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Director General

Robert Giguère

Bureau de la connaissance géoscientifique du Québec

Patrice Roy, geo.

Direction de l'information géologique du Québec

Luc Charbonneau, by interim

IN COLLABORATION WITH THE "SECTEUR DES OPÉRATIONS RÉGIONALES"
AND THE "SECTEUR DES MINES"

Associate deputy minister for regional operations

Jean-Sylvain Lebel

Associate deputy minister for Mines

Line Drouin

Coordination

Abdelali Moukhsil, geo. and **James Moorhead**, geo.

Joanne Nadeau, ing. and **Charlotte Grenier**

Translation

Venetia Bodycomb and **Michèle Mainville**

Graphic design

André Tremblay and **Marie-Eve Lagacé**

Cover photos

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A word from the Minister for Mines

It is a great pleasure for me to present this 2013 report on mining activities in Québec. As an economist I have studied and analysed similar reports on a regional scale for years. I know how useful and relevant it is. This report enhances the relevance of the geoscience work at the ministry and the impact of mining activity on Québec's economy. It demonstrates the evolution of mining activity as a whole.

The year 2013 has been a milestone for mining area in the province due to the revised mining tax regime and the adoption of the Mining Act. This annual report officially closes a chapter of Québec mining history to open a new one. In this new chapter, I hope that the province will be known as a world leader for sustainable mining development and that the area will be an asset for economical and social development of Québec. I also hope that the province finds its place again amongst the mining territories favoured by investors. I will work endlessly to realize these goals. This is why I known I can count on the dynamic team of the *ministère de l'Énergie et des Ressources naturelles* and on the will of Québec mining sector stakeholders.

Luc Blanchette
Minister for Mines

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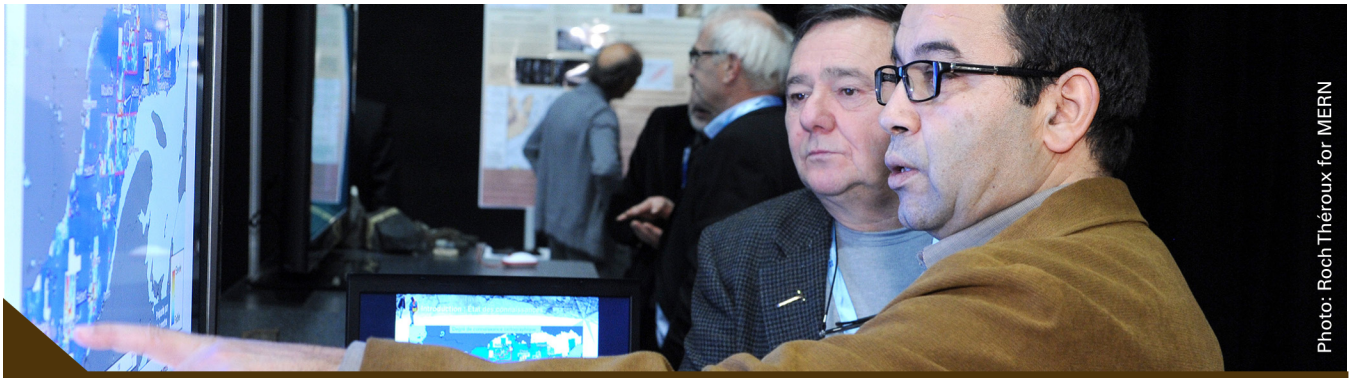


Photo: Roch Théroux for MERN

CHAPTER 1

The mining sector in Québec in 2013: Solid and promising!

In Québec, the mining and processing of metals and minerals are a source of collective wealth and a major driving force for our development as they represent 3% of our gross domestic product, or $9.8 billion.* These industries namely account for 25% of our annual exports, 45,000 direct jobs in major centres and peripheral regions, as well as tens of thousands of indirect jobs distributed in all regions across Québec.

Mining has helped forge Québec's identity and should continue to be a source of pride[1].

As eloquent as they may be, these figures do not paint a complete portrait of today's mining sector in Québec, but you can find out more by reading the highlights for 2013 in the following pages.

A mineral strategy that benefits Québec

In an effort to increase the spinoffs of mining activities in Québec, the government of Québec adopted in 2009 Québec's Mineral Strategy, with the objective of ensuring a bright future for the mining sector in keeping with the principles of sustainable development. Since then, the strategy has served as a framework for the *Ministère de l'Énergie et des Ressources Naturelles* (MERN) in its efforts to promote the development of mineral resources.

During 2013, Québec's Mineral Strategy has been translated into actions such as:

- The adoption of a new Mining Act (see inset), developed on the basis of a wide consensus established during debates that took place during previous attempts to reform the Mining Act (Bills Nos. 79, 14, and 43) (page 22);
- The revision of the Regulation respecting mineral substances other than petroleum, natural gas and brine as regards the financial guarantees required for mine site rehabilitation;
- The revision of the mining tax regime (page 25);
- The continuation of the geoscience knowledge acquisition plan (page 34);
- New initiatives to support further mining development in Northern Québec;
- New measures to promote research and innovation in the mining sector. The MERN has maintained its financial support to organizations involved in research and innovation in the mining sector, including CONSOREM, COREM, SOREDEM and FRQNT (page 126).

For responsible and transparent mining development

The Act to Amend the Mining Act came into force on December 10, 2013. This long awaited Act constitutes a modern framework that balances the development of mineral resources, the respect of communities and protection of the environment. New provisions in the Act call for stronger environmental protection, increased dialogue with communities, greater transparency, a balance between different land uses, and increased economic benefits for Québec.

1- Excerpt from the Mining Act
* Statistics Canada.

Northern development
A collaborative effort

Many different minerals are already being mined in Northern Québec, namely nickel, cobalt, zinc, iron, and gold. Soon, diamonds and perhaps rare earth elements, critical for the energy, transportation and high-technology industries, will also be mined.

The objective is to ensure that northern development is a success that will benefit all Quebecers.

Conscious of the importance of our northern territory, the government of Québec strives to ensure that mining development takes place in a manner respectful of the environment and in collaboration with local and Aboriginal communities. This is why it created, in November 2012, a *Secrétariat*, whose mandate is to coordinate government actions and to maximize economic benefits for local communities and the people of Québec.

Since September 2012, the government of Québec has initiated investments close to $1.4 billion in the development of our northern territory, including:

- $622 million* for the development of local communities and environmental protection;
- $718 million* for transportation infrastructure, including $20 million for the preparation of a feasibility study on the relevance of a third railway line to the Côte-Nord region to transport ore concentrate from the Labrador Trough, where a fair number of iron exploration projects are underway (see inset).

Infrastructure: At the heart of northern development

Road, bridges, airfields, ports, and railroads are the foundations of northern development. To avoid their multiplicity, the government of Québec is proposing a business model that will benefit all stakeholders involved, including Aboriginal communities, local businesses, and developers such as mining companies.

Photo: MERN

Mining tax regime
May 2013 Amendment

The objective of the mining tax regime is broad in scope: ensure the State receives fair compensation for the exploitation of non-renewable resources that are part of the public domain. It is with this objective in mind that the mining tax regime was revised and amended during the past year.

The new mining tax computation model requires each operator to pay a minimum mining tax or a mining tax on the profit based on the growth of profits.

On May 6, 2013, the *Ministère des Finances et de l'Économie* of Québec issued an information bulletin in which it described, in detail, amendments made to the mining tax regime.

* Review of government intervention on the North for All territory, December 31, 2013

Since January 1, 2014, mining companies operating a mine in Québec must now comply with these new measures:

- Each operator must pay a minimum mining tax (between 1% and 4%) of the gross mine-mouth output value;
- More profitable operations are subject to a progressive tax rate on annual profit (between 16% and 28%);
- Operators must pay the higher amount of the two: the minimum mining tax or the tax on annual profit;
- To foster ore processing and transformation in Québec, the processing allowance used as a deduction by operators when computing their annual profit has been increased.

Economic setting and metal and mineral markets

Prospects for growth

The "mining boom" that characterized the period from 2003 to 2011 led to sustained growth in the global mining sector and to the funding and fast-tracked development of numerous mining projects worldwide. After peaking in 2011 and 2012, this growth experienced a certain slowdown in 2013, and declining prices for metals and minerals resulted in several mining projects being postponed or abandoned. The impact on investments and the availability of financing was felt throughout the world in the mining sector.

The first five months of 2013 were marked by a general drop in the price of metals and minerals. The second half of the year however, from June to December 2013, showed a variety of trends depending on the metal or mineral of interest:

- Prices for base metals (nickel, copper, zinc) and other minerals (titanium, niobium, diamond, phosphate, graphite, etc.) remained stable or showed minor fluctuations;
- Precious metals lost some of their attractiveness as safe-haven investments, namely due to the strength of stock markets, and their prices continued to decline. The price of gold dropped by an exceptional 29% to finish the year at $1,204, the same level as in early 2010;
- The price of iron ore concentrate increased and remained at high levels throughout 2013, due to the accelerating economic growth in China. At the end of the year, the price of iron ore concentrate stood at about US$135/t, slightly higher than the previous year.

TABLE 1.1 - Average prices of certain metals in US$.

Annual average	**Gold**[1] per troy ounce	**Silver**[1] per troy ounce	**Platinum**[1] per troy ounce	**Aluminium**[2] per tonne	**Zinc**[2] per pound	**Nickel**[2] per pound	**Copper**[2] per pound	**Iron**[3] per tonne
2003	363	4.89	691	1,431	0.41	4.37	0.81	13.82
2004	410	6.67	845	1,716	0.48	6.27	1.30	16.39
2005	445	7.32	897	1,898	0.63	6.69	1.67	28.11
2006	603	11.55	1,142	2,569	1.49	11.00	3.05	33.45
2007	695	13.38	1,303	2,638	1.47	16.88	3.23	36.63
2008	872	14.99	1,574	2,572	0.85	9.57	3.15	61.57
2009	972	14.67	1,203	1,664	0.75	6.65	2.34	79.99
2010	1,225	20.19	1,609	2,173	0.98	9.89	3.42	146.72
2011	1,572	35.12	1,722	2,398	1.00	10.30	4.00	167.80
2012	1,669	31.15	1,561	2,007	0.88	7.95	3.61	128.77
2013	1,411	23.83	1,487	1,846	0.86	6.81	3.32	135.05

Sources:
1 - London Metal Exchange, average price at noon
2 - London Metal Exchange, reference price
3 - International Monetary Fund, iron ore imports into China at the Port of Tianjin (62% Fe CFR)

Growing demand

In the medium- to long-term, growth prospects for the mining sector are positive. China and other countries such as India, Indonesia, South Africa, Brazil, and Thailand will continue to drive demand for metals and minerals, which is expected to continue to grow.

Geoscience work
To make responsible choices

Each year, the *Ministère de l'Énergie et des Ressources Naturelles* carries out geoscience work that results in the acquisition of new knowledge on Québec's territory and improved management of our geological heritage.

45 new exploration targets were identified in 2013.

This geoscience work is one of the key elements of mining development, as it results in a better definition of areas of interest that will subsequently attract investments in exploration. Identifying a target is thus the first step leading to the discovery of a mineral deposit. The unveiling of new targets in 2013 led to the acquisition of about one hundred new claims.

Financed by mining taxes, geoscience work carried out by the MERN also serves to:

- Stimulate mineral exploration in remote areas or where access is more difficult;
- Boost exploration by providing new geological data and new geological models in mature mining regions;
- Promote the mineral potential of areas that are underexplored but attractive for mineral exploration;
- Help delineate potential territories for the creation of protected areas;
- Collaborate on the Groundwater Knowledge Acquisition Program in partnership with the *Ministère du Développement Durable, de l'Environnement et de la Lutte aux changements climatiques*;
- Help communities in Nunavik adapt to the melting permafrost:
  - After Kuujjuaq, communities in Kangiqsujuaq and Quaqtaq are now benefitting from an assessment of aggregate resources, which are namely used to stabilize the ground under new constructions (work carried out in fiscal year 2013-2014);
- Characterize and protect sites likely to become outstanding geological sites due to their heritage value, their inherent characteristics, their beauty or their vulnerability.

Knowledge accessible to everyone

New geoscience knowledge gathered by the MERN is shared in the geoscience database, a database accessible to everyone through an interactive map (http://sigeom.mrn.gouv.qc.ca/signet/classes/I1108_afchCarteIntr) and renowned as one of the most comprehensive in the world as it encompasses more than one hundred years of data from the MERN and the mining industry.

Mineral exploration

The sluggish mining sector leads to declining expenditures

Declining prices for certain metals on global markets led to a certain contraction of mining investments for exploration and deposit appraisal work in 2012 (-26% for investments of $621 million) and again in 2013[2] (-47% for investments of $328 million). Consequently, the level of spending for exploration and deposit appraisal work corresponds to levels observed in 2006 and 2007, which were the first years of this recent period of sustained growth for the mining industry. Expenditures for these activities may begin climbing again in 2014, since spending intentions indicate a 14% progression (see Figure 1.1).

Investments in mineral exploration are shrinking everywhere, across Canada and abroad. In December 2013, the TSX Venture Exchange Index was down 60% relative to March 2011. This index is largely composed of small mining companies and mineral exploration companies.

Targeted substances

Monopolizing 37% of mineral exploration investments, precious metals (mainly gold) remain the substances attracting the most interest in Québec. They are followed by base metals such as copper, nickel, and zinc (18%), ferrous metals (11%), and rare earth elements (9%).

Phosphate (7%) and graphite (3%) are newcomers among targeted substances in 2012 and 2013 (according to data from the *Institut de la statistique du Québec*).

Graphite is attracting more and more interest in recent years, and nearly all known graphite occurrences in Québec are now covered by exploration titles. Most of these projects are in the preliminary phases of exploration.

Phosphate is attracting a growing share of investments, such that in 2013, more than 7% of exploration and deposit appraisal expenditures were allocated for this substance, for a global amount of $24 million.

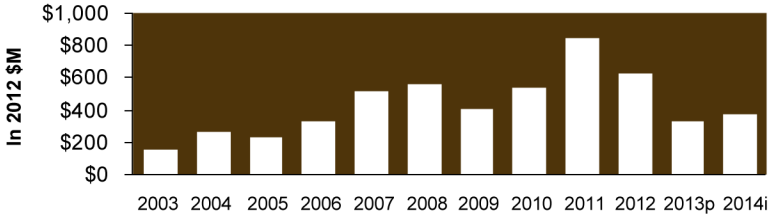
The growing importance of juniors

The share of small mineral exploration companies, or "juniors", has increased in terms of investments in exploration, moving from 55% in 2011 to 65% in 2013. On the other hand, the share of large mining companies, or "majors", has decreased, dropping from 42% in 2011 to 26% in 2013. Finally, public companies[3] account for 9% of total expenditures reported in 2013.

3 - SOQUEM, *Fonds d'exploration minière du Nunavik* and Mine Arnaud.

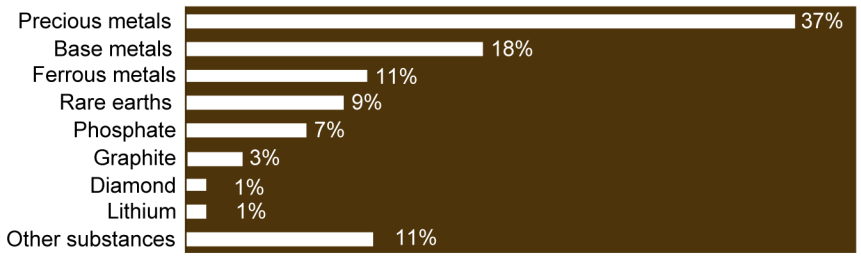
Photo: MERN

Figure 1.1
Exploration and deposit appraisal expenditures in Québec, 2003-2014.



Source: *Institut de la statistique du Québec*. Data for 2013 are preliminary and data for 2014 represent revised spending intentions reported by mining companies.

Figure 1.2
Distribution of exploration and deposit appraisal expenditures in Québec per targeted substances in 2013.



Source: *Institut de la statistique du Québec*

2 - Data for 2013 are preliminary.

From the mine to the electric car
Ore processing and transformation

Minerals may be ubiquitous in our daily lives, but they must undergo many transformations from the moment they are extracted at the mine to their inclusion in everyday consumer products. Primary processing activities on mineral substances (ore, concentrate, agglomerate) are carried out to separate minerals and extract metals and chemical compounds that are useful for society. Separation processes are chemical or metallurgical like smelting, solid-state reduction or leaching, and use heat, electricity, natural gas or chemical products.

After primary processing, metals generally occur as raw materials or semi-finished products (ingots, slabs, pellets, bars, bricks, powders, cathodes, etc.) which are still not ready for immediate use. These products must still undergo transformation (secondary and tertiary processing) before they become everyday consumer products.

The example of lithium

The "life cycle" of lithium begins with the extraction of spodumene (a lithium-bearing mineral), which is concentrated at a processing plant. The concentrate is then transformed into lithium carbonate or lithium hydroxide. These chemical products are used to manufacture lithium-ion batteries, commonly found in electric vehicles. The lithium sector is expected to grow in Québec in parallel with the growth of green industries.

Mining
The value of shipments remains at historic levels

In 2013, the mining sector in Québec remained the most diversified in Canada given the production and beneficiation of 31 minerals (16 metallic and 15 non-metallic minerals) within its borders, compared to 27 in Ontario and 23 in British-Columbia.

In 2011, the value of mineral shipments in Québec has reached a historic high of $8.5 billion.

In 2012, it has reached $8 billion (-5%) before increasing to $8.3 billion (+3%) in 2013 (preliminary data).

The increasing value of mineral shipments in recent years is almost exclusively attributable to metallic minerals, especially iron ore and gold, as these two minerals alone account for more than half of the value of mineral shipments since 2010.

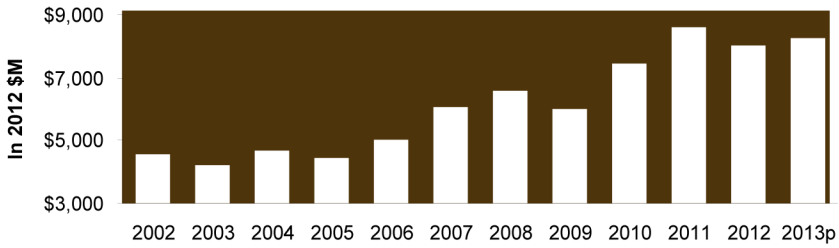
Significant Mining investments

Total mining investments (exploration, deposit appraisal and mine development) continue to increase. They totalled $5.1 billion in 2012 and are expected to reach $3.2 billion in 2013.

Despite the expected decrease for 2013, mining investments remain at historically high levels, as they averaged $2 billion during the period from 2002 to 2012.

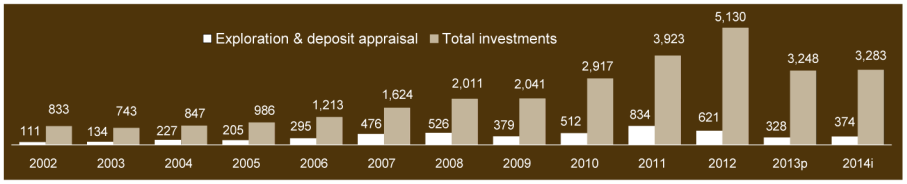
The decline in mining investments for 2013 comes as no surprise as the mining industry experienced a slowdown during that year.

Figure 1.3
Value of mineral shipments in Québec, 2002-2013.



Source: *Institut de la statistique du Québec*. Data for 2013 are preliminary.

Figure 1.4
Total mining investments in Québec, 2002-2014 ($M).



Source: *Institut de la statistique du Québec*. Data for 2013 are preliminary and data for 2014 represent spending intentions.

Jobs and manpower:
Quality and safety

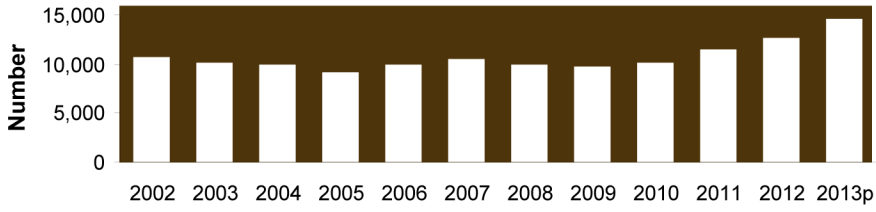
Mineral extraction activities accounted for 14,566 direct jobs[4] in 2013 distributed in all regions across Québec, but particularly in the Abitibi-Témiscamingue, Côte-Nord, and Nord-du-Québec regions. This represents a 15% increase relative to the previous year.

When jobs related to primary metal processing and the production of non-metallic mineral products are added, the total number of direct jobs reaches nearly 45,000.*

Moreover, jobs in the mining sector in Québec are becoming safer year after year, as the number of employment injuries in the sector has dropped by about 27% from 2001 to 2012[5].

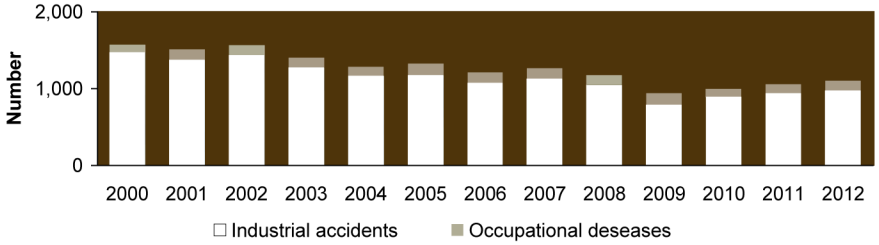
Photo: MERN

Figure 1.5
Number of jobs in mineral extraction activities, 2002-2013.



Source: *Institut de la statistique du Québec*. Data for 2013 are preliminary.

Figure 1.6
Number of employment injuries – Mines, quarries and oil wells, 2000-2012.



Source: *Commission de la santé et de la sécurité au travail*, November 2013. These statistics are based on the year in which employment injuries are reported and confirmed, whether compensation is paid or not.

Thousands of indirect jobs

It is estimated that each direct job in the mining sector generates 0.9 indirect job in another sector (such as the services sector). The mining sector thus contributes to the creation of several thousand indirect jobs distributed in all administrative regions of Québec[6].

6 - Based on a study of economic benefits released by the MERN in May 2011.

4 - According to preliminary data from the *Institut de la statistique du Québec*.
5 - Concerning employment injuries (industrial accidents and occupational diseases), the performance of the mining sector has continuously improved in Québec over the past 30 years.
* Statistics Canada

Mine rehabilitation

100% guarantee

The environmental liability inherited from the mining industry from a bygone era is shrinking. Amendments made to regulations related to the Mining Act and to the Act itself will significantly reduce the risk to the State of inheriting mine sites in need of rehabilitation work without having the amounts required to do so.

Since August 22, 2013, anyone conducting mining activities in Québec is required to submit a financial guarantee that will cover 100% of the cost to rehabilitate the entire mine site. Also, the guarantee must be paid in three instalments (50%-25%-25%) over a period of two years.

Operators who omit to pay the guarantee are subject to a fine corresponding to 10% of the total amount of the financial guarantee per day.

Finally, since the adoption of the new Mining Act, the entire mine site must be restored and operators are required to begin rehabilitation and restoration work on the mine site within three years after the cessation of its mining activities.

The Marcotte creek, after restoration work at the Barvue site.

Photos: MERN

Tailings pond of the old Principale mine, in Chibougamau.

Québec Mines 2013, a great success

The most important mining convention in the French-speaking world

Québec Mines 2013, crossroads of geosciences and mineral resources, took place under the theme *Science – Innovation – Society*, at the Québec City Convention Centre from November 11 to 14, 2013.

Québec Mines is the ideal venue to learn more about the developments that are shaping the future of the mining sector.

Organized by the *Ministère de l'Énergie et des Ressources naturelles* in cooperation with the Québec Mining Association, the Canadian Institute of Mines, Metallurgy and Petroleum, the *Comité sectoriel de main-d'œuvre de l'industrie des mines*, Québec International, the *Institut national des mines* and 48e Nord International, *Québec Mines 2013* welcomed:

- Nearly 5,000 visitors, including 1,900 convention delegates;
- Delegates from twenty different countries;
- 2,000 elementary and high school students;
- 600 citizens;
- 250 job seekers.

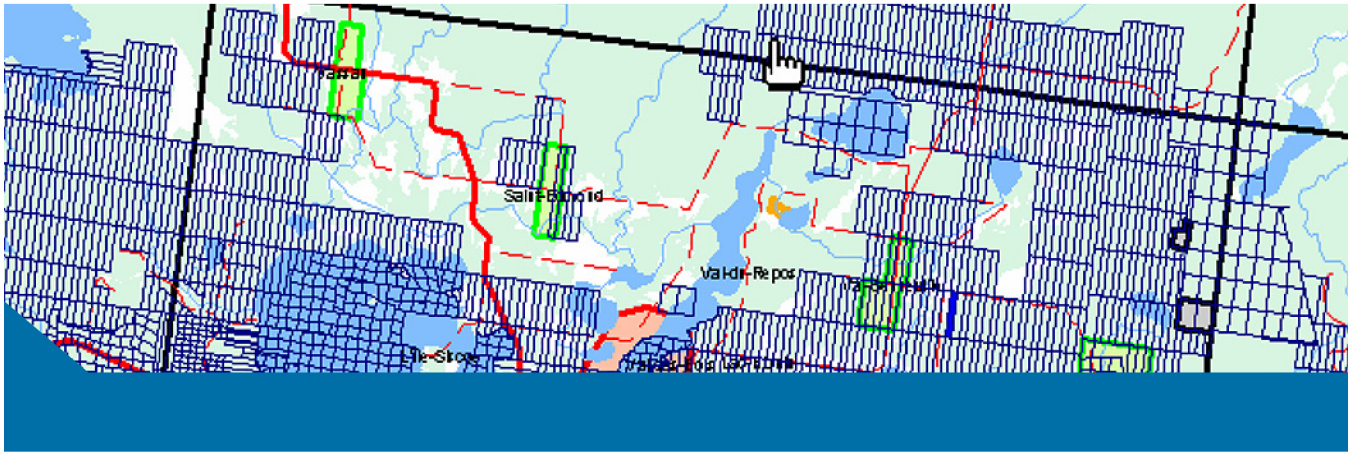
The new international component of *Québec Mines 2013* was an opportunity to showcase Québec's expertise in mineral exploration and mine development to foreign delegates, and also contributed in making Québec Mines the most important mining convention in the French-speaking world.

The *Ministère de l'Énergie et des Ressources naturelles* took advantage of the presence of mining stakeholders to unveil the results of its geoscience work programs, which resulted in the identification of 45 new exploration targets in 2013 (see section on Geoscience work for more information). The unveiling of these new targets led to the acquisition of approximately one hundred new claims.

The conference program at *Québec Mines 2013* was a singular success as it attracted crowds of listeners during sessions devoted to mine engineering and metallurgy. The interest expressed for proposed topics bodes well for future years!

High-level workshops and short courses were offered and enabled participants to update their knowledge on various aspects of the mining process.

Photos: Roch Théroux pour le MERN



CHAPTER 2

Mining regime and land access

Dorra Djemal, Roch Gaudreau and Jocelyne Lamothe

2.1 Legal framework

Mining activities are governed by many laws, including two fundamental laws that specifically apply to this sector: the Mining Act and the Mining Tax Act.

The Mining Act aims to:

- Promote, with a view to sustainable development, the search, prospecting, exploration, and mining of mineral substances, while ensuring that the people of Québec receive their fair share of the wealth generated from the mining of its resources, and 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;
- Develop expertise in Québec in the fields of exploration, mining, and processing of mineral resources.

The Mining Tax Act aims to:

- Ensure Québec receives its fair share of returns on the mining of its mineral resources, while taking into account the competitiveness of companies and the need to maximize benefits.

2.2 Basic principles

Access to the province's mineral resources is open on the largest possible expanse of land (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 comply with conditions stipulated in the Mining 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. In this regard, a mining title constitutes a 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 explore for all mineral substances in the domain of the State within the confines of the claim. The main 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.

To obtain a claim, an applicant must:

- Fill out and submit a notice of map designation through GESTIM Plus;
- Pay the fees prescribed by regulation.

To renew a claim, a titleholder must namely:

- Submit a renewal application before the expiry date of the claim through GESTIM Plus. Preferably, the application should be submitted before the 60th day preceding the expiry date of the claim. It may also be received within the last 60 days preceding the expiry date of the claim, although in the latter case the prescribed fees will be doubled;
- Pay the prescribed fees, which vary according to the surface area and the location of the claim as well as 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;
- Submit a statutory work report and a statement of required mining work at least 60 days prior to the expiry date of the claim. If these documents are submitted within the last 60 days preceding the expiry date of the claim, a fine will be payable for late submission;
- Comply with the provisions of the Mining Act. The titleholder must namely submit to the Minister, at each anniversary date of the claim registration, a summary 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. Excess credits may be applied for the six subsequent renewal terms of the claim.

When the amount of work performed is insufficient or has not been carried out, the claim holder may pay a sum equal to twice the minimum cost of work required.

When a claim is located, in all or in part, within an area deemed incompatible with mining activities[7], it may be renewed only if work is performed on the claim during a term subsequent to the delineation of such an area.

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 namely:

- Produce a report, certified by an engineer member of the *Ordre des ingénieurs du Québec* or a geologist member of the *Ordre des géologues du Québec* who meets the qualification requirements determined by regulation, 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;
- Obtain a survey plan of the land parcel;

7 - Areas deemed incompatible with mining activities will be defined eventually by MRCs in accordance with government orientations, when applicable provisions of the Mining Act are enacted by decree.

- 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 aux changements climatiques* (MDDELCC);
- For metallic ore mining projects with a daily production capacity of 2,000 metric tonnes of ore or more, and for all rare earth mining projects, the applicant must prepare an impact study in accordance with the Regulation respecting environmental impact 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 processing capacity of less than 2,000 metric tonnes of ore, the applicant must proceed with public consultations within the region of the project and produce a report on the consultation process.
- Produce all documents and all information relating to the mining project requested by the *Ministère de l'Énergie et des Ressources naturelles*.

To operate on a mining lease, the leaseholder must namely:

- Form, within 30 days of the issuance of a BM, 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* for the emplacement of a processing plant, if warranted;
- Obtain authorization from the *Ministère de l'Énergie et des Ressources naturelles* for the emplacement of a tailings pond, if warranted;
- Obtain authorization from the *Ministère de l'Énergie et des Ressources naturelles* or a forest management permit, if warranted;
- Obtain authorization from the surface landowner or lessee, if warranted;
- Obtain the consent of holders of leases to mine surface mineral substances, if warranted.

To renew a mining lease, the leaseholder must namely:

- File an application for renewal of a BM prior to the expiry date of the lease. If the application is filed after the 60th day prior to its expiry, an additional amount prescribed by regulation must be paid;
- File a report establishing the fact 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. He must namely 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 global 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 highways 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 of land subject to a BEX may not exceed 100 hectares. However, for peat production, this surface area may reach 300 hectares. The first term of a BEX may not exceed ten years for mineral substances other than peat, and fifteen years for peat. A BEX may be renewed twice at most, for terms of five years, or fifteen years in the case of peat harvesting.

To obtain a BEX, an applicant must namely:

- 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 *Ordre des géologues du Québec* or an engineer member of the *Ordre des ingénieurs du Québec;*
- 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 limits of the targeted parcel of land;
- Produce a hypsometric plan in the case of a peat production site;
- Produce a map at a scale of 1:5,000 or greater namely indicating the limits of the land parcel subject to the application, the proposed extraction area including the location of equipment, and loading, unloading and deposition areas for produced materials, as well as the location of accumulation areas for waste materials, stripped overburden and topsoil;
- Proceed with public consultations within the region of the project in the case of a peat production project, or if the project is deemed necessary for an industrial activity or for commercial export;
- Produce all documents and all information relating to the public consultation requested by the Minister of Energy and Natural Resources;
- If warranted, comply 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 titleholder.

To operate on a BEX, the titleholder must namely:

- Obtain a certificate of authorization issued by the M*inistère du Développement durable, de l'Environnement et de la Lutte aux changements climatiques* (MDDELCC);
- Obtain an authorization from the *Ministère de l'Énergie et des Ressources naturelles* or a forest management permit, if warranted;
- Obtain 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, the 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 after the 60th day prior to its expiry, an additional amount prescribed by regulation must be paid;
- 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 applicant has complied with all 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 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. The BNE 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 1 year.

To obtain a BNE, an applicant must namely:

- File an application for a BNE;
- Produce a map at a scale of 1:50,000 or greater, showing the location of the mining site;
- Pay the rent prescribed by regulation;
- If warranted, 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.

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 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.

2.4 Active mining titles

As at December 31, 2013, the number of active mining titles across Québec was 190,071, for a total surface area of 8,864,725 hectares. This represents a decrease of 19.95% in the number of active mining titles and of 19.54% in the total surface area covered by such titles relative to 2012 (Figure 2.1).

The number of registered exploration titles has decreased relative to 2012 in most administrative regions of Québec, and most notably in Bas-Saint-Laurent (81.8%), Outaouais (68.7%), Côte-Nord (53.6%), Laurentides (46.87%), and Nord-du-Québec (44.64%) (Table 2.1).

A total of 24,071 exploration titles were registered in Québec in 2013, covering a surface area of 1,184,075 hectares. This represents a decrease of 45% relative to the number of exploration titles registered in 2012, and a drop of 46.71% in the total surface area covered by such titles (Figure 2.2).

The number of extraction titles (mining leases and leases to mine surface mineral substances) in Québec as at December 31, 2013 was 3,332, an increase of 2.83% relative to the number of active extraction titles in 2012 (Table 2.2).

Mining extraction titles are distributed in most regions across Québec. Data taken from the Public Register of Real and Immovable Mining Rights of Québec as at December 31, 2013 reveal that 48.62% of all mining leases (BM) and mining concessions (CM) are located in the Abitibi-Témiscamingue region, whereas 62.21% of exclusive leases to mine surface mineral substances (BEX) are located in the Côte-Nord and Nord-du-Québec regions. As for non-exclusive leases to mine surface mineral substances (BNE), more than 73% of these mining titles are distributed in four administrative regions of Québec, namely Saguenay–Lac-Saint-Jean (321 BNE), Abitibi-Témiscamingue (623 BNE), Côte-Nord (475 BNE), and Nord-du-Québec (408 BNE) (Table 2.2).

2.5 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 at: 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 of Québec, and namely makes it possible to:

- Reduce the cost of acquiring and monitoring mining titles for mineral exploration stakeholders;
- 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;

- Generate mining title maps tailored to your needs;
- File a notice of map designation or a claim renewal application;
- Pay the required fees electronically in a totally secure environment;
- File a renewal application for a non-exclusive lease to mine surface mineral substances (BNE);
- Report quantities of extracted or alienated surface mineral substances;
- Pay royalties on extracted or alienated surface mineral substances.

The Mines Sector is resolutely taking to the web by progressively expanding its services offered through GESTIM Plus. Indeed, the Internet is the only accepted means, via the GESTIM Plus system, to file a notice of map designation or submit a notice of staking, a claim renewal application, and a report of 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 MERN account. Because the time of receipt for notices of map designation is used to establish the order in which the Registrar will process the notices, the time of receipt is based on the time of the GESTIM Plus server.

Documents required upon filing a notice of staking must be submitted to the Registrar's office within twenty days following the date of staking.

In addition, applications for the renewal of a BNE must be filed through the GESTIM Plus system, with the exception of mining titles for sand and gravel for sites located on lands in the domain of the State in administrative regions where an agreement to delegate the management of sand and gravel mining is in effect. In such cases, renewal applications must be forwarded to the delegate MRC.

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

New developments in 2013

In an effort to continually improve our services, new parameters allowing users to consult and download data from the Public Register of Mining Rights, per administrative region, per MRC, or per municipality, have been added to the GESTIM Plus system.

2.6
Relations with Aboriginal communities

Over the last few decades, 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. This search for balance aims 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 their pursuit of conciliation, the courts have 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 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 has complied with its obligation to consult Aboriginal communities since 2006, particularly before issuing any extraction title such as a mining lease, an exclusive lease to mine surface mineral substances, a non-exclusive lease to mine surface mineral substances on a new site, or an authorization to mine without a lease. The Mines Sector is also involved in consultations for all major exploration work, including 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. As outlined in Québec's Mineral Strategy, the government is committed to promoting dialogue between mining companies and Aboriginal communities in the hopes that this dialogue will lead to agreements on the impacts and benefits of mining and mineral activities, thus gaining wider social acceptance for mining projects.

New developments in 2013

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.

2.7 Land protection

In order to accommodate other possible uses for the territory, the Minister may impose restrictions on 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 (Chapter Q-2, r. 6);
- Protection of rehabilitation and restoration work carried out in accumulation areas under sections 232.1 and 232.11 of the Mining Act.

In addition, the Minister may, by order and 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 may also, by order, reserve to the State any mineral substance in the domain of the State and for which he has refused a lease to mine sand and gravel under section 142.0.1 of the Mining Act, or for which the Minister has terminated a lease to mine sand, gravel, or stone under section 142.0.2 of the Mining Act.

The ministerial order comes into force on the day of its publication in the Gazette officielle du Québec or on any later date that is stipulated.

Prior to an order, 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. This suspension comes into effect after a notice has been submitted to the Registrar's office, on the date indicated on the notice.

Since December 10, 2013, any mineral substance in the domain of the State occurring within an urbanized perimeter reproduced on maps kept at the Registrar's office 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 determined under section 304.1.1 of the Mining Act.

As at December 31, 2013, lands withdrawn from mining activities covered a total of 17.5 million hectares or 10.5% of the surface area of Québec. Lands subject to a temporary suspension covered 11.5 million hectares or 6.89% of the surface area of Québec. Lands reserved to the State covered a total of 12.9 million hectares or 7.75% of Québec. A surface area of 0.59 million hectares or 0.35% of the surface area of Québec, represents lands within urbanized perimeters withdrawn from mining activities pursuant to a transitory provision that came into effect on December 10, 2013 (Figure 2.3).

Lands recognized as Protected Areas by the International Union for Conservation of Nature cover 9.14% of Québec's territory and are included in the territory subject to restrictions on mining activities.

2.8
Delegation of sand and gravel management to MRCs

In the fall of 2008, the government authorized the Minister of Municipal Affairs, Regions, and Land Occupancy and the Minister of Natural Resources and Wildlife to sign an agreement with the *Fédération québécoise des municipalités* (FQM) and the *Union des municipalités du Québec* (UMQ). One of the goals of the agreement was to delegate to regional county municipalities (*municipalités régionales de comté - MRC*) the management of sand and gravel mining on lands in the domain of the State. In June 2009, the Cabinet adopted an order-in-council to decentralize sand and gravel management.

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 2.4).

Bas-Saint-Laurent

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

Saguenay – Lac-Saint-Jean

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

Capitale-Nationale

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

Mauricie

- City of La Tuque
- Maskinongé MRC
- Mékinac MRC

Côte-Nord

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

Lanaudière

- Matawinie MRC

Laurentides

- Laurentides MRC
- Antoine-Labelle MRC

In 2013, the number of leases and authorizations to mine sand and gravel across Québec was 4,224. These relate to 3,084 sites where surface mineral substances are mined. Many of these titles are managed by the MRCs of delegate administrative regions. Of these, only 1,865 titles are still managed by the MERN (Table 2.3).

2.9 Amendments to the Mining Act

On December 10, 2013, the National Assembly of Québec sanctioned Bill No.70 entitled "An Act to Amend the Mining Act".

Québec is thus establishing its legal framework in a manner that moves and evolves toward sustainable development and that promotes transparency for the benefit of all Quebeckers. In this regard, the new Mining Act succeeds in balancing the development of mineral resources, the respect of local communities, and protection of the environment to enable responsible, dynamic, and balanced mining development in Québec.

In addition to its preamble, the Mining Act is now more specific in the statement of its objectives, which should guide the interpretation of its provisions. Its preamble contains the following elements:

- Mineral resources present throughout Québec constitute social wealth for present and future generations;
- Mining has helped forge Québec's identity and should continue to be a source of pride;
- It is necessary to promote the optimal use of mineral resources in order to create as much wealth as possible for the people of Québec;
- It is necessary to engage in mineral development in a manner respectful of the environment;
- It is necessary to promote development that is associated with Québec communities and integrated into their environment;
- It is necessary to pursue sustainable diversification of the regions' economies.

In addition, the Mining Act stipulates that it aims to promote not only prospecting, searching, exploration and mining of mineral substances, but that it also promotes these activities with a view to sustainable development, while ensuring that the people of Québec will receive a fair share of the wealth created by the mining of its resources, and taking into account other possible land uses; that mining of non-renewable resources is carried out in a way that will benefit future generations; that expertise in the fields of mineral exploration and processing of mineral resources should be developed in Québec.

The Mining Act is essentially built around transparency and the three components of sustainable development: creation of wealth (economic aspect), mineral development respectful of the environment (environmental aspect), and balancing different land uses (social aspect). The main changes introduced by the new Act are as follows:

Economic aspects

Maximizing economic benefits

- The Minister requires that all applications for a new mining lease or renewal must be accompanied by a scoping and market study as regards processing in Québec.
- The government may require, on reasonable grounds, that economic spinoffs be maximized within Québec, when granting a BM or prior to the start of operations in the case of a mining concession.

Stimulating work on claims and mining concessions

- The life span of work credits is limited to twelve years, i.e., six renewal terms;
- The possibility of using credits from exploration work performed on a mining lease or a mining concession to renew a claim has been eliminated.
- The payment in lieu of work to be performed has been doubled.
- Mining operations must be undertaken on mining concessions within five years of the enactment.

Environmental aspects

Conditions to be met prior to the issuance of a mining lease:

- Approval of the rehabilitation and restoration plan;
- Issuance of a certificate of authorization from the MDDELCC;
- Public consultations for all mining projects:
  - Held by the BAPE (metallic ore projects with an expected daily production rate of 2,000 metric tonnes of ore or more, as well as all rare earth projects),
  - Held by the developer (metallic ore projects with an expected daily production rate of less than 2,000 metric tonnes of ore).
- Public consultations held by the developer, prior to the issuance of a lease for peat and for certain sand and gravel operations (required for an industrial activity or for commercial export).

Social aspects

Taking into account the will of MRCs

- MRCs shall have the power to delineate, in their land use and development plans, areas deemed incompatible with mining activities. These areas will be withdrawn from mining activities from the moment they are reproduced on mining title maps.
- The government shall adopt government orientations to structure the process for MRCs.
- The Minister of Energy and Natural Resources may issue an unfavourable notice in respect of withdrawn areas while the plans are being prepared.
- Dialogue between claim holders and communities
  - A claim holder must advise the municipality and landowner that they have obtained the title within 60 days after registration of the claim.
  - A claim holder must obtain written authorization from the landowner or lessee 30 days prior to accessing the site.
  - A claim holder must inform the municipality and landowner at least 30 days prior to the commencement of work.
- Dialogue between mining lease applicants and communities

- Public consultations before the BAPE:
  - Metallic ore mining projects where the daily production capacity is 2,000 metric tonnes or more;
  - All rare earth projects, regardless of the processing or production capacity.
- Consultations for projects not subject to BAPE hearings:
  - Consultations held by the developer within the region of the project.
- Obligation to form and maintain a monitoring committee to foster the involvement of local communities.

- Dialogue with communities with regard to surface mineral substances
  - Prior public consultations must be held by an applicant within the region where a project to harvest peat or a project required for an industrial activity or for commercial export is planned.
  - Possibility to terminate a lease to mine sand, gravel or stone in the public interest.
  - Possibility to refuse an application for a lease to mine sand and gravel, so as to avoid land use conflicts or in the public interest.
- Expropriation
  - Power of expropriation limited to mining titleholders during the mining phase.
  - Financial support for landowners during negotiations:
    - Acquisition of a residential immovable or an immovable used for agricultural purposes and located on farmland;
    - Professional fees to a maximum of 10% of the value of the immovable on the property assessment roll.
  - A residential immovable may not be moved or demolished prior to the issuance of a mining lease.
- More transparency
  - Transparency during the exploration phase
    - Provide to the MERN, each year, a summary of work performed during the year.
    - Report to the MERN all exploration work performed, whether an allowance is claimed or not under the Mining Tax Act.
    - Declare the discovery of mineral substances that contain 0.1% or more of triuranium octaoxide (U_3O_8) within 90 days of the discovery.
    - Make all of this information public.
  - Transparency during the mining phase
    - Amount and value of ore extracted during the previous year.
    - Duties paid under the Mining Tax Act or royalties on surface mineral substances.
    - Global amount of contributions paid.
    - Approved rehabilitation plan.
    - Total amount of the required financial guarantee.
    - Make all of this information public.
- Native communities

In the Mining Act, a new chapter is specifically devoted to Native communities:

- 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.

2.10
Mining taxation

Mining taxation in Québec is distinct from that in other Canadian provinces and territories, namely with regard to tax incentives designed to stimulate mineral exploration as well as the development of new mines.

The main tax incentives available to the mining sector are:

- Québec's flow-through share regime, which allows individual investors to claim deductions reaching up to 150% of their investment cost:

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

- The refundable tax credit for resources, introduced in 2001, which grants companies a refund reaching up to 38.75% of eligible exploration expenditures incurred in Québec:

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

- The credit on duties refundable for losses, a unique measure in Canada, introduced in 1985, which allows mining operators to receive a refund for the tax value of certain exploration, deposit appraisal, and mine development investments prior to production. This credit gives rise to a refund equivalent to 16%, since January 1, 2012:

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

2.11
Mining Tax Act

Québec's Mineral Strategy, announced on June 29, 2009, called for a careful examination of the mining duties regime, to ensure Québec receives its fair share of returns on the mining of its mineral resources, while taking into account the competitiveness of companies and the need to maximize benefits.

Since that time, the mining duties regime has been studied in detail and the government has proposed two major revisions of the regime to adapt it to the new reality of the mining sector: the Mining Tax Act, which brought into force the provisions outlined in the March 30, 2010 reform, was sanctioned on June 6, 2011, whereas the 2013 reform was announced on May 6, 2013, in Information Bulletin 2013-4 published by the *Ministère des Finances* of Québec.

www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=2&file=/I_0_4/I0_4.html

The regime revised in 2010 was characterized by:

- A "mine-by-mine" approach: this approach applies to fiscal years beginning after March 30, 2010 for mine operators and stipulates that losses relating to one mine may not be used to reduce profits at another mine;
- The concept of eligible operator;
- The progressive application of a new mining duties rate;
- A new rate for the credit on duties refundable for losses;
- Changes and additions to the following allowances:
  - Additional allowance for a mine located in Northern Québec,
  - Depreciation allowance,
  - Exploration allowance,
  - Pre-production allowance for mineral deposit evaluation and mine development,
  - Post-production allowance for mineral deposit evaluation and mine development,
  - Processing allowance;
- New rules for work financed by flow-through shares, namely the exclusion of certain expenses;
- Rules applicable in the case of gemstones.

Despite the 2010 reform, certain operators paid no royalties to the State for mineral substances extracted from Québec's subsoil. The government wants to change this situation and improve the profitability of the regime, while providing greater support for processing and transformation activities in Québec.

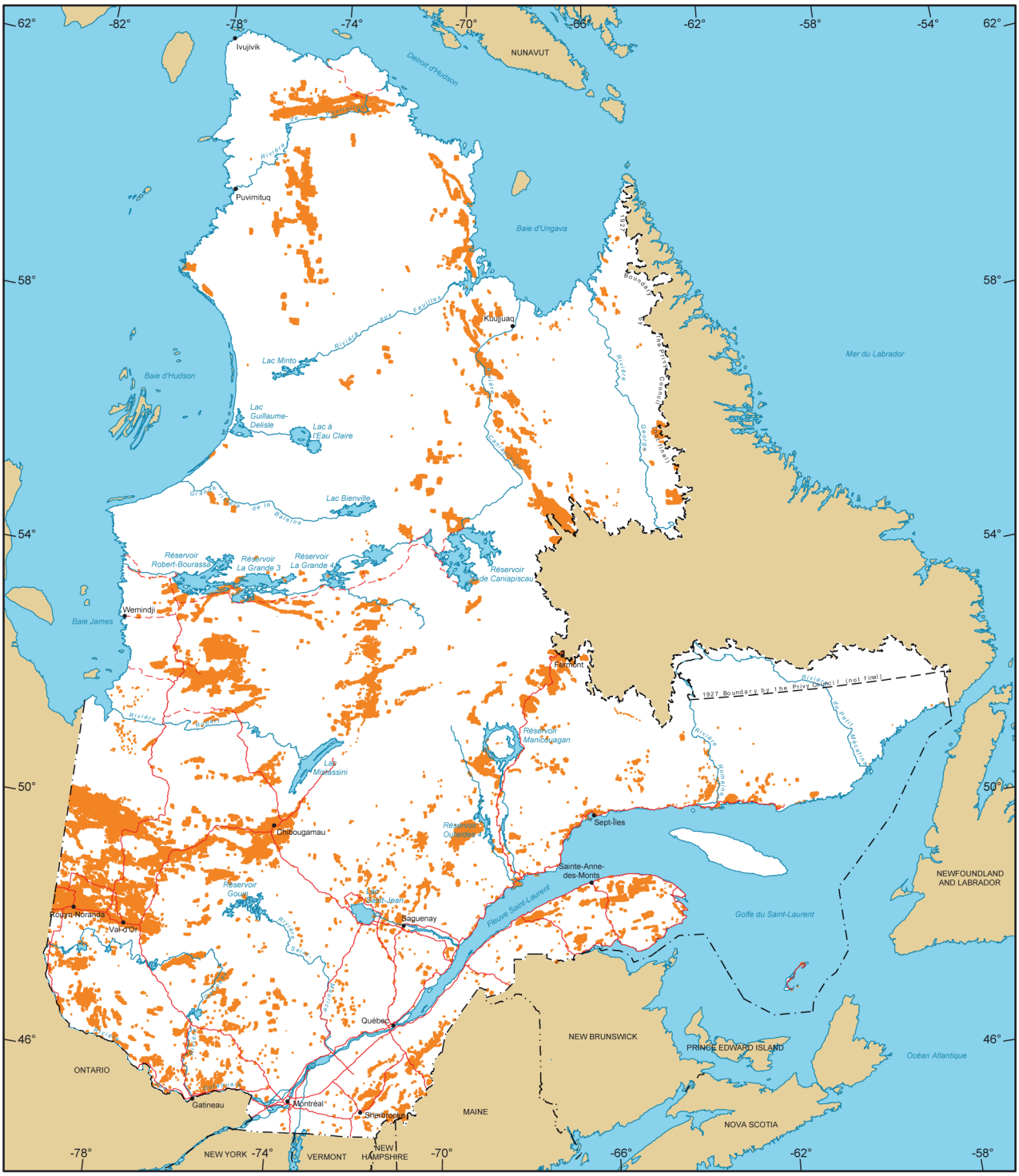
In 2013, certain provisions were added to the regime to ensure that:

- All operators pay royalties to the State;
- More profitable mining companies pay more royalties;
- Processing and transformation activities receive sufficient support.

The main measures introduced since January 1, 2014, are as follows:

- Implementation of a minimum mining tax at a rate of 1% to 4% of the gross mine-mouth output value;
- Introduction of progressive rates ranging from 16% to 28%, used to determine the mining tax on annual profit, based on the company's profit margin;
- Balance between the minimum mining tax and the mining tax based on profit – the higher of the two shall be paid by mining companies;
- Increased processing allowance that makes it possible to exempt from tax the share of profits made by a mining company that is attributable to the processing of mineral substances. Mining companies may benefit from higher deduction rates for their processing assets, and may exempt from tax up to a maximum of 75% of their profits.

