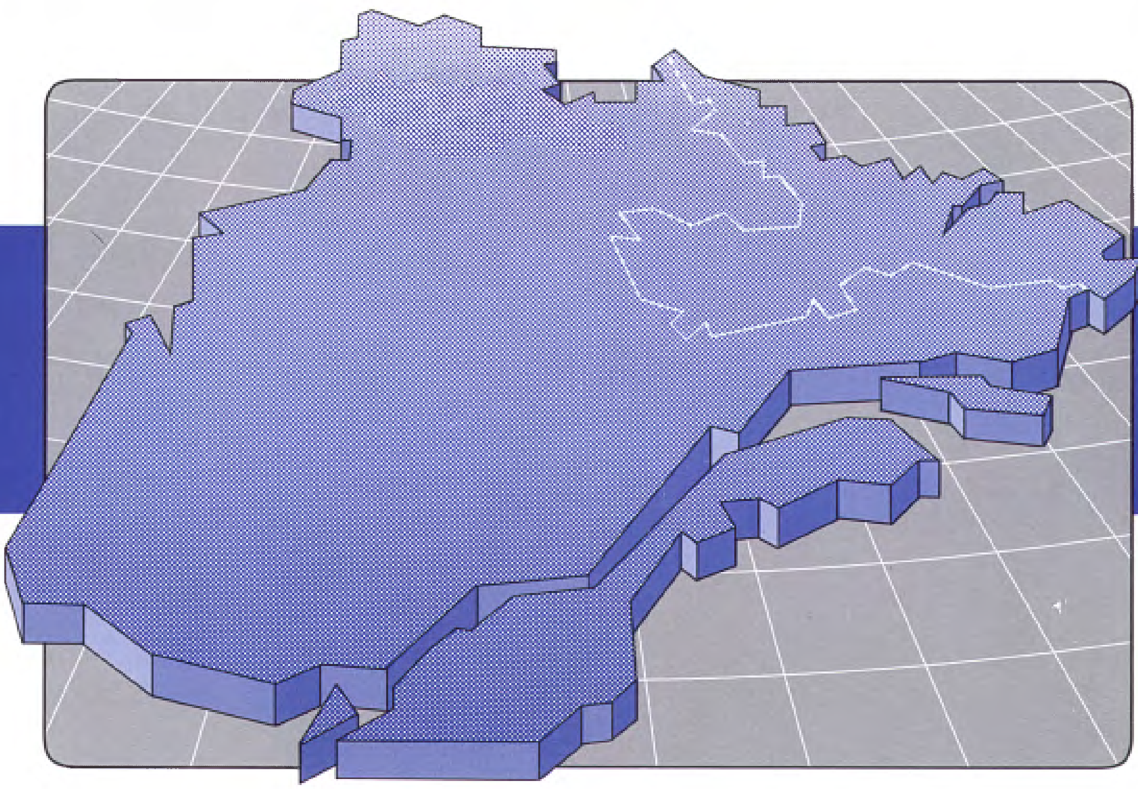
PRO 87-18(A)

ELEMENTS DU GROUPE DU PLATINE DANS LA FOSSE DU LABRADOR

Document de
promotion n° 18

Platinum group element occurrences of the Labrador Trough

Thomas Clark



Québec

PRO 87-18

Février 1987

PLATINUM - GROUP ELEMENT OCCURRENCES IN THE LABRADOR TROUGH

Thomas Clark

INTRODUCTION

The Labrador Trough of northeastern Quebec has recently become a major target for platinum-group element (PGE) exploration. As of mid-February, 1987, 42 exploration permits covering an area of 2 850 km^2, had been applied for. These are in addition to the 16 permits (1 200 km^2) granted last year in the area of gold exploration in the Archean foreland of the Labrador Trough, NW of Schefferville.

The high level of activity is the result of the discovery of several important PGE concentrations by La Fosse Platinum Group Inc. during the summer of 1986. These discoveries were made largely by sampling previously-known Cu-Ni deposits distributed over the entire length of the Quebec portion of the Labrador Trough. Samples were collected both by surface prospecting and from preserved core-sections of old diamond drill holes. The highlights of the analytical results are presented in Table 1; these data were provided to the MERQ by La Fosse Platinum Group Inc. Four of the seven major PGE discoveries are in the Retty Lake area, 65 km NE of Schefferville. Table 2 provides data on all the Cu-Ni deposits of the Trough for which grade and tonnage information is available; the deposits are located in Figure 1.

