$US4.50/lb in 2011, the price in December 2015 fell below the previous 10-year average. The expected imminent opening of many mines led to a belief that supplies would be more abundant. This concern about an oversupply unbalanced the market and weakened the price of copper. However, the fact that many projects were abandoned would seem to contradict this outlook. As with the majority of other metals, weak growth in the demand from China also amplified the decline in the price of copper.

Figure 1.6
Price of copper in US\$/lb



In 2015, the global mining sector was affected by two contradictory factors: a reduction in the growth of the Chinese economy and a notable improvement in the American economy. Nevertheless, both poor outcomes, like the Chinese economy, and positive ones, like the U.S. turnaround, yielded the same results: a slowdown in demand and a decline in mineral commodity prices.

TABLE 1.1 - Average prices of certain metals in US\$.				
	10-year average(1)	2013	2014	2015
Copper (lb) ²	3.16	3.32	3.11	2.48
Nickel (lb) ³	9.14	6.81	7.66	5.36
Zinc (lb) ⁴	1.01	0.86	0.98	0.88
Iron (t) ⁵	93.69	135.36	95.99	54.28
Gold (oz) ⁶	1,149	1,411	1,267	1,158
Ilmenite (t) ⁷	157	344	197	123
Rare earths (indice) ⁸	59.72	39.27	40.69	32.04
Lithium (t) ⁹	5,508	7,215	7,783	8,000
Diamonds (indice) ¹⁰	203	215	215	219
Graphite (t) ¹¹	1,482	1,375	1,371	1,117
Phosphate (t) ¹²	145	148	110	116
Niobium (lb) ¹³	15.47	14.98	17.26	17.54
Euromoney (ind) ¹⁴	468	269	349	269

Notes and definitions

- 1- Monthly averages for the past 10 years, except for diamonds (average from January 2006 to October 2014), and for lithium, graphite and rare earths for which averages are annual.
- 2- London Metal Exchange (LME) price. Cash market price.
- 3- LME price. Cash market price.
- 4- LME price. Cash market price.
- 5- Metal Bulletin price, Iron Ore Index for 62% Fe Fines.
- 6- London Gold Fixing price.
- 7- Metal Bulletin price, Ilmenite bulk conc. min 54% TiO2 FOB/Aus.
- 8- Estimated price based on a mixture of 16 rare earths (min. 99%, large purchases, FOB China, \$/kg). The weighting is based on the world production for each oxide, according to the U.S. Geological Survey.
- 9- Lithium hydroxide, 56.5-57.5% LiOH, large contracts, packed in drums or bags, del Europe or USA.
- 10- Diamond Search Engine price index. This index compiles a weighted price for retail cut stones. For this reason, it cannot be directly related to mine production value, such as that of Lac Renard.
- 11- Industrial Minerals price (large flakes, 94-97% C, +80 mesh, FOB Europe).
- 12- <http://www.indexmundi.com/commodities/?commodity=rock-phosphate>. Phosphate rock (Morocco), 70% BPL, contract, f.a.s. Casablanca, US\$/t.
- 13- Metal-Pages (Ferroniobium Nb 66% - Imports into China from Brazil).
- 14- Euromoney Global Mining Index represents the market capitalization of the world's largest mining companies (~200).



CHAPTER 2

Mining regime and land access

2.1

Legal framework

Mining activities are governed by many laws, including three that specifically apply to this sector: the Mining Act (CQLR, chapter M-13.1), the Mining Tax Act (CQLR, chapter I-0.4) and the Act Respecting Transparency Measures in the Mining, Oil and Gas Industries (CQLR, chapter M-11.5).

The Mining Act aims to:

- Promote, with a view to sustainable development, the search, prospecting, exploration and mining of mineral substances, while ensuring the people of Québec receive their fair share of the wealth generated from the mining of its resources while taking into account other possible land uses;
- Ensure that the mining of non-renewable resources is carried out in a way that will benefit future generations; and
- Develop expertise in Québec in the fields of exploration, mining and processing of mineral resources.

The Mining Tax Act aims to:

- Obtain for the State a fair return from the mining of mineral substances, without compromising the competitiveness of mine operators;
- Stimulate mineral exploration and mining activities;
- Foster the development of Northern Québec; and
- Promote processing and transformation in Québec.

The Act Respecting Transparency Measures in the Mining, Oil and Gas Industries aims to:

- Impose transparency measures with regard to monetary payments or payments in kind made by mining, oil and gas companies;
- Discourage and detect corruption; and
- Foster the social acceptability of natural resource exploration and development projects.

2.2

Basic principles

Access to the province's mineral resources is permitted on the largest expanse of land possible (in the domain of the State), in order to promote the discovery of metal and mineral deposits occurring in the Earth's crust.

Applicants are treated on an equal basis for mining title acquisition. The first to submit a compliant application obtains the exclusive right to search for all mineral substances in the domain of the State on the designated land parcel (claim).

In the event of a discovery of mineable mineral substances, the claim holder has a reasonable assurance of obtaining the right to mine the discovered resource (lease). The lease application must fulfil a number of conditions stipulated in the Mining Act.

Once commercial production has been achieved, the mine operator pays mining tax by filing a statement to this effect and pursuant to a “mine by mine” approach, to avoid instances where losses from one mine may be used to reduce the profits from another. In addition, a mine may not incur a loss given the value of mineral substances.

This value, which is determined at the time the substance is mined, is what is taxed under the mining tax regime, not mining income, which includes the value added by processing activities and that is otherwise taxed under the Taxation Act.

2.3 Mining titles

Mining rights, granted as mining titles, are real and immovable rights that may be the object of transactions. However, mining rights and land rights are unrelated. A mining title thus constitutes property that is distinct from a surface property.

There are two types of mining titles for mineral substances in the domain of the State other than petroleum, natural gas and brine: titles that authorize the search for mineral substances, known as exploration titles or claims, and titles that authorize the mining of mineral substances, known as extraction titles or mining leases.

Exploration titles

The claim gives the holder the exclusive right to search for all mineral substances in the domain of the State within the confines of the claim. The only mode of acquisition is by map designation online via the GESTIM Plus system. Claims are valid for a term of two years and may be renewed for additional terms.

To obtain a claim, an applicant must:

- Designate land parcels and fill out a form to this effect in the GESTIM Plus web application;
- Submit the application through GESTIM Plus, accompanied with the fees prescribed by regulation.

Obligations

The claim holder must carry out, on the land parcel subject to the claim, prior to the 60th day preceding its expiry date, exploration work, the nature and minimum cost of which are determined by regulation.

When the work to be performed by the claim holder has not been carried out, has not been reported within the prescribed deadline, or is insufficient, upon expiry, to renew the claim, the claim holder may pay to the Minister an amount equal to double the minimum cost of work that should have been carried out or reported, as the case may be, or an amount equal to double the difference between the minimum cost and the amount of work actually carried out on the land parcel subject to the claim and for which a report has been filed.

To renew a claim, a titleholder must:

- Submit a renewal application before the expiry date of the claim through GESTIM Plus;
- Pay the fees prescribed by regulation, which vary according to the surface area, the location of the claim and the date of reception of the application:
- If the application is received prior to the 60th day preceding the expiry date of the claim, the fees are as prescribed by regulation;
- If the application is received within the last 60 days preceding the expiry date of the claim, the fees are doubled;
- Have complied with provisions of the Mining Act. The titleholder must namely submit to the Minister, at each anniversary date of the registration of the claim, a report of work performed during the year.

Upon renewing a claim, the titleholder may apply excess work credits from another claim of which he is also the holder, in the exact amount required for its renewal. The claim must be included within a circle with a radius of 4.5 km from the centre of the claim where the excess credits are taken.

The maximum duration of excess work credits, i.e., expenses incurred for work performed on a claim, which may be used to renew a claim, is limited to six claim renewal periods, starting from the date when the work is initially reported.

When a claim is located, in whole or in part, in an area deemed incompatible with mining activities⁴, it may be renewed only if work has been carried out during a term that postdates delineation of such areas.

Extraction titles

There are two types of extraction titles in Québec. Depending on the type of substance to be mined, a mining lease or a lease to mine surface mineral substances may be issued.

A) The mining lease (BM)

A mining lease (BM) is required to mine any mineral substance other than surface mineral substances. The surface area covered by the lease may not exceed 100 hectares. The initial term of a BM is 20 years, and it may be renewed for up to three additional 10-year terms. After the third renewal, the Minister may extend the lease for periods of five years.

To obtain a mining lease, an applicant must:

- Produce a report certified by an engineer member of the *Ordre des ingénieurs du Québec* (OIQ) or by a geologist member of the *Ordre des géologues du Québec* (OGQ), describing the nature, extent and probable value of the ore deposit;
- Produce a feasibility study for the project;
- Produce a market and economic scoping study as regards processing in Québec;
- Pay the annual rent;
- Submit the plan of survey of the targeted land parcel approved by the Surveyor General's Office of Québec;
- Obtain the Minister's approval regarding the rehabilitation and restoration plan;
- Obtain the certificate of authorization required under sections 22, 31.5, 164 or 201 of the Environment Quality Act (chapter Q-2) from the *Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques* (MDDELCC);
- For metallic ore mining projects with a daily production capacity of 2,000 metric tonnes or more, and for all rare earth and uranium mining projects, the applicant must prepare an impact study in accordance with the Regulation respecting environmental impact assessment and review. These projects must be the object of public hearings held by the *Bureau d'audiences publiques sur l'environnement* (BAPE);
- For metallic ore mining projects with a daily production capacity of less than 2,000 metric tonnes of ore, the applicant must proceed with public consultations in the region where the project is situated and produce a report on the consultations in accordance with the Regulation respecting mineral substances other than petroleum, natural gas and brine.

To operate on a mining lease, a leaseholder must⁵:

- Form, within 30 days of the issuance of a mining lease, a monitoring committee to foster the involvement of local communities in the project as a whole;
- Obtain authorization from the *Ministère de l'Énergie et des Ressources naturelles* (MERN) for the location of a processing plant, if applicable;
- Obtain authorization from the MERN for the location of tailings ponds and tailings accumulation areas, if applicable;
- Obtain authorization from the MERN for the location of access roads or power lines, if applicable;
- Obtain from the *Ministère des Forêts, de la Faune et des Parcs* (MFFP) an authorization to cut wood or a forest management permit, if applicable;
- Obtain authorization from the surface landowner or lessee, if applicable;
- Obtain the consent of holders of leases to mine surface mineral substances (BEX), if applicable.

4 - Areas deemed incompatible with mining activities may be defined at a later date by regional county municipalities (MRC), in accordance with government orientations, when the relevant provisions of the *Mining Act* come into effect.

5 - Other permits and authorizations may be required pursuant to other laws and regulations, as the case may be.

To renew a mining lease, a leaseholder must:

- File an application for renewal of a BM prior to the expiry date of the lease. If the application is filed within the last 60 days preceding its expiry date, payment of an additional amount will be required;
- Submit a report establishing that mining operations have taken place during at least two of the last ten years of the term of the BM;
- Pay the annual rent;
- Produce a market and economic scoping study as regards processing in Québec;
- Have complied with provisions of the Mining Act and the Mining Tax Act (chapter I-0.4) during the term that is coming to an end. In particular, the leaseholder must submit to the Minister, at each anniversary date, a report indicating the quantity and value of ore extracted during the previous year, the amount of duties paid under the Mining Tax Act during the same period and the total amount of contributions paid.

B) Leases to mine surface mineral substances

1) The exclusive lease to mine surface mineral substances (BEX)

A BEX is issued for the extraction of silica sand used for industrial purposes, or for surface mineral substances other than sand and gravel; for example, for stone and peat. It is also issued for the extraction of sand, gravel, common clay or any mineral substance naturally occurring as an unconsolidated deposit, if it can be demonstrated to the Minister that a guaranteed supply is required to perform an industrial activity or a crushing activity to guarantee supply for an industrial activity, or to engage in commercial export outside Québec. A BEX may also be issued to a municipality or an intermunicipal board for the construction or maintenance of its streets and road network. A BEX may also be issued to the State for the construction or maintenance of public roads or other State works. This lease gives the lessee the exclusive right to mine and also confers the environmental liability for the site.

The surface area covered by a BEX may not exceed 100 hectares, except for peat production, in which case the surface area of the BEX may reach 300 hectares. The term of an exclusive lease is set by the Minister but may not exceed 10 years. The Minister sets the term according to the anticipated duration of extraction or mining activities that is requested. However, the term of an exclusive lease issued for peat production is 15 years. A BEX may be renewed twice at most, for terms of five years, or fifteen years for peat production.

To obtain a BEX, an applicant must:

- Submit an application for a BEX;
- Pay the rent prescribed by regulation;
- Produce a report describing the nature, extent and quality of the deposit. The report must be certified by a geologist member of the OGQ or by an engineer member of the OIQ⁶;
- Produce a report describing the projected uses of mined substances, targeted markets and the anticipated rate of production;
- Produce a report describing the proposed extraction method;
- Produce a surface plan indicating the perimeter of the targeted land parcel;
- Produce a hypsometric plan in the case of a peat production site;
- Produce a map at a scale of 1/5,000 or more, indicating the perimeter of the land parcel subject to the application, the proposed extraction area including the location of equipment and loading, unloading and stockpiling areas for produced materials, as well as the location of accumulation areas for waste materials, stripped overburden and topsoil;
- Proceed with public consultations in the region where the project is situated, in accordance with the Regulation respecting mineral substances other than petroleum, natural gas and brine, in the case of a peat production project, or if the project is deemed necessary for an industrial activity or for commercial export;
- Produce any document and any information relating to the public consultation requested by the Minister of Energy and Natural Resources;
- Report the quantity of extracted or alienated surface mineral substances and, if warranted, pay the royalties for each lease held by the titleholder.

6 - When the applicant for an exclusive lease to mine surface mineral substances intends to mine silica sand, calcite, dolomite or a type of rock used as building stone or silica ore.

To operate on a BEX, a titleholder must⁷:

- Obtain a certificate of authorization issued by the MDDELCC;
- Obtain authorization from the MERN for the location of access roads or power lines, if applicable;
- Obtain from the MFFP a forest management permit, if warranted;
- Obtain from the MFFP an authorization for activities carried out in a wildlife habitat, if warranted;
- On lands granted, alienated or leased by the State for purposes other than mining, obtain the written authorization of the surface landowner or lessee, at least 30 days prior to accessing the site.

To renew a BEX, a titleholder must namely:

- Have performed mining operations for at least a fifth of the term of the lease;
- Have complied with provisions of the Mining Act during the term that is coming to an end;
- File an application for renewal of a BEX prior to the expiry date of the lease. If the application is filed within the last 60 days preceding its expiry date, payment of an additional amount will be required;
- Pay the rent prescribed by regulation;
- Provide the serial number of the land file, or the identification and registration number of the lease as entered in the Register of the Land Registry Office;
- Update the map required at the time of the initial lease application;
- Provide a statement certifying that the titleholder has complied with all obligations concerning the reporting of quantities of extracted or alienated surface mineral substances and the payment of royalties for the extraction site;
- Certify the accuracy of information provided.

2) The non-exclusive lease (BNE)

A BNE is issued for unconsolidated deposits (sand, gravel and common clay) to be used for construction purposes. It is not transferable. Its term ends on March 31st of the year following its issuance. It may be renewed, ten times at most, for terms of one year.

To obtain a BNE, an applicant must:

- File an application for a BNE;
- Produce a map at a scale of 1/50,000 or more, showing the location of the mining site;
- Pay the rent prescribed by regulation;
- Provide a statement certifying that the applicant has complied with obligations under section 155 of the Mining Act concerning the reporting of quantities of extracted or alienated surface mineral substances and the payment of royalties for each lease held by the applicant, if any.

To renew a BNE, a titleholder must namely:

- File an application for renewal prior to the expiry date of the lease;
- Pay the rent;
- Provide a statement certifying that the titleholder has complied with obligations concerning the reporting of quantities of extracted or alienated surface mineral substances and the payment of royalties for each lease held by the titleholder, if any.

⁷ - Other permits and authorizations may be required pursuant to other laws and regulations, as the case may be.

2.4 Active mining titles

As at December 31, 2015, there were 130,407 active mining titles across Québec covering a total surface area of 6,149,689 hectares. This represents a decrease of 15.9% in the number of active mining titles, and of 14.9% in the total surface area covered by such titles relative to 2014 (Figure 2.1).

This decline is particularly significant in the Capitale-Nationale (82.7%), Centre-du-Québec (79.1%), Montérégie (69.8%), Chaudière-Appalaches (63.5%) and Mauricie (61.7%) administrative regions. On the other hand, the number of registered exploration titles has increased in the Bas-Saint-Laurent (67.7%) administrative region (Table 2.1).

In 2015, 14,309 exploration titles were registered in the Public Register of Real and Immovable Mining Rights, covering a surface area of 706,621 hectares. This is the lowest level since 2003, and represents a 40.2% drop in the number of registered exploration titles relative to 2014 and a 43% decrease in the total surface area covered by such titles (Figure 2.2).

The number of active extraction titles (BM, CM, BEX and BNE) in Québec as at December 31, 2015, was 3,561, an increase of 4% relative to 2014 (Table 2.2).

Mining extraction titles are distributed in most regions across Québec (Figure 2.3). Data taken from the Register as at December 31, 2015, reveal that 49% of all BM and mining concessions (CM) are located in the Abitibi-Témiscamingue region, whereas 63.5% of all BEX are located in the Côte-Nord and Nord-du-Québec regions. As for BNE, more than 73.5% of these mining titles are distributed in four administrative regions of Québec: Saguenay-Lac-Saint-Jean (407 BNE), Abitibi-Témiscamingue (640 BNE), Côte-Nord (528 BNE) and Nord-du-Québec (398 BNE) (Table 2.2).

2.5 Enactment of sections 71.1 and 75 of the Mining Act

On May 6, 2015, sections 71.1 and 75 of the Mining Act were enacted by decree No. 358-215.

Submission of an annual report on exploration work performed on a claim

Section 71.1 introduces the obligation for a claim holder to submit to the Minister of Energy and Natural Resources, on each anniversary date of the registration of a claim, a report on exploration work performed during the year. To do so, the claim holder must, no later than December 31st of each year, file the report using the form provided on the GESTIM Plus website.

Length of time during which excess work credits for amounts spent on a claim may be used

Section 75 limits to twelve years the amount of time during which amounts spent to perform work on a claim in excess of the minimum cost may be applied for the renewal of a claim. Thus, these excess work credits may only be carried over for the six subsequent terms of the claim, starting from the date upon which the work was reported.

Excess work credits previously accumulated on a claim may be applied for the next six terms to renew the claim, starting May 6, 2015.

2.6 Enactment of the Regulation to amend the Regulation respecting mineral substances other than petroleum, natural gas and brine

On December 31, 2015, the Regulation to amend the Regulation respecting mineral substances other than petroleum, natural gas and brine (R.S.Q., c. M13.1, r.2) came into effect. It namely calls for an increase in the amounts payable in connection with certain mining titles and a two-year decrease, of 35%, of the minimum cost of exploration work.

It also triggers the coming into force of seven provisions of the Act to Amend the Mining Act (2013, chapter 32).

I – Enactment of new provisions stipulated in the Act to Amend the Mining Act

These new provisions namely pertain to the following obligations.

Notice to land owners and to the municipality when a claim is issued

On lands granted, alienated or leased by the State for purposes other than mining or on lands subject to an exclusive lease to mine surface mineral substances, the claim holder must, within 60 days following registration of a claim, notify the land owner, lessee, BEX titleholder and the local municipality of the issuance of the claim.

The Regulation stipulates that a claim holder may, as he sees fit, forward the notice directly to the persons and the municipality concerned, or publish the notice in a daily or weekly newspaper circulated in the region where the claim is situated. In the latter case, a map clearly showing the location of the claim and its position must be published along with the notice. Notice must be given using one of the two forms provided to this end on the MERN website, depending on if the notice is forwarded directly to the persons and municipality concerned, or if it is published in a daily or weekly newspaper.

mern.gouv.qc.ca/publications/mines/titres/Avis_obtention_claims-personnel.pdf

mern.gouv.qc.ca/publications/mines/titres/Avis_obtention_claims-publication_journal.pdf

Notice of upcoming mineral exploration work to land owners and the municipality

When a claim is located within the territory of a local municipality, the claim holder must inform the latter, as well as the land owner, that work will be performed, at least 30 days before the work begins.

Reporting a uranium discovery

A claim holder is required to report to the Minister of Energy and Natural Resources and to the Minister of Sustainable Development, Environment and the Fight Against Climate Change, any discovery of mineral substances containing 0.1% or more of triuranium octaoxide (U_3O_8), within 90 days of the discovery.

Public consultations by developers of metallic ore mining projects of less than 2,000 metric tonnes per day

For metallic ore mining projects where the production capacity is less than 2,000 metric tonnes per day, the applicant for a mining lease must, before submitting an application for a mining lease, proceed with public consultations in the region where the project is situated.

This measure is not applicable in the case of rare earth and uranium projects.

The public consultation involves holding a public meeting that is announced by means of a notice containing at least the following information:

- A project description;
- A map showing the location of the project site;
- The location and the website where detailed documentation on the project as a whole may be consulted. This documentation namely includes proposed infrastructure and access roads, a description of the various phases of the project and the expected duration of each phase, the anticipated impacts and benefits of the project, proposed mitigation measures, and a description of other uses of the territory near the project site;
- The means and deadline to submit comments;
- The time and place where a public meeting will be held, which will be selected to facilitate the participation of local citizens;
- The possibility for anyone to forward written comments no later than 30 days after the public meeting.

This notice must be published in a daily or weekly newspaper circulated in the region where the project is situated, at least 30 days before the date of the public meeting. A copy of this notice must be sent to the Minister of Energy and Natural Resources, the Minister of Sustainable Development, Environment and the Fight Against Climate Change, concerned municipalities, and Native communities consulted by the government on this project, if applicable.

During the public meeting, the project is presented and persons who wish to voice comments and opinions are heard. Comments made during this meeting are recorded.

Subsequently, the project developer must submit a report on the consultation to the Minister of Energy and Natural Resources and the Minister of Sustainable Development, Environment and the Fight Against Climate Change.

Public consultations by applicants for a lease to mine surface mineral substances

When a lease is requested for peat production or if it is necessary for an industrial activity or for commercial export, the applicant must, after submitting the lease application, proceed with public consultations in the region where the project is situated.

The applicant provides any document and any information relating to the public consultation requested by the Minister.

The Minister may, if he deems the consultation has not been conducted in the prescribed manner, impose other additional measures.

The Minister may subject the lease to conditions designed to avoid conflicts with other land users and to take into consideration the comments received during the public consultation.

Creation of a monitoring committee

The holder of a mining lease must create, within 30 days of the issuance of the lease, a monitoring committee to foster the involvement of the local community in the project as a whole. This committee must be maintained until all work planned under the rehabilitation and restoration plan has been completed.

Committee members are selected in the manner determined by the leaseholder. The latter also determines the number of committee members.

However, the committee must include at least one representative from the municipal sector, one representative from the economic sector, one citizen, and one representative from the Native community consulted by the government on this project, if applicable.

The majority of committee members must be independent from the leaseholder, and all committee members must come from the region where the mining lease is situated.

II – Rate increases for claims and leases to mine surface mineral substances

The 2015–2016 budget presented by the Government of Québec called for a 16% increase of rates relating to claims, and a 12% increase of rates relating to leases to mine surface mineral substances.

The Regulation to amend the Regulation respecting mineral substances other than petroleum, natural gas and brine calls for these rate increases to come into force progressively over a period of two years. The rate increases will be applied in the following manner:

1- Fees, duties, and amounts to be paid relating to claims, required under sections 1, 2, 3, 7, 8, 128, 129 and 130 of the Regulation will increase by 8% on January 1, 2016, and by an additional 8% on January 1, 2017. This increase applies to:

- Applications for a prospecting licence;
- Renewal of a prospecting licence;
- Obtaining a duplicate of a prospecting licence;
- Obtaining tags for staking;
- Notices of staking;
- Notices of map designation;
- Registration of a transfer or any other act in the Public Register of Real and Immovable Mining Rights;
- Participation to a drawing of lots;
- Application for the revocation of claims.

2- Fees, duties, rents and amounts to be paid relating to leases to mine surface mineral substances, required under sections 49, 50, 53, 54 and 57 of the Regulation will increase by 6% on January 1, 2016, and by an additional 6% on January 1, 2017. This increase applies to:

- The amount of rent for a non-exclusive lease to mine surface mineral substances;
- The amount of rent for an exclusive lease to mine surface mineral substances;
- An application to increase the surface area of a land parcel subject to an exclusive lease to mine surface mineral substances;
- An authorization to extract a fixed amount of surface mineral substances.

III – Two-year reduction of the minimum cost of work to be performed on a claim

Pursuant to section 138.2 of the Regulation respecting mineral substances other than petroleum, natural gas and brine, the minimum cost of work that must be performed by a claim holder is reduced by 35% for a period of two years starting December 31, 2015.

The 35% reduction applies to the minimum cost of work required during the two-year period from December 31, 2015, to December 30, 2017. This reduction will be taken into account when provisions of the Mining Act relating to claim renewal are applied, namely sections 72 to 80, when a renewal application is filed during this period, when an amount is paid to the Minister where the work performed is insufficient or has not been reported in the allotted time, or when a claim holder applies excess work credits.

2.7

The GESTIM Plus mining title management system

In Québec, mining title management is computerized and easily accessible on the Internet via the GESTIM Plus web application (gestim.mines.gouv.qc.ca).

This system provides instant access to up-to-date data in the Public Register of Real and Immovable Mining Rights and namely makes it possible to:

- Electronically designate claims on a map;
- Easily monitor and manage mining titles in real time;
- Consult and download data from the Register by selecting the desired parameters;
- View mining title maps and download them free of charge in PDF format or as shape files;
- Generate mining title maps tailored to your needs;
- File a notice of map designation or a claim renewal application;
- Pay the required fees via e-commerce in a totally secure environment;
- File a renewal application for a BNE⁸;
- Report quantities of extracted or alienated surface mineral substances;
- Pay royalties on extracted or alienated surface mineral substances.

The MERN is resolutely taking to the web by progressively expanding its services offered through GESTIM Plus. The Internet is now the only accepted means, via the GESTIM Plus system, to file a notice of map designation, a claim renewal application, and to file reports on the extraction and alienation of surface mineral substances. Accepted modes of payment when such forms are filed are by credit card or, in the case of “Privilège” members of GESTIM Plus, through the client’s account.

www.mern.gouv.qc.ca/mines/titres/titres-directives.jsp

New developments in 2015

In an effort to continue modernizing and improving its services, the MERN is intent on expanding its electronic service delivery by improving and integrating new self-management tools in the GESTIM Plus system, namely with the following:

- Implementation of a form to report work performed on an annual basis;
- Establishment of a deadline for the use of excess work credits;
- Management of title groups (properties) by external clients;
- 35% reduction in the amount of work required to renew claims;
- Implementation of an electronic form to report the discovery of triuranium octaoxide (U₃O₈);
- Addition, in extraction report forms, of the quantity and value of extracted surface mineral substances.

8 - When a BNE is issued in an administrative region where an agreement to delegate the management of sand and gravel mining is in effect, renewal applications must be forwarded to the delegate MRC.

2.8

Relations with Aboriginal communities

Over the years, the Supreme Court of Canada has rendered many decisions about Aboriginal rights that emphasize the importance of balancing the interests of Aboriginal peoples and society in general. These decisions aim to satisfy the fundamental objective of section 35 of the Constitution Act of 1982, which recognizes and affirms the existing ancestral and treaty rights of the Aboriginal peoples of Canada. In its pursuit of conciliation, the highest court of Canada has insisted that governments respect the concept of the honour of the Crown in its relations with Aboriginal peoples and any obligations that may ensue.

Among the obligations that come with the honour of the Crown, as described by the Supreme Court in the *Haida* and *Taku River* decisions of 2004, is the obligation for the Crown to consult Aboriginal communities and to accommodate them, if possible, when contemplating an action that could have a prejudicial effect on any rights such communities may claim and to which they may be entitled.

In accordance with decisions rendered by the Supreme Court of Canada, the MERN consults Aboriginal communities since 2006, before issuing any extraction title such as a BM, a BEX or a BNE on a new site. The MERN also engages in consultations for all major exploration work, such as excavations that require displacing more than 10,000 cubic metres of unconsolidated deposits, bedrock stripping, removing or displacing 500 or more metric tonnes of mineral substances for geological or geochemical sampling purposes, and the dewatering of mine shafts and mine workings, as well as the sinking of access ramps, shafts or any other type of excavation.

Moreover, Aboriginal communities are expressing a greater desire to participate in development projects taking place on lands to which they claim rights and interests.

In the process leading to the amendment of the Mining Act in 2013, many Aboriginal communities called upon the Government of Québec to address challenges specific to the mining sector, namely concerning the need to consult Aboriginal communities. As a result, a new chapter specifically devoted to Aboriginal communities was added to the Mining Act. It includes the following provisions:

- The Act must be construed in a manner consistent with the obligation to consult Native communities;
- The government shall consult Native communities separately;
- Taking into account the rights and interests of Native communities is an integral part of reconciling mining activities with other possible uses of the territory;
- The Minister draws up, makes public, and keeps up to date a Native community consultation policy specific to the mining sector.

In collaboration with other departments, the MERN has developed a policy project in accordance with the obligations that befall the government.

Beyond the obligation to consult, this policy project translates the government's desire for openness and transparency in its relations with Native communities, with regards to the development of mineral resources.

It aims to make it easier to take into account concerns expressed by Native communities regarding mine development, to clarify the consultation process, to better coordinate government actions, to strengthen relations and promote a healthy dialogue between Québec, Aboriginal communities, and mine developers.

On November 24, 2015, the MERN launched extensive consultations on this policy project, which will continue until the spring of 2016.

2.9 Land protection

In order to accommodate other possible uses of the territory, the Minister may limit or prohibit mining activities. Pursuant to section 304 of the Mining Act, the Minister may reserve to the State or withdraw from prospecting, mineral exploration and mining operations any mineral substance in the domain of the State required for any purpose deemed to be in the public interest, in particular for works or purposes such as:

- Mining, industrial, port, airport, or communications facilities;
- Development and utilization of waterpower, power transmission lines, storage tanks or underground reservoirs;
- Creation of parks or protected areas;
- Classification as an exceptional forest ecosystem;
- Designation of a biological refuge;
- Conservation of wildlife and plant-life;
- Protection of eskers that may be a source of drinking water;
- Respect for protected areas established under the Groundwater Catchment Regulation;
- Protection of rehabilitation and restoration work carried out in accumulation areas.

In addition, the Minister may, subject to conditions he may set on lands reserved to the State, determine that certain specific mineral substances may be the object of mineral exploration or mining.

The Minister must also reserve to the State any mineral substance in the domain of the State for which he has refused a lease to mine sand and gravel or for which the Minister has terminated a lease to mine sand, gravel, or stone.

The Minister may temporarily suspend, for a renewable period of six months, the right to stake and map-designate lands within the boundaries indicated on maps kept at the Registrar's office.

Since December 10, 2013, any mineral substance in the domain of the State occurring within an urbanized perimeter is withdrawn from mining activities, with the exception of mineral substances located within a parcel of land subject to a mining title obtained prior to this date, until areas deemed incompatible with mining activities are delineated.

Pursuant to section 304.1.1 of the Mining Act, areas deemed incompatible with mining activities may be delineated by MRCs. If so, these areas will be withdrawn from mining activities. This task will be undertaken as soon as the government has adopted the necessary land-use orientations.

The purpose of these orientations will be to establish clear and specific rules to guide MRCs in exercising their power to delineate areas deemed incompatible with mining activities. They may also present the objectives and expectations of the government regarding land use with respect to mineral resources.

The Government of Québec wants to foster the development of mineral resources, but also to protect other land users from the effects of mining activities. This new power vested to MRCs and the taking into account of community concerns in land-use planning will lead to increased social acceptability of mining projects and improved predictability for the mining industry, particularly in inhabited areas.

As at December 31, 2015, lands withdrawn from mining activities covered a total of 20.5 million hectares or 12.32% of the surface area of Québec. Lands subject to a temporary suspension covered 12.2 million hectares or 7.33% of the surface area of Québec. Lands reserved to the State covered a total of 12.4 million hectares or 7.44% of the surface area of Québec (Figure 2.4). Note that the Minister may allow, by decree and subject to conditions he may set on lands reserved to the State, mineral exploration or mining activities for certain mineral substances he may designate, in accordance with the Mining Act (section 304 paragraph 4).

Lands recognized as Protected Areas by the International Union for Conservation of Nature cover 9.16% of Québec's territory and are included in the territory subject to restrictions on mining activities described above.

2.10

Delegation of sand and gravel management to regional county municipalities

In an effort to decentralize the management of sand and gravel, the government delegates sand and gravel management to regional county municipalities (MRC) that have signed an agreement to this effect.

Half of the collected royalties and rental fees for sand and gravel mining are retained by the delegate MRCs. The powers and responsibilities vested to MRCs with regard to sand and gravel are:

- The granting, renewal, revocation, and registration in the Public Register of Real and Immovable Mining Rights, of authorizations to mine and leases to mine sand and gravel;
- The issuance of certificates of authorization pursuant to section 22 of the Environment Quality Act;
- The inspection and monitoring of mining operations for these substances;
- The collection of rental fees and royalties;
- The rehabilitation of sand and gravel pits.

The MRCs of regions that have agreed to take over the management of sand and gravel are listed below (Figure 2.5).

Bas-Saint-Laurent (01)

- MRC de Kamouraska
- MRC de La Matapédia
- MRC de La Mitis
- MRC des Basques
- MRC de Matane
- MRC de Rimouski-Neigette
- MRC de Rivière-du-Loup
- MRC de Témiscouata

Saguenay-Lac-Saint-Jean (02)

- City of Saguenay
- MRC de Lac-Saint-Jean-Est
- MRC du Domaine-du-Roy
- MRC de Maria-Chapdelaine
- MRC du Fjord-du-Saguenay

Capitale-Nationale (03)

- MRC de Charlevoix
- MRC de Charlevoix-Est
- MRC de la Côte-de-Beaupré
- MRC de Portneuf

Mauricie (04)

- City of La Tuque
- MRC de Maskinongé
- MRC de Mékinac

Outaouais (07)

- MRC des Collines-de-l'Outaouais
- MRC de Papineau
- MRC de Pontiac
- MRC de La Vallée-de-la-Gatineau

Abitibi-Témiscamingue (08)

- City of Rouyn-Noranda
- MRC de La Vallée-de-l'Or
- MRC de Témiscamingue
- MRC d'Abitibi⁹

Côte-Nord (09)

- MRC de Caniapiscau
- MRC de La Haute-Côte-Nord
- MRC de Manicouagan
- MRC de Minganie
- MRC de Sept-Rivières

Lanaudière (14)

- MRC de Matawinie

Laurentides (15)

- MRC des Laurentides
- MRC d'Antoine-Labelle

In 2015, there were 4,380 active leases and authorizations to mine sand and gravel across Québec, relating to 3,238 sites where surface mineral substances were mined. Of these, 3,643 titles were managed by delegate MRCs and 737 titles were managed by the MERN (Table 2.3).

2.11 The Mining Tax Act

The prime objective of the mining tax regime is to enable the State to receive its fair share of returns on the mining of its mineral resources.

- Since January 1, 2014, all mining companies must pay mining tax to the State, in the higher of the two following amounts:
- A minimum mining tax based on the mine-mouth output value at the following rates:
 - 1% on the first \$80 million;
 - 4% on the rest;

A mining tax on annual profit based on progressive rates ranging from 16% to 28% depending on the company's profit margin. Thus, companies that make more profit contribute a greater proportion of the profit generated by their mine or mines.

The regime is characterized by various allowances that namely serve to stimulate mining, specifically in Northern Québec, for example, and to foster processing and transformation. These allowances take into account investments made by companies in the form of work and assets.

For example, mining companies that acquire processing assets may take advantage of a 75% deduction of their mining profit relating to these assets. The processing allowance, duly calculated, makes it possible to detax part of the profit attributable to the processing of mineral substances.

9 - The agreement was signed in 2014 and management was delegated starting April 1, 2015.

The regime also provides an incentive for investments in exploration and development prior to production. Allowances calculated for the latter enable non-producing companies to claim a credit on duties refundable for losses, a unique measure in Canada, equivalent to 16% of eligible work expenditures. The credit may also be used by producing companies for deposit appraisal work performed prior to the commencement of commercial production.

www.mern.gouv.qc.ca/mines/fiscalite/fiscalite-regime-perte.jsp

In parallel with incentive measures contained in the Mining Tax Act, other fiscal measures also aiming to promote mineral exploration are available via the Québec tax regime.

The main tax incentives relating to the mining sector are:

- The flow-through share regime, which allows individual investors to claim deductions reaching up to 120% of their investment cost;

www.mern.gouv.qc.ca/mines/fiscalite/fiscalite-mesures-actions.jsp

- The tax credit for resources, which grants companies a refund reaching up to 38.75% of eligible exploration expenditures incurred in Québec;

www.mern.gouv.qc.ca/mines/fiscalite/fiscalite-mesures-ressources.jsp

New developments in 2015

On December 1, 2015, the MERN publicly released, for the first time ever, the quantity, mine-mouth output value, and duties paid per mine by mining companies in 2014.

The Act Respecting Transparency Measures in the Mining, Oil and Gas Industries

The Act Respecting Transparency Measures in the Mining, Oil and Gas Industries (chapter M-11.5) came into effect on October 21, 2015. It requires mining companies to report the amounts paid each year to the various levels of government, to government agencies or their mandataries and, starting June 1, 2017, to Native communities and organizations that exercise political functions in their name. Information obtained pursuant to the Act is public.

The obligation to report applies to companies listed on a Canadian stock exchange and whose head office is located in Québec, as well as to major companies, whether they are listed on a stock exchange or not.

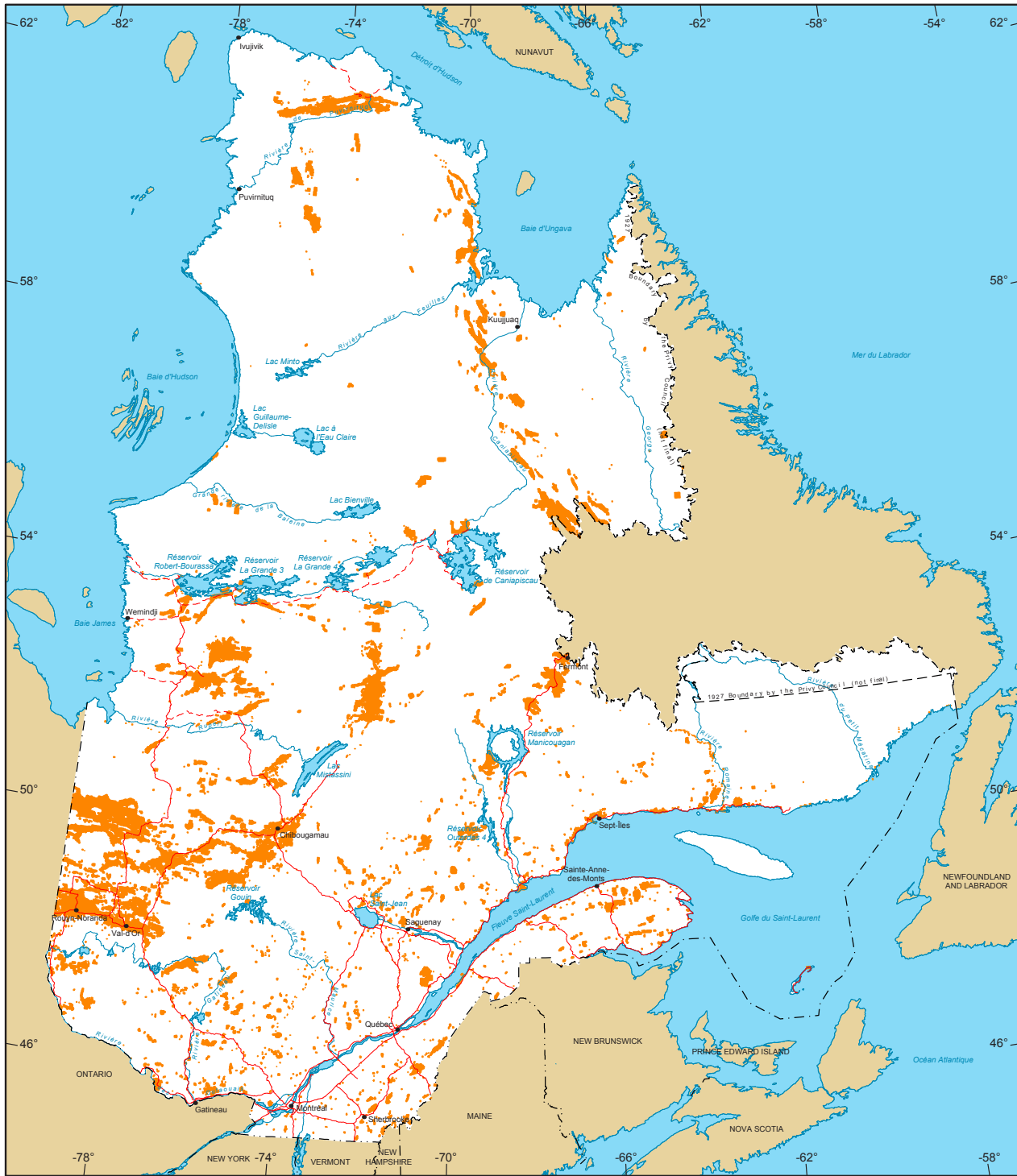
Payments that must be reported are those equal to or greater than \$100,000, made to the same government, pertaining to certain categories such as mining taxes, royalties, mining duties, corporate taxes, municipal taxes, and contributions toward the construction or improvement of infrastructure. These payments may be in kind or in cash.

The *Autorité des marchés financiers* is responsible for the application of the Act Respecting Transparency Measures in the Mining, Oil and Gas Industries (chapter M-11.5). It will receive specific powers to this effect. In fact, most of the companies subject to this Act are eligible issuers pursuant to the Securities Act (chapter V-1.1).

This Act should not increase the administrative burden of companies. It will be harmonized with other laws enacted in G8 countries, in particular with the requirements of the United States Security Exchange Commission and the Transparency Directive of the European Union. The government may recognize the requirements of another government as equivalent to those stipulated under the Act. Consequently, companies will not be required to produce different reports for each country where they hold establishments.

The Federal Government adopted a similar act in January 2015: the Extractive Sector Transparency Measures Act. The Government of Québec will conclude an agreement with the Federal government to harmonize the application of the two legislations.

Figure 2.1 - Active exploration and extraction mining titles in Québec.



Active mining titles
On December 31st, 2015
Number: 130 407
Area: 6 149 689 ha

The area indicated is calculated according to the Modified Transverse Mercator coordinate system with the NAD 83 geodesic datum.

Metadata
Coordinate System
Conic Conformal Lambert with two standard parallels (46° and 60°)

1/10 000 000
0 200 km

Sources
Mining data, MERN, 2016
Cartographic Reference, MERN, 2011 (BDGA 1M, BDGA 5M)

Realisation
Ministère de l'Énergie et des Ressources naturelles
Direction du développement et du contrôle de l'activité minière
Note: This document has no legal value.

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Figure 2.2 - Active mining titles in Québec (number and surface area).

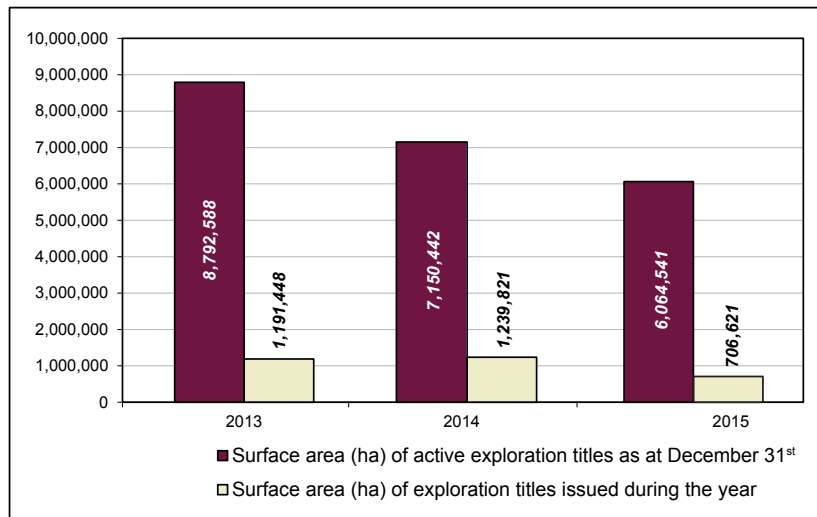
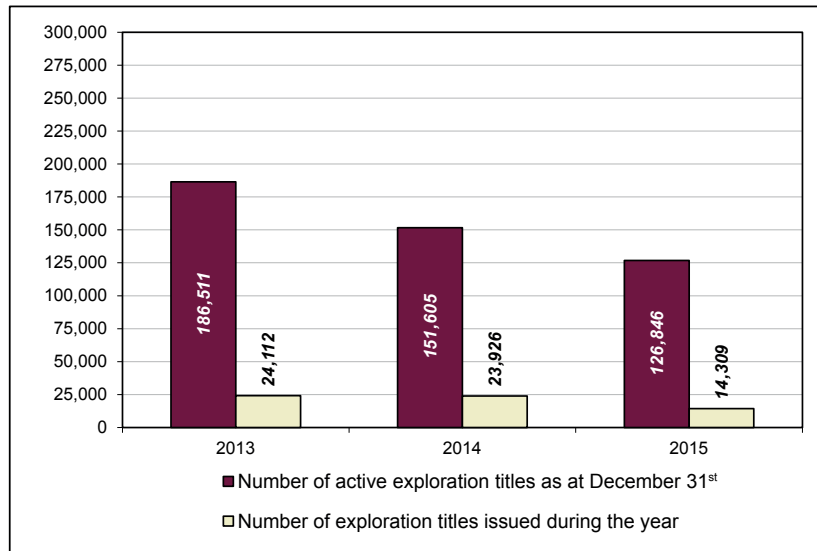


Figure 2.3 - Mining extraction titles by administrative region.

