

St. Lawrence Platform and Appalachians

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Introduction

The St. Lawrence Platform and Appalachians include all parts of Québec located south of the St. Lawrence River (Figure 1F-1). The geological setting of this part of Québec, to the south of the Canadian Shield, mainly consists of Paleozoic rocks subdivided into two geological provinces: the St. Lawrence Platform, which overlies the Grenvillian basement along an erosional unconformity, and the Appalachians to the southeast. The boundary between the two provinces is marked by Logan's Line (LL). In Québec, each of these two provinces is subdivided into major tectono-stratigraphic domains. In the St. Lawrence Platform, from northwest to southeast, we find the following Cambrian to Silurian domains: the Autochthonous Domain and the Parautochthonous Domain. The Appalachian Orogen, also from northwest to southeast, is divided into four domains: the Cambrian-Ordovician Humber and Dunnage zones, separated by the Baie Verte-Brompton Line (BVBL), the Silurian-Devonian Gaspé Belt, and the Permo-Carboniferous Magdalen Basin.

This area hosts two mineral collecting operations on outstanding mineralogical sites. Located a few kilometres northeast of Bonsecours in the Estrie region, **Mines Cristal Québec** extracts, since 1990, quartz crystals of all sizes from numerous druses occurring in quartz veins intercalated in the Sutton Schists. In Lemieux Township south of the Parc national de la Gaspésie, **Mine d'Agates du Mont Lyall** manages a site where collectors can find exceptional agates and geodes, in a rhyolite flow intercalated in the York River Formation (Gaspé Sandstones).

In terms of exploration activities in the St. Lawrence Platform and Appalachians, 18 exploration projects were brought to our attention in 2004, compared to 16 projects in 2003. The total number of metres drilled in 2004 amounted to 6,700 m compared to 6,043 m in 2003.

To provide a clearer framework in which to discuss exploration projects, the St. Lawrence Platform and Appalachians were divided into three segments: the southwestern segment, which includes the Montréal and Chaudière-Appalaches regions (4 projects and 1,950 m drilled), the central segment comprising the Bas-Saint-Laurent region (2 projects), and the northeastern segment, which includes the Gaspésie and Îles-de-la-Madeleine regions (12 projects and 4,750 m drilled).

Exploration Projects

SOUTHWESTERN SEGMENT (MONTRÉAL AND CHAUDIÈRE-APPALACHES REGIONS)

At the end of 2004, **Niocan Inc.** was still waiting for the *Ministère de l'Environnement du Québec* (MENV) to issue the Certificate of Authorization required to continue development work on its niobium deposit, where proven and probable reserves for the two ore zones S-60 and HWM-2 are estimated at 13.3 Mt at a grade of 0.63% Nb₂O₅. This ore deposit is hosted in the Oka carbonatite Complex (project 3, Figure 1F-1), near Montréal in the Lac-des-Deux-Montagnes seigniory. Before the certificate is issued, **Niocan Inc.** will take part in a study led by the *Bureau d'audiences publiques sur l'Environnement* (BAPE) in order to provide, before the end of March 2005, further details on water-related issues on the minesite.

For the second consecutive year, **Osisko Exploration Ltd** explored its Bellechasse property (project 2, Figure 1F-1) in Bellechasse and Panet townships. This property was subject to an option agreement signed in May 2003 with **Golden Hope Mines Ltd**, but the latter announced in a press release dated July 30, 2004, the termination of its agreement with **Osisko Exploration Ltd**. The property contains five known gold-bearing zones (Timmins, Timmins South, 88, Ascot, Northeast), two showings (88 Extension and Colfax) and three prospects of gold-bearing boulders of unknown origin. The gold mineralization is essentially hosted in quartz veins intimately associated with gabbro sills in Ordovician sedimentary rocks of the Etchemin and Beauceville formations (Magog Group). The results of a drill program conducted in the spring 2004 to test this gold stockwork were not released.

In 2003, the discovery of several quartz boulders with native gold prompted prospectors **R. Mainville** and **T. Burnham** to pursue their investigations on the Timrod property (project 4, Figure 1F-1) in the Saint-François seigniory. Thus, in 2004, a new trench was excavated to assess the potential of a well-developed stockwork of quartz veins and veinlets hosted in an acidic tuff in contact with a graphitic argillite typical of the Beauceville Formation. Located directly up-ice from gold placers in Saint-Simon-les-Mines, the Timrod gold showing may represent one of the sources of these placer deposits.