RETTY LAKE AREA

In the southern sector of the Labrador Trough, a series of ultramafic-mafic sills can be traced over a strike length of about 250 km in the eastern magmatic belt. Three of these sills are present in the Retty Lake area. Their stratigraphic characteristics are as follows (Fournier, 1982, 1983; Rohon, 1986):

. the upper sill (> 250 m of ultramafic rock) intrudes tholeiitic basalts of the Willbob Formation;
. the middle sill (30-50 m of ultramafic rock) intrudes turbidites of the Thompson Lake Formation, immediately below the Willbob lower contact;
. the lower sill (> 250 m of ultramafic rock) also intrudes Thompson Lake Formation turbidites.

Table 1 - Concentrations of PGE, Cu, and Ni in known PGE occurrences (selected results)

Name	PGE results			Cu-Ni reserves		
	Pt(g/t)	Pd(g/t)	length	tonnes	Cu(%)	Ni(%)
Pogo (Retty L.)	1.4	13.0	0.6m (core)	692 600	1.00	0.65
Centre (Retty L.)	27.4	41.1	2.7m (core)	91 400	1.26	0.75
Blue Lake (Retty L.)	0.7	1.4	1.5m (chips)	506 400	0.66	0.50
	0.5	1.9	1.5m (core)	---	---	---
Retty (Retty L.)	0.7	2.1	3.0m (chips)	---	---	---
Lepage Zone (Aulneau L.)	1.0	3.1	14.0m (core)	1 088 000	2.02	0.45
Goose Pond (Gerido L.)	2.1	20.9	2.0m (chips)	---	---	---
	(also 1.7 g/t Au, 7.4 % Cu)					
St. Pierre (Thevenet L.)	0.3	1.0	1.0m (chips)	---	---	---

Source: La Fosse Platinum Group Inc. The responsability for the accuracy of the PGE data belongs entirely to La Fosse Platinum Group Inc.

Table 2 - Grades and tonnages of Cu-Ni deposits in the Labrador Trough

Name	Tonnes	Cu(%)	Ni(%)	Ni/Cu
Retty Lake	1 360 500	1.50	0.67	0.45
Pogo	692 600	1.00	0.65	0.65
Centre	91 400	1.26	0.75	0.60
Blue Lake	506 400	0.66	0.50	0.76
Chance Lake	649 400	0.66	0.89	1.35
Aulneau Lake	1 088 000	2.02	0.45	0.22
Erickson #1	519 700	1.12	0.32	0.29
Leslie #2	693 900	1.56	0.33	0.21
Chrysler #2	526 100	1.79	0.48	0.27
Soucy C	129 700	0.72	0.22	0.31
Pio Lake (E vein)	24 000	6.40	3.00	0.47
Hopes Advance #1	20 000 000	0.59	0.16	0.27
Hopes Advance #2	5 100 000	0.76	0.26	0.34

Sources: . Avramtchev, L. and LeBel-Drolet, S. (1979)
. La Fosse Platinum Group Inc.