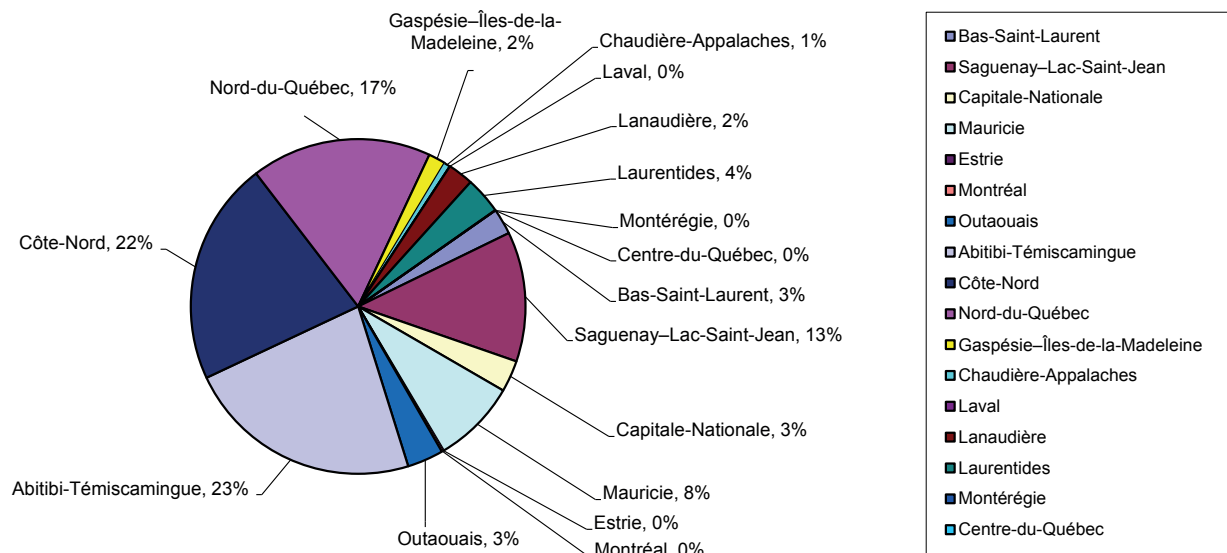
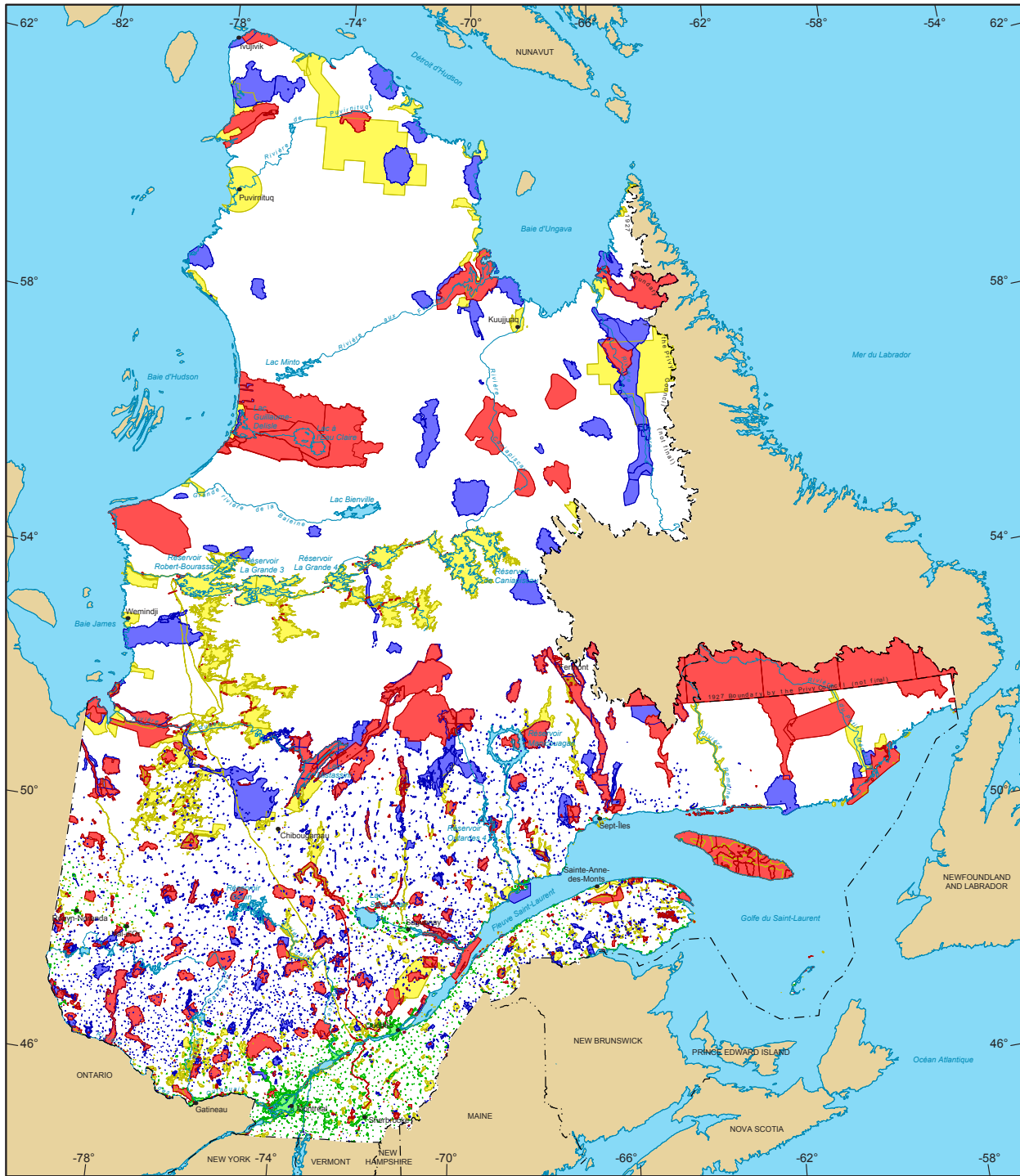


Figure 2.4 - Restriction on mineral exploration in Québec.



Mining restrictions

- Major Exploration prohibited
20 555 160 ha
 - Minor Exploration under specific conditions
12 417 548 ha
 - Major Urban perimeter
635 804 ha
 - Major Land suspended temporarily
12 222 721 ha
- The areas indicated are calculated according to the Modified Transverse Mercator coordinate system with the NAD 83 geodesic datum.

Metadata

Coordinate System
Conic Conformal Lambert with two standard parallels (46° and 60°)

Sources
Mining data, MERN, 2016
Cartographic Reference, MERN, 2011 (BDGA 1M, BDGA 5M)

Note: The areas calculated represent the sum of the surface area of each individual mining restriction. The calculation does not take in consideration the possible overlapping of some areas.

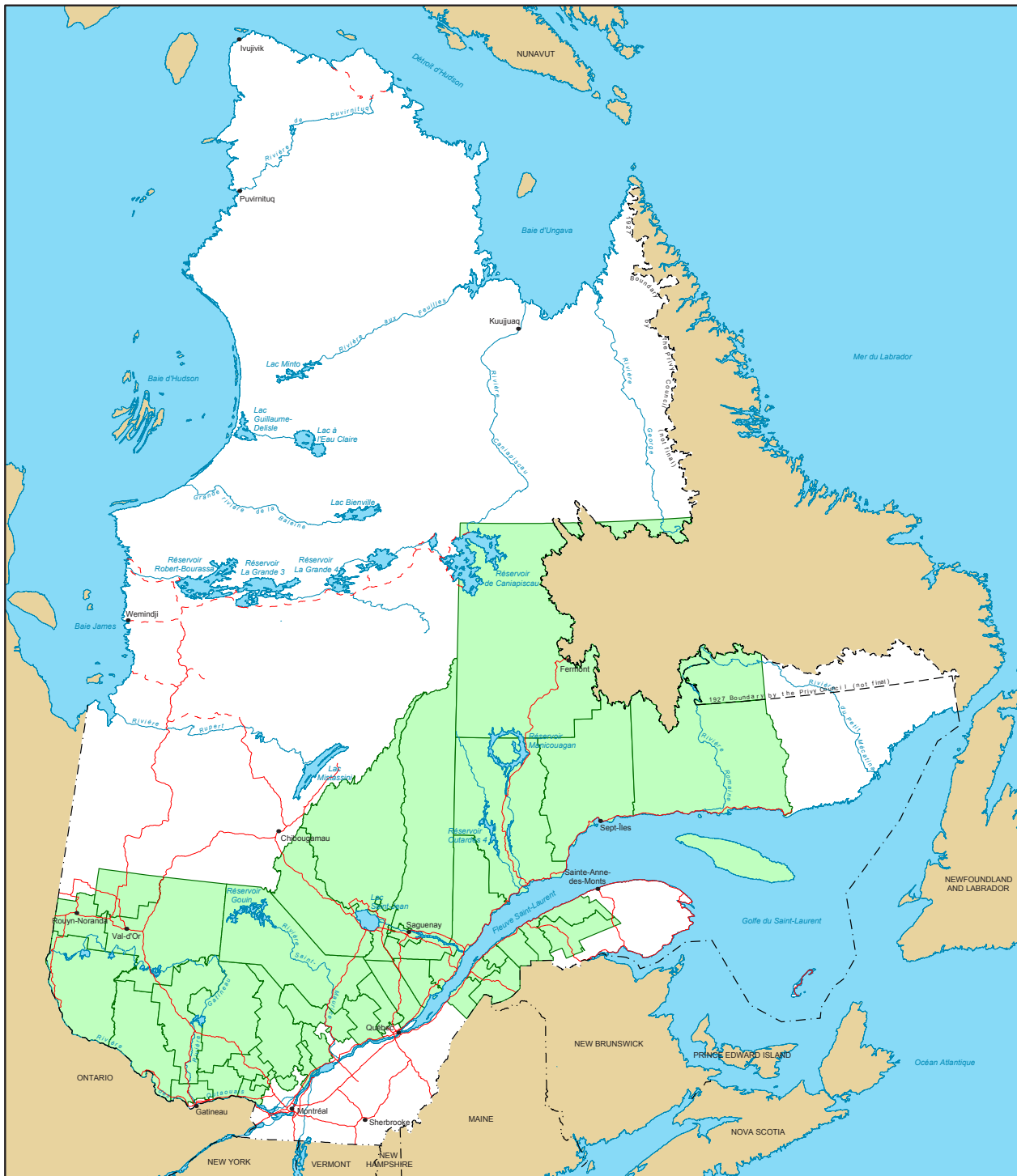
1/10 000 000
0 200 km

Realisation

Ministère de l'Énergie et des Ressources naturelles
Direction du développement et du contrôle de l'activité minière
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Figure 2.5 - Delegation of sand and gravel mining management.



RCM delegatee of the management of sand and gravel on the land of the State

Delegates on December 31st, 2015

Metadata

Coordinate System
Conic Conformal Lambert with two standard parallels (46° and 60°)

1/10 000 000

0 200 km

Sources

Cartographic Reference, MERN, 2016 (SDA 20K)
Cartographic Reference, MERN, 2011 (BDGA 1M, BDGA 5M)

Realisation

Ministère de l'Énergie et des Ressources naturelles
Direction du développement et du contrôle de l'activité minière
Note: This document has no legal value.

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TABLE 2.1 - Distribution of mining exploration titles per administrative region in Québec.

Active and suspended exploration titles as at December 31, 2015.

Administrative region	Number of titles (CL,CDC,CLD)			Variation (%) (2015)		Surface area (ha)			Variation (%) (2015)		Number of titles issued (CL,CDC,CLD)			Surface area (ha) of titles issued		
	2013	2014	2015	2013	2014	2013	2014	2015	2013	2014	2013	2014	2015	2013	2014	2015
	01	1,889	714	733	2.7	103,492	38,054	38,392	0.9	251	201	337	13,785	11,358	16,529	
02	4,978	4,155	3,039	(26.9)	265,999	220,935	164,877	(25.4)	1,029	906	522	55,805	50,139	28,178		
03	558	1,017	973	(4.3)	29,794	56,212	53,945	(4.0)	206	734	127	11,031	41,266	7,114		
04	1,067	1,057	819	(22.5)	58,594	58,571	45,385	(22.5)	441	415	159	23,942	23,360	9,036		
05	2,210	1,137	875	(23.0)	128,895	65,491	51,044	(22.1)	224	277	116	12,843	16,048	6,744		
06	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
07	5,283	3,237	2,607	(19.5)	308,183	187,631	151,031	(19.5)	773	531	393	45,536	31,153	22,978		
08	31,216	25,188	21,274	(15.5)	1,230,836	961,559	837,590	(12.9)	3,414	4,063	3,306	158,727	183,936	136,346		
09	17,929	14,166	11,463	(19.1)	916,099	728,518	585,091	(19.7)	2,276	2,104	1,385	116,733	112,198	73,725		
10	111,224	93,374	79,824	(14.5)	5,205,500	4,431,497	3,866,719	(12.7)	1,2612	13,309	7,162	594,809	698,045	362,576		
11	4,607	3,665	2,412	(34.2)	244,977	195,357	126,712	(35.1)	1,210	478	343	62,428	26,291	18,151		
12	2,510	1,590	1,172	(26.3)	119,983	71,162	49,221	(30.8)	386	389	142	19,829	16,905	6,070		
13	-	3	4	-	-	61	105	-	-	3	1	-	61	44		
-14	785	865	528	(39.0)	45,739	49,537	29,725	(40.0)	599	207	131	34,819	11,252	7,360		
15	2,752	1,948	1,593	(18.2)	154,895	108,480	86,668	(20.1)	706	334	225	40,996	18,794	11,350		
16	131	129	119	(7.8)	7,312	7,123	6,430	(9.7)	19	53	16	1,153	3,038	932		
17	234	135	81	(40.0)	13,992	8,054	4,802	(40.4)	68	67	14	4,082	3,972	830		
Total*	186,511	151,605	126,846	(16.3)	8,792,588	7,150,442	6,064,541	(15.19)	24,112	23,926	14,309	1,191,448	1,239,821	706,621		

*Titles that overlap more than one administrative region are compiled in each of the regions. Consequently, the sum of titles per region does not equal the total number of titles. These statistics are taken from the ODM Register as at February 9, 2016.

Acronyms

CDC: map-designated claim issued after November 22, 2000

CL: staked claim

CLD: map-designated claim issued prior to November 22, 2000

Table 2.2 - Distribution of mining extraction titles per administrative region in Québec.

Active mining extraction titles as at December 31, 2015.					
Administrative region		Number of titles			
		CM,BM	BEX	ASB	BNE
01	Bas-Saint-Laurent	1	17	0	72
02	Saguenay-Lac-Saint-Jean	4	38	0	407
03	Capitale-Nationale	4	34	0	71
04	Mauricie	3	34	0	229
05	Estrie	3	0	0	8
06	Montréal	0	0	0	0
07	Outaouais	3	1	0	121
08	Abitibi-Témiscamingue	140	38	0	640
09	Côte-Nord	23	222	0	528
10	Nord-du-Québec	72	154	0	398
11	Gaspésie-Îles-de-la-Madeleine	10	23	0	26
12	Chaudière-Appalaches	8	3	0	10
13	Laval	0	0	0	0
14	Lanaudière	3	16	0	70
15	Laurentides	12	12	0	103
16	Montérégie	1	0	0	0
17	Centre-du-Québec	0	0	0	0
Total*		286	592	0	2,683

*Titles that overlap more than one administrative region are compiled in each of the regions. Consequently, the sum of titles per region does not equal the total number of titles. These statistics are taken from the ODM Register as at February 9, 2016.

Acronyms

ASB: authorization to mine without a lease
 BEX: exclusive lease to mine surface mineral substances
 BNE: non-exclusive lease to mine surface mineral substances
 CM: mining concession
 BM: mining lease

Table 2.3 - Distribution of active mining titles and authorizations to mine without a lease for sand and gravel mining.

From January 1 to December 31, 2015				
Administrative region		BNE / BEX	ASB	Extraction sites for SMS
01	Bas-Saint-Laurent*	88	0	65
02	Saguenay-Lac-Saint-Jean*	752	0	633
03	Capitale-Nationale*	115	0	83
04	Mauricie*	442	0	398
05	Estrie	13	0	7
06	Montréal	0	0	0
07	Outaouais*	192	0	162
08	Abitibi-Témiscamingue*	957	0	587
09	Côte-Nord *	813	0	527
10	Nord-du-Québec	665	5	531
11	Gaspésie-Îles-de-la-Madeleine	39	0	23
12	Chaudière-Appalaches	20	0	14
13	Laval	0	0	0
14	Lanaudière*	100	0	61
15	Laurentides*	184	0	147
16	Montérégie	0	0	0
17	Centre-du-Québec	0	0	0
Total*		4,380	5	3,238

*Delegate administrative regions responsible for the management of sand and gravel.
These statistics are taken from the ODM Register as at February 9, 2016.

Acronyms

ASB: authorization to mine without a lease
BEX: exclusive lease to mine surface mineral substances
BNE: non-exclusive lease to mine surface mineral substances
SMS: surface mineral substances



CHAPTER 3

Geoscience work program in Québec in 2015

The province of Québec is vast, and its geological knowledge remains, to a large extent, fairly rudimentary. There are indications the province contains profitable resources for a multitude of commodities, such as precious and base metals, and rare metals for which new applications are being developed. Therefore, it is essential to improve our geological understanding so the province's mineral potential can be taken into consideration during land-use planning.

In this respect, the work carried out by the *Direction générale de Géologie Québec* (DGGQ) is a key component of mining development in Québec by better defining the province's mineral potential. The information gathered will also contribute to decision-making processes in public land-use planning and management, particularly where it concerns the conservation of mineral and water resources. The findings will be made public through Québec's geomining database system (SIGÉOM) on the MERN website. The interactive map function allows users to quickly consult regularly updated geoscience data.

Geoscientific knowledge acquisition projects have been made possible through the mining heritage component of the Natural Resources Fund, which is financed by mining royalties. In its 2016 Budget Speech, the Government of Québec stated it would increase its investment in the MERN's bedrock characterization work in the Plan Nord territory by \$3 million per year for three years. This geoscientific work is the first step in the mining development process and it helps focus exploration investments in areas with the best discovery potential for mineral deposits.

In 2015, the MERN conducted 24 geoscientific knowledge acquisition projects: nine geological surveys, five geophysical surveys, six Quaternary surveys, three sampling surveys and one geological study (Figure 3.1). The field work for 18 of these projects was completed by the end of 2015, and two geophysical surveys will commence in the winter of 2016 (the Rivière Romaine and Rivière Delay projects). A detailed overview of these projects is provided in the document *Abstracts of Oral Presentations and Posters, Québec Mines 2015* (DV 2015-06)¹⁰.

During the Québec Mines 2015 convention, the MERN published 126 new exploration targets identified by the MERN's 2015 geoscientific work (PRO 2015-06)¹¹.

3.1 Geological surveys

Of the nine geological surveys in 2015, seven represent the continuation of projects undertaken in previous years, and two are new projects. All the projects are designed to increase geoscience knowledge, particularly in lesser-known regions, and to stimulate exploration in Northern Québec and mining regions.

The Churchill project (No. 1) represents the fifth year of a five-year mapping project at a scale of 1:250,000 in the Churchill Province. In 2015, the project mainly concentrated on NTS map sheet 24B in the Core Zone. Farther north, near Baie aux Feuilles, the aim of the Kuujuaq project (No. 5) is to refine the geological map of the area, which covers the Labrador Trough and the lithotectonic Rachel-Laporte Zone.

In the Baie-James region, three geological surveys were conducted at a scale of 1:50,000. The Baie-James survey (No. 2), centred on the Lac Joubert area, straddles the Opinaca and Opatoca subprovinces, whereas the Baie-James-West survey (No. 3), centred on Lac Villaret, mainly covers units belonging to the Opinaca Subprovince. The Assinica project (No. 9), centred on Lac Rodayer, covers units of both the Opatoca and Opinaca subprovinces.

10 - <http://sigeom.mines.gouv.qc.ca>

11 - <http://sigeom.mines.gouv.qc.ca>

The Clova project (No. 4) is a 1:50,000 mapping program in the Haute-Mauricie region. It is the second year of the program, which will run at least five years in this part of the Grenville Province. The Escoumins project (No. 8) is a 1:250,000 mapping program that will highlight the area's metal potential, particularly for copper and gold.

A geological survey at a scale of 1:20,000 (Chapais-South project, No. 6) was carried out in the Abitibi Subprovince to the south of Chibougamau, in an area known for its strong gold potential.

The Rimouski project (No. 7) completed the geological compilation of the Appalachian Province by covering an area where new roads were recently built.

3.2 Geophysical surveys

The Rivière Delay aeromagnetic survey project (No. 10), situated northwest of Schefferville, covers an area containing belts of volcanic rocks hosting Ni-Cu showings.

The Radisson aeromagnetic survey project (No. 11), situated north of Radisson, covers an area in the Bienville Subprovince that will be subject to a 1:250,000 geological mapping program over the coming years.

The Rivière Romaine aeromagnetic survey project (No. 12), situated northeast of Havre-Saint-Pierre, covers an area in the Grenville Province that will eventually be subject to a 1:50,000 geological mapping program.

East of the Baie-James-East geological survey, the Ashuanipi aeromagnetic survey project (No. 13) covers an area in the Superior Province that will be subject to a 1:50,000 geological mapping program over the coming years.

The Rivière Vachon radiometric and aeromagnetic survey project (No. 14), situated in the Superior and Churchill provinces to the west of Ungava Bay, covers the units in the far northern end of the Labrador Trough and in the adjacent Archean bedrock. This area has potential for Ni-Cu and gold mineralization.

3.3 Quaternary surveys

The Churchill project (No. 15), a Quaternary mapping project, continues to advance alongside the bedrock mapping program (No. 1) and will provide a better understanding of glacial dynamics in northeastern Québec. In addition, chemical and heavy mineral analyses of sampled glacial sediments will assist research on mineralization.

The Chibougamau Project (No. 16) expanded our knowledge on the Quaternary deposits at the contact between the Grenville Province and the Abitibi and Opatica subprovinces. The project also assessed the relevance of conducting geological mapping projects along the Grenville Front in the north-central part of this geological province.

The Gouin project (No. 17) south of the Gouin Reservoir, conducted at the same time as the bedrock mapping program (Clova project, No. 4), improved our understanding of the Quaternary deposits in this part of the Grenville Province. Chemical and heavy mineral analyses of sampled glacial sediments will shed light on the mineral potential of this region.

North of Matagami, the Assinica project (No. 18), conducted in tandem with a bedrock mapping project (Assinica project, No. 9), has led to a better understanding of the Quaternary deposits in this part of the Superior Province. The geochemical data on collected till samples will help assess the mineral potential of the area and supply key information for land-use reconciliation purposes.

The communities of Akulivik and Puvirnituk were the subject of aggregate resource inventories (sand and gravel, project No. 19). The project was in response to a request by the *Ministère des Affaires municipales et de l'Occupation du territoire* (MAMOT) to help find ways to address the issues of melting permafrost and the construction of new infrastructure in Nunavik communities. Another aggregate resource inventory project (sand and gravel, project No. 20) was also carried out in the La Malbaie area in the Charlevoix region.

3.4 Geological studies

The Labrador Trough hosts many Ni-Cu showings, distributed throughout the region. A study focusing on the Ni-Cu potential (project No. 21) was carried out to identify the geoscientific elements that are essential for the presence of this type of mineralization and to delineate new areas with exploration potential.

3.5 Sampling surveys

The following work was conducted in 2015 for mineral potential assessment purposes and to provide new and indispensable geoscientific knowledge that can be used in decision-making processes for public land-use planning:

- The continued analysis of indicator minerals from till samples collected north of Chibougamau (project No. 22);
- A till survey in an area between Lac Assinica and the town of Chibougamau, in the Superior Province (project No. 23); and
- A till survey in an area centred on Lac Brisson, east of Rivière George, in the Core Zone of the Churchill Province (project No. 24).

3.6 Publications

In 2015, thanks to the work by MERN geologists and the statutory work carried out by mineral exploration and mining companies, the SIGÉOM-Examine database grew by 540 documents collected from a wide range of sources. The bulk comprised the following documents that were added to the Mineral Exploration Dossier:

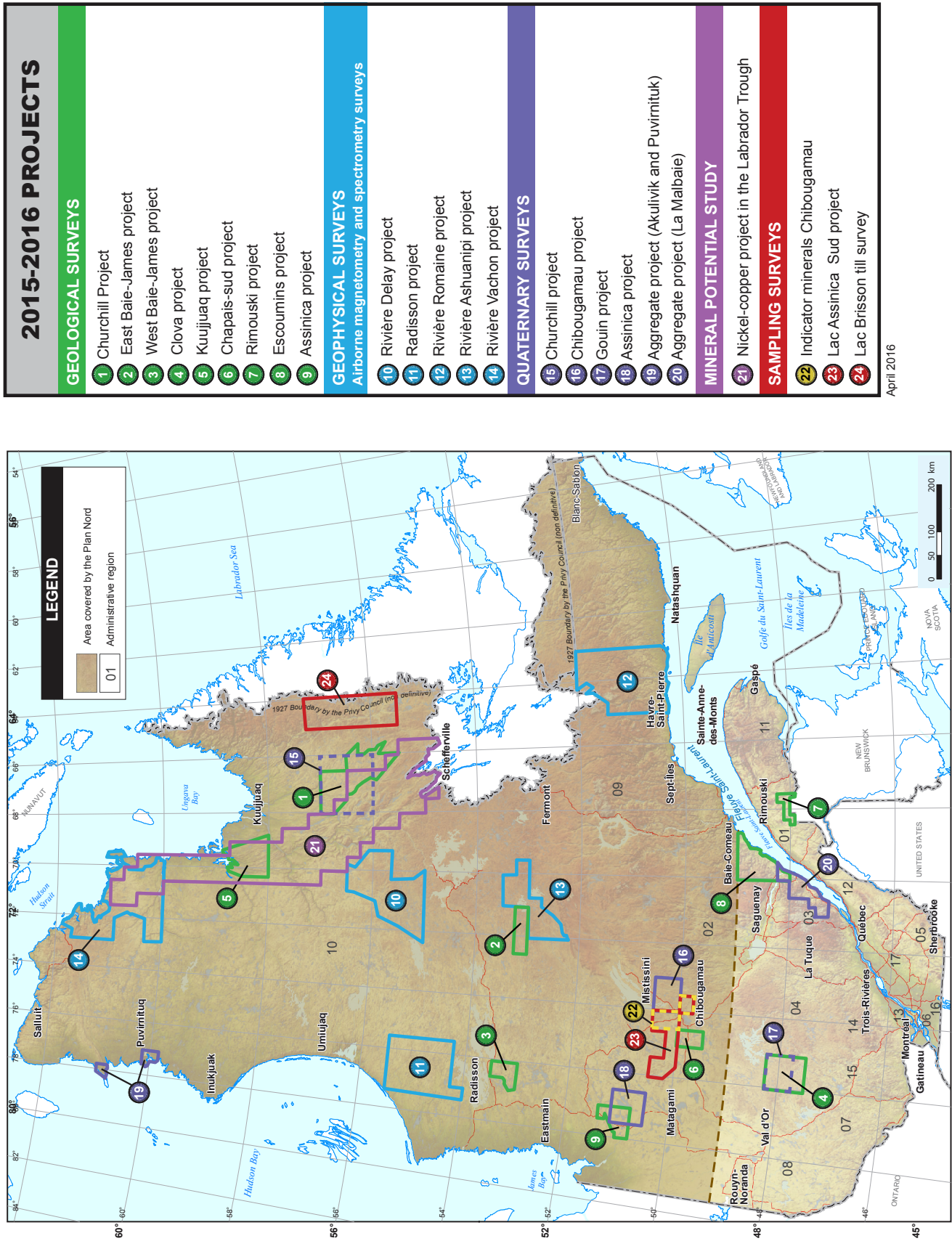
- 437 statutory work reports (GM);
- 3 internal documents (GM);
- 3 reports classified as donations from companies.

The other filings over the course of the year included the following 103 documents added to the QERPUB collection:

- 17 geoscientific compilation maps (*Compilations géologiques*: CG);
- 8 documents in the public document series (*Documents publics*: DP);
- 6 documents in the miscellaneous series (*Divers*: DV);
- 2 documents in the SIGÉOM series (EP);
- 2 documents in the public outreach series (*Géologie pour tous*: GT);
- 55 documents in the manuscript series (*Manuscrits bruts*: MB);
- 1 document in the thesis series (*Mémoires*: MM);
- 6 documents in the promotional document series (*Documents promotionnels*: PRO);
- 3 documents in the geological report series (*Rapports géologiques*: RG);
- 3 documents in the preliminary report series (*Rapports préliminaires*: RP).

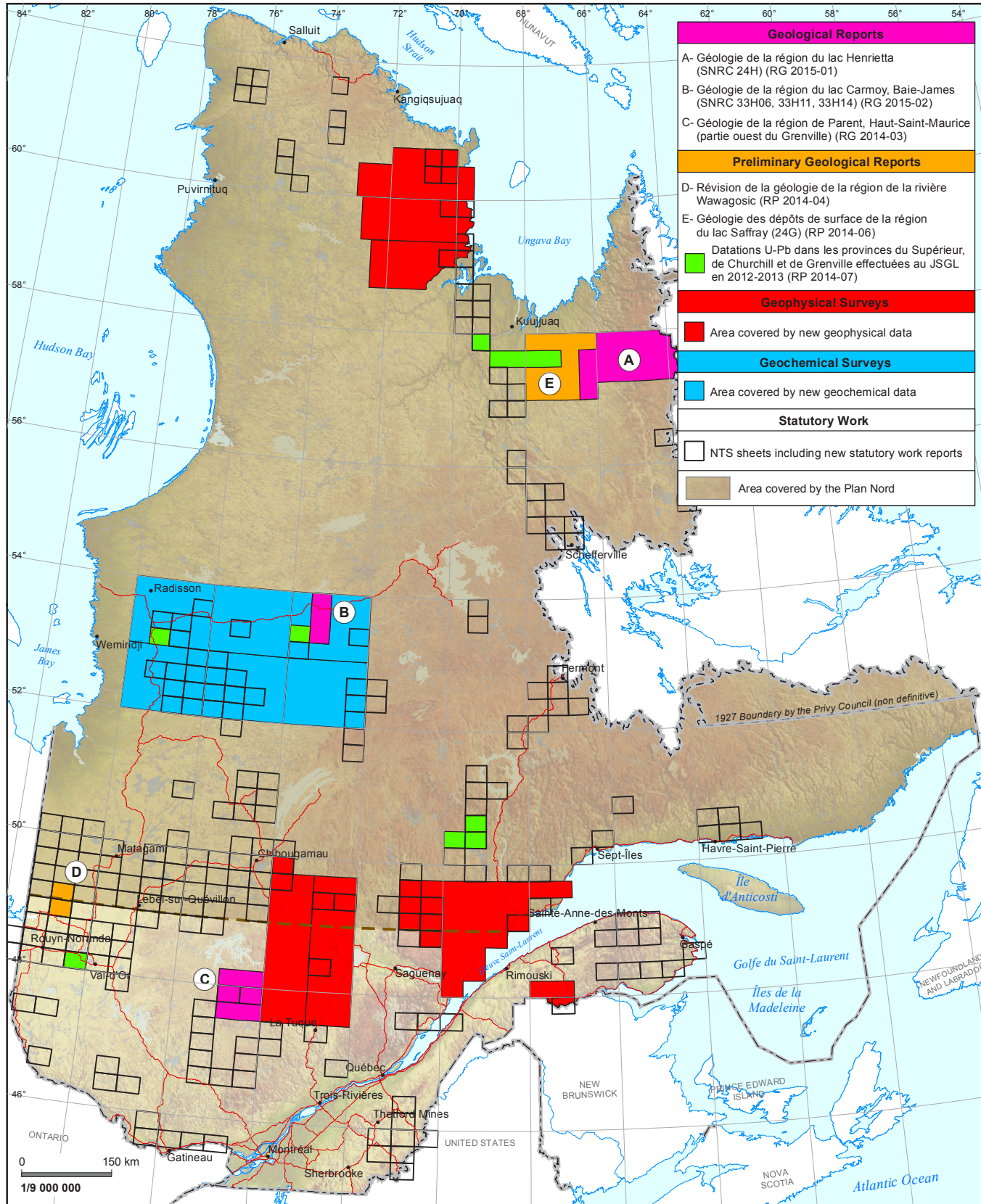
Areas covered by new maps or new data sets are shown in Figure 3.2. This includes geological maps with accompanying reports, geological compilation maps and regional geophysical surveys (aeromagnetic, spectrometry or both).

Figure 3.1 - Geoscientific projects in 2015.



April 2016

Figure 3.2 - New geoscientific publications in 2015.





CHAPTER 4

Mineral Exploration

4.1 Introduction

Targeted commodities

In 2015¹², roughly 200 mining companies reported exploration or deposit appraisal work in Québec as project operator. Exploration expenditures and investments amounted to nearly \$221M (Figures 4.1 and 4.2).

Junior companies continued to have difficulty financing their projects on the stock markets. Although spending by juniors had dropped by 30% in 2013, they have increased by 8% from 2014 to 2015.

As in the past, exploration and deposit appraisal expenditures are largely focused on precious metals (\$108M, 49%), ferrous metals (\$58M, 26%) and base metals (\$13M, 6%) (Table 4.1). The last few years have also seen a growing interest for several commodities that Québec does not yet produce or only in small quantities. This is true for lithium, rare earth elements, diamonds, phosphate and graphite, which collectively reached a high of \$150M in work expenditures in 2012, compared to a total of only \$10M in the early 2000s. Nevertheless, the global stock market pullback had a negative effect on the level of investment for these new commodities. In Québec, expenditures fell from \$150M in 2012 to \$33M in 2015, a drop of 78%.

The applications for these strategic commodities are diverse and growing, particularly in the high-tech and green technology sectors for products such as hybrid and electric cars, wind turbines and high-performance rechargeable batteries.

According to preliminary data, exploration and deposit appraisal expenditures were down for a fourth consecutive year with a total of \$221M.

The year-to-year reductions observed in 2012 (26%), 2013 (38%), 2014 (17%) and 2015 (30%) are explained by lower stock market prices for certain commodities that led to worldwide financing difficulties in the industry. In fact, over the course of the past year, stock market indexes for the mining sector were falling while those for other sectors were on the rise.

Across Canada, expenditures for exploration and deposit appraisal activities were also down. Over the last ten years, Québec's contribution has accounted for 15% to 19% of the total Canadian expenditures for these activities.

12 - Based on data compiled by the *Institut de la statistique du Québec* as part of its mining statistics program.

Figure 4.1
Total mining investments in Québec, 2001-2015 (\$M).

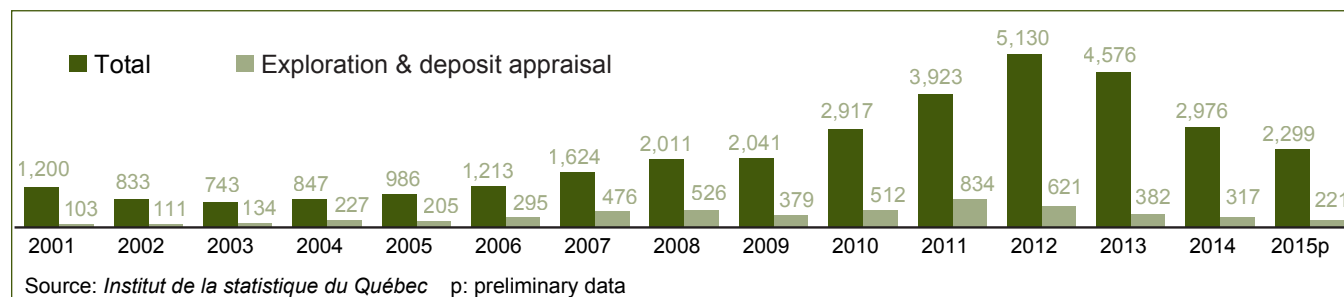


Figure 4.2
Exploration and deposit appraisal expenditures in Québec, 2001-2015 (\$M).

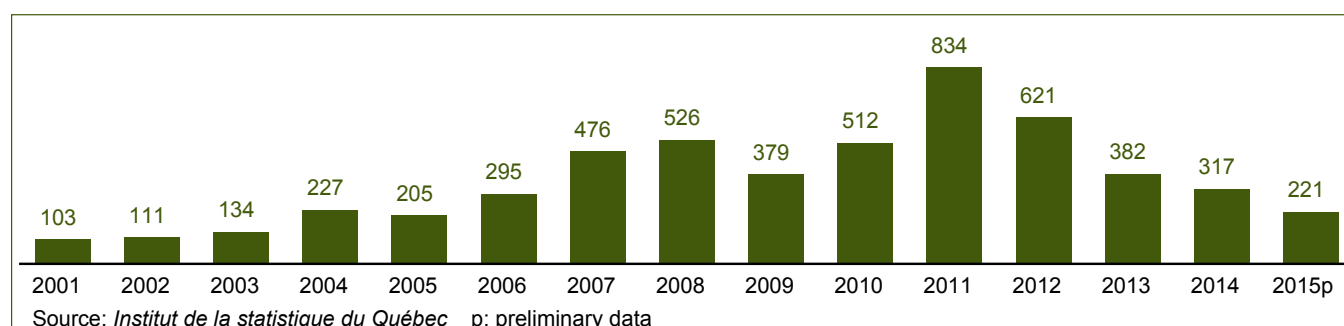
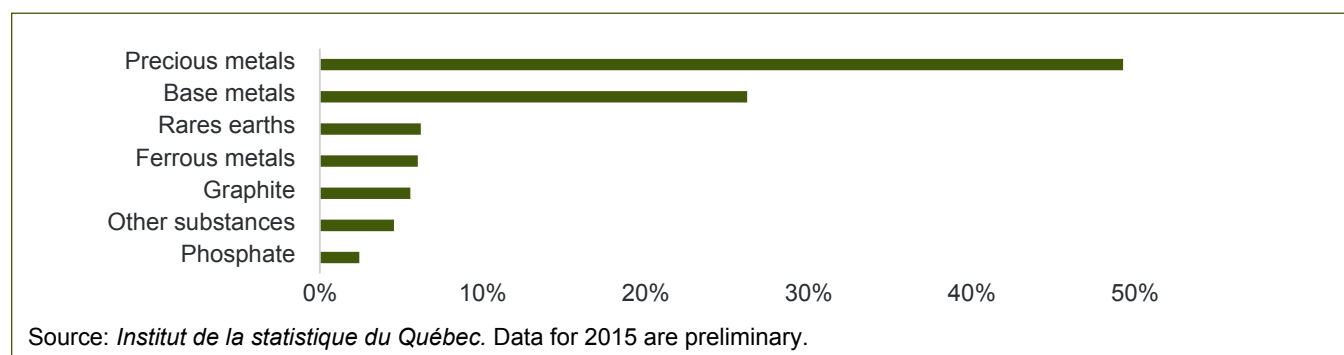


TABLE 4.1 - Exploration and deposit appraisal expenditures in \$M by commodity.

Commodity	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015p
Precious metals (Au, Ag, PGE)	116	145	226	263	231	277	448	245	143	104	108.4
Base metals (Ni, Cu, Zn)	53	71	118	122	59	87	125	83	61	60	57.7
Diamonds	23	29	27	13	10	14	14	14	12	4	-
Ferrous metals	1	22	29	24	15	32	106	143	44	38	13.2
Lithium	-	-	-	0.2	6.4	20	16.7	7.3	11	1	-
Rare earths	-	-	-	1.3	2.8	16.4	41.7	49.2	38	11	13.6
Graphite	< 1	< 1	< 1	< 1	< 1	< 1	1.4	16.7	12	13	12.2
Phosphate	-	-	-	-	-	-	0.9	25.2	4	22	5.3
Other substances	8	6	5	15	7	24	47	13	56	19	7.2
Total	205	295	476	526	379	512	834	621	381	272	220

Source: Institut de la statistique du Québec Data accurate as of March 2016 p: preliminary data

Figure 4.3
Exploration and deposit appraisal expenditures by commodity in Québec, 2015.



Exploration and deposit appraisal expenditures by region

In 2015, most of the province's \$221M in exploration and deposit appraisal expenditures was divided between three administrative regions where most mining activities have historically taken place: Nord-du-Québec (\$117M, 53% of the provincial total), Abitibi-Témiscamingue (\$70M, 32%) and Côte-Nord (\$19M, 9%) (Table 4.2).

TABLE 4.2 - Distribution of exploration and mining development expenditures by administrative region (in \$M).

Administrative region	2011	2012	2013	2014	2015p	% of total expenditures
01 Bas-Saint-Laurent	-	0.2	0.2	0.23	0.51	0.23%
02 Saguenay-Lac-Saint-Jean	19.8	38.3	13.7	17.81	2.59	1.17%
03 Capitale-Nationale	-	-	-	-	3.02	1.36%
04 Mauricie	1.5	-	0.725	-	0.16	0.07%
05 Estrie	2.4	1.8	0.659	0.24	0.05	0.02%
06 Montréal	-	-	-	-	-	0.0%
07 Outaouais	0.9	2.9	1.9	2.10	1.95	0.88%
08 Abitibi-Témiscamingue	286	167.2	80	53.50	70.01	31.62%
09 Côte-Nord	68.3	77.1	32.4	47.65	19.29	8.71%
10 Nord-du-Québec	436.5	309.9	202.78	146.04	117.32	52.99%
11 Gaspésie-Îles-de-la-Madeleine	10.6	15.7	2.994	2.33	0.77	0.35 %
12 Chaudière-Appalaches	5.5	3.3	0.774	0.18	0.70	0.32%
13 Laval	-	-	-	-	-	0.0%
14 Lanaudière	0.2	0.2	0.539	-	2.50	1.13%
15 Laurentides	1	2	0.972	0.74	2.53	1.14%
16 Montérégie	-	-	-	-	-	-
17 Centre-du-Québec	-	-	-	-	-	-
Total	833.9	620.7	381.7	272.28	221.40	100.00 %

Source: Institut de la statistique du Québec

4.2 Mineral exploration

This section summarizes the main exploration projects in Québec, by commodity, that have experienced notable progress in terms of:

- a new resource calculation;
- the discovery of a new mineralized zone; or
- a mineralized drill interval along the extension of a known zone.

Details of these exploration projects are presented in Tables 4.3, 4.4 and 4.5.

Copper and zinc

The work by **Amex Exploration** and its partner **Agnico Eagle Mines** confirmed the presence of a polymetallic mineralized envelope from surface to a vertical depth of 750 metres that may correspond to the extension of the former Normétal mine, which is located about 5 km to the east.

West of Chibougamau, **Yorbeau Resources** discovered a new mineralized lens named Gap.

Work by **Osisko Exploration James Bay** on the Coulon property, 15 km north of the Fontanges airport in the James Bay region, confirmed the northeast and southwest extensions of lens 257.

Diamonds

Stornoway Diamond Corporation continued its construction and development of the Renard mine.

Iron

In the Côte-Nord administrative region, partners **Cartier Iron Corporation** and **Champion Iron** conducted a four-hole drilling program on the Round Lake Project, specifically in the Black Dan, Hearts Lake, Thémines No. 2 and Lac Penguin West areas.

Partners **Century Global Commodities Corporation** and **WISCO International Development & Investment** published a new resource estimate for the Black Bird deposit and a preliminary economic assessment for their Full Moon Project (Sunny Lake), both situated northwest of Schefferville. They also published the results of the feasibility study for their Lac Joyce project (Attikamagen), situated east of Schefferville.

Adriana Resources and **WISCO International Resources Development & Investment** published the results of the feasibility study for the Lac Otelnuq project, situated northwest of Schefferville (Labrador Trough).

Iron-titanium-vanadium

Société d'exploration minière Vior conducted exploration work on the Foothills property, situated in Saint-Urbain, where a dispersal train of rutile-bearing boulders, assaying up to 57.6% TiO₂, had been discovered in 2014. A ground gravimetry survey detected a gravimetric anomaly directly on the Blueberry Lake showing, as well as two other similar anomalies that remain unexplained.

BlackRock Metals completed a prefeasibility study for an iron, titanium and vanadium open pit mine and metallurgical complex approximately 30 km southeast of the town of Chibougamau. In addition, exploration work confirmed the extension of the Fe-Ti-V mineralization 5 km southwest of the Armitage Zone.

VanadiumCorp Resources published the first mineral resource estimate for its Lac Doré project, adjacent to the **BlackRock Metals** property, and also began a preliminary economic assessment.

Graphite

Graphite continued to be an exploration focus in Québec in 2015. Projects are largely concentrated in the Outaouais, Lanaudière, Laurentides and Côte-Nord regions.

In the Outaouais region, **Great Lakes Graphite** announced the results of metallurgical testing and a resource estimate for the Lochaber project, situated approximately 10 km northeast of the Buckingham area (city of Gatineau).

Cavan Ventures published the results of metallurgical tests on samples from its Buckingham project. In October, **Ashburton Ventures** signed an option agreement to earn a 60% interest in the project from Cavan Ventures. In November, the partners conducted a diamond drilling program during which the third hole (BH15-03) intersected graphite mineralization over 148 m. Assay results on drill core samples are expected in early 2016.

CKR Carbon Corporation (formerly Caribou King Resources) continued its exploration work on the Buckingham property. The work included mapping, geophysics (ground EM survey) and sampling, leading to the discovery of the Case Zone, 900 m long by 350 m wide. The results of metallurgical work on different types of samples were also published. In April 2015, the company announced it was working on its TAC project, including sampling near historical drill holes that had yielded anomalous graphite values and near conductors defined by an EM survey conducted in 1990.

Partners **Canada Strategic Metals** and **Lomiko Metals** announced in July the results of grab sample analyses from the La Loutre project. The results of the major drilling program were published in fall 2015 and in early winter 2016.

Nouveau Monde Mining Enterprises carried out major work on the Tony Block (the former Hotel Block) on its Matawinie project, situated in the Saint-Michel-des-Saints area. The work included a heliborne survey, trenching and a program of short drill holes, with the aim of defining mineral resources by the end of 2015. Metallurgical tests were carried out on several 10-kg samples from trenches and drill holes. In December, the company announced the results of drill core analyses and a new resource estimate for the South-East and South-West zones on the Tony Block.

Canada Carbon announced in March that it had granted a contract for a preliminary economic assessment and graphite resource estimate on its Miller project, situated 80 km west of Montréal. In May, the company stated that an induced polarization survey was underway on the East and West blocks, and that drilling would soon resume on the VN6 Zone. In October, the company published a summary of work it had conducted over the course of the year, which included sampling and metallurgical testing of graphite mineralization, as well as the evaluation of a white marble unit as a potential source of commercial architectural stone. **Canada Carbon** also filed for the necessary permits from the relevant ministries so it can re-use the site and infrastructure of the former Asbury graphite mine, some 8 km northeast of the municipality of Notre-Dame-du-Laus.

Lomiko Metals and **Canada Strategic Metals** announced in June the start of field work – prospecting, mapping and sampling – on the Lac des Iles West project in order to test graphite mineralization that had been discovered in 2012. The property is situated west of the Imerys mine, south of Mont-Laurier.

In April 2015, **Saint Jean Carbon** announced the start of field work, comprising sampling, trenching and a drilling program of short holes on its Clot property, 10 km northwest of the Mont Tremblant. The number of drill holes will be determined following the field work.

In the Côte-Nord region, **Mason Graphite** published the positive results of the feasibility for its Lac Guéret project in September 2015. In November, the company announced it had filed an environmental impact assessment with the MDDELCC.

Lithium

Nemaska Lithium obtained provincial and federal authorizations for its Whabouchi project, situated near the Cree community of Nemaska, in the James Bay region.

Critical Elements Corporation announced it had signed a collaborative agreement with a strategic partner to carry out a feasibility study on its Rose deposit in the James Bay region.

Nickel, copper, cobalt and platinum group elements (PGE)

Partners **Eastmain Resources** and **Darnley Bay Resources** encountered disseminated copper and nickel when it drilled the ultramafic Crête-du-Coq intrusion in the Lac Lessard project, north of the Otish Mountains.

On the Grasset property, situated between 25 and 50 km west of Matagami, **Balmoral Resources** extended the Horizon 3 Zone to a depth of more than 425 metres.

In July 2015, **Royal Nickel Corporation** received a positive decision on its environmental assessment from the federal Minister of the Environment, who concluded that the Dumont project is unlikely to cause any major negative environmental impacts. The company had already been issued a certificate of authorization from the MDDELCC the month before.

To the west of the former Marbridge nickel mine and north of the town of Cadillac, **Sphinx Resources** announced in May the results of the first holes drilled on its Preissac project. In June and August, the company enlarged the property by acquiring new claims. The project is now called Somanike.

In June, **Sphinx Resources** announced the assay results for mineralized intervals it encountered while drilling the Green Palladium project, situated in the RCM of Pontiac. Two months later, the company published the results of samples collected from trenches.

Gold

Once again, the year was notable for the publication of new mineral resource estimates for several gold projects at the advanced exploration, development or deposit appraisal stages. Most of these projects are found in the Abitibi, particularly in proximity to or north of the Cadillac Break.

Mine closures and mining project terminations

Richmont Mines ceased production at the Monique mine in January 2015. Stockpiled ore continued to be processed at the Camflo Mill over the course of the year.

