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THE DEEP-SEATED GOLD POTENTIAL OF THE CADILLAC MINING CAMP

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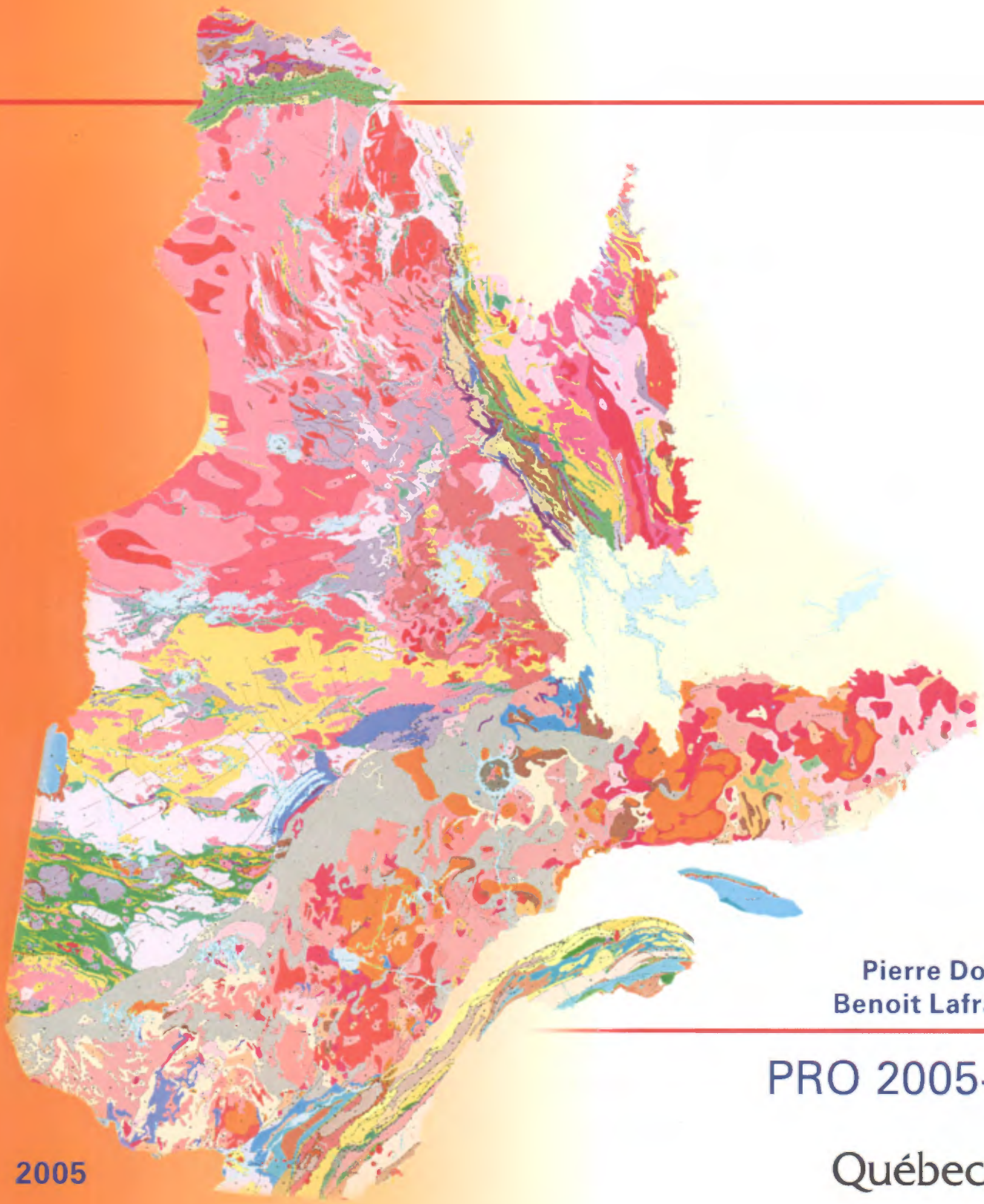
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The deep-seated gold potential of the Cadillac mining camp



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INTRODUCTION

A mere two years after announcing the discovery of the Lapa gold deposit east of Cadillac, Agnico-Eagle Mines Ltd decided to sink a shaft in order to launch an underground development program on the ore deposit. Since the first announcement in 2002, the Cadillac mining camp, located between Val-d'Or and Rouyn-Noranda, has been the focus of intense mineral exploration. This activity is concentrated along the Cadillac Fault and in the Bousquet Formation of the Blake River Group (Figure 1). Six major projects recently yielded impressive results, namely the LaRonde II and Lapa projects by Agnico-Eagle Mines Ltd, the Pandora project by Queenston Mining Inc., the Westwood and J Zone (Doyon mine) projects by Cambior Inc., and the O'Brien-Kewagama project by Radisson Mining Resources Inc. Encouraging results oblained from these projects provide hard evidence of the deep-seated gold potential of this part of the Cadillac Fault (Lapa, Pandora and O'Brien-Kewagama projects) as well as the gold and polymetallic potential associated with the Blake River Group (LaRonde II, Westwood and J Zone projects). Furthermore, Agnico-Eagle Mines Ltd is now targeting the down-plunge extension of known ore zones beneath the former Bousquet 1 mine and the Ellison showing further west. Globex Mining Enterprises and Queenston Mining have a similar strategy on the Wood Gold Mine/Pandora joint venture, located east of the O'Brien-Kewagama property. In fact, a nearly 20-km segment of the Cadillac Fault, on either side of this cluster of properties, remains essentially unexplored beyond a depth of 400 metres. The gold potential of this considerable volume of rock remains to be confirmed.

DEPTH POTENTIAL

The Cadillac mining camp currently ranks as the top gold producing region in Québec, and remains one of the most important mining camps in Canada. To date, it has produced over 12 million ounces of gold and still offers tremendous mineral potential. Drillholes testing the bedrock beyond 200 metres depth are not all that common and great volumes of rock remain unexplored. The vertical section of the northern part of the camp, including the Mouska, Doyon, Bousquet 1, Bousquet 2, and LaRonde mines (Figure 2a) and the vertical section of the southern part of the area, associated with the Cadillac Fault (Figure 2b), show the actual depth of exploration to date. Figure 2 also shows prospective areas for deep exploration. At the Mouska mine, zones 40, 50 and 50 South were traced to more than 800 metres in depth. At the Doyon mine, exploration has reached 1,000 metres in depth. Furthermore, between the Doyon and Mouska mines, very little exploration has been performed at depth. Further east, drillholes on the Westwood project intersected two parallel ore zones at depths between 1,300 and 2,200 metres. The exploration program at the LaRonde mine delineated Zone 20 North to a depth of nearly 3,000 metres. All these mineralized zones remain open at depth and laterally. The area to the east of the LaRonde mine, which includes the El Coco, Sphinx and Bruce properties, also has deep-seated gold potential.