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



Active mining titles
On December 31st, 2013

Number : 190,071
Area : 8,864,725 ha

Metadata

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

1/10,000,000

0 200 km

Sources

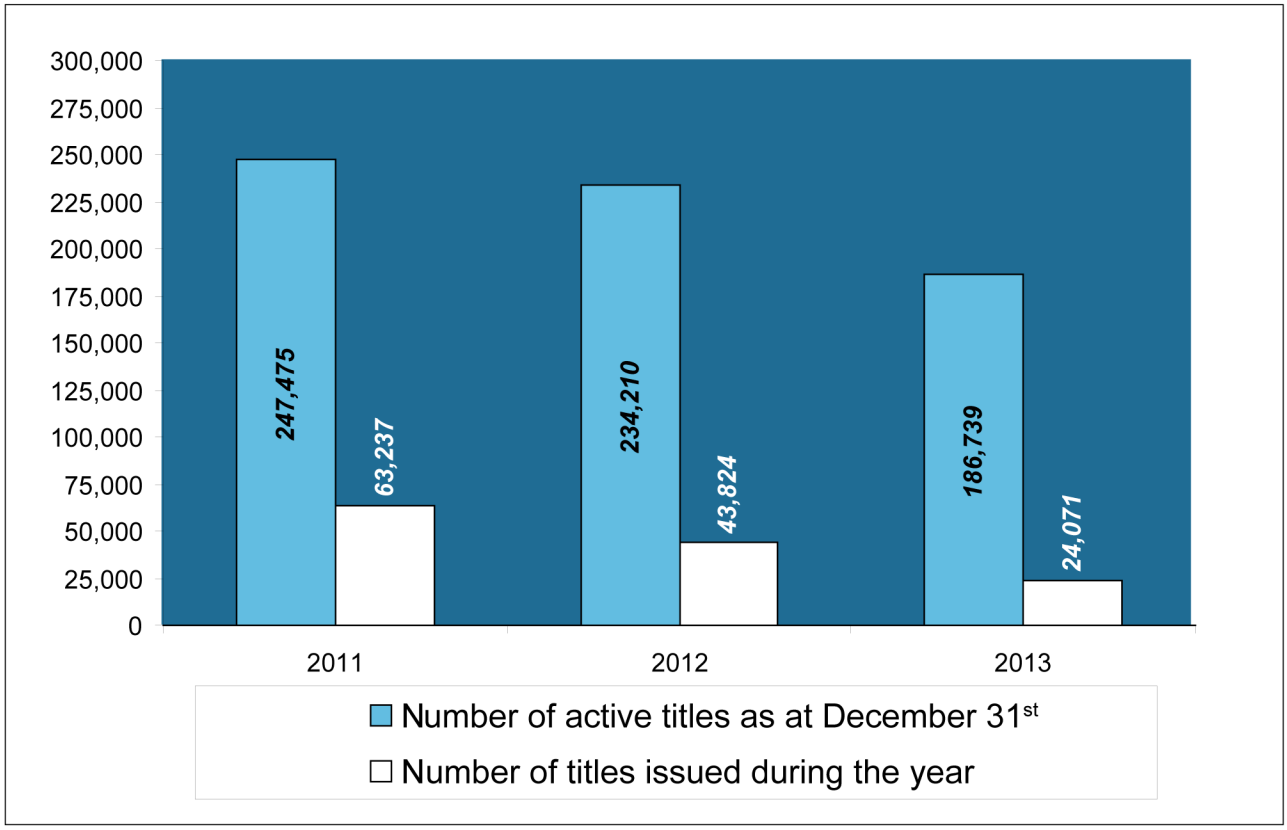
Mining data, MERN, 2014
Cartographic reference, MERN, 2011 (BDGA 1M, BDGA 5M)

Realisation

Ministère de l'Énergie et des Ressources naturelles
Direction des titres miniers et des systèmes
Note: This document has no legal value.

© Gouvernement du Québec, January 7, 2014

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



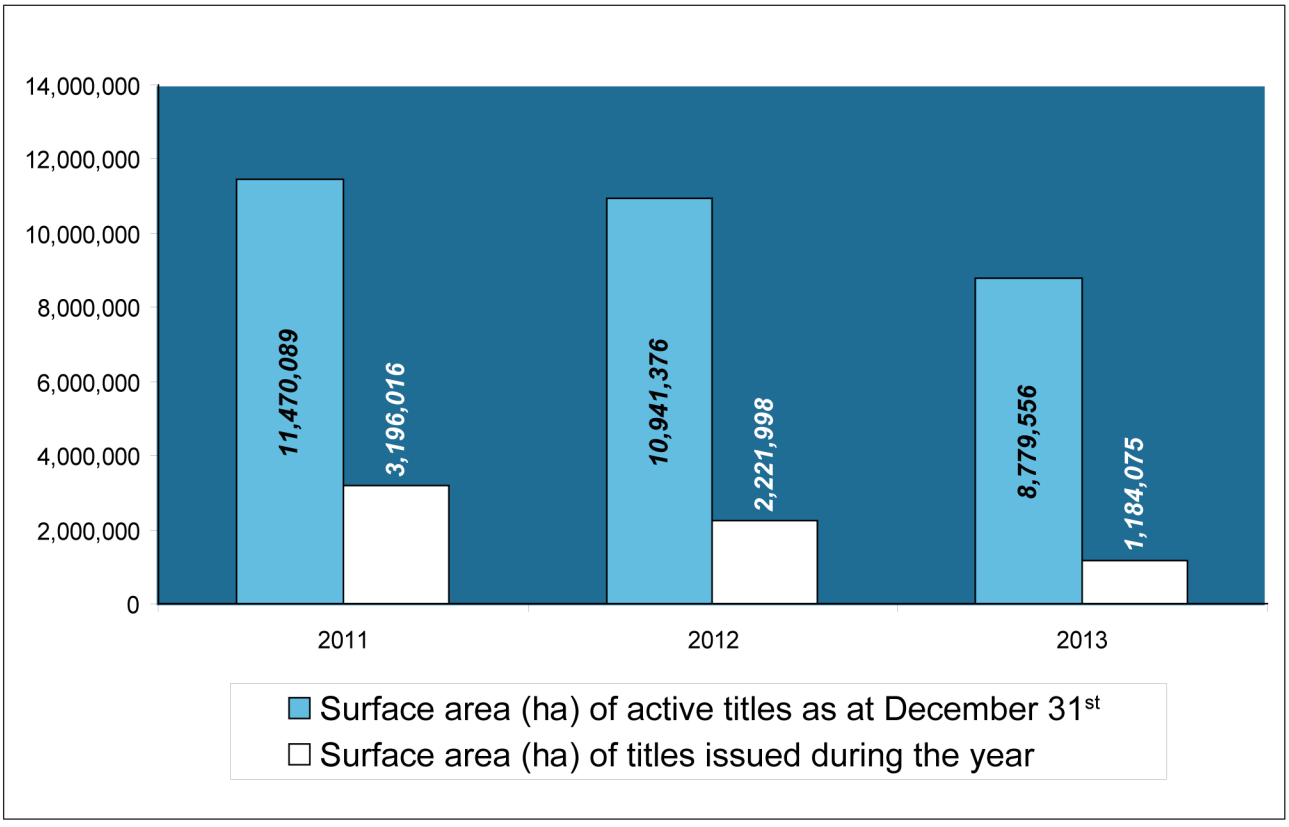
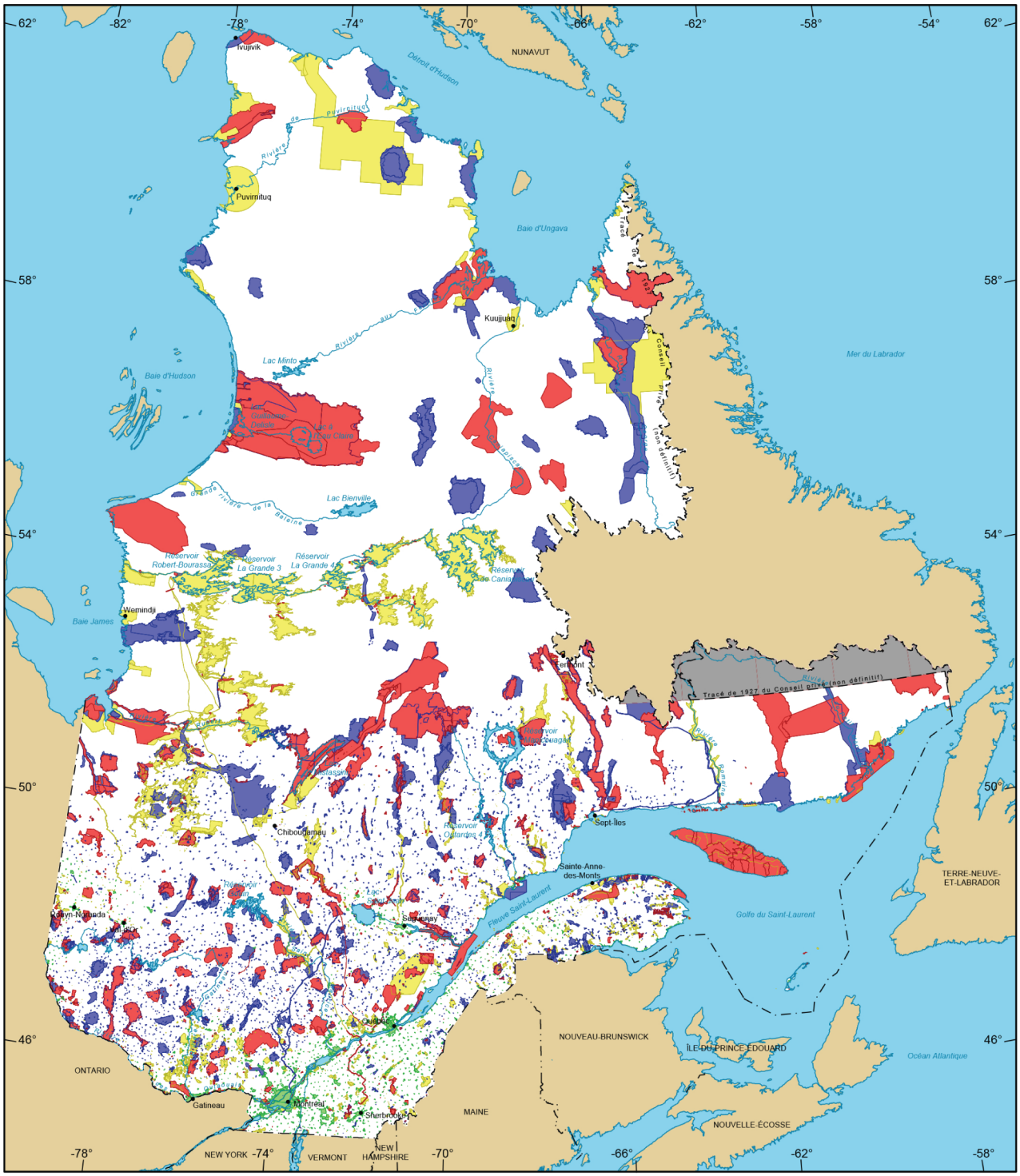


Figure 2.3 - **Restriction on mineral exploration in Québec.**



Mining restrictions

- Major
  Exploration prohibited
  17,565,701 ha
- Major
  Urban perimeter
  598,597 ha
- Major
  Land suspended temporarily
  11,492,173 ha
- Major
  Withdrawl from staking,
  Order in Council
  2,897,400 ha
- Minor
  Exploration under specific conditions
  12,922,042 ha

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

Sources
Mining data, MERN, 2014
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 des titres miniers et des systèmes
Note: This document has no legal value.

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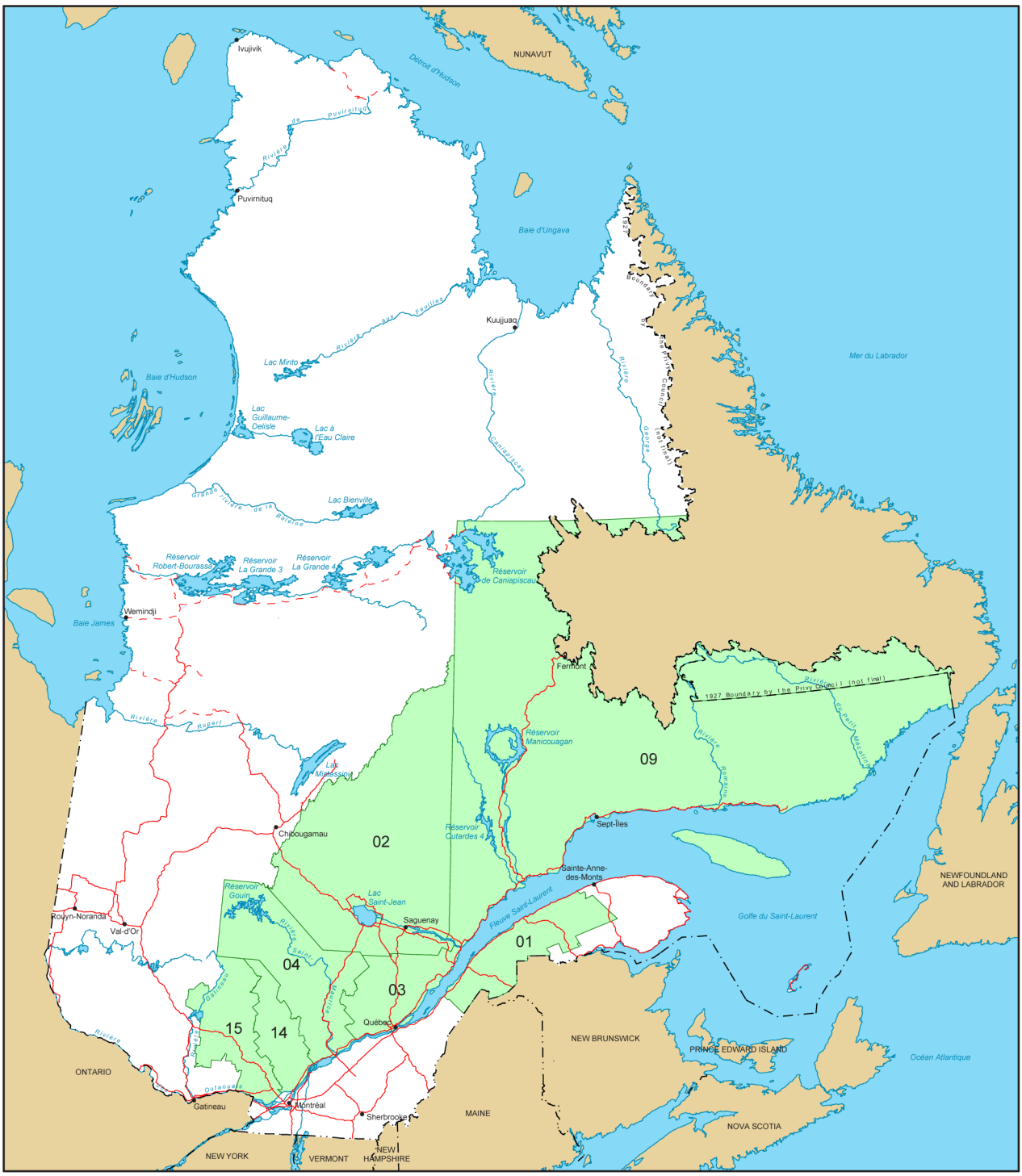
Figure 2.4 - **Delegation of sand and gravel mining management.**



Administrative regions delegatee of the management of sand and gravel on the land of the State

Delegatees on December 31st, 2013

01- Bas-Saint-Laurent
02- Saguenay–Lac-Saint-Jean
03- Capitale-Nationale
04- Mauricie
09- Côte-Nord
14- Lanaudière
15- Laurentides

Metadata

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

1/10,000,00

0 200 km

Sources

Cartographic reference, MERN, 2013 (BDGA 1M, BDGA 5M)

Realisation

Ministère de l'Énergie et des Ressources naturell
Direction des titres miniers et des systèmes
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, 2013.

	Administrative region	Number of titles (CL,CDC,CLD)			Variation (%) in 2013	Surface area (ha)			Variation (%) in 2013	Number of titles issued (CL,CDC,CLD)			Surface area (ha) of titles issued		
		2011	2012	2013		2011	2012	2013		2011	2012	2013	2011	2012	2013
01	Bas-Saint-Laurent	1,219	2,001	1,889	(5.6)	61,106	109,482	103,492	(5.47)	336	1,381	251	18,246	78,078	13,785
02	Saguenay–Lac-Saint-Jean	7,899	7,817	4,978	(36.3)	424,467	422,381	265,899	(37.05)	3,600	1,828	1,029	198,983	100,549	55,705
03	Capitale-Nationale	1,123	874	558	(36.2)	60,665	46,133	29,745	(35.52)	450	231	206	23,505	12,130	10,983
04	Mauricie	1,846	1,380	1,067	(22.7)	100,235	75,703	58,492	(22.73)	788	332	441	42,961	18,434	23,840
05	Estrie	6,668	2,952	2,210	(25.1)	389,579	171,153	128,778	(24.76)	482	531	224	26,938	30,477	12,843
06	Montréal	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07	Outaouais	3,984	5,666	5,283	(6.8)	228,917	328,943	308,162	(6.32)	1,665	2,472	773	95,864	145,034	45,536
08	Abitibi-Témiscamingue	38,860	37,689	31,211	(17.2)	1,562,221	1,512,816	1,225,745	(18.98)	8,613	5,681	3,414	416,191	282,311	156,522
09	Côte-Nord	22,789	22,152	18,157	(18.0)	1,170,300	1,138,153	925,659	(18.67)	6,674	4,903	2,273	347,147	257,187	116,500
10	Nord-du-Québec	148,664	142,572	111,224	(22.0)	6,690,079	6,543,124	5,188,462	(20.70)	36,741	22,744	12,586	1,813,391	1,093,522	590,456
11	Gaspésie–Îles-de-la-Madeleine	4,493	5,078	4,607	(9.3)	231,240	266,167	244,605	(8.10)	2,157	1,574	1,198	115,344	84,800	62,085
12	Chaudière-Appalaches	6,763	3,285	2,510	(23.6)	361,478	163,621	119,983	(26.67)	786	730	386	42,763	36,398	19,829
13	Laval	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Lanaudière	453	288	785	(172.6)	25,947	16,706	45,739	(173.79)	92	98	599	5,151	5,775	34,819
15	Laurentides	2,506	2,923	2,752	(5.9)	140,373	164,572	154,895	(5.88)	869	1,329	706	49,847	76,452	40,996
16	Montérégie	339	157	131	(16.6)	19,593	8,767	7,312	(16.60)	39	33	19	2,177	1,904	1,153
17	Centre-du-Québec	1,014	393	234	(40.5)	59,988	23,187	13,992	(39.65)	75	166	68	4,152	9,910	4,082
	Total*	**247,475**	**234,210**	**186,739**	**(20.3)**	**11,470,089**	**10,941,376**	**8,779,556**	**(19.76)**	**63,237**	**43,824**	**24,071**	**3,196,016**	**2,221,998**	**1,184,075**

*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.
Updates: When this table is updated, the number of mining titles for previous years may be adjusted as a result of decisions from the Minister, court judgments, or any other correction of the Register of real and immoveable mining rights of Québec.
These statistics are taken from the ODM Register as at January 13, 2014.

Acronyms

CDC: map-designated claim obtained after November 22, 2000
CL: staked claim
CLD: map-designated claim obtained prior to November 22, 2000

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

Active and suspended mining extraction titles as at December 31, 2013.

Administrative region		Number of titles			
		CM,BM	BEX	ASB	BNE
01	Bas-Saint-Laurent	1	11	5	80
02	Saguenay–Lac-Saint-Jean	5	35	2	321
03	Capitale-Nationale	4	22	18	60
04	Mauricie	3	7	0	235
05	Estrie	3	0	0	9
06	Montréal	0	0	0	0
07	Outaouais	3	1	0	106
08	Abitibi-Témiscamingue	141	41	1	623
09	Côte-Nord	24	150	68	475
10	Nord-du-Québec	71	120	29	408
11	Gaspésie–Îles-de-la-Madeleine	12	21	4	27
12	Chaudière-Appalaches	8	3	0	14
13	Laval	0	0	0	0
14	Lanaudière	3	8	0	63
15	Laurentides	12	15	0	60
16	Montérégie	1	0	0	0
17	Centre-du-Québec	0	0	0	0
	Total*	**290**	**434**	**127**	**2,481**

*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.
Updates: When this table is updated, the number of mining titles for previous years may be adjusted as a result of decisions from the Minister, court judgments, or any other correction to the Register of real and immoveable mining rights of Québec.
These statistics are taken from the ODM Register as at January 13, 2014.

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, 2013

Administrative region		BNE/ BEX	ASB	Extraction sites for SMS
01	Bas-Saint-Laurent *	101	11	85
02	Saguenay–Lac-Saint-Jean *	585	3	513
03	Capitale-Nationale *	109	13	82
04	Mauricie *	420	1	373
05	Estrie	15	0	9
06	Montréal	0	0	0
07	Outaouais	181	0	143
08	Abitibi-Témiscamingue	1,009	2	606
09	Côte-Nord *	741	66	520
10	Nord-du-Québec	591	68	536
11	Gaspésie–Îles-de-la-Madeleine	41	5	25
12	Chaudière-Appalaches	27	0	22
13	Laval	0	0	0
14	Lanaudière *	105	0	64
15	Laurentides *	127	2	105
16	Montérégie	0	0	0
17	Centre-du-Québec	1	0	1
Total		**4,053**	**171**	**3,084**

*Delegate administrative regions responsible for the management of sand and gravel.
These statistics are taken from the ODM Register as at January 13, 2014.

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

Photo: MERN

CHAPTER 3

Geoscience work in Québec in 2013

Patrice Roy, Abdelali Moukhsil and Charles Maurice

The *Bureau de la connaissance géoscientifique du Québec* (BCGQ) is responsible for acquiring and processing geoscience knowledge from across the province, in the perspective of fostering responsible development of mineral resources. In 2013, the BCGQ was involved in 22 projects across Québec. Some of these projects were launched this year, whereas others have now been finalized. Work on these projects was made possible through the mining heritage component of the Natural Resources Fund, financed with mining taxes. This year, nearly $12 million were invested in geoscience work, along with an additional amount of $250,000 for Quaternary deposit mapping in areas targeted by the Groundwater Knowledge Acquisition Program for municipalized regions in Québec. The 21 projects aimed at acquiring new geoscience knowledge comprise eight geological surveys including a drilling campaign, five geophysical surveys, two geochemistry projects, and six Quaternary surveys (Figure 3.1). A mineral potential study was also undertaken.

3.1 Geological surveys

All eight geological surveys represent the continuation of projects undertaken in previous years. They are designed to increase geoscience knowledge and stimulate exploration in Northern Québec and in mining regions.

The Churchill-Camp Pyramide project (No. 1) represents the third year of a five-year mapping project at a scale of 1:250,000 in the Churchill geological Province. The project covers an area located southeast of Kuujjuaq, in the northeast part of NTS sheet 24G and in NTS sheet 24H.

Two geological surveys were carried out in the Baie-James region. The Baie-James–Lac des Voeux project (No. 2) covers the eastward extension of the Keyano, Guyer, and Corvette volcano-sedimentary units. The Baie-James–Lac Pelletan 2 project (No. 3) will result in a better definition of the boundary between the La Grande Subprovince to the north and the Opinaca Subprovince to the south.

The Grenville-Okaopéo project (No. 4), a mapping survey at a scale of 1:50,000, will complete the geological synthesis of NTS sheet 22K. The mineral potential of this area is very diversified and appears to be related mainly to granitic rocks.

The Lamarck-North geological survey (No. 5), at a scale of 1:20,000, was completed northwest of Chapais and is the continuation of last year's project. It covers a prospective area for gold deposits, but also includes part of the contact between the Abitibi and Opatica subprovinces, which was mapped this year.

The revision of maps at a scale of 1:20,000 in the Malartic area (No. 6) continued in the southeast quadrant of NTS sheets 32D08 and 32D01. The results of this project will ultimately bridge the gap between mapping efforts in the western part of the Malartic Group and work carried out in the Val-d'Or Formation further east, and will also lead to a better characterization of the transition zone between the Abitibi and Pontiac subprovinces and of known gold and nickel occurrences in the area. This project is carried out in collaboration with the Geological Survey of Canada, the Canadian Mining Innovation Council, and several university researchers and mining companies.

The Bell project (No. 7) involves field investigations and rotasonic core drilling of Quaternary deposits and bedrock. The objective of this project is to gain a better understanding of the stratigraphy of Quaternary deposits, and to collect data on the bedrock in this area with strong mineral potential buried under thick Quaternary deposits.

The Lac Saint-Jean project (No. 8) was carried out in collaboration with the Université du Québec à Chicoutimi (UQAC). It covers NTS sheets 32A08 and 32A10, as well as the southwest part of NTS sheet 32A09. The objective of this project is to characterize granites and alkaline rocks within the study area.

3.2
Geophysical surveys

The Rivière George South and North projects (Nos. 9 and 10) completed the airborne magnetic and spectrometry coverage of the Churchill Province to the south of Ungava Bay.

Two projects launched in 2012 are expected to be finalized soon: the North Ungava Orogen project (No. 11), an airborne magnetic and spectrometry survey covering the north part of the Ungava Peninsula, and the Lac Vallard project (No. 12), an aeromagnetic survey covering an area west of Fermont, along the boundary between the Grenville and Superior provinces.

Finally, the Gouin project (No. 13) is underway and will cover the eastern part of the Réservoir Gouin area. This survey is carried out in preparation for an upcoming mapping survey in this area scheduled to begin in 2014.

3.3
Geochemical surveys

The Abitibi-South-East lake sediment sampling survey (No. 14) covers the Caopatina band, the Urban-Barry belt, and the Attic Complex at the southeast end of the Abitibi Subprovince. This area has never been the focus of a lake sediment survey and has only been partially covered by till and stream sediment surveys. It also represents a relatively under-explored part of the Abitibi Subprovince, renowned for its strong mineral potential.

The Mistassini North-East project (No. 15) covers the only other area in Northern Québec where no lake sediment geochemical analyses are available.

3.4
Quaternary surveys

Under the five-year knowledge acquisition plan targeting the Churchill Province to the south of Ungava Bay, the Churchill Quaternary mapping and surficial deposit sampling project (No. 1a) continues, in parallel with the bedrock mapping project (No. 1). This project concludes an initiative which also included geophysical surveys, lake sediment geochemistry surveys, and bedrock mapping, in an effort to build an integrated knowledge base for this geological province.

Three Quaternary mapping projects (Nos. 16, 17 and 18) at a scale of 1:50,000 launched in 2012 in municipalized regions of Québec continued in 2013. These projects cover the Charlevoix, Nicolet–Saint-François, and Chaudière areas. In addition, project No. 19 will be completed in the Vaudreuil-Soulanges area. Collectively, these projects are intended to support the MDDELCC's Groundwater Knowledge Acquisition Program in Québec. Project No. 16 is a collaborative effort involving the BCGQ, Université Laval and Université du Québec à Chicoutimi. Projects Nos. 17, 18 and 19 are carried out by the Université du Québec à Montréal.

Finally, communities in Quaqtaq and Kangiqsujuaq were the focus of an inventory of sand and gravel resources (aggregates, project No. 20). This work was carried out in response to a request by the *Ministère des Affaires municipales, des Régions et de l'Occupation du territoire* (MAMROT) to meet demand for aggregates in light of the melting permafrost and the construction of new infrastructure in communities across Nunavik.

3.5
Mineral potential studies

After five drilling campaigns targeting Quaternary deposits and the bedrock in the Rivière Bell and Rivière Octave areas in the Abitibi region, a detailed study of the mineral potential of these areas was undertaken in 2013 and will continue in 2014 (project No. 21). The objective is to gain a better understanding of the distribution of Quaternary deposits and to identify potential pathfinders for the discovery of new mineral occurrences.

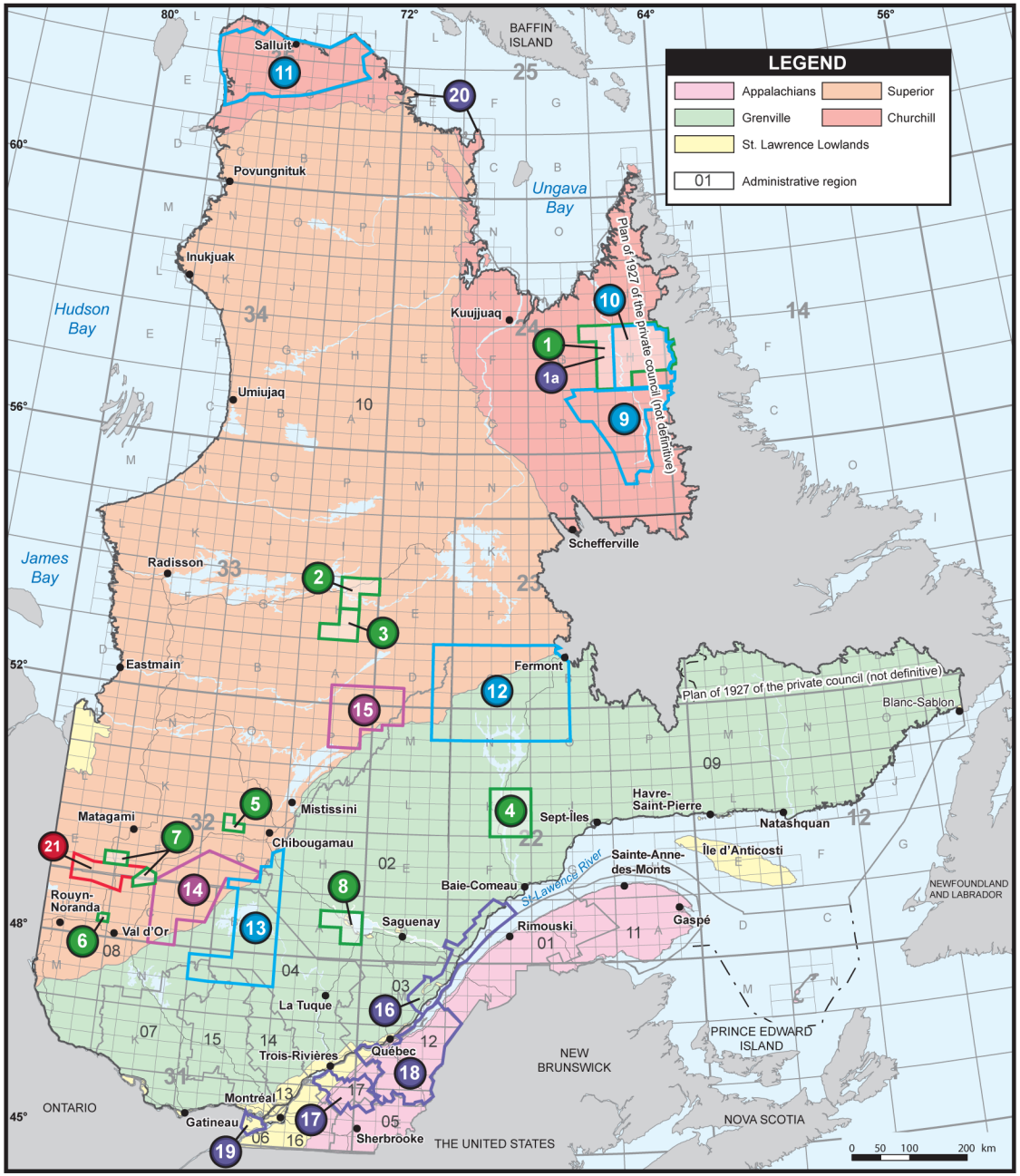
3.6
Publications

In 2013, the SIGÉOM-Examine database was enriched with 989 documents from a variety of sources. In the mineral exploration record holdings, 811 statutory work reports were added, 97 internal documents, and 11 reports were donated by mining companies. During the year, 44 geological compilation maps were prepared as well as 534 maps showing aeromagnetic or spectrometry data, or both, at a scale of 1:50,000. Two maps showing reprocessed gravity gradiometer survey data in the Lac Brisson (Strange Lake) area were also added to the database.

Four (4) geological and five (5) preliminary reports produced by the MERN, along with their accompanying geological maps, were also integrated into the SIGÉOM-Examine database, as well as one mineral potential assessment study and various promotional documents (3), public outreach documents (4) and others (4). Note that three preliminary reports were published in English.

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, regional geophysical surveys (aeromagnetic, spectrometry, or both), as well as areas where new lake sediment geochemistry data is available.

Figure 3.1 - **Geoscientific projects in 2013.**



Geoscientific Survey Program in 2013

GEOLOGICAL SURVEYS

1. Churchill Project - Pyramide Camp
2. Baie James Project - Lac des Voeux
3. Baie James Project - Lac Pelletan 2
4. Grenville Project - Okaopéo
5. Lamarck-North Project
6. Malartic Project
7. Bell Project (Quaternary and Rock Drilling)
8. Lac Saint-Jean Project

GEOPHYSICAL SURVEYS
Airborne Magnetometry and spectrometry

9. George River South Project
10. George River North Project
11. Ungava North Project (2/2)
12. Lac Vallard Project (2/2; magnetometry only)
13. Gouin Project, A Bloc (1/2; magnetometry only)

GEOCHEMICAL SURVEYS

14. Lake Bottom Sediment Survey - Abitibi South-East
15. Lake Bottom Sediment Survey - Mistassini North-East

QUATERNARY SURVEYS

1a. Churchill Project
16. Charlevoix Project
17. Nicolet - Saint-François Project
18. Chaudière Project
19. Vaudreuil-Soulanges Project
20. Aggregates Project (Quaqtaq and Kangiqsujuaq)

MINERAL POTENTIAL STUDY

21. Bell-Octave Project

Novembre 2013

Figure 3.2 - **New geoscientific publications in 2013.**

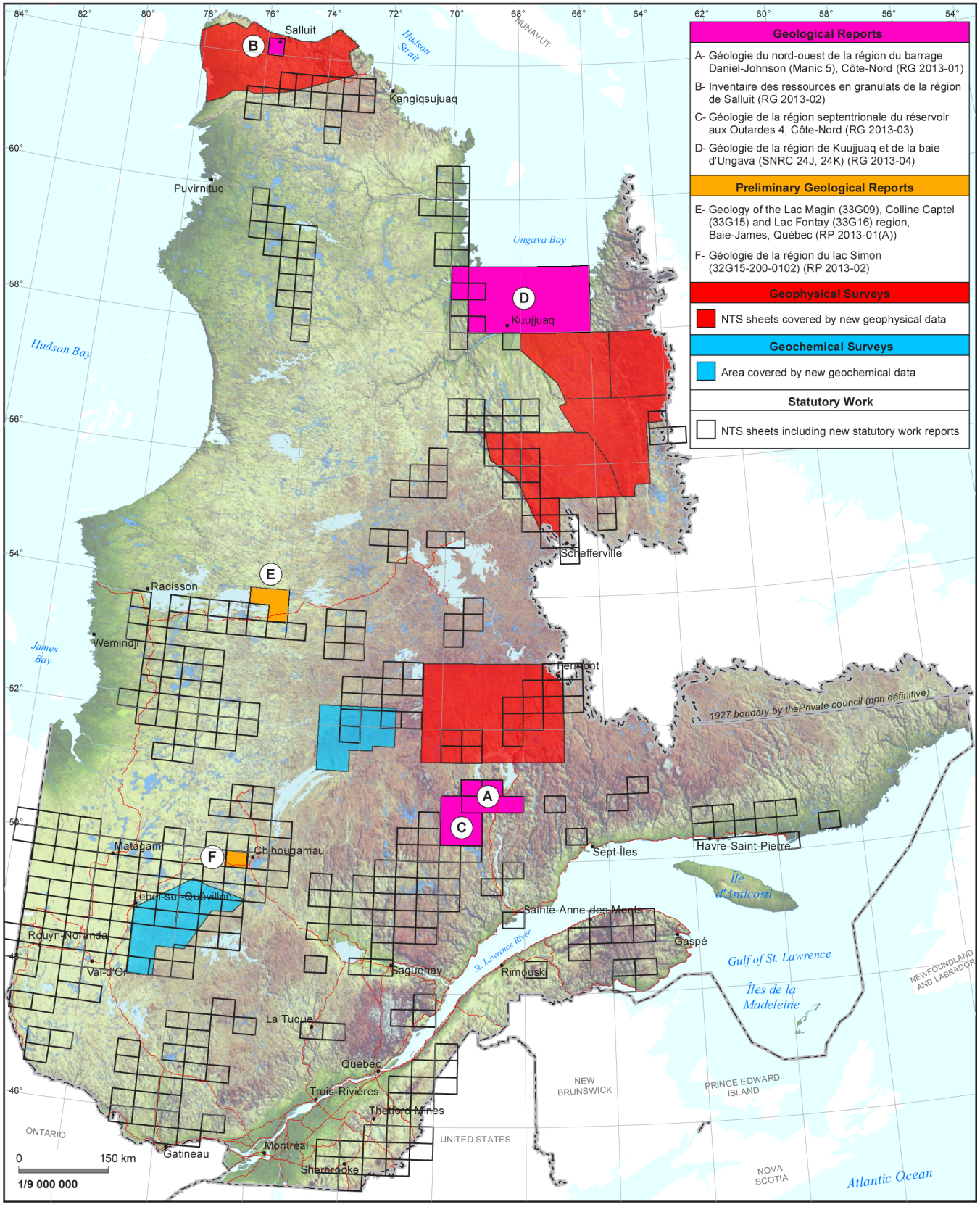


Photo: MERN

CHAPTER 4

Mineral Exploration

4.1 Introduction

Martin Labrecque

Targeted commodities

In 2012[8], more than 300 mining companies reported exploration or deposit appraisal work in Québec as project operator. Expenditures amounted to $621M, of which $181M was for major companies, $418M for junior companies, and $23M for public corporations. The head offices of these companies are located in Québec (39%), Ontario (26%), and British Columbia (17%), and the rest are based elsewhere in Canada or abroad (18%).

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

In 2013, preliminary data for exploration and deposit appraisal activities are down for a second consecutive year with a total of $328M.

TABLE 4.1 - **Exploration and deposit apppraisal expenditures in $M by substance.**

Substances	2005	2006	2007	2008	2009	2010	2011	2012	2013p
Precious metals (Au, Ag, PGE)	116	145	226	263	231	277	448	245	121
Base metals (Ni, Cu, Zn)	53	71	118	122	59	87	125	83	59
Diamonds	23	29	27	13	10	14	14	14	4
Ferrous metals	1	22	29	24	15	32	106	143	36
Lithium	-	-	-	0.2	6.4	20.0	16.7	7.3	4.0
Rare earth elements	-	-	-	1.3	2.8	16.4	41.7	49.2	31.0
Graphite	< 1	< 1	< 1	< 1	< 1	< 1	1.4	16.7	11.0
Phosphate	-	-	-	-	-	-	0.9	25.2	24.0
Other substances	8	6	5	15	7	24	47	13	38
Total	**205**	**295**	**476**	**526**	**379**	**512**	**834**	**621**	**328**

Source: *Institut de la statistique du Québec*

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

The reductions observed in 2012 (-26%) and 2013 (-47%) in Québec are primarily explained by lower metal and mineral prices on the stock markets and by the worldwide financing difficulties faced by the sector. 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. A similar situation was observed in 2009, and exploration expenditures consequently dropped by 28%. The level of expenditures, however, remains relatively high compared to the 2000s when it ranged from $100M to $300M.

Across Canada, expenditures for exploration and deposit appraisal activities were down in 2012 and 2013. In the last ten years, Québec's contribution has accounted for 15% to 19% of the total Canadian expenditures for these activities.

Exploration and deposit appraisal expenditures by region

In 2013, most of the $328M in exploration and deposit appraisal expenditures was divided between three administrative regions where most mining activities have historically taken place: Nord-du-Québec ($161M, 50%), Abitibi-Témiscamingue ($78M, 27%), and Côte-Nord ($38M, 12%).

Jobs in the mineral exploration sector

The information on the number of jobs related to mineral exploration activities is not compiled as part of the mining statistics program of the *Institut de la statistique du Québec* due to the complexity of gathering reliable and representative data. However, as part of a study on the economic benefits of mining activities published in September 2012, the firms Deloitte and E&B Data estimate that mineral exploration activity in Québec created 3,050 direct jobs and about as many indirect jobs in 2010[9]. The majority of the direct jobs are in resource regions, although a large part of the indirect jobs are in the metropolitan regions of Montréal and the city of Québec (equipment manufacturers, accounting services, legal services, geophysical firms, etc.).

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

Administrative region	2011	2012	% of total expenditures for 2012
01 Bas-Saint-Laurent	-	0.2	0.0%
02 Saguenay–Lac-Saint-Jean	19.8	38.3	6.2%
03 Capitale-Nationale	-	c	-
04 Mauricie	1.5	c	-
05 Estrie	2.4	1.8	0.3%
06 Montréal	-	-	-
07 Outaouais	0.9	2.9	0.5%
08 Abitibi-Témiscamingue	286.0	167.2	26.9%
09 Côte-Nord	68.3	77.1	12.4%
10 Nord-du-Québec	436.5	309.9	49.9%
11 Gaspésie–Îles-de-la-Madeleine	10.6	15.7	2.5%
12 Chaudière-Appalaches	5.5	3.3	0.5%
13 Laval	-	-	-
14 Lanaudière	0.2	0.2	0.0%
15 Laurentides	1.0	2.0	0.3%
16 Montérégie	c	c	-
17 Centre-du-Québec	c	c	-
Total	**833.9**	**620.7**	**100%**

c: confidential data
Source: *Institut de la statistique du Québec*

9 - fr.ebdata.com/wp-content/uploads/2012/04/EB_Data-Etude-miniere-260912-1.pdf

4.2
Mineral exploration highlights

James Moorhead, Pierre Doucet, Patrick Houle and Louis Madore

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

- a new resource calculation;
- the discovery of a new mineralized zone;
- 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.

Alumina

The company **Orbite Aluminae** will continue to explore for new aluminous clay resources.

Silver

Since 2009, drilling on the Carheil property, held by **NQ Exploration**, has investigated silver mineralization. In 2013, the first resource estimate was completed for the Ag1 and Ag2 zones.

Copper and zinc

In the Barraute area, **Abcourt Mines** has published a new resource estimate for the three volcanogenic massive sulphide deposits on its Vendome property: Vendome, Barvallée and Belfort.

At the Caribou project, located west of Matagami, **Cogitore Resources** intersected polymetallic sulphides in cherty tuffs during a drilling program.

South of Matagami, partners **Donner Metals** and **Glencore Canada Corporation** announced the start of commercial production at the Bracemac-McLeod mine (Zn-Cu-Ag-Au) on May 15, 2013.

Near Chibougamau, **Chibougamau Independent Mines** intersected polymetallic mineralization (Cu-Ag-Au-Zn) of the Berrigan deposit during a drilling program.

South of Chibougamau, drilling by **Copper One** yielded several copper-silver and tungsten-silver mineralized intervals on the Queylus property.

Virginia Mines demonstrated the continuity of lens 257 (Cu-Zn-Au-Ag) on the Coulon property, located 15 km north of the Fontanges airport in the James Bay area.

Partners **Corvus Gold** and **Les Ressources Tectonic** carried out exploration work on the Gerfault project in the Cape Smith Belt, to the south of Salluit. Grab samples enriched in gold, silver and copper were collected from outcrops spread over a distance of 11 km.

Rare earth elements

Commerce Resources confirmed the northeast extension of the Ashram mineralized zone at the Eldor project, located 130 km to the south of Kuujjuaq.

In the Saguenay region, **IAMGOLD Corporation** continued to assess the economic potential for rare earths in an area adjacent to its Niobec niobium mine at Saint-Honoré. Diamond drilling in 2012 established new resources of rare earth oxides.

Iron

Iron continued to be an important exploration focus in Québec. Iron projects were mainly concentrated in the geological units of the Labrador Trough in the Côte-Nord and Nord-du-Québec regions.

In early May, partners **Fancamp Exploration**, **Champion Iron Mines** and G**imus Resources** announced a new resource estimate for the Lac Lamêlée South project.

Oceanic Iron Ore Corporation published the results of a new resource estimate for its Hopes Advance iron project located in the Aupaluk area of the Labrador Trough.

Century Iron Mines Corporation intersected many iron-rich intersections on its Attikamagen project in the Joyce Lake area to the east of Schefferville. These new findings allowed the company to improve the results of the project's preliminary economic assessment.

Iron-Titanium-Vanadium

East of Chibougamau, on the Mont Sorcier South and Mont Sorcier North properties, **Chibougamau Independent Mines** intersected an iron, titanium and vanadium mineralized zone over several tens of metres during drilling.

In March 2013, **Fancamp Exploration** announced the successful completion of its Phase 2 hydrometallurgical pilot plant tests on an ore sample from the Magpie project in the Côte-Nord region. The concentrate from the titanium dioxide recovery tests reached a grade of 97.90% TiO_2.

Graphite

Graphite exploration has been growing for several years, mostly within the Grenville Province in the administrative regions of Outaouais, Laurentides and Côte-Nord. In 2012, according to data from the Institut de la statistique du Québec, the exploration and deposit appraisal expenditures for this substance reached $17M, representing 2.7% of the total expenditures of this type. Almost all the known graphite showings in Québec are now covered by claims. The projects are largely at the stage of geoscientific information compilation, preliminary work and geophysical studies, all of which will guide the next stages of exploration.

Lithium

Following a resource estimate in 2012, Glen Eagle Resources completed a preliminary economic assessment study for its Authier Lithium project in the Abitibi region. The envisioned open pit will have a 10-year mine life, at a rate of 2,200 t/d.

Critical **Elements Corporation** has optimized its lithium recovery to 91.9% and its tantalum recovery to 84%, in addition to discovering the westward extension of the JR Zone on its Rose deposit in the James Bay region. Feasibility and environmental impact studies are underway on the Rose project.

The Whabouchi deposit, held by **Nemaska Lithium**, is located near the Cree community of Nemaska in the James Bay region. The company's work has extended the main mineralized dyke by 200 m to the east. An environmental, social and economic impact assessment study is now underway to examine an open pit mine scenario.

Nemaska Lithium carried out sampling, drilling and stripping work to test the potential extensions of a tantalum-bearing spodumene pegmatite (dyke No. 5) on the Sirmac property, located 180 km northwest of the town of Chibougamau.

Monarques Resources discovered a new spodumene dyke (the GRAAB showing) on its Lemare property in the James Bay region.

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

Nickel North Exploration Corporation encountered multiple intervals of copper, nickel and PGE mineralization during drilling on its Hawk Ridge property, located in the Labrador Trough.

In June, **Royal Nickel Corporation** published the positive results of a feasibility study for its Dumont nickel project, located west of Amos in the Abitibi-Témiscamingue region.

Gold

In terms of gold, the year 2013 was marked by the publication of eleven new resource estimates for mine development and advanced exploration projects. The majority of these were for projects in the southern part of the Abitibi, near the Cadillac Tectonic Zone.

Exploration in active gold mines

Agnico Eagle Mines continued to drill test Zone 8 in the Zulapa area (a parallel zone approximately 150 metres from the Lapa deposits). The company also announced its intention to develop Zone 7 in the Zulapa area in 2014, as well as Zone 100.

Drilling at the Kiena mine (**Wesdome Gold Mines**), near Val-d'Or, targeted the depth extension of the S-50 Zone, 300 m below the deepest level of the mine (1,000 m). Drill holes intersected a series of gold-bearing structures to the southeast of the mine.

Gold exploration projects with new resource estimates

At the Akasaba property, **Alexandria Minerals Corporation** published a new resource estimate in February 2013. The volume of indicated resources increased for the Akasaba West Zone, which lies 1,600 m to the west of the Akasaba Zone and along the same horizon that hosts the former Akasaba mine.

Eloro Resources and **Monarques Resources** announced a new mineral resource estimate for the former Louvicourt Goldfields gold mine (Simkar project).

Adventure Gold announced a new inferred resource estimate for the New Beliveau, North and Highway zones near the former Lucien Beliveau gold mine (Val-d'Or East project).

Integra Gold Corporation released a new inferred resource estimate for the N°. 4 Plug, Fortune, Parallel and Triangle zones near the former Lamaque mine. A preliminary economic assessment study is underway.

As part of its Marban Block project, **NioGold Mining Corporation** completed a new resource estimate for the Marban deposit.

Radisson Mining Resources published a new resource estimate for its O'Brien-Kewagama project in the Cadillac area.

In June, **Clifton Star Resources** announced a new resource estimate for the Duparquet project, to the east of the municipality of the same name.

Gold exploration projects

Abitibi-Témiscamingue region (08)

Rouyn-Noranda area

During the summer, **Gold Bullion Development Corporation** excavated trenches on the Granada property to test at surface the mineralization previously intersected in drill holes. Metallurgical test work was also carried out during the year.

In the Chib-Kayrand sector of the Trecesson property, **Knick Exploration** stripped the areas of veins 9, 6 and 1. Samples collected from these structures yielded gold and tungsten grades.

Val-d'Or area

At the Presqu'ile Zone, **Wesdome Gold Mines** intersected gold-bearing veins hosted in mafic lavas along a segment of the Norbenite-Marbenite Fault, 1.4 km to the northwest of the Kiena mine.

On the Beacon N°. 1 property, **Globex Mining Enterprises** intersected the extensions of a gold zone discovered in the Bourlamaque Batholith during a drilling program in 2011.

South of the village of Louvicourt, on the Villebon property, **Khalkos Exploration** carried out an exploration program consisting of stripping, sampling and drilling along a gold trend with a strike length of 1 km.

Nord-du-Québec region (10)

Northern part of the Abitibi Subprovince

Near the town of Normétal, on the Perron property, **Amex Exploration** intersected gold mineralization over considerable widths in the Z1 and Z2 zones. The mineralization is hosted by felsic volcanic rocks.

During drilling at the Douay Gold project, located south of Matagami, **Aurvista Gold Corporation** discovered two new gold zones on the South Porphyry.

During drilling on the Benoist property, north of Lebel-sur-Quévillon, **Cartier Resources** encountered a wide interval of low-grade gold along the extension of the Pusticamica deposit.

Maudore Minerals announced the results of drilling on the Hudson, Greer and North Mafic gold zones on the Comtois property, northwest of Lebel-sur-Quévillon.

East of Lebel-sur-Quévillon, **Eagle Hill Exploration Corporation** announced the results of drilling at the Caribou, Caribou South, 27, Mink and Mallard gold zones on its Windfall Lake property.

West of Matagami, **Excellon Resources** intersected gold mineralization in drill holes targeting the depth extension of the B14 Zone.

On the Martiniere property, west of Matagami, **Balmoral Resources** completed a drilling program along the extensions of the Martiniere West, Main and Bug Lake gold zones.

Southwest of Chibougamau, **Toma Gold Corporation** continued drilling gold zones on the Monster Lake trend. In the same area, **Vanstar Mining Resources** discovered two new gold showings on the Nelligan property: Liam and Mila.

Northwest of Chibougamau, on the Croteau East property, **Northern Superior Resources** encountered several gold-bearing drill intervals in the heart of the Croteau-Bouchard shear zone.

Near Chibougamau, **Nuinsco Resources** and **CBay Minerals** encountered several gold-bearing (Au-Cu-Ag) intervals on the Portage Island property.

James Bay area

Sirios Resources and **Golden Valley Mines** confirmed the presence of wide gold-bearing drill intervals on the Cheechoo property.

At the Anatacau-Wabamisk project, **Virginia Gold Mines** discovered a new gold trend with a strike length of 3.5 km, hosted in folded sedimentary rocks.

Bedrock and soil sampling work, carried out during the summer by **Dios Exploration** and **Osisko Mining Corporation**, led to the discovery of five new gold showings on the AU33 West property.

As for the Clearwater project, **Eastmain Resources** once again encountered gold-bearing drill intervals along the strike and depth extensions of the 450 West Zone.

A new gold showing (Lac de la Chlorite) was discovered by **Monarques Resources** on the Lemare property.

Drilling by **Virginia Mines** on the La Grande Sud property yielded gold-bearing intervals along the depth extension of the mineralized envelope of Zone 32.

Phosphate

Exploration for phosphate has been growing for several years now. According to information from the Institut de la statistique du Québec, exploration and deposit appraisal expenditures for this substance reached $25M in 2012, representing 4.1% of the total for this type of expenditure.

4.3 Nord-du-Québec (region 10)

James Moorhead, Pierre Doucet, Patrick Houle, Suzanne Côté, Denis Lesage and Manon Dufour

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 2013. The locations of these projects are shown on figures 4.1, 4.2 and 4.3.

As at December 31, 2013, there were 111,224 active mineral exploration titles in the Nord-du-Québec region, compared to 142,572 as at December 31, 2012, representing a reduction of 22.0% (Table 2.1). The claims in the Nord-du-Québec region accounted for 59.6% of all exploration titles granted in Québec in 2013.

In 2013, there were 204 exploration projects in the region compared to 209 in 2012, which represents a slight decrease of 2.4%. The majority of these projects are located in the Abitibi Subprovince and the Labrador Trough.

In 2013, there were five metal mines in the Nord-du-Québec region:

two gold mines:

- Casa Berardi, **Hecla Mining** (formerly **Aurizon Mines)**;
- Bachelor Lake, **Metanor Resources** (start of commercial production on November 2, 2013);

three polymetallic mines:

- Bracemac-McLeod (Zn-Cu-Ag-Au), **Glencore Canada Corporation** (formerly Glencore Xstrata);
- Raglan (Cu-Ni-Co-PGE), **Glencore Canada Corporation** (formerly Glencore Xstrata);
- Langlois (Zn-Cu-Ag-Au), **Nyrstar Canada Resources**;

Development work continued at two advanced exploration projects:

- Éléonore (Au), **Les Mines Opinaca** (Goldcorp);
- Nunavik Nickel (Cu-Ni-Co-PGE), **Canadian Royalties** and **Jilin Jien Nickel Industry Co**.

New resource estimates were completed for five advanced exploration projects:

- Renard (diamonds), **Stornoway Diamond Corporation**;
- Sunny Lake (Fe) (Lac Le Fer and Rainy Lake), **Century Iron Mines Corporation** and **WISCO International Resources Development & Investment**;
- Carheil (Ag), **NQ Exploration**;
- Vezza (Au), **Maudore Minerals**;
- Opemiska (Cu), **Explorateurs-Innovateurs de Québec**.

Exploration outlook

In the Nord-du-Québec region, the Abitibi Subprovince between the 49th and 50th parallels is renowned for its rich endowment in precious metals (Au-Ag) and polymetallic ore deposits (Cu-Zn-Au-Ag and Cu-Au), which gave rise to the Chapais, Chibougamau and Matagami mining camps. In 2013, exploration work by various companies confirmed the existence of regional gold-bearing faults with excellent discovery potential, such as the Sunday-Detour Lake Deformation Zone, northwest of Matagami, and the Lac Irène–Lac à l'Eau Jaune Deformation Zone, southwest of Chibougamau.

In the Baie-James region, recent gold discoveries by **Sirios Resources** on the CheeChoo-B West property and by **Dios Exploration** on the Au33 West and 33 Carats South properties, in tonalitic to granodioritic units, demonstrate the potential for bulk tonnage, low-grade porphyry gold deposits. This type of attractive metallotect has seen little exploration interest in the past in this region, with the exception of the Troilus mine.