Production at the Lac Herbin mine of **QMX Gold Corporation** came to an end on March 19, 2015. Surface stockpiles of ore were processed until July. Over its mine life, Lac Herbin has produced approximately 1,029,600 tonnes of ore at an average grade of 4.76 g/t Au, for approximately 157,000 ounces of gold, not including the 4,700 ounces expected from the surface stockpiles. Mining of the new FL3 Zone commenced in October 2015 and was scheduled to last two months.

Exploration in active mines

At the Bachelor mine, underground exploration drilling by **Métanor Resources** disconfirmed the presence of the A and B gold veins (Hewfran-West area) between levels 6 and 8, the presence of the Main vein between levels 12 and 14, and the intersection of veins E and Main between levels 13 and 14.

At the Casa Berardi mine of **Hecla Québec** (a subsidiary of **Hecla Mining Company**), surface and underground drilling improved the stoping plan and increased reserves and resources in the 118, 123, 124 and Lower Inter zones in the West mine. In the East mine, work extended the mineralization of Zone 124, leading to the discovery of a new zone known as 117, and also provided a better definition of the geometry and continuity of Zone 157.

Underground exploration work at **Goldcorp's** Éléonore mine has focused on the lower portion of the Roberto deposit, below a depth of 650 m, in order to define the No. 5 and 6 horizons.

Richmont Mines announced in July that it was developing the Q Zone of the Beaufor mine. This should extend the life of the mine by two years, with an estimated annual production of 20,000 to 25,000 ounces in 2016 and 2017. In the first half of 2015, production was from the high-grade M Zone.

In 2015, exploration at the Goldex mine of **Agnico Eagle Mines** focused on the Deep 1 Zone, which includes the Dx Zone and the upper part of the D Zone. The work added at least six years to the mining operations. The company developed an exploration ramp, and the new mineralized zone was approved for production between depths of 850 m and 1,200 m.

Agnico Eagle Mines continued the underground development of drift 101-W from the Lapa mine. At the end of the third quarter, the drift had been driven 691 metres. Underground drilling from the drift commenced in mid-June 2015, targeting the extensions of the Branch and C zones.

Gold projects at the development or construction phase

Abcourt Mines drilled three holes at the beginning of the year: one at depth in the western part of the Elder mine, above the 9th level, and two others near the surface. In July, the company signed a definitive contract with Richmont Mines to process ore at the Camflo Mill. The contract, with an initial duration of six months, includes the shipment of a minimum 10,000 tonnes of ore per month to the mill.

Gold Bullion Development Corporation commenced trenching on the Granada project. Metallurgical tests were carried out on gold mineralization from the site. A new resource estimate was published in May 2015.

Gold exploration projects with new resource estimates

Monarques Gold Corporation published an update of the resource estimate for its Simkar Gold project (report of January 21, 2015). The resources doubled compared to the 2011 study. The property, wholly owned by Monarques Gold Corporation since June 2014, is roughly 15 km east of Val-d'Or.

A geological re-interpretation of the zones in the lower part of the Croinor gold deposit allowed **Monarques Gold Corporation** to produce a new resource estimate for the property, which was published in November 2015.

At the Lamaque South project, **Integra Gold** updated the preliminary economic assessment originally produced in March 2014, and the update yielded lower production costs and pre-production capital, as well as improved recoveries. A new resource estimate was also produced for the Triangle and Parallel zones in the same report. In November 2015, the company published a resource update for the Triangle Zone.

On December 15, 2015, **Radisson Mining Resources** announced the positive results of a preliminary economic assessment for its O'Brien-Kewagama project, situated in the Cadillac mining camp. The company also completed a resource estimate for the 36E and Kewagama zones on its project.

Gold exploration projects

Abitibi-Témiscamingue region (08)

Rouyn-Noranda area

Renforth Resources acquired 50 claims to form the Bonchamp property, adjacent to its New Alger project. In August, the company announced it was conducting prospecting and mapping work around a quartz vein discovered several months earlier.

In October 2015, partners **Globex Mining Enterprises** and **Canadian Malartic GP** announced the drilling results from Phase II on the Pandora-Wood property, situated west of the Lapa mine.

On September 16, **Falco Resources** announced it had drilled six diamond drill holes (totalling 2,750 m) on the Rimo property. A downhole induced polarization survey and a ground survey are underway. **Falco Resources** also drilled 18 holes (with wedge cuts) on its Horne 5 project, situated in Rouyn-Noranda, for which the results were published during the year. The company expects to verify the extensions of the M, C and K mineralized zones on the adjacent Horne 5 PLUS project, between surface and a depth of 650 m.

Midland Exploration drilled seven holes in its Patris property. Hole PAT-15-05, which targeted an induced polarization anomaly, cut a zone characterized by py-mo-cp-ga mineralization.

In May, **Typhoon Exploration** conducted prospecting and sampling work, including channel sampling, on the Ranger and Sommet properties, to the south and southeast of the Fayolle project.

At the East Bay project, situated one kilometre west of Duparquet, **Explor Resources** drilled five holes, for a total of 1,868 m, on three targets.

Val-d'Or area

The Val-d'Or project of **Adventure Gold**, situated approximately 20 km east-northeast of the city of Val-d'Or, hosts the former Lucien C. Béliveau mine. Stripping and trenching work carried out in 2015 revealed four new zones up to 20 metres thick, with good gold grades.

In spring 2015, **Alexandria Minerals Corporation** announced the drilling results for its Orenada property, situated east of Val-d'Or.

The drilling program conducted over the winter of 2015 on the Kiena Mine Complex of **Wesdome Gold Mines** aimed to test the S-50 Zone along strike from the Kiena shaft, as well as the Presqu'île Zone further west. The work confirmed the extension of the S-50 Zone and the presence of high-grade veins at Presqu'île.

In 2015, **NioGold Mining Corporation** completed a 50,000-metre drilling program on the Marban Block. The holes intersected new mineralized zones that were not included in the modelled resources. They may represent an extension of known zones, or entirely new lenses.

Nord-du-Québec region (10)

Northern part of the Abitibi Subprovince

Aurvista Gold Corporation published the results of a preliminary economic assessment for the Douay project, south of Matagami.

In the Lebel-sur-Quévillon area, exploration work by partners **Amex Exploration** and **Visible Gold Mines** confirmed the presence of a gold-bearing structure oriented ENE-WSW on the Cameron property.

Oban Mining Corporation (formerly **Eagle Hill Exploration Corporation**) published the results of a preliminary economic assessment for the Windfall Lake project, situated in the Urban-Barry area.

On the Main Zone of the Gladiator project (West Arena property, Urban-Barry area), **BonTerra Resources** cut a gold-bearing drill intersection at a depth of 400 metres.

Beaufield Resources intersected several gold zones on its Urban property (Macho Block), situated in the Urban-Barry area.

On the La Martinière property, roughly 90 km west of Matagami, definition drilling by **Balmoral Resources** confirmed the presence of the Bug Lake Trend over a distance of at least 1.2 km in a north-south direction, and to a depth of up to 400 metres. On its Grasset property, **Balmoral Resources** intersected three gold-bearing zones while drilling the margin of the ultramafic Grasset Complex, close to the H3 nickel zone.

On its Moroy property, just south of the Bachelor mine, **Métanor Resources** discovered a new mineralized zone on the southern flank of the O'Brien syenite pluton.

In the Waswanipi area, grab samples collected on the Montalembert property by **Globex Mining Enterprises** confirmed the presence of the Galena and Number 2 structures at surface.

On its Anik property, southwest of Chibougamau, drilling by **Geomega Resources** confirmed the presence of the Bobby gold showing within the Opawica-Guercheville deformation corridor. In the same area, on the Nelligan property, **Vanstar Mining Resources** and joint venture partner **IAMGOLD Corporation** defined the Liam and Dan gold zones over a distance of 400 metres and up to a depth of 200 metres.

Southwest of Chibougamau, drilling by **TomaGold Corporation** on the Monster Lake property, in joint venture with **IAMGOLD Corporation**, continued to cut gold mineralization associated with the Monster Lake Shear Zone, northeast of the 325-Megane Zone.

James Bay area

Dios Exploration intersected multi-metre gold zones while drilling the Heberto Zone (AU33 West project).

Drilling by partners **Sirios Resources** and **Golden Valley Mines** continued to intersect wide gold-bearing intervals on its Cheechoo property.

Definition drilling on the Clearwater project by **Eastmain Resources** once again cut gold-bearing intersections, increasing the resources of the Eau Claire deposit, both within the deposit and along strike.

On the Sakami property, situated south of Radisson, drilling by **Strategic Metals of Canada** and **Matamec Explorations** confirmed the west-northwest and depth extensions of the 25 Zone, as well as the discovery of a new gold zone.

Phosphate

Ariane Phosphate updated the resources for the Paul Zone on its Lac à Paul project. The estimate included the new resources in the eastern extension of the Paul Zone and the updated resources in the Paul Zone and its western extension.

Silica

The Lac de la Grosse Femelle property of **Rogue Ressources** is situated 42 km north of the town of Baie-Saint-Paul. The aim of the work conducted in 2015 was to interpret the structure and define the thickness and length of the D and G quartzite units. The goal was to produce a resource estimate in early 2016. A new quartzite, named Quartzite H, was discovered: pure white, coarse-grained, massive, crystalline and without any apparent discoloration. The company also discovered that Quartzite G extends an additional 100 m to the east-northeast. This quartzite is at least 1.5 km long.

Canadian Metals, owner of the Langis project, contracted a firm to conduct metallurgical tests, which confirmed the possibility of producing ferrosilicon from the quartzite on the property. A preliminary economic assessment (PEA) is expected in the fourth quarter of 2015. A drilling program was carried out to provide supporting data for the PEA.

At the Roncevaux project in the Matapédia Valley of the Gaspésie region, **Uragold Bay Resources** conducted field work to confirm the historical resources on the property. The work included mapping and geophysical surveys, as well as trenching, channel sampling and the collection of 200-kg bulk samples for metallurgical testing.

Rare earths

Commerce Resources Corporation discovered a new niobium target and initiated a prefeasibility study for its Eldor property, situated 130 km south of Kuujuaq.

Geomega Resources published a new resource estimate for the Montviel property located north of Lebel-sur-Quévillon.

4.3

Nord-du-Québec (region 10)

This section presents an overview of all the exploration work carried out in the Nord-du-Québec region. Table 4.3 provides the descriptions of all mineral exploration and deposit appraisal projects in the Superior and Churchill provinces that were the subject of work programs in 2015. The locations of these projects are shown in Figures 4.4, 4.5 and 4.6.

As at December 31, 2015, there were 79,824 active mineral claims in the Nord-du-Québec region, compared to 97,374 as at December 31, 2014, representing a reduction of 14.5% (Table 2.1). The claims in the Nord-du-Québec region thus accounted for 63% of all claims held in Québec in 2015. In 2015, there were 185 exploration projects in the region compared to 178 in 2014. The majority of these projects (56%) are located in the Abitibi Subprovince.

In 2015, there were seven metal mines in the Nord-du-Québec region. Three of these are gold mines:

- Casa Berardi, **Hecla Québec** (a subsidiary of Hecla Mining Company);
- Bachelor, **Metanor Resources**;
- Éléonore, **Goldcorp** (commercial production started on April 1, 2015);

and four are polymetallic mines:

- Bracemac-McLeod (Zn-Cu-Ag-Au), **Glencore Canada Corporation**;
- Raglan (Cu-Ni-Co-PGE), **Glencore Canada Corporation**;
- Nunavik Nickel (Cu-Ni-Co-PGE), **Canadian Royalties**, a subsidiary of **Jilin Jien Nickel Industry Co.**; and
- Langlois (Zn-Cu-Ag-Au), **Nyrstar Canada Resources**.

In 2015, Stornoway Diamonds (Canada) continued construction and development work at its advanced exploration Renard diamond project. The work began on July 10, 2014.

Four advanced exploration projects were the subject of preliminary economic assessments:

- Lac Doré (Fe-Ti-V), **VanadiumCorp Resources**;
- Sunny Lake-Full Moon (Fe), **Century Global Commodities Corporation** and **WISCO International Resources Development & Investment**;
- Clearwater (Au), **Eastmain Resources**;
- Eldor (rare earths), **Commerce Resources**.

New resource estimates were completed for two advanced exploration projects:

- Croteau East (Au), **Northern Superior Resources**;
- Sunny Lake– Black Bird Deposit (Fe), **Century Global Commodities Corporation** and **WISCO International Resources Development & Investment**.

Exploration outlook

In 2015, several sectors continued to garner the interest of mining companies on the Eeyou Istchee–James Bay Territory: the Sunday–Detour Lake deformation corridor to the northwest of Matagami, the Opawica-Guercheville and Monster Lake deformation corridors to the southeast of Chapais and the volcano-sedimentary Urban-Barry Belt to the east of Lebel-sur-Quévillon, in addition to the Opinaca Reservoir, the Lac Sakami area and the Otish Mountains.

In greater detail, to the west and northwest of Matagami, work by Balmoral Resources on the Ni-Cu-Co-PGE zones of the ultramafic Grasset Complex and the gold zones of the Martinière project demonstrated the strong exploration potential of the Sunday–Detour Lake deformation corridor in Québec. Added to this is the known potential for polymetallic (Cu-Zn-Au-Ag) deposits in the area of the former Selbaie mine.

To the southeast of Chapais, mapping work by the Bureau de la connaissance géoscientifique du Québec, combined with work conducted by Gestion IAMGOLD-Québec, Tomagold Corporation and Geomega Resources, confirmed the gold potential of the multi-kilometre Opawica-Guercheville and Monster Lake deformation corridors.

In addition, recent exploration work for volcanogenic massive sulphides (VMS) on the northern flank of the Chibougamau Anticline, from Chapais to the Grenville Front, revealed the polymetallic potential of the Obatogamau, Waconichi, Blondeau and Chrissie formations. Yorbeau Resources discovered a new Cu-Zn-Au-Ag lens, named Gap, on the Lac Scott project, whereas Les Ressources Tectonic uncovered two new Cu-Zn-Au-Ag showings on its Kill Bill project at the eastern end of the Abitibi Subprovince.

East of Lebel-sur-Quévillon, work by several companies – Oban Mining Corporation on the Windfall Lake project, Bon-Terra Resources on the Gladiator project and Beaufield Resources on the Urban project (Macho Block) – revealed new base and precious metal intersections, confirming the long-known potential of the volcano-sedimentary Urban-Barry Belt.

In the Opinaca Reservoir area, in the heart of the Eeyou Istchee–James Bay Territory, recent gold-bearing drill intersections obtained by Sirius Resources on the Cheechoo property and by Dios Exploration on the AU33 West property, in tonalitic to dioritic units, indicate a potential for discovering low-grade gold-bearing envelopes that may contain high-grade gold-bearing structures. This type of promising metalotect is also present below the Opinaca Reservoir, near the Éléonore gold mine of Goldcorp.

4.4 Abitibi-Témiscamingue (region 08)

The Abitibi-Témiscamingue administrative region is located in western Québec and comprises three major geological assemblages (from north to south): the Abitibi and Pontiac subprovinces (Superior Province) and the Grenville Province. Mining and exploration have made this territory one of the most important mining regions in Québec for nearly a century.

Table 4.4 provides a description of exploration and mine development projects in the Abitibi and Pontiac subprovinces, and in the western Grenville Province. Figures 4.7, 4.8 and 4.9 show the locations of these projects.

In 2015, there were eight mines in the Abitibi-Témiscamingue region, comprising one polymetallic mine (LaRonde (Au-Zn-Cu-Ag-Pb), belonging to **Agnico Eagle Mines**) and the following seven gold mines:

- Lac Herbin (Au-Ag), **QMX Gold Corporation** (production ceased in March 2015);
- Beaufor (Au-Ag), **Richmont Mines**;
- Monique (Au-Ag), **Richmont Mines** (production ceased in the first quarter of 2015);
- Goldex (Au-Ag), **Agnico Eagle Mines**;
- Westwood (Au-Cu-Ag), **IAMGOLD Corporation**;
- Canadian Malartic (Au-Ag), **Canadian Malartic GP**; and
- Lapa (Au-Ag), **Agnico Eagle Mines**.

After experiencing a sharp rise in exploration and deposit appraisal expenditures for several years to reach a peak of \$286M in 2011, investments have been declining ever since. In 2015, \$70M was invested, representing 32% of the total for this type of expense across the province (Table 4.2).

As at December 31, 2015, there were 21,274 active claims in the Abitibi-Témiscamingue region, representing a 15.5% reduction compared to 2014 (Table 2.1).

In 2015, there were 70 exploration projects compared to 111 in 2014, for a reduction of 37%. The majority targeted gold mineralization along major tectonic breaks, such as the Porcupine-Destor and Cadillac faults.

New resource estimates were produced for the following advanced exploration and mine development projects:

- Simkar Gold, **Monarques Gold Corporation**;
- Croinor Gold, **Monarques Gold Corporation**;
- Lamaque South, **Integra Gold**;
- O'Brien, **Radisson Mining Resources**;
- Granada, **Gold Bullion Development**.

4.5

Regions of Québec outside of Abitibi-Témiscamingue and Nord-du-Québec

Geology

This section deals with all the administrative regions of Québec except Nord-du-Québec (10) and Abitibi-Témiscamingue (08), which were dealt with in sections 4.3 and 4.4, respectively. Most of these regions are underlain by three geological provinces: the Grenville, the Appalachians and the St. Lawrence Platform (Figure 4.10).

The Outaouais (07), Laurentides (15), Lanaudière (14), Mauricie (04), Capitale-Nationale (03), Saguenay-Lac-Saint-Jean (02) and Côte-Nord (09) administrative regions lie primarily within the Grenville Province (Figure 4.10).

The Montréal (06) and Laval (13) administrative regions are situated entirely within the St. Lawrence Platform geological province, whereas the Montérégie (16) and Centre-du-Québec (17) regions straddle the St. Lawrence Platform and Appalachian provinces (Figure 4.10).

Finally, the Estrie (05), Chaudière-Appalaches (12), Bas-Saint-Laurent (01) and Gaspésie-Îles-de-la-Madeleine (11) regions are found primarily within the Appalachian Province (Figure 4.10).

In 2015, exploration work was carried out in most of Québec's administrative regions. The activities carried out by exploration companies in the search for metals, industrial minerals and industrial stone are described in Table 4.5. Their locations are shown in Figure 4.10. Oil and gas exploration, which is quite active in the geological St. Lawrence Platform and Appalachian provinces, is not discussed in this report.

Exploration work in the geological Grenville Province

Outaouais (07)

In Outaouais, the number of claims dropped by 20% between 2014 and 2015 (Table 2.1). However, this region has always been of interest for its graphite potential, particularly given the greater consumption of this commodity in the automotive, steel and high-tech industries, among others.

In 2015, drilling programs were carried out on the La Loutre project held by partners **Canada Strategic Metals** and **Lomiko Metals**, the Green Palladium project of **Sphinx Resources**, as well as the Buckingham property held by **Cavan Ventures** and **Ashburton Ventures**. The company **Great Lakes Graphite** defined resources on its Lochaber project.

Jordan Resources acquired the Ceylon property to the southwest of the former Walker mine held by Saint Jean Carbon.

Laurentides (15)

The number of active claims in this region dropped by 18% between 2014 and 2015, from 1,948 to 1,593 (Table 2.1).

In February 2015, **Saint Jean Carbon** announced it had acquired the Clot project, situated 10 km west of Mont-Tremblant. Also in February, **Graniz Mondal** confirmed it had signed an option agreement to earn a 75% interest in the Mousseau West property near Mont-Laurier.

Lanaudière (14)

In 2015, the number of claims in the Lanaudière region fell by 39 % compared to 2014 (Table 2.1). The Matawinie property of **Nouveau Monde Mining Enterprise** was the only property on which exploration work was carried out.

Mauricie (04)

For several years now, the number of claims has declined in the Mauricie region. From 2014 to 2015, the number dropped by more than 22%, from 1,057 to 819 (Table 2.1).

Midland Exploration collected nepheline samples for metallurgical testing on its Ytria project, situated north of the community of Obedjiwan and north of the Gouin Reservoir.

Capitale-Nationale (03)

Between 2014 and 2015, the Capitale-Nationale region saw the number of claims fall slightly by 4%, from 1,017 to 973 (Table 2.1).

In 2015, two companies conducted exploration work in the region. **Société d'exploration minière Vior** explored its Foothills property, situated north of Baie-Saint-Paul, for titanium. The company also acquired another 34 claims adjacent to the property.

The Lac de la Grosse Femelle project of **Rogue Ressources**, situated approximately 42 km north of Baie-Saint-Paul, was also explored. In December 2015, the company announced the results of 71 drill holes (totalling 11,768 m) that had been drilled over the course of the year. In addition, the company declared it intended to produce an initial resource estimate and a preliminary economic assessment in the second quarter of 2016.

Saguenay-Lac-Saint-Jean (02)

Between 2014 and 2015, the number of claims dropped by almost 27% in the Saguenay-Lac-Saint-Jean region (Table 2.1). Nevertheless, the region still hosts several exploration projects for phosphorous and niobium-tantalum.

North of Lac Saint-Jean, **Arianne Phosphate** continues to develop its Lac à Paul phosphorous and titanium deposit. In December 2015, the Government of Québec issued an order-in-council granting the company permission to move ahead with the project. **Glen Eagle Resources** signed an option agreement to acquire claims in the region in order to explore for phosphorous. This new project, Ituk, is adjacent to the Moose Lake property, which is held by the same company.

MDN conducted a drilling program to explore for niobium and tantalum on its Samaqua property, 40 km north of Girardville. **Multi-Ressources Boréal** explored the Lac du Bouchon project for nickel, copper and cobalt, and the Lac à David project for palladium, platinum, nickel, copper and cobalt.

Côte-Nord (09)

The number of claims in the Côte-Nord region was 19% lower in 2015, dropping from 14,166 the year before to 11,463 (Table 2.1). Exploration remained focused on iron in the Fermont region, on iron, titanium and vanadium to the northwest of Baie-Comeau, and on graphite in areas to the south of the Manicouagan Reservoir.

Mason Graphite published the results of a feasibility study for the Lac Guéret project in September 2015.

In October 2015, **Berkwood Resources** carried out ground geophysics and mapping surveys on its Lac Guéret property, specifically in the Lac Guéret Extension area, to better define two EM anomalies that had been detected by an aerial survey in early 2015.

In November 2015, partners **Cartier Iron Corporation** and **Champion Iron** released the results of the August drilling program on its Round Lake property.

Cartier Iron Corporation announced the results of metallurgical testing that was part of a preliminary economic assessment on its Lac Penguin project, situated southwest of Fermont.

Focus Graphite continued testing of graphite samples from its Lac Knife project, situated approximately 30 km south of Fermont. In June 2015, the company announced it had signed two off-take agreements with Grafoid that commit the latter to purchase part of the eventual production from the future graphite mine.

At the Forestville project, situated approximately 20 km north-northwest of the town with the same name, **Fairmont Resources** announced in early June 2015 that it had started exploration work on a new zone discovered two kilometres east of the main quartzite horizon.

Exploration work in the geological St. Lawrence Platform and Appalachian provinces

Montérégie (16)

On December 31, 2015, there were 119 active claims in the Montérégie region, representing a slight decline of less than 8% compared to 2014 (Table 2.1).

In 2015, only one project – a silica project – was active in the Montérégie region. The Montpetit silica project is held by **Uragold Bay Resources**, and is located near Hemmingford to the south of Montréal.

Estrie (05)

In December 2015, there were 875 active claims in the Estrie region, representing a significant drop of 23% compared to the 1,137 claims that were active on December 31, 2014.

In 2015, exploration work was conducted on two silica exploration projects to the east of Sherbrooke. Both projects, Malvina and Martinville, are held by **Uragold Bay Resources (Quebec Quartz)**. The company also acquired the neighbouring gold project – the Morin Paleoplacer project – in Saint-Augustin-de-Woburn. The company **Multi-Ressources Boréal** carried out data compilation on the Stokes gold project.

Centre-du-Québec (17)

The number of active claims in the Centre-du-Québec region dropped by 40% from 135 in 2014 to 81 in 2015 (Table 2.1).

Uragold Bay Resources acquired claims on a silica exploration property.

Chaudière-Appalaches (12)

In the Chaudière-Appalaches region, the number of claims fell by more than 26% compared to 2014 (Table 2.1).

Two companies explored for gold in the region: **Uragold Bay Resources** and **Golden Hope Mines** on the Beauce Placer Gold and Bellechasse-Timmins projects, respectively.

Bas-Saint-Laurent (01)

Between December 2014 and December 2015, the Bas-Saint-Laurent region experienced a slight increase of 3% in the number of claims (Table 2.1).

Only one active project was reported in the region this year. **Canadian Metals** carried out a preliminary economic assessment and metallurgical tests on its Langis Project, situated 30 km south of the town of Matane.

Gaspésie-Îles-de-la-Madeleine (11)

The number of claims in the Gaspésie-Îles-de-la-Madeleine region dropped by 34% in 2015 (Table 2.1)

Four active mineral exploration projects were reported in the Gaspésie. No exploration activity was reported for Îles-de-la-Madeleine.

The company **Gespeg Copper Resources** conducted exploration work for copper, silver, molybdenum and gold on the Vortex and Port-Daniel properties. **Fancamp Exploration** excavated trenches on the Harriman Fault property. **Uragold Bay Resources** conducted silica prospecting work on the Roncevaux property to the southeast of Matane. **Globex Mining Enterprises** acquired new claims to enlarge its New Richmond Antimony-Gold property. This gold and antimony exploration project lies 6 km to the north of the town of New Richmond.

Figure 4.4 - Exploration projects in the Nord-du-Québec, Nunavik territory, in 2015.

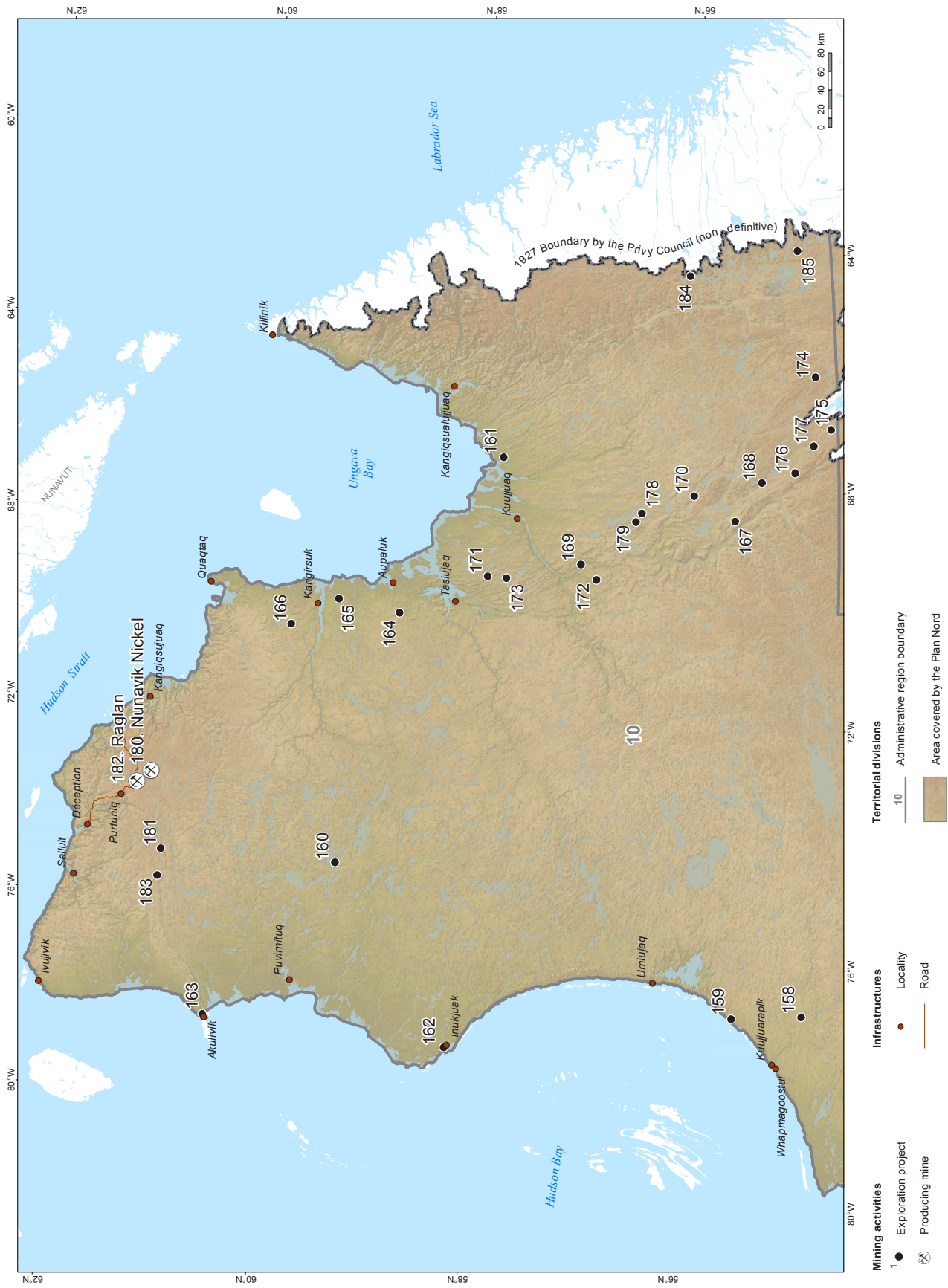


Figure 4.5 - Exploration projects in the Nord-du-Québec, Baie-James territory, in 2015.

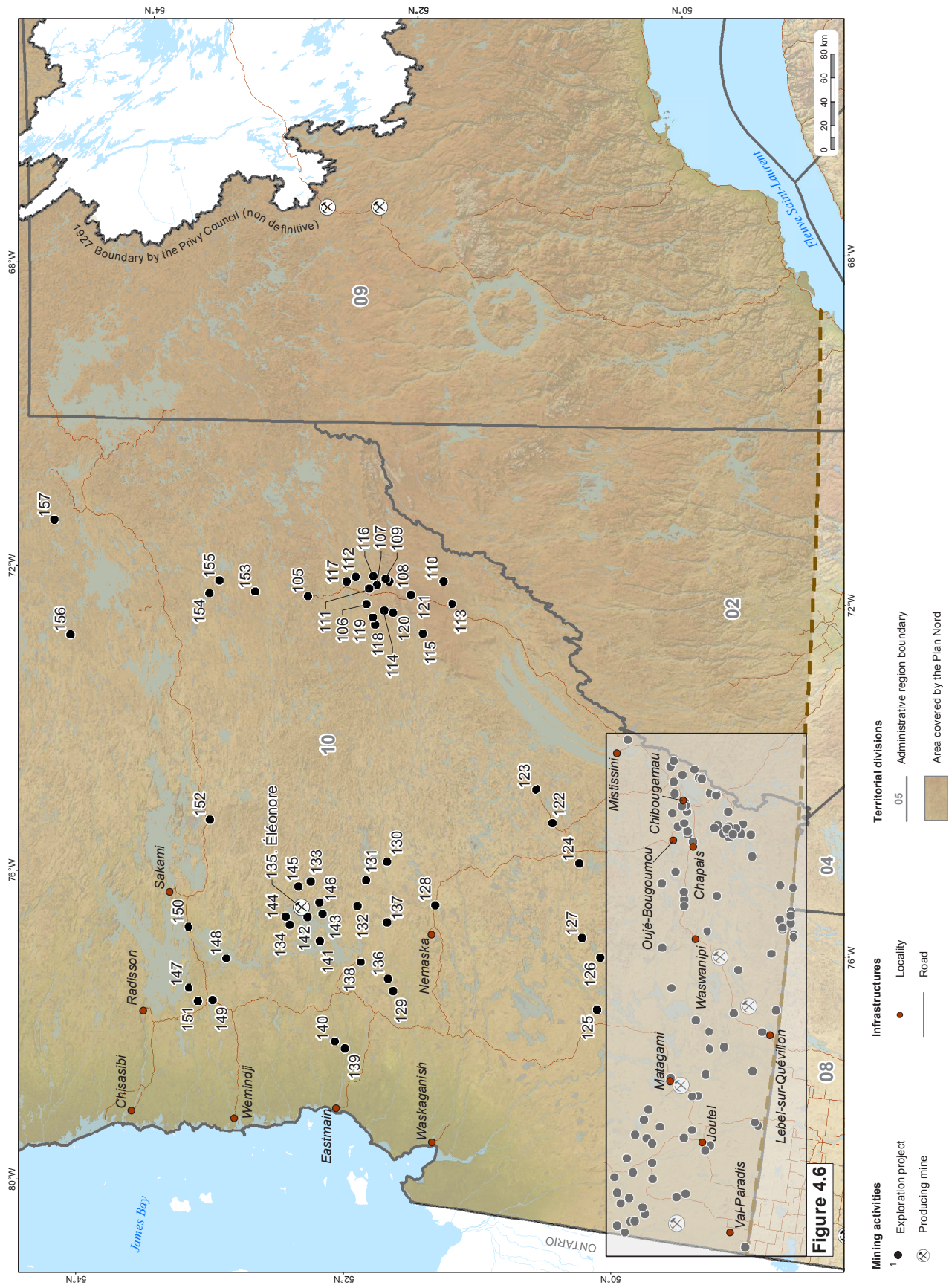


Figure 4.6 - Exploration projects in the Nord-du-Québec, Matagami-Chibougamau sector, in 2015.

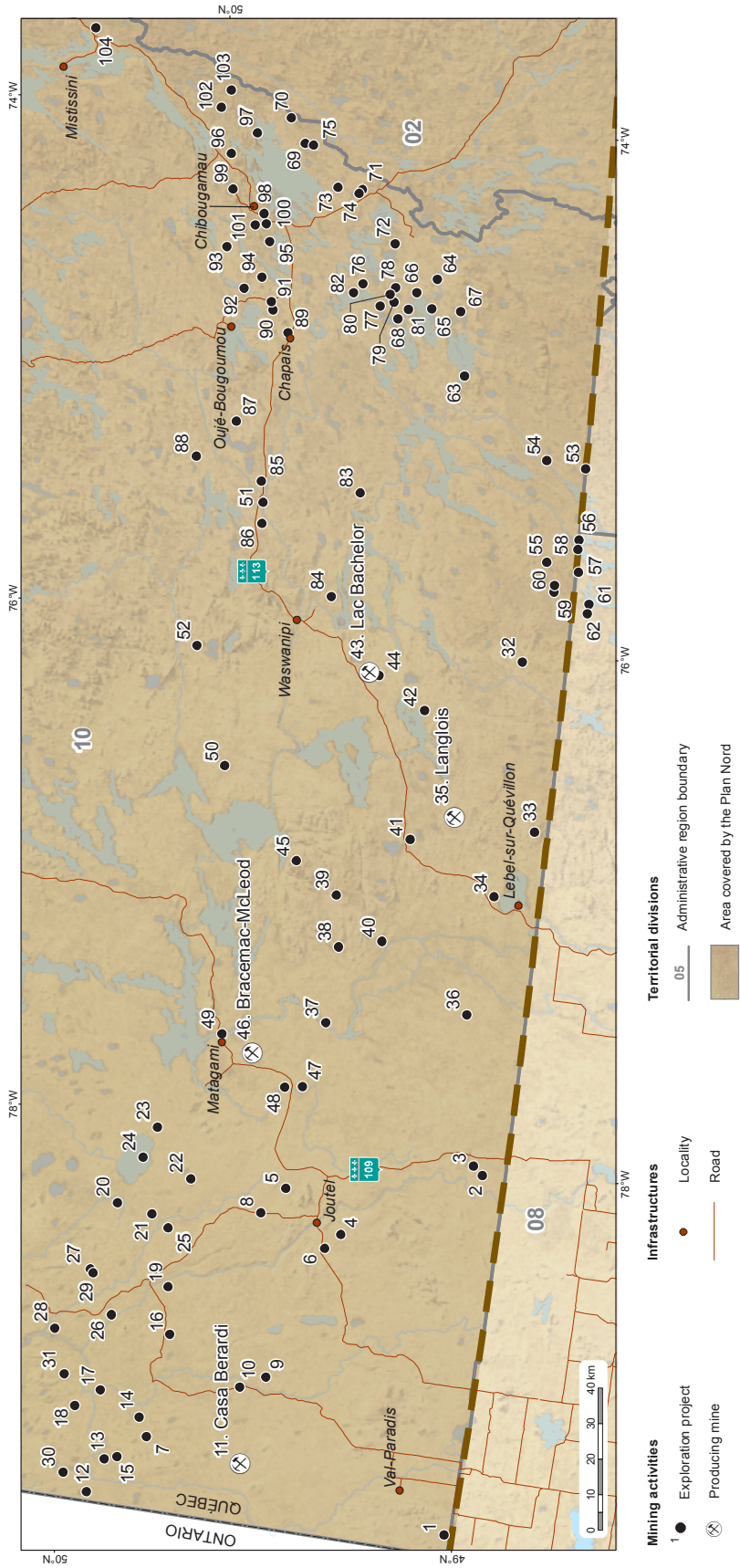


Figure 4.7 - Exploration projects in Abitibi-Témiscamingue in 2015.

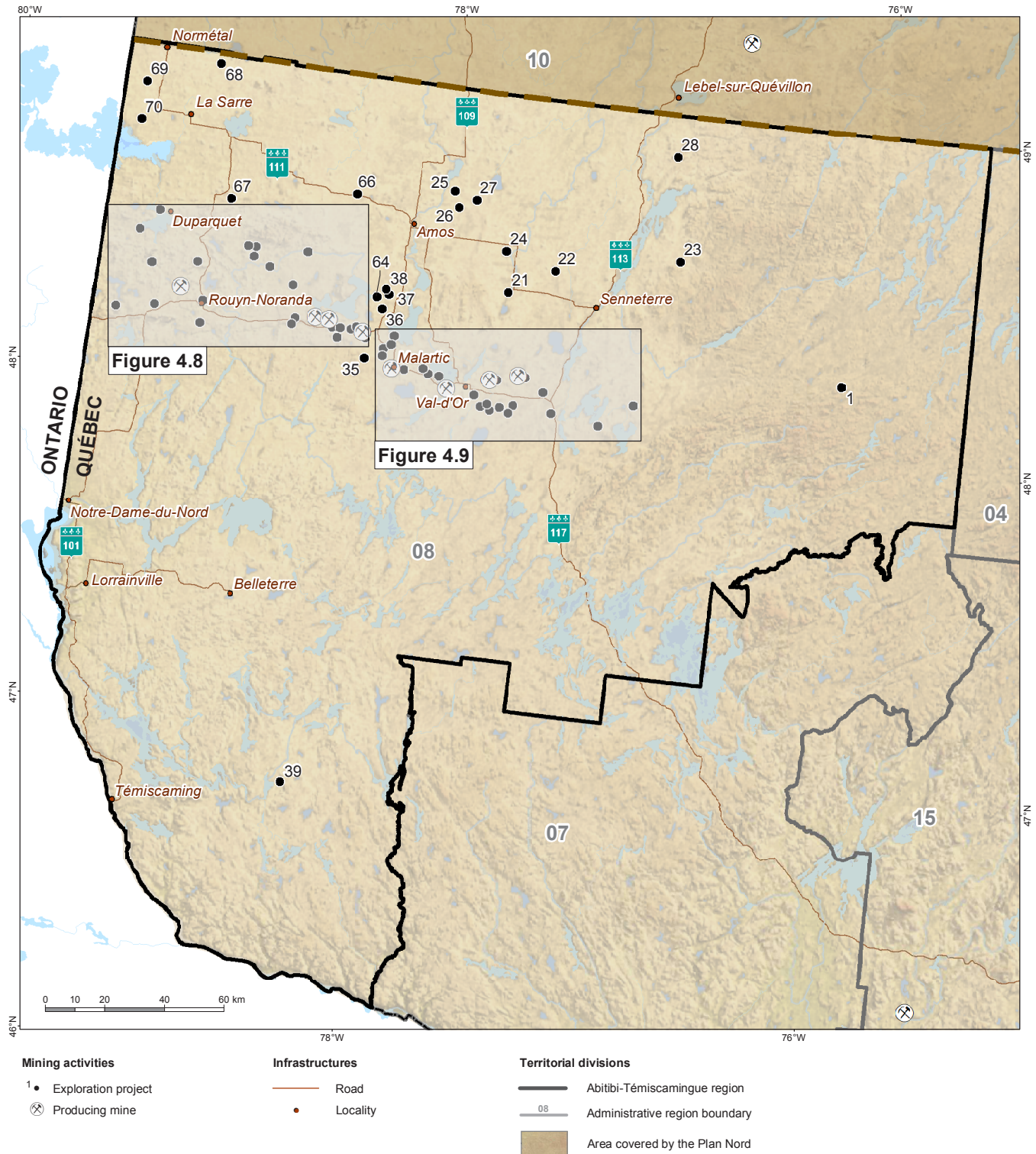


Figure 4.8 - Exploration projects in Abitibi-Témiscamingue, Rouyn-Noranda-Cadillac sector, in 2015.

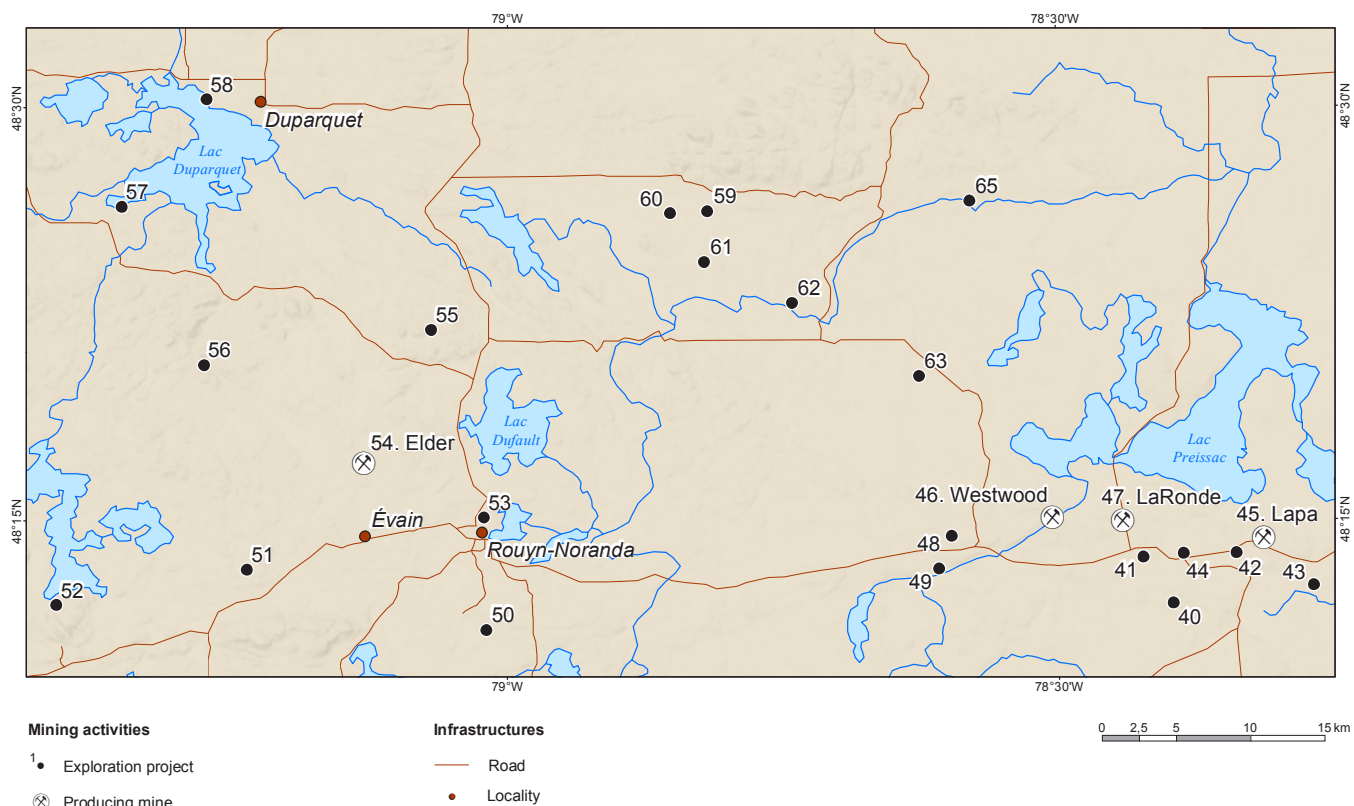


Figure 4.9 - Exploration projects in Abitibi-Témiscamingue, Malartic-Val-d'Or sector, in 2015.

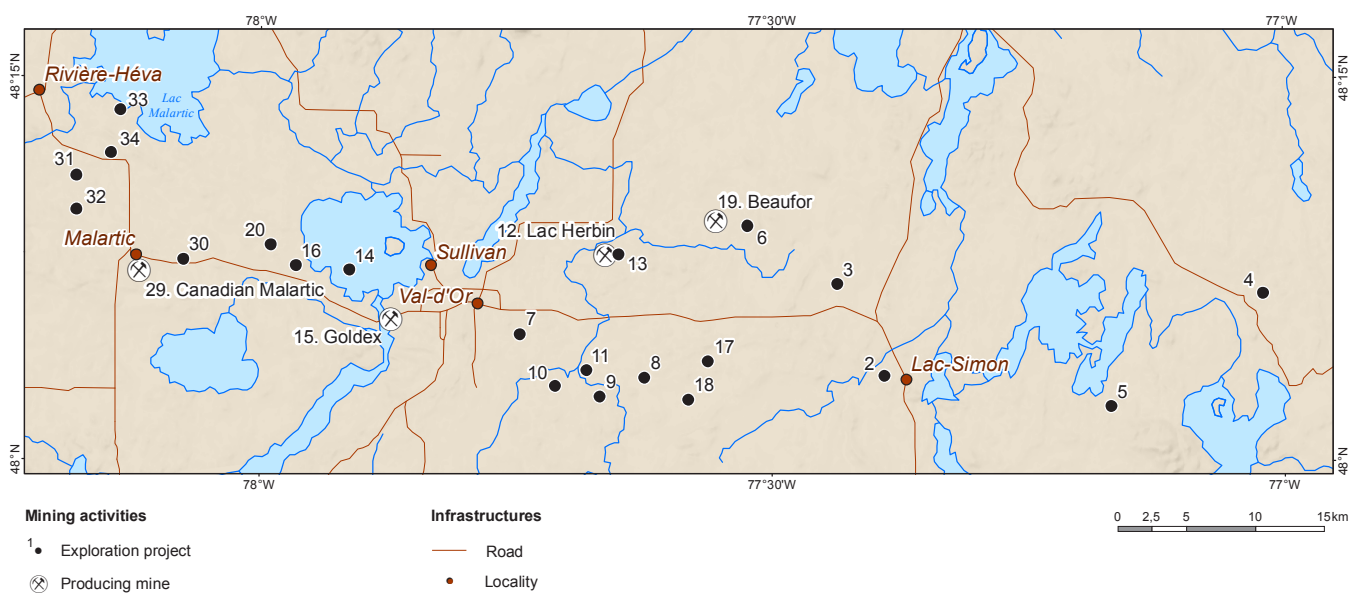


Figure 4.10 - Exploration projects in Québec's administrative regions except Abitibi-Témiscamingue and Nord-du-Québec, in 2015.