The segment of the Cadillac Fault that runs through the Cadillac mining camp includes, from east to west, the former Lapa, Pandora, Wood Cadillac, Central Cadillac, Kewagama, O'Brien, Thompson Cadillac (New Alger) and Bouscadillac mines (figures 1 and 2b). With the exception of the O'Brien mine, these ore deposits only produced a few hundred thousand tonnes of ore. It seems very little exploration has been performed in this area beyond a 400-metre depth. Finally, west of the former Thompson Cadillac mine, a series of gold showings hosted in rocks of the Piché Group are scattered over a distance of 8 kilometres along the Cadillac Fault (Figure 1).

OUTLOOK

The encouraging results reported by Agnico-Eagle Mines, Queenston Mining, Cambior Inc. and Radisson Mining Resources have put the spotlight on the Cadillac mining camp as one of the main areas of interest for gold exploration in Québec. In the North section (Figure 2a), a very

large volume of rock, located east of the Doyon mine at a vertical depth of more than 1,000 metres, offers a very good gold potential. It will gradually become accessible from the exploration drift to be excavated between 2004 and 2007 to reach the Westwood Horizon. Cambior Inc. is also investigating properties between the Mouska and Doyon mines, where it reports promising targets. Agnico-Eagle Mines is conducting extensive exploration on the Bousquet 1/Ellison, Bousquet 2 and LaRonde II projects. Further east, the company also holds the El Coco and Sphinx properties, which remain underexplored at depth.

In the South section (Figure 2b), the start-up of underground development at the Lapa ore deposit, only two years after its discovery, is a clear indication of the importance of this new deposit. If the Contact Zone extends further east on the Lapa property, and further west on the Pandora property, as Queenston Mining claims, the gold potential of these two properties is all the more significant. JV partners Globex and Queenston are also targeting this zone to the east of the Wood Cadillac mine.

As for the segment of the Cadillac Fault that extends for more than 20 kilometres from the Lapa property in the east to the Norgold showing in the west, the deep-seated gold potential remains substantial. This area, untested beyond 500 metres depth, represents a huge volume of unexplored bedrock.

HISTORY OF THE CADILLAC MINING CAMP

The first gold discovery in the Cadillac area was made by Mr. J. O'Brien in 1924 and the mine bearing his name first went into production in 1932. Between 1936 and 1949, several other small ore deposits were brought into production (Lavergne, 1985), namely: the Thompson Cadillac (1936-1939), Lapa Cadillac (1938-1943), Mic Mac (1942-1947), Pandora (1939-1942), Central Cadillac (1939-1943 and 1947-1949) and Wood Cadillac (1939-1942) mines. Following the shutdown of the O'Brien mine in 1957, mineral exploration in the Cadillac camp declined. In the 1950s and 1960s, the attention of prospectors and mining companies shifted to the Rouyn-Noranda and Val-d'Or mining camps. The Cadillac camp did not produce for another twenty years, until the discovery and start-up of production at the Bousquet 1 and Doyon mines in 1979 and 1980 respectively. The start-up of mining operations at LaRonde (Dumagami) in 1988, Bousquet 2 in 1990 and Mouska in 1991 heralded the onset of a second mining era in the Cadillac camp at the end of the 20th century. Recently, in December 2002, the Bousquet 2 mine ceased operations.

REGIONAL GEOLOGY

The Cadillac area is underlain by Archean rocks and Proterozoic gabbro dykes. From north to south, six major lithological units are observed, namely: the Malartic Group, the Kewagama Group, the Blake River Group, the Cadillac Group, the Piché Group and the Pontiac Group (Figure 1). The *Malartic Group* is composed of ultramafic volcanic rocks (komatiites) and tholeiitic basalts (Trudel *et al.*, 1992). The *Kewagama Group* contains wackes and pelitic rocks. The *Blake River Group* comprises the Hébécourt and Bousquet formations. The *Hébécourt Formation* is composed of massive and pillowed basalts, gabbro sills and rhyolites of tholeiitic affinity. According to Lafrance *et al.* (2003c), the *Bousquet Formation* includes a lower member and an upper member. The lower member is composed of an intermediate scoriaceous tuff, of mafic, intermediate and felsic volcanic rocks and of felsic and mafic subvolcanic intrusions. The upper member consists of massive felsic volcanic rocks and volcaniclastic units. Rocks of the lower member are tholeiitic to transitional, whereas those of the upper member show a transitional to calc-alkaline affinity (Lafrance *et al.*, 2003c). The northern part of the Cadillac mining camp is underlain by rocks of the Bousquet Formation. The *Cadillac Group* is composed of wackes, pelitic schists with bands of polymictic conglomerate and iron formation. Most of the orebodies in the southern part of the Cadillac mining camp are hosted in rocks of the *Piché Group*, which forms a thin band several tens of kilometres in length that follows the trace of the Cadillac Fault. In the Cadillac area, the Piché Group is composed of volcanic rocks (tholeiitic basalts, porphyritic andesites and calc-alkaline block tuffs) interbedded with conglomerates, wackes, graphitic schists and pyritic cherts. In the Malartic area, the Piché Group is mainly composed of komatiites and basalts (Trudel *et al.*, 1992). Sedimentary rocks, mainly wackes, of the *Pontiac Group* lie south of the Cadillac Fault.

Volcanic and sedimentary rocks in the Cadillac area form a series of E-W-trending steeply dipping monoclinal panels. Volcanic and sedimentary sequences are separated by longitudinal faults parallel to lithological contacts such as the Cadillac and Lac Imau faults (Figure 1). In Québec, the Cadillac Fault runs along an E-W axis over a lateral distance of nearly 150 kilometres. It separates the Pontiac metasedimentary Subprovince to the south from the Abitibi volcano-sedimentary Subprovince to the north. In Québec, about forty or so gold deposits, which have produced over 60 million ounces of gold since the early 20th century, are associated with this major structure and its subsidiary faults.

Intrusive rocks in the Cadillac area include mafic sills (gabbro and diorite) occurring in the Blake River and Piché groups, the Mooshla synvolcanic pluton, composed of

gabbro, quartz diorite, tonalite, and trondhjemite, as well as N-S and NE-SW-trending Proterozoic diabase dykes. North of the Cadillac Fault, the regional metamorphism ranges from the greenschist facies to the upper greenschist facies, but the metamorphic grade increases to reach the amphibolite facies south of the fault.

MINERALIZATION

The Cadillac mining camp is characterized by three types of mineralization related to distinct gold-bearing geological settings:

1) gold-bearing massive sulphide lenses (Bousquet 2 and LaRonde mines);
2) gold-rich polymetallic veins (Doyon and Mouska mines); and
3) auriferous veins associated with regional E-W-trending faults (O'Brien, Kewagama, Central Cadillac and Wood Cadillac mines, Lapa deposit).

Types 1 and 2 are found in the northern part of the area and are associated with rocks of the Blake River Group (figures 1 and 2a). Type 3 includes ore deposits found in the southern part of the camp, along the Cadillac Fault, mainly in rocks of the Piché Group (figures 1 and 2b). Recent deep-seated discoveries are type 1 and type 3 deposits. A summary description of the gold deposits and showings in the Cadillac camp is provided in Table 1.