CENTRAL SEGMENT (BAS-SAINT-LAURENT REGION)

In 2004, **Ressources Appalaches Inc.** conducted two exploration projects in the Bas-Saint-Laurent region. On the Catalogne project (project 5, Figure 1F-1) in Catalogne Township, the company tested magnetic anomalies which may be related to the presence of copper mineralization. On its Dunière project (project 6, Figure 1F-1) in La Vérendrye Township, it looked for gold-bearing veins along the eastern extension of the Sainte-Florence fault.

NORTHEASTERN SEGMENT (GASPÉSIE AND ÎLES-DE-LA-MADELEINE REGIONS)

For the fourth year in a row, **Ressources Appalachés Inc.** was very active in the Gaspésie region with six exploration projects, especially on its flagship Mont de l'Aigle property (project 11, Figure 1F-1) in Lemieux Township. Work conducted on this property in 2004 was successful in demonstrating the presence of an iron oxide-copper-gold (IOCG)-type deposit. Three trenches excavated over near-surface magnetic anomalies revealed the presence of disseminated chalcopyrite, pyrite, magnetite, and hematite mineralization, with grades ranging from 0.5 to 4.5% Cu, whereas drillholes intersected quartz-sulphide-oxide veins and stockworks over intervals of 10 to 57 m. Five other projects managed by **Ressources Appalachés Inc.** were aimed at assessing the gold potential on the remaining properties.

For the second year in a row, the *Fonds régional d'assistance à la prospection minière Gaspésie-Îles-de-la-Madeleine (FRAPMGÎM)* trained new prospectors to search for epithermal vein-type and Carlin-type gold deposits in black organic shales, and for copper deposits in sedimentary and volcanic red beds. These prospectors led an off-claim prospecting campaign in areas from Nouvelle to Port-Daniel and near Mont Alexandre (project 10, Figure 1F-1), as well as on **FRAPMGÎM** claims, namely on the Rivière Angers property (project 7, Figure 1F-1) in Angers and Carleton townships. These two projects led to the discovery, in outcrop or in erratic boulders, of weakly auriferous (<300 ppb Au) quartz-carbonate-pyrite-stibnite-arsenopyrite veins and breccias, of pyritic felsic volcanic breccias (<125 ppb Au), of altered pyrite-rich dacitic dykes, of altered gold-bearing feldspar porphyry boulders (<500 ppb Au), of chlorite-pyrite stockworks, of weakly auriferous pyritic shales (<50 ppb Au), and of locally altered and pyritic chert and felsic ash tuff horizons.

Mines Cascapédia Inc. (project 13, Figure 1F-1) explored the northern and southern extensions of the historical New Richmond 1 (Cap Brûlé) showing discovered in 1917. The quartz-antimony-gold-silver veins in this showing, associated with a 2 to 8-m-wide fault zone trending N340°/90° across a polymictic conglomerate of the Honorat Group, were previously traced over a distance of 30 m and a width of 4 to 5 m.

Prospectors **R. Lelièvre** and **M. Boudreau** (project 14, Figure 1F-1) observed sedimentary redbed-type copper occurrences (chalcocite, malachite) associated with two structures trending N60° from Grande-Rivière Ouest to Sainte-Thérèse-de-Gaspé, and trending N340° along the "Brèche à Manon" creek. A few samples were collected, yielding assays up to 0.82% Cu and g/t Ag.

The goal of **Junex Inc.** on the Mictaw project (project 15, Figure 1F-1) in Port-Daniel Township is to assess the potential for Kupferschiefer-type copper deposits and other deposit types associated with sediments enriched in organic matter. Certain black shale units in the Mictaw syntectonic melange

host disseminated and nodular sulphides and up to 10% organic matter; these locally contain anomalous gold (18 ppb), molybdenum (61 ppm), and palladium (20 ppb).

Prospectors **J.-B. Beaudin** and **L. Leblanc** pursued their investigations on a Cu-Ag showing (1.0 to 7.2% Cu and 1.2 to 28.6 g/t Ag) consisting of disseminated chalcopyrite and bornite in volcanic conglomerates with quartz veining, discovered in 2001 on the Grand Pabos Nord property (project 16, Figure 1F-1) in Randin Township.