In 2013, several companies continued to conduct work on their properties in the Labrador Trough along the Schefferville-Kuujjuaq axis, exploring for iron, copper, nickel, platinum group elements (PGE) and rare earth elements (REE). Much of the work focused on advancing the following projects to the development stage:

- Lac Otelnuk (Fe), **Lac Otelnuk Mining** (**Adriana Resources** and **WISCO International Resources Development & Investment**);
- Hopes Advance (Fe), **Oceanic Iron Ore Corporation**;
- Taconite (Fe), **New Millennium Iron** and **Tata Steel Minerals Canada**;
- Eldor (REE), **Commerce Resources**;
- Strange Lake (REE), **Quest Rare Minerals**.

4.4
Abitibi-Témiscamingue (region 08)

Pierre Doucet, James Moorhead, Denis Lesage and Suzanne Côté

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 projects and mining development projects in the Abitibi and Pontiac subprovinces and in the western Grenville Province. Figures 4.4, 4.5 and 4.6 show the locations of these projects.

In 2013, there were eight mines in the Abitibi-Témiscamingue region, including one polymetallic mine (LaRonde [Au-Zn-Cu-Ag-Pb], **Agnico Eagle Mines**) and seven gold mines:

- Kiena (Au-Ag), **Wesdome Gold Mines** (closed in June 2013);
- Lac Herbin (Au-Ag), **QMX Gold Corporation** (formerly Alexis Minerals Corporation);
- Beaufor (Au-Ag), **Richmont Mines**;
- Monique (Au-Ag), **Richmont Mines** (start of commercial production in October 2013);
- Mouska (Au-Cu-Ag), **IAMGOLD Corporation**;
- Canadian Malartic (Au-Ag), **Osisko Mining Corporation**;
- Lapa (Au-Ag), **Agnico Eagle Mines**.

Several major exploration projects took place at these mines or in close proximity.

Four advanced exploration projects continued their development work and began processing ore in 2013:

- Québec Lithium (Li), **Québec Lithium inc.**, subsidiary of **Canada Lithium Corporation**;
- Westwood (Au-Ag), **IAMGOLD Corporation**;
- Goldex (Au-Ag), **Agnico Eagle Mines**;
- Elder (Au-Ag), **Abcourt Mines**.

As at January 8, 2014, there were 31,211 active exploration titles in the Abitibi-Témiscamingue region, representing a significant decrease of 17.2% relative to 2012 (Table 2.1).

In 2013, there were 123 exploration projects, representing a drop of 18.5% relative to 2012 when there were 151 projects. The majority of these projects targeted gold mineralization along major tectonic breaks, such as the Porcupine-Destor and Cadillac faults.

Twelve new resource estimates were completed for the following advanced exploration and mine development projects:

- Val-d'Or East (Au), **Adventure Gold**;
- Simkar (Au), **Monarques Resources** and **Eloro Resources**;
- Canadian Malartic mine (Au-Ag), **Osisko Mining Corporation**;
- Gouldie and Charlie Zones (Au-Ag), **Osisko Mining Corporation**;
- Jeffrey Zone (Au-Ag), **Abitibi Royalties** and **Osisko Mining Corporation**;
- Marban Block (Au), **NioGold Mining Corporation** and **Hecla Mining**;
- Akasaba (Au-Cu), **Alexandria Minerals Corporation**;
- Lamaque (Au), **Integra Gold Corporation**;
- Duparquet (Au), **Clifton Star Resources**;
- O'Brien-Kewagama (Au), **Radisson Mining Resources**;
- Kipawa (TREO), **Matamec Explorations** and **Toyotsu Rare Earth Canada**;
- Dumont (Ni-Co-Pd-Pt), **Royal Nickel Corporation**.

4.5
Regions of Québec except Abitibi-Témiscamingue and Nord-du-Québec

Louis Madore and Pierre Doucet

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 4.7).

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 4.7). 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 4.7). 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 4.7).

In 2013, exploration work was carried out in most of these administrative regions. Although no exploration work was carried out in Laval (13), Montréal (06), and Centre-du-Québec (17), these regions did benefit from the indirect economic impacts generated by mineral exploration activities.

The activities carried out by exploration companies in the search for metals, industrial minerals and industrial stone are described in Table 4.5, and their locations are shown in Figure 4.7. Oil and gas exploration, which is quite active in the St. Lawrence Platform and Appalachian geological provinces, is not discussed in this report

Exploration work in the Grenville Province

Outaouais (07)

In the Outaouais administrative region, the number of claims remained relatively stable from 2012 to 2013, with only a slight decline of 7%. Overall, the number has grown significantly in recent years, due mainly to the emergence of new graphite exploration projects in the region. The rise in graphite consumption in the automotive, steel and high technology industries has stimulated interest for this mineral, to the point where almost all known graphite showings in the Outaouais and elsewhere in Québec are now covered by claims.

Of the 28 graphite properties documented in the Outaouais region, a dozen represent new acquisitions and a little more than a dozen were the subject of field work. The latter are held by the following companies: **Cavan Ventures, Galaxy Graphite, Rock Tech Lithium, Atocha Resources, Soldi Ventures, Canada Strategic Metals, Caribou King Resources, New World Mining Enterprises, Saint Jean Carbon** and **Shield Gold**. Other work carried out by **Solo International, Cavan Ventures, Stelmine Canada** and **New World Mining Enterprises** mainly targeted rare earth elements.

Laurentides (15)

Following an increase of 17 % in the number of claims from 2011 to 2012, the Laurentides administrative region experienced a 6% reduction in 2013. Almost all the documented exploration projects were for graphite. Of the 25 exploration properties for this mineral, three represent new acquisitions and eight were the subject of field exploration work or laboratory analyses. The work was carried out by the companies **Canada Carbon, Caribou King Resources, Lomiko Metals, Standard Graphite, Cavan Ventures** and **Graniz Mondal**.

On other fronts**, Berkwood Resources** continued its exploration work for copper and nickel on its Peter Lake Copper project, located 90 km north of Mont-Laurier. And 75 km north of Mont-Laurier, **Goldstar Minerals** conducted a soil geochemistry survey on the Brockaby project where the context is favourable for skarn-type tungsten mineralization.

Lanaudière (14)

The number of claims in the Lanaudière region is low. Consequently, little exploration work has been documented in recent years. Nevertheless, the number of claims in this region rose from 288 in 2012 to 785 in 2013, representing an increase of 173%. Of note, a new graphite exploration project has emerged in the region. The Matawini project comprises six claim blocks within a 50 km radius north of the municipality of Saint-Michel-des-Saints.

Mauricie (04)

For several years, the number of claims has declined in the Mauricie region. From 2012 to 2013, the number of claims dropped by 23%. Two properties were the subject of exploration work or assessment studies in 2013. **DNA Precious Metals** acquired the claims forming the Montauban project near the municipality of Notre-Dame-de-Montauban. The company's objective is to recover metals such as gold, silver and copper from the tailings of the former Montauban mine. **Galaxy Graphite** has acquired the claims for the Parent graphite project.

Capitale-Nationale (03)

With the exception of deposit appraisal work on dimension stone deposits, most of which are in the RCM of Portneuf, exploration work is otherwise rare in the Capitale-Nationale region. Since 2011, the number of claims in the region has dropped by half (a reduction of 36% in 2013). Only one exploration project for metallic substances was the subject of work. **Globex Mining Enterprises** acquired claims covering an iron, titanium and vanadium mineralized zone in the Saint-Urbain area.

Saguenay–Lac-Saint-Jean (02)

In 2013, the number of claims in the Saguenay–Lac-Saint-Jean region, which was stable in 2011 and 2012, dropped by 36%. Nevertheless, several exploration projects for industrial and strategic metals are present in the region; phosphorous, niobium, tantalum and rare earth elements are the main commodities of interest. Companies were also prospecting for copper, nickel and cobalt as well as for iron, titanium and vanadium.

North of Lac Saint-Jean, **Arianne Phosphate** (formerly Arianne Resources) continued its deposit appraisal work at its Lac à Paul project. Nine other projects were the subject of exploration work for phosphate. The work was carried out by the companies **Jourdan Resources**, **Glen Eagle Resources** and **Radisson Mining Resources**.

Also north of Lac Saint-Jean, the company **MDN** continued its deposit appraisal work at its Crevier tantalum and niobium deposit. Further south, in the municipality of Saint-Honoré, **IAMGOLD Corporation** continues its work to increase production at its Niobec niobium mine. **IAMGOLD Corporation** also assessed the economic potential for rare earth elements in the area around the mine.

On the north shore of the Saguenay, in the Saint-Charles area, **Micrex Development** continued its assessment work on a historical deposit of magnetite, ilmenite and apatite. The company's main goal is to bring to market a magnetite product suitable for various industrial processes.

At the Poissons Blancs project, **Khalkos Exploration** conducted preliminary metallurgical tests on samples from its McNickel deposit. This nickel, copper and cobalt deposit is located 45 km north of the municipality of Dolbeau, in the Lac-Saint-Jean area.

Two exploration projects concentrated on deposits of iron, vanadium and titanium. **ElanOre Resources**, in partnership with **Fairmont Resources**, carried out prospecting work on the Lac Élan property (iron, titanium and vanadium) located about 50 km northeast of the municipality of Saguenay.

Côte-Nord (09)

This past year, the number of active claims was 18% lower in the Côte-Nord region, dropping from 22,152 in 2012 to 18,157 in 2013. Exploration remained focused on iron in the Fermont region, on iron-titanium-vanadium to the northwest of Baie-Comeau, and on graphite in the Manicouagan Reservoir area and north of Sept-Îles.

In early May, partners **Fancamp Exploration**, **Champion Iron Mines** and **Gimus Resources** published a new resource estimate for the Lac Lamêlée South project.

In March 2013, on the Magpie project, **Fancamp Exploration** announced the successful completion of Phase 2 hydrometallurgical tests. In September, the company published the results of its latest TiO_2 recovery tests.

Mason Graphite announced the results for 104 holes drilled on its Lac Guéret project in 2012. In April, the company revealed the positive results of a preliminary economic assessment study.

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

Montérégie (16)

The already low number of claims in the Montérégie region experienced a sharp decline, dropping from 339 in 2012 to only 131 in 2013. The only documented exploration property in the Montérégie region is near the village of Sainte-Clotilde-de-Châteauguay. The property covers the Cairnside Formation, which is known for the quality of its silica. **J.A.G. Mines** is evaluating the possibility of putting this deposit into production.

Estrie (05)

For several years now, the number of claims in the Estrie administrative region has dropped significantly, including a reduction of 56% between 2011 and 2012 and a further reduction of 25% in 2013.

The exploration projects that are still underway in the Estrie region focus mainly on gold, as well as on copper, zinc and lead. Also present is a project for chromium and platinum group elements.

Bowmore Exploration, **J.A.G. Mines** and **Uragold Bay Resources** continued to work their gold properties located in the Coaticook and Saint-Victor areas. In the Lac-Mégantic and Weedon areas, exploration work carried out by **Fancamp Exploration**, **J.A.G. Mines** and **Midland Exploration** revealed the base metal potential of their properties. Near the municipality of Asbestos, the company **Corporation Exploration Îledor** acquired the claims for a property with chromium and platinum group element showings.

Centre-du-Québec (17)

The already low number of claims in the Centre-du-Québec region experienced a sharp decline, dropping from 1,014 in 2012 to only 234 in 2013. There were no documented mineral exploration projects in the Centre-du-Québec region during the year.

Chaudière-Appalaches (12)

Between 2011 and 2012, the number of claims in the Chaudière-Appalaches region was reduced by half. In 2013, this number was again reduced by 24%. Mineral exploration activities in this region focus mainly on gold, particularly in the sedimentary rocks of the Appalachians. Gold placers were also the target of some of the exploration work. **Golden Hope Mines** is working on a gold deposit in the Saint-Magloire area. **Uragold Bay Resources** is continuing its exploration work near Saint-Simon-les-Mines. And in the Saint-Georges municipality area, **Bowmore Exploration** intends to acquire a majority interest in a gold property belonging to **Fancamp Exploration**.

On other fronts, **Corporation Exploration Îledor** acquired the claims to a property containing chromium and platinum group element showings, near the municipality of Thetford Mines.

Bas-Saint-Laurent (01)

In the Bas-Saint-Laurent administrative region, there was a 64% increase in the number of claims between 2011 and 2012. In 2013, the number remained relatively stable, with a slight reduction of 6%.

Orbite Aluminae holds claims covering a surface area of 543 km^2 and extending over a total distance of 170 km from east of the city of Québec to Cap-Chat. The majority of these claims are in the Bas-Saint-Laurent administrative region, located 5 km from the St. Lawrence River, between Rimouski and Matane. They cover a large portion of the Orignal Formation, which contains aluminous clay. The company intends to establish new resources of aluminous clay.

Canadian Metals acquired the claims for the Langis project, 30 km south of Matane. The company has commenced a characterization study on the deposit, including metallurgical tests. It plans to use the silica to produce ferrosilicon.

Gaspésie–Îles-de-la-Madeleine (11)

After experiencing a 13% rise from 2011 to 2012, the number of claims in the Gaspésie–Îles-de-la-Madeleine region dropped by 9% in 2013.

Eleven exploration projects were the subject of exploration work on the Gaspé Peninsula, whereas no exploration activities were documented for the Magdalen Islands.

Gespeg Copper Resources carried out exploration work for copper, silver, molybdenum and gold on three properties in the vicinity of the former Gaspé Copper mine, in Murdochville. **Gespeg Copper Resources** also assessed the potential for perlite and bentonite on a property in the heart of the Gaspé Peninsula.

Western Troy Capital Resources continued to explore for vanadium and selenium mineralization, as well as for Mississippi Valley-type lead, zinc and silver mineralization, to the west of the Bridgeville marsh in the Percé area.

Orbite Aluminae continues to explore for aluminous resources. **Habanero Resources**, **Manicouagan Minerals** and **Brookemont Capital** also explored for alumina and rare earth deposits in the aluminous clays in the Gaspé Peninsula

Ressources Pélican continues with its diamond drilling and sampling of a high-purity limestone deposit in the Murdochville area.

Figure 4.1 - **Exploration projects in the Nord-du-Québec, Nunavik territory, in 2013.**

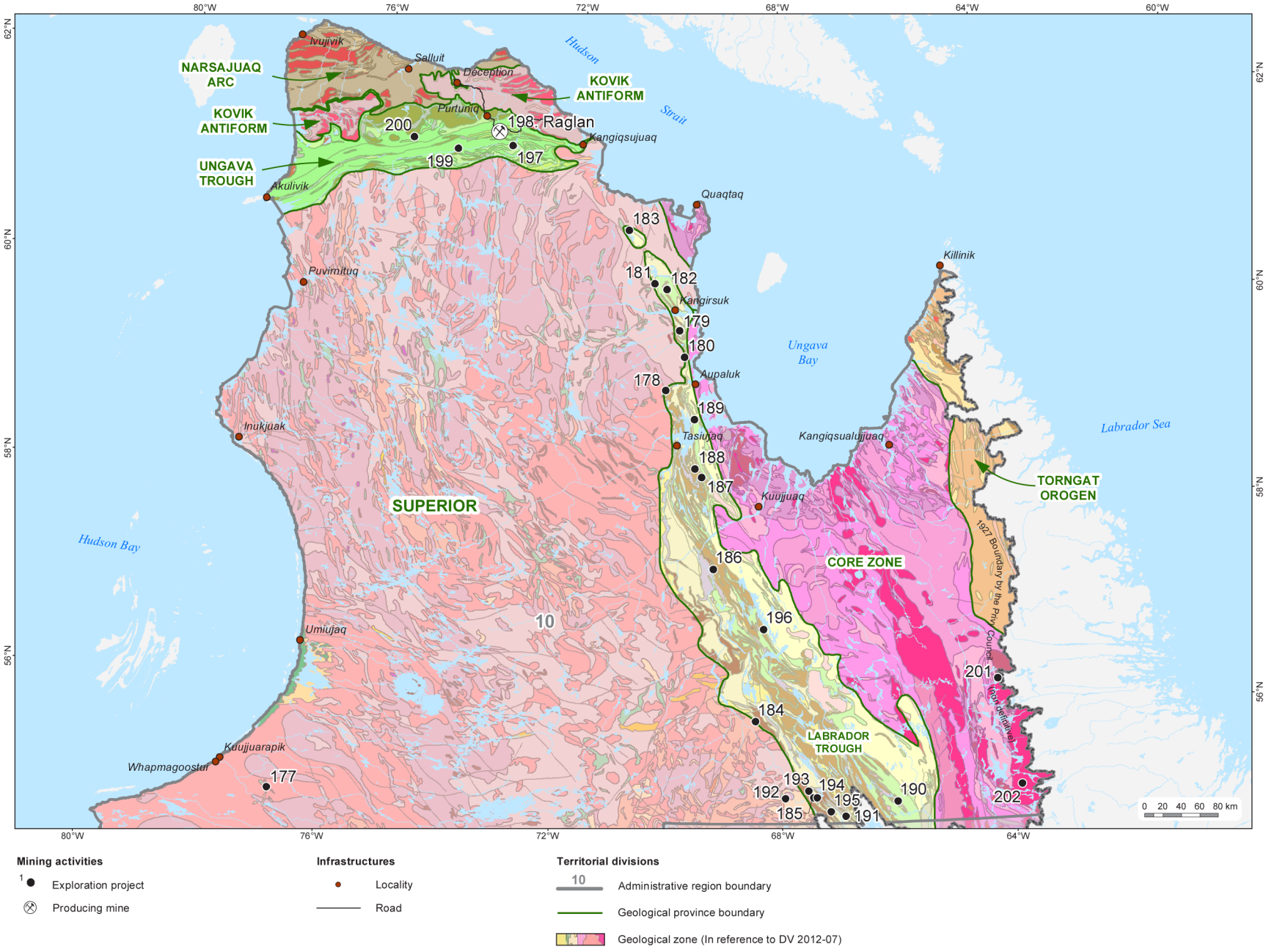


Figure 4.2 - **Exploration projects in the Nord-du-Québec, Baie-James territory, in 2013.**

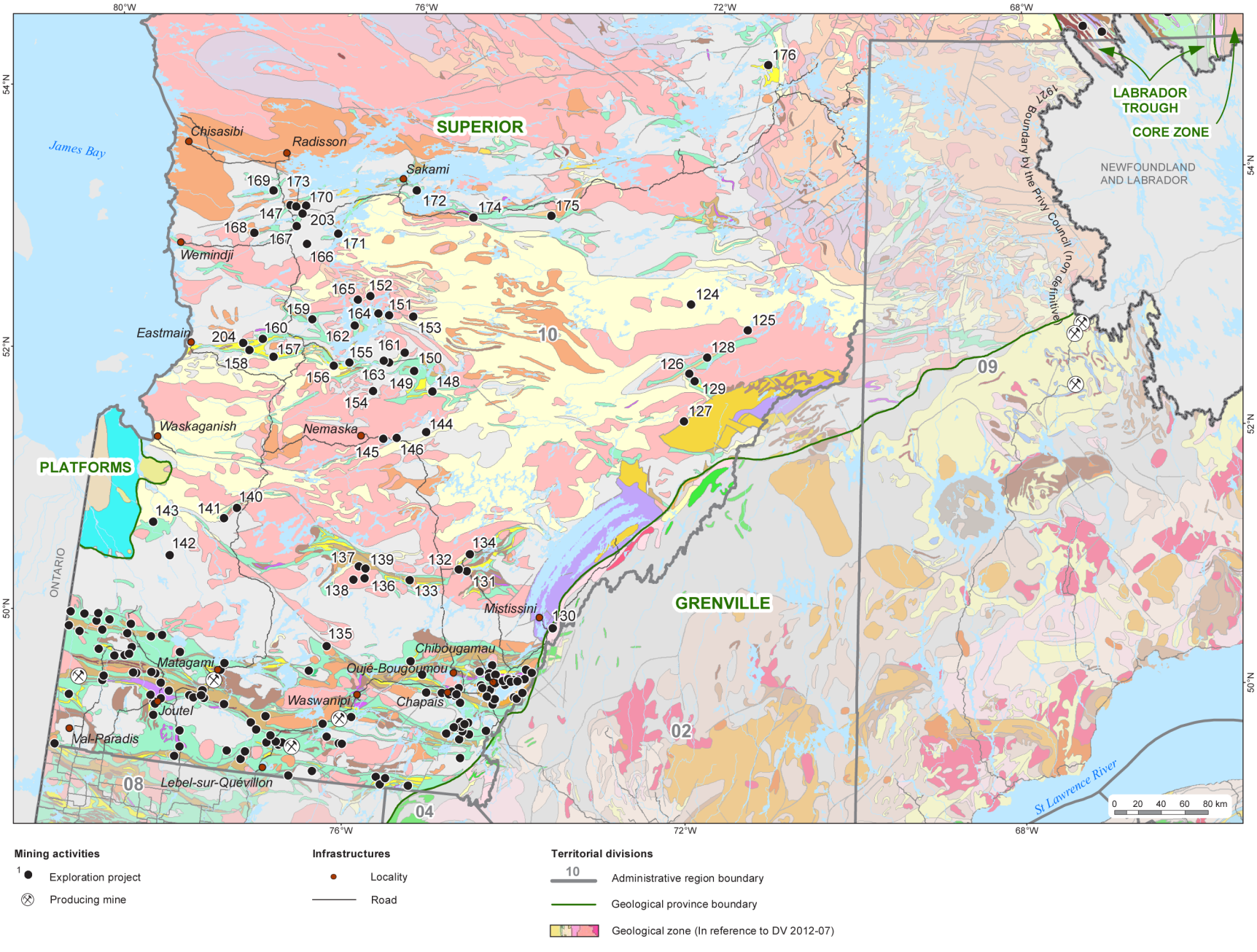


Figure 4.3 - **Exploration projects in the Nord-du-Québec, Matagami-Chibougamau sector, in 2013.**

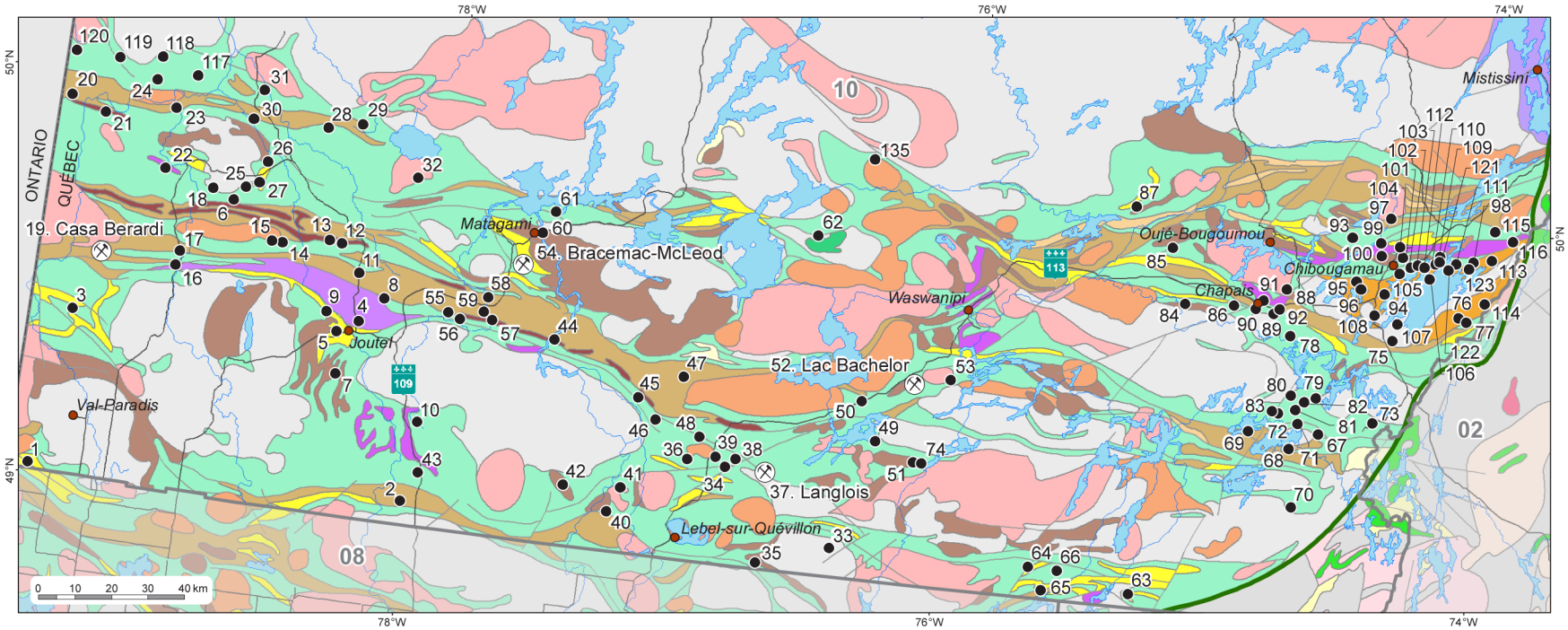


Figure 4.4 - **Exploration projects in Abitibi-Témiscamingue in 2013.**

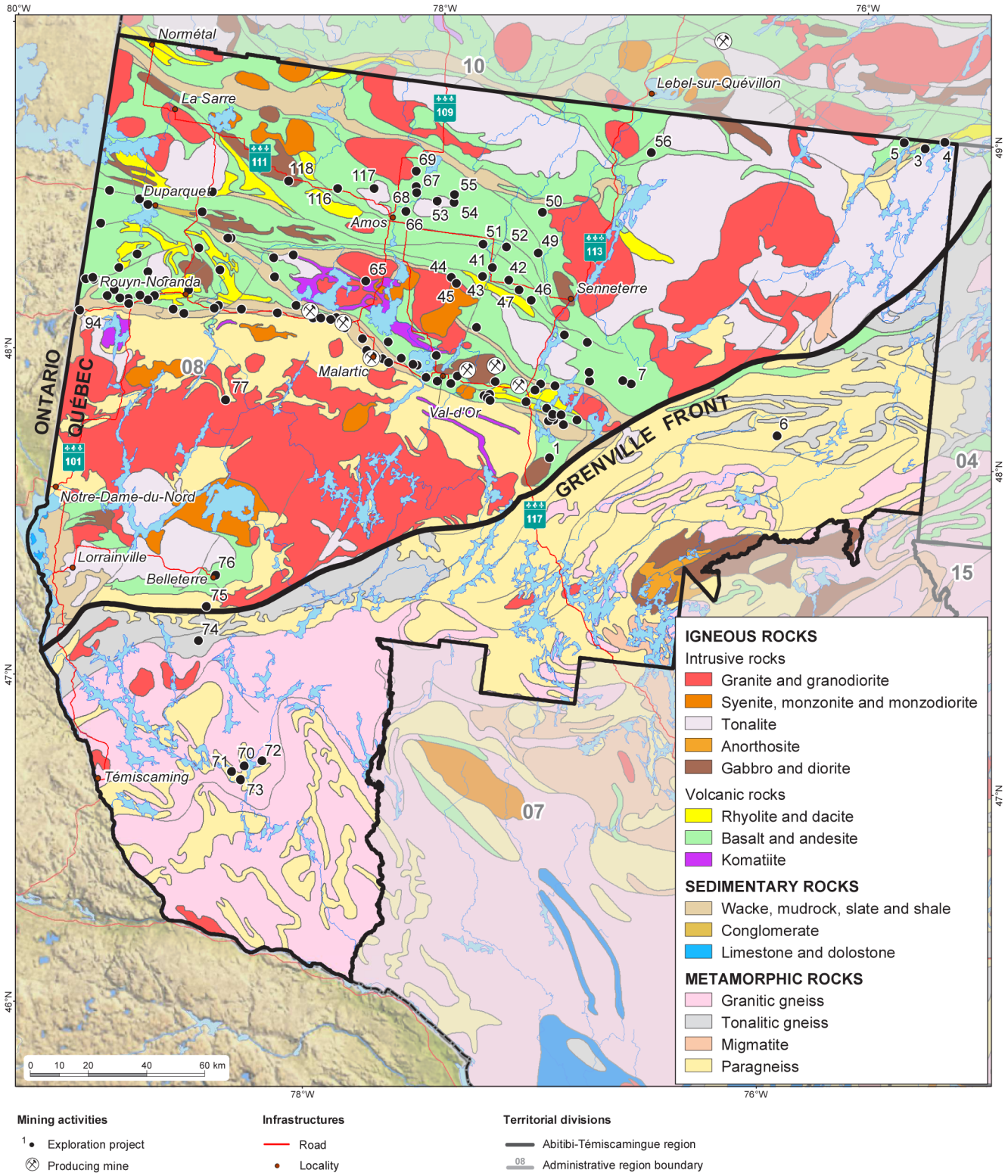


Figure 4.5 - **Exploration projects in Abitibi-Témiscamingue, Rouyn-Noranda–Cadillac sector, in 2013.**

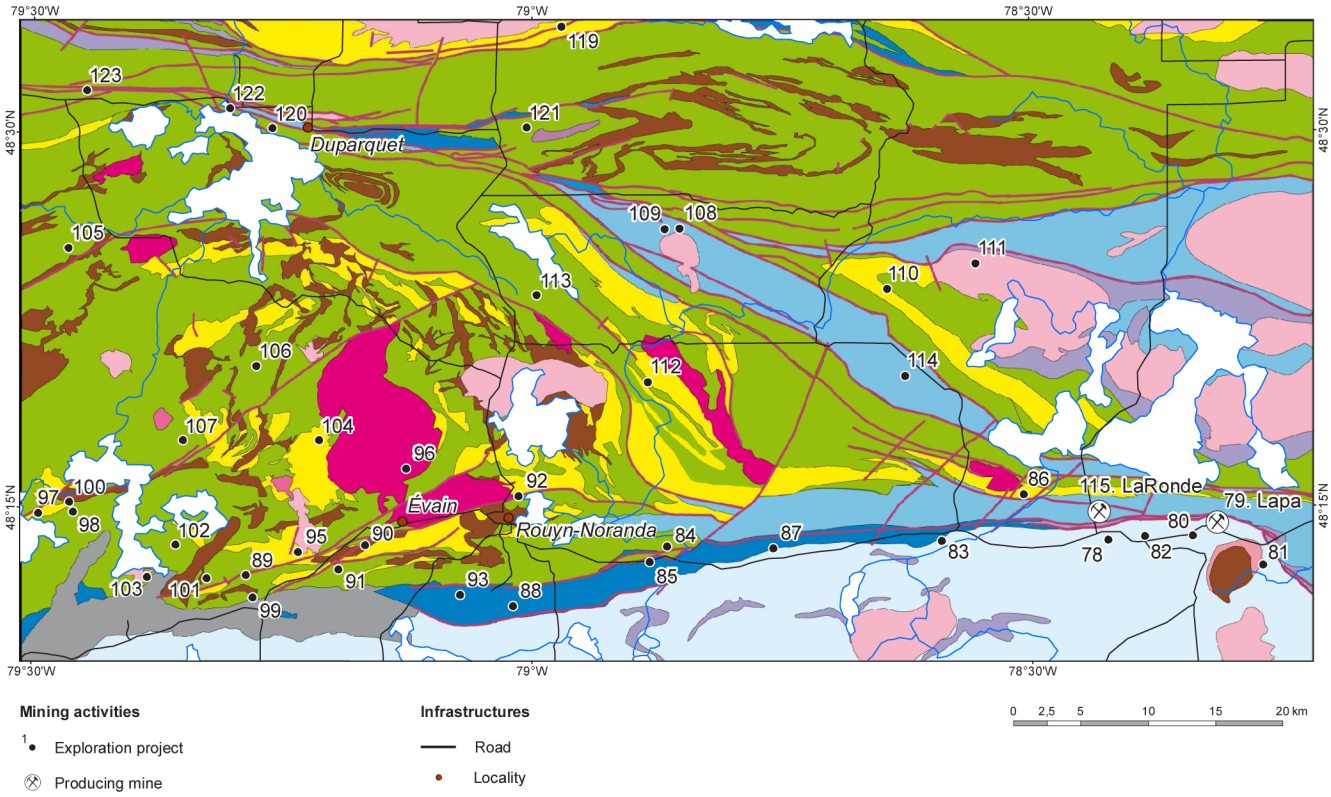


Figure 4.6 - **Exploration projects in Abitibi-Témiscamingue, Malartic–Val-d'Or sector, in 2013.**

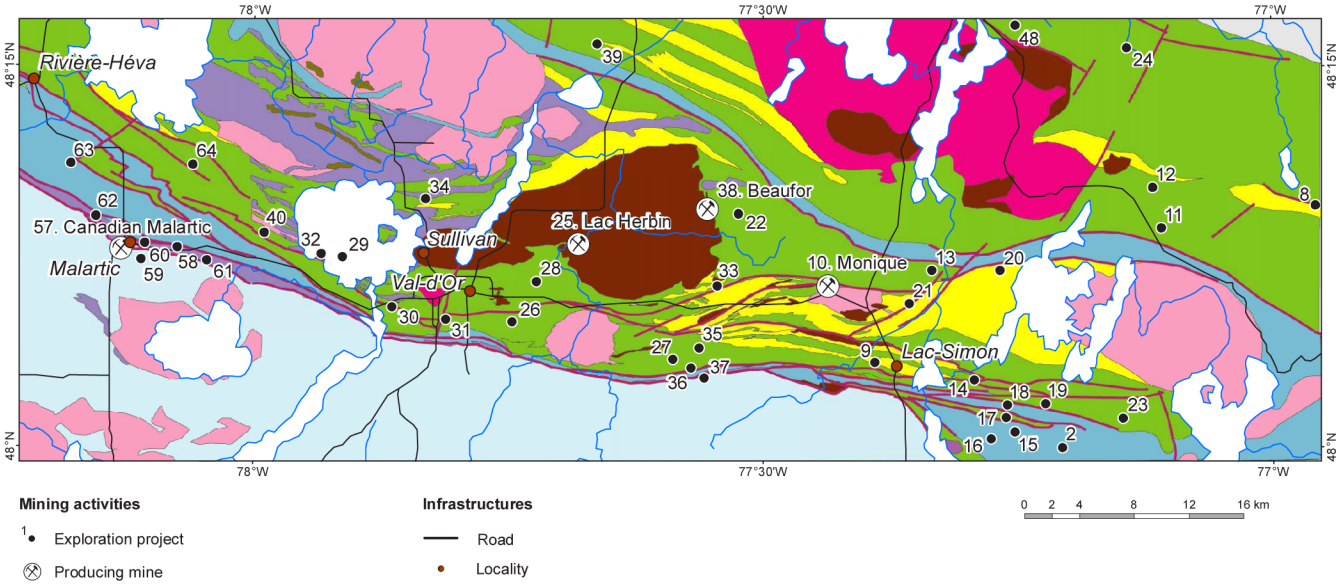


Figure 4.7 - **Exploration projects in Québec's administartive regions except Abitibi-Témiscamingue and Nord-du-Québec, in 2013.**

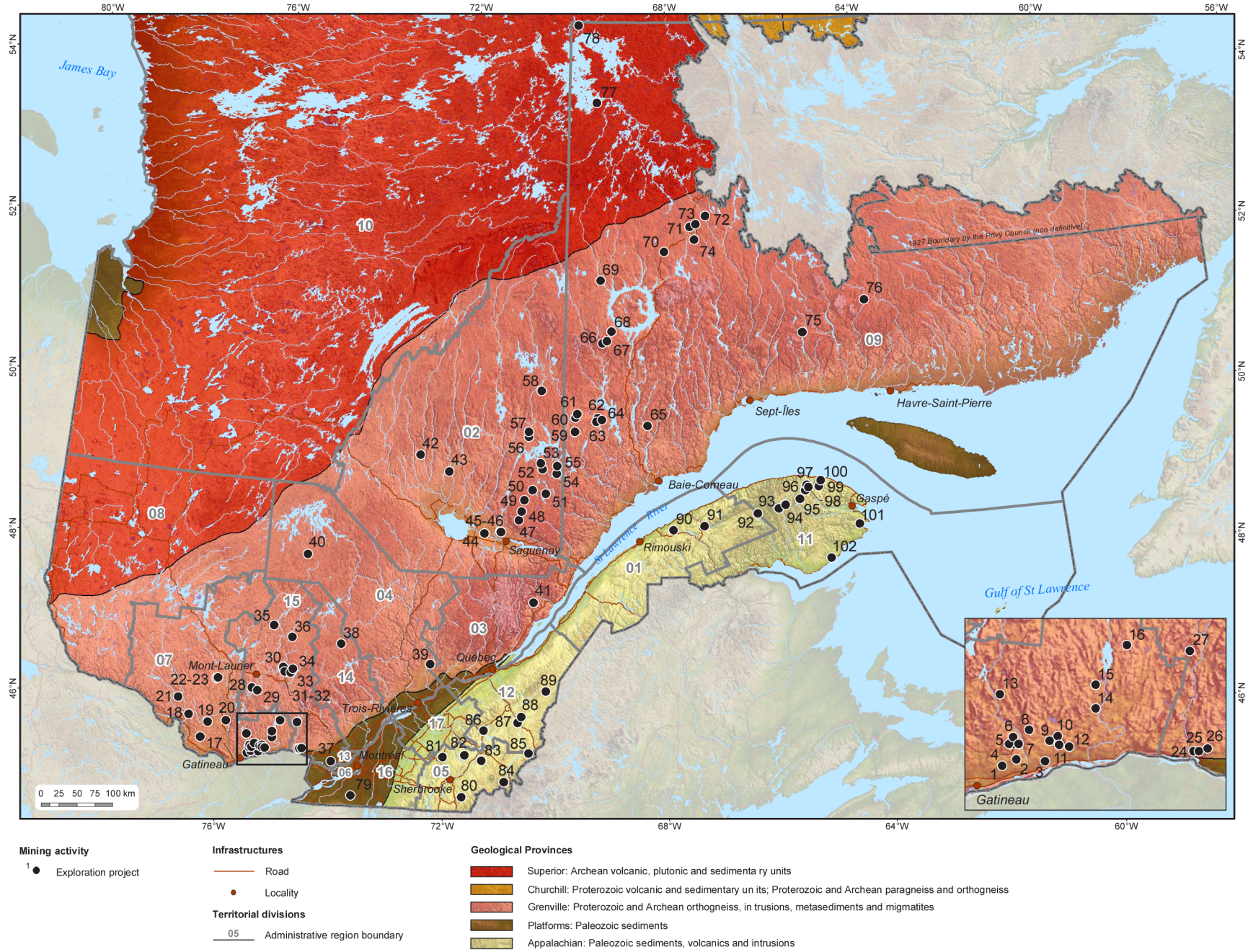


TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
NORTHERN PART OF THE ABITIBI SOUBPROVINCE, MATAGAMI-CHIBOUGAMAU SECTOR (Figure 4.3)						
	Project description: A drilling program intersected two zones (Z-1 and Z-2) of polymetallic sulphide stockwork mineralization (chalcopyrite, sphalerite, pyrite and pyrrhotite). On the Z-1 Zone, drill hole PE-13-03 intersected 2.19 g/t Au, 12 g/t Ag, 0.9% Zn and 0.07% Cu over 41.4 m.					
2	32E01, 32F04	Chaste, Glandelet	Visible Gold Mines	Green Giant	Au	Cg, Gp, Pg,
3	32E06	Dieppe, Collet, Laberge	Bold Ventures	Lac Agisko	Base metals	GpEm
4	32E08	Joutel	Belmont Resources	Joutel	Base metals	GpEl(G), Pr
5	32E08	Joutel	Globex Mining Entreprises	Joutel Copper Mine	Base metals	D (x:x), TE
6	32E10,15	Beschefer	Yorbeau Resources	Rouyn	Au	Gp, Pg
7	32E08	Poirier, Dalet	Bold Ventures	Joutel	Base metals	GpEm
8	32E08, 09	Douay, Joutel	Aurvista Gold Corporation / Société d'exploration minière Vior / SOQUEM	Douay	Au	D (31:11129), GpEl(G), PEA
	Project description: At the Douay project in 2013, highlights of the drilling program on the South Porphyry target included: 1) the discovery of two new gold zones, one yielding an interval of 0.38 g/t Au over 98.0 m (drill hole DO-13-120) and the other an interval of 5.07 g/t Au over 4.5 m (drill hole DO-13-122); and 2) the discovery of Zone 20, corresponding to the eastward extension of the South Porphyry; drill hole DO-13-110 intersected 0.34 g/t Au over 110 m.					
9	32E08, 09, 10	Joutel, Valrennes, Douay	Visible Gold Mines / Agnico Eagle Mines	Joutel	Base metals	D 2012(8:2982)
10	32E08, 32F04, 05	Soissons, Maizerets	Globex Mining Entreprises	Soisson	Au-Base metals	D (x:x), Gp
11	32E09	Aloigny	Adventure Gold	KLM	Au	GpEl(G), GpEm(A), GpMa(G)
12	32E09	Joutel, Douay, Desmazues, Aloigny	Midland Exploration	Jouvex	Au	D (x:x), GpEl(G), GpEm(A)
13	32E09, 10	Montgolfier, Aloigny, Orvilliers, Puiseaux	Barlow Exploration	Colline de Fer	Fe	PFS
14	32E09,10, 14,15	Bapst, La Gauchetière, Ste-Hélène, Mongolfier, Desmazures, Aloigny	SOQUEM	Génération Selbaie	Base metals	D (8:2200)
15	32E10	Orvilliers, Montgolfier	Bold Ventures	Lac Blondel	Base metals	GpEm
16	32E10, 11	Estrées	Cogitore Resources	Caribou	Base metals	D (x:4000), GpEm(B)
	Project description: Holes drilled 3.4 km to the west of the former Estrades mine (Zn-Au) intersected polymetallic sulphides. Drill hole CAR-28 intersected massive sulphides in cherty tuffs: 10.7% Zn, 3.6% Cu, 80.8 g/t Ag and 1.2 g/t Au over 1.2 m.					
17	32E10, 11	Puiseaux, Estrées	Adventure Gold	Casagosic	Au	GpEl(G)
18	32E10, 15	Brouillan	SOQUEM	B26-Brouillan	Base metals	D (35:12475)
19	*32E11*	*Casa Berardi*	*Hecla Québec / Aurizon Mines*	*Casa Berardi Mine*	*Au*	*D (x:58000)*
	Project description: In 2013, definition drilling focused on the 113, 118, 123 and Main zones. The Cherty and 159 zones were the subject of exploration drilling.					
20	32E13, 14	Massicotte	Adventure Gold	Massicotte	Au	GpEl(G)
21	32E14	La Peltrie, Massicotte	Adventure Gold	Casgrain Extension	Au	GpMa(G), Pr
22	32E14, 15	Brouillan, Carheil	NQ Exploration	Carheil	Ag-Cu-Pb-Zn-Au	Cg, RRE
	Project description: Since 2009, drill holes have investigated silver mineralization associated with a silicified rhyolite horizon. Mineralization consists of pyrite, brown sphalerite and traces of galena. In 2013, the initial resource estimate established indicated resources of 379,000 t at 120.5 g/t Ag and inferred resources of 1.452 Mt at 95.9 g/t Ag for the Ag1 Zone, and inferred resources of 112,000 t at 77.2 g/t Ag for the Ag2 Zone.					
23	32E14, 15	La Peltrie, Lanouillier	Adventure Gold	Casgrain	Au	Cg, GpMa(G), Pr
24	32E14, 15, 32L02, 03	Martigny, La Peltrie, Lanouiiler	Midland Exploration / Osisko Mining Corporation	Casault, Casault-Ouest, Casault-Sud	Au	D (14:2992), GpEl(G), TE
25	32E15	Beschefer	Excellon Resources	Beschefer	Au-Ag	D (16:6686)
	Project description: Drill holes intersected the gold-bearing B14 deformation zone, consisting of sheared volcanic rocks altered to sericite-ankerite-hematite-sulphides. The best result of 55.6 g/t Au over 5.57 m, which included an interval of 224.0 g/t Au over 1.23 m, was obtained in drill hole BE13-038 along the depth extension of the B14 Zone.					
26	32E15	Beschefer	Adventure Gold	Sicotte	Au	GpEl(G), GpEm(A), GpMa(G)
27	32E15	Beschefer	SOQUEM	Beschefer	Base metals	D (11:2535)

TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
28	32E15, 16	Fénelon, Subercase	Adventure Gold	Nantel-Fénelon	Au	GpEl(G)
29	32E15, 16, 32L01, 02	Grasset, Du Tast, Subercase, Fénélon	Balmoral Resources	Grasset	Au	Cg, Gp, Gs
30	32E15, 32L02	Gaudet, Lanouillier, Fénélon	Adventure Gold	Gaudet	Au	GpMa(G), Pr
31	32E15, 32L02	Jérémie, Gaudet, La Martinière	Balmoral Resources	Harri	Au-Base metals	GpEl(G), Gs
32	32E16, 32F13	Subercase, Ste-Hélène, Grasset, La Gauchertière	Bold Ventures	Lac Grasset	Base metals	GpEm
33	32F01	Ralleau	Globex Mining Entreprises	Ralleau	Au-Base metals	D (x:x), Gp
34	32F02	Grevet	Amex Exploration	Cameron	Au	D (5:1250)
35	32F02	Verneuil	Les Ressources Tectonic / TJCM	Verneuil	Au	S,T
36	32F02, 06, 07	Franquet, Grevet	Adventure Gold	Florence	Au	Pr, S
37	*32F02, 07*	*Grevet*	*Nyrstar*	*Langlois Mine*	*Zn-Cu-Ag-Au*	*S: (x:x)*
	Project description: The mine closed in November 2008. In 2010-2011, the company developed two access ramps to the No. 3, 4 and 97 zones, and carried out definition and exploration drilling. In 2012, development work continued and commercial production was attained during the first quarter. The reserves are mostly concentrated in the Nos. 3, 4 and 97 zones.					
38	32F02, 07	Grevet	Golden Valley Mines / Big North Graphite	Luciana	REE	Cg, D (x:x), G, Gp(A,G), Pr, S
39	32F02, 07	Grevet, Franquet	Kirrin Resources / M. Proulx	Grevet REE	REE	Cg
40	32F03	Comtois	Hinterland Metals	Tolkien	Au	G, Gp(A), Pr, S, TE
41	32F03	Comtois, Fraser, Quévillon, Cramolet	Maudore Minerals	Comtois (Osbell, Greer, Mafique Nord, Hudson)	Au	D 2012(15:5610), G, RRE, TE
	Project description: An updated resource estimate for the Osbell deposit (Osborne and Bell zones) was completed in 2012. In 2013, Maudore Minerals announced the exploration results for several targets. At the Hudson Zone, located 8 km north of the Osbell deposit, the best result was 3.9 g/t Au over 7.8 m. Gold mineralization consists of disseminated sulphides and sulphide veins in felsic and intermediate volcanics. At the Greer Zone, located 1.9 km southwest of the Osbell deposit, drill hole COM-12-928 intersected 5.8 g/t Au over 2.6 m. The North Mafic Zone, to the north of the Osbell deposit, consists of altered and mineralized mafic volcanics and intrusives. The best result was 15.1 g/t Au over 9.0 m in drill hole COM-12-912.					
42	32F03, 04	Cramolet, Comtois, Themines, Fraser, Fonteneau, Barrin	Midland Exploration / North American Palladium / Maudore Minerals (Aurbec Mines)	Laflamme	Au, Ni-Cu (PGE)	D (7:1619), GpEl(G), GpEm(B)
	Project description: A drilling program tested electromagnetic anomalies and intersected several gold-bearing intervals. Drill hole LAF-12-21 intersected mineralized mafic volcanics (Py-Po) grading up to 0.34 g/t Au over 25.56 m, including an interval of 3.12 g/t Au over 1.5 m.					
43	**32F04**	**Chaste, Glandelet**	**Maudore Minerals / Aurbec Mines**	**Sleeping Giant Mine**	**Au-Ag**	**D (x:20 000), G, RRE, TE**
	Project description: Commercial production at the mine commenced on January 1, 2010. In 2011, the production shaft was deepened another 200 m, following by the development of three new levels. The first drill holes in the lower three levels of the mine yielded good results. Subsequent drill holes, however, failed to intersect viable grades over sufficient longitudinal extent, thereby reducing the volume of mineable ore. Consequently, the company announced the closure of the mine on January 17, 2012. In 2013, rehabilitation work and drilling took place in the summer. A new resource estimate was completed using a cut-off grade of 6.5 g/t Au. Measured and indicated resources total 306,100 t at 12.3 g/t Au and inferred resources 41,700 t at 12.4 g/t Au, distributed in 15 mineralized zones. A 3D re-evaluation of the structural geology is underway. Also, a drilling program is targeting the new 785 N and 16 zones as well as the extensions of zones 30, 20 and 8 in the area adjacent to the shaft, just west of the historical mine workings. Ore extraction from residual production zones at the Sleeping Giant mine started on August 13. During the third quarter, the company mined 979 t at a grade of 6.64 g/t Au.					
44	32F05, 06, 11, 12	Le Tardif, Noyon	Adventure Gold	Bell Vezza	Au	GpEl(G)
45	32F06	Bruneau	Adventure Gold	Bruneau-Sinclair	Au	GpEl(G), GpEm(A), GpMa(G)
46	32F06	Bruneau, Desjardins	North American Palladium / Maudore Minerals / Aurbec Mines	Discovery	Au	RRE
47	32F06, 07	Berthiaume, Desjardins	Belmont Resources	Berthiaume	Base metals	D (x:1800), GpEl(G)
48	32F07	Desjardins	North American Palladium / Maudore Minerals / Aurbec Mines	Flordin	Au	RRE

TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
49	32F08	Benoist, Duplessis	Cartier Resources / Murgor Resources	Benoist	Au	Cg, D (5:4155)
	Project description: A drilling program on the Pusticamica gold deposit, targeting a depth of 450-600 m, intersected a wide gold-bearing envelope associated with strong chlorite alteration. This envelope is cut by a felsic intrusion. The gold grades are associated with the intrusion. Drill hole PU-13-04 intersected an interval of 220 m at 0.4 g/t Au. This interval includes higher grades, such as 5.5 g/t Au over 1.0 m.					
50	32F08	Nelligan, Benoist	Adventure Gold	Céré-113	Au	GpEl(G), GpEM(A), GpMa(G)
51	32F08	Le Tac, Muy	Ressources Broadback	O'Sullivan	Ni-Cu-PGE	TE
52	*32F08, 09*	*Le Sueur*	*Metanor Resources*	*Bachelor Lake Mine*	*Au*	*D(x:15000)*
	Project description: Development work was carried out on levels 10, 11, 12, 13 and 14. Ore mining continued, as did monthly gold production. Drill holes targeted the Main, A, B and E veins. Among the best results were 11.8 g/t Au over 4.19 m (the Main vein) and 20.6 g/t Au over 8.36 m (the A vein) in drill hole 13-082. On November 14, 2013, the Bachelor project reached the stage of commercial production..					
53	32F08, 09, 32G12	Le Sueur	Adventure Gold	Bachelor Extension	Au	GpEl(G), GpEm(A), GpMa(G)
54	*32F12*	*Galinée*	*Donner Metals / Glencore Canada Corporation*	*South Flank (includes Bracemac-McLeod)*	*Base metals*	*D(x:35000), RRE*
	Project description: The construction of the Bracemac-McLeod mine commenced on July 9, 2010. In October 2012, ramp excavation reached the Bracemac Main and Bracemac KT zones and continued toward the McLeod zone. On May 15, 2013, the partners announced the start of commercial production. A feasibility study established proven and probable reserves of 3.73 Mt at 9.60% Zn, 1.26% Cu, 28.25 g/t Ag and 0.43 g/t Au. The life of mine will be four years at a daily production rate of 2,500 t/d. The inferred resources of the McLeod Deep Zone are estimated to be 2.47 Mt at 9.21% Zn, 1.22% Cu, 39.81 g/t Ag and 1.12 g/t Au. Drill hole MCL-13-25 intersected sulphide mineralization between the McLeod and McLeod Deep zones: 9.42% Zn, 2.51% Cu, 35.71 g/t Ag and 0.81 g/t Au over 12.8 m.					
55	32F12	Vezza	Mines Abcourt	Vezza	Au	D (x:x)
56	32F12	Vezza	Balmoral Resources	N1	Au	Cg
57	**32F12**	**Vezza, Noyon**	**Maudore Minerals / Aurbec Mines / Agnico Eagle Mines**	**Vezza Mine Project**	**Au-Ag**	**D (x:x), RRE, TE**
	Project description: As at December 31, 2012, the measured and indicated resources for the Contact Zone on the Vezza project amounted to 1,244,850 t at 6.5 g/t Au (261,110 ounces of gold, cut-off grade of 4.2 g/t Au) and the inferred resources are 435,830 t at 4.9 g/t Au (68,540 ounces of gold; cut-off grade of 3.0 g/t Au). On March 22, 2013, the first two gold bars were poured for a total of 905 ounces of gold. On July 16, Maudore Minerals announced it was suspending development work at the Vezza project to focus on the Sleeping Giant project. Mining at the Vezza project ended on September 22 and the last ore was extracted on October 2, 2013. Since then, the Vezza project has been in care and maintenance mode. During the third quarter of 2013, a total of 40,363 t of ore (5,215 ounces of gold) were extracted. The Vezza project never reached the stage of commercial production.					
58	32F12	Vezza, Noyon	Adventure Gold	Vezza North	Au	GpEl(G), GpEM(A), GpMa(G)
59	32F12	Vezza, Noyon, Cavelier	Adventure Gold	Vezza Extension	Au	GpEl(G), GpEM(A), GpMa(G)
60	32F12, 13	Isle-Dieu	Donner Metals / Glencore Canada Corporation	North Flank (Radiore, Lac Garon, Bell Channel)	Zn - Base metals	G (6:x)
	Project description: Drill holes in the DJV and Landry areas intersected the Key Tuffite. Drill hole LA-13-002 encountered polymetallic mineralization in the Key Tuffite horizon, with grades of 1.56% Zn, 0.07% Cu, 1.10 g/t Ag and 0.073 g/t Au over 2.7 m..					
61	32F13	Isle-Dieu	Exploration Lounor	Matagami	Au	Cg, D (x:x), GpEm(G), GpGr(G), Pr, T, TE
62	32F15, 16	Montviel, Urfé	GéoMégA Resources / NioGold Mining Corporation	Montviel	REE-Nb	MT, TE
63	32G03	Buteux	Globex Mining Entreprises	Fecteau	Au-Base metals	D (5:1500), G, Gp
64	32G04	Urban	Eagle Hill Exploration Corporation / Murgor Resources / Cliffs Natural Resources / Noront Resources	Windfall Lake	Au	D (65:28 000), Gc(r), GpEl(G)

TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
	Project description: In 2012, the resource estimate was updated. Indicated resources in the Main zone were estimated to be 1,665,000 t at 10.05 g/t Au (538,000 ounces of gold) and inferred resources in the Main, F17 and F51 zones were estimated to be 2,906,000 t at 8.76 g/t Au. The Main zone includes the 27, Caribou, Mink and Allard lenses. In 2013, drilling continued on the Caribou, Caribou South, 27, Mink and Mallard gold zones. Among the best results were 22.1 g/t Au over 5.5 m in Zone 27 (drill hole EAG-13-461) and 5.4 g/t Au over 43.7 m in the Caribou Zone (drill hole EAG-13-468).					
65	32G04	Urban	Amseco Exploration / Beaufield Resources	Urban Gold (Lac Rou-leau)	Au	D (8:1684)
	Project description: A drilling program was carried out on the Urban Gold property, in an area located 500 m northeast of the Rivage gold zone of Bonterra Resources. Among the best results were 2.04 g/t Au over 0.95 m and 11.0 g/t Au over 0.45 m (drill hole BRI-13-02).					
66	32G04	Urban, Belmont, Lacroix	TomaGold Corporation	Lac Urban	Au	D (x:2000), GpEm(G)
67	32G07	Gamache, Hazeur	SOQUEM	Philibert	Au	D (33:6024), GpEl(G), S,T
68	32G07	Hazeur	Vanstar Mining Resources	Nelligan	Au	D (10:3000), G, GpMa, Pr
	Project description: A drilling program testing a negative magnetic anomaly measuring 900 m long, revealed the Liam Zone, a new gold-bearing altered structure with an apparent drill width of 37.6 m. The structure includes a strongly silicified zone containing 1-2% disseminated pyrite with an apparent drill width of 20 m. Along the southern contact is a sericite-fuchsite schist and a sheared and mineralized iron formation. An amphibolite horizon, cut by mineralized veins with traces of molybdenite, was observed along the northern contact of the Liam Zone. Drill hole NE13-04 intersected an interval of 31 m at 1.84 g/t Au, including 20.7 m at 2.04 g/t Au. The drilling program also detected the Mila showing, another gold showing, and intersected the gold mineralization of the Lac d'Eu showing.					
69	32G07	Hazeur, Druillettes	Viking Gold Exploration / Golden Share Mining Corporation / B.Boudreault	Vent d'Or	Au	Cg
70	32G07	Pambrun	Nimsken Corporation	Lac Pierre	Au	S,T
71	32G07, 10	Hazeur, Rale, Gamache	Visible Gold Mines	Hazeur	Au	D(11:x), Pr, S ,T
72	32G07, 10	Rale, Hazeur	TomaGold Corporation / IAMGOLD Corporation	Winchester	Au	D (x:2000), Pr,T
	Project description: A drilling program was carried out on the Winchester property, located 6 km south-southwest of the 325 gold zone on the Monster Lake property. A unit of sheared tuff, cut by a gold quartz vein, was intersected in drill holes and included a grade of 9.6 g/t Au and 17.0 g/t Ag over 1.0 m (drill hole W -13-02).					
73	32G09	La Dauversière	Nuinsco Resources / CBay Minerals	La Dauversière	Zn-Cu-Au-Ag	D (6:501)
	Project description: The La Dauversière project is located 3 km north of the former Joe Mann mine. A drilling program tested a geophysical anomaly in highly deformed volcanic rocks. The holes intersected strong pyrite-pyrrhotite mineralization with intervals of anomalous zinc. Drill hole NJ-1301 intersected an interval of 1 metre grading 0.04 g/t Au, 1.0 g/t Ag, 0.071% Cu and 0.484% Zn.					
74	32F08	Le Tac	Western Troy Capital Resources	Nicobi Lake	Cu-Ni-PGE	TE
75	32G09, 16	Queylus	Copper One	Queylus	Cu-Ag-Au-W	D (6:x)
	Project description: A drilling program that tested magnetic and induced polarization anomalies intersected several intervals of copper-silver or tungsten-silver-copper mineralization. Among the most notable results: 2.62% Cu, 3.2 g/t Ag and 0.1 g/t Au over 2.65 m in drill hole QU-12-04 and 0.43% Cu, 2,280.0 g/t Ag; and 1.17% W over 1.0 m in drill hole QU-12-12.					
76	**32G09, 16, 32H13**	**Lemoine, Rinfret, Dollier**	**BlackRock Metals**	**BlackRock**	**Fe-V-Ti**	**ES,T**
	Project description: Following a drilling program in 2010, BlackRock Metals undertook a feasibility study on its iron-vanadium-titanium project, which was completed in November 2011. The environmental and social impact study was filed with COMEX in late 2011. An agreement on the development and operation of the BlackRock project was signed between the Cree community of Oujé-Bougoumou and BlackRock Metals on June 21, 2013.					
77	32G09, 16, 32H13	Lemoine, Rinfret, Dollier	Cogitore Resources	Lemoine	Base metals	Cg
78	32G10	Brongniart	Natives Exploration Services	Lac Presqu'île	Cu-Au	S,T
79	32G10	Fancamp, Rale	Murgor Resources / Vanstar Mining Resources / TomaGold Corporation	Fancamp	Au	D (x:x)
80	32G10	Rale	TomaGold Corporation / IAMGOLD Corporation	Monster Lake	Au	Cg, D (23:5000), G,TE
	Project description: Drill hole M-13-06 tested the depth continuity of Zone 325, located between the Annie and Megane showings, both of which are found in the Monster Lake gold trend. The gold zone consists of a black quartz vein with an assemblage of pyrite-pyrrhotite-chalcopyrite-visible gold, hosted in a sheared and silicified lapilli tuff. Drill hole M -13-106 intersected an interval of 4.8 m at 37.1 g/t Au.					
81	32G10	Rale	Northcore Resources / Vanstar Mining Resources / TomaGold Corporation	Little Monster	Au	D (x:x), G, Gp(G), GpMa(G), Pr, S,T

TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
82	32G10	Rale	Amseco Exploration / Vanstar Mining Resources / TomaGold Corporation	Cookie Monster	Au	D (x:x), G, GpMa(G)
83	32G10	Rale	Northcore Resources	Lac Irène	Au	Cg, G, Pr, S
84	32G14	Dolomieux	M. Bouchard / A. Tremblay	Dolomieux	Au	S,T
85	32G14	Lamark	Fancamp Exploration / GL Géoservices / M. Bouchard	MTK	Au-Ag-Cu	Cg, Pr, S,T
	Project description: Prospecting work revealed an outcrop with a silicified sulphide-rich zone. The best grab sample yielded a grade of 8.8 g/t Au. .					
86	32G14, 15	Daubrée	TomaGold Corporation / 2736-1179 Québec	Lac Cavan	Au-SMV	Cg
87	32G14, 32J03	Guettard, Lamark	Northern Superior / GL Géoservices / M. Bouchard	Grizzly-Kellar	Au	Cg
88	32G15	Lévy	2736-1179 Québec	Saw Mill	Cu-Zn-Au	T
89	32G15	Lévy	2736-1179 Québec	Indian Lake	Base metals	T
90	32G15	Lévy	Fancamp Exploration / GL Géoservices inc. / M. Bouchard	Phoenix	Au-Ag-Cu-Co	Cg
91	32G15	Lévy	Explorateurs Innovateurs du Québec	Opémisca	Cu-Au	Cg, GpMa(G), RRE
92	32G15	Lévy	2736-1179 Québec	Chapais	Au-Cu	D (10:1985)
93	32G15, 16	Barlow, McKenzie	Northern Superior Resources / GL Géoservices / M. Bouchard	Croteau Est	Au	D (7:1300), G, Gp(A), Pr, Rcd(141:x), S,T
	Project description: Following the results of trenching and sampling work in 2011, the company initiated a drilling program in 2012. The best results published in 2013 included 9.52 g/t Au over 2.6 m (drill hole CRO12-49) and 4.39 g/t Au over 5.3 m (drill hole CRO12-54). The excavation of a trench revealed gold-bearing structures. The best results included 16.35 g/t Au over 1.25 m in a sheared porphyry dyke (quartz-feldspar) altered to quartz-sericite-ankerite-pyrite.					
94	32G15, 16	Obalski, Scott	2736-1179 Québec	Lac Cibougamau "South"	Au	D (2:393)
95	32G15, 16	Scott	D. Malouf	Lac David-Ramsay	Au	G, S
96	32G15, 16	Scott, Obalski	2736-1179 Québec	Lac David	Au	D (48:9800)
	Project description: The drilling program intersected several NW-SE shear zones containing subeconomic values of copper, gold and silver.					
97	32G15, 16, 32J01, 02	Barlow. Blaiklock, McKenzie, Richardson, Roy	Northern Superior Resources / Murgor Resources	Waconichi	Au	Cg, Pr
98	32G16	McCorkill, Roy	2736-1179 Québec	Turtle Lake (Neptune Bay)	Au-Cu	D (5:756), S,T
99	32G16	McKenzie	SOQUEM / MDN / Pérylia	McGold (MOP II)	Au-Cu	D (32:7715), S,T
100	32G16	McKenzie	Globex Mining Entreprises / Chibougamau Independent Mines	Berrigan	Zn-Au-Ag-Pb	Cg, D(8:2000), G, GpEl(G), Pr, S
	Project description: The company carried out a drilling program to define the historical polymetallic structure of the Berrigan deposit. Mineralization consists of semi-massive sulphides or sulphide veins (pyrite-chalcopyrite) in siderite-sericite schist. Drill hole BJ-13-10 intersected 2.93% Cu, 39.0 g/t Ag and 0.68 g/t Au over 43.5 m.					
101	32G16	McKenzie	SOQUEM	Brosman	Cu-Au	MSR
102	32G16	McKenzie	Chibougamau Independent Mines / Globex Mining Entreprises	Copper Cliff Extension	Base metals	D (1:135),T
103	32G16	McKenzie	Globex Mining Entreprises / CBay Minerals	Jaculet	Base metals	D (6:1137)
104	32G16	McKenzie	SOQUEM	Radar	Cu-Au	S,T
105	32G16	McKenzie, Obalski	Chibougamau Independent Mines / Globex Mining Entreprises	Kokko Creek Mine	Base metals	Cg, GpEl(G), Pr, S
106	32G16	McKenzie, Roy, Lemoine, Obalski	Chibougamau Independent Mines / Globex Mining Entreprises /	Lac Chibougamau, S-3, Tommy	Base metals	D (x:x)
107	32G16	Obalski	Nuinsco Resources / CBay Minerals	Devlin	Cu-Au	Cg, D (4:x)
	Project description: A drilling program was carried out on the Devlin property, located 18 km south of Chibougamau. The goal was to confirm and characterize the mineralization of the Devlin deposit, consisting of five subhorizontal lenses. The best results included 3.16 m grading 2.41% Cu and 0.435 g/t Au (drill hole DEV-CB3)..					
108	32G16	Obalski	F. De Sa Silva / C. H. Barbe / M. Nguyen	De Sa Silva	Cu-Au	D (3:x)

TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
109	32G16	Roy	Chibougamau Independent Mines / Globex Mining Entreprises	Grandroy	Base metals	Cg, D (x:x), Pr
110	32G16	Roy	Nuinsco Resources / CBay Minerals	Portage Island	Cu-Ag-Au	D 2012 (25:3183), GpEl(G), GpMa(G)
	Project description: A drilling program carried out in November 2012 intersected several gold-bearing intervals near the former Portage mine, located near Chibougamau. The best results included 8.37 g/t Au, 0.12% Cu and 1.39 g/t Ag over 2.96 m (drill hole NH-12-11).					
111	32G16	Roy	Chibougamau Independent Mines	Mont Sorcier North and South	Fe-Ti-V	D (2:705)
	Project description: Drill hole MS-13-17 intersected 41% Fe_2O_3, 1.12% TiO_2 and 0.23% V_2O_5 in an interval with 38.14% magnetite over 225 m. Drill hole MS-13-19 intersected 45.5% Fe_2O_3, 0.75% TiO_2 and 0.44% V_2O_5 in an interval with 41.4% magnetite over 77 m.					
112	32G16	Roy, McKenzie, Lemoine, Obalski	Chibougamau Independent Mines / Globex Mining Entreprises	Bateman Bay Mine	Base metals	Cg, D (x:x)
113	32G16, 32H13	McCorkill	Les Ressources minérales JDG	McCorkill	Cu-Au	D (3:x), S, T
114	32G16, 32H13	Rinfret	Vanadium Corp. Resources / PacificOre Mining Corporation	Lac Doré	Fe-V-Ti	D (3:x)
115	32G16, 32H13, 32I04, 32J01	McCorkill	Typhoon Exploration	Monexco-McCorkill	Au-Cu-Zn	G, S, T
116	32H13	McCorkill	Les Ressources Tectonic	Kill Bill	Cu-Zn	Pr, S
117	32L02, 03	La Martinière, Lanouillier, Martigny	Balmoral Resources	Martinière (East, West)	Au	Cg, D (79:23 600), G, GpEl(G), Gs, Pr
	Project description: In 2013, a drilling program extended the West Zone to the southwest. The best results included 2.29 g/t Au over 24.14 m (drill hole MDX-13-13) and 10.62 g/t Au over 21.44 m (drill hole MDW-13-88). The Bug Lake Zone was also extended for more than 1,000 m. The best results included 19.05 g/t Au over 1.16 m (drill hole MDE-13-117).					
118	32L03	Manthet, Martigny	Adventure Gold	Martigny	Au	GpEm(A)
119	32L03	Martigny	Balmoral Resources	East Doight	Au	Cg, GpEl(G), Gs
120	32L03, 04	Manthet	Adventure Gold	Manthet	Au	GpEm(A)
121	32G16	Roy	Globex Mining Entreprises	Hematite Bay	Cu-Au-Ag	D (1:213)
122	32G16	Roy	Globex Mining Entreprises	Île Marguerite	Au	D (1:324)
123	32G16	Roy	2736-1179 Québec	Lac Taché	Base metals	Cg
JAMES BAY TERRITORY (Figure 4.2)						
124	**33A16**		**Stornoway Diamond Corporation**	**Renard**	**Diamond**	**RRE, TE**
	Project description: Following a successful bulk sampling program on the Renard 65 kimberlite body in the fall of 2012, the company announced a mineral resource update for the Renard 2, 3, 4 and 65 pipes. The indicated resources for the project now stand at 27.1 million carats and the inferred resources amount to 16.9 million carats. In 2013, the company also completed a mining optimization study, as well as the construction of a mining road (the extension of highway 167 North) and an aerodrome.					
125	23D11, 12, 14		Dios Exploration	14 Karats	Au	Cg, Gs
126	33A08		Dios Exploration	33 Carats (South)	Au	D (9:1332), G, Pr, S
	Project description: Drill hole 341-13-01 intersected 1.14 g/t Au over 3.0 m in a tonalite intrusion of calcalkaline affinity. The interval contained pyrite and chalcopyrite in veins and as disseminations. The rocks belong to the Upper Eastmain Belt.					
127	32P09, 16, 33A01, 08		Visible Gold Mines	Project 167	Au	Cg, Pr
128	33A08, 09, 23D05, 09		SOQUEM	Harbour Lake	Au-Cu-Zn	G, Pr, S, T
129	33A08		Eastmain Resources	Eastmain Mine	Au-Ag-Cu	G, Gs(sl), Pr
130	32I05		Nuinsco Resources / CBay Minerals	Perch River	Cu	TE
131	32J09, 10, 11, 15, 16, 32O01		Beaufield Resources	Troilus-Tortigny	Cu-Zn-Au-Ag-Li_2O	D (10:2203), Gs(r,sl), Gp, Pr, S, T
132	32J10		SOQUEM / Perilya	Moblan West	Li_2O	S, T
133	32J11		Nemaska Lithium	Sirmac	Li-Ta	Pr, S

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No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
	Project description: Nemaska Lithium sampled the potential extensions of a tantalum-bearing spodumene pegmatite (the No. 5 dyke).					
134	32J15		Les Ressources Tectonic	Chemin Troilus	Au	Pg
135	32K01	Bernières, Urfé, Dambourges, Monseignat	Goldstar Minerals	Julien	Cu-Zn-Au	GpEl(G)
136	32K09		Jien Nunavik Mining Exploration	Huskies	Ni-Cu-PGE	D (2:371), GpEm(B)
137	32K09		Jien Nunavik Mining Exploration	Remparts	Ni-Cu-PGE	D (1:98)
138	32K09		Jien Nunavik Mining Exploration	Tigres	Ni-Cu-PGE	D (1:156), GpEm(B)
139	32K09		Jien Nunavik Mining Exploration	Wildcats	Ni-Cu-PGE	D (1:99)
140	32K13, 32N04		El Condor Minerals	Horden Lake	Ni-Cu-Co-PGE-Au-Ag	Cg
141	32K13		Jien Nunavik Mining Exploration	Horden	Ni-Cu-PGE	D (2:204)
	Project description: Drill holes intersected disseminated sulphides over roughly 20 metres that included a 1 to 2 metres thick interval of massive sulphide veins, likely representing the extension of the Horden Lake deposit located to the northeast, on the property belonging to El Condor Minerals.					
142	32L09		M.G. Drapeau / Somdra	Suzane	Au	Pg
143	32L15		G. Lamothe	Obamska	Au-Fe	Pr, S
144	32O11, 12, 14		Monarques Resources	Lemare	Cu-Ni-PGE-Au-Li_2O	D (10:1566), GpEl(G)
145	**32O12**		**Nemaska Lithium**	**Whabouchi**	**Li_2O-Rb-Be**	**B (25 000:x), D (24:3124), ES, FS, MT**
	Project description: Nemaska Lithium announced it was commencing an environmental, social and economic impact assessment to study an open pit mine scenario for the Whabouchi deposit. The company also extended the mineralization of the main spodumene dyke another 200 metres to the east.					
146	32O12, 13		Tucana Exploration	Abigail	Li_2O	Cg
147	33F05, 06		Metalex Ventures / Wemindji Exploration/ Dianor Resources	Quebec Diamond	Diamond	Gs(sl), Gs(t), Gp
	Project description: The companies carried out a detailed sampling program near a lake with a diameter of 1.3 km in the James Bay region. The lake is found in an area known to have anomalous amounts of diamond indicator minerals.					
148	33B02, 03, 04		Goldcorp / Azimut Exploration	Wabamisk	Au-Ag-Cu-Zn-Pb-Mo	Pr, S
149	33B04, 05		Eastmain Resources	Clearwater	Au-Te	D (77:31 625), G, Pr, S, T, TE
	Project description: Drilling continued to confirm the continuity of a gold system at the Clearwater deposit over a distance of 600 metres. The system comprises several parallel veins extending from surface to a vertical depth of 300 metres. On the 450 West Zone, drill hole ER13-501 yielded an interval of 10.94 g/t Au and 9.92 g/t Te over 12.0 m along the C vein..					
150	33B04, 33C01		Dios Exploration/ Osisko Mining Corporation	AU33 West	Au	Gs, GpEl(G)
	Project description: Bedrock and soil sampling work, carried out during the summer by Dios Exploration and Osisko Mining Corporation, led to the discovery of five new gold showings on the AU33 West property..					
151	33B12, 13, 33C16		Golden Valley Mines / Sirios Resources	Cheechoo	Au	D (4:750), Gs, Min, S
	Project description: Drill holes cut a felsic intrusion (tonalite) that displays silicification and weak mineralization in the form of finely disseminated sulphides (pyrite, pyrrhotite and arsenopyrite). Drilling also confirmed the presence of wide gold-bearing intervals. Drill hole 2013-10 intersected an interval of 21 m (from 263 m to 284 m) containing a multitude of free gold grains.					
152	33B12, 13, 33C09		Hecla Québec / Aurizon Mines / Azimut Exploration	Opinaca	Au	Cg
153	**33B12, 33C09, 10**		**Goldcorp (Les Mines Opinaca)**	**Éléonore**	**Au**	**D (280:102 000)**
	Project description: The company finished sinking the Gaumond exploration shaft and continued to develop the Éléonore gold project over the course of the year. The start of commercial production is scheduled for the fourth quarter of 2014.					

TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
154	**33C01**		**Critical Elements Corporation**	**Rose**	**Li_2O-Ta**	**ES, FS, MT, S, T**
	Project description: Critical Elements Corporation optimized its lithium recovery to a maximum of 91.9% and tantalum up to 84%, in addition to discovering the westward extension of the JR Zone on its Rose deposit. Furthermore, a feasibility study and an environmental and social impact study are underway on the Rose project.					
155	33C01, 02, 07, 08		Eastmain Resources	Réservoir	Cu-Au-Ag	Gc, Pr
156	33C01, 02, 07		Virginia Mines / IAMGOLD Corporation	Anatacau / Wabamisk	Au	D (29:4472), G, Gs(r,sl), GpEl(G), S , T, TE
	Project description: The Mustang gold vein was the subject of stripping, mapping and channel sampling. The best results included 23.28 g/t over 4.6 m from channel R6 in trench TR045-049. Other centimetric to decimetric gold-bearing quartz veins were discovered beyond the main stripped area; these define a new gold trend with a strike length of 3.5 km in folded sedimentary rocks.					
157	33C03		Eastmain Resources	Hudson Lake	Au-Cu-Zn	Gp
158	33C04		Dios Exploration	Solo	Au	Cg
159	33C04, 05, 07, 10, 11		New World Mining Enterprises	Opinaca River (West & East)	Au	G, Pr
160	33C05		Eastmain Resources	Elmer Lake	Au	Gp
161	33B05		Dios Exploration	LeCaron-Clarkie	Au	Cg, Gs
162	33B02, 03, 06, 33C08, 09, 10		Midland Exploration	James Bay Eleonore	Au	G, GpEl(G), Pr, S, T
	Project description: Several new gold showings were discovered in 2013, including the Golden Gun East (18.8 g/t Au) and Golden Gun West showings (11.95 g/t Au, 2.36 g/t Au and 1.69 g/t Au), respectively located 75 metres east and 200 metres west of the Golden Gun showing (13.6 g/t Au). Another showing, Aston Martin (1.63 g/t Au), was discovered 1,400 metres south of Golden Gun.					
163	33C08		Dios Exploration	Shadow	Au	Cg, Gs(h,sl)
164	33C09		Beaufield Resources	Opinaca	Au-Cu-Mo	D (13:2321)
165	33C09, 10		Virginia Mines	Eleonore regional	Au	Gs, Gp, Pr, S, T
166	33F03		LaSalle Exploration / G. Lamothe	Radisson	Ni-Cu-PGE-Au	GpEm(G), GpMa(G), Pr, S
167	33F03, 06		New World Mining Enterprises	Shabudowan South Lake	Zn-Pb-Au-Ag	GpEm(A), GpMa(A)
168	33F04		Eastmain Resources / Honey Badger Exploration	Radisson	Au	D (4:827), Gs(sl)
	Project description: Honey Badger Exploration announced an interval of 3.17 g/t Au over 1.0 m included in an interval of 0.44 g/t over 17.56 m, contained within a shear zone.					
169	33F05, 12		Augyva Mining Resources / Century Iron Mines Corporation	Duncan Lake	Fe	PEA
	Project description: Following a mineral resource update, the partners announced the results of a preliminary economic assessment study on the Duncan Lake project, south of Radisson.					
170	33F06		Pro-Or Mining Resources	Ménarik	Cr-PGE-Au-Cu-Zn-Ag-Pb	D (5:987)
171	33F02, 07		Canada Strategic Metals / Matamec Explorations	Sakami	Au	D (10:1500), Cg, G, Gs(sl), GpMa(G), Pr, S
	Project description: Channel sampling values included 26.68 g/t Au over 2.0 m for showing 43, and 5.31 g/t Au over 2.0 m for showing 9.6. These values confirm the gold potential for the JR and De L'Ile areas on the property.					
172	33F09, 33G12		Virginia Mines	La Grande East	Au	G, Gs, Gp, Pr, S, T
173	33F06		Virginia Mines	Menarick Lake	Au	G, Pr, S, T
174	33G05, 06, 07, 11		Virginia Mines	Poste Lemoyne Extension	Au	G, Pr, S, T
175	33G08, 09, 33H12		Virginia Mines / Les Manufacturiers Komet	Félicie-Corvet West-Island Lake (FCI)	Au	Cg, D (4:600)
176	23L11, 14		Virginia Mines	Coulon	Cu-Zn-Ag	D (10:7670), G, Gs(r), Pr, S, TE
	Project description: To the northeast of lens 43, Virginia Mines demonstrated the continuity of lens 257 on the Coulon property, located 15 km north of the Fontanges airport. The best grades were obtained in the northern extension of the main zone, including 9.48% Zn, 3.11% Cu and 46.16 g/t Ag over 15.7 m in drill hole CN-13-271.					

TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
203	33F06		Augyva Mining Resources	Yasinski	Cu-Au-Ni-Pt-Cr	Cg
204	33C05		Augyva Mining Resources	Kali	Cu-Ag-Au	Cg
FAR NORTH (Figure 4.1)						
177	33N02		New World Mining Enterprises	Bienville	Cu-Au	G, Gp
LABRADOR TROUGH (Figure 4.1)						
178	24M01, 08		Oceanic Iron Ore Corporation	Hopes Advance	Fe	G, MT, Pr, RRE, S
	Project description: The company published the results of an optimization study for the transport of iron ore as well as the results of metallurgical testing and a new resource estimate for its Hopes Advance iron project in the Aupaluk region.					
179	24M09, 15, 16, 24N12, 13		Oceanic Iron Ore Corporation	Morgan Lake	Fe-Au	G, GpMa(G), Pr, S
	Project description: Thirty-nine grab samples yielded values ranging from 23.5% to 41.2% Fe(total).					
180	24N05, 12		Cartier Iron Corporation	Borel River	Fe	Cg, TE
181	25C04, 05, 25D01, 07, 08, 09, 10		Oceanic Iron Ore Corporation	Roberts Lake	Fe	G, GpMa(G), Pr, S
182	25C04, 25D01, 08		Virginia Mines / Anglo American Exploration Canada	Payne Bay	Cu-Ni-Co-PGE	D (7:1450)
183	25D10, 14, 15		Oceanic Iron Ore Corporation	Armand Lake	Fe	G, GpMa(G), Pr, S
184	**23N16, 24C01, 02**		**Adriana Resources / WISCO International Resources Development & Investment**	**Otelnuk Lake**	**Fe**	**B (80:X), ES, FS, MT**
	Project description: The joint venture commenced a feasibility study based on an open pit mine scenario with an annual output of 180-200 Mt of iron ore and a processing plant capable of producing 50 Mt of iron concentrate per year as a final product.					
185	23O03, 04, 05, 06, 12		New Millennium Iron / Tata Steel Minerals Canada	Taconite	Fe	FS, G, S
	Project description: New Millennium Iron and Tata Steel Minerals Canada have completed the feasibility study for the Taconite project (KéMag and LabMag deposits), to the west of Lac Harris and Lac Gillespie in the Schefferville area.					
186	24F06, 11		Rio Silver / Les Ressources Tectonic	Kan	Au-Ag-Cu-Zn-Ni-PGE	G, Pr, T, S
187	24K03, 04, 05, 06, 24F02		Midland Exploration	Pallas	Cu-Ni-PGE-Au	Pr, S, T
188	24K05		Northern Shield Resources / Impala Platinum Holdings	Idefix	Cu-Ni-PGE-Au	D (14:1501), G, Pr, S
189	24K13, 24N04, 05		Nickel North Exploration Corporation	Hawk Ridge	Cu-Ni-Co-PGE-Au	D (38:7330), G, GpEm(B, G), MT, Pr
	Project description: In December, the company announced the results of drilling on the Falco 7, Hopes Advance North, Hopes Advance Main, Gamma and MAK-1 zones, which are associated with mafic and ultramafic sills of the Montagnais Group. Drill hole HR-2013-16 intersected an interval of 35.85 m at 0.55% Cu, 0.22% Ni and 0.29 g/t PGE + Au (Hopes Advance Main Zone).					
190	23O01, 08		Rockland Minerals Corporation	Blue Lake / Retty Lake / Terrier Lake	Cu-Ni-PGE	Cg
191	23O02, 23J15		Century Iron Mines Corporation	Attikamagen (Joyce Lake)	Fe	D, Rcd (x:3341), TE
	Project description: Century Iron Mines Corporation intersected several iron-rich intervals during drilling on its Attikamagen project (Joyce Lake area, east of Schefferville), thereby improving the results of the project's preliminary economic assessment study.					
192	23O04, 05		Rockland Minerals Corporation / Western Troy Capital Resources	Schefferville Gold	Au-Fe-Cu	G
193	23O05, 06		Century Iron Mines Corporation	Sunny Lake (Rainy Lake)	Fe	D (94:X), MT, RRE
194	23O03, 05, 06		Century Iron Mines Corporation	Sunny Lake (De Fer Lake)	Fe	D (106:20 772), MT, RRE
195	23O03		Beaufield Resources	Schefferville	Fe	Cg, TE

TABLE 4.3 - **Exploration projects in the James Bay and Nunavik regions in 2013.**[1]

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
196	24C15, 16, 24F01		Commerce Resources Corporation	Eldor	REE-Ta-Nb	B, D (12:1177), ES, G, MT, S, T, TE
	Project description: Commerce Resources confirmed the extension of the Ashram mineralized zone to the northeast.					
UNGAVA TROUGH (Figure 4.1)						
197	35H05, 06, 10, 11, 12, 35G08		Canadian Royalties / Jilin Jien Nickel Industry Co.	Nunavik Nickel	Ni-Cu-Co-PGE	G, GpEm(G), Pr, S
	Project description: The first two shipments of copper concentrate were sent by boat from the Nunavik Nickel project.					
198	*35G04, 35H11, 12, 13*		*Glencore Canada Corporation*	*Raglan Mine*	*Ni-Cu-Co-PGE*	*D (170:74 886), GpEm(A,B,G), RRE*
	Project description: New sulphide concentrations were discovered and the volume of known sulphide concentrations increased significantly.					
199	35G07, 08		Glencore Canada Corporation/ Melkior Resources	Kenty Lake (Delta)	Ni-Cu-Co-PGE	Cg
200	35G11, 12		Corvus Gold / Les Ressources Tectonic	Gerfault	Au-Cu	Pr, S
TORNGAT OROGEN AND CORE ZONE (Figure 4.1)						
201	24A08		Quest Rare Minerals	Strange Lake	REE	MT, PFS, TE
	Project description: A prefeasibility study was completed on the B Zone. A pilot plant is being designed.					
202	13M05		Quest Rare Minerals	Misery Lake	REE	GpMa(G)

1 - See legend of abreviations and the meaning of bold and italic types in Appendix 2.

TABLE 4.4 - **Exploration projects in the Abitibi-Témiscamingue administrative region in 2013[1] (see figures 4.4, 4.5 and 4.6).**

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
Eastern part of region 08: Val-d'Or – Amos area						
1	31N14	Villebon	Khalkos Eploration	Villebon Property	Au	Cg, D (29:x), MT, S,T
	Project description: An exploration program comprising stripping, sampling and drilling was carried out on the Villebon property, within a 1-km gold trend. Near the former Céré headframe, stripping revealed a mineralized gold vein containing pyrite, pyrrhotite, chalcopyrite, galena and native gold. Five samples collected from the vein yielded grades ranging from 1.05 g/t to 72.03 g/t Au. Drilling is underway on the No. 4 vein, 1 km to the northeast. The best grab samples taken from the central part of the gold trend, at the No. 3 vein, yielded grades ranging from 2.0 g/t to 73.63 g/t Au. The company intends to collect a 12-tonne bulk sample.					
2	31N14, 32C03	Vauquelin	Richmont Mines	Simon (East and West)	Au	Cg, G
3	32B13	Barry	Golden Valley Mines	Lac Barry	Au	D (8:999)
	Project description: Drill holes intersected a silicified, pyritic and biotite-rich shear zone. In the core of the shear zone, drill hole GLBO-13-01 intersected 3.7 m at 0.177 g/t Au, including an interval of 0.49 m at 0.734 g/t Au. The same drill hole also cut a quartz-carbonate vein with grades of 0.176 g/t Au, 14.5 g/t Ag, 2.21% Cu and 718 ppm Zn over 0.11 m.					
4	32B13, 32G04	Bailly, Barry	BonTerra Resources	Eastern Extension	Au	D (3:x)
	Project description: Following a drilling program totalling 12,543 m in 2011, an initial resource estimate was completed over the Eastern Extension property in 2012. Using a cut-off grade of 1.0 g/t Au, inferred resources were estimated to be 4,337,000 t at 3.53 g/t Au (492,000 ounces). Mineralization consists of smokey quartz veins with sulphides (pyrite, pyrrhotite and chalcopyrite) in altered rocks (silica, carbonate, chlorite, tourmaline and sericite). In 2013, holes were drilled on the Peninsula Zone.					
5	32B13, 32G04	Barry, Urban	Metanor Resources	Mine Barry	Au	D (x:15 000)
6	32C01	Pétain, Esperey	Les Investissements Pierre et Mica	Lac Néron	REE, industrial minerals, Au, Ni, Cr, Ag	S,T
7	32C02	Tavernier	Woden Venture Capital Corporation / Exploration Aurtois	Stella	Au	Cg
8	32C02	Tavernier, Pershing	Monarques Resources / X-Ore Resources	Lac Tavernier	Au-Zn-Pb-Cu-Ag	Cg
9	32C03	Louvicourt	Alexandria Minerals Corporation	Sleepy	Au	D (9:x)
	Project description: A drilling program targeted the extensions of the Sleepy Zone and succeeded in extending mineralization to the west and at depth. Drill hole SAX-13-025 intersected two gold-bearing intervals in the Sleepy Zone: 20.0 m at 3.82 g/t Au and 3.83 g/t Ag and 4.0 m at 6.92 g/t Au and 10.98 g/t Ag. Inferred resources of 1.6 Mt at 3.0 g/t Au (150,400 ounces of gold) were estimated in 2009.					
10	*32C03*	*Louvicourt*	*Richmont Mines*	*Monique*	*Au*	*B(8494:2,76), D (13:1623), RRE, T,TE*
	Project description: A bulk sample of 8,494 t collected from the Monique pit yielded 717 ounces of gold at a grade of 2.76 g/t Au. Proven and probable reserves are 485,737 t at 2.29 g/t Au (36,698 ounces of gold) for the G and J zones. Indicated resources, which lie outside the reserves, are 107,531 t at 4.88 g/t Au (16,858 ounces of gold). Commercial production started on October 1, 2013, and the estimated mine life is 19 months. Mineralization consists of a stockwork of quartz-carbonate-tourmaline veins in altered sulphide-bearing rocks.					
11	32C03	Pershing, Vauquelin, Tiblemont, Tavernier	Monarques Resources / X-Ore Resources	Bel-Rive	Au	Cg
12	32C03	Tavernier, Tiblemont	Globex Mining Entreprises	Tavernier-Tiblemont	Au	D (10:1700+), GpEm(A), GpMa(A), G, Pr
	Project description: A drilling program tested the gold-bearing shear zone on the Tiblemont-Tavernier property. Drill hole TIB-13-13 intersected gold-bearing quartz veins with grades of up to 4.78 g/t Au over 8.8 m.					
13	32C03	Vauquelin	Plato Gold Corporation / Monarques Resources	Plator I (Horseshoe)	Au	Cg
14	32C03	Vauquelin	Plato Gold Corporation / Monarques Resources	Plator II (Hop O' My Thomb)	Au	Gg
15	32C03	Vauquelin	Cartier Resources / Blue Note Mining / Critical Elements Corporation	Chimo	Au	Cg
16	32C03	Vauquelin	Cartier Resources / Blue Note Mining / Critical Elements Corporation	Nova	Au	Cg
17	32C03	Vauquelin	Richmont Mines	Chimo	Au	Cg, G
18	32C03	Vauquelin	Plato Gold Corporation / Monarques Resources	Plator III (Vauquelin I)	Au	Cg
19	32C03	Vauquelin	Plato Gold Corporation / Monarques Resources	Plator IV (Vauquelin II)	Au	Cg

TABLE 4.4 - **Exploration projects in the Abitibi-Témiscamingue administrative region in 2013[1] (see figures 4.4, 4.5 and 4.6).**

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
20	32C03	Vauquelin	Ditem Exploration / Chan Lai Lai	Bruell	Au	Pg, S
21	32C03	Vauquelin, Louvicourt	Monarques Resources / Galahad Metals	Regcourt Gold	Au	CG
22	32C03, 04	Pascalis, Louvicourt	Adventure Gold	Val-d'Or Est (Pascalis-Colombière, Senore, Beaufor Nord)	Au	D (x:x), PEA, RRE, TE
	Project description: The data from a drilling program near the former Lucien Béliveau gold mine was used to update the inferred resources for three of the gold deposits: New Béliveau, Highway and North. For the portion that is amenable to open pit mining, the inferred resources were estimated to be 4.34 Mt at 2.38 g/t Au (330,000 ounces of gold, using a cut-off grade of 0.69 g/t Au). Below the optimized pit shell, inferred resources amount to 3.91 Mt at 3.13 g/t Au (390,000 ounces of gold, using a cut-off grade of 1.5 g/t Au). Mineralization is characterized by disseminated pyrite in quartz-tourmaline veins cutting strongly altered rocks.					
23	32C03	Vauquelin, Pershing	Plato Gold Corporation / Monarques Resources	Plator V (Vauquelin Pershing)	Au	Cg
24	32C03, 06	Tiblemont, Tavernier	Adventure Gold	Mégiscane-Tavernier	Au	Pr, S
25	*32C04*	*Bourlamaque*	*QMX Gold Corporation*	*Lac Herbin Mine*	*Au*	*D(x:10 971), RRE*
	Project description: On July 16, 2013, QMX Gold announced it was suspending development projects and ceasing exploration expenditures at the Lac Herbin mine. Mineralized lenses above level 42 will be mined until the third quarter of 2014. During the third quarter of 2013, 10,000 tonnes of ore from the McGarry mine (Armistice Resources), located near Kirkland Lake in Ontario, were custom milled at the Lac Herbin mill.					
26	32C04	Bourlamaque	Integra Gold Corporation	Lamaque	Au	D (72:29 000), ES, MT, PEA, RRE, T, TE
	Project description: A new resource estimate was completed for the No. 4 Plug, Forestel, Parallel and Triangle zones. Using a cut-off grade of 3 g/t Au, inferred resources are now 738,000 t at 11.3 g/t Au (268,870 ounces of gold) and indicated resources amount to 2.84 Mt at 7.2 g/t Au (661,290 ounces of gold). A preliminary economic assessment is underway. In November, the company announced it had intersected the extensions of the gold-bearing shear zones in the Triangle Zone, in volcanic rocks adjacent to the diorite intrusion. The best grades included 13.29 g/t Au over 7.0 m (drill hole TMS-13-07). Other drill holes intersected the depth extension of gold-bearing veins in the No. 3 mine of the Lamaque mine.					
27	32C04	Bourlamaque	Monarques Resources / X-Ore Resources	Tex-sol	Au	Cg
28	32C04	Bourlamaque	Globex Mining Entreprises	Sigma East	Au	D (6:x)
29	*32C04*	*Dubuisson*	*Wesdome Gold Mines*	*Kiena Complex*	*Au*	*D (x:x), Mine closed on june 30th 2013.*
	Project description: A drilling program targeting the S-50 Deep Zone about 300 metres below the mine's deepest level (1,000 metres) intersected a series of gold-bearing structures to the southeast of the mine. Drill hole U-5445 intersected 10.59 g/t Au over 5.1 m. The S-50 Zone is characterized by a vein–breccia–albitized dyke complex near basaltic and komatiitic lavas. Faced with lower recovery grades and a declining gold price in the winter of 2013, the company announced on March 27, 2013, that mining operations would be suspended at the Kiena mine on June 30, 2013. The mine was then placed in care and maintenance mode with reduced staff.					
30	**32C04**	**Dubuisson**	**Agnico Eagle Mines**	**Goldex**	**Au-Ag**	**D (x:x, RRE), TE**
	Project description: The company stopped commercial production from the GEZ Zone on October 19, 2011. The positive results of a preliminary economic assessment study on the M and E satellite zones were announced in July 2012. Mining operations commenced in September 2013. The anticipated production rate is 5,100 t/d at an average grade of 1.5 g/t Au. Proven and probable reserves in the M Zone amount to 3.619 Mt at 1.62 g/t Au (189,000 ounces of gold). Probable reserves in the E Zone amount to 2.910 Mt at 1.43 g/t Au (134,000 ounces of gold). The estimated mine life is 4 years. Technical studies are underway for other satellite zones.					
31	32C04	Dubuisson	Harricana River Mining Corporation	Belvédère	Au	D (1:x)
32	32C04	Dubuisson	Wesdome Gold Mines	Presqu'île Zone	Au	S (16:x)
	Project description: A drilling program was completed on the Presqu'île Zone, located 1.4 km northwest of the Kiena mine, along a segment of the Norbenite-Marbenite Fault. The drill holes intersected gold mineralization consisting of quartz-carbonate-chlorite-pyrite-chalcopyrite veins with small amounts of sphalerite, galena and visible gold. These veins are hosted in mafic volcanics, at their contact with komatiite flows. The best results include 30.39 g/t Au over 3.0 m (drill hole S744) and 5.04 g/t Au over 6.8 m (drill hole S739).					
33	32C04	Louvicourt	Globex Mining Entreprises	Beacon No.1	Au	D (3:x)
	Project description: A drilling program extended the known dimensions of gold-bearing quartz-tourmaline-pyrite veins previously encountered in drill holes on the Bourlamaque Batholith in 2011. Drill hole BEAC 12-02 intersected 13.4 g/t Au over 2.0 m at a distance of 50 m to the west of the first drill hole, BEAC 11-01.					
34	32C04	Dubuisson, Vassan	Alexandria Minerals Corporation/ NioGold Mining Corporation / Harricana River Mining Corporation	Siscoe East	Au	Cg, D (x:475)

TABLE 4.4 - **Exploration projects in the Abitibi-Témiscamingue administrative region in 2013[1] (see figures 4.4, 4.5 and 4.6).**

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
35	32C04	Louvicourt	Eloro Resources / Monarques Resources	Simkar	Au	Cg, D (20:8000), RRE
	Project description: At the former Louvicourt Goldfields gold mine, a new resource estimate was completed using 590 surface and underground drill holes. Based on a cut-off grade of 3.0 g/t Au, the measured and indicated resources total 110,140 t at 5.54 g/t Au (18,265 ounces of gold) and the inferred resources total 321,210 t at 4.76 g/t Au (57,325 ounces of gold). Mineralization generally consists of quartz tension veins cutting a diorite intrusion or a series of diorite intrusions.					
36	32C04	Louvicourt, Bourlamaque	Alexandria Minerals Corporation	Valdora	Au-Ag-Cu	D (24:x:)
37	32C04	Louvicourt, Bourlamaque	Alexandria Minerals Corporation	Akasaba	Au-Ag-Cu	D (13:7465), RRE
	Project description: Following a major drilling program, a new resource estimate was published in February 2013. Inferred resources for the Akasaba West Zone increased considerably and now stand at 14.86 Mt grading 0.69 g/t Au (332,074 ounces of gold) and 0.41% Cu. The Akasaba West Zone occurs 1,600 m west of the Akasaba Zone, in the same horizon that hosts the former Akasaba mine. It consists of deformed and altered intermediate to felsic volcanics containing pyrite-chalcopyrite-bornite. In November, the company announced that two drill holes had intersected the depth extension of the West Zone, it contains quartz-molybdenite veins. Drill hole IAX-13-238 intersected 0.37 g/t Au, 0.83 g/t Ag, 0.23% Cu and 94.44 ppm Mo over 112.8 m.					
38	*32C04*	*Pascalis*	*Richmont Mines*	*Beaufor Mine*	*Au-Ag*	*B (7700:5,3), D (x: 29 000), RRE*
	Project description: In November 2011, the company began constructing a ramp to access the gold-bearing W Zone located near the mine at shallow depth. In 2013, a 7,700-tonne bulk sample from the W Zone produced 1315 ounces of gold at a recovery grade of 5.30 g/t Au. Probable reserves were established at 132,251 t grading 7.21 g/t Au (30,680 ounces of gold). The start of commercial production was announced on October 1, 2013. The estimated production for 2014 from the W Zone is 14,000 ounces. Gold mineralization consists of quartz-tourmaline-pyrite veins.					
39	32C04, 05	Senneville, Fiedmont, Pascalis	Ressources TSR / Garden Island Mines	Garden Island	Au	D (21:x), T
40	32C04, 32D01	Malartic, Fournière, Dubuisson, Vassan	NioGold Mining Corporation	Marban Block	Au	D (34:12 212), RRE
	Project description: A new resource estimate was completed for the Marban deposit. Using a cut-off grade of 0.35 g/t Au, the open pit measured and indicated resources total 24.6 Mt at 1.31 g/t Au (1,035,000 ounces) and inferred resources total 10.9 Mt at 0.81 g/t Au (284,000 ounces). Using a cut-off grade of 2.0 g/t Au, the measured and indicated resources outside the pit shell amount to 656,000 t at 3.73 g/t Au (79,000 ounces) and inferred resources amount to 578,000 t at 3.79 g/t Au (68,000 ounces). Holes drilled in 2011 on the former Malartic Hygrade mine were resampled. Drill hole RG -11-004 intersected 3.98 g/t Au over 7.2 m in the No. 2 Zone.					
41	32C05	Barraute, Fiedmont	Threegold Resources / Diagnos	Marcotte	Au	TE
42	32C05	Courville, Carpentier	Golden Valley Mines	Perestroika West	Au	D (4:573)
	Project description: Drill holes intersected a sequence of altered and deformed intermediate volcanics, injected by intermediate to felsic intrusions, within the Uniacke deformation corridor. Mineralization consists of quartz-carbonate veins. The best grade is 0.731 g/t Au over 0.12 m (drill hole GPSO-13-01).					
43	32C05	Fiedmont	Abcourt Mines	Vendôme	Base Metals	RRE
	Project description: Following a drilling program in 2013, the company undertook a new resource estimate for the three massive volcanogenic sulphide deposits on the property: Vendôme, Barvallée and Belfort. Measured and indicated resources total 712,332 t at 7.50% Zn, 0.63% Cu, 60.11 g/t Ag and 1.23 g/t Au, whereas inferred resources amount to 305,769 t at 4.30% Zn, 0.49% Cu, 36.77 g/t Ag and 0.99 g/t Au. Sulphide-rich mineralization occurs in a felsic sequence composed primarily of rhyolite and dacite flows intercalated with volcaniclastic horizons.					
44	**32C05**	**La Corne**	**Québec Lithium inc. / Sirocco Mining**	**Québec Lithium**	**Li**	**TE**
	Project description: Startup and initial production took place in 2013. On June 20, the company announced that the first samples of lithium carbonate had been produced. Samples of battery-quality lithium carbonate were shipped to China, Korea and Japan. On August 12, activities at the processing plant were interrupted for the maintenance and upgrading of certain circuits. The processing plant started up again on September 16. On November 18, 2013, the company announced its first continuous lithium carbonate production. On December 4, Québec Lithium and Sirocco Mining announced that a business combination agreement had been reached between their companies. Recall that in 2012, measured and indicated resources amounted to 33.24 Mt at 1.19% Li_2O and inferred resources totalled 13.76 Mt at 1.21% Li_2O, using a cut-off grade of 0.80% Li_2O.					
45	32C05	Lacorne, Fiedmont	Jourdan Resources / ElanOre Resources	Vallée Lithium	Li, REE	Cg
46	32C05, 06	Courville, Fiedmont, Carpentier	Pershimco Resources / Osisko Mining Corporation	Courville	Au -Tonalite	D (8:1550)
47	32C06	Courville	Monarques Resources / X-Ore Resources	Belcourt	Au	Cg
48	32C07	Tiblemont, Senneterre	Globex Mining Entreprises	Smith-Zulapa	Au	D (4:1465)
49	32C11	Carpentier	Hinterland Metals	Mozart	Au	GpEm(A), GpMa(A), Pr, S, T, TE
50	32C11	Rochebeaucourt	Threegold Resources / Diagnos	Charlemagne	Au	TE

TABLE 4.4 - **Exploration projects in the Abitibi-Témiscamingue administrative region in 2013[1] (see figures 4.4, 4.5 and 4.6).**

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
51	32C12	Barraute	Abcourt Mines	Abcourt-Barvue	Ag-Zn	D (4:1000), RRE
52	32C12	Barraute	Threegold Resources / Diagnos	Barraute	Au	TE
53	32C12	Duverny	Tres-Or Resources / Aurizon Mines / Hecla Québec / Globex Mining Entreprises / Merrex Gold	Fontana	Au	D (18:5721), GpMa(G), TE
54	32C12	Duverny	Threegold Resources / Diagnos	Rousseau Est	Au	TE
55	32C12	Duverny, La Morandière	Threegold Resources / Bowmore Exploration / Diagnos	Standard Gold	Au	TE
56	32C15	Tonnancour, Josselin, Holmes	Globex Mining Entreprises	Tonnancour	Base Metals	TE, GpEm(A), GpMa(A,G), Pr, G, S (6:x)
57	*32D01*	*Fournière*	*Osisko Mining Corporation*	*Canadian Malartic - Barnat South*	*Au*	*RRE*
	Project description: In 2011, a new reserve and resource estimate was published for the Canadian Malartic and Barnat South deposits. Using a cut-off grade of 0.31 g/t Au for Barnat South and 0.34 g/t Au for Canadian Malartic, the proven and probable reserves total 298.6 Mt at 1.03 g/t Au (9.86 million ounces of gold), and inferred resources amount to 30.5 Mt at 0.81 g/t Au (790, 000 ounces of gold). Commercial production at the mine began on May 19, 2011. On November 21, 2013, the company announced that the Canadian Malartic mine had recently produced its millionth ounce of gold.					
58	32D01	Fournière	Osisko Mining Corporation / Abitibi Royalties	Malartic CHL, Jeffrey Zone	Au	RRE (12-31-12), PEA, D (31:5660)
	Project description: A new resource estimate was completed for the Jeffrey Zone. Proven and probable reserves total 3,395,200 t at 0.73 g/t Au (79,249 ounces of gold). Measured and indicated resources amount to 5,269,000 t at 0.65 g/t Au (110,696 ounces of gold), and inferred resources total 376,200 t at 0.90 g/t Au (10,892 ounces of gold). The Jeffrey gold zone, located at the southern boundary of the Cadillac Tectonic Zone, consists of disseminated pyrite in quartzo-feldspathic porphyry dykes with potassic alteration, primarily in contact with ultramafic lavas and, to a lesser extent, sedimentary rocks and gabbro-diorite intrusions. Exploration holes were drilled on other zones and targets of the Malartic CHL property (ex: Geo Zone, 0.94 g/t au over 19.7 m in drill hole CHL12-2434). A preliminary economic assessment was also completed.					
59	32D01	Fournière	Abitibi Royalties / Osisko Mining Corporation	Gouldie	Au	RRE (31-12-12)
	Project description: The Gouldie gold deposit lies to the south of the nearby Canadian Malartic deposit, currently in operation. It contains proven and probable reserves of 1,167,100 t at 0.92 g/t Au (34,472 ounces of gold). Measured and indicated resources amount to 5,506,500 t at 0.99 g/t Au (175,631 ounces of gold) and inferred resources stand at 857,800 t at 0.83 g/t Au (22,935 ounces of gold).					
60	32D01	Fournière	Osisko Mining Corporation / Abitibi Royalties	Mammoth/Barnat Zone	Au	RRE (31-12-12)
	Project description: A new reserve and resource estimate was published for the Mammoth/Barnat Zone. Proven and probable reserves total 2,014,600 t at 0.94 g/t Au (60,647 ounces of gold). Measured and indicated resources total 2,071,600 t at 0.80 g/t Au (53,097 ounces of gold), and inferred resources total 1,433,700 t at 1.06 g/t Au (48,965 ounces of gold). The Mammoth/Barnat Zone lies to the south of the Cadillac Fault, in Pontiac sedimentary rocks. The host rocks are porphyry intrusions and silicified metasedimentary rocks. A preliminary economic assessment was also completed.					
61	32D01	Fournière	NSR Resources	Rand Malartic	Au	D (19:x)
62	32D01	Malartic	Osisko Mining Corporation	East-Amphi	Au	D (3:1005)
63	32D01	Malartic	Midland Exploration / Arianne Resources	Héva East	Au	Cg
64	32D01	Malartic, Fournière	NioGold Mining Corporation	Malartic Block	Au	Cg, D(21:x), S
65	**32D08**	**La Motte**	**Glen Eagle Resources / Globex Mining Entreprises**	**Authier Lithium**	**Li**	**PEA**
	Project description: Following the 2010-2012 drilling program, a resource estimate was completed for the property. Using a cut-off grade of 0.5% Li_2O, measured and indicated resources amount to 7.387 Mt at 0.97% Li_2O and inferred resources total 572,000 t at 0.98% Li_2O. Among the best drill results from the 2012 holes that intersected the spodumene pegmatite was 25.5 m at a grade of 1.2% Li_2O including an interval of 6.0 m at 1.67% Li_2O (drill hole AL-12-20). A preliminary economic assessment study was filed in March 2013. The open pit scenario establishes a mine life of 10 years and a production rate of 2,200 t/d.					
66	32D09	Dalquier	Abcourt Mines	Jonpol	Base Metals	D (1:174)
67	32D09	Dalquier	Threegold Resources / Diagnos	Rousseau West	Au	TE
68	32D09	Dalquier	Threegold Resources / Diagnos	Dalquier	Au	TE
69	32D09	Dalquier, Béarn	Threegold Resources / Diagnos	Collines Béarn	Au	TE
Western part of region 08: Rouyn-Noranda – La Sarre – Témiscamingue area						
70	31L15, 16	Villedieu	Matamec Explorations	Zeus	REE-Nb	E
	Project description: On April 25, 2013, the company published the assay results for samples collected at newly discovered showings on the property. Sample DM023 collected from the Certitude Nord showing yielded 7.462% TREO. At the Makwa showing, sample JR0025 assayed 11.052% TREO, and sample JR0039 from the Pakwa showing assayed 9.970% TREO.					