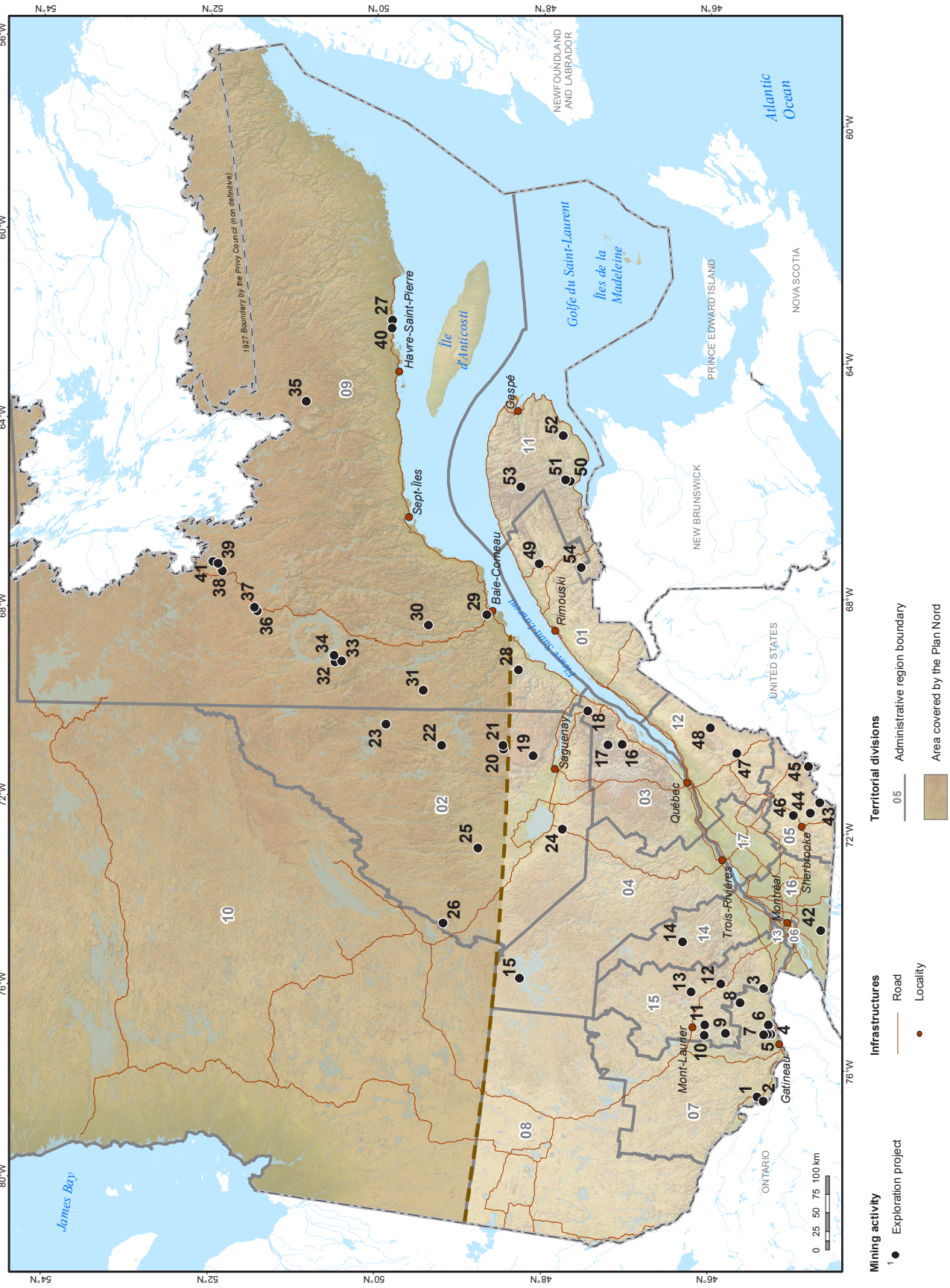


TABLE 4.3 – Exploration projects in the Eeyou Istchee James Bay and Nunavik regions in 2015.⁽¹⁾

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
NORTHERN PART OF THE ABITIBI SUBPROVINCE, MATAGAMI-CHIBOUGAMAU REGION (EYYOU ISTCHEE JAMES BAY TERRITORY) (Figure 4.6)						
1	32D13, 14, 32E03, 04	Perron, Desmeloizes	Amex Exploration and Agnico Eagle Mines	Perron	Zn-Cu-Ag-Au	D (15:6 512), GpEm(B)
Project description: A polymetallic mineralized envelope was intersected from surface to a vertical depth of 750 m. The envelope may correspond to the extension of the ore horizon of the former Normetal mine (historical production of 10.1 Mt at 2.15% Cu, 5.12% Zn, 45.25 g/t Ag and 0.55 g/t Au), situated approximately 5 km to the east. Two drill holes encountered the mineralized envelope: 163-15-015 (2.14% Cu, 0.10% Zn, 6.83 g/t Ag and 0.13 g/t Au over 1.5 m; 128.4-129.9 m) and 163-15-023 (0.16% Cu, 16.0% Zn, 6.28 g/t Ag and 0.22 g/t Au over 2.1 m; 816.0-818.1 m).						
2	32E01, 32F01, 04	Chaste, Glandelet	Visible Gold Mines	Green Giant	Zn-Cu-Ag-Au	D (5:1 050)
3	32E01, 32F04	Chaste, Glandelet, Bernetz, Fonteneau	SOQUEM	Coigny	Cu-Zn-Au	D (2:400)
4	32E08	Poirier, Joutel	Cancor Mines and SOQUEM	Kistabiche/Poirier	Zn-Cu-Au-Ag	Cgi
5	32E08, 09	Douay, Joutel	Aurvista Gold Corporation, Vior and SOQUEM	Douay, Douay-West, Douay-East and Joutel Block	Au-Ag-Zn	Ca, Cgi, Es, Gs(r), GpEl(G), Min, PFS, S
6	32E08, 09	Joutel, Poirier	Globex Mining Enterprises	Eagle Mine / Joutel-Poirier Mine	Au	Cgi, D (1:950), G, Pr, S
7	32E09, 10, 14	Aloigny, Montgolfier, Joutel, Carheil, La Peltrie	SOQUEM	Génération Selbaie	Cu-Zn	G
8	32E09, 10	Joutel, Douay, Desmazures, Aloigny, Montgolfier	Midland Exploration and SOQUEM	Jouvex	Au	D (11:2 182), GpEl(G), GpMa(A)
9	32E10	Estrees	Globex Mining Enterprises	Wawagosic	Cu-Zn-Au-Ag	GpEm(G), GpMa(G), Lc
10	32E10, 11	Puiseaux, Estrees	Adventure Gold and GFK Resources	Casagosic	Au	GpEl(G), Lc
11	32E11	Casa Berardi	Hecla Mining (Québec)	Casa Berardi Mine	Au	D (48:28 083)
Project description: The results from surface and underground drill holes were used to improve the mining plan and to increase the reserves and resources in the 188, 123, 124 and Lower Inter zones of the West mine. At the East mine, work extended the mineralization of Zone 124, leading to the discovery of a new zone known as 117, and also provided better definition of the geometry and continuity of the 157 Zone.						
12	32E13, 14	Massicotte	Adventure Gold and SOQUEM	Massicotte (Detour Gold Québec – Centre area)	Au	GpEl(G), GpMa(G)
13	32E14	La Peltrie, Massicotte	Adventure Gold and SOQUEM	Casgrain Extension (Detour Gold Québec – Centre area)	Au	GpEl(G), GpMa(G)
14	32E14	Brouillan, Carheil	Yorbeau Resources	Selbaie West	Cu-Zn-Au-Ag	D (9:2 544), GpEm(B)
15	32E15	Enjalran, Carheil	Midland Exploration	La Peltrie	Au	Ca, G, GpEl(G), Pr
16	32E15	Beschefer	LaSalle Exploration Corporation	Selbaie	Cu-Zn-Au-Ag	GpEl(G)
17	32E14, 15	La Peltrie, Lanouillier	Adventure Gold and SOQUEM	Casgrain (Detour Gold Québec – Centre area)	Au	D (4: 1 500), GpEl(G), GpMa(G)
18	32E14, 15, 32L02, 03	Martigny, La Peltrie, Lanouillier, La Martinière	Midland Exploration and SOQUEM	Casault	Au	D (40:11 540), Gs(h), GpEl(G), GpEm(G), GpMa(A)
Project description: Anomalous gold-bearing zones are present at the contact of the Turgeon Pluton and in a quartzofeldspathic porphyry unit between a conglomerate basin and mafic volcanics.						
19	32E10, 15	Beschefer, Bapst, Montgolfier, Orvilliers	Midland Exploration	Adam	Cu-Au-Zn	Cgi
20	32E15, 16, 32L01, 02	Grasset, Du Tast, Subercase, Fénelon	Balmoral Resources	Grasset	Ni-Cu-PGE-Au-Co-Zn	Ca, D (54:20 662), Gs(sl), GpEl(G), GpEm(A,B,G), GpMa(A), MT
Project description: Work substantially extended zones H1 and H3. Among the best results: 10.50% Ni, 0.74% Cu, 1.87 g/t Pt and 4.87 g/t Pd over 750 m at a depth of 425 m (H3 Zone) and 1.11% Ni, 0.12% Cu, 0.20 g/t Pt and 0.49 g/t Pd over 42.0 m at a depth of 400 m (H3 Zone). An interval of 3.80 m grading 10.04 g/t Au was also cut in the hanging wall of the H3 Zone (Ni-Cu-PGE).						
21	32E15, 16	La Gauchetière, Sainte-Hélène, Bapst, Gaudet, Subercase	Midland Exploration	Samson	Ni-Cu-PGE-Au	D (6:1 625), GpEm(G)

TABLE 4.3 – Exploration projects in the Eeyou Istchee James Bay and Nunavik regions in 2015.⁽¹⁾

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
22	32E16	Bapst, Ste-Hélène, La Gauchetière	SOQUEM and Nyrstar Canada Resources	Bloc Samson	Au	D (2:852)
23	32E16, 32F13	Grasset, La Pérouse, Daniel, La Gauchetière	Bold Ventures	Grasset Lake	Ni-Cr-PGE	Gs(sl), Pr
24	32E16	Grasset	Xmet	Grasset	Cu-Au	D (11:2 600), GpEm(G), GpMa(G)
25	32E16	Grasset, La Pérouse	SOQUEM	Lac Guay	Au-Cu-Zn	D (3:696)
26	32E15, 32L02	Gaudet, Lanouillier, Fénelon	Adventure Gold	Gaudet (Detour Gold Québec – Centre area)	Au	GpEl(G), Pr
27	32L02	Jérémie, Caumont	Balmoral Resources	Jeremie	Ni-Cu-Zn-PGE	D (5:1 052)
28	32L02	Jérémie, La Martinière	Midland Exploration	Jeremie	Ni-Cu-PGE	GpEm(A)
29	32E15, 32L02	Fenelon	Balmoral Resources	Fenelon	Au-Ni-Cu-PGE-Co-Zn	D (8:2 710), GpEl(G), GpEm(G)
Project description: Discovery of several mineralized zones, including: 0.36% Ni, 0.04% Cu, 0.06 g/t Pt and 0.08 g/t Pd over 7.67 m, and 216 g/t Au over 0.76 m.						
30	32E13, 14, 32L03, 04	Manthet, Martigny	Balmoral Resources	Detour East	Au-PGE	D (1:279)
31	32L02, 03	La Martinière, Lanouillier, Martigny	Balmoral Resources	Martinière	Au	D (47:9 497), GpEl(G)
Project description: New definition drilling results were obtained from the Bug Lake zones. An interval of 4.16 g/t Au over 38.19 m was obtained in the Lower Bug Lake Zone, and 17.71 g/t Au over 9.0 m was encountered in the B Footwall Zone. In addition, an interval of 1.08 g/t Au over 8.05 m confirmed a new mineralized structure, 2 km to the west of the Bug Lake Zone.						
32	32F02	Grevet	Amex Exploration and Visible Gold Mines	Cameron	Au	D (8:1 725)
Project description: Work confirmed the presence of a gold-bearing structure oriented ENE-WSW over a strike length of 200 m, a width of 7.5 to 9.5 m, and to a depth of at least 300 m. Among the best results were those of hole CA2015s08, which cut 1.38 g/t Au over 7.10 m (143.0-151.1 m).						
33	32F02	Verneuil	SOQUEM and Brionor Resources	Verneuil	Au-Cu	G
34	32F02, 03	Quévillon, Verneuil	SOQUEM	Quévillon-Nord	Cu-Zn	Gp, Lc
35	32F02, 07	Grevet	Nyrstar Canada Resources	Langlois Mine	Zn-Cu-Ag-Au	D (69:11 780)
Project description: Exploration and definition drilling on Zone 97.						
36	32F03, 04	Cramolet, Comtois, Themines, Fraser, Fonteneau, Barrin	Midland Exploration and Maudore Minerals	Laflamme	Au-Ni-Cu-PGE	D (4:1 263)
37	32F05, 06, 11, 12	Le Tardif, Noyon	Adventure Gold and GFK Resources	Bell Veza	Au	GpEl(G)
38	32F06, 07, 10	Noyelles, Berthiaume	SOQUEM, Explorateurs Innovateurs de Québec and Geonova Explorations	Syndicat Berthiaume	Au	G, S, T
39	32F06, 10, 11	Noyelles, Berthiaume	SOQUEM	ROC	Au	G, S, T
40	32F06	Bruneau	Adventure Gold and GFK Resources	Sinclair-Bruneau	Au	GpEl(G)
41	32F07	Currie	Sementiou	Rose Lake Mine	Au-Ag-Cu-Zn	S
42	32F08	Benoist, Duplessis	Ressources Cartier and Alexandria Minerals Corporation	Benoist	Au-Cu	GpEl(G), GpMa(G), Lc, Min
43	32F08, 09	Le Sueur	Metanor Resources	Bachelor Lake Mine	Au	D (x:x)
Project description: Work confirmed the presence of the following: gold-bearing veins A and B (Hewfran-West area) between levels 6 and 8, the Principale vein between levels 12 and 14, and the intersection of veins E and Principale between levels 13 and 14.						
44	32F08	Le Sueur	Metanor Resources	Moroy	Au-Ag-Zn	D (97:16 316), GpEl(G)
Project description: Discovery of a new mineralized zone (South Zone) on the south flank of the O'Brien syenite pluton, approximately 1 km south of the Bachelor Lake mine. Drill hole MO-15-14 cut an interval of 10.1 g/t Au over 26.2 m (6.4-32.6 m) in a unit of hematized and sheared tuff containing disseminated pyrite.						
45	32F10	Bourboux, Berthiaume	Globex Mining Enterprises	Dalhousie	Cu-Ni	Ca, G, GpMa(G), Pr, S, T
46	32F12	Galinée	Glencore Canada Corporation	Bracemac-McLeod Mine	Zn-Cu-Ag-Au	D (x:x)
47	32F12	Veza	Promec	Veza Mine	Au	Cgi
48	32F12	Veza, Noyon	Adventure Gold and GFK Resources	Veza North	Au	GpEl(G)
49	32E09, 32E16, 32F11, 12, 13, 14	La Gauchetière, Daniel, Desmazures, Cavalier, Galinée	Glencore Canada Corporation	Matagami Exploration	Zn-Cu-Ag-Au	D (91:44 621), GpEm(B), GpGr

TABLE 4.3 – Exploration projects in the Eeyou Istchee James Bay and Nunavik regions in 2015.⁽¹⁾

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
50	32F15, 16	Montviel, Urfé	GeoMegA Resources and NioGold Mining Corporation	Montviel	REE-Nb	MT, RRE
Project description: New mineral resource estimate: indicated resources of 82.4 Mt at 1.51% TREO, 766 ppm Pr ₂ O ₃ , 2,452 ppm Nd ₂ O ₃ , 52 ppm Eu ₂ O ₃ and 1,715 ppm Nb ₂ O ₅ ; inferred resources of 184 Mt at 1.43% TREO, 746 ppm Pr ₂ O ₃ , 2,433 ppm Nd ₂ O ₃ , 47 ppm Eu ₂ O ₃ and 1,315 ppm Nb ₂ O ₅ .						
51	32F16	Montalembert	Globex Mining Enterprises	Montalembert	Au	Ca, G, GpMa(G), Lc, Pr, S, T
Project description: Surface confirmation of the gold-bearing Galena and N°. 2 structures: grab samples yielded up to 84.04 g/t Au.						
52	32F16	Branssat, Davost, Monseignat	GeoMegA Resources	McDonald	Au-Ag-Cu-Zn-Pb	Gs(t), Pg
53	32G03, 32B14	Buteux	L. Desgagné	Buteux	Au	D (3:126)
54	32G03, 04, 32B13, 14	Piquet, Belmont, Lacroix, Lespinay, Bres-sani, Marceau, Buteux, Urban, Barry, Kalm	Oban Mining Corporation	Urban Barry	Au-Ag-Cu-Zn	Ca, Gs(t), GpEm(A), GpMa(A)
55	32G04	Urban	Eagle Hill Exploration Corporation (Oban Mining Corporation)	Windfall Lake	Au-Ag	D (x:x), Gs(t), GpEm(A), GpMa(A), PEA
Project description: Publication of the results of a preliminary economic assessment. Discovery of five new gold-bearing lenses and the possible extension of known mineralization at depth. Among the best results: 7.04 g/t Au over 20.4 m (646.5-666.9 m), 10.0 g/t Au over 3.7 m (681.0-684.7 m) and 7.0 g/t Au over 10.0 m (751.0-761.0 m) in drill hole OBM-15-559.						
56	32G04, 32B13	Urban, Bailly, Lacroix	BonTerra Resources	Gladiator (East Arena)	Au	Cgi, G, Gs(sl), S
57	32G04, 32B13	Barry	BonTerra Resources	Gladiator (Coliseum)	Au	G, Gs(sl), S
58	32G04, 32B13	Urban, Barry, Bailly	BonTerra Resources	Gladiator (West Arena)	Au	D (4:1 707), G, Gs(sl), S
Project description: On the Main Zone in the SpartacusTrend drill hole BA-15-01A cut 14.0 g/t Au over 6.6 m (210.6-217.2 m; vertical depth of 175 m), and drill hole BA-15-02 cut 7.2 g/t Au over 7.7 m (476.0-483.7 m; vertical depth of 400 m).						
59	32G04	Urban, Carpiquet	Beaufield Resources	Urban (Macho Block)	Au-Ag-Cu-Zn	D (15:1 693), G, GpEl(G), Pr, S
Project description: Drill hole BU-15-07 intersected several gold-bearing zones, one of which yielded 7.86 g/t Au over 6.0 m (33.0-39.0), including 46.2 g/t Au over 1.0 m. Gold values are associated with quartz veins hosted in an altered and sheared volcanic unit between two quartzofeldspathic porphyry dykes.						
60	32G04	Barry	Urbana Corporation	Urban	Au-Ag-Cu-Zn	G, GpEl(G), Pr, S
61	32B13	Souart, Urban	Multi-Ressources Boréal	Souart	Au-Ag-Cu-Zn	Cgi
62	32B13	Souart	Beaufield Resources	Urban (Kent Lake Block)	Au	Pg
63	32G02, 03, 06, 07	Lespinay, Langloiserie, Hazeur, Druillettes	Northern Superior Resources and Bold Ventures	Surprise Lake Gold	Au-Ag-Cu-Zn-Fe	G, Gs(r,sl), GpEl(G), Lc, Pr, S
64	32G07	Hazeur, Gamache	GeoMegA Resources	Anik	Au-Cu-Mo	D (6:1 200), G, Gs(sl), S, T
Project description: Extension of the Bobby gold showing (drill hole ANK-15-21: 1.28 g/t Au over 7.96 m; channels: 1.4 g/t Au over 7.8 m; grab samples: 12 samples ranging from 1.65 to 19.3 g/t Au), as well as the discovery of a new gold showing named Kovi (channels: 0.95 g/t Au over 5.0 m; grab samples: 10 samples ranging from 1.05 to 31.8 g/t Au). Disseminated pyrite with traces of arsenopyrite, associated with sericite-silica-ankerite±fuschite alteration in deformation corridors.						
65	32G07	Hazeur, Pambrun	Vanstar Mining Resources and Gestion IAMGOLD-Québec	Nelligan	Au	Ca, Cgi, D (7:2 519), GpEl(G), GpEm(A), GpMa(A), Pr
Project description: Joint venture work defined the Liam and Dan gold zones over a strike length of 400 metres and to a depth of 200 metres. Highlights: 1.27 g/t Au over 17.19 m (drill hole NE-14-25B; Liam Zone) and 1.80 g/t Au over 17.1 m (drill hole NE-14-24; Dan Zone).						
66	32G07	Hazeur	SOQUEM	Hazeur	Au	D (5:1 400), Gp
67	32G07	Hazeur, Gamache, Pambrun	Vanstar Mining Resources	Emile	Au	Ca
68	32G07, 10	Rale, Hazeur	TomaGold Corporation and Gestion IAMGOLD-Québec	Winchester	Au	G
69	32G09, 16, 32H13	Lemoine, Rinfret, Dollier	BlackRock Metals	Blackrock	Fe-Ti-V	D (2:636)
Project description: Work confirmed the continuation of Fe-Ti-V mineralization at a distance of 5 km to the southwest of the Armitage Zone.						
70	32G16, 32H13	Rinfret	VanadiumCorp Resource	Lac Dore and Lac Dore North	Fe-V-Ti	PEA, RRE
Project description: Publication of the first mineral resource estimate for the Lac Doré project. The Lac Doré East deposit contains inferred resources of 111,934,000 metric tons grading 0.42% V ₂ O ₅ .						
71	32G09	La Dauversière, Queylus, Charron	2736-1179 Québec and G. McCormick	La Dauversière (R-14)	Au-Ag	D (37:5 865), S, T

TABLE 4.3 – Exploration projects in the Eeyou Istchee James Bay and Nunavik regions in 2015.⁽¹⁾

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
72	32G09	Fancamp, La Dauversière	2736-1179 Québec and F. De Sa Silva	Lac Verneuil	Au	D (2:262)
73	32G09	Queylus	2736-1179 Québec	Queylus	Au	D (3:279), Pr
74	32G09	Queylus, La Dauversière	2736-1179 Québec	Audet Lake	Au	D (1:312)
75	32G09, 16	Dollier, Lemoine, Rinfret	Yorbeau Resources	Lemoine	Au-Ag-Cu-Zn	Cgi
76	32G10	Fancamp, Rale	TomaGold Corporation and Gestion IAMGOLD-Québec	Lac à l'Eau jaune	Au	G
77	32G07, 10	Rale	TomaGold Corporation, Gestion IAMGOLD-Québec and Quinto Real Capital Corporation	Monster Lake	Au	D (29:11 718), G, Gs(t), GpEm(A), GpMa(A)
Project description: A series of drill holes cut gold mineralization associated with the Monster Lake Shear Zone, northeast of the 325-Mégane Zone. Among the best results: 18.80 g/t Au over 1.46 m, 4.13 g/t Au over 2.09 m and 4.12 g/t Au over 5.72 m (ML15-134).						
78	32G10	Fancamp	TomaGold Corporation and Vanstar Mining Resources	Monster Island	Au	D (2:368), GpEm(A)
79	32G10	Rale	TomaGold Corporation	Little Monster	Au	D (6:1 118), GpEm(A)
80	32G10	Rale	TomaGold Corporation	Cookie Monster	Au-Ag-Cu-Zn	D (3:297), GpEm(A)
81	32G07, 10	Hazeur	TomaGold Corporation and Visible Gold Mines	Hazeur	Au	GpEm(A)
82	32G10	Rale	GL Géoservice and M. Bouchard	Winwin	Au	S, T
83	32G11	Drouet, Guercheville	Natives Exploration Services	Simard-Guercheville	Cu-Au	D (3:x)
84	32G12	Gand	NQ Exploration and Globex Mining Enterprises	Shortt Lake	Au-REE	Ca
85	32G13, 14	La Ribourde, Lamarck, Saussure	Les Ressources Tectonic	UMEX	Au-Ag-Cu-Zn-Pb	GpEm(G), S, T
86	32G13	La Ribourde	SOQUEM	Alouette	Au-Ag-Cu	G
87	32G14	Lamarck	GL Géoservice and M. Bouchard	MTK	Au-Ag-Cu	Pg
88	32G14, 32J03	Guettard, Lamarck	GL Géoservice and M. Bouchard	Grizzly	Cu-Zn-Au-Ag- Ni-PGE	Pr, S
Project description: Discovery of a new polymetallic showing named Dempster Creek.						
89	32G15	Lévy	Explorateurs Innovateurs de Québec	Opémiska	Cu-Au-Ag	D (5:534)
90	32G15	Lévy	2736-1179 Québec inc.	Indian Lake	Au-Ag-Zn	D (1:276), G
91	32G15	Lévy	2736-1179 Québec inc.	Saw Mill	Au-Ag-Cu-Zn	D (2:396)
92	32G15	Cuvier	Nimsken Corporation	Cuvier	Au	GpEl(G), S, T
93	32G15, 16	Barlow, McKenzie	Northern Superior Resources, GL Géoservice and M. Bouchard	Croteau East	Au	D (11:2 511); Rcd (46:485), RRE, S, T
Project description: Publication in early 2016 of the first mineral resource estimate for the project: inferred resources of 11.6 Mt grading 1.7 g/t Au (640,000 ounces of gold).						
94	32G15, 16	Scott, Cuvier, Barlow	Yorbeau Resources	Scott Lake	Au-Ag-Cu-Zn	D (10:5 933), GpEm(B)
Project description: Discovery of a new mineralized lens named Gap. Among the best results: 0.2% Cu, 13.5% Zn, 0.1 g/t Au and 17.7 g/t Ag over 14.1 m in drill hole SC-53W6; 1.6% Cu, 27.9% Zn, 0.4 g/t Au and 20.2 g/t Ag over 3.6 m in drill hole SC-82; and 1.1% Cu, 4.9% Zn, 0.5 g/t Au and 59.2 g/t Ag over 15.2 m in drill hole SC-82W.						
95	32G15, 16	Scott	D. Malouf and Multi-Ressources Boréal	Ramsay	Au-Cu	S, T
96	32G16	Roy	S. Jobin	Magnéficient	Cu-Ag-Mg	Pr, S
97	32G16	Roy	2736-1179 Québec	Taché Lake /Taché Lake East /Taché Lake North	Cu-Ag-Au	G, S, T
98	32G16	Obalski	D. Malouf	Obalski Mine	Cu-Au-Ag	S, T
99	32G16	McKenzie	Beaux Mines	Norbeau	Au	S, T
100	32G16	Obalski	H. Bouchard and G. McCormick	Demi-Lune	Cu-Au	S, T
101	32G16	Scott, Obalski, McKenzie	SOQUEM	David	Au-Cu-Zn	G
102	32G16, 32H13, 32I04, 32J01	McCorkill	Typhoon Exploration	Monexco-McCorkill	Au-Cu-Zn	Pr, S
103	32H13	McCorkill	Les Ressources Tectonic	Kill Bill	Cu-Zn-Ag-Au-Pb	GpEm(G), S, T
Project description: Discovery of a new showing named Uma, which yielded a sample grading 2.49% Cu, 1.97% Zn, 27 g/t Ag and 0.28 g/t Au over 0.4 m.						
104	32I05	Gauvin	CBay Minerals, J.-L. Tremblay and L. Desgagné	Perch River	Cu-Ag	D (7:879)

TABLE 4.3 – Exploration projects in the Eeyou Istchee James Bay and Nunavik regions in 2015.⁽¹⁾

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
EYYOU ISTCHEE JAMES BAY TERRITORY (Figure 4.5)						
105	33A16		Stornoway Diamond Corporation	Renard	DD	T
	Project description: Construction phase; excavation of open pits and a ramp.					
106	33A08		Dios Exploration	33 Carats	Au-Cu	Cgi
107	33A08		Stellar AfricaGold	Eastmain South	Au-Ag-Cu-Zn	Cgi, Pg
108	32P09, 16, 33A01, 08		Visible Gold Mines	167 Extension	Cu-Zn-Au-Ag	D (25:5 149), Gs(t), GpEl(G), Pr, QS, S
109	33A01, 08, 23D04, 05		Tarku Resources and Ero's Resources Corporation	Chateau Fort	Au-Ag-Cu-Zn	Ca, GpEm(A)
110	22M13		Amex Exploration	Indicateur Lake	Au	Ca
111	33A08		Amex Exploration	Eastmain Centre	Au	Ca
112	23D05		Amex Exploration	Eastmain North	Au	Ca
113	32P09,16		Berkwood Resources	Taco and Takwa	Au	Ca
114	33A01, 02, 08, 23D05		Ressources Majescor and DIAGNOS	Otish-Eastmain	Au-Cu-Zn	Ca
115	32P15, 33A02		Stornoway Diamond Corporation	Mistassini	DD	Ca
116	23D05		Eastmain Resources and Darnley Bay Resources	Lessard Lake	Ni-Cu-Au-PGE	D (11: 1 995)
	Project description: Drill hole LL-15-02 intersected disseminated sulphides grading 0.38% Ni and 0.13% Cu over 12.5 m within the Crête-du-Coq ultramafic intrusion. Drill hole LL-15-10 intersected 0.29% Ni over 199.4 m.					
117	23D05, 33A09		Stellar AfricaGold	Eastmain North	Au-Ag-Cu-Zn	Cgi, Pg
118	33A08		Eastmain Resources	Eastmain Mine	Au-Ag-Cu	Cgi
119	33A07, 08		Eastmain Resources	Ruby Hill	Au-Ag-Cu	Cgi
120	33A01		Canada Strategic Metals	New Gold	Au	Ca, GpEm(A), GpMa(A)
121	33A01		Belmont Resources	Km140	Au	Ca, Cgi, Rsi
122	32J10, 11		Durango Resources	Decouverte (Discovery)	Cu-Au	Gp, Min, S
123	32J16, 32O01		X-Terra Resources	Troilus East	Cu-Au-Ag	Ca
124	32J11		Osisko Exploration James Bay	Assinica	Au	D (8:1 600), Gs(t)
125	32K07		SOQUEM	Nottaway	Cu-Au	G, Gs(sl), Gp(G), Lc
126	32K08		SOQUEM	Chensagi	Au-Cu-Zn	G, Gs(sl), Gp, Lc
127	32K09		SOQUEM	Chablis	Au-Cu-Zn	G, Lc
128	32O12		Durango Resources	Whabouchi South	Li ₂ O-Rb-Be	Ca
129	32N14, 15		Stria Lithium	Pontax Lithium	Li ₂ O-REE	MT
130	33B02, 03, 04		Goldcorp and Azimut Exploration	Wabamisk	Au-Ag-Cu-Zn-Pb-Mo	Cgi, Pr
131	33B04, 05		Eastmain Resources	Clearwater	Au-Te-Ag	E, EEP, G, Pr, S (29:12 837), T
	Project description: Definition drilling by Eastmain Resources allowed the company to add gold resources to the Eau Claire deposit. Work conducted in the SNL area, 2 km east of the Eau Claire deposit, revealed a potential for open pit resources.					
132	33B04, 33C01		Dios Exploration	AU33 Ouest	Au	Cgi, D (12:2 499), G, Pr
	Project description: Several drill holes intersected gold zones ranging from 10 to 20 metres wide in the Heberto Zone, including the main zone, which was defined at surface and by drilling on Section A (2.3 g/t Au over 22.9 m, including 4.79 g/t Au over 8.65 m).					
133	33B12, 13, 33C16		Golden Valley Mines and Sirios Resources	Cheechoo	Au	D (11:1 962), Gs(sl,t), Pr, S, T
	Project description: Drill holes cut a silicified felsic intrusion (tonalite), weakly mineralized with finely disseminated sulphides (pyrite, pyrrhotite and arsenopyrite), in contact with metasedimentary rocks (paragneiss), thereby confirming the presence of wide gold-bearing sections. Drill hole CH-919-15-20 intersected three gold-bearing zones: 15.61 g/t Au over 9.70 m (54.40-64.10 m), including 177.5 g/t Au over 0.8 m; 2.03 g/t Au over 14.35 m (83.15-97.50 m); and 15.04 g/t Au over 12.35 m (107.50-119.85 m).					
134	33B12, 13, 33C09		Hecla Québec, Azimut Exploration and Everton Resources	Opinaca B	Au	Ca, Gs(sl), GpEl(G), GpMa(G), Pr, S, T
135	33B12, 33C09, 10		Goldcorp (Les Mines Opinaca)	Eleonore Mine	Au	D (1 468:156 334), G, Gc(r), PFS, Pr, TE
	Project description: In 2015, underground exploration and predefinition work was conducted in the lower part of the Roberto deposit, below a depth of 650 m, to better define horizons 5 and 6. The results may lead to the conversion of resources into reserves, thereby deepening the ore deposit. Furthermore, the Target 494 area has potential for additional discoveries. The company commenced a prefeasibility study on mining part of the surface pillar (hydrological and geotechnical drilling). Commercial production commenced on April 1, 2015.					
136	32N15, 33C01		Sirios Resources	Pontax	Au-Ag-Zn-Pb	Gs(t)
137	33C01		Critical Element Corporation	Rose	Li₂O-Ta-Mica	FS
	Project description: The company signed an agreement with a strategic partner to conduct a feasibility study on the company's Rose deposit.					

TABLE 4.3 – Exploration projects in the Eeyou Istchee James Bay and Nunavik regions in 2015.⁽¹⁾

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
138	33C01, 02, 07		Osisko Exploration James Bay and Gestion IAMGOLD-Québec	Anatacau - Wabamisk-Assini	Au-Ag	D (18:3 545), G, Gs(t), Pr, S, T
Project description: Discovery of several new gold showings south of the Mustang Zone.						
139	33C04, 05		Dios Exploration	Solo and K2	Au-Cu	Cgi
140	33C05		Eastmain Resources	Elmer Lake	Au-Ag	G, Pg
141	33B02, 03, 06, 33C08, 09, 10		Midland Exploration	Baie James Eleonore / Baie James Or	Au	G, GpEl(G), Pr, S, T
Project description: Work led to the discovery of several new gold showings.						
142	33C09		Beaufield Resources	Opinaca	Au-Cu-Mo	Cgi
143	33C09		Stelmine Canada	Opinaca South	Au	Ca
144	33C09, 16, 33B13		Hecla Québec and Azimut Exploration	Wildcat 1	Cu-Zn-Au	Cgi
145	33C09, 33B12, 13		Hecla Québec, Everton Resources and Azimut Exploration	Opinaca (A and B)	Au	Ca, G, Gs(sl), GpEl(G), GpMa(G), Pr, S, T
146	33C09, 33B12		Eastmain Resources, Goldcorp and Azimut Exploration	Eleonore South JV	Au	Cgi
147	33F06		Nouveau Monde Mining Enterprises	Rivière au Castor	Cu-Au-PGE-V	G, S
148	33F02, 07		Canada Strategic Metals and Matamec Explorations	Sakami	Au	D (7:2049), G, Gs(sl), GpEm(G), GpMa(G), S
Project description: Confirmation of the extension of Zone 25 to the west-northwest and at depth. The extension was tested for more than 250 metres along strike and to a depth of 500 m. Discovery of a new gold zone.						
149	33F04, 06		Northern Superior Resources	Wapistan	Au-Fe	Ca
150	33F07, 09, 10		Osisko Exploration James Bay	La Grande Sud	Au	D (13:3 078)
151	33F06		Osisko Exploration James Bay	Ménarik Lake	Au	Gs, Pr
152	33G05, 06, 07, 11, 12		Osisko Exploration James Bay	Poste Lemoyne Extension	Au-Fe	Rcd (x:x)
153	33H01, 08		Osisko Exploration James Bay	Trieste	Au	D (10:1 578), Gs(t), Lc, Pr
154	33H09		Osisko Exploration James Bay	Escale	Au-Ag-Cu-Mo	Gs(t), GpEl(G)
155	33H09, 23F12		Osisko Exploration James Bay	Noella	Au	GpMa(G)
156	33I02, 03, 06, 09, 10, 12, 33H03, 12		Honey Badger Exploration and 9019-5504 Québec	LG Diamonds	DD	Ca, Cgi, GpMa(A)
157	23L11, 14		Osisko Exploration James Bay, Sodémex Développement, SIDEX and Fonds de Solidarité FTQ	Coulon	Cu-Zn-Ag-Pb	D (39:23 043), GpEm(B)
Project description: Extension of Lens 257 to the northeast and southwest, over a distance of 720 metres along strike and to depths between 500 and 900 metres. Drill hole CN-13-271W4 intersected the following mineralization: 7.98% Zn, 1.57% Cu and 27.41 g/t Ag over 14.85 m and 6.69% Zn, 4.25% Cu, 73.32 g/t Ag and 0.7 g/t Au over 14.20 m.						
TERRITOIRE DU NUNAVIK (Figure 4.4)						
FAR NORTH (Figure 4.4)						
158	33N01		Nouveau Monde Mining Enterprises	Bienville	Cu-Au-Ni-PGE	Pg
159	33N11, 14, 15		Nouveau Monde Mining Enterprises	Mac's Lead	Ag-Pb-Zn	Pg, Rsi
160	34O07, 10, 11, 14		Azimut Exploration	Rex South	Au-Ag-Cu-W-Sn	Cgi
161	24J03		Nunavik Mineral Exploration Fund and Osisko Exploration James Bay	Baleine	Cu-Au-Ag-Mo	Pg
162	34K05, 34L08, 09		Nunavik Mineral Exploration Fund	Inukjuak	DeS	Pg
163	35C13, 35D16		Nunavik Mineral Exploration Fund	Akulivik	DeS	Pg
LABRADOR TROUGH (Figure 4.4)						
164	24M01, 08, 24N05, 24K11		Oceanic Iron Ore Corporation	Hopes Advance	Fe	G, Gp
165	24M16, 24N12, 13		Oceanic Iron Ore Corporation	Morgan Lake	Fe	G, Gp
166	25C04, 05, 25D01, 07, 08, 09, 10		Oceanic Iron Ore Corporation	Roberts Lake	Fe	G, Gp

TABLE 4.3 – Exploration projects in the Eeyou Istchee James Bay and Nunavik regions in 2015. ⁽¹⁾						
No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
167	23N16, 24C01, 02		Adriana Resources and WISCO International Resources Development & Investment	Otelnuke Lake	Fe	FS
Project description: The company presented the results of a feasibility study on the project.						
168	23O12, 13		Northern Shield Resources	Huckleberry	Cu-Ni-PGE-Au	Pg
Project description: Several grab samples from the Discovery, Western and Eastern zones yielded grades of copper, nickel, PGE and gold. The Western Zone has now been traced over a length of 3 km.						
169	24F02, 06, 11		Osisko Exploration James Bay and Altius Minerals Corporation	Kan	Au-Ag-Cu-Zn-Ni-Fe-PGE	Gs, G, Pr, S, T
170	24B05, 24C08		Honey Badger Exploration	Sagar	U-Au	Cgi
171	24K03, 04, 05, 06, 24K11, 24F07		Midland Exploration and Japan Oil, Gas and Metals National Corporation	Pallas	Cu-Ni-PGE-Au	G, Pr, S
Project description: Presence of about 40 showings yielding values of more than 1 g/t Au, with a best result of 77 g/t Au in shear zones injected by quartz-carbonate veins and veinlets.						
172	24F05, 06, 12		Northern Shield Resources	SEDEX	Zn-Pb	Pr, S
173	24F13, 14		Midland Exploration	Willbob	Au	G, Gs(r, t), Pr, S
Project description: Presence of about 30 showings yielding values of more than 1 g/t PGE within a Montagnais sill.						
174	23O01, 08		Rockland Minerals Corporation	Blue Lake, Retty Lake and Terrier Lake	Cu-Ni-PGE	D (7:708), G, GpEm(G), GpMa(G), S
Project description: Among the best results: 0.41% Cu, 0.23% Ni, 0.06 g/t Pt and 0.23 g/t Pd over 4.86 m (71.27-76.13 m) in drill hole RL-15-007.						
175	23O02, 23J15		Wisco Century Sunny Lake Iron Mines	Attikamagen (Lac Joyce)	Fe	FS
176	23O05, 06		Wisco Century Sunny Lake Iron Mines	Sunny Lake (Full Moon)	Fe	PEA
177	23O03, 06		Wisco Century Sunny Lake Iron Mines	Sunny Lake (Black Bird)	Fe	RRE
Project description: The Black Bird iron deposit, defined over a length of 3.3 km and a width of 300 m, contains indicated resources of 1,550,000 metric tons at 59.93% Fe and inferred resources of 8,607,000 metric tons at 57.01% Fe.						
178	24C15, 16, 24F01		Commerce Resources Corporation	Eldor	REE-Ta-Nb-F-P	D (48:4 878), PFS, Gp(B), MT, Pr, S, TE
Project description: Discovery of a new niobium target. Drill hole EC15-129 cut an interval of 1.98% TREO over 199.11 m (0.89-200.00 m), including 2.44% TREO over 45.2 m.						
179	24C15, 16		SourcingLink.net	Eldor	REE	Pr, S
UNGAVA TROUGH (Figure 4.4)						
180	35H05, 06, 10, 11, 12, 35G08, 35F09		<i>Canadian Royalties, Jilin Jien Nickel Industry and Exploration minérale Ungava</i>	<i>Nunavik Nickel</i>	<i>Ni-Cu-Co-PGE</i>	<i>D (37:9 843), GpEm(B,G), Pr</i>
Project description: Discovery of a new Ni-Cu-PGE horizon on the property.						
181	35G06, 07, 12, 35H05		Jilin Jien Nickel Industry	Nunavik Nickel (West)	Ni-Cu-Co-PGE-Cu-Zn	Pr, S
182	35G09, 35H11, 12, 13		Glencore Canada Corporation	Raglan Mine	Ni-Cu-Co-PGE	Cgi, D (231:87 787), GpEm(B,G), Pr, RRE
Project description: Update of known resources; discovery of new showings and targets; slight increase in resources.						
183	35G05, 06, 35F08		True North Nickel and Royal Nickel Corporation	West Raglan	Ni-Cu-Co-PGE	Pr, S
TORNGAT OROGEN AND CORE ZONE (Figure 4.1)						
184	24A08		Quest Rare Minerals	Strange Lake	REE	B (45:x), MT
185	13M04, 05, 23P01, 08		Lakeside Minerals and Quest Rare Minerals	Misery Lake	REE	Cgi

1- See Appendix II for the legend of abbreviations and the meaning of bold and italic text.

TABLE 4.4 - Exploration projects in the Abitibi-Temiscamingue administrative region in 2015⁽¹⁾ (see figures 4.4, 4.5 and 4.6).

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
Eastern part of region 08: Val-d'Or - Amos area						
1	32B04, 05	Baudin, Bongard, Bourgmont, Trevet, Vasson	Cartier Resources	Cadillac Extension	Cu-Zn-Ag	GpEm(A), GpMa
Project description: Geophysical surveys were conducted on the Langlade polymetallic deposit, detailing the positions of anomalies associated with known sulphides. Three new anomalies were also detected, one of which lies along the extension of the Langlade deposit.						
2	32C03	Louvicourt	Alexandria Minerals Corporation	Sleepy	Au	Cgi
3	32C03	Louvicourt	Richmont Mines	Monique Mine	Au	Mine closure
Project description: Richmont Mines ceased production at the Monique Mine in January 2015.						
4	32C03	Pershing	Monarques Gold Corporation	Croinor Gold	Au	D (49:16 404), GpEm, RRE
Project description: Three exploration phases involving 49 drill holes were carried out in 2015 on the Croinor project, along with two electromagnetic surveys (OreVision and I Power 3D). Several gold-bearing zones were cut by drilling, corresponding to the deposit's extensions or inferred extensions to the west and at depth. One gold zone below the measured and indicated resources was traced for 96 metres. The company also signed a letter of intent to acquire the Beacon Mill, situated 60 km from the Croinor project.						
5	32C03	Vauquelin	Khalkos Exploration	Forsan	Au	Ca
Project description: In November 2015, Khalkos purchased the Forsan property, situated less than 10 km from its Villebon property. Historical inferred resources in the FMZ Zone on the Forsan property are estimated at 35,000 ounces of gold.						
6	32C03, 04	Pascalis, Louvicourt	Adventure Gold	Val-d'Or Est (Pascalis-Colombière, Senore, Beaufor Nord, New Beliveau)	Au	G, S, T
7	32C04	Bourlamaque	Integra Gold	Lamaque	Au	D (x:90 000), PEA, RRE
Project description: Approximately 90,000 metres were drilled on the Lamaque property in 2015. Most were on the Triangle Zone, the results of which increased and expanded the zone's resources. Twenty-six holes were also drilled on the Parallel Zone. Many high gold grades were obtained, including 482.26 g/t Au over 1 m in hole PV-15-06, as well as 19.58 g/t Au over 3.3 m and 31.45 g/t Au over 1.7 m in hole PV-15-16. On November 10, the company published a resource estimate for the Triangle Zone stating indicated resources of 2,648 Mt grading 7.37 g/t Au and inferred resources of 39,347 Mt grading 6.89 g/t Au, at a cut-off of 3.0 g/t Au.						
8	32C04	Bourlamaque	Alexandria Minerals Corporation	Annamaque	Au	Cgi
9	32C04	Bourlamaque	Alexandria Minerals Corporation	Oramaque	Au	Cgi
10	32C04	Bourlamaque	Alexandria Minerals Corporation	Orenada	Au	Cgi, D (5;x)
Project description: Statistical, geophysical and geochemical (CARD) studies were conducted on all of Alexandria's properties, identifying 20 priority targets for gold and copper, as well as an unspecified number of targets on the Orenada property. Five holes were drilled on the property. Among the best results: 49.4 m at 1.71 g/t Au, including 1.6 m at 15.15 g/t Au, and 0.9 m at 25.3 g/t Au (hole OAX-15-054); 101.50 m at 0.93 g/t Au, including 46.20 m at 1.33 g/t Au (hole OAX-15-55); 23.1 m at 0.45 g/t Au, 0.59% Cu and 8.35 g/t Ag (hole OAX-15-056).						
11	32C04	Bourlamaque	Alexandria Minerals Corporation	Ducros	Au	Cgi
12	32C04	Bourlamaque	QMX Gold Corporation	Lac Herbin Mine	Au	D (x:x), G, S
Project description: Production at the Lac Herbin mine ceased on March 19, 2015. In June 2015, the FL3 Zone, a quartz-tourmaline-pyrite vein situated near the main access ramp of the mine, was identified and delineated through mapping, sampling and drilling (12 holes). Mining of the zone commenced in October 2015 and should last six months. Definition and exploration drilling will test new targets for potential mining operations in 2016.						
13	32C04	Bourlamaque	QMX Gold Corporation	Ferdeber	Au	Cgi, D (10:x), GpSi
Project description: The company intends on mining the surface pillar of the former Ferdeber mine via open pit (the Ferdeber Open Pit project). This former mine is situated 200 metres from the Aurbel Mill. The company carried out work that included a preliminary mining plan, a seismic survey, geotechnical drilling and surface drilling (10 holes).						
14	32C04	Dubuisson	Wesdome Gold Mines	Kiena Complex	Au	D (30:7097)
Project description: The mine ceased production in 2013. A drilling program was conducted in 2015. High grades were obtained from the S50 Zone, including 5.83 g/t Au over 12.6 m (hole S771) and 40.55 g/t Au over 3 m (hole S775), and from the Presqu'île Zone, including 26.85 g/t Au over 5.9 m (hole S780) and 89.72 g/t Au over 3.1 m (hole S783). Wesdome Gold Mines is currently completing a 43-101 technical report.						
15	32C04	Dubuisson	Agnico Eagle Mines	Goldex Mine	Au-Ag	D (x:x)
16	32C04	Dubuisson	Knick Exploration	East-West	Au	Cgi
Project description: The project is situated between the Kiena mine and the Marban deposit. The company conducted a re-assessment of the West Zone after good results were recently obtained on the adjacent Marban property.						
17	32C04	Louvicourt	Monarques Gold Corporation	Simkar Gold	Au, Ag	GpEm, RRE
18	32C04	Louvicourt, Bourlamaque	Agnico Eagle Mines	Akasaba Ouest	Au-Ag-Cu	ES
Project description: An environmental impact assessment was submitted in the third quarter of 2015. The next step is to commence the BAPE process. The Canadian Environmental Assessment Agency is currently studying the project.						
19	32C04	Pascalis	Richmont Mines	Beaufor Mine	Au-Ag	D (x:x)

TABLE 4.4 - Exploration projects in the Abitibi-Temiscamingue administrative region in 2015⁽¹⁾ (see figures 4.4, 4.5 and 4.6).