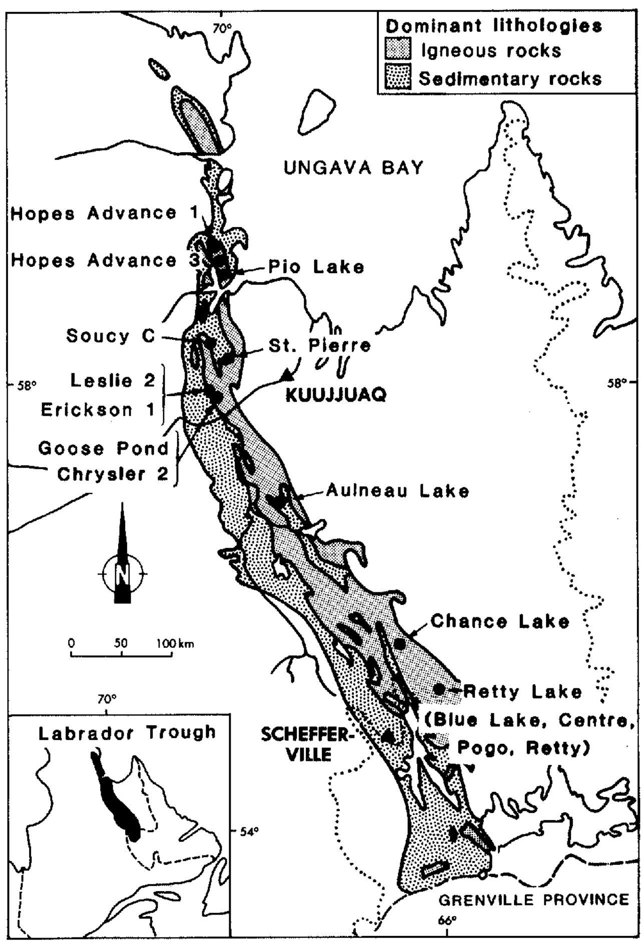


Figure 1 - Locations of the principal Cu-Ni and Cu-Ni-PGE deposits in the Labrador Trough.

All three sills are lithologically similar (Rohon, 1986). They consist of peridotite in the centre, highly serpentinized in the case of the relatively thin middle sill, bordered above and below by a tremolite-actinolite rock, possibly a metapyroxenite. Gabbroic rocks occupy the upper parts of the sills, and chilled margins of gabbroic composition, according to Rohon (1986), mark the limits against the host rocks.

The relation between the ultramafic sills and the overlying gabbros is not clear. Baragar (1967) noted that although gabbro commonly overlies the ultramafic rock, it is in places absent. Fournier (1983) pointed out that a thin horizon of sedimentary rocks can locally be observed between the ultramafic and gabbroic layers. As mentioned above, Rohon (1986) considered the gabbroic layers an integral part of the sills.

The nature of the parent liquid is also in doubt. Fahrig (1962) concluded that the sills were formed by intrusion of a liquid of gabbroic composition charged with abundant olivine crystals. Baragar (1967) considered that the complete absence of feldspar in the ultramafic rocks casts doubt on the presence of gabbroic liquid. He also noted that the chilled margins are actinolite-rich (metapyroxenite ?). Rohon (in press) reports that the sill at Chance Lake consists in part of peridotite with bird-track texture, suggesting the presence of ultramafic liquid.

In the Retty Lake area, all the PGE occurrences as well as almost all the Cu-Ni deposits occur within the middle sill. The sulfides are distributed either at the base of the sill (Blue Lake and Retty showings) or in the central part of the peridotite zone (Pogo and Centre showings, as well as those at Chance and Glance Lakes, farther north) (Rohon, 1986). The sulfides consist of massive to disseminated pyrrhotite, chalcopyrite and pentlandite exhibiting intercumulus textures (large poikilitic pyrrhotite grains, net-textures, etc.) The carriers of the PGE are not well known, although sudburite (PdSb) has recently been identified tentatively (L. Kish, personal communication). Avison et al. (1986) reported recoverable gold values in the PGE mineralizations, and significant gold values (up to 2.7 g/t) over considerable thicknesses (tens of meters) in peridotite. Pyrite, pyrrhotite and chalcopyrite, as disseminated grains and in veinlets, are locally abundant in adjacent argillaceous and arenaceous sedimentary rocks.

The stratigraphic position and the textures of the sulfides in the peridotite led Fournier (1982) to propose an origin by magmatic segregation. However, some features, such as low Ni/Cu ratios and anomalous Au concentrations, suggest that secondary enrichment processes may have been important.

AULNEAU LAKE AREA

The Aulneau Lake area boasts seven separate Cu-Ni deposits. The most significant is the "Lepage Zone", which also contains PGE mineralization (Table 1). Lacroix (1984,1985) showed that the seven deposits are associated with seven aligned, lenticular bodies of gabbro in a highly deformed zone parallel to the regional structural trends. The gabbro bodies contain minor amounts of glomeroporphyritic gabbro (leopard gabbro) and metapyroxenite.

The seven sulfide deposits have the shape of flattered cigars plunging eastward, down-dip, attesting to the importance of the regional deformation in the formation of the deposits.

The mineralization in the Lepage Zone consists of both primary (magmatic) and secondary (hydrothermal) sulfides (Lacroix, 1984). The primary mineralization is made up of pyrrhotite, pentlandite, chalcopyrite and magnetite. Fournier (1982,1983) optically identified merenskeyite (Pd, Fe, Ni) $(Te,Bi)_2$ at Aulneau Lake. Lacroix (1984) noted the importance of the presence of pyroxenite for the emplacement of the primary sulfides.