Ore deposits in the North section are formed of schist lenses rich in quartz, white mica and pyrite. The mineralization may be disseminated or concentrated in layers. It occurs in sulphide or sulphide-quartz veins, in semi-massive or massive pyrite lenses and in massive sulphide lenses (Trudel *et al.*, 1992; Mercier-Langevin *et al.*, 2004). The LaRonde ore deposit consists of nearly a dozen mineralized lenses. These lenses are hosted in volcanic and volcaniclastic rocks of the upper member of the Bousquet Formation. The four lenses accessible from the Penna shaft are:

- zones 6 and 7, hosted in dacitic to rhyodacitic lavas intercalated with andesites;
- Zone 20 North, located at the top of a rhyodacitic to rhyolitic flow complex; and
- Zone 20 South, located at the top of a basaltic andesite dyke and sill complex emplaced in felsic volcaniclastic deposits (Mercier-Langevin *et al.*, 2004).

Gold mineralization at the Bousquet 2 mine occurs as a series of massive pyrite lenses and veins, stringer zones and several breccia zones (Teasdale *et al.*, 1996). At the Bousquet 1 mine, ore lenses are hosted in bands of chlorite-carbonate schist, quartz-muscovite schist or biotite schist as well as in phyllonites and mylonites (Tourigny *et al.*, 1992). Two sets of sulphide-rich veins (mainly pyrite and chalcopyrite) were noted. A first set of veins cuts across the main foliation whereas the second is parallel to the schistosity.

Three zones make up the ore deposit at the Doyon mine:

- Zone # 1, characterized by pyrite-quartz veins in sericite and chlorite-sericite schists;
- Zone # 2, the most important, formed of quartz-pyrite and quartz-pyrite-chalcopyrite veins and veinlets in felsic volcaniclastic rocks; and
- the West Zone, hosted in the Mooshla pluton, also composed of quartz-pyrite and quartz-pyrite-chalcopyrite veins (Savoie *et al.*, 1991).

At the Mouska mine, the mineralization consists of narrow quartz veins rich in pyrite, pyrrhotite and chalcopyrite (Belkadir and Hubert, 1995). The ore zones are hosted in intermediate and mafic volcanic rocks of the Hébécourt Formation and in the Mooshla pluton.

Gold deposits in the South section may also be subdivided into deposits associated either with quartz veins or with altered schist bands (Table 1) (Trudel *et al.*, 1992). The latter are parallel to the Cadillac Fault, which runs E-W. Faults and deformation zones in the southern part of the study area are vertical to subvertical, whereas veins are either horizontal or vertical. Auriferous veins, such as those mined at the former O'Brien, Wood Cadillac and Pandora mines, also contain sulphides, mainly arsenopyrite, accompanied by pyrite, pyrrhotite and chalcopyrite. Visible gold is observed in several veins. The veins may also contain tourmaline. The enclosing wall rocks are locally altered and mineralized. Sulphides observed in the wall rocks mainly consist of arsenopyrite, pyrite and pyrrhotite, with minor amounts of chalcopyrite (Trudel *et al.*, 1992).

Figure 2 shows that most of the orebodies plunge steeply to the west. This is particularly obvious for the Bousquet 1, Bousquet 2 and LaRonde deposits, and also appears to be the case for the Westwood, Lapa and Pandora deposits. The dip of these orebodies is parallel to mineral and stretching lineations measured in adjacent wall rocks, namely at the Bousquet 2 mine (Teasdale *et al.*, 1996). The apparent plunge of ore zones may therefore serve as a guide for deep exploration below known showings and deposits elsewhere in the Cadillac camp.

EXPLORATION AT DEPTH

Lapa project (Agnico-Eagle Mines Ltd)

On the Lapa property, the first exploration work dates back to 1933. Between 1938 and 1943, the Lapa Cadillac (Zulapa) mine produced 1,470 kg of gold and 57 kg of silver from 346,000 tonnes of ore, for an average recovery grade of 4.3 g/t Au (Trudel *et al.*, 1992). From 1981 to 1989, Breakwater Resources Ltd identified several mineralized

zones formed of cylindrical bodies in a schist band. The ore zones are characterized by quartz veinlets and lenses in competent rocks (wacke or massive volcanic rock) or by quartz stringers in an aplite body rich in pyrite and pyrrhotite. Breakwater Resources Ltd delineated 1.686 Mt of inferred resources at a grade of 6.4 g/t Au. In 1999, a 4-hole drill campaign revealed the presence of a new gold-bearing horizon, the Contact Zone. This horizon consists of a sericitized shear zone with quartz veins and stringers that contain disseminated arsenopyrite, stibnite, pyrrhotite and visible gold. The shear zone is vertical and is hosted in ultramafic rocks of the Piché Group, along the contact with sedimentary rocks of the Cadillac Group to the north.

In accordance with an agreement signed in 2002, Agnico-Eagle Mines Ltd acquired a 60% interest in the Lapa property. In February 2003, the partners delineated 2.967 Mt of inferred resources at a grade of 8.5 g/t Au for the Contact Zone over 396 metres in length and 610 metres of vertical extent. In June 2003, Agnico-Eagle Mines Ltd became the sole owner of the property and announced that inferred resources were now estimated at 4.0 Mt at a grade of 8.5 g/t Au, indicating the deposit contained over 1 million ounces of gold, and that the ore zone had been traced over more than 430 metres along strike and 650 metres of vertical extent, reaching a total depth of 1,150 metres below surface.

In January 2004, the company released very convincing results obtained at depth and also stated that the mineralization is characterized by:

- a greater thickness, exceeding 5 metres and reaching 7 to 11 metres at depth and to the west;
- a decrease in the total sulphide content (arsenopyrite, stibnite and pyrrhotite), going from an average of 5% in the upper block to 1% or less in the lower block;
- a more intense silicification, overprinting the biotite alteration observed in the upper block; and
- an increased frequency of coarse gold.

Furthermore, a drillhole intersecting the South Contact Zone, discovered in 2003, confirmed the high-grade character of this structure.

In April 2004, a drillhole extended 200 metres eastward beyond the mineralized envelope suggests a possible extension of the mineralization in this direction. In the fall of 2004, the sinking of a 830-metre shaft commenced. The latter will make possible an underground drilling campaign to test, among other things, the depth potential of the ore deposit. The extraction of a 15,000-tonne bulk sample is also planned, to help confirm the mining method, to refine the metallurgical process and to determine if the frequency of coarse gold is sufficient to justify an increase in the gold grade (nugget effect). According to Agnico-Eagle Mines Ltd, the shaft should be completed in the first half of 2006. The company noted that if the results of this program, budgeted at 30 million dollars, are conclusive, the shaft will be deepened to 1,385 metres. The company expects to mine the deposit for at least eight years at an annual production rate of about 125,000 ounces of gold. In October 2004, drillholes intersected the mineralized zone at depths of 1,403 and 1,534 metres, *i.e.* more than 300 metres below the previously defined mineralized envelope. In two years, Agnico-Eagle Mines Ltd has completed more than 82,000 metres of drilling from the surface, to delineate an orebody located between 300 and 1,230 metres below, over a strike length of more than 600 metres, and thicknesses ranging from 3 metres in the eastern part of the lens to a maximum of 30 metres in the western part. The latest results indicate a strong possibility that this zone may extend at depth.