Opportunities for Exploration

BASE METALS AND PRECIOUS METALS

Over the past two decades, exploration carried out by mining companies has shown the mineral potential of sedimentary environments in the Appalachians, namely for copper in red beds and for Carlin-type gold in limestones. **Ressources Appalachés Inc.** and **SOQUEM INC.** explored the Paleozoic sedimentary basin in the Bas-Saint-Laurent region, more specifically in NTS sheets 22 C/02 and 21 N/15. Their work on the Transfiguration and Squatec properties, southwest of Rimouski, uncovered stratiform Cu-Au±Pb±Zn occurrences typical of sedimentary redbed-type copper deposits. The copper mineralization is disseminated and essentially consists of chalcopyrite and minor chalcocite, with grades ranging from 0.1 to 15% Cu. On a regional scale, it occurs in reduced facies composed of grey and green conglomerates and grey quartzitic sandstones overlying the base of the Silurian Robitaille Formation in the Connecticut Valley-Gaspé Synclinorium.

In north-central Gaspésie, and more specifically in Boisbuisson Township west of the Devonian McGerrigle granitic Pluton (NTS 22 G/01 and 22 H/04), the **FRAPMGÎM** performed exploration work on its property, which includes the minesite of former copper producer **Les Mines Madeleine Ltée**. They confirmed the presence of copper-silver mineralization also related to sedimentary redbed-type copper deposits. The mineralization, reaching grades of 4.8% Cu and 31 g/t Ag, is disseminated in green sandstones overlying mafic volcanic and volcanoclastic rocks at the top of the Cambrian volcano-sedimentary sequence of the Des Pics Unit in the Québec Supergroup. In this area in 1981, **Les Mines Madeleine Ltée** had estimated, based on drill results, mineral resources at 400,000 tonnes at a grade of 0.25% Cu.

DIVEX, a group of earth scientists united in a research network to diversify mineral exploration in Québec, is taking a closer look at known gold showings in sedimentary environments near the Grand Pabos-Ristigouche fault in the southern Gaspésie region. The efforts of **DIVEX** to better characterize the geological setting of occurrences and particularly the Saint-André-de-Restigouche gold-stibnite showing in Ristigouche Township (NTS 22 B/02) show that several features typical of Carlin-type gold deposits are present.

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The results of this study outline the potential for Carlin-type gold deposits in Ordovician and Silurian limestones of the Matapédia Group.

In eastern Gaspésie, more specifically in York, Fortin, Baillargeon, and Galt townships (NTS 22 A/09, A/10 and A/15), the **FRAPMGÎM** conducted a study on hydrocarbons and Pb-Zn±Ag occurrences in cherty and dolomitic limestone, dolomite and dolomitic breccia zones along the Troisième Lac fault. The study confirms that lead-zinc occurrences are related to Mississippi Valley-type (MVT) deposits, and that, in this area, lower Devonian carbonate rocks in the Indian Cove Formation of the Upper Gaspé Limestones and in the York Lake Formation of the overlying Gaspé Sandstones offer a strong potential for this type of ore deposit.