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
20	32C04, 32D01	Malartic, Fournière, Dubuisson, Vassan	NioGold Mining Corporation	Bloc Marban	Au	D (69:50 000), MT
	Project description: A total of 69 holes (50,000 metres) were drilled in 2015. Among the best results: 49.90 g/t Au over 4.5 m, including 24.28 g/t Au over 1.1 m (hole MB-14-343); 68.73 g/t Au over 4.1 m (hole MB-14-34); 74.38 g/t Au over 1.2 m (hole MB-14-369); 16.51 g/t Au over 5.2 m (hole MB-15-410); 8.88 g/t Au over 4.0 m (hole MB-14-349); 1.38 g/t Au over 28.1 m (hole MB-14-359); and 1.50 g/t Au over 27.6 m (hole MB-14-37). In addition, 50 bottle-roll leaching tests were conducted on mineralized samples. Average recovery was 88.3% for grades ranging from 0.22 to 4.4 g/t Au.					
21	32C05	Fiedmont	BlackWidow Resources	Vendôme Sud	Base metals	Ca
22	32C06, 32C11	Carpentier	Globex Mining Entreprises	Carpentier (Pyrophyllite)	Pyrophyllite, Au	Ca, Cgi
	Project description: Globex Mining Entreprises acquired all the interests (100%) in the Carpentier property, situated approximately 30 km northeast of Val-d'Or. This property contains horizons of pyrophyllite schist. Historical drilling programs also encountered gold values from quartz porphyry dykes.					
23	32C10	Brassier, Delestres, Martin	SOQUEM	Hibou	Ni	Ca, G, Gp(A)
24	32C12	Barraute	Abcourt Mines	Barvue	Ag-Zn	D (2:x)
25	32C12	Duverny	Tres-Or Resources, Secova Metals and Globex Mining Entreprises	Duvay	Au	Ca
	Project description: Secova Metals signed an agreement to acquire up to 90% of the interests in Tres-Or's Duvay project. The agreement includes the Duvay property of Globex Mining Entreprises.					
26	32C12	Duverny	Tres-Or Resources and Globex Mining Entreprises	Fontana	Au	Ca
27	32C12	Duverny, La Morandière	Threegold Resources	Standard Gold	Au	Pr
28	32C15	Tonnancour, Josselin, Holmes	Globex Mining Entreprises	Tonnancour	Base metals	GpEm(G), GpMa(G)
	Project description: Ground geophysical surveys (magnetic and electromagnetic) covered four zones where electromagnetic anomalies had been previously defined by an aerial survey, resulting in the identification of several drill targets.					
29	32D01	Fournière	Canadian Malartic GP (Agnico Eagle Mines and Yamana Gold)	Canadian Malartic Mine - Barnat Sud	Au	ES
	Project description: The environmental impact assessment and the highway 117 deviation study on the Barnat Extension project were submitted on February 13, 2015. This project aims to mine the Barnat Zone by expanding the company's open pit. A joint construction process was also launched to eliminate activities that generate disturbances for the community.					
30	32D01	Fournière	Canadian Malartic GP (Agnico Eagle Mines and Yamana Gold)	Malartic CHL	Au	Cgi, D (28:24 537)
	Project description: Abitibi Royalties sold its share (30%) of the Malartic CHL project to Canadian Malartic GP (Agnico Eagle Mines and Yamana Gold), but retained its 3% NSR royalty. Late in the third quarter, the company compiled the data for the Odyssey and Odyssey North zones, and drilled 28 holes (24,537 m).					
31	32D01	Malartic	Midland Exploration	Heva (East Bloc)	Au	S, Gc(G), Tr
	Project description: In addition to prospecting work on the Heva East project, Midland Exploration also conducted channel sampling in old trenches. New showings were discovered during the prospecting work: a grade of 1.9 g/t Au was obtained from a conglomerate (outcrop), and values of 1.1 g/t Au were obtained from angular mineralized boulders. The sampling of an old dynamited trench yielded values of 18.0 g/t Au and 5.1 g/t Au.					
32	32D01	Malartic	Globex Mining Entreprises and Renforth Resources	Parbec	Au	Ca, Cgi, Pr, S
	Project description: Renforth Resources signed a letter of intent to acquire all the interest (100%) in the Parbec project. The property, consisting of 11 claims, is situated 6 km northwest of the Canadian Malartic mine and is adjacent to the former East Amphi mine. The mineralized zones were compiled and modelled using drilling data, assay results and geological information. The objective of this work is to define the extent of mineralization and establish drill targets. Samples were also collected.					
33	32D01	Malartic	Khalkos Exploration	Malartic Lakeshore	Au	Ca
	Project description: In November 2015, Khalkos announced its intention to acquire the Malartic Lakeshore property held by Golden Share. This property is contiguous with the Malartic property, which is subject to an option agreement with Khalkos.					
34	32D01	Malartic	JAG Mines and Khalkos Exploration	Malartic	Au - Base metals	Ca, D (5:x), S
	Project description: The property is situated 30 km northwest of Val-d'Or, south of Lac Malartic. Khalkos signed an agreement option in June 2015 to acquire 55% of the property held by Les Mines JAG. This property contains a gold-bearing shear zone, which hosts the Malrobian deposit. The best value obtained from sampling was 293 g/t Au in a grab sample. Five holes were drilled in 2015. Among the results: 3.7 g/t Au over 4 m, including 11.4 g/t over 1 m, in the first hole, and 5.1 m at 2.5 g/t Au, including 4.8 g/t Au over 1.5 m, in the fourth hole.					
35	32D01	Malartic	Renforth Resources	West Malartic Blocks	Au	Ca
36	32D08	La Motte	Globex Mining Entreprises	Moly Hill	Mo-Bi	S, G
	Project description: Systematic mapping and sampling work was carried out on gold-bearing massive quartz veins carrying historical values of Mo, Bi and Ta.					
37	32D08	La Motte	Royal Nickel Corporation and Sphinx Resources	Marbridge	Ni-Cu-PGE	Ca
	Project description: An agreement was announced under which Sphinx Resources would acquire the project in its entirety (100%). The Marbridge deposit is now part of the Somanike project of Sphinx Resources.					

TABLE 4.4 - Exploration projects in the Abitibi-Temiscamingue administrative region in 2015⁽¹⁾ (see figures 4.4, 4.5 and 4.6).

No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
38	32D08	La Motte	Glen Eagle Resources	Authier Lithium	Li	PEA
	Project description: A preliminary economic assessment disclosed measured and indicated resources of 7.7 Mt at 0.96% LiO ₂ , at a cut-off grade of 0.50% LiO ₂ . The project would have a mine life of 10 years at a production rate of 2,200 metric tons per day. In December 2015, the company proposed a merger through a joint venture with the facilities of Canada Lithium, with the goal of restarting mining operations.					
Western part of region 08 : Rouyn-Noranda – La Sarre – Témiscamingue area						
39	31L16	Villedieu	Globex Mining Entreprises	Turner Falls	RRE-Y	Ca, S
40	32D01	Cadillac	Renforth Resources	Bonchamp	Au	Ca
41	32D01	Cadillac	Renforth Resources	New Alger	Au	D (4:x), G, S
	Project description: Claims adjacent to the southern limit of the New Alger project have been acquired to form the Bonchamp property. Prospecting and mapping work was conducted on a new quartz vein in the western part of the property.					
42	32D01	Cadillac	Globex Mining Entreprises, Agnico Eagle Mines and Yamana Gold	Wood-Pandora	Au	D (3:1 802)
	Project description: In October 2015, the partners announced the results of drilling on the property. Hole W15-116B cut an interval of 5.0 m at 15.59 g/t Au, including a section of 3.0 m at 24.37 g/t Au.					
43	32D01	Cadillac	Midland Exploration and Agnico Eagle Mines	Maritime-Cadillac	Au	Cgi
44	32D01	Cadillac	Radisson Mining Resources	O'Brien-Kewagama	Au	D (x:x), PEA, RRE, TE
	Project description: A positive preliminary economic assessment was announced in December 2015. A new resource estimate was also released in April 2015. The drilling program at the end of the year targeted the extensions of known mineralized zones.					
45	32D01	Cadillac	Agnico Eagle Mines	Lapa Mine	Au	D (x:x)
	Project description: The company targeted two zones for exploration: Zone 8 East-Upper Mine and Zulapa 7-Deep 2. According to the company, these zones could potentially support future mining activity.					
46	32D01, 02, 07, 08	Bousquet	IAMGOLD Corporation	Westwood Mine	Au	D (x:x)
47	32D01, 08	Bousquet, Cadillac	Agnico Eagle Mines	LaRonde Mine	Au	D (x:x)
	Project description: The company pursued its work to test the potential for mining the zones between mine levels 311 and 371.					
48	32D02	Bousquet	Vantex Resources	Bousquet Lake	Au	Ca
49	32D02	Bousquet	IAMGOLD Corporation	Bousquet-Odyno	Au	Cgi, D (3:x)
50	32D02, 32D03	Rouyn	Gold Bullion Development Corporation	Granada Mine	Au	MT, RRE, S, T
	Project description: A new resource estimate was announced in May 2015. The company completed its trenching program on the property. Trench TR15-11 yielded a section of 8 m at 6.05 g/t Au, including 3 m at 14.98 g/t Au.					
51	32D03	Beauchastel	Abcourt Mines	Aldermac	Au-Ag-Cu-Zn	D (1:x)
52	32D03	Dasserat	Vantex Resources and Vanstar Mining Resources	Galloway	Au	Gc(G)
53	32D03, 32D06	Rouyn	Falco Resources	Horne 5	Au-Ag-Cu-Zn	D (18:17 150), ES, MT, PEA, RRE, S, TE
	Project description: The company drilled a series of holes (with wedges) on its project to test the silver grades of the ore, to conduct metallurgical tests and to improve the quality of the resources. Hole H5-15-02 cut 100.9 m at 1.32 g/t Au, 29.46 g/t Ag, 0.11% Cu and 1.94% Zn. Falco Resources intends to test the near-surface extensions of zones M, C and K on the adjacent Horne 5 PLUS project.					
54	32D06	Beauchastel	Abcourt Mines	Elder	Au	D (3:x)
	Project description: Three holes were drilled early in the year, one above level 9 of the mine and the other two closer to the surface. A contract to process the ore at the Camflo Mill of Richmond Mines was signed in July 2015.					
55	32D06	Dufresnoy	Globex Mining Entreprises	Vauze	Au	D (4:x)
56	32D06	Duprat	Falco Resources and QMX Gold Corporation	Rivière Mouilleuse (RIMO)	Au-Ag-Cu-Zn	D (6:2750), GpEm(B,G)
57	32D06	Hébécourt	Globex Mining Entreprises and Mag Copper	Magusi-Fabie	Au-Ag-Cu-Zn	Gp(G)
58	32D06, 32D11	Duparquet, Hébécourt	Explor Resources	East Bay	Au	D (5:1 868)
	Project description: In October 2015, the company announced the results of five holes drilled on three targets. Drill hole EXS-15-07 cut a section of 3.0 m at 2.2 g/t Au, including 1.5 m at 3.7 g/t Au.					
59	32D07	Aiguebelle,	Typhoon Exploration and Agnico Eagle Mines	Aiguebelle-Goldfields	Au	Gp(G)
60	32D07	Aiguebelle, Cléricy, Destor	Typhoon Exploration and Hecla Québec	Fayolle	Au-Ag	TE
61	32D07	Cléricy	Typhoon Exploration	Ranger	Au	Ca, Pr, S
62	32D07	Cléricy	Typhoon Exploration	Sommet	Au	Ca, Pr, S

TABLE 4.4 - Exploration projects in the Abitibi-Temiscamingue administrative region in 2015 ⁽¹⁾ (see figures 4.4, 4.5 and 4.6).						
No.	NTS	TOWNSHIP	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
63	32D07	La Pause, Cléricy	Midland Exploration and Teck Resources	Patris	Au	D (7:1 298), GpEm(G), GpMa(G)
Project description: In May 2015, Midland announced the results of a winter 2014 drilling program. Hole PAT-15-05, which targeted an IP anomaly, cut a section of 1.0 m grading 0.10 g/t Au, 82.6 g/t Ag, 0.22% Cu and 1.0% Pb. A magnetic survey and an IP survey were conducted in the vicinity of this drill hole in 2015.						
64	32D08	La Motte	Sphinx Resources	Somanike	Ni-Cu-PGE	Ca, D (x:x), G, GpEm(G), GpMa(G)
Project description: The results of the first drill holes were announced in May 2015. Hole SR-15-06192 cut a section of 0.5 m grading 1.41% Ni, 0.05% Cu, 0.04 g/t Pt and 0.30 g/t Pd.						
65	32D08	Manneville	Cartier Resources	MacCormack	Au	GpEm(G), GpMa(G)
66	32D09	Launay, Trécesson	Royal Nickel Corporation	Dumont	Ni-PGE	B (300:31)
Project description: Royal Nickel received a positive decision from the federal government for its environmental impact assessment. The company was issued a certificate of authorization from the MDDELCC in June 2015.						
67	32D10	Destor, Poularies	Globex Mining Entreprises	Lyndhurst	Au	Gp(A)
68	32D14	Clermont, Chazel	Globex Mining Entreprises	Great Plains	Cu-Zn	GpEm(G)
69	32D14	DesMeloizes, La Reine	Globex Mining Entreprises	Duvan	Au-Cu	Cgi, GpEm(G), Pr
70	32D14	La Reine	Globex Mining Entreprises	Santa-Anna	Au	G, D, T

1- See Appendix II for the legend of abbreviations and the meaning of bold and italic text.

TABLE 4.5 - Exploration projects in Québec (excluding Abitibi-Témiscamingue and Nord-du-Québec) in 2015 ⁽¹⁾ (see Figure 4.7)						
No.	NTS	GEOLOGICAL PROVINCE	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
Outaouais administrative region (07)						
1	31F10	Grenville	Sphinx Resources	Green Paladium	Pd-Cu-Pt-Au	Ca, D (9:962)
2	31F10	Grenville	Active Growth Capital	Portage-du-Fort	Mg-Dolomite	Ca, Cgi
3	31G10	Grenville	Canada Carbon	Miller Mine	Graphite	D (x:x), MT, GpEm(G), PEA, RRE
Project description: Metallurgical tests on a 10-kg sample of graphite concentrate yielded a high-purity product a 99.9998% C(t). The company also conducted characterization work on white marble found on the property. Marble blocks were cut and polished to assess their use as architectural stone. The company awarded a contract for a preliminary economic assessment and resource estimation.						
4	31G11	Grenville	Jourdan Resources	Ceylon Lump	Graphite	Ca
5	31G11	Grenville	CKR Carbon Corporation	Buckingham	Graphite	G, Gc(r), GpEm(G), MT, S
Project description: Mapping, sampling and a ground EM survey were carried out on the project, leading to the discovery of the Case Zone. Samples from this zone yielded grades that included 28.7% Cg (sample #1138362) and 23.8% Cg (sample #1138361).						
6	31G11	Grenville	Great Lakes Graphite	Lochaber	Graphite	D (x:x), RRE
Project description: A new resource estimate was published in June 2015. Inferred resources amounted to 4,091 Mt grading 4.01% Cg, at a cut-off grade of 2.45% Cg. Metallurgical test results were also announced over the course of the summer.						
7	31G12	Grenville	Ashburton Ventures / Cavan Ventures	Buckingham	Graphite	B (20 kg:x), D (4:x), MT, S
Project description: Metallurgical tests were conducted on various samples from the property. A drilling program was conducted in late 2015. Hole BH15-03 cut a zone of graphite mineralization over 148 m. Assay results were still pending at the end of the year.						
8	31G14, J03	Grenville	Canada Strategic Metals / Lomiko Metals	La Loutre	Graphite	D (x:x), S
Project description: In July 2015, the partners announced grab sample results for the property. Thirteen samples yielded values between 20.3% Cg and 27.6% Cg, whereas the values for 19 others ranged from 10.25% Cg to 19.65% Cg. Several holes were also drilled. Hole LL-15-09 cut a section of 90.75 m grading 9.00% Gp.						
Laurentides administrative region (15)						
9	31J04	Grenville	Canada Carbon	Asbury	Graphite	GpEl(G)
Project description: The company applied to the government for the necessary permits to re-use the site and infrastructure of a former mine located northwest of the municipality of Notre-Dame-du-Laus. An IP survey was conducted on the East and West blocks in spring 2015. The company intends to drill the VN6 Zone.						
10	31J05	Grenville	Canada Strategic Metals and Lomiko Metals	Lac des Îles West	Graphite	Pr, S, G
11	31J06	Grenville	American Graphite Technologies	Lac Rouge	Graphite	Ca, G, Pr, S
12	31J07	Grenville	Saint-Jean Carbon	Clot	Graphite	Ca, Cgi, TE
13	31J10	Grenville	CKR Carbon Corporation	TAC	Graphite	Cgi, S
Project description: The company conducted sampling work in spring 2015 in the vicinity of historical drill holes and near anomalous conductors defined by a 1990 EM survey.						
Lanaudière administrative region (14)						
14	31J16	Grenville	Nouveau Monde Mining Enterprises	Matawinie	Graphite	D (68:10 025), GpEm(A), GpMa(A), MT, Pr, RRE, S, T
Project description: Work conducted on the Tony Block comprised a heliborne geophysical survey, trenching and a program of short drill holes. Grab sample 15-AC 15 returned a value of 7.73% Cg. Hole TO-15-16 in the South-East Zone cut a section of 160.1 m grading 3.19% Cg. Trench TO-15-TR-6 exposed a section of 62 m grading 3.74% Cg in a channel. Metallurgical tests were conducted on 10-kg samples collected from surface trenches and drill core. A new resource estimate for the South-East and South-West zones of the Tony Block was announced in December 2015. Indicated resources stand at 26.3 Mt grading 3.73% Cg and inferred resources stand at 19.2 Mt grading 3.67% Cg, at a cut-off grade of 2.5% Cg.						
Mauricie administrative region (04)						
15	32B10	Grenville	Midland Exploration	Ytria	Nepheline-Albite-Orthoclase	B (0,06:x), Gs, MT
Capitale Nationale administrative region (03)						
16	21M09, 10	Grenville	Société d'exploration minière Vior	Foothills	Ti	Ca, G, Gs(s), Gs(sl), GpGr(G), GpMa(A), S
Project description: The Foothills project is situated in the municipality of Saint-Urbain. Exploration work in 2014 defined two glacial dispersal trains of rutile-bearing ilmenite boulders. The dispersal trains measure 9 km long by 5.5 km wide. Vior acquired 34 claims adjacent to the property to secure the source of the boulders. A high-resolution heliborne magnetics survey was flown over the southwestern part of the project. Over the course of the year, the company conducted rock, soil and stream sampling, as well as mapping and ground geophysics.						

TABLE 4.5 - Exploration projects in Québec (excluding Abitibi-Témiscamingue and Nord-du-Québec) in 2015 ⁽¹⁾ (see Figure 4.7)						
No.	NTS	GEOLOGICAL PROVINCE	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
17	21M15	Grenville	Rogue Resources	Lac de la Grosse Femelle	Si	B (7:x), D (71:11 768), ES, G, GpEm(A,G), Lc, MT, Pr, S, T, TE
Project description: The Lac de la Grosse Femelle property is situated 42 km north of the city of Baie-Saint-Paul. Work conducted in 2015 included prospecting, mapping, sampling, line cutting, trenching and a major drilling program targeting the G and H quartzites. A bulk sample was collected from the G quartzite.						
Saguenay-Lac-Saint-Jean administrative region (02)						
18	22C04, 22D01	Grenville	Multi-Ressources Boréal	Lac à David	Pd-Pt-Ni-Cu-Co	Pr
19	22D15	Grenville	Fairmont Resources	Buttercup	Fe-Ti-V	S
Project description: Samples were collected and made available to potential clients so they may conduct material characterization tests.						
20	22E02	Grenville	Glen Eagle Resources	Ituk	P	Ca
Project description: Glen Eagle Resources signed an option agreement to acquire 63 mining titles that are almost adjacent to the Moose Lake property. An airborne magnetics survey had previously been flown over Ituk and Moose Lake. The survey detected anomalies with similar signatures on the two properties.						
21	22E02	Grenville	Multi-Ressources Boréal	Graphite LC	Graphite	Pr
22	22E10, 15	Grenville	Arianne Phosphate	Lac à Paul	P-Ti	MT, RRE
Project description: Arianne Phosphate continues to develop the phosphate deposit on its Lac à Paul property, situated approximately 200 km north of Lac Saint-Jean in the Pipmuacan Reservoir area. The project was presented to the Bureau d'audiences publiques sur l'environnement (BAPE), and the report was published in October 2015. In December 2015, the Government of Québec issued an environmental decree authorizing the company to mine the deposit. Metallurgical testing by COREM produced 1.2 metric tons of high-quality apatite concentrate. The company is waiting for the federal environmental assessment.						
23	22L08, 22L09	Grenville	Multi-Ressources Boréal	Lac du Bouchon	Ni-Cu-Co	Cgi, S
24	32A08	Grenville	Fairmont Resources	Lac Bouchette	Si	S, TE
25	32H07	Grenville	MDN	Samaqua	Nb-Ta	D (8:1227)
Project description: A drilling program took place in the winter of 2015. Eight holes were drilled on targets identified by airborne magnetic surveys and an induced polarization survey.						
26	32G09, 32H12	Grenville	Exploration Fieldex and L. Desgagné	Copper Point	Cu-Au-Ag	Ca, D (1:200), GpEl(G)
Côte-Nord administrative region (09)						
27	12L07	Grenville	Placements Appalaches	PAL	Si	Ca
28	22C14	Grenville	Fairmont Resources	Forestville Quartzite	Si	D (x:x)
29	22F08	Grenville	Fairmont Resources	Baie Comeau Quartzite	Si	Ca
30	22F16	Grenville	St-Georges Platinum and Base Metals	Julie	Ni-Cu-Co-Pt-Pd	Pr, S
Project description: In January 2015, the company announced the results of samples collected in trenches on the T2 and T3 zones. Channel No. 3 in trench T3 included a section of 1.93 m at 0.39% Ni, 0.108% Cu and 0.012% Co.						
31	22K04	Grenville	Argex-Titane	La Blache (East and West Hervieux)	Ti-Fe-V-Mg	MT
32	22N03	Grenville	Mason Graphite	Lac Guéret	Graphite	ES, FS, MT, PEA, RRE, TE
Project description: The results of a feasibility study on the project were announced in September 2015. The environmental impact study was submitted to the MDDELCC in November 2015.						
33	22N03	Grenville	Berkwood Resources	Lac Guéret South	Graphite	G, GpEm(A,G), GpMa(A,G)
34	22N03	Grenville	Berkwood Resources	Lac Guéret East	Graphite	GpEm(G)
35	22P08	Grenville	The Magpie Mines	Magpie	Fe-Ti-V-Cr	MT
36	23B04, 23C01	Grenville	Cartier Iron Corporation and Champion Iron Mines	Lac Penguin	Fe	PEA, MT
37	23B04, 23C01	Grenville	Cartier Iron Corporation and Champion Iron Mines	Round Lake	Fe	D (4:707)
38	23B06, 23B11	Grenville	Champion Iron Mines	Fermont (17 properties)	Fe	Ca
39	23B11	Grenville	Nevado Resources Corporation	Fermont	Fe	Pr, E
40	12L07	Grenville	Globex Mining Entreprises	Feldspar	Feldspath	Ca
41	23B11	Grenville	Focus Graphite	Lac Knife	Graphite	ES, FS, MT, RRE, TE
Project description: The results of metallurgical tests were announced in February 2015. In September, the company announced the signing of two agreements with Grafoid for the sale of its future graphite production over a 10-year period.						

TABLE 4.5 - Exploration projects in Québec (excluding Abitibi-Témiscamingue and Nord-du-Québec) in 2015 ⁽¹⁾ (see Figure 4.7)						
No.	NTS	GEOLOGICAL PROVINCE	COMPANY / PROSPECTOR	PROJECT	COMMODITY	EXPLORATION WORK
Montérégie administrative region (16)						
42	31H04	Appalaches	Uragold Bay Resources (Quebec Quartz)	Montpetit	Si	S
Estrie administrative region (05)						
43	21E03	Appalaches	Uragold Bay Resources (Quebec Quartz)	Malvina	Si	S
44	21E05	Appalaches	Uragold Bay Resources (Quebec Quartz)	Martinville	Si	S
45	22E08	Appalaches	Uragold Bay Resources (Quebec Quartz)	Morin Paleoplacer	Au	Ca
	Project description: Uragold Bay Resources acquired a 100% interest in the Morin Paleoplacer project at Saint-Augustin de Woburn, 34 km south of Lac Mégantic. The project hosts a post-glacial placer deposit in which gold is disseminated along the base of sands and gravels. Woburn Gold Mines exploited this deposit in the 1900s. According to a partner of that company, an 8-ounce nugget was found at the site.					
46	22E12	Appalaches	Multi-Ressources Boréal	Stokes	Au	Cgi
Centre-du-Québec administrative region (17)						
	n/a	n/a	n/a	n/a	n/a	n/a
Chaudière-Appalaches administrative region (12)						
47	21L02	Appalaches	Uragold Bay Resources and Fancamp Exploration	Beauce Placer Gold	Au	Ca, TE
	Project description: The Beauce Placer Gold project is located upstream of Rivière Gilbert, near the municipality of Saint-Simon-les-Mines (Saint-Georges area). It hosts a placer-type gold deposit discovered in 1862. Uragold Bay Resources acquired claims that once belonged to Fancamp.					
48	21L09	Appalaches	Golden Hope Mines	Bellechasse (Timmins)	Au	Ca, Min, GpMt
	Project description: The Bellechasse-Timmins property is situated near the municipality of Saint-Magloire, 110 km southeast of the city of Québec. Mineralization occurs primarily in quartz-carbonate veins contained in diorites. The agreement signed with Uragold Bay Resources to acquire an interest in the project came to an end in November 2015. A 3D model was generated for the purpose of resource estimation. New mining titles were acquired around the property. An audio-magnetometric survey and a petrochemical study were also carried out. The survey revealed a conductive anomaly extending from 240 m to 650 m below the surface.					
Bas-Saint-Laurent administrative region (01)						
49	22B11	Appalaches	Canadian Metals	Langis	Si	D (x:x), MT, PEA
	Project description: Canadian Metals retained the company Mintek to carry out metallurgical tests. The tests confirmed it is possible to produce ferrosilicon from the quartzite, which has excellent thermal shock resistance. Another company was mandated to study options for the location of the ferrosilicon production plant. A preliminary economic assessment (PEA) was underway in the fourth quarter of 2015. A drilling program was completed to support the PEA.					
Gaspésie-Îles-de-la-Madeleine administrative region (11)						
50	22A04, 22A05	Appalaches	Globex Mining Entreprises	New Richmond Antimony-Gold Property	Au-Sb	Ca
	Project description: Claims were acquired around the property.					
51	22A05	Appalaches	Fancamp Exploration	Harriman Fault	Zn-Au	T
52	22A07	Appalaches	Gespeg Copper Resources	Port-Daniel	Cu-Ag-Au	Pr, S, T
	Project description: The Port-Daniel project is situated about 15 km north of the municipality of Port-Daniel-Gascons. Trenching and prospecting work was carried out in 2015. This work targeted several anomalous zones that had been defined by the geochemical survey of 2014.					
53	22A13	Appalaches	Gespeg Copper Resources	Vortex	Cu-Ag-Mo	D (x:x)
	Project description: A drilling program commenced in June 2015 on the Sullipek East area of the Vortex property.					
54	22B03	Appalaches	Uragold Bay Resources (Quebec Quartz)	Roncevaux	Si	G, GpEl, GpEm, GpMa, Lc, MT, S, T
	Project description: A major producer of metal silicon expressed interest in purchasing a considerable quantity of quartz material from the Roncevaux property. The producer in question also declared the material had passed tests to determine its suitability for silicon metal production. A first phase of exploration has been carried out, including geophysical surveys, trenching, sampling and geological mapping. The results of this work will be used to plan drilling with the objective of validating a historical resource estimate.					

1- See Appendix II for the legend of abbreviations and the meaning of bold and italic text.



CHAPTER 5

Deposit appraisal, mine development, and care and maintenance

In 2015, 25 mining projects remained in or reached the deposit appraisal phase (Figure 5.1 and Table 5.1), two projects were in the mine development phase, and two projects were put in care and maintenance mode (Figure 5.2 and Table 5.2).

However, the Grande-Vallée (alumina), Iron Hills (iron), Duncan Lake (iron), and Lac Pelletier (gold) projects, which were listed in the deposit appraisal phase in 2014, were removed from the list. Project operators no longer expect to bring these projects to the production phase in the foreseeable future.

5.1 Deposit appraisal

Deposit appraisal begins with the first preliminary economic assessment and ends with the decision to go ahead with construction.

Apatite

Mine Arnaud continues development work on the Arnaud mining project, located about 15 km west of the city of Sept-Îles. The project involves an open pit mine and a processing plant, and will produce an average of 1.2 Mt of apatite concentrate per year over a period of 30 years. On February 18, 2015, the Government of Québec issued a decree for the delivery of a certificate of authorization for this project. The capital cost for the project is estimated at about \$855 million, and the project will create about 275 direct mining jobs.

Arianne Phosphate is working on the development of the Lac à Paul project, located about 200 km north of the city of Saguenay. The project involves an open pit mine and a processing plant with an average annual production capacity on the order of 3 Mt of apatite concentrate and a mine life of at least 26 years.

On December 16, 2015, the Government of Québec issued a decree for the delivery of a certificate of authorization for this project. The capital cost for the project is estimated at about US\$1.2 billion, including costs to upgrade road access and build port facilities in Sainte-Rose-du-Nord. The project will create some 375 direct mining jobs.

Iron

Poor market conditions for the price of iron ore, which are expected to last for a few years, will make it more difficult to develop some of these projects, both in terms of financing and for the completion and publication of studies.

Following a shift in priorities during the year, rather than publish a feasibility study on its Fire Lake North project in 2015, **Champion Iron** put its efforts in acquiring the Bloom Lake mine site. In January 2015, the Bloom Lake site was placed in care and maintenance mode by its owner, Cliffs Natural Resources. In early 2016, the Superior Court of Québec accepted the purchase offer and Champion Iron became the new owner of the Bloom Lake mine site.

Lac Otelnuk Mining is a joint venture between Adriana Resources and WISCO International Resources Development & Investment, a Chinese steelmaker. In April 2015, Lac Otelnuk Mining published a feasibility study for the Lac Otelnuk project, located 150 km north of Schefferville. Construction costs for the project are estimated at \$9.4 billion.

There were no major developments on the Hopes Advance project held by **Oceanic Iron Ore Corporation** in 2015. The company announced the upcoming publication of an environmental impact study in 2016 and a feasibility study in 2017.

In 2015, no progress was reported on the Taconite-KéMag project held by **New Millennium Iron Corporation** and **Tata Steel Minerals Canada**. In September 2015, New Millennium Iron Corporation announced the project would be reviewed and a re-scoped version would be presented in 2016.

Lamêlée Iron Ore released a preliminary economic assessment for its Lamêlée project in 2015, and **WISCO Century Sunny Lake Iron Mines** did the same for its Full Moon project. Both studies are based on fairly optimistic projections for the price of iron ore (~US\$90/t). These projects are unlikely to go forward in the short and medium term.

Following a call for interest in July 2014, the Québec government joined forces with Champion Iron and Lac OtelnuK Mining (north of Schefferville) to create, on October 16, 2014, the Société ferroviaire du Nord québécois (SFNQ). The latter is responsible for the preparation of a study aiming to define the optimal railway option to improve access to the Labrador Trough. The study is expected to be released in the coming months.

The Government of Québec's contribution has been set by decree to a maximum amount of \$20 million and will be drawn from the Fonds du Plan Nord. Private partners Champion Iron and Lac OtelnuK Mining will contribute technical data and related services.

Iron-titanium-vanadium

BlackRock Metals has been working, over the past few years, on a project to mine a magnetite, ilmenite and vanadium deposit located east of Chibougamau. The project involves mining and metallurgical components. In 2015, BlackRock revisited its project a few times and a study on the metallurgical component is expected in 2016.

Graphite

Mason Graphite published in September 2015, a feasibility study for the Lac Guéret project, located 260 km north of Baie-Comeau, on the southwest shore of Réservoir Manicouagan. Investments required for the construction of the mine and processing plant are estimated at \$166 million. In November 2015, the company submitted an environmental impact study to the MDDELCC. In 2016, Mason Graphite intends to focus on permitting activities to obtain all environmental authorizations required to begin construction of the mine site.

In 2015, **Focus Graphite** launched the permitting process to obtain all environmental authorizations for its Lac Knife project. The permitting process will continue in 2016.

Lithium

In the Abitibi region, **Glen Eagle Resources** continued its work on the Authier project, where it is planning an open pit mine and the production of 103,000 tonnes per year of spodumene concentrate grading 6.0% Li₂O. The project has an estimated mine life of 10 years at a daily production rate of 2,200 tonnes.

Nemaska Lithium is working on the development of the Whabouchi project, located about 30 km east of the Nemaska Cree community (Baie-James) and about 280 km north of Chibougamau. The company released a feasibility study in July 2014. The projected open pit mine and concentrator with an annual capacity of 213,000 tonnes of spodumene concentrate will supply a processing plant located in Shawinigan. Once in operation, the plant will produce 28,000 tonnes of battery-grade lithium hydroxide and 3,250 tonnes of battery-grade lithium carbonate annually. Spodumene will be extracted in an open pit (over a period of 20 years), then by underground methods (over a period of 6 years). The entire project requires investments on the order of \$500 million and will create a total of nearly 300 jobs. Nemaska Lithium continues to work on the permitting process required for the construction of the mine and concentrator. The company is expected to acquire Resolute Forest Products' former Laurentide plant, and is planning to build a pilot plant in 2016.

Lithium and tantalum

The Rose tantalum-lithium project is located north of the 52nd parallel, between the Eastmain-1 hydroelectric generating station and the Nemaska Cree community, about 300 km northwest of Chibougamau. **Critical Elements Corporation** plans to mine lithium and tantalum ore in an open pit and concentrate it on site. The company is also considering the possibility of building a lithium carbonate production plant on the mine site and producing both tantalum and mica concentrates. According to the preliminary economic assessment released in December 2011, the project calls for investments on the order of \$270 million. Based on current resources, the mine life is estimated at 17 years at a production rate of 4,600 tonnes per day. In 2014, Critical Elements Corporation continued metallurgical testing and other studies in preparation for a feasibility study. Tests are currently underway to optimize recovery and upgrade the purity of the lithium carbonate product.

Nickel, copper, cobalt, and platinum group elements (PGE)

In 2015, **Royal Nickel Corporation** obtained all environmental authorizations required to begin construction at the Dumont mine site. The company is now seeking financing for its project. This step may prove somewhat difficult given the current slump in nickel prices.

Gold

In August 2015, **Agnico Eagle Mines** submitted an environmental and social impact study for the Akasaba West project to the MDDELCC. This project involves mining gold and copper ore from an open pit at an average rate of about 10,000 tonnes per day. The ore will be crushed on site, then processed at the existing Goldex mill. Only the sulphide concentrate will be shipped to the LaRonde facilities. The development plan includes about one year for the construction and preparation of the site, four years of open pit mining operations, and two years to process the ore stockpiled on the Akasaba West site.

The Croinor Gold project held by **Monarques Gold Corporation** is located 75 km by road east of Val-d'Or. In October 2014, an updated prefeasibility study was published. The project involves underground mining operations over a period of five years, including one year and a half of pre-production, at a daily production rate of 475 to 675 tonnes. Ore will be processed at the Beacon mill. On November 17, 2015, the company announced execution of an agreement to acquire the mill. Investments required for the construction of the mine site and refurbishing of the Beacon mill are estimated at \$27 to \$30 million. Monarques Gold Corporation is planning to test a new mining method using equipment designed for shallow-angle mining, developed by Minrail based in Val-d'Or. Minrail's system, called SAMS for "Shallow Angle Mining System," was developed in Québec and makes it possible to mine stopes inclined between 10 and 45 degrees. It is based on the use of a mechanized working platform suspended from an overhead double rail system. From this platform, miners can drill the bedrock and perform all activities required to extract the ore. This equipment includes various specialized modules: a module for the development of opening drifts, a module for the automated drilling of blast holes, a module for explosive loading and a module for mucking. Each is equipped with safety devices certified by mining safety organizations from Québec and Ontario.

The Fayolle project held by **Typhoon Exploration** and **Hecla Quebec** is located 40 km northeast of Rouyn-Noranda, near the southern limit of Parc national d'Aiguebelle. On March 28, 2013, a preliminary economic assessment was published. Two scenarios were considered: open pit mining and underground mining. The study considers a project with a mine life of three years at a production capacity of 750 to 1,000 tonnes of ore per day. No NI 43-101-compliant resource estimate has been published on the Fayolle property. Investments for the open pit and underground scenarios are estimated at \$5.9 million and \$22.7 million, respectively. On May 27, 2014, Hecla Quebec acquired 50% interest in the Fayolle project and became project operator. The project is currently being assessed and subsequent exploration work will target unexplored zones on the property over the next few years.

On the Granada project, located 2.5 km south of the town of Granada and about 9 km south of Rouyn-Noranda, **Gold Bullion Development Corporation** is planning two phases of mining, first by open pit in a series of small pits then by underground methods. In May 2014, the company published a prefeasibility study for the first phase of the project. Investments to complete this phase are estimated at \$6.7 million. The open pit mine has a projected mine life of three years at a production rate of 550 tonnes of ore per day, and the ore will be shipped to the Westwood mill for processing. The company is planning to begin open pit mining operations (rolling start) in the fourth quarter of 2016, pending receipt of environmental permits.

Integra Gold published, in December 2015, an updated NI 43-101-compliant mineral resource estimate for the Lamaque South project, located in Val-d'Or, near the southeast city limits. This project involves underground mining in the Fortune, Parallel, No.4 Plug, and Triangle zones, at a daily rate of 1,400 tonnes of ore over a period of more than four years. Investments for the construction of the mine are estimated at about \$62 million. However, this amount may be scaled down as the company acquired, in October 2014, the Sigma milling complex along with the Sigma and Lamaque properties. This acquisition gives the company access to an ore processing plant, a network of underground workings, and a number of certificates of authorization issued by the MDDELCC. In light of the highly positive results obtained in the Triangle zone in 2015, a 90,000- to 100,000-metre drilling program is planned in 2016 to further test this zone and delineate its extent.

The Douay West gold project held by **Aurvista Gold Corporation** is located about 55 km southwest of Matagami and 120 km north of Amos, in the Abitibi Greenstone Belt. The gold deposit contains indicated resources estimated at 2.6 million tonnes grading 2.77 g/t Au (238,400 ounces of gold). The company completed a preliminary economic assessment in January 2015. Mining operations will take place first in an open pit, then by underground methods. Production will be on the order of 900 tonnes per day over a mine life of about four years. Ore processing would take place off the mine site. Aurvista Gold has not yet launched the environmental assessment or the community consultation process.

The Windfall Lake gold project held by **Oban Mining Corporation** is located about 200 km northeast of Val-d'Or and 115 km east of Lebel-sur-Quévillon, in the Baie-James region. A preliminary economic assessment was completed in April 2015. At a projected mining rate of 1,200 tonnes per day, the underground mine would produce 106,000 ounces of gold per year over a period of nearly 8 years. Initial capital costs are estimated at \$240 million.

Rare earth elements

In 2015, **Commerce Resources Corporation** completed metallurgical tests, environmental analyses, geotechnical drilling, and definition drilling on the Eldor (Ashram) project, in preparation for a feasibility study. According to the preliminary economic assessment dated July 2012, the project, located in the Labrador Trough about 130 km south of Kuujuaq, involves an open pit mine, a concentrator, and a hydrometallurgical plant. A mixed rare earth carbonate concentrate will be produced at a rate of 36,000 tonnes per year for at least 25 years. Capital costs for the project are estimated at \$763 million, including the cost of building a road and port facilities. The project will create 230 jobs.

Quest Rare Minerals continues development work on the Strange Lake project (B-Zone deposit), located 220 km northeast of Schefferville. Based on the prefeasibility study released on November 23, 2013, the project involves an open pit mine and a mill at Strange Lake, as well as a hydrometallurgical plant and a rare earth element separation plant in Bécancour. Production of a rare earth oxide concentrate is also considered. The company submitted a request for financial assistance on the order of \$4.25 million within the scope of a \$17-million financing package to perform pilot tests. Sustainable Development Technology Canada has confirmed its financial assistance in the amount of \$5 million, and Quest Rare Minerals must now complete its private financing. This project, at an estimated cost of \$1.2 billion, will create 500 jobs during the construction phase and 683 jobs during the mining phase. The company is seeking a strategic partner on the project. Quest Rare Minerals is also negotiating an agreement with Native communities in Labrador.

In the Témiscamingue region, on the Zeus property, **Matamec Explorations** completed a feasibility study on the Kipawa rare earth project in September 2013, the first study of its kind in Québec. The project involves an open pit mine, a concentrator, and a hydrometallurgical plant, and targets a total annual production of 3,600 tonnes of mixed heavy rare earth concentrate and mixed light rare earth concentrate. At an estimated cost of \$374 million, this project could create 230 jobs. In 2014, Toyotsu Rare Earth Canada (TRECAn), Matamec Explorations' strategic partner, withdrew from the project. The company is planning another phase of metallurgical testing, process optimization, and engineering, and is seeking a strategic partner to move forward on this project.

5.2

Mine development, care and maintenance

In 2015, the Bloom Lake and Québec Lithium projects were placed in care and maintenance mode. Investments on the order of tens of millions of dollars will be required to revive these projects. Various scenarios to this effect are currently under evaluation.

Diamond

Stornoway Diamonds (Canada), a subsidiary of **Stornoway Diamond Corporation**, is developing the Renard project located north of the Otish Mountains, about 360 km north of Chibougamau. Construction of the mine began in July 2014. Mining operations will take place by open pit and underground methods, and will produce an average of 1.6 million carats of diamonds annually. The expected mine life is currently estimated at 11 years, but is likely to be extended. Mining operations are expected to begin in 2016 and will create nearly 500 jobs.

Stornoway Diamond Corporation concluded a new agreement for the financing of the Renard project with various financial partners. This new financing package totals \$944 million, and includes financial commitments from Orion for \$407 million, from Ressources Québec for \$240 million, and from the Caisse de dépôt et placement du Québec for \$105 million. The financing package also calls for a public placement of \$132 million as well as an equipment financing facility from Caterpillar for an amount of \$39 million. Stornoway had already contracted a loan of \$77 million from the Ministère de l'Économie, de la Science et de l'Innovation for the road, and a \$13-million loan from the Cree Nation of Mistissini. The total amount of financing required is \$1,034 million.

Stornoway Diamond Corporation completed construction of segments C and D of the Route 167 Extension, as well as an airport on the mine site.

Iron

Tata Steel Minerals Canada, a joint venture between **Tata Steel** (94%) and **New Millennium Iron Corporation** (6%), commissioned and is ramping up its processing plant for the DSO project near Schefferville. Although the plant is located in Labrador, part of its iron ore feedstock will come from open pits located in Québec (in 2017).

The Bloom Lake mine site was placed in care and maintenance mode by its owner, **Cliffs Natural Resources**, in January 2015. In early 2016, Champion Iron's purchase offer was accepted and the latter is now the owner of the Bloom Lake mine site.

Lithium

In 2014, **RB Energy** announced it was suspending operations on the Québec Lithium project, located near the town of La Corne in the Abitibi region, and placed itself under the protection of the *Companies' Creditors Arrangement Act*. The company permanently ceased operations and went into receivership. The site remained in care and maintenance mode in 2015.

Figure 5.1 - Location of projects in the deposit appraisal phase in Québec in 2015.

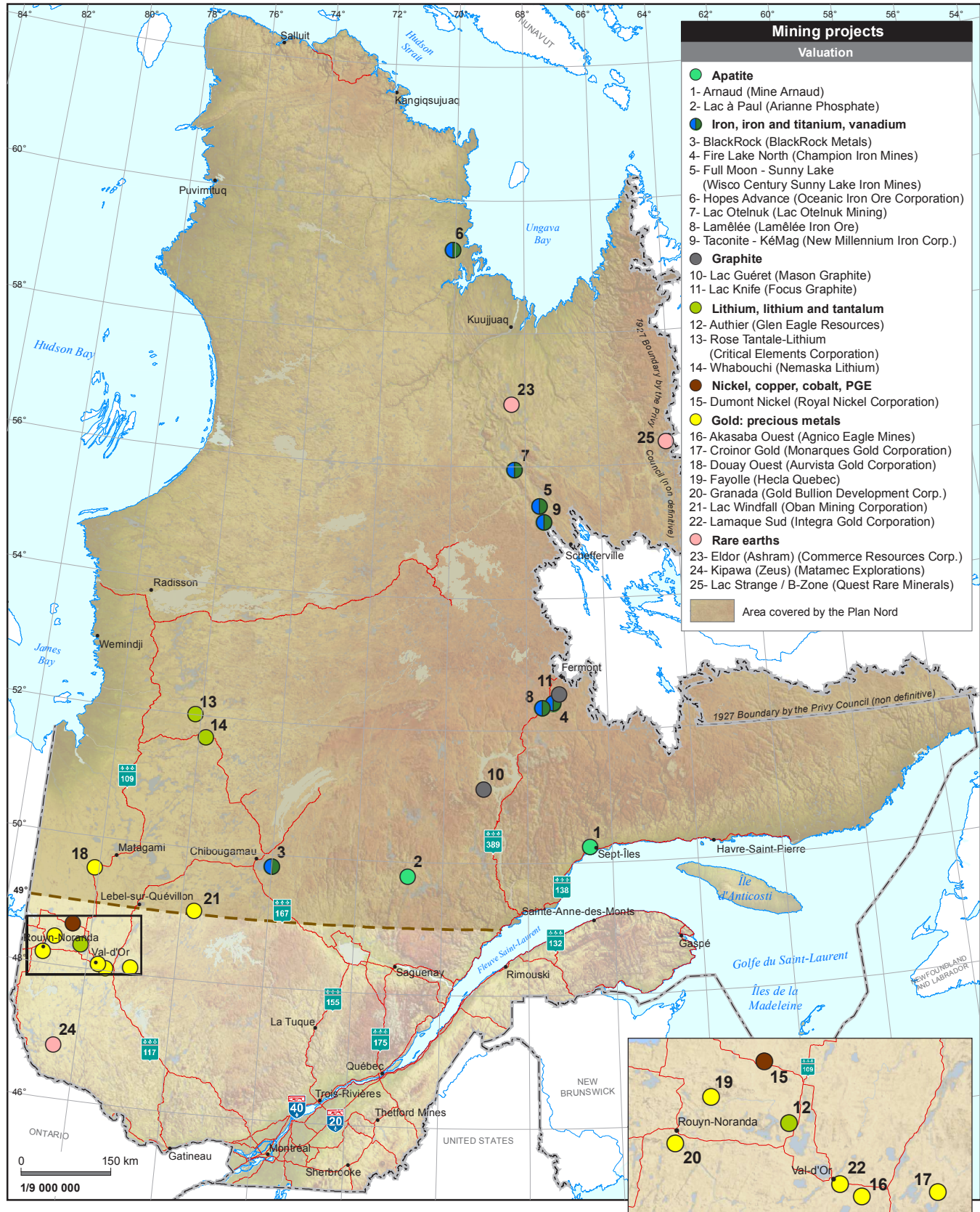


Figure 5.2 - Location of the mining projects in the development phase and in care and maintenance in Québec in 2015.