TABLE 4.4 - **Exploration projects in the Abitibi-Témiscamingue administrative region in 2013[1] (see figures 4.4, 4.5 and 4.6).**

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
71	31L15, 16	Villedieu	Matamec Explorations / Toyotsu Rare Earth Canada	Kipawa	REE-Nb	ES, FS, MT, RRE, TE
	Project description: On September 4, 2013, the partners announced the positive results of a feasibility study for their project. The studied open pit scenario envisions a production rate of 3,650 tonnes per day and a mine life of 15.2 years. Proven and probable reserves amount to 19.769 Mt grading 0.4105% TREO (including yttrium).					
72	31L16	Villedieu	Globex Mining Enterprises	Turner Falls	REE-Y	D (18:871), G, Pr, S
73	31L16	Villedieu	Fieldex Exploration	Lac Sairs Kipawa	REE-Nb-Zr-Y	G, Pr
74	31M02	Bellefeuille, Lanoue	R. J. Tremblay (3421856 Canada)	Bellefeuille-Lanoue	PGE	Pr
75	31M07	Guillet	9285-4116 Gc (Granico)	Claims Gilles Rondeau	Diamonds	S
76	31M07	Guillet	Les Mines J.A.G.	Belleterre	Au	GpGr(G), Pr, S, T
77	31M15	Basserode	D. Desrosiers	Basserode	Au	T
78	32D01	Cadillac	Renforth Resources	New Alger	Au	G, Pr, S
	Project description: Prospecting work in the summer of 2013 defined a quartz vein system with a strike length of 250 m. Channel samples yielded up to 3.11 g/t Au over 0.6 m.					
79	*32D01*	*Cadillac*	*Agnico Eagle Mines*	*Lapa Mine*	*Au*	*D (x:x)*
	Project description: Exploration work was carried out on Zone 8 in the Zulapa area, about 150 m from the Lapa mine deposits and parallel to the latter. In 2014, the company intends to develop Zone 7, also in the Zulapa area, as well as Zone 100. According to the company, this work could prolong the life of the mine beyond 2016.					
80	32D01	Cadillac	Globex Mining Entreprises / Osisko Mining Corporation	Wood-Pandora	Au	D (18:11 414)
	Project description: During the fall of 2013, the partners published the results of the drilling program announced in June. Drill hole W -13-17 intersected an interval of 11.8 m grading 15.1 g/t Au, including a section of 3.30 m grading 47.8 g/t Au.					
81	32D01	Cadillac	Midland Exploration / Agnico Eagle Mines	Maritime-Cadillac	Au	D (6:2373)
	Project description: The partners drilled five underground holes from an exploration drift at a depth of 1,000 m in the Lapa mine, and one hole from surface. The holes targeted the West Dyke Zone and V4 West Zone. Drill hole 141-13-35 intersected 1.5 g/t Au over 18.9 m, including an interval of 12.9 m at 1.85 g/t Au.					
82	32D01	Cadillac	Radisson Mining Resources	O'Brien-Kewagama	Au	D (x:x), RRE
	Project description: In April, the company announced the results of holes drilled in 2012. Drill hole OB 12-21 intersected intervals of 4.21 g/t Au over 0.80 m and 3.52 g/t Au over 1.00 m. In November, the company published a new resource estimate. Indicated resources are estimated to be 508,023 Mt at 5.91 g/t Au and inferred resources amount to 287,577 Mt at 6.53 g/t Au.					
83	32D02	Bousquet	IAMGOLD Corporation	Bousquet-Odino	Au	Cg, D (11:1476), MT, RRE
84	32D02	Joannes	IAMGOLD Corporation	Joannes-West	Au	Cg
85	32D02	Rouyn	IAMGOLD Corporation	Rouyn-Merger	Au	Cg
86	**32D01, 02, 07, 08**	**Bousquet**	**IAMGOLD Corporation**	**Westwood**	**Au**	**D (x:x)**
	Project description: At the end of the first quarter in 2013, the mill at the former Doyon mine began processing ore from last mining operations at the Mouska mine in 2012 and 2013. During the second quarter, the mill generated 39,000 ounces of gold from both Mouska ore and preproduction ore from the Westwood mine. The company's production target is 130,000 to 150,000 ounces of gold in 2013.					
87	32D02	Joannes	Hecla Québec / Aurizon Mines	Heva-Hosco	Au	D (28:1018), MT, RRE
88	32D02, 03	Rouyn	Gold Bullion Development Corporation	Granada Mine	Au	PEA, PFS, RRE, S, T, TE
	Project description: During the summer, the company excavated four trenches and four other small pits to test, at surface, the mineralization previously encountered in drill holes. Metallurgical tests were also completed over the course of the year. The results of a prefeasibility study were expected in the fourth quarter of 2013.					
89	*32D03*	*Beauchastel*	*Richmont Mines*	*Francoeur*	*Au*	*Dismantling, MSR*
90	32D03	Beauchastel	Richmont Mines	Globex Option	Au	Cg
91	32D03	Beauchastel	Richmont Mines	Wasamac	Au	MSR, MT, TE
92	32D03	Rouyn	Falco Pacific Resources Group	Horne 5	Au-Ag-Cu-Zn	Cg, RRE, TE
	Project description: In May 2013, the company performed 3D modelling of historical data from the work carried out by Noranda between 1931 and 1976, comprising more than 9,000 drill holes, 370 level plans, and 99 longitudinal sections. In December, the company announced that in addition to the progress on its compilation work, a new resource estimate had been completed and would be published in the first quarter of 2014.					

TABLE 4.4 - **Exploration projects in the Abitibi-Témiscamingue administrative region in 2013[1] (see figures 4.4, 4.5 and 4.6).**

No.	NTS	TOWNSHIPS	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
93	32D02, 03	Beauchastel, Rouyn	Yorbeau Resources	Rouyn	Au	D (20:5777), GpMa(G),T
	Project description: In May, Gold Fields Sudbury Exploration Corporation acquired a 51% interest in the Rouyn property. Several months later, a two-phase exploration program was announced. The first phase consisted of 11,000 m of drilling on the Cinderella, Augmitto, Lac Gamble and Astoria blocks. In October, the partners announced that the stripping program and extension of trench 4 on the Augmitto block was complete. Two main types of gold were observed: gold associated with silicified carbonate rocks containing fuchsite and breccias (ultramafic rocks of the Piché Group), and gold associated with silicified metasedimentary rocks and veins found structurally below the Piché Group.					
94	32D03, 04	Dufay, Dasserat	Semeco	Border	Au-Ag-Cu	Pr, S
95	32D03	Beauchastel	Abcourt Mines	Aldermac	Au	D (x:x)
96	**32D06**	**Beauchastel**	**Abcourt Mines**	**Elder Mine**	**Au**	**D (21:2106)**
	Project description: During the summer, the company signed an agreement with Aurbec (a subsidiary of Maudore Minerals) to process ore from the Elder mine at the Sleeping Giant mill, north of Amos. In July, the results of 18 definition drill holes were published; drill hole E13-60 intersected an interval of 2.03 m at 55.37 g/t Au, including 1.53 m at 68.00 g/t Au. On October 23, 2013, the company announced that the first gold bar had been poured at the Sleeping Giant mine. Between May and September, 17,000 t of ore were extracted during preproduction work.					
97	32D06	Dasserat	Rocmec Mining	Rocmec 1	Au	Gc, Gp
98	32D06	Dasserat	Richmont Mines	Lac Labyrinthe	Au	G
99	32D03	Dasserat	Richmont Mines	Guinared-Massia	Au	Cg, G
100	32D06	Dasserat	Richmont Mines	Lac Boissier	Au	G
101	32D03	Dasserat	Richmont Mines	Lac Fortune	Au	Cg
102	32D03	Dasserat	Richmont Mines	Arncoeur	Au	G
103	32D03	Dasserat	Vantex Resources	Galloway	Au	D (x:x), MT
	Project description: In June, the company announced that it had carried out laboratory leaching tests on ore from the Hurd showing. The company drilled several holes on the Moriss Zone. These holes targeted, among other things, the western extensions of this zone. Drill hole VM13-07 yielded 2.11 g/t Au over 5.55 m, including an interval of 3.45 m at 2.94 g/t Au..					
104	32D06	Duprat	Falco Pacific Resource Group	Flavrian	Au	D (7:2051)
105	32D05, 06	Hébecourt, Montbray	Golden Bridge Mining Corporation / Northern Skye Resources	Hébecourt	Au-Ag-Cu-Zn	D (4:900), G, Gp, GpEm, S
106	32D06	Duprat	Falco Pacific Resource Group / Druk Capital Partners / QMX Gold Corporation	Rivière Mouilleuse	Au-Ag-Cu-Zn	GpEm
107	32D06	Montbray	Falco Pacific Resource Group / Druk Capital Partners	Lac Montbray-Four Corners	Au-Ag-Cu-Zn	GpEm
108	32D07	Aiguebelle, Clericy, Destor	Typhoon Exploration / Hecla Québec / Aurizon Mines	Fayolle	Au-Ag	G, GpMa(G), Gs, Gs(G), MT, PEA, Pg, Pr,S,T
	Project description: In April, the partners announced the positive results of a preliminary economic assessment study. The scenario is for an open pit mine producing 568,941 t of ore at 4.35 g/t Au (74,813 ounces of gold) over a period of 3 years at a production rate of 1,000 t/d. In addition, part of the deposit will be mined by a ramp at a rate of 750 t/d over a period of 27 months. The result will be 449,426 t of ore processed at a grade of 4.73 g/t Au, yielding 64,195 ounces of gold. The partners intend to excavate a trench over the Paré Zone, located 500 m south of the Fayolle deposit. Channel samples collected from the Cinco Zone, located 2 km east of the deposit Fayolle, yielded up to 0.78 g/t Au over 13.70 m including an interval of 1.8 m at 3.69 g/t Au.					
109	32D07	Aiguebelle, Destor	Typhoon Exploration / Axe Exploration	Destorbelle	Au	Pg, Pr
110	32D07	Cléricy, La Pause	Typhoon Exploration	Faille 1	Au	Pg, Pr
111	32D07	La Pause	Axe Exploration	Gold Peak	Au	GpEm(G, GpMa(G),)Pr, S
112	32D07	Cléricy	Falco Pacific Resource Group	Lac Hervé	Au-Cu-Zn	GpEm
113	32D07	Dufresnoy	Falco Pacific Resource Group	Dufresnor	Au-Cu-Zn	D (1:600), GpEm(B)
114	32D07	La Pause, Cléricy	Midland Exploration /Teck Resources	Patris	Au	GpEm(G), Gs(G), Pr, S,T
	Project description: In October, the partners announced it was conducting trenching and prospecting work on the Rosie showing, discovered during the summer of 2013, where a grab sample assayed 15.5 g/t Au. The showing is associated with a network of quartz-pyrite veinlets hosted in a strongly ankeritized felsic dyke.					
115	*32D08*	*Cadillac*	*Agnico Eagle Mines*	*LaRonde Extension*	*Cu-Zn-Au-Ag-Pb*	*S (x:x)*
	Project description: The company's exploration work in 2013 focused on converting resources into reserves and on investigating the LaRonde horizon at depth.					

TABLE 4.4 - **Exploration projects in the Abitibi-Témiscamingue administrative region in 2013[1] (see figures 4.4, 4.5 and 4.6).**						
No.	**NTS**	**TOWNSHIPS**	**COMPANIES / PROSPECTORS**	**PROJECTS**	**COMMODITIES**	**EXPLORATION WORK**
116	**32D09**	**Launay, Trécesson**	**Royal Nickel Corporation**	**Dumont Nickel**	**Ni-PGE**	**Cg, D (17:4728), FS, G, GpEm(B), GpEm(G)**
	Project description: On June 17, 2013, the company announced the positive results of a feasibility study. The scenario envisions an initial production rate of 73 Mlbs of Ni per year, increasing to an annual average of 113 Mlbs in the 5th year until the end of the 20-year mine life. Proven and probable reserves stand at 1.178 billion tonnes at a grade of 0.27% Ni, 107 ppm Co, 0.019 g/t Pd and 0.009 g/t Pt.					
117	32D09	Trécesson	Knick Exploration / Les Explorations Carat	Trecesson Gold	Au-W	GpEm(G), Pr, S, T
	Project description: In the Chib-Kayrand area, following stripping work to expose the N°. 9 veins, grab samples yielded 0.64%, 0.63% and 0.55% WO_3. In the same area, stripping work explored the N°. 6 vein, uncovering anomalous values, including 0.15 m at 18.00 g/t Au. A stripping on the N°. 1 vein produced grab samples grading 14.89 g/t Au and 12.58 g/t Au. In November, the company obtained a grade of 3.2% WO_3 for a sample that had been collected from the Scheelite vein area in 2012 and had previously assayed 51 g/t.					
118	32D10	Launay	Melkior Resources / Beaufield Resources	Launay	Au	D (x:x), GpEm(B),MT, S
	Project description: Preliminary metallurgical tests were carried out on a sample collected from holes drilled on Zone 75. After processing, the recovery rate for the sample, with an average grade of 3.26 g/t Au, was 87%. In May, the company announced the results for grab samples collected from parallel zones 75A and 75B. Samples Grab-6 and Grab-13 respectively yielded 7.44 g/t Au and 4.90 g/t Au.					
119	32D10, 11	Poularies, Destor	Globex Mining Enterprises	Lyndhurst	Au	D (5:1650), G, Gp
120	32D11	Duparquet	Clifton Star Resources	Duparquet	Au	B (12:1.83), D (39:x), ES, MT, PEA, PFS, RRE, S
	Project description: In 2013, 39 holes were drilled on the property. Drill hole BD13-22 intersected an interval of 34.0 m at 5.64 g/t Au including 11.7 m at 8.36 g/t Au. Pilot plant metallurgical tests were carried out in the months of March and August 2013. The grade of the resulting concentrate was 26.8 g/t Au and the recovery rate was 91.7%. In June, the company announced a new resource estimate. The deposit contains measured resources of 184,700 t at 1.52 g/t Au, indicated resources of 60,696 Mt at 1.59 g/t Au, and inferred resources of 29,684 Mt at 1.51 g/t Au. Clifton Star also commenced a prefeasibility study on the Duparquet project.					
121	32D11	Destor	IAMGOLD Corporation	Lépine	Au	D (12:3203), G
122	32D11	Duparquet, Hébecourt	Explor Resources	East Bay	Au	D (x:1500)
123	32D11	Hébercourt	IAMGOLD Corporation	Porcupine	Au	D (6:3073), G

1 - See legend of abreviations and the meaning of bold and italic types in Appendix 2.

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
Outaouais administrative region (07)						
1	31G12	Grenville	Anglo Canadian Mining	Windsor	Graphite	Cg
	Project description: In 2013, Anglo Canadian Mining acquired claims to form the Windsor project. The property is located near the municipality of L'Ange-Gardien, in an area where several graphite deposits have been documented in the past.					
2	31G11	Grenville	Galaxy Graphite	Buckingham	Graphite	S, G, GPMa(G), GPEm(G)
	Project description: The Buckingham project is located approximately 2 km west of the town of the same name. The project hosts the Sainte-Marie artisanal mine from which roughly fifty tonnes of graphite were extracted. The company carried out geological mapping on the property, as well as a ground-based magnetic and electromagnetic survey. Forty-eight surface bedrock samples were also collected, yielding values up to 11.5% graphite.					
3	31G11	Grenville	Shield Gold	Bell	Graphite	GpEm(A), GpMa(A), GpRa(A)
	Project description: In 2012, Shield Gold acquired the claims for the Bell project. The property is located 6 km east of the town of Buckingham, along the shore of the St. Lawrence River. The company carried out airborne electromagnetic, magnetometric and radiometric surveys. It also performed ground-based exploration activities, including a geophysical survey using Beep-Mat equipment to detect conductivity and magnetic susceptibility responses.					
4	31G11	Grenville	Canada Carbon	Walker	Graphite	Cg
	Project description: In 2013, Canada Carbon acquired the claims of the Walker project. The property, located 8 km northwest of the municipality of Buckingham, hosts the former Walker graphite mine where more than 400 tonnes of graphite were mined intermittently from 1876 to 1906.					
5	31G12	Grenville	Caribou King Resources	Buckingham	Graphite	Cg, GpEm(G), Pr
	Project description: In late 2012, Caribou King Resources acquired the claims of the Buckingham project. The property, located 9 km northwest of the municipality of Buckingham, is near the former Walker graphite mine which was mined intermittently from 1876 to 1906. The company carried out basic prospecting activities, including a geophysical survey using Beep-Mat equipment to detect conductivity and magnetic susceptibility responses.					
6	31G11, 12	Grenville	Cavan Ventures	Buckingham	Graphite	S, GpEm(G)
	Project description: The project is located 10 km north of Buckingham just north of the former Walker graphite mine, where more than 400 tonnes of graphite were mined intermittently from 1876 to 1906. The company performed a ground-based geophysical survey using a Beep-Mat conductivity and magnetic susceptibility detector to follow a conductive horizon over more than a kilometre. The 14 samples collected along this conductor contained assayed between 0.46% and 11% graphite except for one sample that yielded 21.7% graphite. Heliborne magnetic and electromagnetic surveys were also completed for a total of 135 km of flight lines. Sampling and diamond drilling programs are being planned.					
7	31G11	Grenville	Torch River Resources / Saint Jean Carbon	Walker Lump Graphite	Graphite	Cg, S
	Project description: Torch River Resources acquired the claims of the Walker Lump Graphite project. The property is located about 7 km northwest of the municipality of Buckingham, near the former Walker graphite mine that was mined intermittently from 1876 to 1906. The company undertook a compilation study of historical work on the property. Grab samples were also retrieved from the property and subjected to concentration tests. The results reached purity levels of up to 99.1% carbon. In late October, the company changed its name to Saint Jean Carbon.					
8	31G11	Grenville	Torch River Resources / Saint Jean Carbon	Wallingford	Graphite	Cg
	Project description: Torch River Resources acquired the claims for the Wallingford project. The property, located about 10 km from the municipality of Buckingham, hosts the past-producing Wallingford-Buckingham feldspar-quartz mine. A number of pegmatite intrusions are present in marbles, providing a favourable contact for skarn-type graphite mineralization. In late October, the company changed its name to Saint Jean Carbon.					
9	31G11	Grenville	RockTech Lithium	Lochaber	Graphite	D (30:7000)
	Project description: The Lochaber project is located in the Buckingham region, 45 km northeast of the city of Gatineau. Graphite mineralization occurs in gneiss, associated with marbles. Since 2012, the company drilled roughly 30 diamond drill holes for a total of more than 7,000 metres. These holes passed through up to 127.5 m of graphitic layers containing 2.6% graphite.					
10	31G11	Grenville	Soldi Ventures	Lochaber	Graphite	Cg
	Project description: In 2012, Soldi Venture acquired the claims for the Lochaber project located 10 km north of Thurso. The company conducted exploration work in 2013, mainly the compilation of geoscientific information.					
11	31G11	Grenville	Atocha Resources	Saint-Sixte	Graphite	Pg
	Project description: In 2012, Atocha Resources acquired the claims for the Saint-Sixte project located 6 km southwest of the village of the same name. In 2013, the company began approaching land owners to gain access to the land and carry out its exploration activities. The limited access to the property and the results of an economic assessment of the project led the company to abandon the Saint-Sixte project.					
12	31G11	Grenville	Shield Gold	Powerline	Graphite	GpEm(A), GpMa(A), GpRa(A), GpEm(G), Pg
	Project description: In 2012, Shield Gold acquired the claims for the Powerline project located 5 km north of Thurso. The company carried out airborne electromagnetic, magnetometric and radiometric surveys. It also performed ground-based exploration work, including a geophysical survey using Beep-Mat equipment to detect conductivity and magnetic susceptibility responses.					

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
13	31G13	Grenville	Solo International	Philadelphia REE	REE	S, GpEm(G)
	Project description: The Philadelphia project lies in the Notre-Dame-de-la-Salette area, near the past-producing Philadelphia mine from which 2,000 tonnes of apatite were extracted in the late 1800s. Solo International is exploring the project for rare earth elements. Twelve of the 42 samples collected at surface contain anomalous rare earth concentrations ranging from 0.56% and 0.08% TREO. The company also performed a geophysical survey using Beep-Mat equipment to detect conductivity and magnetic susceptibility responses.					
14	31G14	Grenville	Atocha Resources	Montpellier	Graphite	Pg
	Project description: In 2012, Atocha Resources acquired the claims for the Montpellier project near the village of Ripon. In 2013, the company began approaching land owners to gain access to the land and carry out its exploration activities. The limited access to the property and the results of an economic assessment of the project led the company to abandon the Montpellier project.					
15	31G14	Grenville	Caribou King Resources	Montpellier	Graphite	Cg
	Project description: Caribou King Resources acquired the claims for the Montpellier property located less than 2 km from the municipality of Montpellier. The target of the exploration project is graphite. Previous work, which included diamond drilling, identified graphite concentrations of up to 10.47% over 44.97 m and 12.33% over 21.64 m.					
16	31G13, 14, 31J02, 03	Grenville	Canada Strategic Metals	La Loutre	Graphite	Cg, TM
	Project description: The La Loutre project is located about 117 km northwest of Montréal and 15 km from Chénéville. In 2012, Canada Strategic Metals collected a series of grab samples with up to 22.04% graphite. In 2013, preliminary metallurgical tests were carried out on the samples. On other fronts, the company continued its compilation of geoscientific information. It also intends to conduct other metallurgical tests and drill about 15 diamond drill holes for a total of about 1,500 m.					
17	31F09	Grenville	Canada Carbon	Dun Raven	Graphite	Cg
	Project description: In 2013, Canada Carbon acquired the claims for the Dun Raven project, located 16 km east of the municipality of Campbell's Bay. The property hosts the Dun Raven deposit. Historical work on the deposit established a resource containing 571,532 tonnes of ore grading 4.72% graphite.					
18	31F15	Grenville	Nouveau Monde Mining Enterprises	Ceres	Graphite, REE, U, Mo	Cg
	Project description: Nouveau Monde Mining Enterprises acquired the claims for the Ceres project. The property is located 6 km northeast of the municipality of Fort-Coulonge. Rare earth element mineralization and graphite showings are present on the property, in addition to previously documented showings of molybdenite, fluorite, uranium, mica and apatite.					
19	31F16	Grenville	Cavan Ventures	Cawood	Graphite	Cg, Pg
	Project description: In 2013, Cavan Ventures acquired the claims for the Cawood project. The property covers 550 hectares and is situated about a dozen kilometres northwest of the village of Cawood.					
20	31G13	Grenville	Cavan Ventures	Sainte-Marie	Graphite	S, G
	Project description: In 2013, Cavan Ventures acquired the claims for the Sainte-Marie exploration project. The property covers 605 hectares near the municipality of Lac-Sainte-Marie. Several graphite showings were discovered during geological mapping. Grab samples contain more than 3% graphite, including a sample with 25% graphite.					
21	31F14, 15, 16 31K02, 03, 06, 07	Grenville	Nouveau Monde Mining Enterprises	Outaouais	Graphite	Cg, GpEm(A)
	Project description: Nouveau Monde Mining Enterprises acquired the claims for the Outaouais graphite exploration project. The project consti-tutes 1,964 claims covering 116,263 hectares in the RCM of Pontiac. A heliborne MAG-TDEM covered part of the property and delineated several kilometre-scale conductive zones with the potential to host graphite deposits.					
22	31K08	Grenville	Cavan Ventures	Pythonga	REE	S, Pg
	Project description: The Pythonga project is located 20 km northwest of the town of Maniwaki. Cavan Ventures obtained new assay results for grab samples collected in 2012. A sample of mafic gneiss cut by pegmatite veins returned the best result with 8.31% REO. The company intends to continue its exploration work through diamond drilling. .					
23	31K08, 09	Grenville	Stelmine Canada	Maniwaki West	REE	Cg, S, GpRa(G)
	Project description: In 2013, Stelmine Canada acquired the claims for the Maniwaki West project. The property is located about 20 kilometres northwest of the municipality of Maniwaki. The company conducted a ground-based radiometric survey using a scintillometer. Grab samples were also retrieved from the property.					
Laurentides administrative region (15)						
24	31G10	Grenville	Caribou King Resources / Canada Carbon	Calumet	Graphite	G, GpEm(G)
	Project description: In 2013, Caribou King Resources acquired the claims for the Calumet project. The property is situated near the municipality of Calumet, several kilometres north of the Ottawa River. The company conducted geological mapping on the property as well as a ground-based geophysical survey using a Beep-Mat equipment to detect conductivity and magnetic susceptibility responses. In late 2013, Canada Carbon announced its intention to acquire the property.					

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
25	31G10	Grenville	Canada Carbon	Miller Graphite	Graphite	S, G, GpEm(G), GpEm(A), MT, D(12:595)
	Project description: The Miller Graphite project is located near the municipality of Calumet, several kilometres north of the Ottawa River. The property consists of two claim blocks. The east block contains a past-producing graphite and phlogopite mine that was exploited between 1845 and 1900. Canada Carbon has just completed the first phase of exploration: a grab sampling program (including trenching); geological mapping; and ground-based and airborne electromagnetic surveys. In addition, the company drilled about a dozen shallow diamond drill holes (total of 595.5 m). Other diamond drill holes are planned (minimum of 1,000 metres in total). On other fronts, metallurgical tests yielded a concentrate grading 99% graphite.					
26	31G10	Grenville	Weststar Resources	East Miller	Graphite	Cg
	Project description: In 2013, Weststar Resources acquired the claims for the East Miller project. The property is located 7 km northeast of the municipality of Calumet.					
27	31G15, 31J02	Grenville	Torch River Resources/ Saint Jean Carbon	Saint-Jovite Lump Graphite	Graphite	Cg
	Project description: Torch River Resources acquired the claims for the Saint-Jovite Lump Graphite project. The property, which hosts the past-producing Brébeuf-SSE mica and apatite mine, is situated about 8 km south of the village of Brébeuf. The deposit consists of large pegmatite veins up to 1.8 m wide. In late October, the company changed its name to Saint Jean Carbon.					
28	31J05	Grenville	Caribou King Resources	Saint-Aimé	Graphite	Cg
	Project description: In 2013, Caribou King Resources acquired the claims for the Saint-Aimé project. The property is located near the municipality of Saint-Aimé-du-Lac-des-Îles, just west of the Lac des Îles graphite mine operated by TIMCAL Graphite & Carbon.					
29	31J05, 06	Grenville	Cavan Ventures	Big Flake	Graphite	S
	Project description: The Big Flake project is located 8 km from the municipality of Saint-Aimé-du-Lac-des-Îles, near the Lac des Iles graphite mine operated by TIMCAL Graphite & Carbon. Three rock samples were collected from the property; the best result was 2.04% graphite in schistose paragneiss.					
30	31J10, 11	Grenville	Lomiko Metals	Quatre Milles Graphite	Graphite	MT
	Project description: The Quatre Milles Graphite project is located about 175 km northwest of Montreal and 17 km from Sainte-Véronique. The area is accessible by road. The deposit consists of graphitic horizons intercalated with metamorphosed sedimentary rocks. The company carried out metallurgical tests on samples of core from the 2012 diamond drilling program in order to characterize the graphite mineralization.					
31	31J10	Grenville	Standard Graphite	Mousseau East	Graphite	Pg
	Project description: The Mousseau East project is located 40 km northeast of Mont-Laurier. Following diamond drilling in 2012, Standard Graphite continued its exploration work with field tests.					
32	31J10, 31J11	Grenville	Graniz Mondal	Mousseau West	Graphite	Cg, D(27:3000)
	Project description: The Mousseau West project is situated a dozen kilometres north of Sainte-Véronique (municipality of Rivière-Rouge). Quartzo-feldspathic biotite paragneiss constitute the dominant unit on the property. The graphitic horizon is a marble interlayered within a biotite paragneiss sequence. In addition to re-evaluating the results of historical work, Granitz Mondal drilled new diamond drill holes. One of these holes encountered a grade of 8.6% graphite over a vertical distance of 86 metres. The company states that the deposit contains inferred resources of 4.1 Mt at a grade of 6.2% graphite.					
33	31J10	Grenville	Caribou King Resources	TAC	Graphite	S, G, GpEm(G)
	Project description: In late 2012, Caribou King Resources acquired the claims for the TAC project. The property is situated 7 km northwest of L'Ascension. In July 2013, the company commenced exploration work: a grab sampling program; geological mapping; and an induced polarization survey.					
34	31J10	Grenville	Caribou King Resources	Lac Vert	Graphite	S, G, GpEm(G)
	Project description: In late 2012, Caribou King Resources acquired the claims for the Lac Vert project. The property is situated 12 km north of L'Ascension. In July 2013, the company commenced exploration work: a grab sampling program; geological mapping; and an induced polarization survey.					
35	31O03	Grenville	Berkwood Resources	Peter Lake Copper	Cu-Ni	S, Pg
	Project description: The Peter Lake Copper project is located 90 km north of Mont-Laurier. Mineralized zones carrying copper and nickel sulphides are present in a gabbro dyke. The company collected 17 channel samples and 201 surface rock samples. The best grade was 1.46% Cu. In October, the company abandoned the property to concentrate on gold and graphite exploration.					
36	31O02	Grenville	Goldstar Minerals	Brockaby	W	Gs(sl)
	Project description: The Brockaby project is situated about 75 km northeast of Mont-Laurier. Local geology consists of a sequence of marbles and paragneiss cut by late granite intrusions, providing a favourable environment for skarn-type tungsten mineralization. The company carried out a soil geochemistry survey. Airborne magnetic and radiometric surveys are planned.					
37	31G09	St. Lawrence Platform	Western Troy Capital Resources	Lac-Des-Deux-Montagnes	Nb	Cg
	Project description: Western Troy Capital Resources acquired the claims for the Lac-Des-Deux-Montagnes project. The property is located a dozen kilometres from the municipality of Oka.					

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
Lanaudière administrative region (14)						
38	31I13, 31J09,16, 31O01, 31P04	Grenville	Nouveau Monde Mining Enterprises	Matawinie	Graphite	Cg,GpMa(A), GpEm(A), S, D(19,1505)
	Project description: Nouveau Monde Mining Enterprises acquired the claims for the Matawinie project. The claims are distributed in six blocks within a 50-km radius north of the municipality of Saint-Michel-des-Saints. Heliborne magnetic and electromagnetic surveys were flown over all the claims. Five channel samples and 33 grab samples were retrieved at surface. Nine of the grab samples contain significant values ranging from 5.08% to 16.8% graphite. Elsewhere, a diamond drill hole tested the depth extension of a surface showing, intersecting a zone containing 11.9% graphite over 17.32 m, including a higher grade zone of 13.03% graphite over 13.12 m. A program of 19 diamond drill holes totalling 1,505 metres took place from late October to late November 2013.					
Mauricie administrative region (04)						
39	31I16	Grenville	DNA Precious Metals	Montauban	Au, Ag, Cu	TE
	Project description: DNA Precious Metals acquired the claims for the Montauban project. The property, adjacent to the municipality of Notre-Dame-de-Montauban, covers 340 hectares. The objective of the company is to recover metals, such as gold, silver and copper, from the tailings of the past-producing Montauban mine.					
40	32B02	Grenville	Galaxy Graphite	Parent	Graphite	Pr, D(4:800)
	Project description: Galaxy Graphite acquired the claims for the Parent project. The property is located about 20 kilometres northwest of the village of the same name. A field visit uncovered graphite-rich quartzite. Four diamond drill holes totalling about 800 m were planned for late 2013.					
Capitale-Nationale administrative region (03)						
41	21M09, 10	Grenville	Globex Mining Enterprises	Saint-Urbain	Fe-Ti	Cg, S
	Project description: Globex Mining Enterprises acquired the claims for the Saint-Urbain project. The property, located 25 km north of Baie-Saint-Paul, covers a zone of ilmenite mineralization in the Saint-Urbain Anorthosite. A grab sample of massive ilmenite mineralization assayed 59.17% Fe_2O_3, 38.0% TiO_2 and 1,575 ppm V.					
Saguenay–Lac-Saint-Jean administrative region (02)						
42	**32H07, 10**	**Grenville**	**MDN**	**Crevier (Anita)**	**Ta-Nb**	**TM**
	Project description: The Crevier project, which hosts niobium and tantalum resources, is situated about 90 km north of Lac Saint-Jean. The results of metallurgical tests demonstrate it is possible to obtain an overall recovery of 62.8% for the flotation circuit and to produce a concentrate grading 9.6% niobium tantalum. Considering the promising market and steadily growing demand, the company decided to modify its feasibility study parameters. The company will increase daily production to 6,000 tonnes of ore per day instead of the 4,000-tonne target presented in the preliminary study. In addition, it will diversify by producing tantalum oxide, niobium oxide and niobium hydroxide that can be sold on the ferroniobium market.					
43	32H08	Grenville	Khalkos Exploration	Poissons Blancs	Ni-Cu-Co	MT
	Project description: The Poissons Blancs project, located 45 km north of the municipality of Dolbeau, in Lac-Saint-Jean, hosts the McNickel deposit with historical resources of 5.9 Mt at 0.21% Ni, 0.11% Cu and 0.03% Co. The company carried out preliminary metallurgical tests on representative samples from the deposit. The bio-leaching processing tests yielded recovery rates reaching 89.6% nickel, 62.8% copper and 77.5% cobalt.					
44	22D11	Grenville	Micrex Development	Saint-Charles	Magnetite	TE
	Project description: The project is located in the Saint-Charles area on the north shore of the Saguenay. Micrex Development continues the deposit appraisal work on its magnetite, ilmenite and apatite deposit. The company is seeking future buyers for its magnetite product, a substance used in various industrial processes. It is also looking for opportunities to sell ilmenite and apatite as a by-product.					
45	22D11	Grenville	IAMGOLD Corporation	REE Zone	REE	RRE, PEA
	Project description: The company continues to assess the economic potential for rare earths in an area adjacent to its Niobec niobium mine. Diamond drilling in 2012 established indicated resources at 531 Mt of ore at an average grade of 1.64% total rare earth oxides (TREO), to which are added inferred resources of 527 Mt at an average grade of 1.83% TREO.					
46	*22D11*	*Grenville*	*IAMGOLD Corporation*	*Niobec Mine*	*Nb*	*RRE, FS, ES*
	Project description: The company is evaluating the possibility of increasing production at the Niobec mine, located in Saint-Honoré, by switching to a block caving method of underground mining. This will increase probable reserves to 1.8 billion kilograms of niobium. The project will involve the construction of a new industrial complex with ore processing facilities as well as impoundment areas for storing the additional volume of tailings. The company is proceeding with a feasibility study. Also, environmental impact studies, compliant with provincial and federal regulations, are currently underway.					
47	22D15	Grenville	Fairmont Resources	Buttercup	Fe-Ti-V	Cg
	Project description: Fairmount Resources acquired the claims for the Buttercup project. The property is located about 30 km north of the municipality of Saguenay.					
48	22D15	Grenville	ElanOre Resources / Fairmont Resources	Lac Élan	Fe-Ti-V	S, Pg
	Project description: The Lac Élan property is located about 50 km northeast of the municipality of Saguenay. Surface rock sampling, trenching and prospecting work were carried out on the property. The grades from one trench reached 56.88% Fe_2O_3, 16.93% TiO_2 and 0.42% V_2O_5 over 18.5 m.					

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
49	22D14, 15, 22E02	Grenville	Jourdan Resources	Hache	P, Fe, Ti	Cg
	Project description: Jourdan Resources acquired the claims for the Hache project. The property is located about 50 km north of the municipality of Saguenay. The results of historical work estimated 20 Mt of ore containing 24.75% Fe, 5.15% Ti and 5.21% P_2O_5.					
50	22E02	Grenville	Glen Eagle Resources	Moose Lake	P	S, D (37:2074)
	Project description: The Moose Lake project is situated 125 km north of the town of Saguenay. In late 2012, the company completed its 37-hole diamond drilling program (total of 2,074 metres). The best grades obtained in drill hole ranged from 3.8% to 5.5% P_2O_5. Following these results, the company acquired additional claims to expand the property and continue to assess its potential.					
51	22E01	Grenville	Jourdan Resources	Cache	P-Ti	Cg
	Project description: Jourdan Resources acquired the claims for the Cache project. The property is located about 100 km northeast of the town of Saguenay. The property is underlain by gabbroic rocks enriched in apatite and ilmenite. According to historical work, grades reached 8.36% P_2O_5 and 20.6% TiO_2.					
52	22E08	Grenville	Radisson Mining Resources	Lac Gouin SSO	P	Cg, Pg
	Project description: Radisson Mining Resources acquired the claims for the Lac Gouin SSO project. The property, located about 115 km north of the town of Saguenay, hosts a deposit discovered in 1962 consisting of a magnetite- and apatite-rich monzonite body. The magnetite grade can reach 25% and the apatite grade 15%..					
53	22E08	Grenville	Radisson Mining Resources	Riverin	P	Cg
	Project description: Radisson Mining Resources acquired the claims for the Riverin project. The Riverin property is located near the Lac Gouin SSO property, about 115 km north of the town of Saguenay.					
54	22E08	Grenville	Radisson Mining Resources	Klemka	P	Cg
	Project description: Radisson Mining Resources acquired the claims for the Klemka project. The Klemka property is located 22 km east of the Lac Gouin SSO property, about 115 km north of the town of Saguenay.					
55	22E08	Grenville	Jourdan Resources	Lac Catherine	P	Cg
	Project description: Jourdan Resources acquired the claims for the Lac Catherine project. The property is located 40 km west of the village of Labrieville. It covers a band of gabbroic rocks enriched in apatite.					
56	22E10, 15	Grenville	Jourdan Resources	Jazz Phosphate	P	GpMa(G), Pr, G
	Project description: The Jazz Phosphate project is located about 200 km north of the town of Saguenay in the Pipmuacan Reservoir area. The company just completed a ground magnetic survey. Prospecting work and geological mapping have also been conducted on the property.					
57	**22E10, 15**	**Grenville**	**Arianne Phosphate**	**Lac à Paul**	**P**	**FS, ES**
	Project description: Arianne Phosphate continued its deposit appraisal work on the phosphate deposit at its Lac à Paul property, about 200 km north of Lac Saint-Jean in the Pipmuacan Reservoir area. The company completed its feasibility study with a focus on project financing. The company also filed its environmental impact study with the government of Québec for project acceptability assessment. Measured resources are estimated at 336.76 Mt and inferred resources at 253.48 Mt, with grades of 7.22% and 7.02% P_2O_5 respectively.					
58	22L07, 08	Grenville	Glen Eagle Resources	Lac Lisette	P	Gp
	Project description: The Lac Lisette project is located 150 km north of Lac Saint-Jean, in the Lac-Saint-Jean Anorthosite Complex. The company is conducting field exploration work. Core samples from the 2012 diamond drilling program were sent for analysis.					
Côte-Nord administrative region (09)						
59	22F13	Grenville	Jourdan Resources	Dissimieux Lake Titanium-Phosphate-Rare Earth Elements	Ti-P-REE	D (x:x), Pr, S
	Project description: In February 2013, the company published the results of 11 drill holes (total of 1,313.9 m) that targeted the northeastern extensions of the Main Phosphate Horizon Zone. Drill hole DL025 cut an interval of 137.80 m grading 3.02% P_2O_5. In December, the results of prospecting work outside the Main Phosphate Horizon Zone were announced. Sample J413169 graded 3.55% P_2O_5, 11.40% TiO_2 and 40.10% Fe_2O_3.					
60	**22K04**	**Grenville**	**Argex Titanium**	**La Blache (East and West Hervieux)**	**Ti-Fe-V-Mg**	**FS, MT**
	Project description: In April, the company announced that it intended to construct a plant at Salaberry-de-Valleyfield to process ore from the La Blache deposit. In June, a supply agreement for TiO_2 pigment was signed with PPG Industries. In October, the company announced the positive results of an industrial feasibility study for the plant project. The study examined the first production module of 50,000 tonnes per year of TiO_2 pigment and a mine life of 25 years. Other modules may eventually be added. The company expects to go into production during the summer of 2015.					
61	22K04	Grenville	Nevado Resources Corporation	La Blache #1 Iron-Titanium-Vanadium	Fe-Ti-V-Cgr	MT, B (20:x)
	Project description: On December 18, 2013, the company announced the start of metallurgical testing on a 200 kg sample of ore from the La Blache deposit to establish the material's crushing and grinding parameters.					
62	22K03	Grenville	Canada Strategic Metals	Grand Prix	Graphite	S
	Project description: Grab sample 115301 assayed 7.21% graphite and channel GPR5 yielded 3.26% graphite over 5.00 m.					

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
63	22F14	Grenville	Canada Rare Earths	Champagne	Graphite	S
	Project description: Grab sample 115315 assayed 2.05% graphite.					
64	22F14	Grenville	Galaxy Graphite	Sun	Graphite	Pg
	Project description: In January 2013, the company announced the results of holes drilled the year before. Drill hole SG-12-08 cut an interval of 10.50 m grading 1.32% graphite.					
65	22F16	Grenville	St-Georges Platinum and Base Metals	North Shore Flagship (Julie and Isoukustouc)	Pt-Pd-Rh-Cu-Co-Ni	Pr, S
	Project description: In March, the company published the assay results for grab samples retrieved from the Isoukustouc property. Sample 2287 assayed 0.351% Cu, 1.820% Ni and 20.20% Fe. The mineralization consisted of an assemblage of pyrrhotite-pyrite+/-chalcopyrite+/-pentlandite associated with mafic and ultramafic intrusions in contact with metasedimentary rocks.					
66	22K14	Grenville	Cavan Ventures	Tetepisca	Graphite	Pr, S
	Project description: Channel sample 265062-63 assayed 52.7% Cg over 1.9 m, including 1.0 m at 63.5% graphite, and grab sample 265051 returned a grade of 55.1% graphite. The mineralization is associated with the Nault Formation, composed mainly of paragneiss.					
67	22K14	Grenville	Focus Graphite	Lac Guinecourt	Graphite	Pg
	Project description: The assay results for 32 grab samples collected in 2012 from the vicinity of the Graphi-Centre showing were published in May 2013. Sample 3232415 returned a grade of 45.90% graphite..					
68	22N03	Grenville	Mason Graphite	Lac Guéret	Graphite	MT, RRE, PEA, ES, D (x:x)
	Project description: In April, the company announced the results of 104 holes drilled in 2012. Drill hole LG-207 intersected intervals of 44 m grading 17.1% graphite and 28 m grading 16.9% graphite. The company also announced the positive results of a preliminary economic assessment. The study scenario envisions an annual production of 50,000 tonnes of graphite concentrate, a recovery rate of 96%, and a mine life of 22 years. The graphitic sedimentary rocks are found mainly within the Lac Guéret Member (informal designation) of the Menihek Formation. In September, the results were announced for preliminary metallurgical tests on the purification of graphite concentrates. Purities of 99.9% graphite were obtained.					
69	22N11, 14	Grenville	Argex Titane	Mouchalagane	Fe	MT
70	23B04, 23C01	Grenville	Cartier Iron Corporation / Champion Iron Mines	Round Lake	Fe	D (10:3 315), RRE, Pr, S
	Project description: In spring, the company announced the results of 10 drill holes (total of 3,315 metres) in the Penguin Lake area. Drill hole PL13-04 cut an interval of 242 m at a grade of 25.2% Fe(total). On December 19, 2013, the company published the first resource estimate for the Penguin Lake deposit. Inferred resources for the open pit amount to 531.2 Mt at 33.1% Fe(total), using a cut-off grade of 15% Fe(total).					
71	23B05, B06	Grenville	Fancamp Exploration / Champion Iron Mines / Gimus Resources	Lac Lamêlée South	Fe	RRE
	Project description: In early May, the companies announced a new resource estimate. The study established inferred resources of 520 Mt at a grade of 39.5% Fe_2O_3 (or 27.6% Fe(total)), using a cut-off grade of 22% Fe_2O_3. The iron mineralization occurs in two units: a banded iron formation (BIF) and a unit of quartz-pyroxene-magnetite, in the Sokoman Formation. In December, the three partners signed an agreement by which Gimus acquired all the interests in the property. Gimus subsequently changed its name to Lamêlée Iron Ore..					
72	**23B11**	**Grenville**	**Focus Graphite**	**Lac Knife**	**Graphite**	**D (x:x), MT, FS, ES**
	Project description: In March, the company announced the results of holes drilled in 2012. Drill hole LK-12-170 cut an interval of 66.8 m grading 14.68% graphite. The company carried out pilot plant metallurgical tests over the course of the year. In November, the company granted a contract for a feasibility study, which should be ready in 2014. Mineralization is associated with mica-, quartz- and feldspar-rich schists and with paragneisses and horizons of calcsilicate rocks belonging to the Menihek Formation.					
73	**23B06**	**Grenville**	**Champion Iron Mines**	**Fermont (17 properties)**	**Fe**	**FS, (Fire Lake North), D (10:3 315), RRE**
	Project description: In January 2013, the company announced a new resource estimate for the East and West deposits. The study established measured and indicated resources of 693.5 Mt at 31.5% Fe(total) and inferred resources of 521.6 Mt at 30.1% Fe(total), using a cut-off grade of 15% Fe(total)..					
74	23B11	Grenville	Nevado Resources Corporation	Fermont	Graphite	
	Project description: In February 2013, the company announced the results of four drill holes (1,065 metres); hole NV12-01 intersected intervals of 16.30 m at 8.65% graphite and 15.70 m at 9.97% graphite.					
75	22P03	Grenville	Focus Graphite / SOQUEM	Kwyjibo	REE-P-F-Mo-U-Au-Cu	D (55:10 500), MT, TE
	Project description: In March, the partners announced the results of 31 drill holes (total of 4,207 metres) that had been drilled in the fall of 2012. Drill hole 10885-12-75 cut an interval of 36.0 m at 3.22% TREO and 0.1% Cu, including 7.0 m at 7.04% TREO and 0.19% Cu. These results confirm the extent of the mineralization within the Josette horizon over a distance of 600 metres and to a depth of 175 metres. The mineralization is found in three distinct zones cutting leucocratic granitic gneiss: an upper breccia characterized by magnetite veins, a hydrothermal iron formation, and a lower breccia zone of magnetite veins.					

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
76	22P08, 12M05	Grenville	The Magpie Mines	Magpie	Fe-Ti-V-Cr	MT
	Project description: In March, the company announced the successful completion of Phase 2 pilot plant hydrometallurgical tests. Phase 3 of the test work commenced soon thereafter to test vanadium and chrome recoveries. In September, the company published the most recent TiO_2 recovery results. The concentrate reached 97.90% TiO_2. The property is underlain by the Lac Fournier Anorthosite. The four Magpie deposits are associated with pyroxene-rich granites (mangerite and charnockite) as well as granites and pegmatites.					
77	23F11, 12, 14	Superior	Virginia Mines / Anglo American Exploration (Canada)	Ashuanipi	Au-Ag-Cu-Zn-Mo	S, Gs, Gp, Pr, D (8:1 248), T
78	23K13, 23L16, 23N04	Superior	Virginia Mines / IAMGOLD Corporation	Lac Pau	Au-Cu	D (9:2 970)
Laval administrative region (13)						
n/a	n/a	n/a	n/a	n/a	n/a	n/a
Montréal administrative region (06)						
n/a	n/a	n/a	n/a	n/a	n/a	n/a
Montérégie administrative region (16)						
79	31H04	St. Lawrence Platform	J.A.G. Mines	Seigneurie de Beauharnois	Silica	TE
	Project description: The Seigneurie de Beauharnois project is located near the village of Sainte-Clotilde-de-Châteauguay. The property covers the Cairnside Formation belonging to the Potsdam Group. The Cairnside Formation, composed of quartz sandstones, is renowned for the quality of its silica. The company is studying the possibility of putting the deposit into production..					
Estrie administrative region (05)						
80	21E04, 05	Appalachians	Uragold Bay Resources	McDonald Gold	Au	Pg
	Project description: The McDonald Gold project lies several kilometres northeast of the town of Coaticook. The Moe River gold placer deposit, discovered in 1908, is present at the western project boundary. The company is conducting exploration work on the property..					
81	31H09	Appalachians	Corporation Exploration Îledor	Sterret	Cr-PGE	Cg
	Project description: Corporation Exploration Îledor acquired the claims for the Sterret project. The property is located 8 km south of the municipality of Asbestos. Between 1917 and 1945, more than 110,000 tonnes of chromite ore with an approximate average grade of 19% Cr_2O_3 were mined intermittently from the former Sterret mine. The property's potential for platinum group elements has not been systematically evaluated.					
82	21E11, 12, 13, 14	Appalachians	Bowmore Exploration	Saint-Victor	Au	Pg
	Project description: The Saint-Victor project lies in the central part of the Humber Zone. In 2013, the company abandoned 676 claims to concentrate its exploration efforts on the rest of the property. The three main gold zones – Wotton, Wotton NW and Camille – are spaced up to 6.5 km apart. These gold zones occur about 20 km south of the town of Asbestos. The mineralization is disseminated in slates containing pyrite and ankerite, with anomalous values ranging from 0.05% g/t Au to 0.99 g/t Au.					
83	21E11	Appalachians	Midland Exploration	Weedon	Cu-Zn-Ag-Au	Pg
	Project description: The Weedon project lies several kilometres east of the municipality of Weedon. On the property, rocks belonging to the Ascot-Weedon volcanosedimentary belt host deposits of copper, zinc silver and gold. Recent geophysical surveys, including gravimetric and electric (induced polarization) surveys, revealed new exploration targets.					
84	21E07	Appalachians	Fancamp Exploration	Clinton	Cu-Zn	Cg
	Project description: The target of the Clinton project, located 20 km south of Lac-Mégantic, is volcanogenic massive sulphide (VMS) copper and zinc mineralization. Fancamp Exploration acquired the data for the historical exploration work carried out by Namex Exploration on the property. The historical data includes diamond drill hole results of 1.26% Cu and 1.37% Zn over 32.2 m and 1.31% Cu over 26.9 m.					
85	21E15	Appalachians	J.A.G. Mines	Saint-Robert	Au-Ag-Pb-Zn-W	Pg, D(x;2500)
	Project description: The Saint-Robert project, located 35 km northeast of Lac-Mégantic and near the village of Saint-Robert-Bellarmin, contains many quartz veins and carbonate veins carrying polymetallic sulphides, injected in sedimentary rocks. The property contains showings of Pb, Ag, W, Bi, Zn and Mo. Exploration work consists of a compilation study, a mineral potential assessment of the property, and geophysical surveys. The company carried out a drilling program totalling 2,500 m.					
Centre-du-Québec administrative region (17)						
n/a	n/a	n/a	n/a	n/a	n/a	n/a
Chaudière-Appalaches administrative region (12)						
86	21L03	Appalachians	Corporation Exploration Îledor	Coleraine	Cr-PGE	Cg
	Project description: Corporation Exploration Îledor acquired the claims for the Coleraine project. The property is located 5 km south of Thetford Mines. The results of historical work demonstrate the presence of platinum and palladium on the property.					