Pandora property (Queenston Mining Inc.)

The first claims covering the Pandora property, located just west of the Lapa property, were staked in 1923 by Martin Meers (Ross and Asbury, 1940). Shaft #1, some 30 metres deep, was sunk in 1928, whereas shaft #2 was sunk to a depth of 155 metres between 1931 and 1934. Shaft #3, 123 metres deep, was excavated between 1936 and 1938, and shaft #4 was sunk in 1936. A total of 178,231 tonnes of ore at a grade of 4.70 g/t Au were processed between 1939 and 1942 (Trudel *et al.*, 1992). An ore deposit comprising the North Branch and South Branch zones as well as four other ore zones (Shaft #3, Shaft #4 "Amm Shaft", C Zone and Shaft #2) are located on the Pandora property. Queenston Mining Inc. acquired part of the property in 1992, and the remainder in 1999. The ore zones reportedly contain the following inferred resources to 400 metres depth:

- 131,366 t at 4.6 g/t Au in the C Zone;
- 582,859 t at 6.5 g/t Au in the Shaft #3 Zone;
- 1,358,000 t at 4.0 g/t Au in the North Branch Zone; and
- 837,000 t at 5.2 g/t Au in the South Branch Zone.

In early 2003, Queenston Mining Inc. announced its intention to test-drill the extension of the Contact Zone on its property. In March, the company released preliminary results from the first drillhole intersecting what appears to be the westward extension of the zone. On the Pandora property, the Contact Zone is hosted in a sequence of mafic and ultramafic volcanic rocks intercalated with biotite-rich sedimentary rocks. It comprises quartz-carbonate veins that contain visible gold and up to 5% sulphides, mainly arsenopyrite with traces of pyrite, pyrrhotite and stibnite. This first drillhole encountered the mineralized zone at a vertical depth of 500 metres.

Queenston Mining Inc. noticed that certain assessment reports of previous work performed on the Pandora property mentioned the presence of mineralization similar to that of the Contact Zone. This mineralization, located in the western part of the property, extends for nearly 4.5 kilometres. According to the company, drillholes completed in 1980-1981 by Camflo Mines near shaft #3 appear to have

intersected the Contact Zone at a depth of about 300 metres. On the Pandora property, the company has confirmed the extension at depth of the Contact Zone in three areas, namely the Lapa Contact, Keel Contact and Central Contact zones (Figure 2b). In early 2004, Queenston Mining announced a new drill campaign, comprising at least eight drillholes. This compaign would be undertaken to test the very deep (1,400 metres) extension of the Lapa Contact Zone, 100 metres west of the property boundary. In September of 2004, Globex Mining Enterprises and Queenston Mining Inc. announced a new partnership to test the deep-seated potential of the Wood Gold Mine property and the western part of the Pandora property. A drill program initially targeting the Piché and Shaft #3 zones at a depth of 750 metres was announced by the partners in November of 2004.

Westwood property (Cambior Inc.)

The Doyon area was first explored in the early 1910s, but it would take another twenty years for exploration to take off in the vicinity of the future mine. In the late 1930s, O'Leary Malartic Mines Ltd sank a shaft some 64 metres deep on the Westwood Cadillac showing. In 1938, a total of 2.88 tonnes of ore at an average grade of 197 g/t Au were extracted from the orebody. Between 1940 and 1944, O'Brien Gold Mines Ltd, then Siscoe Gold Mines performed exploration drilling but got inconclusive results.

More recently, in November 2002, Cambior Inc. drilled a hole on the Westwood property, located 2 kilometres east of the Doyon mine. The latter intersected two mineralized zones. The first zone, referred to as the North Corridor, was intersected at a depth of 1,425 metres. It occurs along the extension of a mineralized horizon that hosts zones 1 and 2 at the Doyon mine. The North Corridor consists of intermediate tuff, locally strongly sericitized, with disseminated sulphide mineralization (pyrite, chalcopyrite and pyrrhotite). A few thin quartz veinlets with visible gold were locally encountered. The second zone, the Westwood Horizon, was intersected at a 1,500-metre depth. The host rock is a strongly altered dacite known to host other sulphide zones in this area. Cambior Inc. reports that the alteration associated with mineralization in the Westwood Horizon is typical of alteration facies observed at the Bousquet 1, Bousquet 2 and LaRonde mines, near certain semi-massive sulphide lenses or bordering massive orebodies.

In 2003 and 2004, Cambior Inc. reported the results of five drillholes wedged from main drillhole 1158-02. These new drillholes intersected the North Corridor and the Westwood Horizon. In August 2004, Cambior Inc. released the results of a second surface drillhole which encountered the Westwood Horizon at a depth of 2,050 metres, and the North Corridor at about 2,100 metres depth (Figure 2a). According to the company, the alteration and mineralization system has a vertical extent of more than 800 metres and a lateral extent of more than 350 metres. The company is currently driving an exploration drift from level 14 at the Doyon mine. This drift should reach the Westwood Horizon in 2007. Drillholes will be bored throughout the entire drift development to test the depth potential between the Doyon mine and the North Corridor and Westwood Horizon ore zones.

Doyon mine (Cambior Inc.)

Mining operations began at the Doyon mine in 1980, and since then, more than 26 million tonnes of ore averaging 5.82 g/t Au were processed. In March 2003, Cambior Inc. reported positive results from an exploration drilling program testing the extension of gold-bearing structures in the J Zone. These structures are located 125 metres east of the mine infrastructure, and were traced to a depth of 1,000 metres. The J Zone is open at depth and to the east. Based on a preliminary estimate, the J20, J40 and J125 zones contain inferred and diluted resources of 356,000 tonnes at a grade of 7.5 g/t Au. The company is also looking west, between the Mouska and Doyon mines, and is considering the possibility of driving an underground exploration drift in this area.

LaRonde mine and the LaRonde II and Bousquet 1/Ellison projects (Agnico-Eagle Mines Ltd)

Since the inauguration of Shaft #1 in 1988, the LaRonde mine has produced more than 1.7 million ounces of gold. On August 17, 2001, Agnico-Eagle Mines Ltd inaugurated the 2,270-metre Penna shaft, to mine four gold-rich volcanogenic massive sulphide horizons at the LaRonde mine.