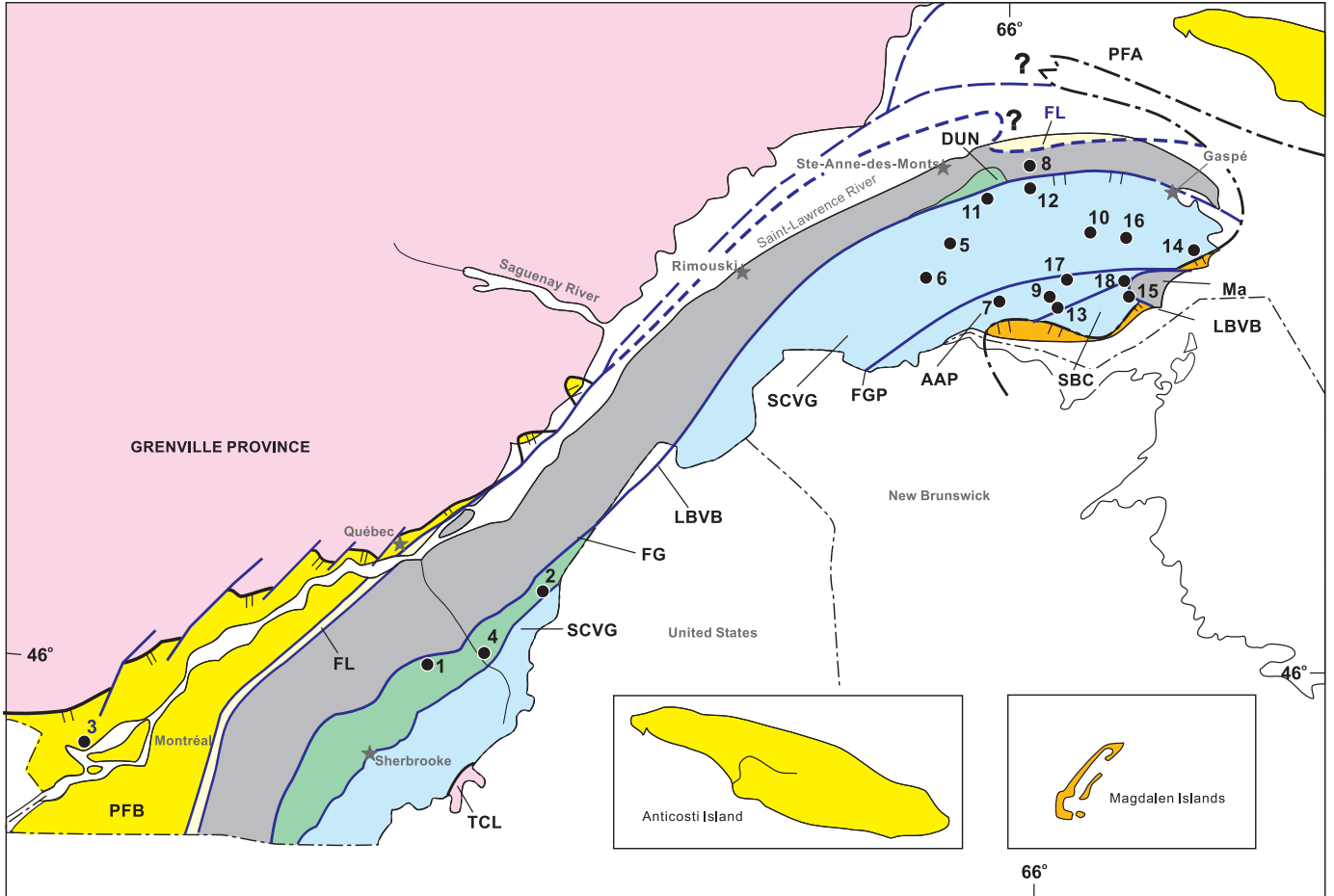
To date, Paleozoic sedimentary and volcanic assemblages in north-central Gaspésie (NTS sheets 22 A/11 to 14, B/09, B/16, G/01 and H/04) were explored to find copper deposits similar to those at the former **Gaspé Copper mine** (a division of **Noranda Inc.**) in Murdochville, namely: porphyry-type deposits (Copper Mountain), skarns (zones B and C), marble-hosted replacement massive sulphides (mantos) (zone E), as well as distal polymetallic vein-type deposits.

However, based on the presence of favourable metallogenic environments (Lachance and Pilote, 2003; Pilote, 2002; Doyon,

1995, 1996; Bellehumeur and Valiquette, 1993; Wares, 1988; Stevens, 1983), the north-central Gaspésie region also represents a first-order regional target in the search for zinc-lead-silver replacement deposits (skarns and massive sulphides) in limestones, epithermal gold deposits in and around rhyolitic volcanic centres (particularly in Mont Lyall and Mont Tuzo rhyolites peripheral to the Lemieux dome), SEDEX-type lead-zinc-silver-barite deposits associated with manganese-enriched zones in calcareous shales with bentonite beds indicating volcanism coeval with sedimentation in the Upper Gaspé Limestones, volcanogenic massive sulphide (VMS)-type zinc-lead-copper deposits or Besshi-type copper-zinc deposits, and along the southern edge of the Lemieux dome, disseminated lead-zinc deposits in quartzofeldspathic sandstones of the lower Devonian York River Formation.

Recent exploration campaigns conducted by **Ressources Appalaches Inc.** on its Mont de l'Aigle property and geoscience studies conducted by the *Ministère des Ressources naturelles, de la Faune et des Parcs (MRNFP)* in the Lac Saint-Anne area (NTS 22 B/16-0200-0102) confirm the presence of hematite-magnetite-chalcopyrite-quartz-dolomite veins and hydrothermal breccias, particularly in the northern part of the Lemieux dome. These Paleozoic Appalachian occurrences correspond to iron oxide-copper-gold (IOCG)-type deposits, with a gold component that for the moment remains poorly developed.