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
87	21L02	Appalachians	Fancamp Exploration / Bowmore Exploration	Beauce	Au	Cg
	Project description: In 2012, Fancamp Exploration carried out exploration work on its Beauce gold project. The property, located in the Saint-Georges area along Rivière Gilbert, hosts a placer-type gold deposit discovered in 1862. Bowmore Exploration announced its intention to acquire a majority interest in the Beauce gold property before the end of 2013. Bowmore Exploration considers the property to have potential for a low-grade, bulk tonnage gold deposit in bedrock.					
88	21L02	Appalachians	Uragold Bay Resources	Beauce Placer Gold	Au	GpEl(G), TE
	Project description: The Beauce Placer Gold project is located near the municipality of Saint-Simon-les-Mines. The company completed a geo-electric tomography survey in electrical resistivity and induced polarization modes to determine the thickness of the Quaternary deposits and to detail the stratigraphy of the placer. Small-scale gold recovery tests on samples from the paleoplacers were also carried out. On other fronts, the company obtained a certificate of authorization from the MDDELCC as well as authorization from the Commission de la protection du territoire agricole du Québec to develop the gold placer.					
89	21L09	Appalachians	Golden Hope Mines	Bellechasse (Timmins)	Au	Pg
	Project description: The Bellechasse-Timmins gold deposit lies 5 km southeast of Saint-Magloire. In the fall of 2012, Golden Hope drilled 21 diamond drill holes. The assay results on the drill core reached up to 144 g/t Au.					
Bas-Saint-Laurent administrative region (01)						
90	22B11, 12, 13, 14, 22C08, 09	Appalachians	Orbite Aluminae	Rimouski-Matane	Al	Pg
	Project description: Orbite Aluminae holds 952 claims covering 543 km^2 over a total distance of more than 170 km, from east of the city of Québec to Cap-Chat . These new claims, mostly falling within the Bas-Saint-Laurent administrative region, cover a large part of the Orignal Formation, which contains aluminous clays. Orbite Aluminae intends to explore the area to establish new aluminous clay resources. The company must first produce a feasibility study technical report for its metallurgical alumina plant project that will process aluminous clays.					
91	22B11	Appalachians	Canadian Metals	Langis	Silica	Cg, TE
	Project description: Canadian Metals acquired the claims for the Langis project. The property is located 30 km south of the town of Matane. Previous work established a historical resource estimate of 27 Mt of silica at a grade of 99.25% SiO_2. The deposit was mined by Uniquartz in the late 1980s and early 1990s. The company has undertaken a characterization study on the deposit, including metallurgical tests. A technical report was filed, indicating a potential for 15 to 28 Mt of silica material at a grade ranging from 98.1% to 99.20% SiO_2. The company intends to use the silica in the manufacture of ferrosilicon.					
Gaspésie–Îles-de-la-Madeleine administrative region (11)						
92	22B16	Appalachians	Gespeg Copper Resources	Mont Tuzo	Perlite-bentonite	Pg
	Project description: The Mont Tuzo project is located in the heart of the Gaspé Peninsula, 45 km southeast of the town of Sainte-Anne-des-Monts. Gespeg Copper Resources is assessing the property for its perlite and bentonite potential.					
93	22A13	Appalachians	Gespeg Copper Resources	Vortex	Cu-Ag-Mo	Gs(sl), Pg
	Project description: The Vortex project lies just south of the Parc National de la Gaspésie, about 30 km from the town of Murdochville. In the summer of 2013, the company performed field work to better interpret the data from geophysical surveys carried out the previous year. This work will establish future diamond drill targets. In addition, the company completed a soil geochemistry survey over the west part of the property.					
94	22A13	Appalachians	Gespeg Copper Resources	In Between	Cu-Ag-Au	Gs(sl), Pg
	Project description: The In Between project is located about 20 km west of the town of Murdochville. In the summer of 2013, the company performed field work to better interpret the data from geophysical surveys carried out the previous year. This work will establish future diamond drill targets. In addition, the company completed a soil geochemistry survey over the southeast and northwest parts of the property.					
95	22A14	Appalachians	Gespeg Copper Resources	Murdoch	Cu-Mo	Pg
	Project description: The Murdoch project lies just east of the town of Murdochville. In 2013, geophysical surveys carried out the previous year were interpreted using different computer analysis techniques. About ten exploration targets were identified.					
96	22H03	Appalachians	Pelican Resources	Lefrançois	Limestone	S, D (x:x)
	Project description: Pelican Resources has undertaken a diamond drilling program and a sampling program over the Lefrançois deposit situated 15 km northeast of Murdochville. The prospecting work by the company over the past few years has already demonstrated that the purity of the material in one part of the deposit is high. Since June 2012, the company has held an exclusive lease to mine surface mineral substances from the deposit.					
97	22H03	Appalachians	Habanero Resources	Grande-Vallée Nord	Al	D(9:801), Pg
	Project description: The Grande-Vallée Nord project is located 18 km southwest of the village of Grande-Vallée. In December 2012, the company announced it had drilled nine diamond drill holes for a total of 801 metres. In May 2013, the company acquired additional claims to enlarge its property by about 1,800 hectares.					
98	**22H03**	**Appalachians**	**Orbite Aluminae**	**Grande-Vallée**	**Al-REE**	**Pg**
	Project description: Orbite Aluminae intends to mine the aluminous clay on its property (claims and a mining lease), located a dozen kilometres southwest of the village of Grande-Vallée, and process the clay with the aim of producing metallurgical alumina. The project will consist of an open pit mine. The company has finished the basic engineering design and carried out a preliminary economic assessment for the metallurgical alumina plant that will process the aluminous clays. The company intends to produce a feasibility study technical report for its plant project.					

TABLE 4.5 - **Exploration projects in Québec (Abitibi-Témiscamingue and Nord-du-Québec regions excluded) in 2013[1] (see Figure 4.7).**

No.	NTS	GEOLOGICAL PROVINCE	COMPANIES / PROSPECTORS	PROJECTS	COMMODITIES	EXPLORATION WORK
99	22H02, 03	Appalachians	Manicouagan Minerals	Cloridorme Aluminous Clay	Al-REE	Pg
	Project description: The Cloridorme Aluminous Clay project is located a dozen kilometres south of the village of Grande-Vallée. In early 2013, the company published the results of a 6-hole diamond drilling program that ended in November 2012. The best result obtained in these holes was 23.28% Al_2O_3 over 76.10 m including 24.37% Al_2O_3 over 39 m.					
100	22H03	Appalachians	Brookemont Capital	Gaspe Bay Aluminous Clay	Al-REE	Pg
	Project description: Brookemont Capital continued to explore its Gaspe Bay Aluminous project, located about 5 km from the village of Grande-Vallée.					
101	22A09	Appalachians	Western Troy Capital Resources	Gaspé	V-Se-Ag-Pb-Zn-Cu	Pg
	Project description: The Gaspé project is situated near the town of Percé, west of the Bridgeville marsh. Sedimentary rocks on the property contain vanadium and selenium mineralization as well as Mississippi Valley-type lead, zinc and silver mineralization. Western Troy Capital Resources continued its prospecting work on the property to better define known mineralization and identify new showings.					
102	22A02	Appalachians	McInnis Deposit	Port-Daniel Cement	Limestone	FS
	Project description: The company confirmed it has obtained all the required permits to start construction work at the Port-Daniel cement plant. The company is now seeking funding that will allow it to undertake the project. The limestone deposit contains an estimated 450 Mt of high-quality limestone reserves. The cement plant will process up to 3 Mt of limestone per year.					

1 - See legend of abreviations and the meaning of bold and italic types in Appendix 2.

Photo : MERN

CHAPTER 5

Deposit appraisal and mine development

Martin Bernatchez, Katrie Bergeron, Denis Blackburn, Dominic Fragasso, Germain Girard, Denys Laplante, Jacinthe Paquet and Denis Raymond

During 2013, twenty-eight mining projects were in the deposit appraisal phase (Figure 5.1 and Table 5.1) and eight projects, in the mine development phase (Figure 5.2 and Table 5.2).

5.1 Deposit appraisal

Alumina

Orbite Aluminae is planning to develop an argillite deposit in Grande-Vallée, Gaspésie. The company wants to produce smelter-grade alumina (SGA) to supply aluminium smelters in Québec and around the world. Argillite resources are estimated at one billion tonnes at an average grade of 23% aluminium oxide. Orbite Aluminae is currently finalizing the construction of a high-purity alumina (HPA) production facility in Cap-Chat, Gaspésie, and intends to build a smelter-grade alumina (SGA) production plant subsequently.

Diamond

Stornoway Diamond Corporation completed construction of segments C and D of the Route 167 Extension, in order to reach its Renard project located north of the Monts Otish, about 360 km north of Chibougamau. The company also began construction of an airfield in the fall of 2013. Raising the necessary financing is the last step leading to the start of construction at the Renard project, which is scheduled to take two years. Mining operations will take place in open pit and underground, to produce on average 1.6 million carats of diamonds per year. The capital cost of the project is estimated at $832M and the mine will provide some 480 jobs for an expected mine life of 11 years.

Iron

Champion Iron Mines focused most of its efforts on raising the financing required to continue a feasibility study on the Fire Lake North iron ore project. In the late fall of 2013, the company announced it had raised the financing for the study. The feasibility study is now scheduled for release in the summer of 2014. The company is aiming to begin mining operations in late 2016.

Oceanic Iron Ore Corporation reviewed its plans concerning development of the Hopes Advance project located near Aupaluk (west coast of Ungava Bay). The feasibility study, initially scheduled for release in 2013, has been postponed until 2014. Mining operations are expected to begin in 2018 at the earliest.

In the spring of 2013, partners **New Millennium Iron Corporation** and **Tata Steel Minerals Canada** received a preliminary version of the feasibility study for the Taconite-KéMag project, located north of Schefferville. Since that time, the two companies have been working to finalize the study, scheduled for release during the first quarter of 2014. The anticipated date for the start of production will be known at that time.

In May 2013, the two partners on the Duncan Lake project, **Augyva Mining Resources** and **Century Iron Mines Corporation**, released a preliminary economic assessment. The cost of the project is estimated at $4B to produce 12 Mt of iron pellets. A feasibility study is scheduled for release in the summer of 2014. Mining operations are expected to begin in 2017.

Lac Otelnuk Mining (LOM) is a joint venture between Adriana Resources and WISCO (a Chinese steelmaker). In October 2013, LOM commissioned engineering firm SNC-Lavalin to finalize a feasibility study on the Lac Otelnuk project, located 150 km north of Schefferville. The feasibility study is expected toward the end of 2014. Mining operations could begin in 2019.

Barlow Mine, a privately-funded company, continued exploration work and studies on its Montgolfier Iron Hills project located approximately 14 km south of the former Selbaie mine. The company intends to complete a prefeasibility study, then a feasibility study for 2015, but is in search of financing. The main issues in this project are the transportation of iron ore concentrate and the power supply. In January 2012, the company released a NI 43-101 compliant technical report on the project.

Iron-titanium-vanadium

In early December 2013, the MDDEFP delivered an environmental certificate of authorization to **BlackRock Metals** for the construction of the BlackRock mine site, located east of Chibougamau. The company is still waiting for its federal certificate of authorization. The company intends to complete the financing for the project over the course of 2014 and start the construction phase, with the objective of beginning mining operations in the spring of 2016.

Graphite

Mason Graphite Corporation released on April 23, 2013, the results of a preliminary economic assessment on the Lac Guéret project, located 260 km north of Baie-Comeau on the southwest shore of Réservoir Manicouagan. Based on an initial capital cost estimated at $130M, annual production would be on the order of 176,000 tonnes of ore grading 27.4% graphitic carbon (Cgr) over a mine life of 22 years. Primary processing will take place on site, to produce 50,000 tonnes of concentrate grading 93.7% Cgr. The company is planning a drilling campaign during the winter of 2013-2014 as well as metallurgical tests and intends to publish a feasibility study in the fall of 2014.

Focus Graphite updated its preliminary economic assessment (PEA) of 2012 concerning the Lac Knife project located 35 km south of Fermont. According to information published in November 2013, conclusive metallurgical results indicate a higher grade product upon primary concentration. The thermal purification process considered in the first study was abandoned, thus reducing the initial capital cost to $126M. The expected annual production is 300,000 tonnes of ore grading 15.66% graphitic carbon (Cgr) over a mine life of 20 years. According to the company, mining operations may begin in 2016 and would create up to 92 jobs. Primary processing will take place on site, to produce 44,300 tonnes per year of concentrate grading 96.6% Cgr. The company is planning to produce high-purity processed natural graphite for the battery market, and flake concentrate.

Lithium

In the Abitibi region, adjacent to the Québec Lithium project of Québec Lithium inc., a subsidiary of Corporation Canada Lithium, **Glen Eagle Resources** continued work on the Authier project. An open pit mine producing 1,000 tonnes per day of spodumene ore is being considered. Glen Eagle Resources is also examining the possibility of producing lithium metal.

In the Baie-James region, about 30 km east of the Nemaska Cree community and about 280 km north of Chibougamau, **Nemaska Lithium** continued deposit appraisal work on the Whabouchi project. The projected open pit mine and concentrator with an annual capacity of 213 Kt of spodumene concentrate will supply a processing plant located in Valleyfield, near Montréal. The plant would produce 20 Kt per year of lithium hydroxide and 5-10 Kt per year of lithium carbonate. The entire project represents a global investment of $477M and would create 190 jobs on the mine site and 75 jobs at the processing plant. A feasibility study is scheduled for release in early 2014. Nemaska Lithium has also launched the permitting process leading to construction.

Lithium and tantalum

About 30 km north of the Nemaska Cree community on the Rose tantalum-lithium project, **Critical Elements Corporation** plans to mine lithium and tantalum ore from an open pit mine and concentrate it on site. The company is also examining the possibility of building a lithium carbonate production plant on the mine site. According to the preliminary economic assessment, the estimated cost for the project is $270M. Critical Elements Corporation has undertaken various work programs, testing and studies in preparation for an upcoming feasibility study.

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

In May 2013, **Royal Nickel Corporation** published a feasibility study on the Dumont Nickel project located near Amos. The cost of the project is estimated at $1.3B for an annual production of 30 Kt of nickel concentrate. The company is hoping to receive its environmental certificate of authorization by July 2014, which would enable it to raise the necessary financing of the project and begin construction of the mining site. Mining operations on this project could begin in 2016.

Niobium and tantalum

Northwest of Girardville in the Lac-Saint-Jean region, deposit appraisal work continues on the Crevier niobium-tantalum project by **Les Minéraux Crevier**, a subsidiary of **MDN**. A feasibility study is underway and is scheduled for release in 2014. The estimated cost for the project is $479M and the project would create 300 jobs. Mining operations are expected to begin in 2017.

Gold

Conway Resources concluded the acquisition of mining titles of the former Belleterre Mine. Following changes in the board of directors and financial restructuring, Conway Resources announced its intention to close the company by liquidating its assets. A notice to its creditors was sent by the trustee in bankruptcy. The company considers that the lack of annual financing and increasing expenses for a junior public company were responsible for it maintaining a high debt ratio.

A preliminary economic assessment was published in February 2013 by **Clifton Star Resources** for the Duparquet project, located near the town of Duparquet in the Abitibi-Témiscamingue region. The study focuses on a project to mine the gold deposit by open pit as well as the tailings of the former Beattie mine. The mine life is estimated at 16 years, at a production rate of 8,000 tonnes of ore per day. It would require investments on the order of $370M. A prefeasibility study is scheduled for release in 2014.

The Fayolle project held by **Typhon Exploration** and **Hecla Québec** is located 40 km northeast of Rouyn-Noranda, near the southern limit of the Parc national d'Aiguebelle. In March 2013, a preliminary economic assessment was published. Two scenarios were considered: open pit mining and underground mining. The life of the mine could reach three years and the daily production capacity would be in the order of 750 to 1,000 tonnes of ore. Investments for the open pit mine and the underground mine are respectively estimated at $5.9M and $22.7M. Typhoon Exploration carried out additional work to increase mineral resources on the property.

Gold Bullion Development Corporation released in February 2013 a preliminary economic assessment on the Granada project considering open pit mining and underground mining operations. The investment required for the project is estimated at $259M. The mine life is estimated at 11 years and the proposed mill has a daily capacity of 7,500 tonnes of ore. This project is located 2.5 km south of the town of Granada and about 9 km south of Rouyn-Noranda. The prefeasibility study, initially scheduled for the end of 2013, has been postponed.

On the Joanna project located east of Rouyn-Noranda, **Hecla Québec** announced it was postponing its decision to mine the Hosco ore deposit, despite the positive outcome of the feasibility study. This announcement comes in the wake of excellent exploration results obtained on the Heva and Hosco West zones, namely indicating higher gold grades and better metallurgical properties. The potential for a mining operation on the Joanna project thus remains quite realistic.

QMX Gold Corporation (formerly Alexis Minerals Corporation) is still involved in an arbitration process with **Thundermin Resources** concerning the Lac Pelletier property located near Rouyn-Noranda. The latter is the registered holder of the claims and mining concessions that make up the Lac Pelletier property, however QMX Gold Corporation has performed deposit appraisal work on the property.

In March 2012, **Richmont Mines** announced the results of a preliminary economic assessment on the Wasamac property located near Rouyn-Noranda. Since the project provided a less than adequate return on investment, exploration and deposit appraisal activities on this property were suspended in November 2012. The company still considers this project as an important asset, not only because of its location and size, but because it remains interesting if gold prices increase. This project will be re-examined in the event of a material change in economic parameters or if further geological information on this project makes it more attractive to develop. Public consultations with local communities near Wasamac will continue so as to maintain open lines of communication and to ensure activities are carried out in a socially acceptable manner.

Phosphate

Mine Arnaud heads the Arnaud mining project located about 15 kilometres west of Sept-Îles. In August 2013, the company released a prefeasibility study. The project involves an open pit mine with an estimated mine life of 28 years and a mill. The average annual production will be on the order of 1.4 Mt of apatite concentrate. This project will provide nearly 340 jobs during the mining phase. During the months of August and September 2013, the Arnaud mining project was submitted to public scrutiny during the public hearings held by the BAPE (*Bureau d'audiences publiques sur l'environnement*). The BAPE report is scheduled for publication in early 2014.

Arianne Phosphate released in June 2013 an environmental impact study for the Lac à Paul project, located about 200 km northeast of the town of Saguenay, followed by a feasibility study in November 2013. The project, involving an open pit mine and a mill, is expected to produce, on average, 3 Mt per year of apatite concentrate. Initial capital costs are estimated at US$982.5M for the mine and US$232.2M to transport the apatite concentrate from the mine site to a shipping dock on the north shore of Rivière Saguenay in Saint-Fulgence. Mining operations could begin in 2016 and the mine would generate 375 jobs over a period of nearly 26 years.

Rare earths

In the Labrador Trough, about 130 km south of Kuujjuaq, **Commerce Resources Corporation** is continuing its metallurgical tests, environmental analyses and geotechnical drilling on the Ashram (Eldor) project to carry out a feasibility study. According to the preliminary economic assessment, the project includes an open pit mine, a mill and a hydrometallurgical plant. A mixed rare earth carbonate concentrate would be produced at a rate of 16.8 Kt per year over a period of at least 25 years. Capital costs for the project are estimated at $763M, including the cost of building a road and port facilities. The project would create 230 jobs.

About 220 km northeast of Schefferville, work by **Quest Rare Minerals Corporation** is progressing rapidly on the B-Zone deposit on its Strange Lake project. The prefeasibility study was released on November 23, 2013. The project involves an open pit mine, a mill and a hydrometallurgical plant where products will be separated. The production of mixed rare earth oxide concentrate and niobium and zirconium by-products is being considered. Quest Rare Minerals is planning to ship its entire ore production (1.4 Mt per year) by truck then by boat to Bécancour. To do so, the company needs to build a 165-km road to Anaklalak Bay in Labrador as well as port facilities ($330M). In 2016-2017, the company is planning to develop the mine site at Strange Lake and to build the hydrometallurgical plant in Bécancour, at a cost of $1.3B. Mining operations are expected to begin in late 2017. This project will cost an estimated $2.56B and will create 500 jobs during the construction phase and 834 jobs during the mining phase (324 jobs at the mine, 381 jobs at the plant, and 129 jobs in administration and infrastructure). The company is working to raise the $50M required to complete the feasibility study, scheduled for 2014. It also wishes to interest a strategic partner to advance the project.

In the Témiscamingue region on the Zeus property, **Matamec Explorations** completed a feasibility study on the Kipawa rare earth project in September 2013. It is the first study of its kind in Québec. Toyotsu Rare Earth Canada (TRECan) is the strategic partner of Matamec Explorations on this project. A new phase of metallurgical testing, process optimization and engineering is planned in the coming months. The permitting process is underway. The project involves an open pit mine, a mill and a hydrometallurgical plant, to produce annually 3.6 Kt of mixed heavy rare earth concentrate and mixed light rare earth concentrate. Mining operations may begin in 2016. The estimated cost for the project is $374M and 230 jobs would be created.

Two other projects at the advanced exploration phase are also worthy of mention, namely the Montviel project by **GeoMegA Resources** near Lebel-sur-Quévillon and the Niobec rare earth project by **Mines Niobec** (IAMGOLD Corporation) near Saguenay. In addition, **Innovation Metals** is currently considering a project to build a rare earth separation plant in the Bécancour area.

Zinc

Glencore Canada Corporation and **Donner Metals** were bound by an agreement, the Matagami Exploration Joint Venture, focusing on five (5) distinct properties in the Matagami area. On December 12, 2013, Donner Metals agreed to sell to Glencore Canada Corporation its interest in this joint venture.

5.2
Mine development

Alumina

In December 2013, **Orbite Aluminae** was in the process of finalizing construction of a high-purity alumina (HPA) production facility in Cap-Chat, Gaspésie. The company will proceed once it has raised the necessary financing. The plant will be supplied with smelter-grade alumina (SGA) from Orbite, if its SGA plant is commissioned, or from another supplier. Commercial production at the plant is expected to be on the order of 3 tonnes per day in the fourth quarter of 2014, ramping up to 5 tonnes per day during the first half of 2015. HPA will be sold to clients for the production of ceramics, electronic components, sapphires, and light-emitting diodes (LED). Subsequently, Orbite Aluminae will proceed with its construction project to build a SGA production plant.

Iron

Tata Steel Minerals Canada (TSMC), a joint venture between **New Millennium Iron Corporation** and **Tata Steel**, began open pit mining operations to produce high-grade (~60%) iron ore on the DSO project near Schefferville. From 2014 onward, the company intends to improve its ore processing methods. The commissioning and ramp-up period for the project will continue throughout 2014.

Lithium

In the Abitibi region near La Corne, **Québec Lithium inc.**, a subsidiary of Canada Lithium Corporation, finalized at year-end the construction of mining and processing infrastructure as well as the lithium carbonate production plant on the Québec Lithium project. The commissioning and ramp-up period is underway and commercial production will be achieved in early 2014. The processing plant processes spodumene ore from the nearby open pit mine. The annual production is expected to reach 20,000 tonnes of lithium carbonate. The expected mine life would be 15 years and about 200 jobs will be created. A five-year offtake agreement for 12,000 to 14,400 tonnes per year of lithium carbonate was concluded with a Chinese company. This is the first active spodumene mining operation and lithium carbonate production plant in Québec since 1955. In December 2013, Québec Lithium inc. and Sirocco Mining announced their intention to merge the two companies. Sirocco operates an iodine mine in Chile.

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

Canadian Royalties, a subsidiary of **Jilin Jien Nickel**, completed construction work on its Nunavik Nickel project, with the exception of port facilities in Deception Bay. This mine site is located about 100 km west of the Inuit community of Kangiqsujuaq. Mining and processing operations began during the first half of 2013. The commissioning and ramp-up period took much longer than expected, putting the company in a difficult situation. The company is hoping for a turnaround in 2014.

Gold

The Elder project held by **Abcourt Mines** is located about 10 km northwest of Rouyn-Noranda. In November 2012, Abcourt Mines released a preliminary economic assessment for an underground mining project at the former Elder mine. In April 2013, the company received the certificate of authorization to extract 75,000 tonnes of ore, which represents 12,500 ounces of gold. Ore extracted to date has been shipped to the Sleeping Giant mill (property of Aurbec Mines) located 195 km from the mine site. The first gold bar was produced in mid-October, but the project did not reach commercial production in 2013.

In the Baie-James region, the Eleonore project is in construction at a cost of $1.75B. **Les Mines Opinaca**, a subsidiary of Goldcorp, intends to commence production at the end of 2014. This will be an underground mine with a capacity of 7,000 tonnes of ore per day, for an average annual production of 600,000 ounces of gold. Mining operations are expected to last 10 years and create more than 600 jobs.

Agnico Eagle Mines continued development work on two new zones at the Goldex mine near Val-d'Or over the course of 2013. Capital investments are estimated at about $100M, to consolidate 150 jobs and create 100 additional jobs. Extraction and crushing activities resumed in satellite zones E and M at the end of the third quarter of 2013. Commercial production is expected to be achieved in early 2014 and will last an estimated 4 years. The mine and processing plant are located about 60 km east of the LaRonde mine, Agnico Eagle property. In October 2011, production was suspended in the GEZ zone due to geotechnical problems. The company performed the necessary work to correct the situation. Exploration in the deeper D zone could extend the mine life.

About 25 km south of Matagami, **North American Palladium** (NAP) worked to bring the Vezza mine into production. Annual production was expected to reach 39,000 ounces of gold over a period of 7 to 9 years. The company announced however its intention to sell the property. In March 2013, **Maudore Minerals** acquired all of NAP Québec's assets (Vezza mine, Sleeping Giant mine, mill, tailings pond, exploration properties) for $18M and 1.5 million shares and created a subsidiary, **Aurbec Mines**. In July 2013, Maudore Minerals suspended development work at the Vezza mine and moved some of the workers to the Sleeping Giant site to conduct exploration and development work with the objective of resuming mining operations. In November 2013, processing of stockpiled ore at Vezza was completed. Stopes will be allowed to flood. The Vezza project is now classified as a deposit with a tonnage estimate pending an eventual resumption of operations.

On June 4, 2013, **IAMGOLD Corporation** inaugurated the Westwood mine. The capital cost for the Westwood project, including refurbishing the Doyon processing plant, totalled $700M. The annual gold production will be 186,000 ounces over a mine life estimated at 19 years. A total of 700 employees will be required at the underground mine and the processing plant. Gold ore from Westwood will be processed at the Doyon mill. Tailings and waste rock generated from mining operations will be used to rehabilitate the former Doyon mine. In the fall, the company revised and postponed the date of commercial production to the third quarter of 2014. In 2013, IAMGOLD Corporation launched a $100M cost reduction program.

Figure 5.1 - **Location of projects in the deposit appraisal phase in Québec in 2013.**

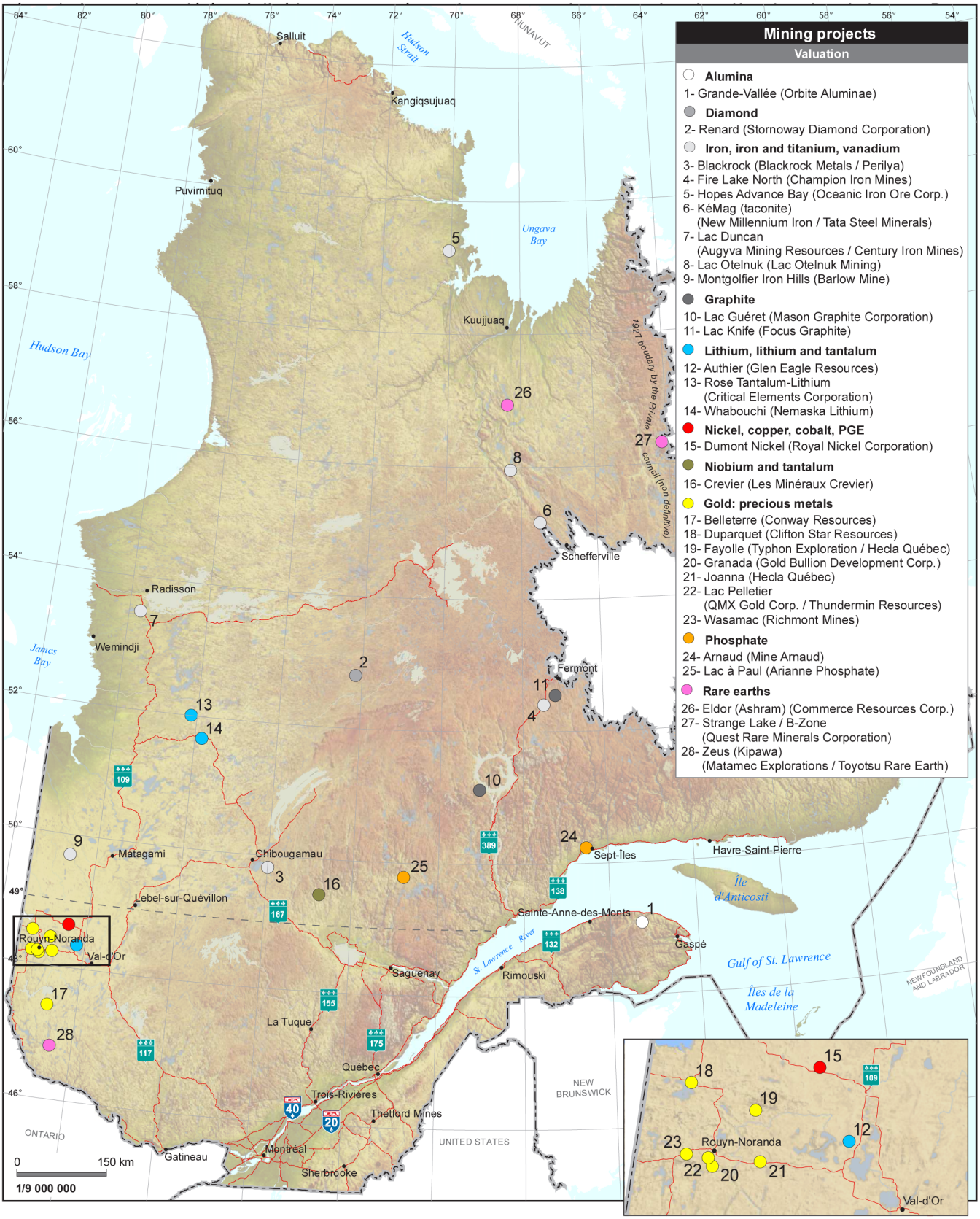


Figure 5.2 - **Location of the mining projects in the development phase in Québec in 2013.**

TABLE 5.1 – **Mining projects in the deposit apraisal phase in Québec in 2013[1] (see Figure 5.1).**

No.	Township / Nts / 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
Alumina													
1	LEFRANCOIS / 22H03 / Gaspésie–Îles-de-la-Madeleine	Grande-Vallée	Orbite Aluminae	Argillite Open pit mine	Alumina	n/a	n/a	n/a	67.3 Mt at 23.4% Al_2O_3		6,960 t/d (mill)	n/a	100 years
Diamond													
2	33A16 / Nord-du-Québec	Renard	Stornoway Diamond Corporation	Kimberlite-hosted diamond deposit Open pit and underground mine	Diamond	n/a	*23.79 Mt at 0.755 c/t	n/a	35.45 Mt at 0.764 c/t	29.67 Mt at 0.57 c/t	7,000 t/d (mill)	2016	11 years
Iron, iron-titanium-vanadium													
3	LEMOINE / 32G16 / Nord-du-Québec	BlackRock	BlackRock Metals / Perilya	Titanium-vanadium magnetite Open pit mine	Iron Ilmenite Vanadium	64.3 Mt at 30.3% Fe 8.48% TiO_2 0.49% V_2O_5	227.4 Mt at 26.3% Fe 7.22% TiO_2 0.4% V_2O_5	n/a	n/a	n/a	12,400,000 t/y (mill)	2016	25 years
4	MALAPART / 23B06 / Côte-Nord	Fire Lake North	Champion Iron Mines	Specular hematite in metamorphosed Lake Superior-type iron formations Open pit mine	Iron	23.73 Mt at 35.96% Fe	440.86 Mt at 32.17% Fe	n/a	n/a	n/a	23,000,000 t/y (mill)	2016	20 years
5	24M08 / Nord-du-Québec	Hopes Advance Bay	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	26,000,000 t/y (mill)	2018	31 years
6	23O04 / Nord-du-Québec	KéMag (taconite)	New Millennium Iron Corporation / Tata Steel Minerals Canada	Taconite Open pit mine	Iron	n/a	n/a	n/a	300 Mt at 31.3% Fe	n/a	76,000,000 t/y (mill)	n/a	25 years
7	3112 / 33F05 / Nord-du-Québec	Lac Duncan	Augyva Mining Resources / Century Iron Mines Corporation	Magnetite in meta-morphosed Lake Superior-type iron formation Open pit mine	Iron	n/a	n/a	406 Mt at 23.92% Fe	645 Mt at 24.73% Fe	563 Mt at 24.69% Fe	115,000 t/d (mill)	2017	20 years
8	23N16 / Nord-du-Québec	Lac Otelnuk	Lac Otelnuk Mining	Taconite Open pit mine	Iron	n/a	n/a	5,510 Mt at 29.2% Fe	5,840 Mt at 28.7% Fe	12,390 Mt at 30.4% Fe	195,000,000 t/y (mill)	2019	30 years
9	32E10 / Nord-du-Québec	Montgolfier Iron Hills	Barlow Mine	Taconite Open pit mine	Iron	n/a	n/a	826.5 Mt at 21% Fe	437.1 Mt at 20.1% Fe	1,026.6 Mt at 20.1% Fe	60,000,000 t/y (mill)	n/a	n/a
Graphite													
10	22N03 / Côte-Nord	Lac Guéret	Mason Graphite Corporation	Graphite deposit in paragneiss Open pit mine	Graphite	n/a	n/a	4.52 Mt at 15.5%	45.51 Mt at 15.6% Cgr	11.86 Mt at 17.1% Cgr	50,000 t/y (mill)	2016	22 years
11	23B11 / Côte-Nord	Lac Knife	Focus Graphite	Graphite deposit in paragneiss Open pit mine	Graphite	n/a	n/a	n/a	4.9 Mt at 15.76% Cgr	3 Mt at 15.58% Cgr	44,300 t/y (mill)	2016	20 years

TABLE 5.1 – **Mining projects in the deposit apraisal phase in Québec in 2013[1] (see Figure 5.1).**

No.	TOWNSHIP / NTS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DSCRIPTION 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
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% Li_2O	5.12 Mt at 0.92% Li_2O	0.29 Mt at 0.87% Li_2O	2,200 t/d (mill)	n/a	12 years
13	33C01 / Nord-du-Québec	RoseTantalum-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_2O 163 g/t Ta_2O_5	10.7 Mt at 0.86% Li_2O 145 g/t Ta_2O_5	4,600 t/d (mill)	n/a	17 years
14	32O12 / Nord-du-Québec	Whabouchi	Nemaska Lithium	Spodumene-bearing granitic pegmatites Open pit mine	Lithium	n/a	n/a	10.2 Mt at 1.53% Li_2O	9.44 Mt at 1.455% Li_2O	n/a	3,000 t/d (mill)	2015	18 years
Nickel, copper, cobalt, PGE													
15	LAUNAY / 32D09 / Abitibi-Témiscamingue	Dumont Nickel	Royal Nickel Corporation	Magmatic Ni-Cu-PGE Open pit mine	Nickel Platinum Palladium Cobalt	*179.6 Mt at 0.32% Ni 0.013 g/t Pt 0.029 g/t Pd 114 g/t Co	*999 Mt at 0.26% Ni 0.008 g/t Pt 0.017 g/t Pd 106 g/t Co	372.1 Mt at 0.28 % Ni 0.011 g/t Pt 0.024 g/t Pd 112 g/t Co	1,293.5 Mt at 0.26 % Ni 0.008 g/t Pt 0.017 g/t Pd 106 g/t Co	499.8 Mt at 0.26 % Ni 0.006 g/t Pt 0.014 g/t Pd 101 g/t Co	52,000 t/d (mill)	2016	33 years
Niobium and tantalum													
16	CREVIER / 32H07 / Saguenay–Lac-Saint-Jean	Crevier	Les Minéraux Crevier	Nepheline syenite dykes, alkaline igneous complex Open pit mine	Niobium Tantalum	n/a	n/a	12.47 Mt at 0.2% Nb_2O_5 0.023% Ta_2O_5	12.9 Mt at 0.19% Nb_2O_5 0.023% Ta_2O_5	15.42 Mt at 0.17% Nb_2O_5 0.025% Ta_2O_5	6,000 t/d (mill)	2017	14 years
Gold: precious metals													
17	GUILLET / 31M07 / Abitibi-Témiscamingue	Belleterre	Conway Ressources	Orogenic lode gold Underground mine	Gold	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
18	DUPARQUET / 32D11 / Abitibi-Témiscamingue	Duparquet	Clifton Star Resources	Shear-related disseminated gold sulphides and quartz-carbonate veinlets Open pit mine	Gold	n/a	n/a	0.18 Mt at 1.52 g/t Au	60.7 Mt at 1.59 g/t Au	29.68 Mt at 1.51 g/t Au	8,000 t/d (mill)	n/a	16 years
19	AIGUEBELLE / 32D07 / Abitibi-Témiscamingue	Fayolle	Exploration Typhon / Hecla Québec	Shear-related disseminated gold sulphides and quartz-carbonate veinlets Underground and open pit mine	Gold	n/a	n/a	n/a	0.55 Mt at 5.75 g/t Au	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	Shear-related disseminated gold sulphides and quartz veinlets Underground and open pit mine	Gold	n/a	n/a	24.99 Mt at 1.01 g/t Au	9.34 Mt at 1.18 g/t Au	0.45 Mt at 0.77 g/t Au	7,500 t/d (mill)	n/a	11 years

TABLE 5.1 – **Mining projects in the deposit apraisal phase in Québec in 2013[1] (see Figure 5.1).**

No.	TOWNSHIP / NTS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DSCRIPTION 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
21	JOANNES / 32D02 / Abitibi-Témiscamingue	Joanna	Hecla Québec	Shear-related disseminated gold sulphides and quartz veinlets Open pit mine	Gold	28.25 Mt at 1.305 g/t Au	12.85 Mt at 1.151 g/t Au	1.89 Mt at 1.14 g/t Au	18.38 Mt at 1.36 g/t Au	16.85 Mt at 1.53 g/t Au	8,500 t/d (mill)	n/a	13 years
22	ROUYN / 32D03 / Abitibi-Témiscamingue	Lac Pelletier	QMX Gold Corporation / Thundermine Resources	Lode gold: greenstone-hosted quartz-carbonate veins Underground mine	Gold	*0.06 Mt at 6.2 g/t Au	*0.11 Mt at 6.6 g/t Au	0.06 Mt at 8.6 g/t Au	0.22 Mt at 8.61 g/t Au	0.42 Mt at 8.37 g/t Au	620 t/d (extraction) Ore processed at Camflo	n/a	1 year
23	BEAUCHASTEL / 32D03 / Abitibi-Témiscamingue	Wasamac	Richmont Mines	Lode gold: greenstone-hosted quartz-carbonate veins Underground mine	Gold	n/a	n/a	3.12 Mt at 2.75 g/t Au	12.13 Mt at 2.89 g/t Au	18.76 Mt at 2.66 g/t Au	n/a	n/a	14 years
Phosphate													
24	ARNAUD / 22J02 / Côte-Nord	Arnaud	Mine Arnaud	Layered mafic complex Open pit mine	Phosphate	*260 Mt at 4.34% P_2O_5	*64.4 Mt at 4.74% P_2O_5	370.87 Mt at 4.16% P_2O_5	110.87 Mt at 4.24% P_2O_5	42.76 Mt at 3.52% P_2O_5	30,000 t/d (mill)	2017	28 years
25	22E15 / Saguenay–Lac-Saint-Jean	Lac à Paul	Arianne Phosphate	Anorthosite-related magmatic deposit Open pit mine	Phosphate	*313.71 Mt at 6.92% P_2O_5	*158.38 Mt at 6.8% P_2O_5	336.76 Mt at 7.22% P_2O_5	253.48 Mt at 7.02% P_2O_5	9.81 Mt at 5.89% P_2O_5	50,000 t/d (mill)	2016	26 years
Rare earths													
26	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 0.07% HREO 0.058% Y_2O_3	27.67 Mt at 1.9% TREO 1.82% LREO 0.05% HREO 0.038% Y_2O_3	219.8 Mt at 1.88% TREO 1.81% LREO 0.04% HREO 0.03% Y_2O_3	4,000 t/d (mill)	n/d	25 years
27	24A08 / Nord-du-Québec	Strange Lake / B-Zone	Quest Rare Minerals Corporation	REE- and yttrium-enriched pegmatite and aplite in peralkaline granite Open pit mine	Rare earths Light RE Heavy RE Zirconium Yttrium	n/a	*43.2 Mt at 1.16% TREO 0.53% LREO 0.63% HREO 2.31% ZrO_2 0.35% Y_2O_3	n/a	278.13 Mt at 0.93% TREO 0.57% LREO 0.12% HREO 1.92% ZrO_2 0.24% Y_2O_3	214.35 Mt at 0.85% TREO 0.55% LREO 0.11% HREO 1.71% ZrO_2 0.19% Y_2O_3	1.44 Mt/y (extraction) Mill expected at Bécancour	2017	30 years
28	VILLEDIEU / 31L15 / Abitibi-Témiscamingue	Zeus (Kipawa)	Matamec Explorations / Toyotsu Rare Earth Canada	REE-enriched syénite Open pit mine	Rare earths Light RE Heavy RE Yttrium	*10.22 Mt at 0.44% TREO 0.28% LREO 0.06% HREO 0.10% Y_2O_3	*9.55 Mt at 0.38% TREO 0.24% LREO 0.05% HREO 0.09% Y_2O_3	10.48 Mt at 0.46% TREO 0.29% LREO 0.06% HREO 0.11% Y_2O_3	13.38 Mt at 0.36% TREO 0.23% LREO 0.05% HREO 0.08% Y_2O_3	3.27 Mt at 0.31% TREO 0.22% LREO 0.04% HREO 0.06% Y_2O_3	3,650 t/d (mill)	2016	13 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.
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.
LREO: Lanthanum, cérium, praséodymyum, néodymium, samarium
HREO: Europium, gadolinium, terbium. Dysprosium, holmium, erbium, thulium, ytterbium, lutécium
TREO: LREO + HREO + Y_2O_3

TABLE 5.2 – **Mining projects in the development phase in Québec in 2013[1] (see Figure 5.2).**

No.	TOWNSHIP / NTS / 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
Iron													
1	23J14 / Côte-Nord	DSO	Tata Steel Minerals Canada	Enriched iron formations Open pit mine	Iron	21.1 Mt at 59.87% Fe	43.01 Mt at 58.38% Fe	21 Mt at 59.2% Fe	n/a	10.3 Mt at 58.3% Fe	4,000,000 t/y (mill)	2013	15 years
Lithium													
2	LA CORNE / 32C05 / Abitibi-Témiscamingue	Québec Lithium inc.	Québec Lithium	Spodumene-bearing granitic pegmatites Open pit mine	Lithium	*6.61 Mt at 0.92% Li_2O	*10.46 Mt at 0.95% Li_2O	6.91 Mt at 1.18% Li_2O	26.33 Mt at 1.19% Li_2O	13.76 Mt at 1.21% Li_2O	3,800 t/d (mill)	2013	15 years
Nickel, copper, cobalt, PGE													
3	8030 / 35H11 / Nord-du-Québec	Nunavik Nickel	Canadian Royalties / Jilin Jien Nickel	Magamatic Ni-Cu-PGE Open pit and underground mine	Nickel Copper Palladium Platinum Cobalt	n/a	n/a	0.56 Mt at 0.93% Ni 1.1% Cu	21.34 Mt at 0.93% Ni 1.15% Cu	5.24 Mt at 0.72% Ni 0.93% Cu	4,500 t/d (mill)	2013	15 years
Gold: precious metals													
4	BEAUCHASTEL / 32D06 / Abitibi-Témiscamingue	Elder	Abcourt Mines	Orogenic lode gold Underground mine	Gold	n/a	n/a	0.51 Mt at 6.68 g/t Au	0.67 Mt at 6.5 g/t Au	0.41 Mt at 5.76 g/t Au	630 t/d (extraction) Ore processed at Géant Dormant	2014	11 years
5	33C09 / Nord-du-Québec	Éléonore	Les Mines Opinaca / Goldcorp	Disseminated-replacement gold deposit in a highly metamorphosed sedimentary sequence Underground mine	Gold	n/a	12.48 Mt at 7.56 g/t Au	0.14 Mt at 10.01 g/t Au	1.23 Mt at 11.05 g/t Au	12.25 Mt at 10.6 g/t Au	7,000 t/d (mill)	2014	10 years
6	DUBUISSON / 32C04 / Abitibi-Témiscamingue	Goldex	Agnico Eagle Mines	Quartz-tourmaline veins with Py-Cp cross-cutting granodiorite sills and dykes Underground mine	Gold	0.06 Mt at 1.7 g/t Au	6.94 Mt at 1.55 g/t Au	12.36 Mt at 1.83 g/t Au	14.81 Mt at 1.83 g/t Au	34.65 Mt at 1.52 g/t Au	8,200 t/d (mill)	2013	4 years

TABLE 5.2 – **Mining projects in the development phase in Québec in 2013[1] (see Figure 5.2).**

No.	TOWNSHIP / NTS / 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
7	Vezza / 32F12 / Nord-du-Québec	Vezza	Mines Aurbec / Minéraux Maudore	Orogenic lode gold Underground mine	Gold	n/a	n/a	0.19 Mt at 6.1 g/t Au	1.52 Mt at 5.8 g/t Au	0.63 Mt at 5.0 g/t Au	750 t/d (extraction) Ore processed at Géant Dormant	n/a	7-9 years
8	BOUSQUET / 32D07 / Abitibi-Témiscamingue	Westwood	IAMGOLD Corporation	Gold-rich volcanogenic massive sulphides, stockwerk and disseminated sulphides Underground mine	Gold	*0.27 Mt at 7.6 g/t Au	*0.67 Mt at 13.1 g/t Au	0.28 Mt at 7.5 g/t Au	1.12 Mt at 13 g/t Au	9.59 Mt at 10.6 g/t Au	2,600 t/d (mill)	2013	19 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.
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.

Photo : MERN

CHAPTER 6

Mineral production

6.1

Economic data and statistics on mineral production[10]

Martin Labrecque

Mineral shipments

Québec is one of the most important mining producers in Canada, particularly for metallic minerals. In 2013, Québec ranked second among Canadian provinces for the value of mineral shipments, second only to Ontario, historically the most important mining producer in Canada. For metallic minerals in particular, after two years in the pole position in 2009 and 2010, Québec is since 2011 the second largest producer in Canada, again trailing Ontario[11]. It remains however the most diversified mineral producer in Canada, given the production and beneficiation of 31different minerals (16 metallic and 15 non-metallic minerals) within its borders.

The value of Québec shipments in 2013 (metallic and non-metallic minerals) has reached $8.3B, an 3% increase relative to the previous year ($8B). This considerable increase is attributable to the value of mineral shipments that has considerably increased in recent years following the rising price of several metals between 2003 and 2011, in particular iron and gold, the two most important mineral commodities produced in Québec in terms of tonnage and value (tables 6.1 and 6.2).

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

Commodities produced in Québec

In Québec, iron, gold, titanium dioxide, stone (crushed, architectural, etc.), nickel, and zinc are the main commodities produced in terms of value. Québec also produces several other metallic and non-metallic mineral commodities.

Companies operating metallic ore mines in Québec

There were seventeen metallic ore mines in operation in Québec during the second half of 2013 (Table 6.3).

In addition to exploration and deposit appraisal expenditures, companies in the mining sector make significant investments in mine development, 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 three administrative regions where the most important mines in Québec are found (Table 6.4).

10 - 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*, under the Mining Statistics Program
11 - According to preliminary data from the *Institut de la statistique du Québec* and Natural Resources Canada

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

No.	Region	2011	2012	2013p
01	Bas-Saint-Laurent	58	64	61
02	Saguenay–Lac-Saint-Jean	194	213	228
03	Capitale-Nationale	188	188	152
04	Mauricie	25	30	30
05	Estrie	84	86	81
06	Montréal	c	c	c
07	Outaouais	25	23	22
08	Abitibi-Témiscamingue	1,320	1,459	1,604
09	Côte-Nord	3,328	2,540	2,920
10	Nord-du-Québec	1,431	1,319	1,305
11	Gaspésie–Îles-de-la-Madeleine	64	59	54
12	Chaudière-Appalaches	76	65	51
13	Laval	c	c	c
14	Lanaudière	202	169	156
15	Laurentides	99	116	79
16	Montérégie	1,290	1,583	1,477
17	Centre-du-Québec	36	41	34
	Total	**8,482**	**8,037**	**8,299**

p: data for 2013 are preliminary
c: confidential data
Source: *Institut de la statistique du Québec*

Primary processing activities

There are in Québec nearly 35 establishments where primary processing activities are carried out on ore mined in Québec or from abroad (Table 6.5). These activities are often based outside of mining regions, which helps spread the economic benefits of the mining sector across the entire province.

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

In addition to these establishments, there are also in Québec primary processing plants for non-metallic commodities such as cement plants, lime production facilities, clay plants, and processing plants for peat, graphite, and perlite.

Jobs in the mining sector

In 2013, according to preliminary data from the *Institut de la statistique du Québec*, the total number of jobs related to mineral extraction activities in Québec (metallic and non-metallic ores) was 14,566 (Table 6.6). These jobs were distributed throughout all regions of Québec, particularly in the Abitibi-Témiscamingue, Côte-Nord, and Nord-du-Québec regions, where the vast majority of metallic ore mines are located.

When jobs related to primary metal processing and the production of non-metallic mineral products are added, mineral extraction and metal and mineral processing activities account for a total of nearly 45,000 direct jobs.

Note also that due to the scope of its activities and its investments, the mining 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 about 0.9 indirect job in another sector (in the services sector for example)[12].

12 - Based on a study of economic benefits by the *Ministère des Ressources naturelles* in May 2011.

TABLE 6.2 - **Mineral shipments from Québec per commodity – 2011 to 2013.**

Commodity	2011		2012		2013p	
	Volume	Value ($M)	Volume	Value ($M)	Volume	Value ($M)
Metallic minerals						
Antimony (t)	c	c	1	< 1	c	c
Bismuth (t)	5	< 1	4	< 1	6	< 1
Cadmium (t)	1,427	4	152	< 1	101	< 1
Cobalt (t)	450	18	475	15	630	19
Copper (t)	20,043	175	23,649	188	31,364	237
Gold (kg)	26,094	1,302	28,094	1,507	35,690	1,697
Iron (ore) (kt)	19,808	3,054	20,309	2,546	22,928	2,859
Iron, remelt (t)	c	c	c	c	c	c
Lead (t)	2,264	6	1,207	2	420	1
Nickel (t)	26	599	27	473	32	503
Niobium (t)	4,551	c	4,705	c	4,910	c
Platinum group (kg)	c	c	c	c	c	c
Selenium (t)	19	3	37	4	26	2
Silver (t)	131	148	117	118	119	97
Tellurium (t)	2	< 1	3	< 1	2	< 1
Zinc (t)	191,120	415	167,628	385	129,884	254
Total - Metallic minerals	-	*6,601*	-	*5,887*	-	*6,377*
Non-metallic minerals						
Cement (kt)	2,705	377	2,834	329	2,421	305
Chrysotile asbestos (kt)	c	c	c	c	c	c
Clay products (bricks)	c	c	c	c	c	c
Graphite (t)	c	c	c	c	c	c
Ilmenite (kt)	c	c	c	c	c	c
Lime (kt)	753	101	c	c	c	c
Mica (t)	c	c	c	c	c	c
Peat (kt)	345	70	329	98	352	103
Salt (t)	c	c	c	c	c	c
Sand and gravel (kt)	21,350	112	26,418	142	23,582	119
Silica (kt)	538	19	568	23	506	22
Stone (kt)	49,566	531	46,843	516	39,041	416
Sulphur(kt)	135	25	151	30	139	26
Talc (t)	c	c	c	c	c	c
Titanium dioxide (t)	c	c	c	c	c	c
Total - Non-metallic minerals	-	*1,880*	-	*2,150*	-	*1,922*
Grand Total		**8,482**		**8,037**		**8,299**

p: data for 2013 are preliminary
c: confidential data
Sources: *Institut de la statistique du Québec* and Natural Resources Canada

TABLE 6.3 – **Active metallic ore mines in Québec and operating companies.**

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	Public (subsidiary of GlencoreXstrata)	Baar (Switzerland)
Canadian Malartic	Gold	Osisko	Public	Montréal
Casa Berardi	Gold	Hecla Mining	Public	Cœur d'Alene, Idaho (USA)
Fire Lake	Iron ore	ArcelorMittal Mines Canada	Public (subsidiary of ArcelorMittal)	Luxembourg
Lac Bachelor	Gold	Metanor Resources	Public	Val-d'Or
Lac Bloom	Iron ore	Cliffs Natural Resources	Public	Cleveland (USA)
Lac Herbin	Gold	QMX Gold Corporation	Public	Toronto
LacTio	Ilmenite (iron and titanium)	Rio Tinto, Fer et Titane	Public (subsidiary of Rio Tinto Group)	London (UK)
Langlois	Zinc	Nyrstar Canada Resources	Public (subsidiary of Nyrstar)	Zurich (Switzerland)
Lapa	Gold	Agnico Eagle Mines	Public	Toronto
LaRonde	Gold	Agnico Eagle Mines	Public	Toronto
Monique	Gold	Richmont Mines	Public	Rouyn-Noranda
Mont-Wright	Iron ore	ArcelorMittal Mines Canada	Public (subsidiary of ArcelorMittal)	Luxembourg
Mouska	Gold	IAMGOLD	Public	Toronto
Niobec	Niobium	Niobec	Public (subsidiary of IAMGOLD)	Toronto
Raglan	Nickel	Glencore Canada	Public (subsidiary of Glencore Canada Corporation)	Baar (Switzerland)

Source: *Ministère de l'Énergie et des Ressources naturelles.* Data as of December 2013.