Agnico-Eagle Mines Ltd is pursuing its exploration campaign at depth and to the west, from the mine's 215 level exploration drift. This project is referred to as LaRonde II. Mineralization in zones 20 North and 20 South extends to nearly 3,000 metres below the surface and remains open in all directions (Figure 2a). The latest results, at a depth of more than 2,870 metres and 1,200 metres west of the Penna shaft, indicate the presence of a higher-grade gold core. According to the company, Zone 20 North may widen at depth, to the south and the west. Agnico-Eagle Mines Ltd is considering the possibility of developing the LaRonde II project either from a new shaft more than 3,000 metres deep, or from an internal shaft accessible from the former Bousquet 2 mine, closed since the fall 2002 and acquired from Barrick Gold in 2003. The company is also planning to explore below known ore zones at the former mine. Moreover, Agnico-Eagle Mines Ltd is targeting the depth extension of mineralization on the Ellison property, to the west of the LaRonde mine, and also intends to test the down-plunge extension of the 3-1 Zone at the Bousquet 2 mine (Figure 2a).

O'Brien mine (Radisson Mining Resources Inc.)

Between 1926 and 1956, the O'Brien mine produced 587,521 ounces of gold from 1.20 Mt of ore grading 16.1 g/t Au on average. The 36 East Zone, which contains 0.68 Mt of resources at a grade of 9.6 g/t Au, has been delineated to a depth of 550 metres. On December 15, 2003, Radisson Mining Resources Inc. announced a deep drilling campaign on its O'Brien and Kewagama properties, located 8 kilometres west of the Lapa deposit. The objective is to test the depth and eastward extension of the 36 East Zone over a distance of 3 kilometres, onto the Kewagama property. In September and December 2004, the company released the results of six completed drillholes. These drillholes intersected gold mineralization at 1,280 and 1,150 metres depth. They have shown that Zone 36 East does indeed extend eastward under the Kewagama mine shaft.

CONCLUSION

Deep exploration programs carried out over the past few years at the LaRonde mine and on the Westwood, Pandora and Lapa properties have met with resounding success. Other companies are now hoping to reproduce the results on their own projects. Considering the proximity of mines in operation and the possibility of using existing infrastructure to start-up new projects, the easy access provided by Highway 117 between Rouyn-Noranda and Val-d'Or, the presence of mining resources in many of the former mines listed in this report, the recent hike in metal prices as well as the very encouraging results obtained by several companies, the Cadillac mining camp will most likely remain, for the next few years at least, a focal point for gold exploration in Québec.

REFERENCES

BEAUDOIN, A. – TRUDEL, P., 1989 – Géologie des mines New Alger, Wood Cadillac, Central Cadillac, Pandora, Lapa Cadillac et Mic Mac. Ministère de l'Énergie et des Ressources, Québec; MB 88-25, 189 pages.

BELKABIR, A. – HUBERT, C., 1995 – Geology and Structure of a Sulfide-rich Gold Deposit : An Example from the Mouska Gold Mine, Bousquet District, Canada. Economic Geology, volume 90, pages 1064-1079.

DUBÉ, B. – MERCIER-LANGEVIN, P. – HANNINGTON, M.D. – DAVIS, D.W. – LAFRANCE, B., 2004 – Le gisement de sulfures massifs volcanogènes aurifères LaRonde, Abitibi, Québec : altération, minéralisations, genèse et implications pour l'exploration. Ministère des Ressources naturelles, de la Faune et des Parcs, Québec; MB 2004-03, 112 pages.

LAFRANCE, B. MERCIER-LANGEVIN, P. – DUBÉ, B. – GALLEY, A.G. – HANNINGTON, M.D. – DAVIS, D.W. – MOORHEAD, J. – PILOTE, P. – MUELLER, W.U., 2003a – Carte synthèse de la Formation de Bousquet : partie ouest. Ministère des Ressources naturelles, de la Faune et des Parcs, Québec; DV 2003-08, échelle 1 : 20 000.

LAFRANCE, B. – MERCIER-LANGEVIN, P. – DUBÉ, B. – GALLEY, A.G – HANNINGTON, M.D. – DAVIS, D.W. – MOORHEAD, J. – PILOTE, P. – MUELLER, W.U., 2003b – Carte synthèse de la Formation de Bousquet : partie est. Ministère des Ressources naturelles, de la Faune et des Parcs, Québec; DV 2003-08, échelle 1 : 20 000.

LAFRANCE, B. – MOORHEAD, J. – DAVIS, D.W., 2003c – Cadre géologique du camp minier de Doyon-Bousquet-LaRonde. Ministère des Ressources naturelles, Québec; ET 2002-07, 43 pages.

LAVERGNE, C., 1985 – Gîtes minéraux à tonnage évalué et production minérale du Québec. Ministère de l'Énergie et des Ressources, Québec; DV 85-08, 77 pages.

MARQUIS, P. – HUBERT, C. – BROWN, A.C. – SCHERKUS, E. – TRUDEL, P. – HOY, L.D., 1992 – Géologie de la mine Donald J. LaRonde. Ministère de l'Énergie et des Ressources, Québec; ET 89-06, 106 pages.

MERCIER-LANGEVIN, P. – DUBÉ, B. – HANNINGTON, M.D. – DAVIS, D.W. – LAFRANCE, B., 2004 – Contexte géologique et structural des sulfures massifs volcanogènes aurifères du gisement LaRonde, Abitibi. Ministère des Ressources naturelles, de la Faune et des Parcs, Québec; ET 2003-03, 47 pages.

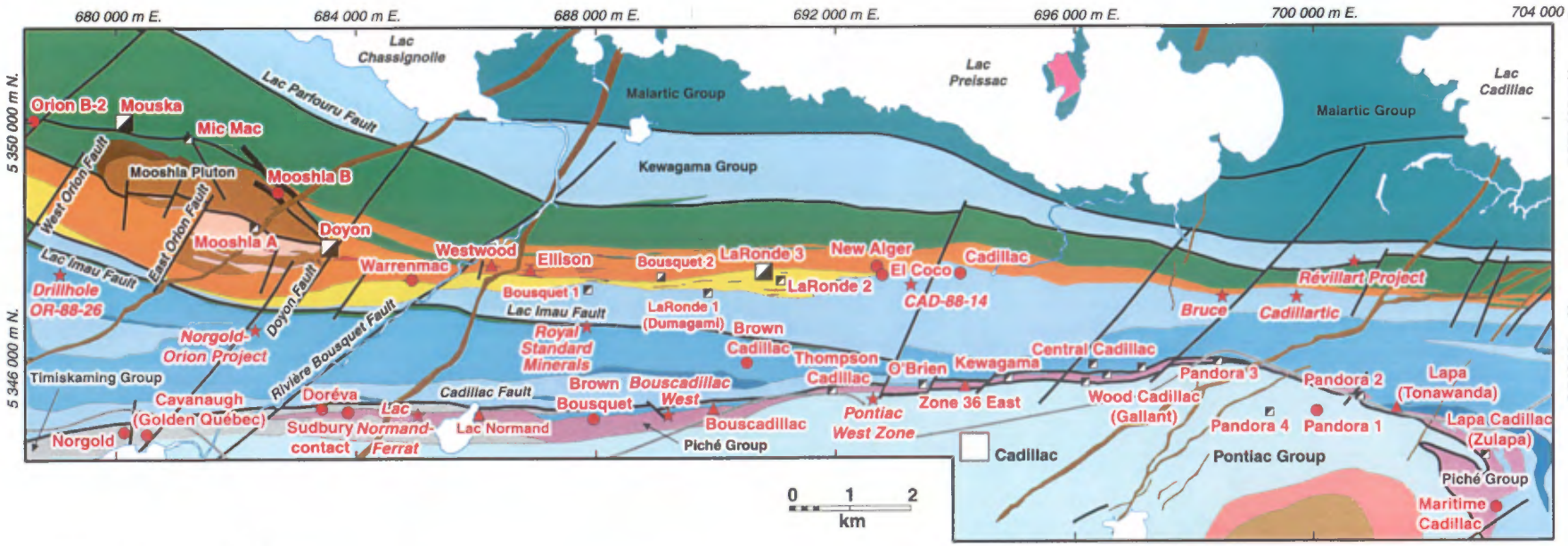
ROSS, S.H. – ASBURY, W.N., 1940 – Terrains miniers et travaux de mise en valeur dans les comtes d'Abitibi et de Témiscamingue durant l'année 1939. Ministère du Travail, des Mines et des Pêcheries maritimes, Québec; RP 150, 51 pages.