TABLE 5.1 – Mining projects in the deposit appraisal phase in Québec – December 31, 2015⁽¹⁾ (see Figure 5.1).

No.	TOWNSHIP / Nrs / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF THE PROJECT AND TYPE OF MINE	COMMODITY	PROVEN RESERVES ⁽²⁾	PROBABLE RESERVES ⁽²⁾	MEASURED RESOURCES	INDICATED RESOURCES	INFERRED RESOURCES	EXTRACTION OR MILL NOMINAL CAPACITY	EXPECTED START-UP DATE	EXPECTED MINE LIFE
Apatite													
1	ARNAUD / 22J02 / Côte-Nord	Arnaud	Mine Arnaud	Layered mafic complex	Apatite	* 274.18 Mt at 4.22% PO	* 68.42 Mt at 4.61% PO	413.58 Mt at 4% PO	131.91 Mt at 3.98% PO	44.64 Mt at 3.36% PO	30,000 t/d (mill)	2019	28 years
2	22E15 / Saguenay-Lac-Saint-Jean	Lac à Paul	Ariane Phosphate	Anorthosite-related magmatic deposit Open pit mine	Apatite	* 313.71 Mt at 6.92% PO	* 158.38 Mt at 6.8% PO	336.76 Mt at 7.22% PO	253.48 Mt at 7.02% PO	9.81 Mt at 5.89% PO	55,000 t/d (mill)	2018	26 years
Iron, iron-titanium-vanadium													
3	LEMOINE / 32G16 / Nord-du-Québec	BlackRock	BlackRock Metals	Anorthosite-related magmatic deposit Open pit mine	Ilmenite Iron Vanadium	* 356.45 Mt at 6.97% TiO ₂ 19.39% Fe	* 48.7 Mt at 7.62% TiO ₂ 19.97% Fe	380.7 Mt at 6.8% TiO ₂ 25.34% Fe	84.9 Mt at 7.1% TiO ₂ 25.76% Fe	84.5 Mt at 7.5% TiO ₂ 26.6% Fe	12.4 Mt/y (mill)	n/a	100 years
4	MALAPART / 23B06 / Côte-Nord	Fire Lake North	Champion Iron Mines / subsidiary of Champion Iron Limited	Specular hematite in metamorphosed Lake Superior-type iron formations	Iron	* 23.73 Mt at 35.96% Fe	* 440.86 Mt at 32.17% Fe	40.3 Mt at 34.19% Fe	715 Mt at 31.42% Fe	461 Mt at 31.83% Fe	26 Mt/y (mill)	n/a	20 years
5	Nord-du-Québec	Full Moon-Sunny Lake	Wisico Century Sunny Lake Iron Mines	Taconite	Iron	n/a	n/a	n/a	2248.2 Mt at 30.18% Fe	2,669 Mt at 29.86% Fe	20 Mt/y	n/a	30 years
6	24M08 / Nord-du-Québec	Hopes Advance	Oceanic Iron Ore Corporation	Taconite Open pit mine	Iron	* 763.28 Mt at 32.3% Fe	* 595.99 Mt at 32.1% Fe	774.24 Mt at 32.2% Fe	613.8 Mt at 32% Fe	222,19 Mt at 32.5% Fe	26 Mt/y (mill)	n/a	31 ans
7	23N16 / Nord-du-Québec	Lac Otelnuik	Lac Otelnuik Mining / joint venture Adriana Resources and WISCO International Resources & Development Investment	Taconite Open pit mine	Iron	n/a	n/a	16.21 Gt at 29.3% Fe	4.43 Gt at 31.5% Fe	6.84 Gt at 29.8% Fe	120 Mt/y (mill)	n/a	30 years
8	Nord-du-Québec	Lamélee	Lamélee Iron Ore	Hematite/magnetite	Iron	n/a	n/a	n/a	n/a	354.1 Mt at 29.49% Fe	5 Mt/y	n/a	20 years
9	23O04 / Nord-du-Québec	Taconite-KéMag	New Millennium Iron Corporation	Taconite Open pit mine	Iron	* 1,172 Gt at 31.2% Fe	* 718 Mt at 31.4% Fe	1,507 Gt at 31.4% Fe	876 Mt at 31.95% Fe	1,007 Gt at 31.56% Fe	88 Mt/y (mill)	n/a	25 years
Graphite													
10	22N03 / Côte-Nord	Lac Guéret	Mason Graphite / joint venture POCMIL 1	Paragneiss Open pit mine	Graphite	18.93 Mt at 17.8% Cg	43.94 Mt at 16.9% Cg	19.1 Mt at 17.9% Cg	46.6 Mt at 16.9% Cg	17.7 Mt at 17.2% Cg	52,000 t/y (mill)	n/a	25 years
11	23B11 / Côte-Nord	Lac Knife	Focus Graphite	Paragneiss Open pit mine	Graphite	* 0.43 Mt at 23.61% Gp	* 7.43 Mt at 14.64% Gp	0.43 Mt at 23.66% Gp	9.14 Mt at 14.35% Gp	3.1 Mt at 13.25% Gp	44,300 t/y (mill)	n/a	25 years
Lithium, lithium-tantalum													
12	LA MOTTE / 32D08 / Abitibi-Témiscamingue	Authier	Glen Eagle Resources	Spodumene-bearing granitic pegmatites Open pit mine	Lithium	n/a	n/a	2.36 Mt at 0.9% LiO	5.12 Mt at 0.92% LiO	0.29 Mt at 0.87% LiO	2,200 t/d (mill)	n/a	12 years
13	33C01 / Nord-du-Québec	Rose Tantalite-Lithium	Critical Elements Corporation	Spodumene-bearing granitic pegmatites Open pit mine	Lithium Tantalum	n/a	n/a	n/a	26.5 Mt at 0.98% Li ₂ O 163 g/t Ta ₂ O ₅	10.7 Mt at 0.86% Li ₂ O 145 g/t Ta ₂ O ₅	4,600 t/d (mill)	n/a	17 years
14	32O12 / Nord-du-Québec	Whabouchi	Nemaska Lithium	Spodumene-bearing granitic pegmatites Underground and open pit mine	Lithium	* 13.3 Mt at 1.54% LiO	* 14 Mt at 1.39% LiO	13 Mt at 1.6% LiO	14.99 Mt at 1.54% LiO	4.69 Mt at 1.51% LiO	2,740 t/d (mill)	2018	26 years

TABLE 5.1 – Mining projects in the deposit appraisal phase in Québec – December 31, 2015⁽¹⁾ (see Figure 5.1).

No.	TOWNSHIP / Mts / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF THE PROJECT AND TYPE OF MINE	COMMODITY	PROVEN RESERVES ⁽²⁾	PROBABLE RESERVES ⁽²⁾	MEASURED RESOURCES	INDICATED RESOURCES	INFERRED RESOURCES	EXTRACTION OR MILL NOMINAL CAPACITY	EXPECTED START-UP DATE	EXPECTED MINE LIFE
Nickel, copper, cobalt, PGE													
15	LAUNAY / 32D09 / Abitibi-Témiscamingue	Dumont Nickel	Royal Nickel Corporation	Magmatic deposit Open pit mine	Nickel Cobalt Palladium Platinum	* 179.6 Mt at 0.32% Ni 114 g/t Co 0.029 g/t Pd 0.013 g/t Pt	* 999 Mt at 0.26% Ni 106 g/t Co 0.017 g/t Pd 0.008 g/t Pt	372.1 Mt at 0.28% Ni 112 g/t Co 0.024 g/t Pd 0.011 g/t Pt	1.29 Gt at 0.26% Ni 106 g/t Co 0.017 g/t Pd 0.008 g/t Pt	499.8 Mt at 0.26 % Ni 101 g/t Co 0.014 g/t Pd 0.006 g/t Pt	52,000 t/d (mill)	2017	33 years
Gold													
16	32C04 / Abitibi-Témiscamingue	Akasaba Ouest	Agnico Eagle Mines	Disseminated gold sulphides Open pit mine	Gold Copper	n/a	4.8 Mt at 0.92 g/t Au 0.52% Cu	n/a	2.8 Mt at 0.60 g/t Au 0.33% Cu	n/a	10,000 t/d (extraction) Ore processed at Goldex	2017	6 years
17	PERSHING / 32C03 / Abitibi-Témiscamingue	Croinor Gold	Corporation Aurifère Monarques	Lode gold Underground mine	Gold	* 0.07 Mt at 6.25 g/t Au	* 0.47 Mt at 6.85 g/t Au	0.08 Mt at 8.41 g/t Au	0.6 Mt at 9.18 g/t Au	0.16 Mt at 8.56 g/t Au	425 t/d (extraction)	n/a	5 years
18	DOUAY / 32E09 / Nord-du-Québec	Douay Ouest	Aurvista Gold Corporation	Open pit Underground mine	Gold	n/a	n/a	n/a	2.6 Mt at 2.77 g/t Au	1.4 Mt at 1.77 g/t Au	900 t/d (extraction)	n/a	4 years
19	AIGUEBELLE / 32D07 / Abitibi-Témiscamingue	Fayolle	Hecla Québec	Disseminated gold sulphides and stockwork Open pit mine	Gold	n/a	n/a	n/a	n/a	n/a	750 to 1,000 t/d (extraction) Ore processed at Westwood	n/a	3 years
20	ROUYN / 32E02 / Abitibi-Témiscamingue	Granada	Gold Bullion Development Corporation	Lode gold Open pit and underground mine	Gold	0.17 Mt at 3.72 g/t Au	0.4 Mt at 4.46 g/t Au	7.8 Mt at 2.14 g/t Au	5.3 Mt at 2.32 g/t Au	8.6 Mt at 2.23 g/t Au	550 t/d (extraction) Ore processed at Westwood	2016	Progressive start-up for the open pit part on 3 years
21	32G04 / Abitibi-Témiscamingue	Lac Windfall	Oban Mining Corporation	Lode gold Underground mine	Gold	n/a	n/a	n/a	2.8 Mt at 8.42 g/t Au	3.5 Mt at 7.62 g/t Au	1,200 t/dj	n/a	8 years
22	32C04 / Abitibi-Témiscamingue	Lamaque Sud	Integra Gold Corporation	Lode gold Underground mine	Gold	n/a	n/a	n/a	5.3 Mt at 6.78 g/t Au	4.3 Mt at 7.03 g/t Au	2,200 t/d (mil)	n/a	4 years
Rare earths													
23	24C16 / Nord-du-Québec	Eldor (Ashram)	Commerce Resources Corporation	REE-enriched carbonatite Open pit mine	Rare earths Light RE Heavy RE Yttrium	n/a	n/a	1.59 Mt at 1.77% TREO 1.65% LREO 0.068% HREO 0.058% Y2O3	27.67 Mt at 1.9% TREO 1.82% LREO 0.05% HREO 0.038% Y2O3	219.8 Mt at 1.88% TREO 1.81% LREO 0.044% HREO 0.03% Y2O3	4,000 t/d (mill)	n/a	25 years
24	VILLEDIEU / 31L15 / Abitibi-Témiscamingue	Kipawa (Zeus)	Matamec Explorations	REE-enriched syénite Open pit mine	Rare earths Light RE Heavy RE Yttrium	* 10.22 Mt at 0.44% TREO 0.059% HREO 0.279% LREO 0.101% Y ₂ O ₃	* 9.55 Mt at 0.379% TREO 0.053% HREO 0.239% LREO 0.087% Y ₂ O ₃	10.48 Mt at 0.461% TREO 0.062% HREO 0.294% LREO 0.106% Y ₂ O ₃	13.38 Mt at 0.364% TREO 0.05% HREO 0.232% LREO 0.082% Y ₂ O ₃	3.27 Mt at 0.309% TREO 0.039% HREO 0.221% LREO 0.064% Y ₂ O ₃	3,650 t/d (mill)	n/a	11 years

TABLE 5.1 – Mining projects in the deposit appraisal phase in Québec – December 31, 2015⁽¹⁾ (see Figure 5.1).

No.	TOWNSHIP / NRS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF THE PROJECT AND TYPE OF MINE	COMMODITY	PROVEN RESERVES ⁽²⁾	PROBABLE RESERVES ⁽²⁾	MEASURED RESOURCES	INDICATED RESOURCES	INFERRED RESOURCES	EXTRACTION OR MILL NOMINAL CAPACITY	EXPECTED START-UP DATE	EXPECTED MINE LIFE
25	24A08 / Nord-du-Québec	Lac Strange / B-Zone	Quest Rare Minerals	REE- and yttrium-enriched pegmatite and apfite in peralkaline Open pit mine	Rare earths Light RE Heavy RE Niobium Zirconium Yttrium Hafnium	n/a	n/a	n/a	278.13 Mt at 0.93% TREO 0.57% LREO 0.12% HREO 0.18% Nb ₂ O ₅ 1.92% ZrO ₂ 0.24% Y ₂ O ₃ 0.05% HfO ₂	214.35 Mt at 0.85% TREO 0.55% LREO 0.11% HREO 0.14% Nb ₂ O ₅ 1.71% ZrO ₂ 0.19% Y ₂ O ₃ 0.04% HfO ₂	1,538 Mt/y (mill)	n/a	20 years

Notes:

1-The list of abbreviations is provided in Appendix 2.

Data compiled in this table are preliminary and are based on information publicly released by mining companies.

2 - The distinction between proven and probable reserves, and between measured, indicated, and inferred resources is defined in accordance with National Instrument 43-101.

* The reserves are included in the resources.

RE: Rare earths

LREO: Light rare earth oxides (lanthanum, cérium, praséodymyum, néodymium, samarium)

HREO: Heavy rare earth oxides (europium, gadolinium, terbium, Dysprosium, holmium, erbium, thulium, ytterbium, lutécium)

TREO: LREO + HREO + Y₂O₃

TABLE 5.2 – Mining projects in the development phase and in care and maintenance in Québec – December 31, 2015⁽¹⁾ (see Figure 5.2).

No.	TOWNSHIP / NRS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF THE PROJECT AND TYPE OF MINE	COMMODITIES	PROVEN RESERVES ⁽²⁾	PROBABLE RESERVES ⁽²⁾	MEASURED RESOURCES	INDICATED RESOURCES	INFERRED RESOURCES	EXTRACTION OR MILL NOMINAL CAPACITY	EXPECTED START-UP DATE	EXPECTED MINE LIFE
Diamonds													
1	33A16 / Nord-du-Québec	Renard	Stornoway Diamond Corporation	Kimberlites Underground and open pit mine	Diamond	n/a	* 23.79 Mt at 0.755 c/t DD	n/a	35.45 Mt at 0.764 c/t DD	29,67 Mt at 0.57 c/t DD	7000 t/d (mill)	2016	11 years
Iron													
2	23J14 / Côte-Nord	DSO	Tata Steel Minerals Canada / joint venture New Millennium Iron Corporation and Tata Steel	Enriched iron formations Open pit mine	Iron	* 21.1 Mt at 59.87% Fe	* 43.01 Mt at 58.38% Fe	26.5 Mt at 59.6% Fe	72.4 Mt at 59.2% Fe	6.7 Mt at 56.7% Fe	6 Mt/y	Ramp-up phase	15 years
3	Côte-Nord	Lac Bloom	Cliffs Natural Resources and WISCO	Hematite/magnetite	Iron	n/a	n/a	n/a	n/a	n/a	20 Mt/y (mill)	600	2010 - (36) Ceased operations
Lithium													
4	LA CORNE / 32C05 / Abitibi-Témiscamingue	Québec Lithium	Énergie RB	Spodumene-bearing granitic pegmatites Open pit mine	Lithium	n/a	n/a	6.91 Mt at 1.18% LiO	26.33 Mt at 1.19% LiO	13.76 Mt at 1.21% LiO	3,800 t/d (mill)	n/a	15 ans

Notes:

1 - The list of abbreviations is provided in Appendix 2.

Data compiled in this table are preliminary and are based on information publicly released by mining companies.

2 - The distinction between proven and probable reserves, and between measured, indicated, and inferred resources is defined in accordance with National Instrument 43-101.

* - The reserves are included in the resources.



CHAPTER 6

Mineral production

6.1

Economic data and statistics on mineral production¹³

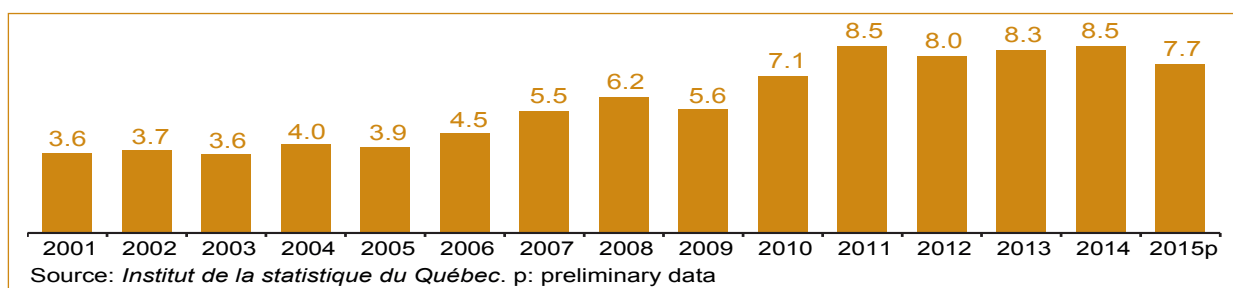
Mineral shipments

Québec has been the second-largest producer of metallic minerals in Canada since 2011, behind Ontario¹⁴, after coming in first position in 2009 and 2010. Québec is the most diversified mineral producer in Canada, given the production and beneficiation of 32 different minerals (16 metals and 16 industrial minerals) within its borders.

The value of shipments from Québec in 2015 (metallic and industrial minerals) reached \$7.7 billion, down 9.5% (based on actual figures) relative to 2014 (\$8.5 billion). This drop in the value of shipments is mainly attributable to the significant decline, since mid-2014, in the price of iron ore.

With the extraction of surface mineral substances such as crushed stone, sand and gravel, all administrative regions of Québec are involved in one way or another in the mining sector.

Figure 6.1
Value of mineral shipments in Québec, 2001–2015 (\$B).



Commodities produced in Québec

Iron, gold, titanium dioxide, stone (crushed, architectural, etc.), nickel and zinc are the main commodities produced in Québec in terms of value.

¹³ - All data on mining investments, jobs in the mining sector, and mineral production in Québec are compiled by the Institut de la statistique du Québec (ISQ) under the Mining Statistics Program.

¹⁴ - According to preliminary data from the ISQ and Natural Resources Canada.

Companies operating metallic ore mines in Québec

There were 19 metallic ore mines in operation in Québec during the second half of 2015 (Table 6.3).

In addition to exploration and deposit appraisal expenditures, companies in the mining sector make significant investments, for the construction of new mines or on existing mine sites. These investments, which include mine development work, capital assets and repairs, are primarily distributed in the three administrative regions where the most important mines in Québec are found (Abitibi-Témiscamingue, Côte-Nord and Nord-du-Québec) (Table 6.4).

TABLE 6.1 - Value of mineral shipments per administrative region in Québec in 2011, 2012, 2013, 2014 and 2015 (\$M).

No.	Region	2011	2012	2013	2014	2015p
1	Bas-Saint-Laurent	58	64	60	54	56
2	Saguenay-Lac-Saint-Jean	194	213	212	277	290
3	Capitale-Nationale	188	188	163	166	176
4	Mauricie	25	30	32	32	34
5	Estrie	84	86	82	83	84
6	Montréal	-	-	-	-	-
7	Outaouais	25	23	23	21	19
8	Abitibi-Témiscamingue	1,320	1,459	1,589	1,691	1,814
9	Côte-Nord	3,328	2,540	2,844	2,845	1,345
10	Nord-du-Québec	1,431	1,319	1,276	1,830	2,262
11	Gaspésie-Îles-de-la-Madeleine	64	59	53	67	91
12	Chaudière-Appalaches	76	65	52	51	42
13	Laval	-	-	-	-	-
14	Lanaudière	202	169	205	198	175
15	Laurentides	99	116	103	104	92
16	Montérégie	1,290	1,583	1,287	1,324	1 099
17	Centre-du-Québec	36	41	33	32	31
	Total	8,482	8,037	8,095	8,475	7,656

Data for 2015 are preliminary

Source: *Institut de la statistique du Québec*

Primary processing activities

In Québec, there are roughly 20 establishments where primary processing activities are carried out on ore mined in Québec or from abroad (Table 6.5). These activities are mostly based outside of mining regions and contribute to distributing the economic benefits of the mining sector across the entire province.

Establishments where metallic commodities are processed are generally more important in terms of jobs and economic benefits.

There are also primary processing plants for non-metallic commodities (industrial minerals) in Québec such as cement plants, lime production facilities, clay plants and processing plants for peat, graphite and perlite.

Jobs in the mining sector

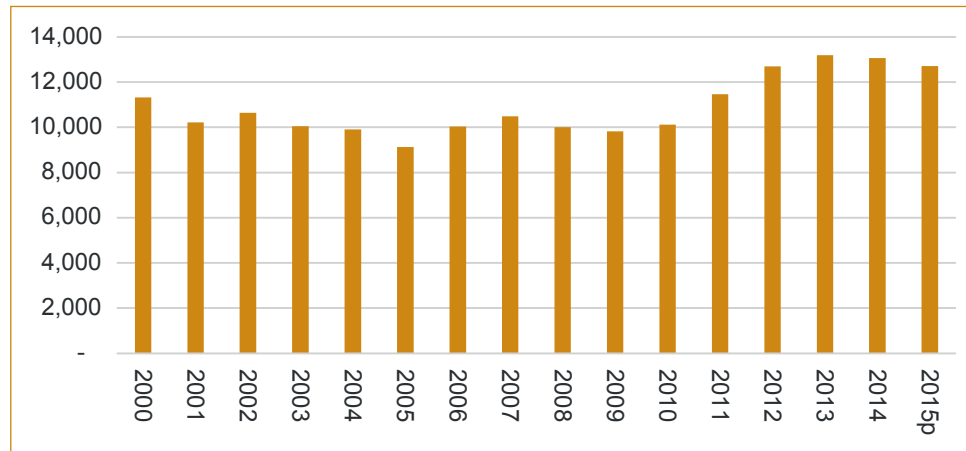
In 2015, according to preliminary data from the ISQ, the total number of jobs related to mineral extraction activities in Québec (metallic minerals and industrial minerals) was 12,700 (Table 6.6). These jobs were distributed throughout all regions of Québec, but particularly in the Abitibi-Témiscamingue, Côte-Nord and Nord-du-Québec regions, where the vast majority of metallic ore mines are located.

Mineral extraction and metal and industrial mineral processing activities generate a total of nearly 45,000 direct jobs, including those related to primary metal processing activities and the production of non-metallic mineral products (industrial minerals).

Given the scope of mining-related activities and investments, this sector contributes to the creation of several thousand indirect jobs distributed in all administrative regions of Québec. It is estimated that each direct job in the mining sector generates approximately 1 indirect job in another sector; for example, in the services sector¹⁵.

15 - According to a study of economic benefits published by the *Ministère des Ressources naturelles et de la Faune* in May 2011.

Figure 6.2
Number of jobs in the mineral extraction sector, 2000-2015.



p: data for 2015 are preliminary

TABLE 6.2 - Mineral shipments from Québec per commodity – 2011 to 2015.

SUBSTANCES	2011		2012		2013		2014		2015p	
	Volume	Value (\$M)	Volume	Value(\$M)	Volume	Value (\$M)	Volume	Value (\$M)	Volume	Value (\$M)
Metallic minerals										
Antimoine (t)	-	-	-	-	-	-	-	-	-	-
Bismuth (t)	5	< 1	4	< 1	-	-	-	-	-	-
Cadmium (t)	1,427	4	152	< 1	-	-	-	-	-	-
Cobalt (t)	450	18	475	15	560	17	902	32	1066	39
Copper (t)	20,043	175	23,649	188	31,769	240	39,253	299	45,802	301
Gold (t)	26	1,302	28	1,507	35	1,659	41	1,861	50	2,374
Iron (ore) (kt)	19,808	3,054	20,309	2,546	22,844	2,821	28,134	2,460	25,680	1,319
Iron (remelt) (t)	-	-	-	-	-	-	-	-	-	-
Lead (t)	2,264	6	1,207	2	-	-	-	-	-	-
Nickel (t)	26,464	599	27,180	473	32,147	497	42,974	801	53,452	850
Niobium (t)	4,551	-	4,705	-	4,916	-	-	-	-	-
Platinum group (kg)	-	-	-	-	-	-	-	-	-	-
Selenium (t)	19	3	37	4	-	-	-	c	-	-
Silver (t)	131	148	117	118	117.8	93	97	66	78,586	51
Tellurium (t)	2	< 1	3	< 1	-	-	-	c	-	-
Zinc (t)	191,120	415	167,628	385	130,057	256	122,144	292	93,640	219
<i>Total - Metallic minerals</i>	-	6,601	-	5,887	-	6,239	-	6,535	-	5,885
Industrial minerals										
Cement (kt)	2,705	377	2,834	329	2,432	305	2,526	378	2,648	411
Chrysotile asbestos(kt)	-	-	-	-	-	-	-	-	-	-
Clay products (bricks)	-	-	-	-	-	-	-	-	-	-
Graphite (t)	-	-	-	-	-	-	-	-	-	-
Ilmenite (kt)	-	-	-	-	-	-	-	-	-	-
Lime (kt)	753	101	-	-	-	-	-	-	-	-
Lithium	-	-	-	-	-	-	-	-	-	-
Mica (t)	-	-	-	-	-	-	-	-	-	-
Peat (millions of bags)	9.5	70	9.3	98	10.3	75	9.5	79	9.1	69
Salt (t)	-	-	-	-	-	-	-	-	-	-
Sand and gravel (kt)	21,350	112	26,418	142	22,251	121	20,299	116	17,613	100
Silica (kt)	538	19	568	23	648	23	432	14	490	21
Stone (kt)	49,566	531	46,843	516	41,982	494	40,393	468	35,730	430
Sulphur (kt)	135	25	151	30	129	25	113	19	126	25
Talc (t)	-	-	-	-	-	-	-	-	-	-
Titanium (t) (bioxide)	-	-	-	-	-	-	-	-	-	-
<i>Total - Industrial minerals</i>	-	1,880	-	2,150	-	1,856	-	1,940	-	1,771
Grand Total	-	8,482	-	8,037	-	8,095	-	8,475	-	7,656

p: data for 2015 are preliminary

Sources: Institut de la statistique du Québec and Natural Resources Canada

TABLE 6.3 - Operating companies of metallic ore mines in Québec – December 31, 2015.

Name of mine	Main commodity produced	Name of company	Company status	Head office
Beaufor	Gold	Richmont Mines	Public	Rouyn-Noranda
Bracemac-McLeod	Zinc	Glencore Canada Corporation	Public (subsidiary of Glencore)	Baar (Switzerland)
Canadian Malartic	Gold	Canadian Malartic GP	Public (joint venture Agnico Eagle and Yamana Gold)	Montréal
Casa Berardi	Gold	Hecla Québec	Public (subsidiary of Hecla Mining Company)	Cœur d'Alene, Idaho (USA)
Elder	Gold	Abcourt Mines	Public	Mont Saint-Hilaire
Éléonore	Gold	Les Mines Opinaca	Public (subsidiary of Goldcorp)	Vancouver
Fire Lake	Iron	ArcelorMittal Exploitation minière Canada	Public (subsidiary of ArcelorMittal)	Luxembourg
Goldex	Gold	Agnico Eagle Mines	Public	Toronto
Lac Bachelor	Gold	Metanor Resources	Public	Val-d'Or
Lac Herbin	Gold	QMX Gold Corporation	Public	Toronto
LacTio	Iron and titanium	RioTinto Fer et Titane	Public (subsidiary of RioTinto Group)	London(UK)
Langlois	Zinc	Nystar Canada Resources	Public (subsidiary of Nyrstar)	Zurich (Switzerland)
Lapa	Gold	Agnico Eagle Mines	Public	Toronto
LaRonde	Gold, silver, copper and zinc	Agnico Eagle Mines	Public	Toronto
Mont-Wright	Iron	ArcelorMittal Exploitation minière Canada	Public (subsidiary of ArcelorMittal)	Luxembourg
Niobec	Niobium	Niobec	Public (property of Magris Resources Canada)	Toronto
Nunavik Nickel	Nickel and copper	Canadian Royalties	Private (subsidiary of Jien Canada Mining)	Toronto
Raglan	Nickel and copper	Glencore Canada Corporation	Public (subsidiary of Glencore)	Baar (Switzerland)
Westwood	Gold	IAMGOLD Corporation	Public	Toronto

Source: *Ministère de l'Énergie et des Ressources naturelles*. Data as of December 31, 2015.

TABLE 6.4 - Total mining investments in certain administrative regions (exploration and deposit appraisal; mine development; in \$M).

	Abitibi-Témiscamingue			Côte-Nord			Nord-du-Québec			Other regions			Total		
	Explor. & dep. app.	Mine devel.	Total	Explor. & dep. app.	Mine devel.	Total	Explor. & dep. app.	Mine devel.	Total	Explor. & dep. app.	Mine devel.	Total	Explor. & dep. app.	Mine devel.	Total
2008	182	426	608	32	382	413	290	602	891	22	76	98	526	1,485	2,011
2009	166	820	987	14	497	510	185	263	447	15	82	96	379	1,661	2,041
2010	182	1,236	1,418	45	561	607	261	484	746	23	124	147	512	2,405	2,917
2011	286	756	1,042	68	1,350	1,419	438	876	1,314	42	106	148	834	3,089	3,923
2012	167	991	1,159	77	2,020	2,097	310	1,325	1,635	67	173	240	621	4,509	5,130
2013	80	754	834	32	1,523	1,555	203	1,342	1,545	67	576	642	382	4,194	4,576
2014	62	692	754	52	786	837	167	1,094	1,262	37	348	123	317	2,920	2,976
2015p	70	680	750	19	561	580	117	769	886	15	68	83	221	2,077	2,299

p: preliminary data

Data accurate as of March 2016

Source: *Institut de la statistique du Québec*

TABLE 6.5 - Primary metallic ore processing plants in Québec in 2015*.

Type	Name	Owner	Location
Copper refinery	Canadian Copper Refinery (CCR)	Glencore Canada	Montréal
Zinc refinery	Canadian Electrolytic Zinc (CEZ)	Noranda Income Limited Partnership	Montréal
Copper smelter	Horne Smelter	Glencore Canada	Abitibi-Témiscamingue
Smelter & iron-titanium processing plant	RTFT metallurgical complex	Rio Tinto, Fer et Titane	Montréal
Ferrous plant	Niobec plant	Magris Resources Canada	Saguenay-Lac-Saint-Jean
Silicon metal plant	Silicium Bécancour	QSI Partners	Centre-du-Québec
Ferrosilicon plant	Elkem Metal Canada	Elkem	Saguenay-Lac-Saint-Jean
Alumina refinery	Vaudreuil plant	Rio Tinto Alcan	Saguenay-Lac-Saint-Jean
Aluminium smelter	Arvida plant	Rio Tinto Alcan	Saguenay-Lac-Saint-Jean
Aluminium smelter	Laterrière plant	Rio Tinto Alcan	Saguenay-Lac-Saint-Jean
Aluminium smelter	Grande-Baie plant	Rio Tinto Alcan	Saguenay-Lac-Saint-Jean
Aluminium smelter	Alma plant	Rio Tinto Alcan	Saguenay-Lac-Saint-Jean
Aluminium smelter	Shawinigan plant	Rio Tinto Alcan	Mauricie
Aluminium smelter	Baie-Comeau plant	Alcoa	Côte-Nord
Aluminium smelter	Deschambault plant	Alcoa	Capitale-Nationale
Aluminium smelter	Aluminerie de Bécancour (ABI)	Alcoa and Rio Tinto Alcan	Centre-du-Québec
Aluminium smelter	Aluminerie Alouette	Aluminerie Alouette	Côte-Nord

* Does not include steel mills.

Source: MERN compilation as of March 2016

TABLE 6.6 - Distribution of direct jobs in the mineral production sector per administrative region in 2015.

No.	Region	Number of jobs*	Wages and salaries paid (\$M)	Hours paid (000)
1	Bas-Saint-Laurent	-	-	-
2	Saguenay–Lac-Saint-Jean	522	49	1,069
3	Capitale-Nationale	-	-	-
4	Mauricie	62	3	118
5	Estrie	-	-	-
6	Montréal	-	-	-
7	Outaouais	60	3	122
8	Abitibi-Témiscamingue	2,876	317	6,365
9	Côte-Nord	2,799	436	6,412
10	Nord-du-Québec	3,015	349	6,381
11	Gaspésie–Îles-de-la-Madeleine	170	10	343
12	Chaudière-Appalaches	140	6	270
13	Laval	-	-	-
14	Lanaudière	-	-	-
15	Laurentides	299	19	616
16	Montérégie	745	50	1,579
17	Centre-du-Québec	121	6	244
	Total	12,706	1,385	27,425

Data for 2015 are preliminary

Data as accurate of March 2016

Source: *Institut de la statistique du Québec*

* in man-day

Includes only the primary sector minus the diamond drilling.

Employment injuries in the mineral extraction sector

The mineral extraction sector inevitably generates some employment injuries (occupational diseases, employment injuries and industrial accidents), just like any other industrial sector. That said, year after year the mineral extraction sector¹⁶ accounts for only 1% of all employment injuries reported in Québec by the *Commission de la santé et de la sécurité au travail* (CSST). For more information on the *Regulation respecting occupational health and safety in mines*, please consult the *Act respecting occupational health and safety*, chapter S-2.1, r.14.

The *Act respecting industrial accidents and occupational diseases*¹⁷ stipulates that employers must keep a register of all industrial accidents that take place in their establishment, even if the accident does not render the worker unable to perform his duties beyond the day on which the event took place. The employer must show the register to the worker so the latter may sign the register to confirm he has indeed suffered an accident as well as provide the date of the accident. The employer must also ensure the CSST has access to the register.

The performance of the mining sector continues to improve year after year. Employment injuries have decreased 43% over the period from 2001 to 2014, an improvement similar to what is observed in other industrial sectors in Québec¹⁸ (Table 6.7).

The most common accidents occurring in the mining sector include collisions between vehicles, exposure to substances, excessive effort, being hit by an object, friction, vibration and repetitive movements.

Substantial efforts are continuously expended by governments and industry to reduce employment injuries. Safety in the mining sector is of prime concern for the CSST. It has namely devoted an entire section of its website¹⁹ to this industry, where it offers numerous guides and standards. The CSST is also responsible for the *Regulation respecting occupational health and safety in mines*²⁰. On July 11, 2013, fourteen amendments or additions were made to this regulation. The previous amendments, totalling 11, were made in January 2011.

16 - Data on employment injuries include mineral extraction activities, as well as drilling of oil and gas wells. The latter represents a small fraction of the number of jobs related to mineral extraction activities.

17 - <http://legisquebec.gouv.qc.ca/en/showdoc/cs/A-3.001>

18 - These data do not include employment injuries related to exploration and deposit appraisal activities, or to the primary processing metals and minerals.

19 - www.csst.qc.ca/prevention/secteur/minier/programme_intervention.htm

20 - <http://legisquebec.gouv.qc.ca/en/ShowDoc/cr/S-2.1,%20r.%2014>

FIGURE 6.3
Number of employment injuries in the mining sector, 2001-2014.

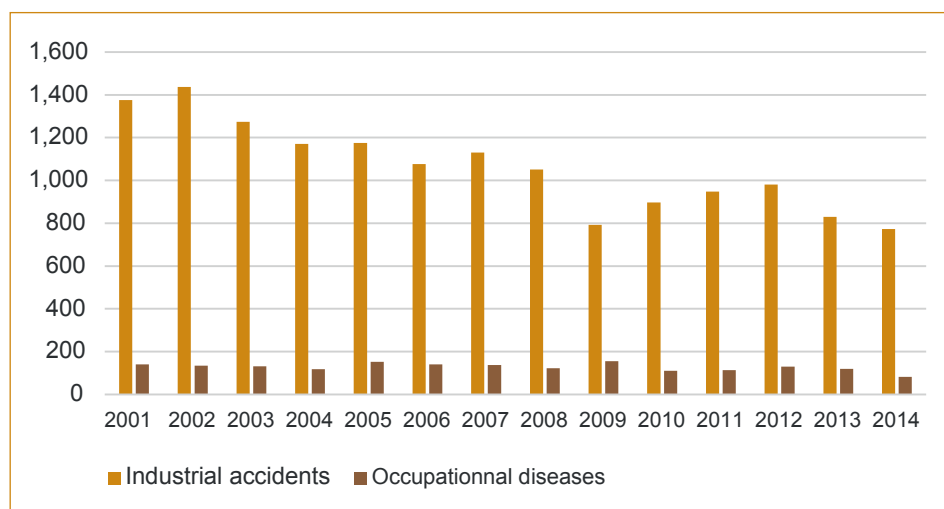


TABLE 6.7 - Reported and confirmed employment injuries – Mines, quarries and oil wells, 2001-2014.

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Industrial accident	1,375	1,436	1,274	1,170	1,175	1,077	1,130	1,051	792	897	948	948	980	773
Occupational disease	140	135	131	118	152	141	137	123	156	110	113	113	130	82
Total - Mining sector	1,515	1,571	1,405	1,288	1,327	1,218	1,267	1,174	948	1,007	1,061	1,061	1,110	855
Total - All sectors in Québec	141,283	137,456	135,724	132,906	125,931	122,086	112,009	108,758	95,597	92,112	91,030	91,030	89,640	88,046

6.2 Mineral production

A total of 26 mines were in operation in Québec in 2015; their location is shown in Figure 6.4. Tables 6.8 and 6.9, respectively, provide statistics on the production of metal commodities and industrial minerals in Québec.

Active mines: Openings and closures

In 2015, two mines achieved commercial production, but two other mines suspended mining operations. One of the latter, the Monique mine, permanently ceased operations.

Of the 26 active mines, five are in the process of carrying out expansions of their mine site: the Canadian Malartic (**Canadian Malartic GP**), LacTio (**Rio Tinto Fer et Titane**), Raglan (**Glencore Canada Corporation**), Bracemac-McLeod (**Glencore Canada Corporation**) and Goldex (**Agnico Eagle Mines**) mines.

Gold

On April 1, 2015, **Les Mines Opinaca**, a subsidiary of **Goldcorp**, announced it had achieved commercial production at the Éléonore mine. The company employs nearly 900 workers and the expected mine life is ten years.

Abcourt Mines achieved commercial production at the end of the fourth quarter in 2015. The latter employs about 50 workers.

Richmont Mines ceased mining operations at the Monique mine in 2015. At the Lac Herbin mine, **QMX Gold Corporation** temporarily suspended operations in March 2015 but resumed mining operations in September 2015.

Metallic minerals

The main metallic minerals mined in Québec in 2015 were silver, copper, iron, nickel, niobium, gold, titanium and zinc. Note that active metallic ore mines are those where mining leases are currently in effect.

Iron

The Mont-Wright mine held by **ArcelorMittal Mining Canada** delivered a record-breaking production of 26 Mt of iron concentrate in 2015. During a public presentation in July 2015, Mr. Lakshmi N. Mittal, president of ArcelorMittal, announced that operating costs now stood below US\$30 per tonne of iron concentrate at the Mont-Wright mine site. This exceptional performance (production volume and operating costs) should enable the Mont-Wright mine to carry on despite the crisis affecting the iron ore industry.

Concentrate produced at Mont-Wright is shipped to Port-Cartier by rail. Nearly 10 Mt of concentrate is pelletized and the rest is sold as is. Concentrate and pellets are sold on European, Asian and North American markets.

ArcelorMittal Mining Canada also operates the Fire Lake mine, located 55 km south of the Mont-Wright mining complex. Ore extracted at Fire Lake is shipped by rail to the Mont-Wright processing plant.

Iron-titanium

The year 2015 was particularly difficult for the LacTio mine held by **Rio Tinto Fer et Titane**. The company suspended operations for several weeks.

Nickel, copper, cobalt and platinum group elements

The Nunavik Nickel mine held by **Canadian Royalties** survived the year 2015, despite the substantial decline in the price of nickel and copper. This mine employs 400 workers.

Glencore Canada Corporation continued mining operations at the Raglan mine site. At the end of 2015, the company implied that new standards for atmospheric nickel concentrations could not be met with existing technology, and that it would reconsider its investments currently planned to extend mining operations at the Raglan mine beyond the year 2020.

Niobium

Niobec supplies between 8 and 10% of the global niobium consumption, which is currently used mainly in the form of ferroniobium to manufacture high-resistance low-alloy steel. In addition to being the only underground niobium mine in the world, Niobec is also the only active niobium mine outside of Brazil.

Gold

Most gold mining facilities include a processing plant where physical and hydrometallurgical (cyanidation) processes are performed. Gold concentrated by physical means and precipitated by cyanidation is smelted on the mine site to produce unrefined doré bars (containing gold and silver), which are shipped outside Québec for refining.

In 2015, **Richmont Mines'** Québec division (Beaufor and Monique mines; Camflo mill) produced 42,991 ounces of gold. The Monique mine permanently ceased operations and ore extracted at the Monique mine was processed at the Camflo mill. The company also updated its estimate of mineral reserves at the Beaufor mine. The latter increased by 95%, adding two years of production at the mine.

The Canadian Malartic mine is operated by the **Canadian Malartic GP**, a 50/50 joint venture between **Agnico Eagle Mines** and **Yamana Gold**. Its average annual production guidance is on the order of 600,000 ounces of gold.

The environmental impact study for the expansion of the Canadian Malartic mine, required to access the Barnat deposit and involving the deviation of Route 117 at the east end of Malartic, was submitted to the MDDELCC in January 2015.

The Casa Berardi mining complex held by **Hecla Québec**, a subsidiary of **Hecla Mining** based in Idaho (U.S.A.), includes an underground mine and a processing plant (cyanidation). The mine life was estimated at ten years in 2006, with an average annual production of 130,000 to 150,000 ounces of gold.

The Bachelor Lake mine held by **Metanor Resources** is located 4 km south of Route 113 and 90 km northeast of the town of Lebel-sur-Quévillon. The site includes an underground mine and a cyanidation processing plant. The expected mine life is four years (2013–2017), with an average annual production of 50,000 ounces of gold. In 2015, the company paid off its debt to Investissement Québec.

The Lac Herbin mine held by **QMX Gold Corporation** temporarily shut down in March 2015 but resumed operations in September 2015.

The Goldex mine site held by **Agnico Eagle Mines** includes an underground mine and a processing plant (gravity and flotation). The mine site is located 3 km west of the city of Val-d'Or, in a semi-urban area. On July 29, 2015, the company announced its decision to develop the Deep 1 project, which will add seven years to the mine life, now projected to last until 2024. The project involves an extension of the current mine at depth, in the same rock type, using the same mining methods. Some \$135 to \$140 million will be invested to develop this project, and nearly 400 jobs will be maintained as a result. Production in 2015 reached approximately 115,000 ounces of gold.

Wholly owned by **Agnico Eagle Mines**, the Lapa underground mine is located 11 km east of the LaRonde mine in Cadillac Township, about halfway between Val-d'Or and Rouyn-Noranda. In October 2015, the company announced that production was forecast to end at the mine in the third quarter of 2016. Nearly 200 employees working at the mine will be relocated to the company's other operations. Production in 2015 reached approximately 91,000 ounces of gold.

Agnico Eagle Mines operates the LaRonde polymetallic underground mine and processing plant. Unrefined doré bars (containing gold and silver) smelted on the mine site are shipped outside Québec for refining, whereas copper concentrates are shipped to the Horne smelter and zinc concentrates to British Columbia. Mining operations are expected to last until 2026, with an average production anticipated at 300,000 ounces of gold per year. The mine employs 830 workers and 260 contractors. Production in 2015 reached approximately 268,000 ounces of gold.

Richmont Mines produced 23,307 ounces of gold at the Monique open pit in 2014. At the end of 2014, 157,000 tonnes of ore grading 1.81 g/t Au extracted from the Monique pit were stockpiled on site, including about 54,700 tonnes at a grade of 2.67 g/t Au. Richmont Mines terminated mining operations in the Monique pit in January 2015. Stockpiled ore was processed at the Camflo mill during the year.

The Westwood underground mine was inaugurated by **IAMGOLD Corporation** in June 2013 and achieved commercial production on July 1, 2014. Total investments for the Westwood project, including an overhaul of the Doyon processing plant, reached \$700 million. The underground mine and processing plant are expected to provide 650 jobs, and the mine life is estimated at about twenty years. Production in 2015 stood at 60,000 ounces of gold, after reaching 82,000 ounces in 2014. Mining operations outside of the affected area continue at a moderate pace and production is expected to remain at 60,000 ounces in 2016. Production at the mine is expected to ramp up to full capacity over the next four years.

The Elder mine held by **Abcoart Mines** is located 10 km northwest of Rouyn-Noranda. The company produced its first doré bar in October 2013. Extracted ore was processed at the Aurbec mill until October 2014, and subsequently at the processing plant held by QMX Gold Corporation. Over the past two years, the company has been evaluating the potential for underground mineralization.

In the Baie-James region, the first gold pour took place in October 2014 at the Éléonore project. **Les Mines Opinaca**, a subsidiary of **Goldcorp**, achieved commercial production on April 1, 2015. Investments for the construction of the underground mine and the processing plant reached \$2.04 billion, and the project created 900 jobs. In 2015, the plant processed up to 5,400 tonnes of ore per day. This rate will increase to 7,000 tonnes per day in 2018. The production shaft is expected to be operational in 2016.

Zinc, copper, gold and silver

In 2015, two mines produced zinc and copper concentrates, namely the Bracemac-McLeod mine, located about 10 km from Matagami, and the Langlois mine, located 40 km from Lebel-sur-Quévillon. Although zinc and copper prices, in US dollars, were rather disappointing in 2015, the two operations took advantage of the weakness of the Canadian dollar to survive despite difficult market conditions. **Glencore**, owner of the Bracemac-McLeod mine, is continuing studies on the McLeod Deep project, which would enable the company to extend the mine life beyond 2017.

Industrial minerals

The value of industrial mineral shipments, as established by the ISQ, reached \$710 million in 2015 (preliminary data), compared to \$857 million in 2014 (final data). This represents a 17% decrease in the value of mineral shipments. These figures do not include the value of limestone, dolomite and clay product shipments, which are included with stone products, and also exclude the value of sand and gravel shipments.

Industrial minerals (non-metallic commodities) produced in Québec in 2015 include **potassium feldspar, graphite, mica, rock salt** and **silica**. Figure 6.4 shows the location of industrial mineral mines, and information on the latter is listed in Table 6.9.

Feldspar

Dentsply Canada extracts potassium feldspar at the Othmer mine, located 23 km northeast of Buckingham, in the Outaouais region. This high-purity product is namely used to manufacture dental ceramics. Only 5 to 8% of the feldspar recovered at the mine is of dental quality. Mining takes place at a rate of 70 tonnes every two years, and serves to replenish reserves and supply plants operated by Ceramco, a subsidiary of Dentsply Canada, located in Puerto Rico.

Graphite

IMERYS Graphite & Carbon Canada extracts graphite at the Lac-des-Îles deposit near Mont-Laurier. The company, member of the IMERYS Group, produces 24,000 tonnes of ultrafine to coarse flake graphite annually at its concentration plant. IMERYS Graphite & Carbon Canada is currently conducting exploration work in an effort to extend the mine life. Produced graphite is exported to Europe and sold on American markets. It is used to make refractories, lubricants and batteries (primary and rechargeable). Graphite is also used in metallurgy, to make automotive parts and in new technologies (polymers, supercapacitors, fullerene, nanotubes and graphene).