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		
	Expl. & dep. app.	Mine devel.	Total	Expl. & dep. app.	Mine devel.	Total	Expl. & dep. app.	Mine devel.	Total	Expl. & dep. app.	Mine devel.	Total	Expl. & 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*	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	447	4,178	4,625

* Data for 2013 are revised spending intentions in the summer and fall 2013.
Source: *Institut de la statistique du Québec.*

TABLE 6.5 - **Primary metallic ore processing plants in Québec in 2013*.**

Type	Name	Owner	Location
Copper refinery	Canadian Copper Refinery (CCR)	Glencore Canada	Montréal
Zinc refinery	Canadian Electrolytic Zinc (CEZ)	Noranda Income Limited Partnership	Montérégie
Copper smelter	Horne Smelter	Glencore Canada	Abitibi-Témiscamingue
Smelter & iron-titanium processing plant	RTFT metallurgical complex	Rio Tinto, Fer et Titane	Montérégie
Ferroalloy plant	Niobec plant	Niobec (subsidiary of IAMGOLD)	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 Inc.	Côte-Nord

* Does not include steel mills.
Source: MERN compilation accurate as of November 2013

TABLE 6.6 - **Distribution of direct jobs in the mineral production sector per administrative region in 2013p.**				
No.	**Regions**	**Number of jobs**	**Wages and salaries paid ($M)**	**Hours paid (thousands)**
01	Bas-Saint-Laurent	511	17	812
02	Saguenay–Lac-Saint-Jean	704	52	1,394
03	Capitale-Nationale	349	13	551
04	Mauricie	134	4	172
05	Estrie	204	7	253
06	Montréal	c	c	c
07	Outaouais	101	3	156
08	Abitibi-Témiscamingue	3,255	364	6,827
09	Côte-Nord	4,446	515	9,360
10	Nord-du-Québec	2,738	267	5,289
11	Gaspésie–Îles-de-la-Madeleine	237	9	346
12	Chaudière-Appalaches	243	7	292
13	Laval	c	c	c
14	Lanaudière	220	10	371
15	Laurentides	379	16	660
16	Montérégie	740	32	1,307
17	Centre-du-Québec	157	6	259
	Total	**14,566**	**1,333**	**28,430**

p: preliminary data
Source: *Institut de la statistique du Québec*

Employment injuries in the mining sector

As in any other industrial sector, each year the mining sector inevitably generates some employment injuries (occupational diseases, employment injuries, and industrial accidents).

The Act respecting industrial accidents and occupational diseases[13] 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 that the latter may sign the register to confirm he has indeed suffered an accident and the date of the accident. The employer must also ensure the *Commission de la santé et de la sécurité au travail* (CSST) has access to the register.

Each year, the mining sector[14] accounts for about 1% of all employment injuries reported in Québec by the CSST. Nevertheless, the performance of the mining sector continues to improve year after year. Employment injuries in the mining sector have dropped by 27% over the period from 2001 to 2012, an improvement similar to what is observed in other industrial sectors in Québec[15] (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 diminish employment injuries. The CSST is very much involved in the mining sector and has notably devoted an entire section of its website[16] to the mining sector, in which numerous guides and standards are presented. The CSST is also responsible for the Regulation respecting occupational health and safety in mines[17]. On July 11, 2013, fourteen amendments or additions were made. The previous amendments, totalling 11, were made in January 2011.

TABLE 6.7 – **Reported and confirmed employment injuries – Mines, quarries and oil wells, 2001-2012.**												
Category	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Industrial accident	1,375	1,436	1,274	1,170	1,175	1,077	1,130	1,051	792	897	948	980
Occupational disease	140	135	131	118	152	141	137	123	156	110	113	130
Total - Mining sector	1,515	1,571	1,405	1,288	1,327	1,218	1,267	1,174	948	1,007	1,061	1,110
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	89,640

Source: CSST

13 - www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=2&file=/A_3_001/A3_001_A.html
14 - Data on employment injuries include mineral extraction activities, as well as drilling of oil and gas wells. The latter represents a small fraction of jobs related to mining activities
15 - These data do not include employment injuries related to exploration and deposit appraisal activities, nor to the primary processing of metals and minerals.
16 - www.csst.qc.ca/prevention/secteur/minier/programme_intervention.htm
17 - www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=2&file=%2F%2FS_2_1%2FS2_1R14_A.htm

6.2
Mineral production

Martin Bernatchez, Katrie Bergeron, Denis Blackburn, Dominic Fragasso, Germain Girard, Denys Laplante, Jacinthe Paquet, Denis Raymond and N'golo Togola

Figure 6.1 shows the location of the 25 mines that were in operation in Québec in 2013. Tables 6.8 and 6.9 provide statistics on the production of metal commodities and industrial minerals in Québec, respectively.

Active mines: Openings and et closures

In 2013, **three (3) mines began** their commercial production while **two (2) others have ceased** operations.

Gold

Metanor Resources has reached commercial production at the **Lac Bachelor/Hewfran** underground mine on May 1, 2013. The company employs 250 workers for its mining operations.

Kiena Mine, property of **Mines d'or Wesdome**, ceased operations on June 30, 2013. The company employed 170 workers.

Richmont Mines has reached commercial production at **Monique Mine** on October 1, 2013. Mining operations should be completed in the third quarter of 2014.

Zinc

The **Perseverance** mine began operations in the fall of 2008 and closed at the end of June 2013. The company **Glencore Canada Corporation** employed 225 workers.

On other fronts, the company Glencore Canada Corporation began underground mining operations at the new **Bracemac-McLeod** mine in the spring of 2013. The company employs 250 workers.

Metal commodities

Metal commodities mined in Québec in 2013 include silver, copper, iron, nickel, niobium, gold, titanium, and zinc. Figure 6.1 shows the location of metallic ore mines and Table 6.8 lists information on the latter. Note that active metallic ore mines are those where mining titles are currently in effect.

Iron

ArcelorMittal Mines Canada (AMMC) invested in the expansion of its Mont-Wright mine site to increase its annual production of iron ore concentrate from 15 to 24 Mt. In June 2013, the company received its mining lease for the Hessé West project and the mill was commissioned on the 22nd of the month. It may take up to one year to complete the ramp-up period at the mill. The cost of this expansion is estimated at $1.5B, including the mine site and rail and port facilities. This investment will create more than 600 new jobs and extend the mine life until 2040. In 2013, the number of employees at AMMC (in Fermont and Port-Cartier) has reached about 2,500 workers.

Concentrate produced at Mont-Wright is shipped to Port-Cartier by rail, where 50% is processed into pellets and the remainder is sold as is. Concentrate and pellets are sold on European, Asian, and North American markets. The project to build a second pellet plant in Port-Cartier was postponed due to the current market situation and the high cost of pelletizing iron ore, which do not justify current margins obtained on sales prices. The company has already examined the possibility of increasing the capacity of the current plant to produce 10.5 Mt per year of pellets.

ArcelorMittal Mines Canada also operates the Fire Lake mine since 2006, where it extracts about 3 Mt of iron ore per year on a seasonal basis. The ore is shipped by rail to the processing plant at the Mont-Wright mining complex.

The Bloom Lake mine, property of **Cliffs Natural Resources** and **WISCO International Resources Development & Investment**, produced nearly 6 Mt of concentrate in 2013. The company expects to produce the same volume in 2014 and will announce in the early part of the year its decision concerning its expansion project at Bloom Lake. The expansion project, which was suspended in November 2012, would increase annual production at this mine site to 14 Mt per year of concentrate.

Iron-titanium

Rio Tinto Fer et Titane continued to invest in the Lac Tio mine, in order to extend the mine life to at least 2050.

Nickel, copper, cobalt, and platinum group elements

Glencore Canada Corporation continued mining operations at the Raglan mine site. The company is seriously considering the possibility of powering the Raglan site with energy sources other than diesel; potential options include wind power and natural gas. A pilot project is in the planning stages to test a wind turbine in 2014.

Niobium

The company Niobec, subsidiary of IAMGOLD Corporation, has maintained the annual production at Niobec mine at nearly 5 million kilograms of ferroniobium. The company has an expansion project estimated at $1.2B which aims to triple the annual ferroniobium production to 15 million kilograms and extend the mine life at about 40 years. This project would create 200 new jobs. The feasibility is scheduled for release at the beginning of 2014. The BAPE hearings concerning the expansion project are scheduled in 2014.

Gold

The Beaufor mine operated by **Richmont Mines** has an annual production guidance of 20,000 to 25,000 ounces of gold. Commercial production commenced on October 1st, 2013 in the W Zone. The latter is expected to produce 12,000 ounces of gold in 2014.

Osisko Mining Corporation invested in its Canadian Malartic mine to increase the production capacity at the processing plant by adding new stationary equipment. In 2014, the design capacity of the plant is expected to reach 55,000 tonnes per day, for an annual production targeted between 610,000 and 670,000 ounces of gold. Osisko Mining Corporation applied for a mining lease covering the Gouldie open pit, an extension of the Canadian Malartic mine. The company also honored its commitment to deposit the full financial guarantee of $46.44M covering the future rehabilitation costs for the entire mine site. Due to the gold price, the company implemented in 2013 an $80M cost reduction program.

On June 3, 2013, **Hecla Mining Company**, a mining company headquartered in Idaho (United States), announced the acquisition of **Aurizon Mines** through its subsidiary **Hecla Québec.** The transaction led to a few changes in the executive team. Since operations resumed in November 2006, the Casa Berardi mine is now in its seventh year of commercial production. Work to deepen the shaft at the West mine, undertaken in 2011, was completed during the second quarter of 2013. This work is expected to lead to an increase in mineral reserves and possibly add 6 to 10 years to the mine life. Commissioning of the processing plant took place during the third quarter of 2013. After producing 136,848 ounces of gold in 2012, the objective for 2013 is between 125,000 and 130,000 ounces of gold. The company applied for a mining lease for the expansion of the Casa Berardi mine.

The Kiena mine, held by **Wesdome Gold Mines**, produced 18,900 ounces of gold in 2012 from 265,800 tonnes of ore mined at an average recovered grade of 2.2 g/t Au. Activities were suspended at the mine on June 30, 2013, as they were no longer profitable. The mining company is planning to develop an exploration program in an effort to resume operations at the Kiena mine.

Underground development work at the Bachelor Lake mining project by **Metanor Resources** continued in 2013. Commercial production was achieved on May 1st, 2013. The mining lease for the Bachelor Lake mine expansion (Hewfran zone) was issued and announced on November 14, 2013, during the Québec Mines 2013 convention. The ore is processed at the mill on the mining site. The concentrate produced is melt-processed to produce a gold brick. The expected mine life is 4 years.

QMX Gold Corporation announced in July 2013 that it was suspending its development projects at the Lac Herbin mine due to lack of profitability. The company is planning to mine known ore lenses until the third quarter of 2014. In this context, the number of employees will gradually decrease as the mining of ore zones progresses. Measures were implemented to help as many workers as possible find jobs elsewhere in the mining industry. During the first nine months of 2013, the Lac Herbin mine produced about 15,350 ounces of gold, a production level in line with the annual guidance set at about 20,000 ounces of gold.

Wholly owned by **Agnico Eagle Mines**, the Lapa mine is located 11 km east of the LaRonde mine in Cadillac Township, about halfway between Val-d'Or and Rouyn-Noranda. Mining operations began on August 27, 2009. The company launched an exploration program in an effort to extend the mine life beyond 2016. In 2012, the Lapa mine produced 106,191 ounces of gold. Production objectives are set at 97,000 ounces in 2013, 96,000 ounces in 2014, and 65,000 ounces in 2015.

Over the course of 2013, **Agnico Eagle Mines** continued its expansion project undertaken in 2006 at the LaRonde mine, to access higher-grade ore located at more than 3 km depth. Production from the expansion will be added to the production from other zones and will extend the mine life to 2026. Some work was also carried out during the year to solve ventilation and congestion issues in the lower levels of the mine. The stated annual production objective is 157,500 ounces of gold. This mine also produces silver, copper and zinc. In 2014 and 2015, the average annual production rate at the LaRonde mine is expected to reach about 320,000 ounces over the life of the mine.

Richmont Mines reached a number of milestones on its Monique project located near Val-d'Or. The company namely obtained a mining lease in February 2012 and a global certificate of authorization in October 2012. Commercial production was achieved on October 1st, 2013. The commercial mine life is estimated at 19 months, and production over this period is estimated at 30,000 ounces of gold. Open pit mining operations may be followed by an underground phase.

IAMGOLD Corporation continues to use its processing facilities at the former Doyon mine in Preissac. Investments made at the Doyon mill, where ore from the Mouska mine is processed, will now serve to maintain the processing capacity to treat ore from the Westwood project. In 2013, production at the Mouska mine should stand at about 60,000 ounces of gold. Reserves at the mine are expected to be depleted during the first quarter of 2014, after 30 years of mining operations. IAMGOLD Corporation announced a $100M cost reduction program in 2013.

Zinc, copper, gold, and silver

In the spring of 2013, mining operations ceased at the Perseverance mine held by **Glencore Canada Corporation** due to depletion of its mineral resources. However, at nearly the same time, the new Bracemac-McLeod mine, located about 10 km from the Perseverance mine, commenced production. The new mine will be in operation for at least four years. The ore is processed at the Matagami mill. The zinc concentrate is sent to Valleyfield for processing.

In 2013, the Langlois mine held by **Nyrstar Canada Resources** continued mining operations with no major news or events.

Industrial minerals

The value of industrial mineral shipments, as established by the *Institut de la statistique du Québec*, reached $878M in 2013 (provisional data), compared to $890M in 2012 (preliminary data), for a slight drop of 1.4% 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, nor do they take into account the value of sand and gravel shipments.

Industrial minerals (non-metallic commodities) produced in Québec in 2013 include **potassium feldspar**, **graphite**, **mica**, **rock salt**, and **silica**. Figure 6.1 shows the location of industrial mineral mines and information about the latter is listed in Table 6.9. Note that active industrial mineral mines are those where mining titles are currently in effect.

Feldspar

Dentsply Canada extracts feldspar, used to make dental ceramics, at the Othmer mine deposit near Buckingham, in the Outaouais region. Mining operations are sporadic and excavation work is planned in 2014 to renew reserves and supply their plants located in Puerto Rico. Only 5 to 8% of the feldspar recovered at the mine is dental quality. Reserves are sufficient for several years.

Graphite

Timcal Graphite & Carbon extracts graphite at the Lac-des-Îles deposit located near Mont-Laurier. The company, member of the Imerys group, annually produces 24,000 tonnes of ultrafine to coarse flake graphite at its concentration plant. Timcal Graphite & Carbon is currently conducting exploration work to extend the mine life. The produced graphite is exported to Europe and the United States. It is used to produce refractories, lubricants, batteries (primary and rechargeable), in metallurgy, to make automotive parts and in new technologies (polymers, supercapacitors, fullerene, nanotubes, 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 next extraction period at the mine is scheduled for 2014. At the current production rate, the 27 Mt in ore reserves are sufficient to last one hundred years. The plant produces annually 30,000 tonnes of micronized mica which, given its insulating and heat-resistant properties, is destined for the construction market (ceramics, rubber, plastic, plaster, paint, electric and electronic components). Sixty percent of the production is sold on Asian markets and 40% in North America.

Salt

In 2013, nearly 1,400,000 tonnes of rock salt (halite) were extracted at the Seleine mine in the Îles-de-la-Madeleine. The mine is held by the **Société canadienne de sel** (formerly Windsor Salt), headquartered in Pointe-Claire. The mine has 10 Mt in proven reserves and 30 Mt in probable reserves. The residual mine life is estimated at about ten years. The rock salt 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 Charlevoix municipality produces annually 200,000 tonnes of silica and is jointly operated by **Silicium Québec** and **Sitec**. The 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.

In 2013, the mine operated by **Unimin Canada** in Saint-Canut produced 200,000 tonnes of silica from a siliceous sandstone. The processing plant on site has an annual production capacity of 500,000 tonnes. The silica is almost exclusively sold in the Montréal area to manufacture glass bottles.

The third silica mine in operation is held by **Société minière Gerdin** in Saint-Rémi-d'Amherst, in the Laurentides region.

Industrial stone

The location of industrial stone quarries in Québec is shown in Figure 6.2 and information relating to these quarries is listed in Table 6.10.

Industrial stone varieties produced in Québec in 2013 include **limestone**, **dolomite**, **marble, quartzite, sandstone**, and **shale**. Limestone, dolomite, and marble are mined for industrial purposes in fourteen quarries and are used to produce quick lime, various aggregate products (soil amendments, mineral fillers, granules), or cement. 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 region.

Architectural stone

Figure 6.3 shows the location of architectural stone quarries in operation in Québec in 2013. Brief descriptions of each quarry are presented in Table 6.11.

Seventy-three (73) architectural stone quarries were active in Québec in 2013. The **Rivière-à-Pierre** area, with its twelve quarries in operation, constitutes the most important region in Québec for the production of stone. Other areas of interest for the production of architectural stone namely include Saint-Nazaire and Chute-des-Passes (five quarries) as well as the Saint-Alexis-des-Monts and Saint-Didace areas (five quarries).

Peat

Information regarding peat harvesting sites in Québec is listed in Table 6.12 and the location of these sites is shown in Figure 6.4.

For the 2012-2013 fiscal year (summer of 2012), Québec's peat production reached about 9,016,000 bags of 170 dm^3 for a total value on the order of $75.5M.

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

The peat production sector in Québec represents some 600 direct jobs related to peat harvesting and 1,550 direct jobs in the peat industry in general. In addition to peat harvesting, the industry includes 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).

A strategic five-year plan was initially adopted in the Bas-Saint-Laurent region for 2006-2011 to promote a niche of excellence on the "Development of peat and agroenvironmental technologies" under the ACCORD (*Action concertée de coopération régionale de développement*; regional development cooperation) program. During the summer of 2013, a new agreement was signed focussing on implementation of the strategy and including an action plan for 2013-2018 for the **Peat and Agroenvironment** niche of excellence in the Bas-Saint-Laurent region. For the occasion, the niche of excellence was renamed to better represent the peat industry.

The Peat and Agroenvironment niche of excellence brings together **26 businesses** from various sectors, namely horticultural and agricultural products, environmental products, specialized equipment, etc.

The 2013-2018 action plan is designed to promote continuous improvement in companies, to accelerate the development of new products and technologies, and to provide support for market development. Other objectives of the plan are to increase the attractiveness of jobs in this sector, namely through training, and to contribute to the creation of an environment conducive to growth.

The Peat and Agroenvironment niche is coordinated by the Québec Peat Moss Producers Association (APTHQ, www.tourbehorticole).

Figure 6.1 - **Active mines in Québec in 2013.**

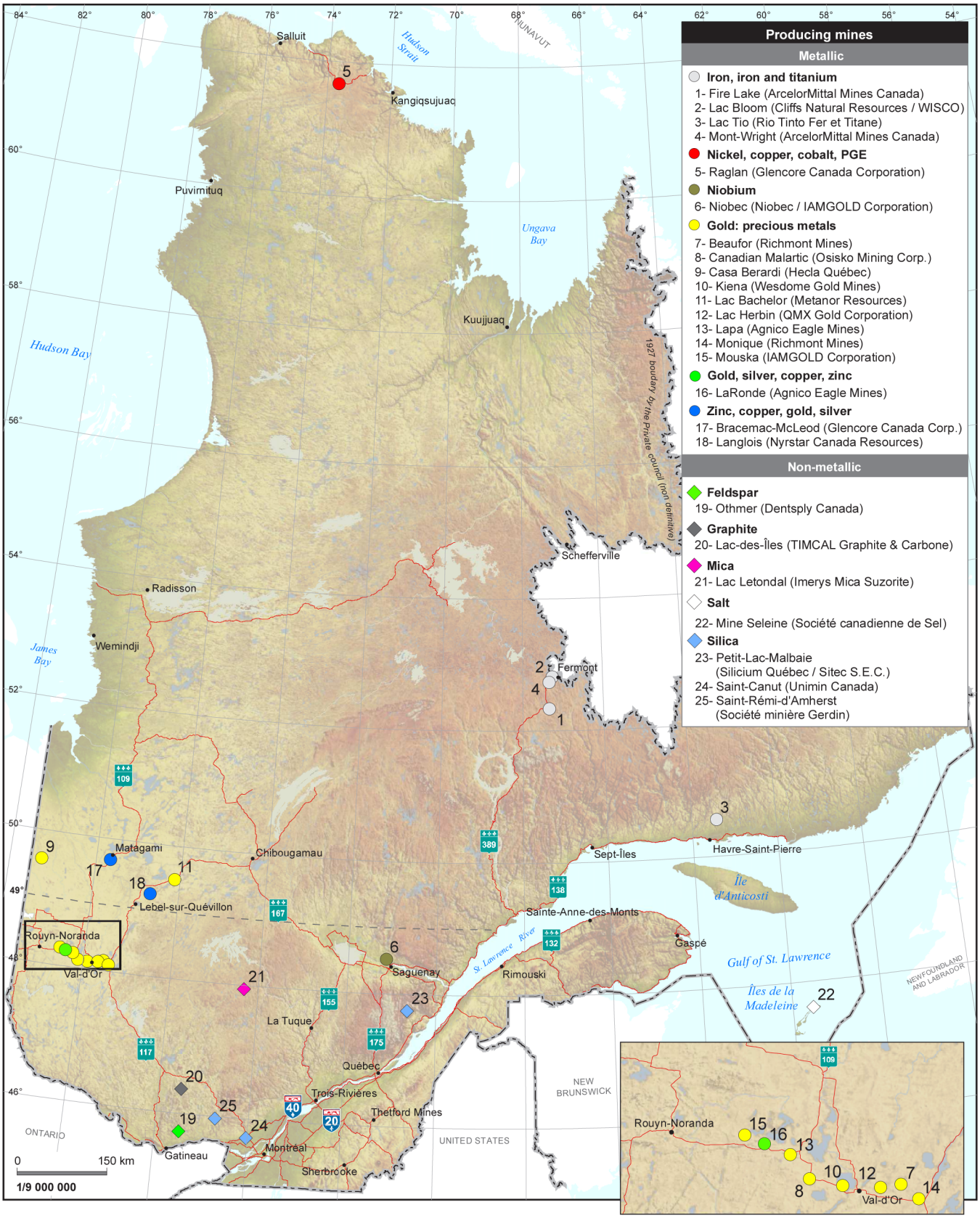


Figure 6.2 - **Industrial stone quarries exploited in Québec in 2013.**

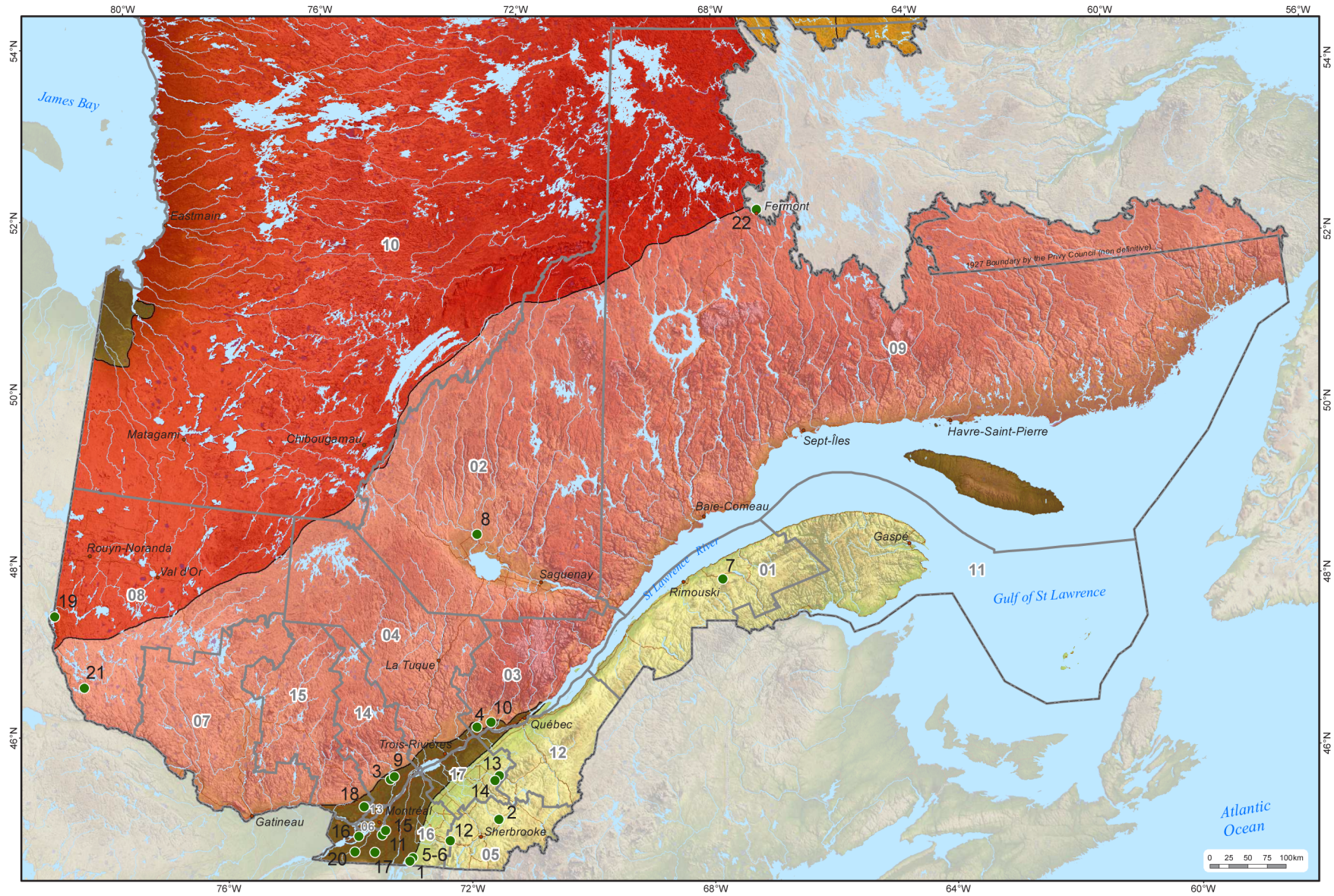


Figure 6.3 - **Architectural stone quarries exploited in Québec in 2013.**

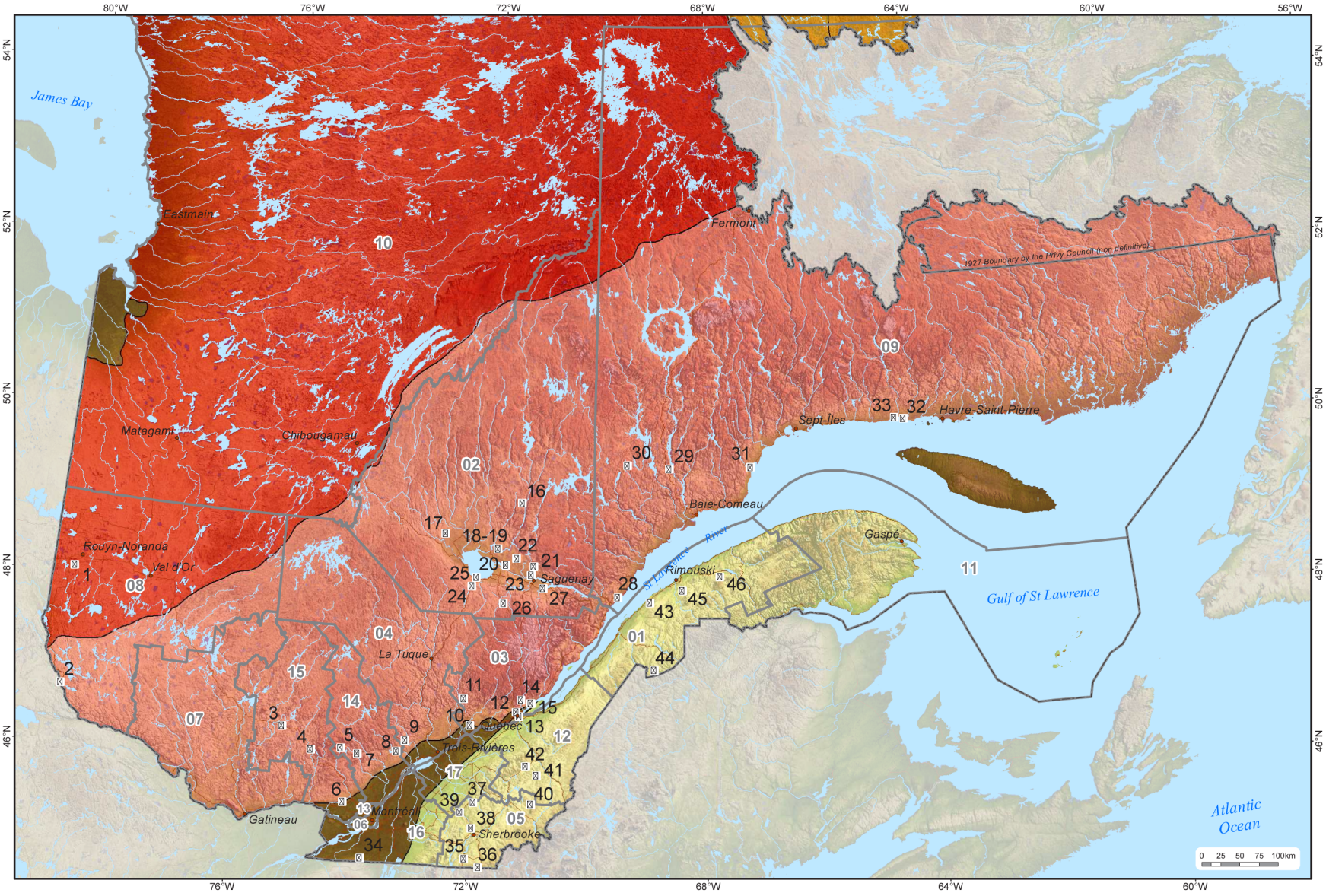


Figure 6.4 - **Peatlands exploited in Québec in 2013.**

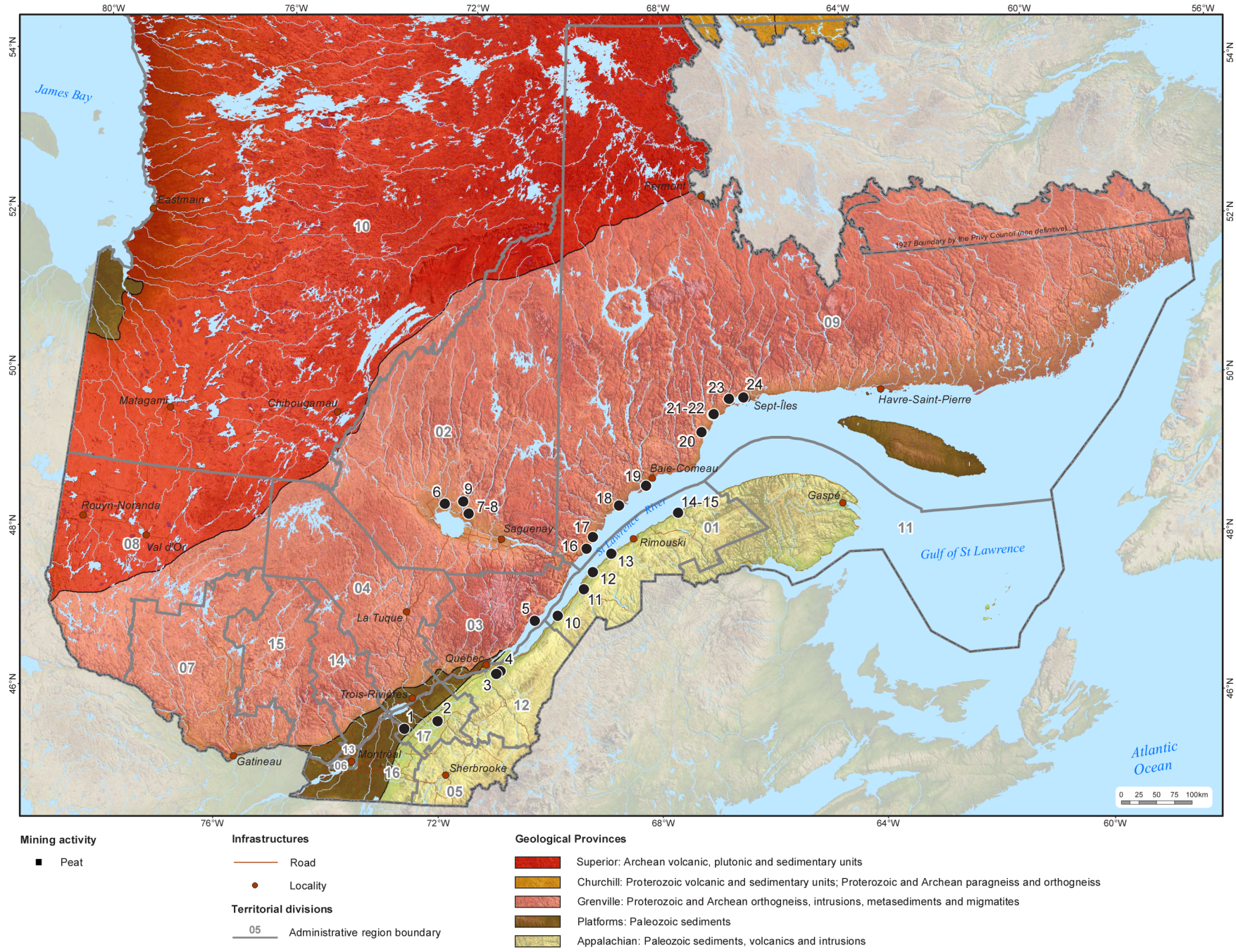


TABLE 6.8 – **Producing mines of metal commodities in Québec in 2013[1] (see Figure 6.1).**

No.	TOWNSHIP/ NTS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF ORE DEPOSIT AND TYPE OF MINE	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 Mines Canada	Specular hematite in metamorphosed Lake Superior-type iron formation Open pit mine	The reserves and the resources are included in those of Mont-Wright.					14,000 t/d or 6,000,000 t/y (extraction) Ore processed at Mont-Wright	20	1976 - 1984 (9) 2006 - 20.. (8)
2	NORMANVILLE / 23B14 / Côte-Nord	Lac Bloom	Cliffs Natural Resources / WISCO International Resources Development & Investment	Magnetite and specular hematite in metamorphosed Lake Superior-type iron formation Open pit mine	269.2 Mt at 29.3% Fe	765.3 Mt at 28.3% Fe	n/a	n/a	n/a	20,000 000 t/y (mill)	420	2010 - 20.. (4)
3	PARKER / 12L11 / Côte-Nord	LacTio	Rio Tinto Fer and Titane	Massive hemo-ilmenite in anorthosite from the Havre-Saint-Pierre Intrusive Suite Open pit mine	n/a	48 Mt at 81% TiO_2	n/a	n/a	n/a	3,500,000 t/y (extraction)	350	1950 - 20.. (100)
4	NORMANVILLE / 23B11 / Côte-Nord	Mont-Wright	ArcelorMittal Mines Canada	Specular hematite in metamorphosed Lake Superior-type iron formation Open pit mine	1,484 Mt at 27.5% Fe	468 Mt at 31.3% Fe	4,931 Mt at 29% Fe	n/a	1,082 Mt at 29% Fe	66,000,000 t/y (mill)	1,500	1975 - 20.. (39)
Nickel, copper, cobalt, PGE												
5	8029 / 35H12 / Nord-du-Québec	Raglan	Glencore Canada Corporation	Magmatic Ni-Cu in massive sulphide lenses at the base of ultramafic flows Underground and open pit mine	*3.59 Mt at 2.8% Ni 0.06% Co 0.79% Cu 0.76 g/t Pt 1.91 g/t Pd	*4.13 Mt at 3.49% Ni 0.08% Co 0.77% Cu 0.88 g/t Pt 2 g/t Pd	4.41 Mt at 3.04% Ni 0.06% Co 0.86% Cu 0.83 g/t Pt 2.1 g/t Pd	9.39 Mt at 3.45% Ni 0.07% Co 0.96% Cu 0.96 g/t Pt 2.36 g/t Pd	19.3 Mt at 3% Ni 0.1% Co 0.9% Cu 0.9 g/t Pt 2.3 g/t Pd	3,600 t/d (mill)	830	1998 - 20.. (16)
Niobium												
6	SIMARD / 22D11 / Saguenay–Lac-Saint-Jean	Niobec	Niobec / IAMGOLD Corporation	Niobium deposit in a carbonatite Underground mine	n/a	*416.42 Mt at 0.41% Nb_2O_5	286.01 Mt at 0.44% Nb_2O_5	343.91 Mt at 0.4% Nb_2O_5	67.7 Mt at 0.42% Nb_2O_5	2,200 Mt/y (mill)	460	1976 - 20.. (38)
Gold: precious metals												
7	PASCALIS / 32C04 / Abitibi-Témiscamingue	Beaufor	Richmont Mines	Auriferous veins within E-W-trending shear zones along the margins of the Bourlamaque Batholith Underground mine	0.07 Mt at 5.87 g/t Au	0.12 Mt at 6.4 g/t Au	0.09 Mt at 5.46 g/t Au	0.68 Mt at 6.57 g/t Au	0.9 Mt at 5.46 g/t Au	132,500 t/y (extraction) Ore processed at Camflo	120	1933 - 1951 (19) 1996 - 2000 (5) 2002 - 20.. (12)
8	FOURNIERE / 32D01 / Abitibi-Témiscamingue	Canadian Malartic	Osisko Mining Corporation	Porphyry gold Open pit mine	*41.8 Mt at 0.94 g/t Au	*256.9 Mt at 1.04 g/t Au	40,4 Mt at 1 g/t Au	280.1 Mt at 1.08 g/t Au	30.5 Mt at 0.81 g/t Au	55,000 t/d (mill)	550	2011 - 20.. (3)
9	CASA-BERARDI / 32E11 / Nord-du-Québec	Casa Berardi	Hecla Québec / Hecla Mining Company's subsidiary	Quartz-carbonate-pyrite-arsenopyrite veins in shear zones or stockwerks Underground mine	1 Mt at 6 g/t Au	7.21 Mt at 5.5 g/t Au	1.8 Mt at 5.8 g/t Au	9.24 Mt at 3.8 g/t Au	3.2 Mt at 5.54 g/t Au	2,400 t/d (mill)	500	1988 - 1997 (10) 2006 - 20.. (8)
10	DUBUISSON / 32C04, 08/ Abitibi-Témiscamingue	Kiena	Wesdome Gold Mines	Auriferous breccia and quartz veins lodged between two komatiitic flows Underground mine	n/a	n/a	n/a	n/a	n/a	20,000 t/m	179	1981 - 2002 (22) 2006 - 20.. (8)

TABLE 6.8 – **Producing mines of metal commodities in Québec in 2013[1] (see Figure 6.1).**

No.	TOWNSHIP/ NTS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF ORE DEPOSIT AND TYPE OF MINE	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	LE SUEUR / 32F08 / Nord-du-Québec	Lac Bachelor	Metanor Resources	Orogenic lode gold Underground mine	0.18 Mt at 8.36 g/t Au	0.47 Mt at 7.23 g/t Au	n/a	n/a	0.21 Mt at 6.76 g/t Au	775 t/d (moulin)	250	2013 - 20.. (2)
12	BOURLAMAQUE / 32C04 / Abitibi-Témiscamingue	Lac Herbin	QMX Gold Corporation	Gold associated with quartz-pyrite veining in shear zones cross-cutting the Bourlamaque Batholith Underground mine	*0.04 Mt at 7.45 g/t Au	*0.1 Mt at 6.45 g/t Au	0.07 Mt at 9.2 g/t Au	0.12 Mt at 7.6 g/t Au	0.28 Mt at 7.4 g/t Au	1,000 t/d (extraction) Ore processed at Aurbel	140	2008 - 2014.. (6)
13	CADILLAC / 32D01 / Abitibi-Témiscamingue	Lapa	Agnico Eagle Mines	Blue-grey quartz vein in biotite- and sericite-rich volcanic rock Underground mine	1.13 Mt at 6.25 g/t Au	0.94 Mt at 5.58 g/t Au	n/a	1.12 Mt at 4.08 g/t Au	0.54 Mt at 9.25 g/t Au	1,725 t/d (Extraction) Ore processed at LaRonde	210	2009 - 20.. (5)
14	LOUVICOURT / 32C03 / Abitibi-Témiscamingue	Monique	Richmont Mines	Lode gold: greenstone-hosted quartz-carbonate veins Open pit mine	0.02 Mt at 2.26 g/t Au	0.46 Mt at 2.29 g/t Au	n/a	0.11 Mt at 4.88 g/t Au	n/a	547,500 t/y (extraction) Ore processed at Camflo	n/a	2013 - 20.. (2)
15	BOUSQUET / 32D07 / Abitibi-Témiscamingue	Mouska	IAMGOLD Corporation	Quartz veins in Mooshla diorite near the northern sheared contact Underground mine	*0.16 Mt at 12.4 g/t Au	*0.02 Mt at 13.4 g/t Au	0.47 Mt at 6.9 g/t Au	0.73 Mt at 4 g/t Au	1.74 Mt at 6.3 g/t Au	2,600 t/d (extraction) Ore processed at Westwood	160	1991 - 20.. (23)
Gold, silver, copper, zinc												
16	BOUSQUET / 32D08 / Abitibi-Témiscamingue	LaRonde	Agnico Eagle Mines	Massive to semi-massive pyrite lenses in sericitized felsic volcanic rocks metamorphosed to andalusite-kyanite schists Underground mine	6.32 Mt at 2.96 g/t Au 0.12% Pb 1.06% Zn 0.3% Cu 30.81 g/t Ag	22.46 Mt at 4.99 g/t Au 0.05% Pb 0.68% Zn 0.24% Cu 20.54 g/t Ag	n/a	5.43 Mt at 1.88 g/t Au 0.15% Pb 1.5% Zn 0.12% Cu 28.04 g/t Ag	11.89 Mt at 3.73 g/t Au 0.05% Pb 0.58% Zn 0.25% Cu 11.68 g/t Ag	7,000 t/d (mill)	790	1988 - 20.. (26)
Zinc, copper, gold, silver												
17	GALINEE / 32F12 / Nord-du-Québec	Bracemac-McLeod	Glencore Canada Corporation	Volcanogenic massive sulphides Underground mine	2.79 Mt at 9.8% Zn 1.4% Cu 0.39 g/t Au 31.55 g/t Ag	0.94 Mt at 8.9% Zn 0.9% Cu 0.54 g/t Au 18.46 g/t Ag	n/a	n/a	2.63 Mt at 8.79% Zn 1.31% Cu 1.06 g/t Au 38.8 g/t Ag	2,500 t/d (mill)	250	2013 - 20.. (4)
18	GREVET / 32F02 / Nord-du-Québec	Langlois	Nyrstar Canada Resources	VMS-type in a mafic and felsic lava sequence Underground mine	*2.27 Mt at 8.85% Zn 0.53% Cu 41.34 g/t Ag 0.05 g/t Au	*2.25 Mt at 8.59% Zn 0.66% Cu 41.98 g/t Ag 0.08 g/t Au	2.84 Mt at 10.55% Zn 0.66% Cu 50.91 g/t Ag 0.05 g/t Au	2.53 Mt at 9.22% Zn 0.75% Cu 48.21 g/t Ag 0.1 g/t Au	1.28 Mt at 8.36% Zn 0.57% Cu 47.57 g/t Ag 0.1 g/t Au	2,570 t/d (mill)	250	2012 - 20.. (2)

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 6.9 – **Producing mines of industrial minerals in Québec in 2013[1] (see Figure 6.1).**

No.	TOWNSHIP/ NTS / ADMINISTRATIVE REGION	PROJECT	COMPANY	SUMMARY DESCRIPTION OF ORE DEPOSIT AND TYPE OF MINE	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												
19	PORTLAND / 31G11 / Outaouais	Othmer	Dentsply Canada	Potassium feldspar from pegmatite Open pit mine	n/a	235,000 t at 50% FK	n/a	n/a	n/a	35 t/y (mill)	10	2002 - 20.. (11)
Graphite												
20	BOUTHILLIER / 31J05 / Laurentides	Lac-des-Îles	TIMCAL Graphite & Carbone	Graphite as disseminated flakes in crystalline limestone Open pit mine	n/a	n/a	n/a	n/a	n/a	n/a	60	1989 - 20.. (24)
Mica												
21	SUZOR / 31O16 / Mauricie	Lac Letondal	Imerys Mica Suzorite	Lenticular alkaline intrusion containing 80-85% phlogopite Open pit mine	n/a	27 Mt at 85% Mi	n/a	n/a	n/a	30,000 t/y (mill)	30	1970 - 20.. (43)
Salt												
22	ÎLES-DE-LA-MADELEINE / 11N12 / Gaspésie–Îles-de-la-Madeleine	Mine Seleine	Société canadienne de Sel	Carboniferous salt diapir Underground mine	6 Mt at 100% NaCl	7 Mt at 100% NaCl	n/a	n/a	n/a	n/a	160	1982 - 20.. (31)
Silica												
23	CHARLEVOIX 3 / 21M15 / Capitale-Nationale	Petit-Lac-Malbaie	Silicium Québec / Sitec S.E.C.	Quartzite Open pit mine	n/a	n/a	n/a	n/a	n/a	200,000 t/y (mill)	20	1977 - 20.. (36)
24	LAC DES DEUX-MONTAGNES 31G09 / Laurentides	Saint-Canut	Unimin Canada	Postdam Group sandstone Open pit mine	n/a	n/a	n/a	n/a	n/a	550,000 t/y (mill)	60	1978 - 20.. (35)
25	AMHERST / 31G15 / Laurentides	Saint-Rémi-d'Amherst	Société minière Gerdin	Quartzite Open pit mine	n/a	n/a	n/a	n/a	n/a	n/a	20	1970 - 20.. (43)

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 2013 (see Figure 6.2).**

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 #5 and #6	Graymont (Qc) (Marbleton division)	Lac Aylmer Formation limestone	Quicklime, ground limestone products for industrial use, crushed stone	Dudswell / 21E12	12
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, Messier-Missisquoi	Omya Canada (St-Armand division)	Strites Pond Formation limestone	Pulverized limestone for use as mineral filler	Seigneurie de Saint-Armand / 31H03	16
6	Saint-Armand Principale	Omya Canada (St-Armand division)	Strites Pond Formation limestone	Pulverized limestone for use as mineral filler, white terrazzo granules	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)	Limestone from the Trenton and Black River Groups	Cement production	Lanoraye / 31I03	14
10	Saint-Basile-sud	Ciment Québec	Limestone from the Trenton and Black River Groups	Cement production	Auteuil / 21L12	3
11	Ciment Lafarge	Lafarge Canada	Limestone from the Trenton and Black River Groups	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	Ormstown	La Compagnie Bon Sable (Ormstown division)	Natural sand	Washed sand for sandblasting, smelting, ceramic glue mixtures	Beauharnois-2 / 31H04	16
17	Sainte-Clotilde	Les Sables Silco	Potsdam Group sandstone	Silica-rich crushed stone for cement plant and ferrosilicon	Beauharnois-1 / 31H04	16
18	Saint-Joseph-du-Lac	La Compagnie Bon Sable	Natural sand	Washed sand for masonry and sandblasting	Lac-des-Deux-Montagnes-1 / 31H12	15
19	Saint-Bruno-de-Guigues	OPTA Minerals	Ordovician sandstone	Sand for filtering, smelting, hydraulic fracturing	Guigues / 31M06	8
20	Chromasco	Carrières Sud-Ouest	Potsdam Group sandstone	Crushed stone and silica-rich aggregate for cement plant and ferrosilicon	Beauharnois / 31H05	16
21	Lac Beauchêne	Les Pierres du Nord	Muscovite quartzite from the Kipawa Formation	Quartz granules for artificial stone	Campeau / 31L10	8
22	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 2013[1] (see Figure 6.3).**

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	Téminscaming	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	Notre-Dame-de-la-Merci	A. Lacroix et Fils Granit	Anorthosite - DS	Orion	31I05	14	BEX 255
8	Saint-Didace	A. Lacroix et Fils Granit	Quartz mangerite - DS	Nordix Red	31I06	14	Private
9	Saint-Alexis-des-Monts	A. Lacroix et Fils Granit	Mangérite quartzifère - PD	Autumn Brown	31I06	4	BEX 463 BEX 1070
		Firstake Capital	Quartz mangerite - DS	Newton Brown	31I06	4	BEX 174
		Granicor	Quartz mangerite - DS, CS	Autumn Brown	31I06	4	Private
		Polycor	Quartz mangerite - DS	Newton Brown	31I06	4	Private
10	Saint-Marc-des-Carrières	Graymont (Portneuf)	Limestone - DS	Saint-Marc Limestone	31I09	3	Private
11	Rivière-à-Pierre	A. Lacroix et Fils Granit	Quartz mangerite - DS	Atlantic Blue	31P01	3	BEX 178
		A. Lacroix et Fils Granit	Quartz mangerite - DS	Forest Green	31P01	3	BEX 349
		A. Lacroix et Fils Granit	Farsundite - DS	Salmon Brown	31P01	3	BEX1089
		A. Lacroix et Fils Granit	Farsundite - DS	Deer Brown, Atlantic Green	31P01	3	BM 723 BM 746
		A. Lacroix et Fils Granit	Farsundite, quartz mangerite - DS	Forest Green, Atlantic Green, Atlantic Blue	31P01	3	CM 488
		Granicor	Farsundite - DS, CS	New New	31I16	3	Private
		Granicor	Farsundite - DS, CS	Abbey Rose	31P01	3	Private
		Granicor	Quartz mangerite and quartz jotunite - DS, MO, CS	Prairie Green	31P01	3	BEX 164 BEX 165
		Granicor	Quartz mangerite, farsundite -DS, CS	Nara	31P01	3	BEX 231
		Polycor	Farsundite - DS, CS	Caledonia, Caledonia Dark	31P01	3	Private
		Polycor	Farsundite - DS, CS	Caledonia Dark	31P01	3	BEX 33
		Polycor	Farsundite - DS, CS	Galaxie blue	31P02	3	BEX 1013
12	Charlesbourg	Construction B.M.L.	Limestone - BS	n/a	21L14	3	Private
13	Québec	Les Pierres S.D.	Limestone - BS	n/a	21L14	3	Private
14	Sainte-Brigitte-de-Laval	Sablière Vallière	Granit block - BS	n/a	21L14	3	Private
15	Château-Richer	Carrière Daniel Lachance	Limestone - BS	n/a	21L14	3	Private
16	Maria-Chapdelaine	Polycor	Anorthosite - DS, MO, CS	Kodiac	22 E 06	2	BEX 402
17	Saint-Thomas-Didyme	Granicor	Quartz mangerite - DS, CS	Acajou	32A15	2	Private
18	Chute-du-Diable	Granicor	Anorthosite - DS, MO, CS	Canadian Black (Peribonka)	22D13	2	Private

TABLE 6.11 - **Architectural stone quarries exploited in Québec in 2013[1] (see Figure 6.3).**

SITE	LOCATION	COMPANY	TYPE OF ROCK - PRODUCTS	COMMERCIAL NAME	NTS	ADMINISTRATIVE REGION	TITLE
		Granicor	Anorthosite - DS, MO, CS	Canadian Black (Peribonka)	22D13	2	BEX 449
19	Rivière Alex	A. Lacroix et Fils Granit	Anorthosite - DS, MO, CS	Canadian Black (Peribonka)	22D13	2	BEX 1189
20	Saint-Nazaire	A. Lacroix et Fils Granit	Leucogabbronorite - DS	Nordix Green, Atlantic Black, Black Forest	22D12	2	Private (2 quarries)
		A. Lacroix et Fils Granit	Leucogabbronorite - DS	Nordix Green, Atlantic Black	22D12	2	BEX 148
		Granicor	Leucogabbronorite - DS, MO, CS	Cambrian	22D12	2	BEX 332
		Polycor	Leucogabbronorite - DS, MO	Cambrian Black	22D12	2	"BM 705 (2 quarries) "
21	Falardeau	Les Pierres Naturelles Tremblay	Limestone - BS	n/a	22D11	2	Private
22	Bégin	A. Lacroix et Fils Granit	Quartz mangerite - DS	Atlantic Pink	22D11	2	Private
		Granicor	Quartz mangerite - DS, CS	Granville	22D11	2	Private
23	Tremblay	Carrière 500	Limestone - BS	n/a	22D06	2	Private
24	Saint-François-de-Sales	A. Lacroix et Fils Granit	Quartz mangerite - DS	Spring Green	32A08	2	BEX 203 BEX 548
25	Chambord	A. Lacroix et Fils Granit	Limestone - BS	Chambord Limestone	32A08	2	Private
26	Réserve faunique des Laurentides	A. Lacroix et Fils Granit	Farsundite - DS	Autumn Harmony	22D03	2	BEX 225
		Granicor	Quartz mangerite - DS, CS	Laurentian Green	22D04	2	BEX 221
		Polycor	Quartz jotunite - DS, MO	Laurentian Green	22D04	2	BEX 210
27	La Baie	Granicor	Farsundite - DS, CS	Polychrome	22D07	2	Private
		Polycor	Farsundite - DS	Polychrome	22D07	2	Private
		Sablière BY	Granite Block - BS	n/a	22D07	2	Private
28	Grandes-Bergeronnes	Granicor	Gneiss - DS, CS	Tadoussac	22C04	9	Private
29	Lac Poulin	Granijem	Granite - DS	Nordic Frost	22F14	9	BEX 490
30	Manic 3	Granijem	Gneiss - DS, CS	Manic	22F15	9	BEX 489
31	Rivière-Pentecôte	Polycor	Anorthosite - DS	Nordic Black	22G14	9	BEX 155
32	Rivière Saint-Jean	Polycor	Hypersthene Syenite - DS	Picasso	22I07	9	BEX 552
		Polycor	Hypersthene Syenite - DS	Magpie	22I08	9	BEX 91
33	Magpie	Granijem	Hypersthene Syenite - DS	Anticosti	22I08	9	BEX 436
34	Havelock	Carrières Ducharme	Sandstone - BS	Ducharme	31H04	16	Private (2 quarries)
35	Stanstead	Granite D.R.C.	Granite - DS, BS	Beverly Grey	31H01	5	Private
		Polycor	Granodiorite - DS, MO	Stanstead Grey	31H01	5	Private
		Rock of Ages du Canada	Granodiorite - DS, MO	Stanstead Grey	31H01	5	Private
36	Stanhope	Granicor	Granodiorite - DS, MO, SC	Snow White	21E04	5	Private
37	Asbestos	Ardobec	Slate, BS	n/a	21E12	5	Private
38	Bromptonville	Ardoise 55	Slate - DS, BS	n/a	21E05	5	Private
39	Melbourne	Ardoise Kingsbury	Slate - BS	n/a	31H09	5	Private
40	Saint-Sébastien	Polycor	Granite - PD	San Sebastian Grey	21E10	5	Private
41	Saint-Ferdinand	Les Carrières St-Ferdinand	Sandstone, dolomite - BS	n/a	21L04	12	Private
42	East Broughton	Les Pierres Stéatites	Steatite, talc-carbonate rock, serpentinite - RS	n/a	21L03	12	Private

TABLE 6.11 - **Architectural stone quarries exploited in Québec in 2013[1] (see Figure 6.3).**

SITE	LOCATION	COMPANY	TYPE OF ROCK - PRODUCTS	COMMERCIAL NAME	NTS	ADMINISTRATIVE REGION	TITLE
43	Saint-Marc-du-Lac-Long	Glendyne	Slate - BS, RT	La Canadienne, La Québécoise	21N07	1	Private
44	Saint-Mathieu-de-Rioux	J.-C. Ouellette	Sandstone - BS	n/a	22C03	1	Private
		Les Pierres St-Mathieu	Sandstone - BS	Grès Basques	22C02	1	BEX 460
45	Mont-Lebel	Les Pierres Naturelles du Québec	Siltstone - BS	n/a	22C08	1	Private
46	Saint-Cléophas	Carrière Bernier	Siltstone - BS	n/a	22B05	1	Private (2 quarries)

1 - See legend abreviations in Appendix 2.
BEX: exclusive lease to mine mineral surdace
BM: mining lease
CM: mining concession

TABLE 6.12 - **Peatlands harvested in Québec in 2013 (see Figure 6.4).**

SITE	DEPOSIT	COMPANY	SUMMARY DESCRIPTION OF DEPOSIT	PRODUCTS	TOWNSHIP / NTS	ADMINISTRATIVE REGION
1	Saint-Bonaventure	Fafard et Frères	Peat	Sphagnum moss, potting soil, compost	Upton / 31H15	17
2	Saint-Valère Centre	Fafard et Frères	Peat	Sphagnum moss	Bulstrode / 31I01	17
3	Saint-Henri-de-Lévis	Premier Horticulture	Peat	Sphagnum moss	Seigneurie Lauzon / 21L11	12
4	Saint-Charles	Tourbière Smith 2000	Peat	Sphagnum moss	Seigneurie Lauzon et fief de La Martinière (Beauchamp) / 21L10	12
5	Isle-aux-Coudres	Tourbières Pearl	Peat	Sphagnum moss	Seigneurie Îsle-aux-Coudres / 21M08	3
6	Sainte-Marguerite Marie	Fafard et Frères	Peat	Sphagnum moss	Dolbeau / 32A16	2
7	L'Ascension Ouest	Tourbières Lambert	Peat	Sphagnum moss	Garnier / 22D12, 22D13	2
8	Saint-Léon	Tourbières Lambert			Labrecque / 22D12	2
9	Saint-Ludger-de-Milot SW	Fafard et Frères	Peat	Sphagnum moss	Milot / 22D13	2
10	Rivière Ouelle	Tourbières Lambert	Peat	Sphagnum moss, potting soil, floral moss	Seigneurie Rivière-Ouelle / 21N05	1
11	Rivière-du-Loup	Premier Horticulture	Peat	Sphagnum moss, potting soil, compost, endomycorrhiza, biofilters	Seigneurie Rivière-du-Loup et 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		
12	Isle-Verte Est	Tourbière Réal Michaud et fils	Peat	Sphagnum moss	Seigneurie Isle-Verte 22C03	1
13	Saint-Fabien	Tourbière Henri Théberge et associés	Peat	Sphagnum moss	Seigneurie Nicolas-Rioux 03 / 22C07	1
14	Saint-Ulric	Les Tourbes M.L.	Peat	Sphagnum moss	Matane / 22B13	1
		Premier Horticulture		Sphagnum moss		
15	Rivière Blanche	Les Tourbes M.L.	Peat	Sphagnum moss	Matane / 22B13	1
16	Escoumins	Tourbières Lambert	Peat	Sphagnum moss	Bergeronnes / 22C06	9
17	La Petite Romaine	Tourbières Lambert	Peat	Sphagnum moss	Iberville / 22C06	9
18	Sainte-Thérèse-de-Colombier Est	Sun Gro Horticulture Canada	Peat	Sphagnum moss	Betsiamites / 22C15	9
19	Groupe de tourbières à Pointe-Lebel[1]	Premier Horticulture	Peat	Sphagnum moss	Manicouagan / 22F01	9
20	Rivière-Pentecôte	Tourbières Berger	Peat	Sphagnum moss	Fitzpatrick / 22G14	9
21	Port-Cartier Ouest	Les Tourbes M.L.	Peat	Sphagnum moss	Babel / 22J02	9
22	Port-Cartier et Port-Cartier NW	Sun Gro Horticulture Canada	Peat	Sphagnum moss	Babel / 22J02	9
23	Clarke City	Les Tourbes M.L.	Peat	Sphagnum moss	Arnaud / 22J02	9
24	Ville de Sept-Îles / Letellier III	Les Tourbes M.L.	Peat	Sphagnum moss	Letelier / 22J01, 22J08	9

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

Photo: MERN

CHAPTER 7

Mine site rehabilitation

Philippe-André Lafrance, Olivia Dawson, Jean Dionne, Robert Lacroix, Sophie Proulx, Sophie Turcotte and Malek Zetchi

7.1 Introduction

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

In addition to active mining projects and mines in operation, there are also in Québec what is referred to as "abandoned" mine sites. The owners of these sites are unknown or insolvent. The MERN has decided to take action and to 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. Figure 7.1 shows the location of rehabilitation and securement work performed at orphaned mine sites in 2013.