SAVOIE, A. – TRUDEL, P. – SAUVÉ, P. – HOY, L. – LAO, K., 1991 – Géologie de la mine Doyon (région de Cadillac). Ministère de l'Énergie et des Ressources, Québec; ET 90-05, 80 pages.

TEASDALE, N. – BROWN, A. – TOURIGNY, G., 1996 – Gîtologie de la mine Bousquet 2. Ministère des Ressources naturelles, Québec; MB 96-37, 43 pages.

TOURIGNY, G. – HUBERT, C. – BROWN, A.C. – CRÉPEAU, R. – TRUDEL, P. – HOY, L. – KHEANG, L., 1992 – Géologie de la mine Bousquet. Ministère de l'Énergie et des Ressources, Québec; ET 89-09, 99 pages.

TRUDEL, P. – SAUVÉ, P. – TOURIGNY, G. – HUBERT, C. – HOY, L., 1992 – Synthèse des caractéristiques géologiques des gisements de la région de Cadillac (Abitibi). Ministère des Ressources naturelles, Québec; MM 91-01, 106 pages.



LITHOSTRATIGRAPHIC LEGEND

Intrusive Rocks

Proterozoic dyke
- Diabase

Mooshla Pluton
- Trondhjemite and trondhjemitic porphyry
- Diorite, quartz diorite, tonalite and aplite
- Gabbro and diorite

Sedimentary Rocks

Timiskaming Group
- Wacke, conglomerate and mudstone

Pontiac Group
- Wacke and mudstone

Cadillac Group
- Turbiditic wacke and siltstone
- Polymictic conglomerate
- Volcaniclastic sandstone, turbidite and oxide-facies iron formation

Kewagama Group
- Wacke and pelitic rocks

Volcanic Rocks

Blake River Group

Reneault-Dufresnoy Formation
- Basaltic andesite and andesite

Bousquet Formation

Upper Member
- Feldspar-porphyritic dacite, rhyodacite and rhyolite. Basalt and basaltic andesite.

Lower Member
- Basaltic to andesitic schist. Rhyodacitic schist. Highly vesicular/amygdaloidal andesite and dacite. Quartz-feldspar-porphyritic rhyodacite and rhyolite.

Hébécourt Formation
- Basalt and basaltic andesite with rhyolite horizons

Malartic Group
- Komatiite and basalt

Piché Group
- Komatiite, basalt and andesite

LITHOLOGICAL LEGEND

- Gabbro
- Granodiorite
- Granite

- ***Active mine***
- ***Closed mine***
- ***Orebody with tonnage estimate***
- ***Worked deposit***
- ***Showing***
- ***Road***
- ***Fault (strong anisotropy due to shearing and/or flattening)***
- ***Mineralized zone (projected parallel to stratigraphic dip)***

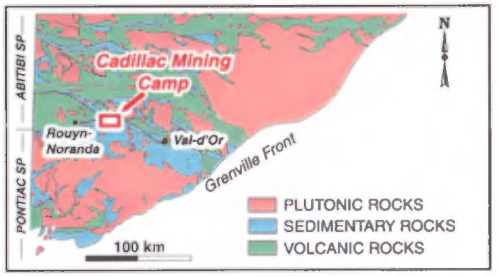


FIGURE 1 - Geological synthesis of the Cadillac mining camp, showing the location of active and closed gold mines, ore deposits and showings. Map modified after Lafrance *et al.* (2003a; 2003b).