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- APPALACHIAN**
- Orange box: Magdalen Basin (Permo-Carboniferous)
 - Light blue box: Gaspé belt (Upper Ordovician-Devonian)
 - Green box: Dunnage Zone (Cambro-Ordovician)
 - Grey box: Humber Zone (Cambro-Ordovician)
- ST. LAWRENCE PLATFORM**
- Yellow box: Subautochthonous (Ordovician)
 - Light yellow box: Autochthonous (Cambro-Ordovician)
 - Pink box: Precambrian

- Abbreviations:**
- AAP: Aroostook-Percé anticlinorium;
 - DUN: Dunnage zone;
 - FGP: Grand Pabos fault;
 - FL: Logan fault;
 - FG: Guadeloupe fault;
 - LBVB: Baie Verte-Brompton line;
 - Ma: Maquereau-Mictaw window;
 - PFA: Anticosti platform;
 - PFB: St. Lawrence Lowlands platform;
 - SBC: Baie des Chaleurs synclinorium;
 - SCVG: Connecticut Valley-Gaspé synclinorium;
 - TCL: Chain Lakes terrane.

- Dashed line: Fault
- Hatched line: Erosionally unconformity
- Dotted line: Boundary

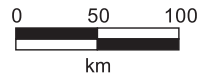


FIGURE 1F-1. Exploration projects over the St. Lawrence Platform and the Appalachians for 2004.

TABLE 1F-1 - Exploration projects over the St.Lawrence Platform and the Appalachians for 2004 (see figure 1F-1).

NO	TOWNSHIPS (SEIGNIORIES)	NTS	COMPANIES / PROSPECTORS	PROJECTS	SUBSTANCES	WORKS ⁽¹⁾
Southwestern Segment (Montréal and Chaudière-Appalaches regions)						
1	Adstock	21 L/03	Ressources Mengold Inc.	Thetford Option	Cr-PGE	Cs, Pr, S
2	Bellechasse, Panet	21 L/09	Osisko Exploration Ltd / Golden Hope Mines Ltd	Bellechasse	Au	D(12:1950), Mag(A)
3	(Lac-des-Deux-Montagnes)	31 G/09	Niocan Inc.	Niobium/Oka	Nb	Env
4	(Saint-François)	21 L/02	R. Mainville / T. Burnham	Timrod	Au	T
Central Segment (Bas-Saint-Laurent region)						
5	Catalogne	22 B/10	Ressources Appalaches Inc.	Catalogne	Cu	Cs(r), Pr, S
6	La Vérendrye	22 B/07	Ressources Appalaches Inc.	Dunière	Au	Cs(r), Pr, S
Northeastern Segment (Gaspésie et Îles-de-la-Madeleine regions)						
7	Angers, Carleton	22 B/08, 01	FRAPMÇÎM	Propriété Rivière Angers	Au-Cu-Ag-Pb-Zn-Ni	Cs(r), Pr, S
8	Boisbuisson	22 H/04	Ressources Appalaches Inc.	Boisbuisson	Au	D(4:250), T
9	Flahault	22 A/05	Ressources Appalaches Inc.	Harriman	Au	Cs(sl), Pr, T
10	Gaspésie	22 A, B	FRAPMÇÎM	Prospection de cibles 2004	Au-Cu-Pb-Zn	Cs(r), Pr, S
11	Lemieux	22 B/16	Ressources Appalaches Inc.	Mont de l'Aigle	Cu-Au	D(17:4500), T, Titan 24
12	Lesseps	22 A/13	Ressources Appalaches Inc. / SOQUEM INC. / Major Drilling Group International Inc.	Lesseps Est	Au	Cs(sl)
13	New Richmond	22 A/04, 05	Mines Cascapédia Inc.	Côte New Richmond I	Sb-Au-Ag	Cs(r), Pr, S, T
14	Percé	22 A/08	R. Lelièvre / M. Boudreau	Lits rouges cuprifères de Grande-Rivière	Cu-Ag-Co-Au- Ni-PGE	Cs(r) Pr, S
15	Port-Daniel	22 A/02, 03	Junex Inc.	Mictaw	Au-Cu-Ni	Cs(r), Pr, S
16	Randin	22 A/11	J.-B. Beaudin / L. Leblanc	Grand Pabos Nord	Cu-Ag	C, Cs(r), Pr, S, T
17	Robidoux	22 A/06, 05	Ressources Appalaches Inc.	Robidoux	Au-Cu	Pg, Titan 24
18	Weir	22 A/06	Ressources Appalaches Inc.	Irlande	Au	Cs(r), Pr, S

1 = See abbreviation list in appendix II.