7.2 Active mines

Since March 9, 1995, anyone conducting mining activities is required to submit, prior to start-up, a rehabilitation plan and a financial guarantee.

In 2013, mine operators paid $34.3M in financial guarantees, bringing the total amount of guarantees held by the MERN to $227.6M.

The government, by way of regulation, has introduced measures to reduce the risk to the State of having to assume mine site rehabilitation costs. Since August 22, 2013, the amount of the required financial guarantee corresponds to 100% of the cost of restoration work for the entire mine site. This guarantee is paid in three instalments (50% - 25% - 25%) over a period of two years. Also, following the adoption of the Act to amend the Mining Act in December 2013, operators who omit to pay the financial guarantee are subject to a fine corresponding to 10% of the total amount of the guarantee per day. Operators are now required to begin rehabilitation and restoration work within three years after the cessation of mining activities.

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

In 2006, to assess the extent of its environmental liabilities, the government requested that all ministries and government agencies compile an inventory of abandoned contaminated sites. The MERN completed its inventory on March 31, 2011.

The amount of money required to rehabilitate abandoned mine sites is recorded as a reduction in environmental liabilities with respect to the contaminated sites listed in the consolidated financial statements of the government.

As at March 31, 2013, a total of 698 mine sites were listed in the Québec government's inventory of environmental liabilities, for a total amount of $880M. Among these:

- 488 are exploration sites:
- 275 exploration sites in Nunavik, most of which require cleanup due to waste and refuse left on site;
- 213 exploration sites on Cree territory, for which restoration work is expected to begin shortly;
- 198 are mining sites. Of these, 137 have already been the focus of rehabilitation, securement, or maintenance work;
- 12 are quarries and sand pits. Restoration work has already been carried out at six of these sites.

From April 1 to December 31, 2013, the Mines Sector devoted $6.1M to carry out rehabilitation work on abandoned sites.

Mauricie (04)

Montauban

Located in the municipality of Notre-Dame-de-Montauban, this site encompasses five former mine tailings accumulation areas, three of which are part of the government's environmental liabilities, namely the Tétreault 1, Tétreault 2 and Montauban United sites. These three tailings ponds cover a surface area of about 20 hectares.

In 2009, a characterization study was conducted to determine the size of the affected area as well as the nature and volume of mine tailings involved. In July 2011, a complementary characterization study was carried out and the rehabilitation plan has been completed since 2012.

The rehabilitation process has been suspended since the land owners have given their consent to a project to reprocess the mine tailings.

Estrie (05)

Capelton

The Capelton mine site, located in North Hatley, was active from 1863 to 1924. The mine produced copper and sulphuric acid.

During a site characterization study in 2009, more than 250,000 m^3 of contaminated soils, mainly loaded with metals, were discovered. Follow-up work is scheduled in 2014.

Suffield

This former zinc and copper mine is located approximately 10 kilometres southwest of Sherbrooke. There is no tailings pond on site, since ore extracted here was processed elsewhere. There is however a waste pile covering more than one hectare.

The characterization study completed in June 2013 was designed to measure the potential environmental impacts of the site by sampling waste material, soils, groundwater, surface water, and sediments. The results namely demonstrate higher concentrations in zinc, nickel, and copper in groundwater in contact with waste materials present on site.

A complementary characterization study was carried out in the fall of 2013 and the rehabilitation plan will be prepared in the winter of 2014. Rehabilitation work is planned for the summer of 2014.

Outaouais (07)

Lac Renzy

The former Lac Renzy mine is located approximately 40 kilometres west of Highway 117, at kilometre 294, within the Poirier outfitter's territory.

Mining operations at the nickel and copper mine took place from 1969 to 1972. Nearly 0.8 Mt of ore were mined from an open pit and processed on site.

The results of a site characterization study carried out in the fall of 2012 and the spring of 2013 indicate that mine tailings and mining waste are potentially acid-generating and leachable. In addition, the quality of soils, sediments, surface water and groundwater currently exceeds the criteria established by the *Ministère du Développement durable, de l'Environnement et de la Lutte aux changements climatiques* (MDDELCC) for certain metals. A rehabilitation plan will be prepared in 2014.

New Calumet

The New Calumet mine site is located 6 kilometres west of the village of Bryson. This former lead and zinc mine was in operation from 1943 to 1968. It includes three tailings ponds covering approximately 20 hectares.

A site characterization study took place from the fall of 2012 to the spring of 2013. The mine tailings in all three tailings ponds are potentially acid-generating and leachable. Surface water in certain sampling sites is contaminated with metals (zinc, copper, lead, nickel, and iron). However, the groundwater quality is good overall and the contaminants have not reached the Ottawa River that flows about 300 metres from this site.

A complementary characterization study was carried out in the fall of 2013 and a rehabilitation plan will be developed in the winter of 2014. Rehabilitation work may begin in the fall of 2014 and continue into 2015.

Abitibi-Témiscamingue (08)

Barvue

Located approximately 50 kilometres north of Val-d'Or, the Barvue mine site is a former zinc and silver producer discovered in 1950. More than 5 Mt of ore were extracted and processed on site between 1952 and 1957. These operations created a tailings pond of roughly 35 hectares. Mine tailings on the Barvue site generate acid drainage.

Following a characterization study of the site in 2009, a rehabilitation plan was prepared in 2011. The selected rehabilitation scenario involved the installation of a multilayer impervious cover to prevent oxidation of tailings and generation of acid mine drainage.

Rehabilitation work began in December 2011 with the construction of an access road and tree removal in areas to be restored. During the summer and fall of 2012, the dikes around the former tailings pond were stabilized and reshaped, and a partial derivation of Ruisseau Marcotte was completed.

In 2013, nearly 400,000 m^3 of acid-generating tailings were removed from the banks of Ruisseau Marcotte, which were subsequently landscaped and revegetated. Two settling ponds were also built during the year.

Containment and revegetation of the tailings pond will begin in the winter of 2014, and environmental monitoring instruments will be installed on site, the final step in the rehabilitation of the Barvue site. This work is expected to be completed in the fall of 2015.

The Barvue site. The Marcotte creek before restoration work.

Tailing ponds of the the Barvue site.

The Marcotte creek, after restoration work (excavated taillings and et remodeled banks).

Beattie

Located in the municipality of Duparquet, about 40 kilometres north of Rouyn-Noranda, the Beattie mine was in operation from 1933 to 1956.

During the summer of 2011, an environmental characterization study was carried out on the tailings pond to determine its impacts on the environment. More than one hundred holes were drilled and samples of water, tailings, and soil were collected and analyzed.

The rehabilitation process was subsequently interrupted, since a project to resume mining operations on site involves reprocessing the tailings and rehabilitation of the pond. Monitoring of surface water and groundwater quality continued in 2013.

Darius O'Brien, Pandora, Thompson Cadillac and Lapa (Zulapa)

Located on either side of Highway 117 near the Cadillac area, these four former gold mines were active before the 1960s.

In 2012, the MERN completed an environmental characterization of these four mine sites. Given the proximity of the four sites and their similar environmental issues, rehabilitation work will be performed simultaneously at the four sites.

In 2014, rehabilitation solutions will be developed.

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.

Since 2010, following the signature of the East-Osisko project agreement between the MERN and Osisko Mining Corporation, the company is responsible for the management and rehabilitation of the mine site. Under this partnership, rehabilitation costs totalling $23M are shared equally between the two partners, i.e., at $11.5M each.

Tailings produced since 2011 by Osisko Mining Corporation are thickened, non-leachable and non-acid generating. They are used to cover up the tailings from the former mine.

In 2013, rehabilitation work continued as planned. About 80% of the tailings pond has now been covered.

Manitou

The Manitou site is located about 10 kilometres 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. These tailings were dumped in two tailings ponds that were inadequately contained and as a result, tailings were dispersed along the periphery of the accumulation area and along Ruisseau Manitou over a distance of 6.5 km, up to Rivière Bourlamaque. The total surface area of land disturbed by mine tailings represents about 200 hectares, namely due to the effects of wind and water erosion.

Following the bankruptcy of the last mining titleholder in 2002, the MERN became responsible for the Manitou site. At the end of 2006, an agreement reached between the MERN and Agnico Eagle Mines provided that alkaline mine tailings generated at the Goldex mine would be used to rehabilitate the Manitou tailings pond. Mine tailings from Goldex were to be shipped through a 23-km pipeline from the Goldex mine to the Manitou site.

Nearly 8 Mt of tailings from the Goldex mine were shipped to the Manitou site. Deposition of mine tailings, which was initially planned over a period of 8 years, was interrupted following the temporary shutdown of the Goldex mine in October 2011. During the interruption, a new scenario was developed to optimize the initial concept, in particular the future deposition of Goldex tailings. The volume needed to cover up the Manitou site was reduced in light of the new mining methods implemented at Goldex. The new scenario calls for the deposition of 3.5 Mt of mine tailings from the Goldex mine until 2017.

Deposition of Goldex tailings at the Manitou site resumed in October 2013.

Preissac Molybdenite B

This is a former molybdenum and bismuth mine located near the municipality of Preissac, that was active between 1962 and 1971. Approximately 2.2 Mt of ore were mined and processed on site.

In 2011, an environmental characterization study was undertaken by the MERN. Samples of soils, mine tailings, sediments, surface water, and groundwater were collected. Analyses indicated high concentrations of dioxins and furans in waste material, backfill, and groundwater samples collected on the mine site and near Baie Indienne on Lac Fontbonne. A preliminary assessment of human health risks was also undertaken.

The next step of this project, scheduled for 2014, will consist in the preparation of a rehabilitation plan including a detailed risk assessment study.

Siscoe

This gold deposit, located on the island of the same name, lies in the middle of Lac De Montigny near Val-d'Or. It was mined between 1926 and 1949 and 3.3 Mt of ore were extracted.

The site includes two tailings ponds totalling approximately 30 hectares. An environmental characterization study was conducted in the fall of 2011.

A rehabilitation plan was developed during the winter of 2013, and plans and specifications were prepared the following spring. Additional characterization work was subsequently carried out. Rehabilitation work is scheduled for the summer of 2014. The plan involves covering up and revegetating the tailings ponds to reduce the amount of water seepage and put an end to the erosion of mine tailings into Lac de Montigny.

Waite-Amulet

This former mine located about 12 kilometres north of Rouyn-Noranda was in operation from 1927 to 1962. The mine concentrator produced about 6 Mt of sulphur-rich tailings.

In 2013, an assessment of the site's potential environmental risks was carried out. Characterization of the site is planned in 2014.

Principale mine

The former Principale (Campbell) copper mine, one of the largest in the Chibougamau area, was active from 1953 to 1979. The mill, however, continued to be fed by neighbouring mines until 2010, when the mining company went bankrupt. The site covers a surface area of more than 300 hectares and encompasses three tailings ponds and a polishing pond.

Several studies were conducted by the MERN, namely an environmental characterization of the site and a geotechnical assessment of the stability of crown pillars. In 2011, the MERN began preparation of a rehabilitation plan. In October 2013, the content of the plan was approved by communities in Oujé-Bougoumou and Chibougamau.

Tailings pond of the old Principale mine, in Chibougamau.

A technical committee composed of representatives from the Oujé-Bougoumou Cree community, the town of Chibougamau, the MDDELCC and the MERN, was created to monitor the progression of the rehabilitation project. The MERN wants representatives from these communities to be involved in decisions concerning rehabilitation of the Principale mine site. In this regard, representatives from the Oujé-Bougoumou community took part in the process to select professional firms commissioned to complete the various mandates given to date.

In 2013, in addition to approval of the rehabilitation plan, the MERN continued maintenance and securement work on site. A new larger water pipeline was installed to accommodate the significant amount of water from the site and a second submersible pump was acquired.

In January 2014, a ditch will be excavated to avoid water accumulations near the crest of the dam. Proposed rehabilitation scenarios will be simulated in the laboratory. The MERN will also continue data acquisition and will install new measuring equipment on site so as to proceed with hydrogeological modelling.

Following a request formulated by the Oujé-Bougoumou community, the Principale mine site rehabilitation project was submitted to the evaluation committee (COMEV). The COMEV's decision is expected in 2014.

Mining site of the old Principale mine.

Exploration sites in Nunavik

The inventory conducted in 2001 identified 275 abandoned mineral exploration sites in Nunavik, among which 18 sites were classified as major.

In 2007, the Québec government, the Kativik Regional Government, the Makivik Corporation, and the Nunavik Restor-Action Fund signed a partnership agreement with the aim of cleaning up the 18 most important exploration sites.

Initially planned until 2012, the agreement was extended until 2017. The cleanup of all major sites is now almost completed, at a lesser cost than what was initially planned. Consequently, there are sufficient funds to continue cleanup work on the remaining sites.

7.4
Inspection and securement

The MERN annually conducts a major inspection program of mine sites listed among its environmental liabilities, allowing it to identify potential risks to the environment and human safety, and to plan maintenance and securement work. The main purpose of this work is to secure former mine entrances and openings by installing fences and concrete slabs, or by backfilling.

In 2013, 210 former mine sites were visited by MERN inspectors to ensure, among other things, the safety of these sites. Among these, 25 sites were the object of securement work or maintenance on securement measures already in place. This work was carried out in the Estrie, Outaouais, Abitibi-Témiscamingue, Nord-du-Québec, and Gaspésie–Îles-de-la-Madeleine regions.

Estrie (05)

In 2012, the presence of an opening at the former Clark mine triggered ground subsidence on College Street in Lennoxville. The hole was temporarily backfilled in 2012 and a permanent solution was implemented in 2013.

Maintenance work took place at the Eustis mine site, which was rehabilitated by the MERN from 2007 to 2010.

Outaouais (07)

Open pits at the Grant, Emerald, Walker, and Phosphate King abandoned mine sites were backfilled in 2013.

Fences were installed to secure the Blackburn North Hill, Gauthier, McLemments, New York, and Pednaud sites. This work was completed in June 2013.

Maintenance work was carried out at the Lac Jake and Evans Cameron sites.

Abitibi-Témiscamingue (08)

Open pits at the Claremont and Lac Fortune Ouest sites were fenced in in early 2013. Later on in the year, waste piles at the Regcourt, Akasaba and Simon Ouest sites were levelled to make them safer.

Finally, monitoring and maintenance work was carried out on the East-Sullivan, Darius O'Brien, Preissac Molybdenite B and Wood-Cadillac sites.

Nord-du-Québec (10)

A slump was backfilled at the Opemiska mine. Follow-up work is planned in 2014.

Gaspésie – Îles-de-la-Madeleine (11)

Monitoring and maintenance work was carried out at the former Candego and Mines Madeleine sites. Dikes were cleared of vegetation and beaver dams, which caused the water level to go up potentially harming the integrity of earthworks, were removed.

7.5
Conclusion

In 2013, the government of Québec tightened the rules governing mine site restoration. Rehabilitation plans must now be approved before a mining lease is even issued. The financial guarantee has also been increased to 100% of the restoration cost for the entire site, and must be paid within a period of two years following approval of the plan.

These new measures greatly reduce the risk that the State will have to assume the responsibility for mine site rehabilitation without having the money required to do so.

Figure 7.1 - **Location of rehabilitation and securement work performed at orphaned mine sites in 2013.**

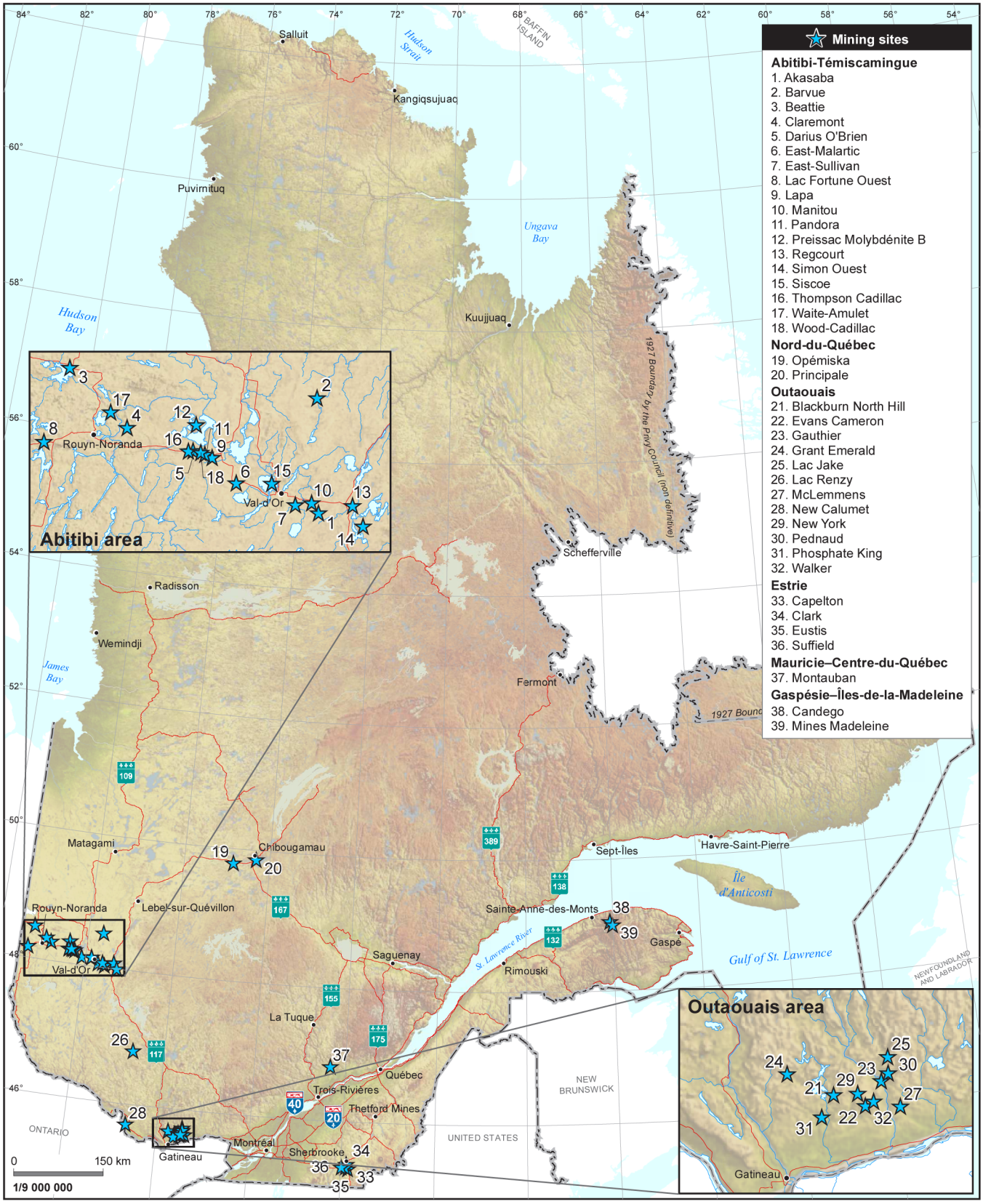


Photo: MERN

CHAPTER 8

Research and innovation

Louis Bienvenu

In its Mineral Strategy (published in June 2009), the Québec government stated that technological innovation and the development of new processes will help the industry face both environmental and technical challenges while improving its competitiveness. In this regard, the government granted in 2013 financial assistance to the following organizations dedicated to mining innovation:

SOREDEM

The **Société de recherche et de développement minier** (SOREDEM) was created by the Québec Mining Association (AMQ) in 1992. Its mission is to oversee research projects aimed at developing better technologies for narrow-vein mining (lode deposits). The *Ministère de l'Énergie et des Ressources Naturelles* (MERN) signed an agreement with SOREDEM to provide financial assistance in the amount of $45,000 per year for 3 years (April 2012 to March 2015), to support its research and development activities.

In 2013, SOREDEM reported seven projects underway and five projects in preparation. A total amount of nearly $1.2M was invested by the various partners involved in these projects. Information on the latter is now provided in the form of fact sheets on the AMQ website (http://www.amq-inc.com/).

Projects carried out by SOREDEM focus on health and safety, alternative energy, new rock fracturing methods, mechanization of operations, more environment-friendly mining processes, and greenhouse gases.

SOREDEM pursues its objective to bring together organizations and persons interested in promoting, advancing, and supporting research in the field of underground mining. It has eleven members; seven are mine operators and two are research organizations, one is a contracting firm and another is a public utility.

In addition, SOREDEM is involved in the MISA (Mines, Innovations, Solutions and Applications) Group, an organization actively involved in regional economic development in Abitibi-Témiscamingue, specifically in the Underground Techno-Mines niche of excellence.

CONSOREM

The **Mineral Exploration Research Consortium** (CONSOREM), based at Université du Québec à Chicoutimi, is a research group focussing on mineral exploration geotechnologies in Québec. It represents a link between its various members and partners of the mineral industry that come from the industrial, governmental, and academic fields. CONSOREM exists to develop concepts and modern mineral exploration techniques that will optimize the discovery of new deposits in resource regions.

In 2013, CONSOREM conducted eight research projects, the results of which will be presented to members of the consortium at the end of April 2014. The results of projects carried out in 2012-2013 were made public during a workshop held on November 11, 2013 within the scope of Québec Mines 2013. A conference session entitled "Evolution of knowledge in the Abitibi Subprovince" was also organized by CONSOREM during Québec Mines 2013.

CONSOREM annually holds a regional mining forum. In 2013, the mining forum attracted 120 participants and the following companies were on site to present their projects: Arianne Phosphate, Gleneagle Resources, Blackrock Metals, Niobec, Les Minéraux Crevier and IOS Services Géoscientifiques.

In January 2013, financial assistance in the amount of $450,000 was awarded to CONSOREM for a period of 3 years.

COREM

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

Over the years, COREM has become the most important research centre in Canada in ore processing, and the spinoffs of its pre-competitive research program benefit the entire mining industry. COREM today 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 $14M, 80% of which is self-funded, including infrastructure, which is a fairly high rate for a research organization. However, COREM needs public financing to pursue its pre-competitive research. For the moment, revenues from member fees, technological transfers, and services are insufficient to ensure a completely private financing of its activities. Thus, the MERN annually provides funding in the amount of $1M to COREM, which receives similar contributions from the *Ministère de l'Enseignement Supérieur, de la Recherche, des Sciences et de la Technologie* (MESRST) and from the federal government.

In 2013, COREM was affected by the mining industry slowdown, which in its case translated into a 20% drop in contract-based revenues, and the loss of two members (Rio Tinto Alcan and Cliffs Wabush Mines). Cost reduction measures were implemented to address the situation, including a reduction in personnel (120 as at March 31, 2014 versus 142 in January 2013). The consortium currently includes ten member mining companies that represent fifteen establishments.

A report assessing COREM's performance, commissioned by the *Ministère de l'Économie, de l'Innovation et de l'Exportation* (MEIE), indicates that government intervention is still justified since COREM's activities are directly aligned with the government's financing objectives, and since it delivers the expected results. Among the impacts of COREM'S work, the report mentions the implementation of new technologies by member companies, which yielded significant and recurring reductions in ore processing costs. The report also emphasizes the maintenance and creation of jobs in R&D in the Québec region, as well as training of highly skilled personnel.

MISA

The MISA (**Mines**, **Innovations, Solutions and Applications**) Group is a network of experts that are actively engaged in advancing equipment and innovative services to ensure the sustainable and responsible development of the mining industry. MISA is the organization officially recognized by the Québec government to oversee the development of the Underground Techno-Mines niche of excellence under the ACCORD (*action concertée de coopération régionale de développement*) program for Abitibi-Témiscamingue. MISA finances its projects with grants from the *Ministère de l'Économie, de l'Innovation et de l'Exportation* (MEIE), which may reach up to 70% of the cost of its projects. The rest is provided by members of MISA. The MERN's Mines Sector provides sector-specific advice to the MEIE, before the latter awards financing.

One of the most interesting projects aimed at facilitating social acceptability for mining projects is the development of a certification standard, based on the principles of sustainable development, that would apply to mineral exploration companies. The end-result of the project is intended to provide companies in this sector with a normative document that can be used to prepare for an audit that would certify compliance of practices.

This type of certification standard could prove to be an efficient tool to ensure best practices in the industry and make companies more competitive from a sustainable development perspective. In addition, the standard will help guarantee the responsible behaviour of certified companies for investors, thus increasing access to financing on capital markets.

In another respect, in 2013 MISA brought together experts from different industries to spend an entire day in "solution-finding" mode, focussing on six operational issues for ore processing plants in the Abitibi-Témiscamingue and Nord-du-Québec regions. Representatives from plants operated by Glencore (Horne Smelter and Matagami Mine), Agnico Eagle (LaRonde, Lapa and Goldex divisions) and Goldcorp presented their issues to an audience of more than 40 "problem-solvers" divided among the following workshops:

- Rapid and commonly localized wear of feeding chute liners for primary crushers;
- Maintenance and replacement of pump parts;
- Metallic pieces in crushers;
- Steel particles in the milling circuit;
- Rapid wear of pump parts;
- Conveyor guards.

The MISA Group is now considering converting proposed solutions into practical measures that will be implemented at operational mills in the region.

In 2012-2013, MISA contributed to the financing of some 30 projects for a total value of nearly $9M, approximately 50% of which is funded by the Québec government, mainly the *Ministère de l'Économie, de l'Innovation et de l'Exportation*.

FRQNT

The *Fonds de recherche du Québec - Nature et technologies* (FRQNT) developed a 5-year r**esearch program on the sustainable development** of the mining sector. During this time, the **MERN will provide funding** to the FRQNT, to a maximum amount of **$15M** to contribute to the funding of this research program. A first instalment of $3M was paid on May 29, 2013.

This program is for research institutions (colleges and universities). However, each project must also be supported, in a significant proportion, by mining companies who will contribute, either financially or in the form of goods and services, at least 10% of the cost of the project. This program will focus on the following research topics:

- Exploration and mining at depth;
- Northern development of the mining sector;
- Energy savings and greenhouse gas emissions;
- Environmental and community impact of mine development;
- Development and optimization of geoscience and geomatics tools.

The program will consist in three calls for projects, with a budget of $5M each. The first call for projects was launched in June 2013 and received 42 letters of intent for projects totalling $11.4M. The subsequent evaluation of projects by a relevance committee and a scientific committee resulted in the selection of nineteen projects considered to be the most promising and feasible with the available budget.

Selected projects include:

- Three projects concerning exploration and mining at depth;
- Five projects concerning the northern development of the mining sector;
- Three projects concerning energy savings and greenhouse gas emissions;
- Three projects concerning the environmental and community impact of mine development;
- Five projects concerning the development and optimization of geoscience and geomatics tools.

Selected projects are led by scientists from École Polytechnique, Université Laval, Université du Québec en Abitibi-Témiscamingue, Université du Québec à Montréal, Institut de technologie agroalimentaire de La Pocatière, McGill University, Institut national de la recherche scientifique, Université de Sherbrooke and École de technologie supérieure. Most of these projects extend over periods of 2 to 3 years and will benefit from grants on the order of $200,000 to $300,000.

The next call for projects will take place in the fall of 2014 and will also have a budget of about $5M.

TJCM

The *Table jamésienne de concertation minière* (TJCM) is a non-profit organization that conducts applied research in the field of mineral exploration across the entire Baie James region. It brings together various stakeholders, including the MERN, the *Ministère de l'Emploi et de la Solidarité Sociale*, the *Ministère des Affaires Municipales, des Régions et de l'Occupation du Territoire*, the Baie-James Regional Conference of Elected Officials and the Baie-James Municipality. The TJCM's mission is to support the development of the mining industry in the Baie James region, in a sustainable development perspective, while ensuring the maximization of economic benefits for the people that live in the region.

In 2007, the TJCM saw its efforts come to fruition with the creation of the Quaternary Applied Research Centre (QARC). The project leaders intended for the QARC to become an expert in its field and a partner of choice for mining companies active in the Nord-du-Québec region. The Quaternary is the most recent geological period, and is characterized by unconsolidated deposits like sand and gravel, which cover more than 90% of Québec's surface area. These deposits represent a valuable source of multidisciplinary scientific information, not only for mineral exploration but also for civil engineering, agriculture, archeology, forestry, environmental sciences and water resources.

In 2012, an agreement was signed, providing the TJCM with financial assistance in the amount of $50,000 per year over three years, to support its research and development activities.

In 2013, the TJCM began to develop a series of tools for decision-makers, with a view to promoting the sustainable development of northern regions in Québec. These tools will be used to assess the economic, social, and environmental impacts and benefits of mining projects. They may also be used to help determine the location of future protected areas, as well as for strategic and structural planning in northern regions with regard to infrastructure, optimizing land use, regional monitoring of mining labour needs, and geoscience knowledge acquisition.

Photo: MERN

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 4.4), 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, 2004). 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 Ottawan 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 Lac Tio titanium mine in the Côte-Nord region, as well as the Niobec niobium mine in the Saguenay–Lac-Saint-Jean region.

St. Lawrence Platform

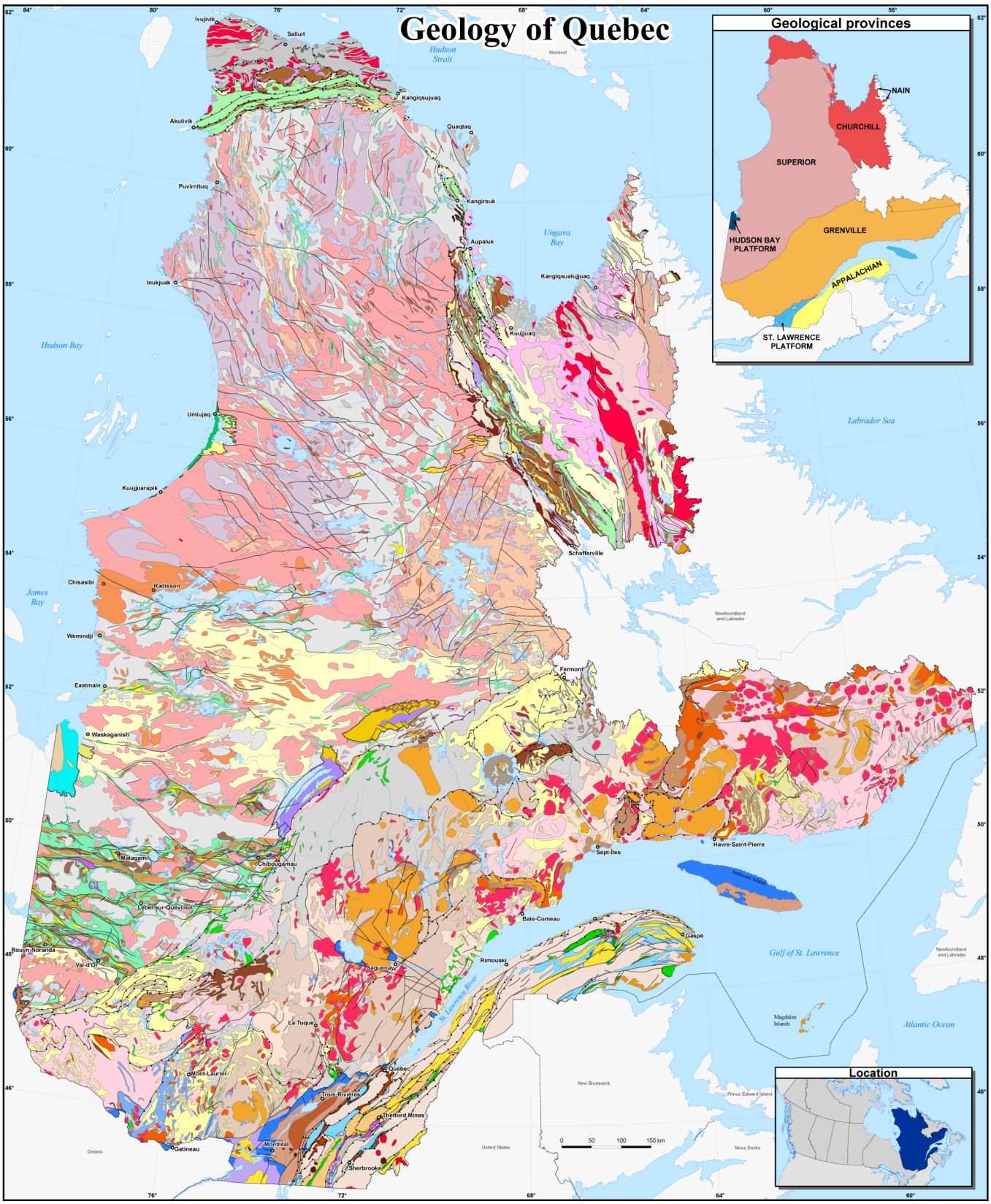
The Paleozoic St. Lawrence Platform, which overlies the Grenvillian basement along an erosional unconformity and is separated from the Appalachian Province by Logan's Line, is subdivided into two distinct platforms: the St. Lawrence Lowlands Platform and the Anticosti Platform. The main mineral resource 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)


Geology of Quebec
Geological provinces
NAIN
CHURCHILL
SUPERIOR
GRENVILLE
HUDSON BAY PLATFORM
APPALACHIAN
ST. LAWRENCE PLATFORM
Location
Ivujivik
Salluit
Kangiqsujuaq
Akulivik
Quaqtaq
Puvirnituq
Kangirsuk
Aupaluk
Inukjuak
Kangiqsualujjuaq
Kuujjuaq
Umiujaq
Kuujjuarapik
Schefferville
Chisasibi
Radisson
Wemindji
Eastmain
Fermont
Waskaganish
Havre-Saint-Pierre
Sept-Îles
Matagami
Chibougamau
Lebel-sur-Quévillon
Baie-Comeau
Gaspé
Rouyn-Noranda
Val-d'Or
Rimouski
Saguenay
La Tuque
Mont-Laurier
Québec
Trois-Rivières
Thetford Mines
Gatineau
Montréal
Sherbrooke
Hudson Strait
Ungava Bay
Hudson Bay
James Bay
Labrador Sea
Gulf of St. Lawrence
Atlantic Ocean
Anticosti Island
Magdalen Islands
St. Lawrence River
Nunavut
Newfoundland and Labrador
New Brunswick
Prince Edward Island
Nova Scotia
Ontario
United States
0 50 100 150 km

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

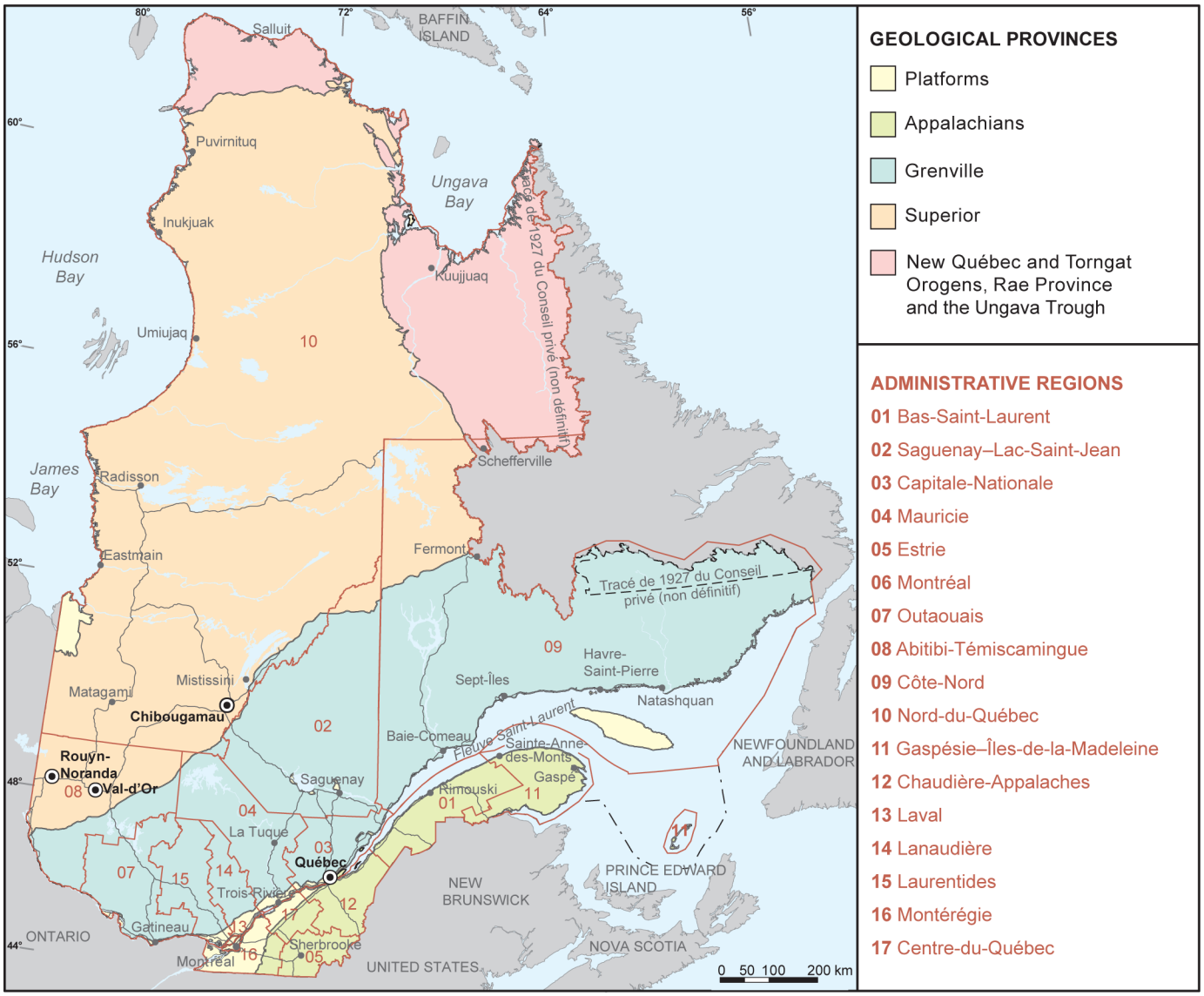
- Limestone and shale

PROTEROZOIC

- Basalt, dolostone, sandstone and conglomerate
- Sandstone, red mudrock, basalt and conglomerate
- Sandstone and conglomerate
- Dolostone and dolomitic sandstone
- Conglomerate, sandstone and iron formation
- Argilite, 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



CHIBOUGAMAU

Unité de gestion des ressources naturelles de Chibougamau

624, 3e Rue
Chibougamau (Québec) G8P 1P1
Phone: 418-748-2647
Fax: 418-748-3359

QUÉBEC

Centre de service des mines

Phone: 418-627-6278, poste 5743
Ligne sans frais : 1-800-363-7233, ext. 5743
Fax: 418-643-1815
Email: service.mines@mern.gouv.qc.ca

ROUYN-NORANDA

Unité de gestion des ressources naturelles de Rouyn-Noranda

70, avenue Québec
Rouyn-Noranda (Québec) J9X 6R1
Phone: 819-763-3388
Fax: 819-763-3845
Email: abitibi-temiscamingue@mern.gouv.qc.ca

VAL-D'OR

Unité de gestion des ressources naturelles de Val-d'Or

420, boulevard Lamaque
Val-d'Or (Québec) J9P 3L4
Phone: 819-354-4611
Fax: 819-354-4367

Appendix II

Legend of abbreviations used in tables

Prospecting and geology works

B (mt:g/t)	Bulk sampling including tonnage and gradeor (mt: % Xx) (metric tons:gram per ton) or (metric tons: % Xx)
Bs	Block sampling for dimension stones
Cg	Compilation of geoscientific information
Ct	Characterization tests and analysis (peat)
D (#h:m)	Diamond drilling (number of holes:total meters)
G	Geological mapping
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 sediments geochemical survey
Gs(r)	Lithogeochemical survey (rock)
Gs(s)	Stream sediments geochemical survey
Gs(sl)	Soils geochemical survey
Gs(t)	Till geochemical survey

Geophysical surveys

Gp	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	Feasability studies
MSR	Mining site rehabilitation
MT	Metallurgical test
PEA	Preliminary economic assesment
PFS	Prefaisability study
QS	Quaternary studies
RRE	Reserve and resource evaluation
TE	Technical evaluation

Substances

Ag	Silver
Au	Gold
Be	Beryllium
Bi	Bismuth
Ce	Cerium
Co	Cobalt
Cr	Chrome
Cr_2O_3	Chromite
Cs	Cæsium
Cu	Copper
Dy	Dysprosium
Dy_2O_3	Dysprosium oxide
Eu	Europium
Fe	Iron
Fe_2O_3	Iron oxide
Ga	Gallium
Gd	Gadolinium
La	Lanthane
La_2O_3	Lanthane oxide
Li_2O	Lithium oxide
Mg	Magnesium
Mo	Molybdenum
Nb	Niobium
Nb_2O_5	Niobium oxide
Nd	Neodimium
Nd_2O_3	Neodimium oxide
Ni	Nickel
TREO	Total Rare Earth Oxides (including ytrium)
P	Phosphorus
Pb	Lead
Pd	Palladium
PGE	Platinum Group Elements
Pr	Praseodymium
Pr_2O_3	Praseodymium oxide
Pt	Platinum
P_2O_5	Phosphorus oxide
Rb	Rubidium
REE	Rare earth elements
Sc	Scandium
Si	Silica
SiO_2	Silica oxide
Sm	Samarium
Ta	Tantalum
Ta_2O_5	Tantalum oxide
Tb	Terbium
Te	Tellurium
Th	Thorium
Ti	Titanium
U	Uranium
U_3O_8	Uranium oxide
V	Vanadium
V_2O_5	Vanadium oxide
W	Tungsten
Y	Yttrium
Y_2O_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	*Gestion des titres miniers*
MDDEFP	*Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs du Québec*
MDDELCC	*Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques*
SIGÉOM	*Système d'informations géominières*
c	Confidential data
n/a	Not available
Italic	Exploration work done on mine properties
Bold	Advanced exploration project

Photo: MERN

Appendix III

The process of mineral development

The Mineral Development Process

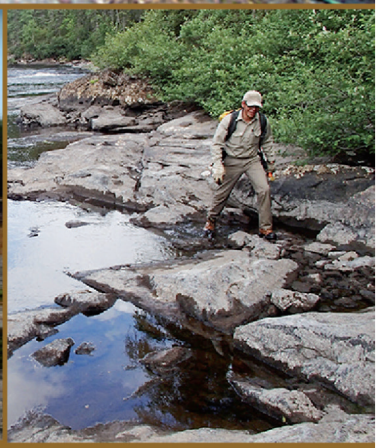
This schematic chart describes the nature and duration of work, objectives, evaluation methods, targeted results, nature of mineral inventory, and investment and risk levels, for each of the four phases of the mineral resource development process: mineral resource assessment, exploration, deposit appraisal,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

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 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 resources 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 operations, and mine site rehabilitation.

	Mineral Resource Assessment	Exploration					Deposit Appraisal				Mine Complex Development		
Phase	VRM	EX- 1	EX- 2	EX- 3	EX- 4	EX- 5	MV- 1	MV- 2	MV- 3	MV- 4	ACM-1 Preparation and development	ACM-2 Mining operations	ACM-3 Site rehabilitation
Work	Surveys, research, and metallogenic syntheses.	Exploration planning.	Regional reconnaissance and surveys.	Prospecting and ground surveys on anomalies.	Verification of anomalies and showings.	Discovery and delineation of a deposit with estimated tonnage.	Definition of deposit with estimated tonnage.	Definition of technical parameters. (Engineering)	Definition of economic parameters.	Feasibility study.	Construction. Start-up of mine.	Production and marketing.	Mine closure. Mine site rehabilitation.
Duration				2 years +					3 to 8 years		2 to 3 years	5 years +	
Objectives	Provide information and tools to develop mineral resources in a sustainable development perspective.	Select targeted minerals and metals. Establish objectives and strategies. Select prospective target areas.	Find regional and local anomalies. Select the most promising targets.	Acquire properties. Confirm the presence, position and characteristics of anomalies.	Determine the source of anomalies. Find mineral showings. Acquire additional properties as needed.	Discover, confirm and delineate a first mineral inventory for the deposit. Assess its economic potential in a preliminary fashion. First pre-feasibility study.	Define the extent, controls, and internal distribution of the mineralogy and ore grade of the deposit. Plan and design project engineering.	Establish technical feasibility. Establish mining plans, schedules and estimations for the project.	Establish parameters for economic and financial assessment. Examine potential sources of financing.	Ensure validity of data, assumptions, and estimations. Decide whether or not to proceed.	Complete mine development and required construction work in line with budget and schedule. Prepare start-up of mine and processing plant.	Achieve commercial production as per planned rate and specifications. Achieve profitability in a sustainable development perspective.	Rehabilitate mine site to safe and visually acceptable level and environment quality compatible with future land uses.
Evaluation methods	Surveys, research, and geoscientific, metallogenic and economic syntheses by governments, universities, and other research groups.	Studies and selection of metals and minerals. Review and synthesize geological and metallogenic information for various regions. Assess legal and political context.	Remote sensing, aerial photography, airborne geophysics. Prospecting, geology and geochemistry. Assessment and selection of anomalies.	Prospecting and ground geoscientific surveys. Overview and selection of anomalies for follow-up.	Geological mapping and other surveys. Trenching, sampling, drilling. Assessment of results and selection of targets.	Stripping, trenching, mapping, sampling, drilling, geophysics. Preliminary resource estimation. Environmental characterization.	Definition work by mapping, sampling, surface and underground drilling. Acquire data for project engineering. Detailed surveys of site and environment.	Bulk sampling. Pilot-scale tests, engineering and cost estimates for the mine, the ore concentration process, infrastructure, environmental protection and site rehabilitation.	Market, price, and financial studies. Analysis of technical, economic, financial, social, political, and environmental risks.	Due diligence review of all available information on the project. Assess profitability, risks, and positive aspects of the project.	Project management and quality management. Plan mine start-up and training of personnel.	Manage production in line with continuous improvement of quality and performance. Exploration, deposit appraisal, and development of new zones on and off mine site.	Decommissioning of mine. Environmental reclamation and monitoring.
Targeted results	Databases, maps, and models	Exploration projects	Regional anomalies	Local anomalies	Mineral showings	Deposit with estimated tonnage	Define mineral resources	Determine mining methods	Technical and economic feasibility	Ore deposit Decision to go into production	Start-up of production	Profitability	Rehabilitated mine site
Mineral Inventory	MINERAL POTENTIAL	NEW UNIDENTIFIED, SPECULATIVE, HYPOTHETICAL, OR MODELLED MINERAL RESOURCES				INFERRED MINERAL RESOURCES	MEASURED AND INDICATED MINERAL RESOURCES				PROVEN AND PROBABLE MINERAL RESERVES		MINERAL RESOURCES

Source: Modifications coordinated by S. Lacroix in August 2001, 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.
Graphic design: Charlotte Grenier

Ressources naturelles Québec



Québec