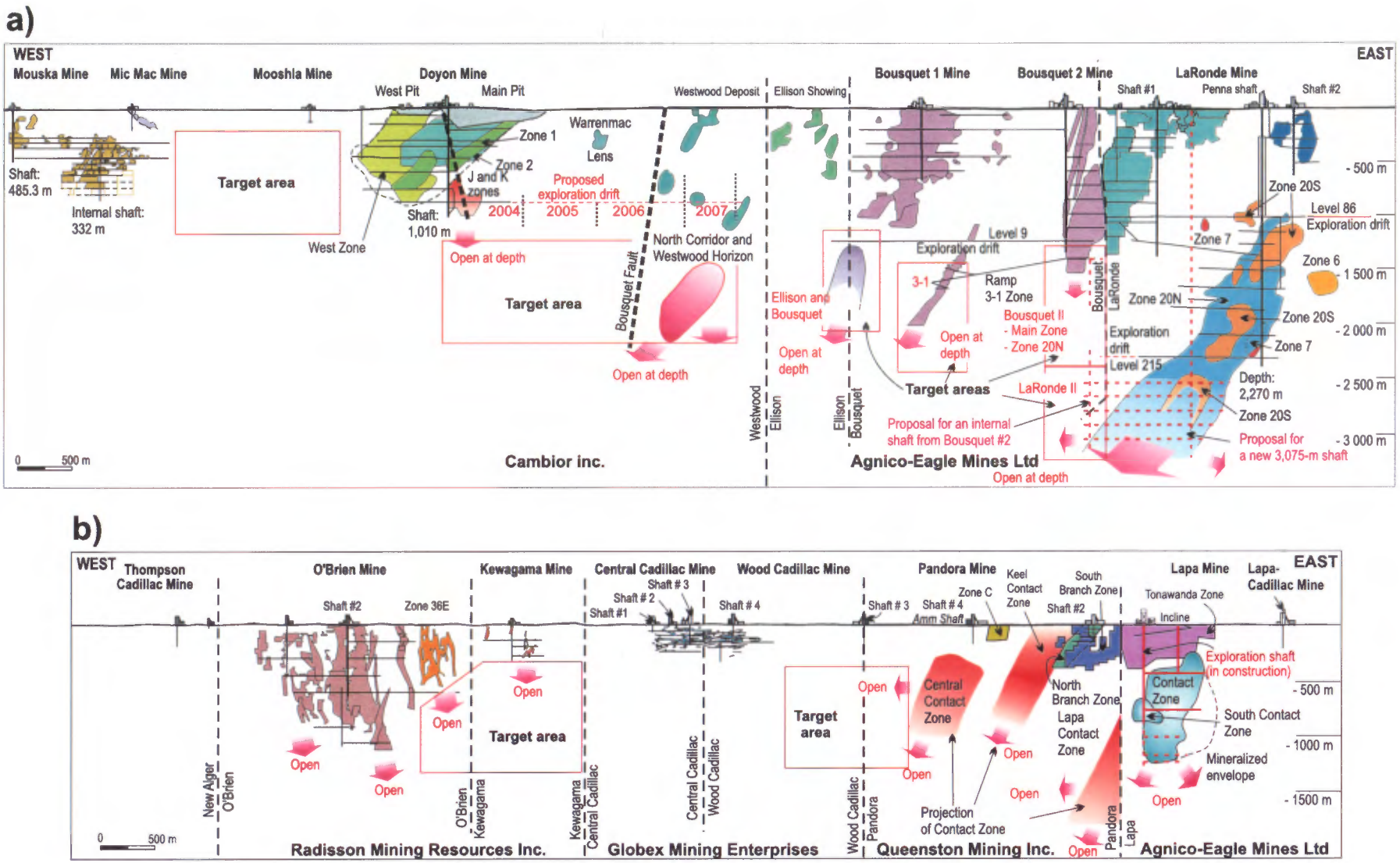


FIGURE 2 - Vertical sections showing the location of orebodies and showings in the Cadillac mining camp: **a)** North section (Mouska, Doyon, Bousquet and LaRonde mines), **b)** South section (Cadillac Fault). No vertical exaggeration. The data used to produce this figure was provided by several mining companies.

TABLE 1 - Characteristics of orebodies and showings in the Cadillac mining camp.

Orebodies North Section	Mineralization	Host rocks	Alteration	Years in production	Production[1]	Grade[1]	Reserves[1]	References
Mouska	Sulphide-rich quartz veins and sulphide veins	Mafic volcanic rocks of the Hébécourt Formation and Mooshla Pluton	Chlorite, biotite, magnetite, carbonate, silica	1991-	1.158 Mt (as of 31/12/01)	10.93 g/t Au 1.68 g/t Ag	129,000 t at 15.6 g/t Au	Belkadir and Hubert (1995)
Doyon	Quartz-sulphide veins and disseminated pyrite	Sericite schists and intermediate and felsic volcaniclastic rocks of the Blake River Group, porphyritic tonalite of the Mooshla Pluton	Sericite, pyrite, alumino-silicates	1980-	26.885 Mt	5.82 g/t Au	3.005 Mt at 4.89 g/t Au	Savoie *et al*. (1991)
Bousquet 1	Two sets of sulphide veins, across and parallel to the foliation; disseminated pyrite in deformation zone	Felsic, intermediate and mafic volcanic rocks of the Blake River Group	Sericite, alumino-silicates (andalusite) in felsic rocks; carbonate and chlorite in mafic volcanic rocks	1980-1996	7.447 Mt	5.3 g/t Au		Tourigny *et al*. (1992)
Bousquet 2	Massive to semi-massive pyrite lenses and veins	Andalusite schists (volcanic rocks of the Blake River Group)	Sericite, alumino-silicates (andalusite) in felsic rocks; carbonate and chlorite in mafic volcanic rocks	1990-2002	8.139 Mt	8.25 g/t Au 0.57% Cu		Teasdale *et al*. (1996)
Donald J. LaRonde 1 (Dumagami)	Massive pyrite lenses, pyrite veins and disseminated pyrite	Volcanic and volcaniclastic rocks of the Blake River Group	Alumino-silicates, sericite, pyrite and silica	1988-2000	6.539 Mt	6.8 g/t Au		Marquis *et al*. (1992)
LaRonde 2 (zones 6 and 7)	Massive sulphide lenses and zones of sulphide veining and disseminated sulphides	Volcanic and volcaniclastic rocks of the Blake River Group	Alumino-silicates, sericite, pyrite, silica, biotite, garnet, chlorite, epidote and green mica	1994-	959,516 t	7.3 g/t Au 40.67 g/t Ag 0.73% Cu 2.54% Zn		Dubé *et al*. (2004); Mercier-Langevin *et al*. (2004)
LaRonde (Penna shaft)	Massive to semi-massive sulphide lenses	Volcanic and volcaniclastic rocks of the Blake River Group	Sericite, alumino-silicates (andalusite and kyanite), pyrite	2000-	4.341 Mt (as of 31/12/02)	5.01 g/t Au 76 g/t Ag 0.27% Cu 4.44% Zn	31.226 Mt at 3.13 g/t Au 87.34 g/t Ag 0.37% Cu 3.93% Zn	
Ellison Zones A & C	Two zones of massive and disseminated pyrite	Tuffs of the Blake River Group	No data	n/a	n/a	n/a	Zone A: about 1 Mt at 6.86 g/t Au	MRNFP Mineral deposit file
Mic Mac	Narrow quartz veins in three en-echelon lenses associated with a major shear zone	Mafic to intermediate volcanic rocks of the Blake River Group	Silica, biotite, sericite, chlorite, carbonate	1942-1947	723,385 t (3,341.6 kg Au)	4.62 g/t Au	1,450,000 t at 6.1 g/t Au	Beaudoin and Trudel (1989)
Westwood Cadillac	North Zone: quartz-tourmaline-pyrite veins South Zone: massive and disseminated gold-pyrite-chalcopyrite-sphalerite mineralization	North Zone: pyroclastic breccias and intermediate tuffs of the Blake River Group South Zone: iron formation associated with pyroclastic rocks of the Blake River Group	Chlorite, sericite and carbonate	n/a	n/a	n/a	417,309 t at 9.26 g/t Au	MRNFP Mineral deposit file
Mooshla A	One or several fractures with massive pyrite and pyrrhotite, enriched in gold and silver	Leucotonalite of the Mooshla Pluton	Sericite. Garnet and tourmaline were also observed.	1939-1940	4,450 t (132.0 kg Au)	29.83 g/t Au		MRNFP Mineral deposit file

1 Production and reserve/resource data updated to December 31, 2003. Preliminary data taken from DV 2004-01.

TABLE 1 - (continued) Characteristics of orebodies and showings in the Cadillac mining camp.