Mica

IMERYS Mica Suzorite operates the Lac Letondal mine in Haute-Mauricie since 1970. Ore is extracted every four years to supply their processing plant located in Boucherville. The last extraction campaign at the mine took place in 2014. At the current production rate, ore reserves, estimated at 27 Mt, are sufficient to last a century. The plant produces 30,000 tonnes of micronized mica annually, which, given its insulating and heat-resistant properties, is destined for the construction market (ceramics, rubber, plastic, plaster, paint, electric and electronic components). The company is planning to increase its production to 38,000 tonnes per year over the next four years. Sixty percent of its production is sold on Asian markets and 40% in North America.

Salt

Mines Seleine is a division of **K+S Windsor Salt**, a subsidiary of **K+S Canada Holdings**, headquartered in Saskatoon, Saskatchewan. The residual mine life of the Seleine mine is estimated at about twenty years. The salt it produces is used for winter de-icing purposes on roads in Québec, Ontario, in the Maritimes and along the East Coast of the United States.

Silica

The Petit-Lac-Malbaie mine in the municipality of Charlevoix produces 200,000 tonnes of silica annually, and is jointly operated by **Silicium Québec** and **Sitec Quartz**. Its silica production supplies foundries, glass factories, as well as the Silicium Québec plant in Bécancour and the plant operated by **Elkem Metal Canada** in Saguenay, which produces silicon metal and ferrosilicon.

In 2015, the mine operated by **Unimin Canada** in Saint-Canut produced 192,000 tonnes of silica from a siliceous sandstone unit. The processing plant on site has an annual production capacity of 500,000 tonnes. The silica production supplies the glass bottle market in Ontario and in the Montréal area.

The third active silica mine is held by **Silice St-Donat** and is located in Saint-Donat. Silice St-Donat resumed mining operations in 2015, after initially shutting down the mine in 2009.

Industrial stone

The location of industrial stone quarries in Québec is shown in Figure 6.5 and information relating to these quarries is listed in Table 6.10.

Industrial stone varieties produced in Québec in 2015 include **limestone, dolomite, marble, quartzite, sandstone** and **shale**. Limestone, dolomite and marble are mined for industrial purposes in 14 quarries and are used to produce quick lime, cement and various aggregate products (soil amendments, mineral fillers, granules). The main sources of silica are quartzites, quartz-rich sandstones and natural sand deposits. Shale (clay schist) used to manufacture facing bricks is quarried in a single location in the Montréal area.

Architectural stone

Figure 6.6 shows the location of architectural stone quarries in operation in Québec in 2015. Brief descriptions of each quarry are presented in Table 6.11.

A total of 37 architectural stone quarries were active in Québec in 2015. The Rivière-à-Pierre area, with its eight quarries in operation, is the most important stone-producing region in Québec. Other areas of interest for the production of dimension stone namely include Saint-Nazaire and Chute-du-Diable (six quarries), as well as the Saint-Alexis-des-Monts (two quarries) area.

In the Saint-Alexis-des-Monts area, near Lac de l'Aqueduc, **A. Lacroix et Fils** quarried blocks of a stone variety marketed under the name Autumn Brown.

Peat

Information regarding peat harvesting sites active in the summer of 2015 in Québec is listed in Table 6.12 and the location of these sites is shown in Figure 6.7.

According to the latest statistics available, Québec's peat production reached about 9.1 million bags of 170 dm³, for a total value on the order of \$69 million.

Ten producers were active in Québec, harvesting peat from nearly thirty different sites. Production in Québec comes mainly from the Bas-Saint-Laurent, Centre-du-Québec and Côte-Nord regions.

The peat production sector in Québec represents about 2,150 direct jobs, including 600 jobs related to peat harvesting and 1,550 related to other activities in the peat industry. In addition to peat harvesting, this industry encompasses the production of value-added products (horticultural growing media), the design of harvesting and packaging equipment as well as environmental applications (wastewater biofilters and absorbents).

During the summer of 2013, a new agreement on the implementation of the strategy and the 2013–2018 action plan for the **Peat and Agroenvironment** niche of excellence was signed in the Bas-Saint-Laurent region. This new agreement is a natural extension of the ACCORD (*Action concertée de coopération régionale de développement*) program.

The objectives of the 2013–2018 action plan are to promote continuous improvement in companies, accelerate the development of new products and new technologies, and provide support for market development. The plan also aims to increase the attractiveness of jobs in the peat production sector, namely through training, and contribute to the creation of favourable conditions for businesses.

The Peat and Agroenvironment niche of excellence brings together nearly 30 businesses from various sectors, namely horticultural and agricultural products, environmental products and specialized equipment. The Peat and Agroenvironment niche of excellence is coordinated by the Québec Peat Moss Producers Association (APTHQ, www.tourbehorticole.com).

Figure 6.4 - Active mines in Québec in 2015.



Figure 6.5 - Industrial stone quarries exploited in Québec in 2015.



Figure 6.6 - Architectural stone quarries exploited in Québec in 2015.

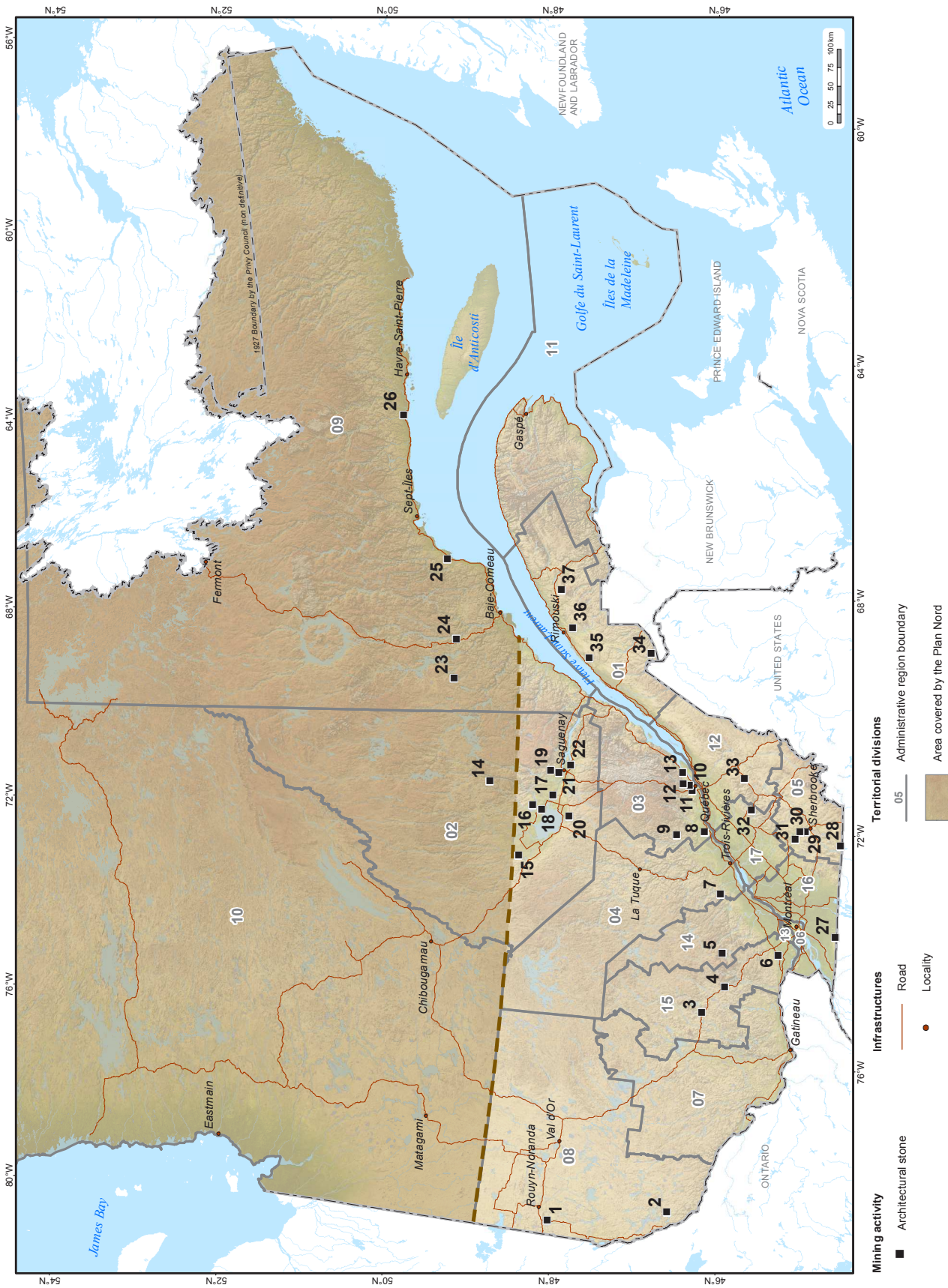


Figure 6.7 - Peatlands exploited in Québec in 2015.



TABLE 6.8 – Producing mines of metal commodities in Québec – December 2015⁽¹⁾ (see Figure 6.4).

No.	TOWNSHIP/ NTS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF ORE DEPOSIT AND TYPE OF MINE	COMMODITIES	PROVEN RESERVES ⁽²⁾	PROBABLE RESERVES ⁽²⁾	MEASURED RESOURCES	INDICATED RESOURCES	INFERRED RESOURCES	EXTRACTION OR MILL NOMINAL CAPACITY	AVERAGE NUMBER OF JOBS	YEARS OF PRODUCTION (EXPECTED MINE LIFE)
Iron, iron and titanium													
1	BERGERON / 23B06 / Côte-Nord	Fire Lake	ArcelorMittal Mining Canada / subsidiary of ArcelorMittal	Specular hematite in metamorphosed Lake Superior-type iron formation Open pit mine	Iron		The reserves and the resources are included in those of Mont-Wright.				75 Mt/a (extraction) Ore processed at Mont-Wright	40	1976 - 1984 (9) 2006 - ?
2	PARKER / 12L11 / Côte-Nord	LacTio	Rio Tinto Fer et Titane / subsidiary of Rio Tinto Group	Anorthosite Open pit mine	Ilmenite	n/a	121 Mt at 83.9% TiO	11 Mt at 84.9% TiO	n/a	n/a	3.5 Mt/a (extraction)	350	1950 - (100)
3	NORMANVILLE / 23B11 / Côte-Nord	Mont-Wright	ArcelorMittal Mining Canada / subsidiary of ArcelorMittal	Metamorphised Lac Superior-type iron formation Open pit mine	Iron	2,048 Mt at 28.7% Fe	81 Mt at 27.8% Fe	3,663 Mt at 30% Fe		1,850 Mt at 29.4 % Fe	70 Mt/a (mill)	1500	1974 - (66)
Nickel, copper, cobalt, PGE													
4	8030 / 35H11 / Nord-du-Québec	Nunavik Nickel	Canadian Royalties	Magmatic deposit Open pit mine	Nickel Cobalt Copper Platinum Gold Palladium	n/a	n/a				3,600 t/d (mill)	400	2014 - (15)
5	8029 / 35H12 / Nord-du-Québec	Raglan	Glencore Canada Corporation / subsidiary of Glencore	Magmatic deposit Underground and open pit mine	Nickel Cobalt Copper Platinum Palladium	* 3.75 Mt at 3.01% Ni 0.07% Co 0.73% Cu 0.76 g/t Pt 1.81 g/t Pd	*6.68 Mt at 3.05% Ni 0.06% Co 0.77% Cu 0.89 g/t Pt 2.04 g/t Pd	5.77 Mt at 3.92% Ni 0.08% Co 0.94% Cu 0.98 g/t Pt 2.29 g/t Pd	12.69 Mt at 3.25% Ni 0.07% Co 0.97% Cu 0.96 g/t Pt 2.41 g/t Pd	18 Mt at 3.0% Ni 0.1% Co 0.9 % Cu 0.9 g/t Pt 2.3 g/t Pd	3,600 t/d (mill)	900	1998 - (53)
Niobium													
6	SIMARD / 22D11 / Saguenay-Lac Saint-Jean	Niobec	Niobec / property of Magris Resources Canada	Carbonatite Underground mine	Niobium	n/a	* 416.42 Mt at 0.41% Nb ₂ O ₅	288.33 Mt at 0.43% Nb ₂ O ₅	0.35 Mt at 0.4% Nb ₂ O ₅	61.09 Mt at 0.38% Nb ₂ O ₅	2.4 Mt/y (mill)	480	1976 - (57)
Gold													
7	PASCALIS / 32C04 / Abitibi-Témiscamingue	Beaufor	Richmont Mines	Lode gold Underground mine	Gold	0.04 Mt at 7.31 g/t Au	0.27Mt at 6.48 g/t Au	0.1 Mt at 5.32 g/t Au	0.73 Mt at 6.5 g/t Au	0.135 Mt at 6.44 g/t Au	134,000 t/y (extraction) Ore processed at Camflo	120	1933 - 1951 (19) 1996 - 2000 (5) 2002 -2017 - (13)
8	FOURNIERE / 32D01 / Abitibi-Témiscamingue	Canadian Malartic	Canadian Malartic GP / joint venture Agnico Eagle Mines-Yamana Gold	Porphyric intrusion Open pit mine	Gold Silver	* 27.4 Mt at 0.97 g/t Au	* 83.3 Mt at 1.12 g/t Au	1.75 Mt at 1.32 g/t Au	11.1 Mt at 1.55 g/t Au	4.5 Mt at 1.47 g/t Au	55,000 t/d (mill)	685	2011 - (16)
9	CASA-BERARDI / 32E11 / Nord-du-Québec	Casa Berardi	Hecla Québec / subsidiary of Hecla Mining Company	Lode gold Underground mine	Gold	1.11 Mt at 5.29 g/t Au	7.93 Mt at 4.67 g/t Au	1.99 Mt at 5.29 g/t Au	9.9 Mt at 3.42 g/t Au	3.73 Mt at 4.98 g/t Au	2,400 t/d (mill)	500	1988 - 1997 (10) 2006 - (10)
10	BEAUCHASTEL / 32D06 / Abitibi-Témiscamingue	Elder	Abcoart Mines	Lode gold Mine souterraine	Gold	n/a	n/a	0.51 Mt à 6.68 g/t Au	0.67 Mt à 6.5 g/t Au	0.41 Mt à 5.76 g/t Au	630 t/d (extraction) Custom milled	2014	11 years

TABLE 6.8 – Producing mines of metal commodities in Québec – December 2015⁽¹⁾ (see Figure 6.4).

No.	TOWNSHIP/ NTS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF ORE DEPOSIT AND TYPE OF MINE	COMMODITIES	PROVEN RESERVES ⁽²⁾	PROBABLE RESERVES ⁽²⁾	MEASURED RESOURCES	INDICATED RESOURCES	INFERRED RESOURCES	EXTRACTION OR MILL NOMINAL CAPACITY	AVERAGE NUMBER OF JOBS	YEARS OF PRODUCTION (EXPECTED MINE LIFE)
11	33C09 / Nord-du-Québec	Éléonore	Les Mines Opinaca / subsidiary of Goldcorp	Stockwork Underground mine	Gold	3.0 Mt at 6.27 g/t Au	21.6 Mt at 6.30 g/t Au	0.86 Mt at 8.03 g/t Au	4.3 Mt at 6.0 g/t Au	12.1 Mt at 7.19 g/t Au	7,000 t/d (mill)	2015	10 years
12	DUBUISSON / 32C04 / Abitibi-Témiscamingue	Goldex	Agnico Eagle Mines	Lode gold Underground mine	Gold	0.3 Mt at 1.54 g/t Au	12.64 Mt at 1.61 g/t Au	12.36 Mt at 1.86 g/t Au	22.07 Mt at 1.88 g/t Au	24.63 Mt at 1.53 g/t Au	6,300 t/d (extraction) 9,500 t/d (mill)	300	2013 - (11)
13	LE SUEUR / 32F08 / Nord-du-Québec	Lac Bachelor	Metanor Resources	Lode gold Underground mine	Gold	0.19 Mt at 8.33 g/t Au	0.65 Mt at 7.1 g/t Au	0.19 Mt at 8.8 g/t Au	0.65 Mt at 7.49 g/t Au	0.43 Mt at 6.52 g/t Au	775 t/d (mill)	260	2013 - (4)
14	BOURLAMAQUE / 32C04 / Abitibi-Témiscamingue	Lac Herbin	QMX Gold Corporation	Lode gold Underground mine	Gold	n/a	n/a	n/a	n/a	n/a	1,000 t/d (Aurbel mill)	30	2008 - (8)
15	CADILLAC / 32D01 / Abitibi-Témiscamingue	Lapa	Agnico Eagle Mines	Lode gold Underground mine	Gold	0.44 Mt at 5.49 g/t Au	---	0.05 Mt at 5.33 g/t Au	1.09 Mt at 4.21 g/t Au	1.44 Mt at 6.52 g/t Au	1,500 t/d (extraction) Ore processed at LaRonde	200	2009 - (7)
16	BOUSQUET / 32D07 / Abitibi-Témiscamingue	Westwood	IAMGOLD Corporation	Lode gold and stockworks Underground mine	Gold	* 0.7 Mt at 7.5 g/t Au	* 1.72 Mt at 7.6 g/t Au	0.47 Mt at 12.7 g/t Au	1.45 Mt at 11.8 g/t Au	7.55 Mt at 11.3 g/t Au	2,600 t/d (extraction) Ore processed at Westwood	850	2013 - (22)
Gold, silver, copper, zinc													
17	BOUSQUET / 32D08 / Abitibi-Témiscamingue	LaRonde	Agnico Eagle Mines	Volcanogenic massive sulphides Underground mine	Gold Zinc Lead Copper Silver	3.46 Mt at 4.09 g/t Au 0.44% Zn 0.05% Pb 0.27% Cu 21.19 g/t Ag	14.77 Mt at 5.59 g/t Au 0.90% Zn 0.04% Pb 0.23% Cu 19.39 g/t Ag	n/a	6.84 Mt at 3.49 g/t Au 0.82% Zn 0.07% Pb 0.24% Cu 18.25 g/t Ag	9.14 Mt at 4.26 g/t Au 0.90% Zn 0.06% Pb 0.23% Cu 15.07 g/t Ag	7,200 t/d (mill)	840	1988 - (36)
Zinc, Copper, gold, silver													
18	GALINEE / 32F12 / Nord-du-Québec	Bracemac-McLeod	Glencore Canada Corporation / subsidiary of Glencore	Volcanogenic massive sulphides Underground mine	Zinc Copper Silver Gold	1.21 Mt at 6.24% Zn 1.29% Cu 16.9 g/t Ag 0.37 g/t Au	4.2 Mt at 6.8% Zn 1.1% Cu 27 g/t Ag 0.6 g/t Au	2.38 Mt at 5.55% Zn 1.28% Cu 17.4 g/t Ag 0.35 g/t Au	4.1 Mt at 7.3% Zn 1.2% Cu 30 g/t Ag 0.8 g/t Au	0.16 Mt at 7% Zn 2% Cu 20 g/t Ag 0.6 g/t Au	2,500 t/d (mill)	250	2013 - (7)
19	GREVET / 32F02 / Nord-du-Québec	Langlois	Nyrstar Canada Resources / subsidiary of Nyrstar	Volcanogenic massive sulphides Underground mine	Zinc Copper Silver Gold	1.90 Mt at 9.34% Zn 0.72% Cu 52.33 g/t Ag 0.04 g/t Au	* 0.64 Mt at 8.74% Zn 1.07% Cu 47.18 g/t Ag 0.09 g/t Au	2.48 Mt at 11.61% Zn 0.72% Cu 55.66 g/t Ag 0.04 g/t Au	1.95 Mt at 8.88% Zn 0.63% Cu 48.89 g/t Ag 0.08 g/t Au	1.12 Mt at 7.02% Zn 0.40% Cu 41.68 g/t Ag 0.07 g/t Au	2,570 t/d (mill)	270	2012 - (10)

Notes:

1 - The list of abbreviations is provided in Appendix 2.

Data compiled in this table are preliminary and are based on information publicly released by mining companies.

2 - The distinction between proven and probable reserves and between measured, indicated, and inferred resources is defined in accordance with National Instrument 43-101.

* - The reserves are included in the resources.

TABLE 6.9 – Producing mines of industrial minerals in Québec – December 31, 2015⁽¹⁾ (see Figure 6.4).

N°.	TOWNSHIP/ Mts / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF ORE DEPOSIT AND TYPE OF MINE	COMMODITY	PROVEN RESERVES ⁽²⁾	PROBABLE RESERVES ⁽²⁾	MEASURED RESOURCES	INDICATED RESOURCES	INFERRED RESOURCES	EXTRACTION OR MILL NOMINAL CAPACITY	AVERAGE NUMBER OF JOBS	YEARS OF PRODUCTION (EXPECTED MINE LIFE)
Feldspar													
20	PORTLAND / 31G11 / Outaouais	Othmer	Dentsply Canada	Pegmatite Open pit mine	Feldspar	n/a	0,24 Mt	n/a	n/a	n/a	40 t/y (mill)	n/a	2002 - (30)
Graphite													
21	BOUTHILLIER / 31J05 / Laurentides	Lac des Îles	IMERY'S Graphite & Carbone Canada	Crystalline limestones Open pit mine	Graphite	n/a	n/a	n/a	n/a	n/a	24,000 t/y (extraction)	60	1989 -
Mica													
22	SUZOR / 31O16 / Mauricie	Lac Letondal	IMERY'S Mica Suzorite	Ultramafic intrusion Open pit mine	Mica	n/a	27 Mt at 85% MI	n/a	n/a	n/a	30,000 t/y (mill)	30	1974 -
Salt													
23	ÎLES-DE-LA- MAD-ELEINE / 11N12 / Gaspésie-Îles-de-la-Madeleine	Mines Seleine	K+S Sel Windsor	Salt diapir Underground mine	Salt	11 Mt at 100% NaCl	6 Mt at 100% NaCl	n/a	n/a	n/a	n/a	150	1983 - (50)
Silica													
24	CHARLEVOIX 3 / 21M15 / Capitale-Nationale	Petit-Lac-Malbate	Silicium Québec s.e.c. and SITEC Quartz	Quartzite Open pit mine	Silica	n/a	n/a	n/a	n/a	n/a	200,000 t/y (mill)	60	1975 -
25	LAC DES DEUX- MONTAGNES / 31G09 / Laurentides	Saint-Canut	Unimin Canada	Postdam Group sandstone Open pit mine	Silica	n/a	n/a	n/a	n/a	n/a	550,000 t/y (mill)	60	1978 - (35)
26	Lussier / 31J08 / Lanaudière	Saint-Donat	Silice St-Donat	Quartzite Open pit mine	Silica	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1970 - 2009 2015 -

Notes:

1 - The list of abbreviations is provided in Appendix 2.

Data compiled in this table are preliminary and are based on information publicly released by mining companies.

The distinction between proven and probable reserves, and between measured, indicated, and inferred resources is defined in accordance with National Instrument 43-101.

2-The reserves are included in the resources.

TABLE 6.10 - Industrial stone quarries in production in Québec in 2015 (see Figure 6.5).

SITE	DEPOSIT	COMPANY	SUMMARY DESCRIPTION OF DEPOSIT	PRODUCTS	TOWNSHIP / NTS	ADMINISTRATIVE REGION
Limestone, dolomite, and marble						
1	Bedford	Graymont (Qc) (Bedford division)	Corey Formation limestone	Quicklime, ground limestone products for industrial use, crushed stone	Stanbridge / 31H03	16
2	Domlim #2 and #6	Graymont (Qc) (Marbleton division)	Lac Aylmer Formation limestone	Quicklime, ground limestone products for industrial use, crushed stone	Dudswell / 21E12	5
3	Jolichaux	Graymont (Qc) (Joliette division)	Deschambault Formation limestone	Quicklime, ground limestone products for industrial use, crushed stone	Lavaltrie / 31I03	14
4	Calco	Graymont (Portneuf)	Deschambault Formation limestone	Crushed stone, ground limestone products for industrial use	Seigneurie de Grondines / 31I09	3
5	Saint-Armand Principale	Omya Canada (St-Armand division)	Strites Pond Formation limestone	Pulverized limestone for use as mineral filler, terrazzo white granules	Seigneurie de Saint-Armand / 31H03	16
6	Saint-Armand Principale	Omya Canada (division St-Armand)	Strites Pond Formation limestone	Magnesian soil improvement	Seigneurie de Saint-Armand / 31H03	16
7	La Rédemption	Coopérative des Producteurs de chaux du Bas-Saint-Laurent	Dolomitic marble from the Sayabec Formation	Magnesian soil improvement	Awantjish / 22B05	1
8	Pères Trappistes	Les Calcites du Nord	Calcitic marble	White granules for artificial stone, masonry sand, soil improvement	Pelletier / 32A16	2
9	Ciment indépendant	Ciment St-Laurent (independant)	Trenton and Black River Groups limestone	Cement production	Lanoraye / 31I03	14
10	Saint-Basile-sud	Ciment Québec	Trenton and Black River Groups limestone	Cement production	Auteuil / 21L12	3
11	Ciment Lafarge	Lafarge Canada	Trenton and Black River Groups limestone	Cement production	Sault-Saint-Louis / 31H05	16
12	Soca	Agrégats Waterloo	Dolomitic marble from the Stukely-South fault zone	Magnesium-rich soil improvement, terrazzo granules, decorative aggregate	Stukely / 31H08	5
13	Saint-Ferdinand	Les Carrières St-Ferdinand	Oak Hill Group dolomite	Magnesium-rich soil improvement, decorative aggregate	Halifax / 21L04	17
14	Trottier Mills	Les Carrières St-Ferdinand	Oak Hill Group dolomite	Magnesium-rich soil improvement	Chester / 21L04	17
Claystone minerals						
15	Briqueterie Saint-Laurent	Les Briques Hanson	Nicolet Formation shale	Facing bricks	La Prairie / 31H06	16
Silica						
16	Sainte-Clotilde	Les Sables Silco	Potsdam Group sandstone	Silica-rich crushed stone for cement plant	Beauharnois-1 / 31H04	16
17	Saint-Joseph-du-Lac	La Compagnie Bon Sable	Natural sand	Washed sand for masonry and sandblasting	Lac-des-Deux-Montagnes-1 / 31H12	15
18	Saint-Bruno-de-Guigues	OPTA Minerals	Ordovician sandstone	Sand for filtering, smelting, hydraulic fracturing	Guigues / 31M06	8
19	Chromasco	Carrières Sud-Ouest	Potsdam Group sandstone	Crushed stone and silica-rich aggregate for cement plant	Beauharnois / 31H05	16
20	Lac Beauchêne	Les Pierres du Nord	Muscovite quartzite from the Kipawa Formation	Quartz granules for artificial stone	Campeau / 31L10	8
21	Lac Daviault	Exploration Québec / Labrador	Quartzite from the Wishart Formation, Gagnon Group	Quartz granules for artificial stone	Lislois / 23B14	9

TABLE 6.11 - Architectural stone quarries exploited in Québec in 2015⁽¹⁾ (see Figure 6.6).

SITE	LOCATION	COMPANY	TYPE OF ROCK - PRODUCTS	COMMERCIAL NAME	NTS	ADMINISTRATIVE REGION	TITLE
1	Beaudry	Les Pierres du Nord	Biotite schist - BS	Schiste Nordic	32D03	8	BEX 86
2	Témiscaming	Les Pierres du Nord	Muscovite quartzite- BS	Aventurine	31L10	8	BEX 355
3	Guénette	Rock of Ages du Canada	Monzogranite - DS, MO	Laurentian Pink, Autumn Pink	31J11	15	CM 79
4	Labelle	Excavation R.B.Gauthier	Paragneiss - BS	n/a	31J07	15	BEX 330
		Excavation R.B.Gauthier	Paragneiss - BS	n/a	31J07	15	BEX 337
		Les Pierres Naturelles Durand	Paragneiss - BS	n/a	31J07	15	BEX 76
5	Saint-Donat-de-Montcalm	Carrières F. L.	Gneiss - BS	n/a	31J08	14	BEX 140
6	Mirabel	Les Pierres Saint-Canut	Sandstone - BS	Saint-Canut Sandstone	31G09	15	Private
7	Saint-Alexis-des-Monts	A. Lacroix et Fils Granit	Quartz mangerite - DS	Autumn Brown	31I06	4	BEX 463
		Granicor	Quartz mangerite - DS, CS	Autumn Brown	31I06	4	Private
8	Saint-Marc-des-Carrières	Graymont (Portneuf)	Limestone - DS	Saint-Marc Limestone	31I09	3	Private
9	Rivière-à-Pierre	A. Lacroix et Fils Granit	Quartz mangerite - DS	Forest Green	31P01	3	BEX 349
		A. Lacroix et Fils Granit	Farsundite - DS	Deer Brown, Vert Atlantique	31P01	3	BM 723 BM 746
		Granicor	Quartz mangerite and quartz jotunite - DS, MO, CS	Vert Prairie	31P01	3	BEX 164 BEX 165
		Granicor	Quartz mangerite, farsundite - DS, CS	Nara	31P01	3	BEX 231
		Granite D.R.C.	Farsundite - DS, CS	Caledonia, Dark Caledonia	31P01	3	Private
		Polycor	Farsundite - DS, CS	Dark Caledonia	31P01	3	BEX 33
		Polycor	Farsundite - DS, CS	Rose Cendré	31I16	4	Privé
		Polycor	Farsundite - DS, CS	Titanium Blue	31P01	3	BEX 1013
10	Charlesbourg	Construction B.M.L.	Limestone - BS	n/a	21L14	3	Private
11	Québec	Les Pierres S.D.	Limestone - BS	n/a	21L14	3	Private
12	Sainte-Brigitte-de-Laval	Sablière Vallière	Granit block - BS	n/a	21L14	3	Private
13	Château-Richer	Carrière Daniel Lachance	Limestone - BS	n/a	21L14	3	Private
14	Chute-des-Passes	Polycor	Anorthosite - DS, MO, CS	Kodiac	22 E 06	2	BEX 402
15	Saint-Thomas-Didy	Granicor	Quartz mangerite - DS, CS	Acajou	32A15	2	Private
16	Chute-du-Diable	Granicor	Anorthosite - DS, MO, CS	Canadian Black (Peribonka)	22D13	2	Private
		Granicor	Anorthosite - DS, MO, CS	Canadian Black (Peribonka)	22D13	2	BEX 449
		A. Lacroix et Fils Granit	Anorthosite - DS, MO, CS	Black Cristal	22D13	2	BEX 1189
17	Saint-Nazaire	A. Lacroix et Fils Granit	Leucogabbronorite - DS	Nordix Green, Atlantic Black, Black Forest	22D12	2	Private (2 carrières)
		A. Lacroix et Fils Granit	Leucogabbronorite - DS	Atlantic Black, Nordix Green	22D12	2	BEX 148
		Polycor	Leucogabbronorite - DS, MO	Cambrian Black	22D12	2	BM 705 (2 quarries)
18	St-Henri-de-Taillon	Polycor	Anorthosite, leucotroctolite - DS, MO	Taillon Black	22D12	2	Private
19	Falardeau	Les Pierres Naturelles Tremblay	Limestone - BS	n/a	22D11	2	Private
20	Metabetchouan	Polycor	Farsundite, DS, CS	Violeta Canadien	22D05	2	Private
21	Tremblay	Carrière 500	Limestone - BS	n/a	22D06	2	Private
22	La Baie	Granicor	Farsundite, DS, CS	Polychrome	22D07	2	Private
		Sablière BY	Granite Block - BS	n/a	22D07	2	Private
23	Lac Poulin	Granijem	Granite - DS	Nordic Frost	22F14	9	BEX 490
24	Manic 3	Granijem	Gneiss - DS	Manic	22F15	9	BEX 489
25	Rivière-Pentecôte	Polycor	Anorthosite - DS, MO, CS	Nordic Black	22G14	9	BEX 155

TABLE 6.11 - Architectural stone quarries exploited in Québec in 2015⁽¹⁾ (see Figure 6.6).

SITE	LOCATION	COMPANY	TYPE OF ROCK - PRODUCTS	COMMERCIAL NAME	NTS	ADMINISTRATIVE REGION	TITLE
26	Magpie	Granijem	Hypersthene syenite - DS	Anticosti	22I08	9	BEX 436
27	Havelock	Carrières Ducharme	Sandstone - DS	Ducharme	31H04	16	Private (2 quarries)
28	Stanstead	Granite D.R.C.	Granite - DS, BS	Pepper & Salt	31H01	5	Private
		Rock of Ages du Canada	Granodiorite - DS, MO	Stanstead Grey	31H01	5	Private
29	Asbestos	Ardobec	Slate, BS	n/a	21 E05	5	Private
30	Bromptonville	Ardoise 55	Slate, DS,BS	n/a	21 E05	5	Private
31	Melbourne	Ardoise Kingsbury	Slate, BS	n/a	31H09	5	Private
32	Saint-Ferdinand	Les Carrières St-Ferdinand	Sandstone, dolomite - BS	n/a	21L04	17	Privé
33	East Broughton	Les Pierres Stéatites	Steatite, talc-carbonate rock, serpentinite - RS	n/a	21L03	12	Private
34	Saint-Marc-du-Lac-Long	Glendyne	Slate - BS, RT	La Canadienne, La Québécoise	21N07	1	Private
35	Saint-Mathieu- de-Rieux	J.-C. Ouellette	Sandstone - BS	n/a	22C03	1	Private
		Les Pierres St-Mathieu	Sandstone - BS	Grès Basques	22C02	1	BEX 460
36	Mont-Lebel	Les Pierres Naturelles du Québec	Siltstone - BS	n/a	22C08	1	Private
37	Saint-Cléophas	Carrière Bernier	Siltstone - PB	n/a	22B05	1	Private (2 quarries)

1- See legend abbreviations in Appendix 2.

BEX: exclusive lease to mine mineral surdace

BM: mining lease

CM: mining concession

Table 6.12 - Peatlands harvested in Québec in 2015 (See Figure 6.7).

SITE	DEPOSIT	COMPANY	SUMMARY DESCRIPTION OF DEPOSIT	PRODUCTS	TOWNSHIP / NTS	ADMINISTRATIVE REGION
1	Senneterre	9258-0315 Québec inc.	Peat	Sphagnum moss	Senneterre / 32C06	8
2	Saint-Bonaventure	Fafard et Frères	Peat	Sphagnum moss, potting soil, compost	Upton / 31H15	17
3	Saint-Valère Centre	Fafard et Frères	Peat	Sphagnum moss	Bulstrode / 31I01	17
4	Saint-Henri-de-Lévis	Premier Horticulture	Peat	Sphagnum moss	Seigneurie Lauzon / 21L11	12
5	Saint-Charles	Tourbière Smith 2000	Peat	Sphagnum moss	Seigneurie Lauzon and Fief de La Martinière (Beauchamp) / 21L10	12
6	Sainte-Marguerite Marie	Fafard et Frères	Peat	Sphagnum moss	Dolbeau / 32A16	2
7	Saint-Ludger-de-Milot SW / Saint-Ludger-de-Milot I	Fafard et Frères	Peat	Sphagnum moss	Milot / 22D13	2
8	L'Ascension Ouest	Tourbières Lambert	Peat	Sphagnum moss	Garnier / 22D12, 22D13	2
9	Saint-Léon	Tourbières Lambert	Peat	Sphagnum moss	Labrecque / 22D12	2
10	Saint-Nazaire	Tourbières Lambert	Peat	Sphagnum moss	Taché / 22D12	2
11	Rivière Ouelle	Tourbières Lambert	Peat	Sphagnum moss, potting soil, floral moss	Seigneurie Rivière-Ouelle / 21N05	1
12	Saint-André-Station	Tourbières Berger	Peat	Sphagnum moss	Seigneurie de L'Islet-du-Portage / 21N12	1
13	Rivière-du-Loup	Premier Horticulture	Peat	Sphagnum moss, potting soil, compost, endomycorrhiza, biofilters	Seigneurie Rivière-du-Loup and Cacouna / 21N13, 21N14	1
		Tourbière Michaud		Sphagnum moss		
		Les Tourbes M.L.		Sphagnum moss		
		Tourbières Berger		Sphagnum moss, potting soil		
		Tourbière Henri Théberge et associés		Sphagnum moss		
		Sun Gro Horticulture Canada		Sphagnum moss		
14	Isle-Verte Est	Tourbière Réal Michaud et fils	Peat	Sphagnum moss	Seigneurie Isle-Verte / 22C03	1
15	Saint-Fabien	Tourbière Henri Théberge et associés	Peat	Sphagnum moss	Seigneurie Nicolas-Rioux 03 / 22C07	1
		Tourbières Berger				
16	Saint-Ulric	Les Tourbes M.L.	Peat	Sphagnum moss	Matane / 22B13	1
17	Rivière Blanche	Les Tourbes M.L.	Peat	Sphagnum moss	Matane / 22B13	1
18	Escoumins	Tourbières Lambert	Peat	Sphagnum moss	Bergeronnes / 22C06	9
19	La Petite Romaine	Tourbières Lambert	Peat	Sphagnum moss	Iberville / 22C06	9
20	Sainte-Thérèse-de-Colombier «Est» et Sainte-Thérèse-de-Colombier NE	Sun Gro Horticulture Canada	Peat	Sphagnum moss	Betsiamites / 22C15	9
21	Groupe de tourbières à Pointe-Label ¹	Premier Horticulture	Peat	Sphagnum moss	Manicouagan / 22F01	9
22	Rivière-Pentecôte and Ruisseau-Chouinard #1	Tourbières Berger	Peat	Sphagnum moss	Fitzpatrick / 22G14	9
23	Port-Cartier Ouest	Les Tourbes M.L.	Peat	Sphagnum moss	Babel / 22J02	9
24	Port-Cartier and Port-Cartier NW	Sun Gro Horticulture Canada	Peat	Sphagnum moss	Babel / 22J02	9
25	Clarke City	Les Tourbes M.L.	Peat	Sphagnum moss	Arnaud / 22J02	9
26	Ville de Sept-Îles and Letellier III	Les Tourbes M.L.	Peat	Sphagnum moss	Letellier / 22J01, 22J08	9

1 - Group of peatlands at Pointe-Label: Pointe-Label, Rang VI, Cimetière, Piste de course, Petit Village, Carrée, Buissonnette, Petite-Rivière, LesBuissons, Baribeau Sud and Pointe-aux-Outardes.



CHAPTER 7

Mine site rehabilitation

7.1

Introduction

The Mining Act stipulates that a rehabilitation and restoration plan must be approved prior to the issuance of a mining lease, required to begin mining activities. This plan namely describes the type of restoration work to be performed and the total amount of the financial guarantee to be paid.

In addition to active mining projects and mines in operation, Québec also has some abandoned mine sites. The owners of these sites are unknown or insolvent. The MERN has decided to take action and rehabilitate these mine sites. It also monitors sites that were surrendered to the State in the past, or where a certificate has been issued to release the owner from further rehabilitation obligations pursuant to the Mining Act.

7.2

Active mines

Anyone engaged in mining activities is required to submit, prior to start-up, a rehabilitation and restoration plan, as well as a description of the financial guarantee and of the estimated cost of work required to rehabilitate and restore lands affected by mining activities.

The government has introduced measures to reduce the risk to the State of having to assume mine site rehabilitation costs. The amount of financial guarantee to be paid corresponds to 100% of the total cost of restoration work for the entire mine site. This guarantee is paid in three instalments (50% – 25% – 25%) over a two-year period. In addition, operators that don't pay the financial guarantee are subject to a fine corresponding to 10% of the total amount of the guarantee.

In 2015, mine operators paid \$244 million in financial guarantees, bringing the total amount of guarantees held by the MERN to \$678 million.

7.3

Mine sites under the responsibility of the State (surrendered, released or abandoned)

Environmental liability

In 2006, in an effort to determine the extent of its environmental liability, the government requested that all ministries and government agencies compile an inventory of abandoned contaminated sites.

The amount of money required to rehabilitate abandoned mine sites is recorded as a reduction of the environmental liability related to contaminated sites included in the government's consolidated financial statements.

As at March 31, 2015, 498 mine sites are included in the Government of Québec's environmental liability inventory, for a total amount of \$775.5 million. Among these:

- 263 are mineral exploration sites that require clean-up work:
 - 50 exploration sites in Nunavik,
 - 213 exploration sites in Eeyou Istchee Baie-James;
- 229 are mining sites:
 - 121 sites have been rehabilitated or secured. The MERN monitors and maintains these sites,
 - 22 sites are currently undergoing rehabilitation work,
 - 38 sites are in need of rehabilitation work,
 - 48 sites are in need of securement work; and
- 6 sites are quarries and/or sand pits.

From March 31, 2015, to March 31, 2016, the Mines Sector spent \$15.4 million to carry out rehabilitation work on abandoned mine sites. Since 2006, the MERN has spent a total of \$134 million to this end.

The complete list of sites included in the environmental liability inventory is available on the MERN website at the following address (in French only): www.mern.gouv.qc.ca/mines/restauration/.

Figure 7.1 shows the location of sites where rehabilitation and securement work was carried out by the MERN in 2015.

Characterization studies

The *Direction de la restauration des sites miniers* (DRSM) wishes to clearly define the environmental impacts of abandoned mine sites included in the MERN's environmental liability relating to mine sites. To this end, the DRSM has implemented an environmental characterization program of sites where rehabilitation work has yet to be performed. Environmental characterization namely serves to assess the actual impacts of each abandoned mine site on its receiving environment. It is the first step leading to the development of a rehabilitation plan and is necessary to prepare an estimate of rehabilitation costs recorded in the environmental liability relating to mine sites. It can also serve to determine which mine sites should be restored in priority.

The following characterization studies were carried out in 2015.

Arntfield

The Arntfield mine site is located 25 km west of Rouyn-Noranda. This former underground mine was in operation from 1935 to 1942. Gold and silver ore was mined from three different shafts.



Tailings pond at the Arntfield site.

Ore was processed on site by cyanidation, thereby generating a tailings pond that covers approximately 10 hectares (ha). Mine tailings are contained to the south by a dyke reaching 10 m high. Run-off water percolating under the dyke carries mine tailings to a small water course. These tailings are potentially acid-generating and leachable (may potentially release heavy metals in the receiving environment). The receiving environment consists mainly of Ruisseau Wasa, Lac Mud and Lac Renault.

The site also includes an area where industrial facilities were built. The foundations and structures of nearly a dozen former buildings present on site represent a safety hazard given their poor condition.

Environmental characterization of the site began in September 2015 and will be completed in September 2016. This work involves the design, planning and implementation of a site restoration study, including an impact assessment of lands disturbed by the presence of mine tailings, waste rock or any other source of contamination derived from activities related to the former mine.

Delbridge

The area of interest is located in Range X, Rouyn Township, and includes the former Eldona mine and the Delbridge deposit. More than 480,000 metric tonnes of ore were mined for zinc, copper, gold and silver over two short periods of time between 1950 and 1971. The ore was custom-milled off site.

The Delbridge site, which includes the main area of interest, the powder magazine and the ventilation raise, covers a surface area of less than 2 ha. Ruisseau Dallaire, which flows to the east of the site, constitutes the main receiving environment.

Environmental characterization work began in the fall of 2015 and the study will be completed in early 2016. Preliminary results confirm that waste rock on site is potentially acid-generating; however, its impact on the receiving environment is limited given the absence of surface aquifers.

Icon Sullivan

The Icon Sullivan mine site is located 20 km south of the Mistissini Cree community, north of Chibougamau. Here, a copper, zinc and silver deposit was mined by open pit and underground methods between 1967 and 1976. Based on available information, ore extracted during this time was mainly processed off site. However, starting in 1970, the ore was pre-concentrated on site, which generated a tailings accumulation area on site. Waste rock produced during mining operations are scattered over a surface area of more than 27 ha.

The characterization study is focused on the area where most of the mining facilities are located, including the pre-concentration plant.

Environmental characterization work took place over the course of 2015, and the study will be completed in early 2016. Preliminary results confirm that waste rock and pre-concentration mine tailings have a limited impact on the receiving environment.

Molybdenite Corporation

The Molybdenite Corporation mine site is located in the municipality of La Corne, about 30 km northwest of Val-d'Or. Molybdenum and bismuth ore was mined at this former underground mine from the main shaft from 1942 to 1945, and again from 1954 to 1972.



Tailings pond at the Molybdenite Corporation site.

Ore was processed on site by flottation, generating a tailings pond that covers a surface area of about 25 ha, still largely devoid of vegetation, a spillage zone of about 4 ha, and a waste pile approximately 20 metres high and covering a surface area of about 0.8 ha. Tailings contained in the pond have low potential for acid generation and heavy metal contamination. Ruisseau Lusignan, which flows into Rivière Harricana, is the receiving environment.

The area of interest includes the site where industrial facilities were built; some foundations and building structures remain. The latter represent a safety hazard given their poor condition and the presence of debris, including tiles that contain asbestos.

Environmental characterization of the site began in October 2015 and will be completed in September 2016. This work involves the design, planning and implementation of a characterization study.

Rehabilitation work

Estrie (05)

Suffield

This former zinc and copper mine is located about 10 km southwest of Sherbrooke. Mined ore was shipped to a processing plant located nearby, and as a result, there is no tailings pond on site. However, there is a waste pile covering a surface area of about 1 ha. The site is located on a hillside, near inhabited areas.



Beginning deposition of waste rock in the containment cell.



Waste rock cell after completion.

Laboratory tests indicate that the waste rock is leachable (high risk) and potentially acid generating. Higher concentrations of zinc, cadmium, nickel and copper were measured in surface water and groundwater downstream from the site.

The objective of the selected rehabilitation scenario is to prevent water from coming in contact with waste rock. To do so, the waste rock was contained in an impervious cell lined with a polyethylene geomembrane. Soils contaminated with metals were also placed in the cell.

This work began in May 2015. The unexpected discovery of additional waste rock in a wooded area required an expansion of the containment cell during the work program, which was finally completed in November 2015.

In parallel, four underground openings were secured and two partially collapsed buildings were also demolished during this time.

Post-rehabilitation monitoring of water quality will begin in 2016.

Outaouais (07)

Lac Renzy

The former Lac Renzy mine is located approximately 40 km west of kilometre 294 on Route 117. It lies within the Poirier outfitter's territory.

Mining operations at this nickel and copper mine took place from 1969 to 1972. Nearly 0.8 Mt of ore were mined in an open pit and were processed on site. The open pit mined out during operations has now been filled by water from Lac Renzy. Mining operations generated a waste rock pile covering 1.2 ha and a tailings accumulation area covering about 6.7 ha in the middle of Lac Renzy, in effect dividing the lake into two distinct water bodies.

Characterization studies carried out on site indicate that the mine tailings and waste rock are potentially acid generating and leachable. In addition, certain metals show concentrations in soils, sediments, surface water and groundwater that exceed criteria established by the MDDELCC.

Various rehabilitation scenarios were proposed (design engineering) and validated in 2015 for the tailings accumulation area, the waste rock pile and the mine site. The rehabilitation plan and detailed engineering phase, including plans and specifications, will be completed in 2016, in parallel with applications for environmental authorizations required to proceed with the work in 2017. Remediation work on contaminated soils identified in the vicinity of the former mining facilities will take place in the summer of 2016.

New Calumet

The New Calumet mine site is located 6 km west of the municipality of Bryson. This former lead and zinc mine was in operation from 1943 to 1968. Mining activities generated a volume of 1.3 million m³ of mine tailings that were deposited in three tailings ponds (A, B and C) covering a total surface area of about 20 ha.



Photo: MERN



Photo: MERN

Excavation of mine tailings at pond B.

Aerial view of pond B after excavation and landscaping work.

Mine tailings in the three tailings ponds are potentially (high risk) acid generating and leachable. On site, surface water and groundwater are contaminated with metals (zinc, cadmium, copper, lead) at concentrations exceeding MDDELCC criteria. Wind erosion has also led to contamination of soils on surface.