Showings North Section	Mineralization	Host rocks	Alteration	Type of sample	Grade	Resources	References
Mooshla B	Two sulphide-rich veins in a shear zone	Granodiorite intruding the Blake River Group	Chlorite	Grab sample	34.29 g/t Au (best result)		MRNFP Mineral deposit file
Cadillac	Sulphide-rich quartz-tourmaline veins	Intermediate tuffs of the Blake River Group	Na depletion and K enrichment	Drill core	1.27 g/t Au over 0.63 m		MRNFP Mineral deposit file
Bruce	Quartz-carbonate-chlorite-tourmaline veins	Sedimentary rocks of the Cadillac Group	Insufficient data	Drill core	1.03 g/t Au over 3.05 m		MRNFP Mineral deposit file
Warrenmac-1	Generally massive pyrite	Sulphide-facies iron formation in pyroclastic breccia and dacitic and andesitic tuffs of the Blake River Group	Chlorite and carbonate		21.55 to 97.97 g/t Au over widths of 0.30 to 0.90 m		MRNFP Mineral deposit file

Orebodies South Section	Mineralization	Host rocks	Alteration	Years in production	Production	Grade	Resources	References
O'Brien (Darius)	Stockworks of quartz veins	Conglomerate and porphyritic andesite of the Piché Group	Arsenopyrite, biotite, tourmaline, carbonate and sericite	1926-1956	1,190,000 t (18,299 kg Au)	15.4 g/t Au	Zone 36E: 0.68 Mt at 9.6 g/t Au	Radisson Mining Resources
Thompson-Cadillac (New Alger)	50-cm quartz vein in two thin (1-2 m) shear zones with mineralized wall rocks	Mafic to intermediate porphyritic volcanic rocks of the Piché Group	Carbonate, biotite, silica, arsenopyrite, pyrite and pyrrhotite	1936-1939	158,775 t (512 kg Au)	3.22 g/t Au		Beaudoin and Trudel (1989)
Wood Cadillac (Gallant)	Horizontal quartz-tourmaline veins. Silicified sedimentary lenses and vertical quartz veins	Sheared and silicified wackes of the Cadillac Group located between the Cadillac fault and an iron formation	Silica, tourmaline, pyrite and arsenopyrite	1939-1942	162,716 t (846.5 kg Au)	5.2 g/t Au	52,688 t at 4.98 g/t Au	Beaudoin and Trudel (1989)
				1947-1949	233,300 t (1,010 kg Au)		1,146,000 t at 5.16-6.46 g/t Au	
Lapa Cadillac (Zulapa)	Cylindrical bodies in a 120-m band of schists corresponding to the Cadillac fault zone	Wackes, mafic volcanic rocks of the Piché Group and aplite	Silica, carbonate, chlorite, biotite, sericite, pyrite and arsenopyrite	1938-1943	366,000 t (1,470 kg Au)	5.21 g/t Au	25,000 t at 6.52 g/t Au	Beaudoin and Trudel (1989)
Pandora	Quartz veins and shear zones partially filled with quartz	Shafts #2 and #3 - wacke, aplite and mafic volcanic rocks of the Piché Group. Shafts #1 and #4 - wacke of the Pontiac Group and feldspar porphyry	Silica, carbonate, tourmaline, sericite, arsenopyrite and pyrite	1939-1942	178,231 t (837.8 kg Au)	4.7 g/t Au	3 zones of the Branch Zone: 2,196,105 t at 4.46 g/t Au	Beaudoin and Trudel (1989)
Central Cadillac [Consolidated Central Cadillac]	Horizontal quartz-tourmaline veins. Silicified sedimentary lenses and vertical quartz veins	Sheared and silicified wackes of the Cadillac Group located between the Cadillac fault and an iron formation	Silica and tourmaline	1939-1943 [1947-1949]	418,870 t (1,964.4 kg Au)	4.69 g/t Au		Beaudoin and Trudel (1989)

TABLE 1 - (continued) Characteristics of orebodies and showings in the Cadillac mining camp.

Showings South Section	Mineralization	Host rocks	Alteration	Type of sample	Grade	Resources	References
Bouscadillac (Graham Bousquet)	Disseminated sulphides; arsenopyrite, chalcopyrite, pyrite and pyrrhotite	Porphyritic basalt of the Piché Group	Carbonate, silica, chlorite and sericite	Drill core	3.92 g/t Au / 21 m	Resources estimated at 36,000 t at 7.89 g/t Au	MRNFP Mineral deposit file
Bouscadillac West	Shear zone, sulphide-rich tuff and quartz veins	Volcanic rocks of the Piché Group	Insufficient data	Channel samples	3.60 g/t Au / 1.0 m 2.40 g/t Au / 1.0 m 2.36 g/t Au / 1.05 m		MRNFP Mineral deposit file
Brown-Bousquet	Quartz veins	Wacke and iron formation of the Cadillac Group	Silica and chlorite	Grab sample	60.6 g/t Au in a trench		MRNFP Mineral deposit file
Deane-Cadillac*	Sulphide-rich quartz-tourmaline vein	Wacke, conglomerate and albitite of the Cadillac Group	Silica	Drill core	3.43 g/t Au / 0.8 m 19.5 g/t Au / 0.3 m		MRNFP Mineral deposit file
Norgold-Orion Project	Two sheared lenses of semi-massive sulphides	Wacke, siltstone and iron formation of the Cadillac Group	Carbonate	Drill core	1.20 g/t Au / 0.40 m 1.35 g/t Au / 2.40 m 1.3 g/t Au / 1.5 m		MRNFP Mineral deposit file
Brown-Cadillac	Massive sulphide lenses and sulphide-rich quartz-tourmaline veins	Porphyritic basalt or andesite, iron formation and wacke of the Piché Group	Silica, tourmaline and pyrite	Drill core	4.46 g/t Au / 0.37 m 1.71 g/t Au / 1.2 m		MRNFP Mineral deposit file
Maritime Cadillac	Sulphide-rich quartz veins	Wacke, basalt and conglomerate of the Piché Group	Insufficient data	Grab sample and drill core	10.90 g/t Au 36.35 g/t Au 6.42 g/t Au / 1.5 m 3.05 g/t Au / 1.5 m 5.21 g/t Au / 0.6 m		MRNFP Mineral deposit file
Royal Standard Minerals	Quartz veins in silicified zones	Sedimentary rocks of the Cadillac Group interbedded with volcanic rocks of the Blake River Group	Silica	Drill core	3.30 g/t Au / 0.3 m 1.93 g/t Au / 1.7 m		MRNFP Mineral deposit file
Lartic East*	Quartz veinlets with arsenopyrite and pyrite	Wackes of the Cadillac Group	Insufficient data	Drill core and grab sample	1.015 g/t Au / 1 m 13.7 g/t Au grab sample		MRNFP Mineral deposit file
Audet Zone*	Shear zone along pluton contact, quartz veins and disseminated pyrite in pluton	Granodioritic to monzonitic pluton in contact with intermediate to felsic tuffs	Carbonate, chlorite and sericite	Drill core	5.93 g/t Au / 3.5 m 8.87 g/t Au / 2.5 m 7.28 g/t Au / 4.5 m 3.64 g/t Au / 5.0 m		MRNFP Mineral deposit file
Baie Carpentier Ouest*	Sulphide-rich quartz veins	Gabbro in Malartic Group	Insufficient data	Channel sample	0.55% Cu / 0.30 m		MRNFP Mineral deposit file
Baie Carpentier-Sud*	Shear zone in pluton	Granodioritic pluton	Insufficient data	Channel sample	1.7 g/t Au / 0.24 m		MRNFP Mineral deposit file

* Showing location not shown in Figure 1.

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