In 2014, the rehabilitation plan and detailed engineering phase of the rehabilitation scenario were completed. A multilayer covering, including a bentonite membrane, will be installed on ponds B and C to divert surface water and precipitations. This type of membrane consists of a layer of clay material contained between two woven geotextile membranes. Since a third of the surface area of pond A is located in a wetland and a marsh, a different concept was selected in order to preserve and enhance this environment, which naturally acts as an oxygen barrier, preventing sulphide oxidation reactions. The remaining undersaturated areas within pond A will be covered.

In the winter of 2015, the selected rehabilitation scenario was laboratory tested to confirm its effectiveness in field conditions typical of the New Calumet site. Bentonite membranes were submitted to several freeze-thaw and wet-dry cycles, using distilled water, contaminated groundwater collected on site and reconstituted precipitation water. The results indicate that the bentonite membrane should not come in contact with the contaminated groundwater on site, as this significantly increases its permeability. This type of membrane will be installed only in ponds B and C.

The first phase of the program took place from September to December 2015. Preparatory work was needed since the profile of pond B, with its steep slopes and its thick (about 30 metres) accumulation of mine tailings, made it impossible to implement the rehabilitation design. Approximately 180,000 m³ of mine tailings from pond B were moved to pond C. The slopes in pond B were thus reduced by 33%. Demolition of buildings and management of waste rock and contaminated soils were also carried out during the same period.

The type of covering used on pond A will be determined in the winter of 2016, and field work is scheduled to continue in the summer of 2016.

Abitibi-Témiscamingue (08)

Barvue

The Barvue mine site is located in the municipality of Barraute, about 50 km northwest of Val-d'Or. This former zinc and silver mine was in operation from 1952 to 1957, and during this time more than 5 Mt of ore were extracted and processed on site. These activities generated a tailings pond of roughly 35 ha.

A major breach of the north tailings dam during mining operations generated a tailings spill covering a surface area of about 28 ha along the shores of Ruisseau Marcotte, a tributary of Rivière Laflamme.

The characterization study completed in the spring of 2009 demonstrated that mine tailings on site were acid generating and leachable, and also revealed that the tailings containment dam needed to be secured in the short term. A rehabilitation plan for the entire site was developed in 2011. The selected rehabilitation scenario involved the installation of a multilayer covering including a textured high-density polyethylene geomembrane to prevent oxidation of the mine tailings, and consequently, acid mine drainage.



Installation of the geomembrane at the Barvue site.



Rehabilitation work at the Barvue site.

Rehabilitation work took place in four phases:

- **Phase 1** (winter of 2012): preparatory work, including the construction of an access road and tree removal in areas to be restored (65 ha);
- **Phase 2** (July to December 2012): dykes around the former tailings pond were stabilized and reshaped. Consolidation of the north dam, where a breach took place in the 1950s, required the construction of a berm and a partial derivation of Ruisseau Marcotte;
- **Phase 3** (January to October 2013): excavation of nearly 400,000 m³ of mine tailings in the spillage zone and deposition in the pond, landscaping and revegetation of nearly 2 km of shoreline along Ruisseau Marcotte and construction of two settling ponds;
- **Phase 4** (April 2014 - ongoing):
 - Excavation of the south part of the tailings pond, over a surface area of about 11 ha, and deposition of the tailings in the north part, to compensate for settling of saturated tailings deposited in 2013 and to ensure effective surface drainage conditions. This modification to the initial rehabilitation scenario reduces the environmental footprint of the Barvue site and leads to a significant reduction of costs;
 - Installation of a multilayer covering of more than 1 m in thickness, including a textured geomembrane over the entire surface of the tailings pond (about 26 ha) and construction of ditches at mid-slope on the dykes for improved erosion control;
 - Revegetation of the entire site. In a sustainable development perspective, fertilizing residual materials (paper mill biosolids, fly ash and wood shavings) were used to prepare the potting soil used to plant vegetation instead of the usual materials;
 - Installation of instrumentation required for post-rehabilitation environmental monitoring and to assess the performance of the rehabilitation scenario selected to restore the Barvue site (mainly observation wells and settlement plates).

In the spring of 2016, two small areas will be revegetated, and this will signal the end of rehabilitation work conducted on the Barvue mine site.

East Malartic

Located in the town of Malartic, this former gold mine was one of the most important in the Abitibi-Témiscamingue region when it was in operation.

In 2010, following the signature of the East-Osisko Project Agreement between the MERN and Osisko Mining Corporation, the mining company assumed responsibility for the management and rehabilitation of the mine site. Although Osisko Mining Corporation was acquired by Agnico Eagle Mines and Yamana Gold in 2015, rehabilitation of the former East Malartic tailings pond has continued as planned. Under the partnership agreement, rehabilitation costs, estimated at \$23 million, are shared equally. The maximum contribution for the MERN has thus been set at \$11.5 million.

Manitou

The Manitou site is located about 10 km southeast of Val-d'Or. Mining operations at this zinc, copper and lead deposit took place from 1942 to 1979 and produced nearly 11 Mt of acid-generating tailings, which were deposited in two inadequately contained tailings ponds. The tailings were dispersed along the periphery of the accumulation area and along Ruisseau Manitou over a distance of 6.5 km, eventually reaching Rivière Bourlamaque. The total surface area of land disturbed by mine tailings represents roughly 200 ha.



Tailings pond at the Manitou site undergoing rehabilitation work.

After the last mining titleholder went bankrupt in 2002, the MERN assumed responsibility for the Manitou site. At the end of 2006, the MERN and Agnico Eagle Mines concluded an agreement whereby alkaline mine tailings generated at the Goldex mine would be used to rehabilitate the Manitou tailings pond. Consequently, starting in September 2008, tailings from the Goldex mine were shipped to the Manitou site through a pipeline over a distance of 23 km.

Deposition of mine tailings, which was initially planned over a period of eight years, was interrupted following a temporary shutdown of the Goldex mine in October 2011. By then, nearly 8 Mt of tailings from the Goldex mine had already been deposited on the Manitou site. During the interruption, a new rehabilitation scenario was developed to optimize the initial design. The volume of tailings required to cover the site was reduced to account for the new mining methods in use at the Goldex mine and the need to backfill stopes. The new scenario calls for the deposition of 3.5 Mt of mine tailings from the Goldex mine until 2017.

Since mining operations have resumed at the Goldex mine in 2013, a total of 2.552 Mt of tailings have been shipped to the Manitou site, including 1.01 Mt in 2015.

Two test cells were installed in pond 1 in 2015. These consist of 100-m² cells, where the behaviour of various multi-layer coverings will be tested in order to select the best solution to cover pond 1. These tests will continue in 2016.

Preissac Molybdenite

This is a former molybdenum and bismuth mine located near the municipality of Preissac. The mine was active between 1962 and 1971, during which time approximately 2.2 Mt of ore were mined and processed on site. Mining operations generated a waste rock pile covering about 2 ha and two unconfined tailings ponds, each covering approximately 12 ha (pond A) and 22 ha (pond B). Pond A, located on the mine site, contains approximately 1.2 Mt of mine tailings. Rehabilitated in 1992, pond B, located in lots 11 and 12, Range IV, Preissac Township, is not included in the area of interest.

In 1971, clandestine activities, whereby tar containing copper chloride was secretly burned, took place on site and along the shores of Lac Fontbonne. The burn residues were incorporated to the waste rock pile when the mine site and its facilities were later dismantled.

Environmental characterization studies carried out since 2011 have confirmed the presence of chlorinated dioxin and furan contamination in the waste rock piles, backfill material, soils on surface, and groundwater collected on site and along the shores of Lac Fontbonne. Contamination was also observed in wildlife and vegetation (fish, hare, grouse, moose, and berries) collected in the area for human consumption. Consequently, the *Direction de la santé publique* of

the Abitibi-Témiscamingue Health and Social Services Agency issued a recommendation to the local population aiming to restrict access to the site and consumption of food products from the area (www.sante-abitibi-temiscamingue.gouv.qc.ca/la_sante_publique/sante_et_environment/contamination_du_site_preissac_molybdenite.html).

In addition to dioxin and furan contamination, more than 2,000 m³ of waste rock are contaminated with petroleum hydrocarbons. Waste rock on site is also considered acid generating, since very acid pH levels were measured in groundwater in the vicinity of the waste rock pile. Mine tailings on site are leachable and are subject to water erosion, which has an impact on the quality of surface water downstream from the site.

The development of solutions to rehabilitate the site, including remediation of lands contaminated with dioxins and furans, is currently underway.

Siscoe

This gold deposit is located on Siscoe Island in the middle of Lac De Montigny, near Val-d'Or. It was mined from 1926 to 1949, and 3.3 Mt of gold ore were extracted.



Siscoe site. Pond A after sowing.

Mining operations led to the creation of two unconfined tailings ponds along the shores of Lac De Montigny, totalling about 30 ha. The mine tailings are enriched in copper but are not acid generating and only weakly leachable. The main issue in this case was water erosion, which carried additional mine tailings into Lac De Montigny.

The rehabilitation plan, as well as plans and specifications, were prepared in 2013. The selected rehabilitation scenario consists of installing a granular monolayer covering over the mine tailings and building a network of drainage ditches. This work was carried out in 2014.

The site was entirely revegetated in 2015. Approximately 16,000 trees and shrubs were planted on both tailings ponds and on the site where the former industrial complex was located.

Nord-du-Québec (10)

Mine Principale

The former Principale (Campbell) copper mine, one of the largest in the Chibougamau area, was active from 1953 to 1979. However, the mill continued to process ore from neighbouring mines until 2010, when the operator went bankrupt. The site covers a surface area of more than 300 ha and encompasses three tailings ponds, a polishing pond, a mining site and an ore processing plant. This is the largest abandoned mine site in Québec.

Since 2010, several studies were conducted in preparation for the site restoration, namely an environmental characterization of the site, an assessment of the geotechnical stability of crown pillars in the vicinity of the mine and the ore processing plant, the preparation of a rehabilitation plan (design engineering) and specific studies to establish the geochemical and hydrogeological conditions on site.

The Principale mine site is located within trapline O-59 of the Oujé-Bougoumou community and within the Chibougamau city limits. Both communities are stakeholders and are very much involved in all work relating to the site rehabilitation and restoration through their participation in a steering committee and its technical subcommittee.

In 2015, following a public call for tenders, the MERN mandated a consulting engineering firm to carry out engineering work. The six-year contract covers all engineering work needed for the pre-feasibility and feasibility phases, studies, plans and specifications, and supervision of rehabilitation work done on site.

Following a review of all available data and previous studies, samples were collected and instrumentation was installed in the summer and fall of 2015 to acquire data needed for subsequent engineering phases. Specifically, a pluviometer was installed, groundwater levels were surveyed, surface water and groundwater samples were collected and analyzed, gauging campaigns were carried out, etc. More specific studies were also carried out to optimize the final rehabilitation scenario, namely hydrogeological modelling, geotechnical stability studies of underground openings and pit walls, as well as a hydrological assessment. Physical simulations of rehabilitation scenarios conducted at the URSTM (*Unité de recherche et de service en technologie minérale*) in the winter of 2014 were completed in the fall of 2015. The results will be integrated in the project engineering. Treatment options for hydrocarbon-contaminated soils present in the area where former mining facilities were located are currently being tested at the National Research Council of Canada. In parallel, the MERN is continuing maintenance and water management activities on site.

In 2016, the MERN hopes to progress in the selection of the final scenario and the preparation of plans and specifications for the various components of the project (restoration of accumulation areas, securement of underground openings and remediation of contaminated soils). Certain preparatory activities may begin; for example, preparation of access routes, clean-up of residual materials in the vicinity of the mine and the ore processing plant, etc. A major geotechnical characterization campaign (geotechnical drilling in former underground stopes) is also planned in the spring of 2016 to validate the stability of crown pillars and determine what needs to be done to return the site to a satisfactory condition and to ensure public safety.

Mineral exploration sites in Nunavik

An inventory conducted in 2001 identified 275 abandoned mineral exploration sites in Nunavik, 18 of which were deemed major.

In 2007, the Government of Québec, the Kativik regional government, the Makivik Corporation and the Nunavik Restoration Fund (a group of mining companies) signed a partnership agreement with the aim of cleaning up the 18 major sites.

In 2012, since the clean-up of major sites was done at a lower cost than originally anticipated, the clean-up of 27 intermediate sites was added to the mandate. Therefore, the agreement was extended until 2017.

Following work carried out in the summer of 2015, a total of 41 mineral exploration sites have now been cleaned up under this agreement.

Other sites currently undergoing rehabilitation work

The rehabilitation process has begun on the Darius (O'Brien), Pandora, Thompson Cadillac, Lapa (Zulapa) and Capelton sites. Rehabilitation work will continue over the next few years.

Corrective measures are planned on the Eustis, Aldermac, Opemiska and East Sullivan sites.

7.4

Inspection and securement

The MERN annually conducts a major inspection program of mine sites included in its environmental liability inventory, in order to identify potential environmental and safety hazards, and to plan maintenance and securement work. The main purpose of this work is to secure former mine openings by installing fences and concrete slabs or by backfilling.

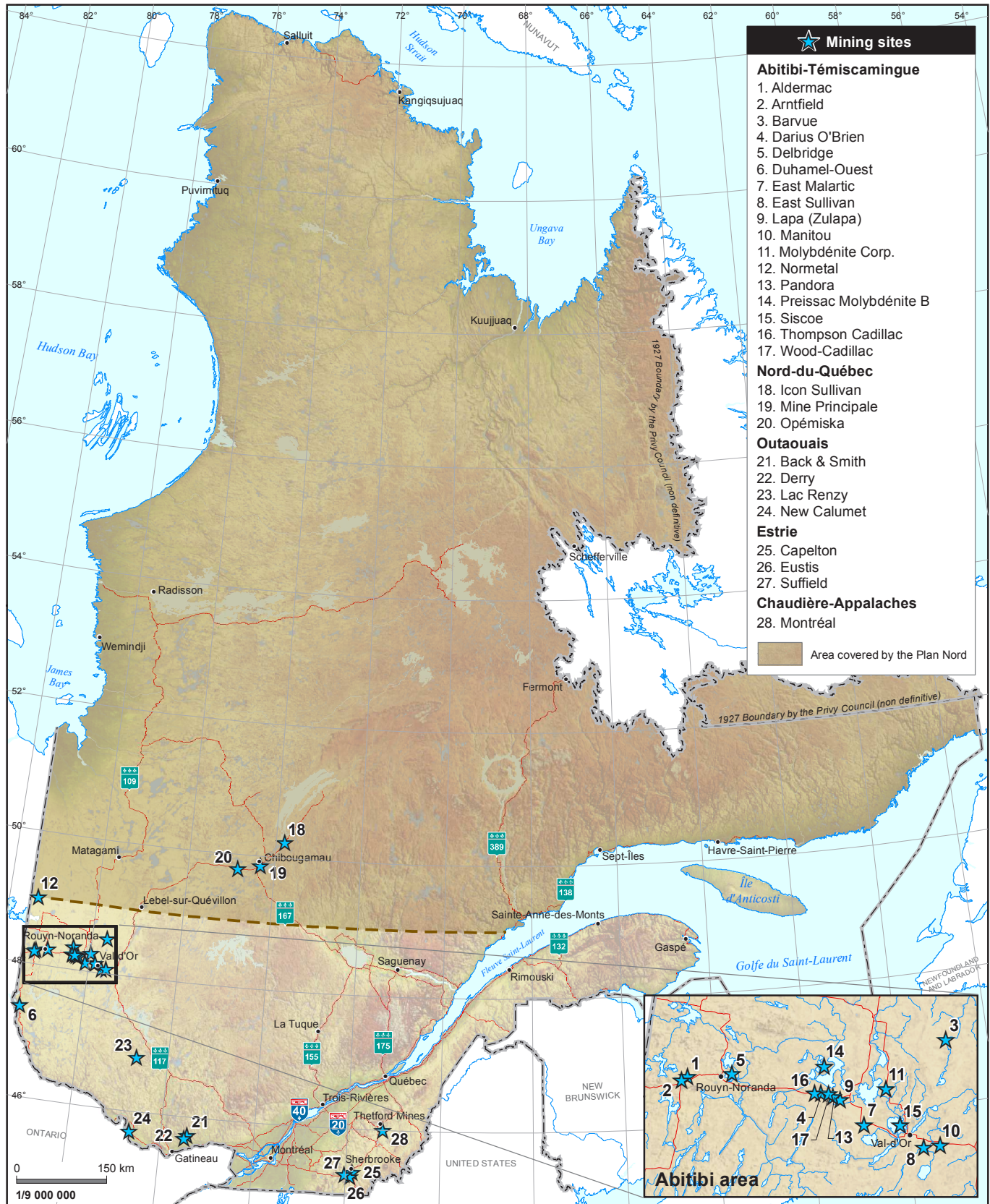
In 2015, 192 abandoned mine sites were visited by MERN inspectors to ensure, among other things, the safety of these sites. Among these, seven sites were the object of securement or maintenance work: Duhamel-Ouest, Normétal and Wood-Cadillac in the Abitibi-Témiscamingue region, Opemiska in the Nord-du-Québec region, Back & Smith and Derry in the Outaouais region, and the Montréal site in Chaudières-Appalaches.

7.5

Conclusion

Since 2007, the MERN has spent in excess of \$129 million in rehabilitation work on abandoned mine sites. In 2015, rehabilitation work was carried out on the Siscoe and Suffield mine sites. Work on the Barvue site is practically finished. This is the largest rehabilitation project undertaken by the MERN to date.

Figure 7.1 - Location of rehabilitation and securement work performed at orphaned mine sites in 2015.





CHAPTER 8

Research and innovation

In its Mineral Strategy (published in June 2009), the Government of Québec stated that technological innovation and the development of new processes would help the industry face both environmental and technical challenges while improving its competitiveness. With this vision in mind, the government has granted financial assistance to the following organizations dedicated to innovation in the mining sector.

CONSOREM

The Mineral Exploration Research Consortium (CONSOREM), based at Université du Québec à Chicoutimi, is a research group focused on mineral exploration geotechnologies in Québec. It represents a link between various stakeholders in the mining industry from the government, academia and industry sectors. The goal of CONSOREM is to develop modern mineral exploration concepts and techniques that could lead to the discovery of new deposits in resource regions.

CONSOREM is the only pre-competitive research centre in mineral exploration. Its mission — to transfer knowledge to users through innovative projects initiated by the industry — is unique in Canada. Applied research and cutting-edge tools developed by CONSOREM help the industry find practical, effective and reliable solutions to address current issues.

A new agreement was signed between CONSOREM and the MERN in 2015. This agreement covers the 2015–2016 fiscal year. The MERN granted \$150,000 to CONSOREM to augment applied research on mineral exploration geotechnologies in Québec and support the province's mining development activities.

COREM

COREM is a consortium of applied research for the processing and transformation of mineral substances. It was created in 1999 from the assets of the MERN's *Centre de recherches minérales*. COREM's fields of expertise include mineralogy, comminution, physical separation, flotation, extractive metallurgy, pelletizing and thermal processes.

Over the years, COREM has become the largest ore processing research centre in Canada, and the spinoffs of its pre-competitive research program benefit the entire mining industry. Today, COREM has a portfolio of nearly 40 innovative technologies, all demonstrated and validated at the laboratory, pilot plant or industrial scale.

COREM's annual budget is on the order of \$14 million, 80% of which is self-funded, including infrastructure. The MERN contributed \$525,000 to COREM during the 2014–2015 fiscal year.

COREM has an agreement with the federal government granting it financial assistance up to a maximum amount of \$3,370,000 over three years (from August 31, 2014, to June 30, 2017), representing about \$1,125,000 per year.

For the fiscal year ending December 31, 2014, the total value of the consortium's activities was \$13.6 million, almost \$2 million lower than the previous year. Nonetheless, investments in COREM's 2014 research program reached \$5.6 million in spite of the difficult financial situation facing the mining industry.

MISA

The MISA Group (Mines, Innovations, Solutions and Applications) is a network of experts actively engaged in advancing innovative equipment and services to ensure the sustainable and responsible development of the mining industry. MISA is the organization officially recognized by the Government of Québec to oversee the development of the Underground Techno-Mines niche of excellence under the ACCORD program (*Action concertée de coopération régionale de développement*) for the Abitibi-Témiscamingue region.

To support the development of these niches of excellence, the *Ministère de l'Économie, de la Science et de l'Innovation* (MESI) has a specific program in place: *Programme d'appui au développement des secteurs stratégiques et des créneaux d'excellence*.

The MISA Group finances its projects with grants from the MESI, which may represent up to 70% of project costs. The remainder is funded by the group's members. The Mines Branch of the MERN provides the MESI with sector-specific advice before the latter awards financing.

In 2014, MISA contributed to the identification, start-up, financing and realization of 37 innovation projects in four areas of expertise: geosciences and drilling; mining; ore processing; and the environment and energy optimization.

In December 2015, the MERN reached a \$420,000 grant agreement with MISA to promote the continuous improvement of processes in all aspects of the mining industry and to develop renewable energy sources for mining operations. The agreement is for three years.

FRQNT

The *Fonds de recherche du Québec – Nature et technologies* (FRQNT) has developed a five-year research program on sustainable development in the mining sector. Over this period, the MERN will provide up to \$15 million in funding towards this research program. Since its inception in June 2013, the FRQNT has received a total of \$12 million.

The program is intended for research institutions (colleges and universities). However, each project must also receive support from mining companies, either financially or in the form of goods and services, amounting to at least 10% of the cost of the project. This program focuses on the following research topics:

- Deep exploration and mining;
- Development of the mining sector in Northern environments;
- Energy savings and greenhouse gas emissions;
- Environmental and community impacts of mining development;
- Development and optimization of geoscience and geomatics tools.

The program consists of three calls for proposals, with aggregate budgets of \$5 million, \$5 million and \$4.55 million. Nineteen projects were retained under each of the first two calls for proposals (in 2013 and 2014) to remain within the allotted budgets. The third call is currently underway.

In June 2015, the FRQNT launched a complementary call for projects dealing specifically with the perception of the mining industry and the social acceptability of mining projects. The \$450,000 budget allowed three research projects to be funded.

In the 2015–2016 budget, the government allocated an additional \$1.5 million to the FRQNT's program to launch another call for proposals on mine waste valorization. The call was announced in December 2015. Approximately 15 projects can be financed by this initiative.

UQAT-UQAM CHAIR IN MINING ENTREPRENEURSHIP

The Chair in Mining Entrepreneurship brings together professors, researchers and representatives from the MERN, the industry and associations. The Chair's activities support broad goals that include the creation of new businesses in Québec and the success of companies involved in mineral resource development. Objectives specific to the Chair include the identification of best practices in techniques and management, testing innovative management and operational models, developing innovations in sustainable development, and contributing to mine management training. The MERN has been providing \$150,000 per year since 2011, and this will continue until 2016.

INSTITUT DE L'ENVIRONNEMENT, DU DÉVELOPPEMENT DURABLE ET DE L'ÉCONOMIE CIRCULAIRE

In December 2015, the MERN signed a \$900,000 grant agreement with the *Institut de l'Environnement, du développement durable et de l'économie circulaire* (EDDEC). The objective is to identify avenues for optimizing metal consumption and the impacts of Québec's mining industry on the environment. The EDDEC is composed of professors from École Polytechnique de Montréal, HEC Montréal and Université de Montréal. Over the course of the three-year project, researchers will assess the circular potential of three of the province's strategic metals (copper, lithium and iron) and identify the main environmental impacts in the value chain for these metals. The work will be carried out in collaboration with the International Research Centre for the Life Cycle of Products, Processes and Services (CIRAIG).



Appendix I

Geology of Québec and mining customer service offices in Québec

Superior Province

In the Nord-du-Québec region, the Superior Province extends across the entire James Bay region and much of Nunavik. The seven geological subprovinces in the James Bay region are, from north to south: Bienville, La Grande, Eastmain, Opinaca, Nemiscau, Opatica, and Abitibi. The territory of Nunavik, north of the 55th parallel, is covered by nine geological subprovinces in whole or in part: Bienville, La Grande, Ashuanipi, Tikkerutuk, Lac Minto, Qalluviartuk, Goudalie, Utsalik and Douglas Harbour. Comprising volcano-plutonic and sedimentary assemblages, the subprovinces of the Superior Province are transected by a series of shear zones trending E-W to WNW-ESE and NE-SW. Volcanic assemblages are metamorphosed to the greenschist facies in the centre, grading to upper amphibolite near their margins. These assemblages are intruded by a number of granitic intrusions assigned to various plutonic suites (Moukhsil *et al.*, 2003). The sedimentary assemblages are affected by a metamorphism ranging from the amphibolite facies to the granulite facies.

Abitibi and Pontiac Subprovinces

The Abitibi and Pontiac subprovinces occupy the southern part of the Superior Province in Québec. The Abitibi Subprovince is among the largest and richest Archean greenstone belts in the world, and one of the most studied. It comprises granitoid intrusions and volcano-sedimentary belts broadly trending E-W (Figure 4.7), ranging in age from 2.75 to 2.67 Ga. The Abitibi Belt is transected by many E-W or NW-SE-trending, generally reverse faults, as well as sinistral NE-trending and dextral SE-trending faults.

The Pontiac Subprovince is separated from the Abitibi Subprovince by the Cadillac Tectonic Zone, a structure that hosts many gold deposits. The Pontiac Subprovince comprises granitoid intrusions and orthogneisses (in its central part), detrital sedimentary rocks and paragneisses, as well as a few volcanic sequences. The latter form ultramafic, mafic and felsic assemblages in the southwest part of the subprovince. A few thin bands of mafic to ultramafic volcanic rocks are also present in its northern part.

The Abitibi Subprovince is renowned for the great number and richness of its precious metal (Au-Ag) and polymetallic mines (Cu-Zn-Au-Ag and Cu-Au). In the Pontiac Subprovince, a few metal deposits, architectural stone quarries and industrial mineral deposits (lime, quartz, kyanite, mica, garnet) are also mined. Mining and exploration have made the Abitibi-Témiscamingue region one of the most important mining regions in Québec for close to a century.

Churchill Province

The Churchill Province underlies the north and northeast parts of Nunavik. It mainly comprises Paleoproterozoic rocks of the New Québec (Labrador Trough), Torngat, and Ungava (Cape Smith Belt) orogens and their hinterland (the Core Zone, largely composed of Archean rocks) (James *et al.*, 1996; Wardle *et al.*, 2002).

New Québec Orogen

Also referred to as the Labrador Trough, or simply “the Trough”, the New Québec Orogen ranges in age from 2.17 to 1.79 Ga and forms a fold and thrust belt along the margin of the Superior Province. The Trough is composed of rocks belonging to two volcano-sedimentary cycles and a third cycle of metasedimentary rocks (Clark and Wares, 2006). The main commodities of interest in the New Québec Orogen are iron, copper, nickel, platinum group elements (PGE), gold and zinc.

Torngat Orogen and Core Zone

The Paleoproterozoic Torngat Orogen is bounded to the east by Archean rocks of the Nain Province and to the west by Archean and Paleoproterozoic rocks of the Core Zone. It is subdivided into lithotectonic domains and complexes separated by ductile shear zones.

Located in the southeast part of the Churchill Province, the Core Zone (formerly known as the Rae Province) lies between the Labrador Trough hinterland and the Torngat Orogen foreland. It is largely composed of Archean gneisses and bands of Paleoproterozoic supracrustal rocks.

These rocks were subsequently deformed and metamorphosed during the Paleoproterozoic. The Core Zone is divided into a series of lithotectonic domains separated by wide deformation zones (Wardle *et al.*, 2002). The main commodities of interest in the Torngat Orogen and the Core Zone are uranium, diamonds, copper, and rare earth elements (REE).

Ungava Orogen

The Ungava Orogen (Ungava Trough or Cape Smith Belt) is composed of a Paleoproterozoic volcano-sedimentary belt that stretches some 370 km along an ENE axis. The region is divided into four main tectonic units: a) the autochthonous Archean basement of the Superior Province; b) the allochthonous accretionary belt or Ungava Trough; c) the Paleoproterozoic Narsajuaq Terrane; and d) the parautochthonous Archean basement (Lamothe, 1994). Host to the Raglan mine and the Nunavik Nickel mine development project, the Ungava Trough continues to attract attention from exploration companies searching for nickel, copper, cobalt, and platinum group elements (PGE).

Grenville Province

The Grenville Province is the youngest of the tectonic provinces in the Canadian Shield. It is composed primarily of Archean and Proterozoic orthogneisses, intrusive rocks, metasedimentary rocks and migmatites. The province extends for more than 2,000 km in a northeast direction and has an average width of 350 km. It is bounded to the northwest by the Grenville Front and to the southeast by the St. Lawrence River and the Paleozoic orogens of the Appalachian mountain chain.

The Grenville Front is a northeast-trending tectonic zone characterized by a steep metamorphic gradient toward the southeast. Southeast of the front, Archean (Pontiac, Abitibi, Opatica and Ashuanipi subprovinces) and Paleoproterozoic (Otish Basin and Gagnon Terrane) rocks form the Parautochthon. The latter constitutes crust that initially formed the southeast margin of Laurentia and was largely reworked during the Mesoproterozoic.

The earliest terranes, recognized in the northeast part of the Grenville Province, are Labradorian in age (1710-1600 Ma), followed by Pinwarian (1520-1460 Ma) rocks, which extend over most of the province. The Allochthon, consisting of magmatic or accreted terranes, was later assembled onto the Parautochthon. The most recent terrains are represented by an episode of crustal formation restricted to the southwest part of the province. They correspond to a juvenile tonalite-diorite assemblage assigned to the Lacoste, Mekinac and La Bostonnais magmatic suites (ca. 1380 Ma).

Between accretionary episodes, extensional phases led to the formation of formation of back-arc basins in the Mont-Laurier and Morin terranes, as well as the intra-arc basin filled by rocks of the Wakeham Group. Extensional phases are also associated with the emplacement of anorthositic and charnockitic (AMCG) complexes. During the Shawinigan metamorphic event (1190-1140 Ma), the Mont-Laurier and Morin terranes were metamorphosed to amphibolite-granulite facies. The main collision of the Grenvillian phase took place during the Ottawa orogeny (1080-1020 Ma). A final phase of compression, at about 1000 Ma, appears to be essentially restricted to the Grenville Front zone, whereas within the orogen, this episode is marked by the emplacement of late anorthosite and discrete granitic intrusions.

From an economic standpoint, the Grenville Province is known for its architectural stone and industrial stone quarries as well as its industrial mineral deposits (see Chapter 6). It also hosts the Mont Wright iron ore mine and the LacTio titanium mine in the Côte-Nord region, as well as the Niobec niobium mine in the Saguenay-Lac-Saint-Jean region.

St. Lawrence Platform

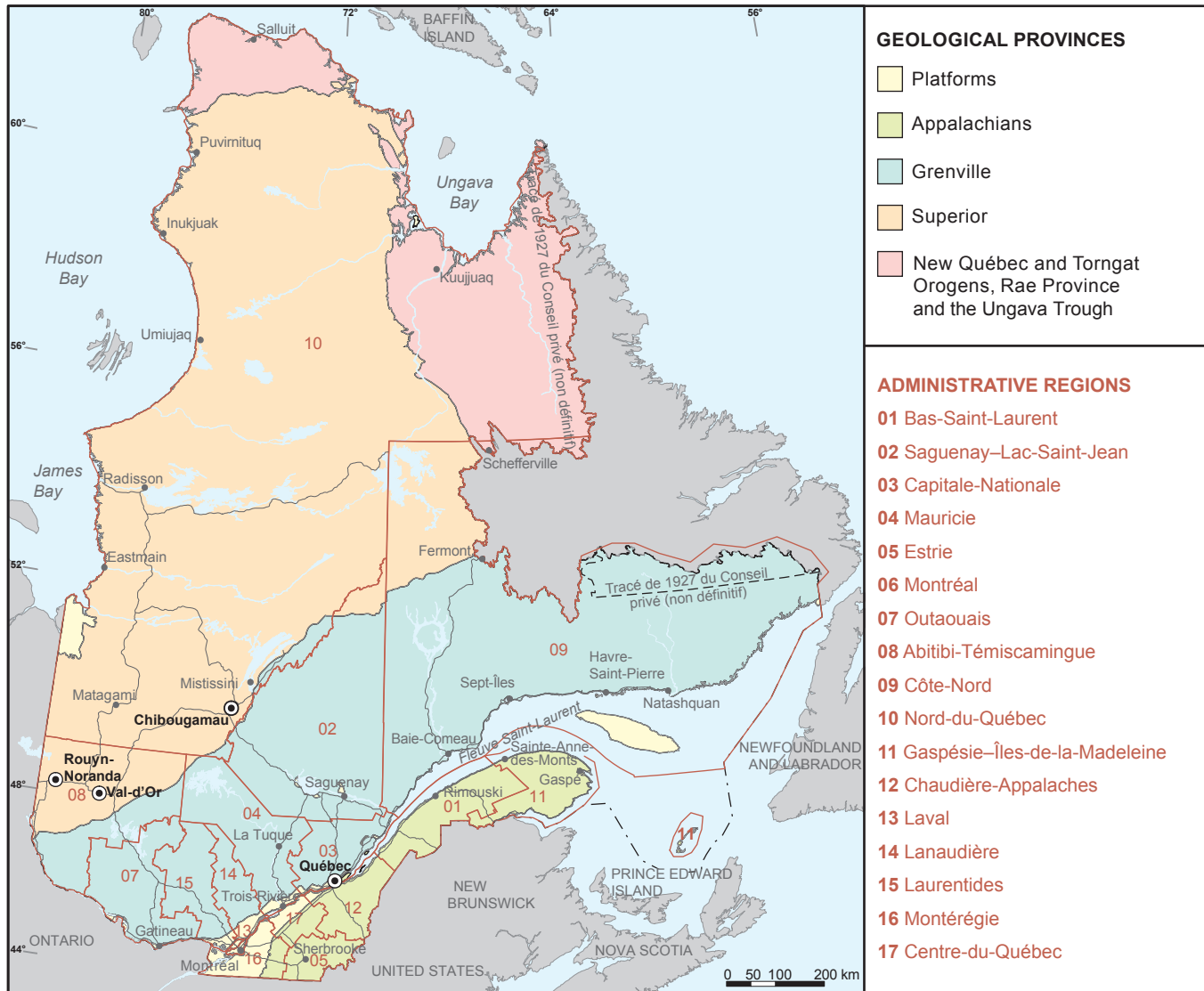
The Paleozoic St. Lawrence Platform, which overlies the Grenvillian basement along an erosional unconformity and is separated from the Appalachian Province by Logan's Line, is subdivided into two distinct platforms: the St. Lawrence Lowlands Platform and the Anticosti Platform. The main mineral resource is limestone. This geological province is also known for its hydrocarbon potential, mainly in the form of shale gas.

Appalachian Province

The Paleozoic Appalachian Province is subdivided, from northwest to southeast, into three distinct tectonostratigraphic domains: the Humber Zone; 2) the Dunnage Zone; and 3) the Connecticut Valley-Gaspé Synclinorium. The Appalachian Province is bounded to the east by the Permo-Carboniferous Magdalen Basin and was affected, in Québec, by two major tectonic events: the Taconian and Acadian orogenies. Major asbestos and copper resources belonging to Mines Gaspé are found in this geological province.

References

(see Appendix III of DV 2009-02)



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ST. LAWRENCE PLATFORM

(St. Lawrence Lowlands and Anticosti platforms)

MESOZOIC

CRETACEOUS

Alkaline intrusive rocks

PALEOZOIC

CAMBRIAN TO SILURIAN

Red shale and green sandstone
Black shale, mudrock and limestone
Limestone, shale and sandstone
Dolostone and dolomitic sandstone
Sandstone and conglomerate

HUDSON BAY PLATFORM

PALEOZOIC

ORDOVICIAN TO DEVONIAN

Sandstone and arkose
Mudstone, sandstone and evaporite
Limestone and dolostone

APPALACHIAN PROVINCE

PALEOZOIC

PERMO-CARBONIFEROUS

Conglomerate, red sandstone and red mudrock

ORDOVICIAN TO DEVONIAN

Granite, granodiorite and syenite
Limestone, dolostone, mudrock and sandstone
Sandstone, conglomerate, mudrock and limestone
Mudrock, wacke, slate, sandstone, limestone and conglomerate
Schist with blocks
Mélange
Mafic volcanic rocks
Ultramafic to mafic rocks

PROTEROZOIC TO CAMBRIAN

Phyllite, schist and slate
Mafic volcanic rocks
Paragneiss and granulitic intrusive rocks

GRENVILLE PROVINCE

MESOZOIC

TRIASSIC

Impactite

PROTEROZOIC AND ARCHEAN

Granite, granodiorite, quartz monzonite and unsubdivided granitoids
Syenite, monzonite and monzodiorite
Migmatite
Granitoid gneiss
Orthopyroxene-bearing granitoids and gneiss
Tonalitic gneiss, unsubdivided gneiss and tonalite
Anorthosite, leucogabbro and leucotroctolite
Gabbro, norite, troctolite and pyroxenite
Mafic gneiss and amphibolite
Sandstone and wacke
Marble and calc-silicate rocks
Iron formation
Paragneiss, quartzite and migmatite
Felsic volcanic rocks
Mafic volcanic rocks and amphibolite

CHURCHILL PROVINCE

PROTEROZOIC AND ARCHEAN

Syenite and monzonite
Anorthosite and gabbro
Gabbro and diorite
Peridotite, pyroxenite and dunite
Iron formation
Dolostone and dolomitic sandstone
Sandstone and conglomerate
Granite, granodiorite and monzonite
Migmatite
Granitoid gneiss
Orthopyroxene-bearing granitoids and gneiss
Tonalitic gneiss and tonalite
Mafic volcanic rocks and amphibolite
Mudrock and wacke
Paragneiss, schist, quartzite and marble

SUPERIEUR PROVINCE

PALEOZOIC

PERMIAN

Impactite

ORDOVICIAN

Limestone and shale

PROTEROZOIC

Basalt, dolostone, sandstone and conglomerate
Sandstone, red mudrock, basalt and conglomerate
Sandstone and conglomerate
Dolostone and dolomitic sandstone
Conglomerate, sandstone and iron formation
Argillite, wacke and conglomerate

ARCHEAN

Diatexite
Monzonite, syenite and monzodiorite
Granite and granodiorite
Orthopyroxene-bearing granitoids
Tonalite and tonalitic gneiss
Anorthosite, gabbro and pyroxenite
Gabbro and diorite
Pyroxenite, peridotite and dunite
Wacke and mudrock
Conglomerate
Iron formation
Paragneiss and schist
Felsic volcanic rocks
Mafic volcanic rocks
Ultramafic volcanic rocks



Appendix II

Legend of abbreviations used in tables

Prospecting and geology works

B (mt:g/t)	Bulk sampling including tonnage and grade or (mt: % Xx) (metric ton:gram per ton) or (metric ton: % Xx)
Bs	Block sampling for dimension stones
Ca	Acquisition of claims
Cgi	Compilation of geoscientific information
Ct	Characterization tests and analysis (peat)
D (#h:m)	Diamond drilling (number of holes:total meters)
G	Geological mapping
Lc	Line cutting
Min	Mineralogical studies
Pg	Unspecified prospecting and geological works
Pr	Prospection
Pt	Polishing test
Rcd (#h:m)	Reversed circulation drilling (number of holes:total meters)
Rsi	Remote sensing interpretation
S	Sampling
T	Trenching and stripping

Geochemical surveys

Gs	Unspecified geochemical surveys
Gs(e)	Esker geochemical survey
Gs(h)	Humus geochemical survey
Gs(l)	Lake sediment geochemical survey
Gs(r)	Lithochemical survey
Gs(s)	Stream sediment geochemical survey
Gs(sl)	Soils geochemical survey
Gs(t)	Till geochemical survey

Geophysical surveys

GpUs	Unspecified geophysical survey
GpEl	Electric survey
GpEm	Electromagnetic survey
GpGr	Gravimetry survey
GpMa	Magnetometric (magnetic) survey
GpMt	Magnetotelluric survey
GpRa	Radiometric survey
GpSi	Seismic survey

(A) aerial, (B) borehole, (G) ground

Other types of works

ES	Environmental studies
FS	Feasibility studies
MSR	Mining site rehabilitation
MT	Metallurgical test
PEA	Preliminary economic assessment
PFS	Prefeasibility study
QS	Quaternary studies
RRE	Reserve and resource evaluation
TE	Technical evaluation

Substances

Ag	Silver
Au	Gold
Be	Beryllium
Bi	Bismuth
Ce	Cerium
Cg	Graphitic carbon
Co	Cobalt
Cr	Chrome
Cr ₂ O ₃	Chromite
Cs	Cæsium
Cu	Copper
DD	Diamonds
Dy	Dysprosium
Dy ₂ O ₃	Dysprosium oxide
Eu	Europium
Fe	Iron
Fe ₂ O ₃	Iron oxide
Ga	Gallium
Gd	Gadolinium
Gp	Graphite
HREO	Heavy rare earth oxides
La	Lanthanum
La ₂ O ₃	Lanthanum oxide
Li ₂ O	Lithium oxide
LREO	Light rare earth oxide
Mg	Magnesium
Mo	Molybdenum
Nb	Niobium
Nb ₂ O ₅	Niobium oxide
Nd	Neodimium
Nd ₂ O ₃	Neodimium oxide
Ni	Nickel
TREO	Total rare earth oxides (including yttrium)
P	Phosphorus
Pb	Lead
Pd	Palladium
PGE	Platinum group elements
Pr	Praseodymium
Pr ₂ O ₃	Praseodymium oxide
Pt	Platinum
P ₂ O ₅	Phosphorus oxide
Rb	Rubidium
REE	Rare earth elements
Sc	Scandium
Si	Silica
SiO ₂	Silicium oxide
Sm	Samarium
Ta	Tantalum
Ta ₂ O ₅	Tantalum oxide
Tb	Terbium
Te	Tellurium
Th	Thorium
Ti	Titanium
TR ₂ O ₃	Rare earth oxides
TR ₂ O ₃ T	Total rare earth oxides
U	Uranium
U ₃ O ₈	Uranium oxide
V	Vanadium
V ₂ O ₅	Vanadium oxide
W	Tungsten
WO ₃	Tungsten trioxide
Y	Yttrium
Y ₂ O ₃	Yttrium oxide
Zn	Zinc
Zr	Zirconium
ZrO ₂	Zirconium oxide

Measurement Units

c/t	Carat/ton
G	Billion
g/t	Gram per ton
K	Thousand
M	Million
st	Short ton
t	Metric ton
t/d	Metric ton per day
t/m	Metric ton per month
t/y	Metric ton per year

Products and usages of architectural stones

BS	Building stone and landscaping
CS	Curbstone
DeS	Decorative stone
DS	Dimension stone
MO	Monument stone
RS	Refractory stone
RT	Roofing tiles

Other abbreviations

CA	Certificate of authorization
GESTIM	<i>Gestion des titres miniers</i>
MDDELCC	<i>Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques</i>
SIGÉOM	<i>Système d'informations géominières</i>
n/a	Not available
p	Preliminary data
<i>Italic</i>	Exploration work done on mine properties
Bold (in tables)	Advanced exploration project



Appendix III

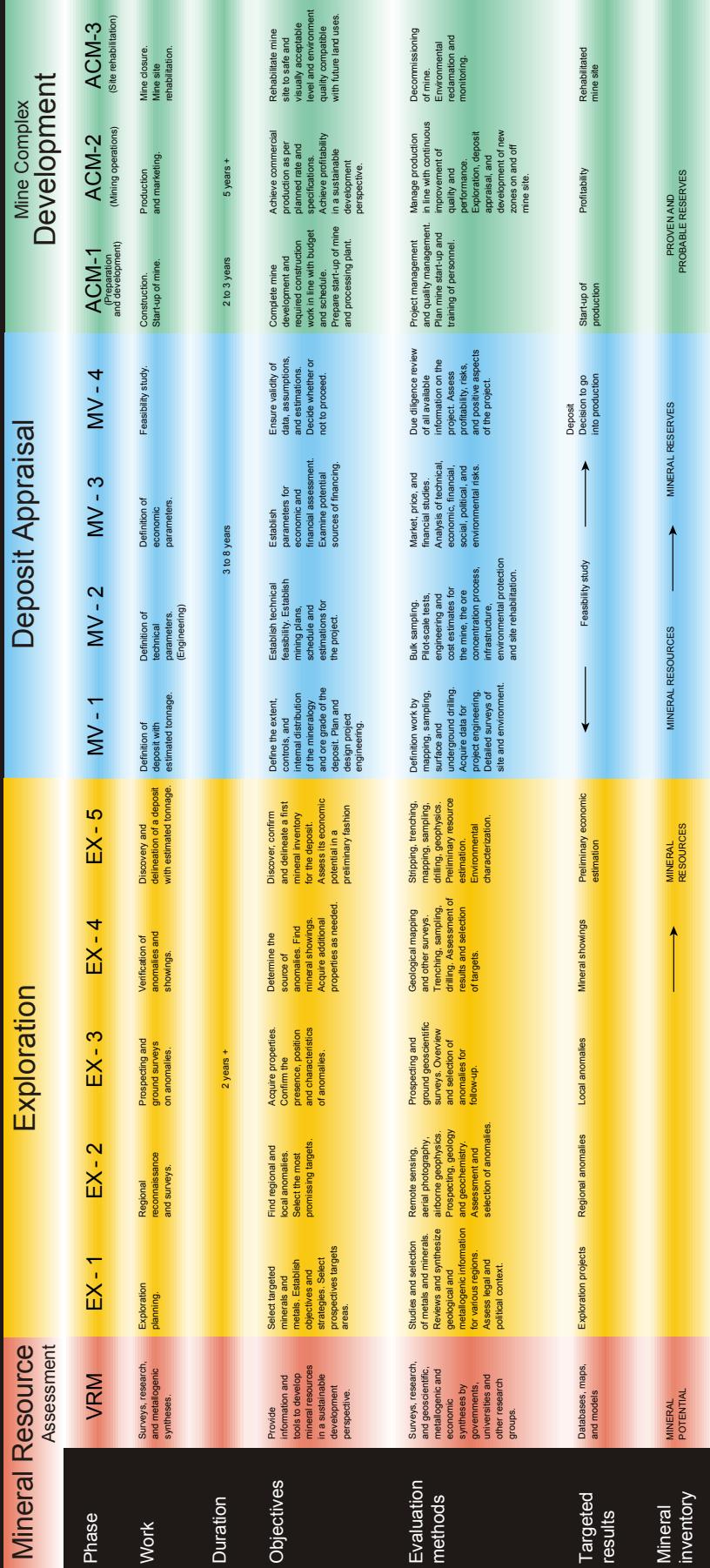
The process of mineral development

The Mineral Development Process

This schematic chart describes the nature and duration of work, objectives, evaluation methods, targeted results and nature of mineral inventory for each of the four phases of the mineral resource development process: mineral resource assessment, exploration, deposit appraisal and mine complex development.

potential economic value. A mineral deposit consists of at least one mineralized zone for which the economic potential has been broadly assessed through a first mineral resource estimation. Conversion of mineral resource into mineral reserves not only requires a positive feasibility study following deposit appraisal work, but also a commitment to bring the deposit into production. The mine complex development phase includes work conducted during the preparation and development of the project, mining operation, and mine site rehabilitation.

In this chart, a mineral showing requires at least one grab sample or one drill intercept, trench or channel sample from a mineralized zone that exhibits



Source: Modifications coordinated by S. Lacroix in August 2001 and by the Direction du développement de l'industrie minière, March 2015, based on SOQUEM annual report, 1976-77, p. 4-5 and Vallée, M., 1992, Guide to the Evaluation of Gold Deposits, CIM, Special Volume, p. 4.

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