The secondary mineralization consists of pyrite and chalcopyrite, along with traces of sphalerite and galena. It is associated with an intense alteration (propylitization) which occurred at the syn- to late-tectonic stage. This mineralization is superimposed on the primary mineralization, and also extends to nearby zones of structural weakness (shears, breccias, lithological contacts). Lacroix (1984) postulated that perhaps half of the sulfides in these deposits was emplaced during the hydrothermal event, which would account for the low Ni/Cu ratios and the presence of Zn in the Cu-Ni deposits.

NORTHERN LABRADOR TROUGH

Many of the Cu-Ni deposits of the northern Trough are located in glomeroporphyritic gabbro sills (Fournier, 1981). These sills contain discontinuous lenses of mineralization (Table 2) ranging up to 1 km in strike length and 50 m in thickness, which are generally located near the base of the glomeroporphyritic facies. The sulfides consist of pyrrhotite, chalcopyrite, and pentlandite. Using an electron microprobe, Fournier (1982, 1983) identified merenskeyite at the Erickson 1 deposit, south of Gerido Lake.

Avison et al. (1986) reported no anomalous PGE values in the Cu-Ni deposits in glomeroporphyritic gabbro. They did note important PGE concentrations, however, in massive sulfides in a pyroxenite horizon situated beneath mineralized glomeroporphyritic gabbro at the south end of Gerido Lake (Goose Pond) (see Table 1).

The glomeroporphyritic gabbro sills were emplaced mainly along the lower contact of the Hellancourt Formation basalts, above the turbidites of the Upper Baby Formation. Because of the probable regional correlation of the Hellancourt and Willbob basalts and of the Upper Baby and Thompson Lake sediments, the stratigraphic position of the glomeroporphyritic gabbro sills is the same as that of the PGE-mineralized peridotites in the Retty Lake area.

Glomeroporphyritic gabbro most commonly forms discontinuous lenses (with gradational or sharp contacts) in the centre of a sill of common gabbro. It appears that an ultramafic facies is rather uncommon in the glomeroporphyritic gabbro sills. Nevertheless, the presence of this facies may be of capital importance for the concentration of PGE in these sills (for example, Goose Pond). The large map-scale lenses of peridotite and pyroxenite situated between Gerido Lake and Leaf Lake occur within a thick differentiated sill, which that was apparently emplaced at a lower stratigraphic level than the glomeroporphyritic gabbro sills (see Sauvé and Bergeron, 1965).

CONCLUSIONS

The basic and ultrabasic sills of the Labrador Trough constitute an attractive target for PGE exploration. In the southern Trough, peridotite sills (and one in particular) appear to have the highest potential. In the northern Trough, limited data suggest basal pyroxenite horizons in glomeroporphyritic gabbro sills are the preferred PGE host. Deformation of the sulfides and remobilization and reconcentration by hydrothermal processes probably were important factors in some deposits.

References

Avison, T. - Ferderber, P. - Scott, F., 1986 - Platinum group and gold discoveries in the Labrador Trough. Paper presented at the Séminaire d'information of the Direction générale de l'Exploration géologique et minérale, Ministère de l'Energie et des Ressources, Québec, December 2-3, 1986.

Avramtchev, L. - LeBel-Drolet, S., 1979 - Inventaire des gîsements minéraux du Québec. Ministère de l'Energie et des Ressources, Québec; DPV-707.

Baragar, W.R.A., 1967 - Wakuach Lake map-area, Québec-Labrador. Geological Survey of Canada, Memoir 344.

Fahrig, W.F., 1962 - Petrology and geochemistry of the Griffis Lake ultrabasic sill of the central Labrador Trough, Quebec. Geological Survey of Canada, Bulletin 77.

Fournier, D., 1981 - Gîtes de Cu-Zn et Cu-Ni dans la partie nord de la Fosse du Labrador. Ministère de l'Energie et des Ressources, Québec; DPV-835.

Fournier, D., 1982 - Gîtes de Cu-Zn et Cu-Ni dans la partie centrale de la Fosse du Labrador. Ministère de l'Energie et des Ressources, Québec; DPV-929.

Fournier, D., 1983 - Gîtes de Cu-Zn et de Cu-Ni de la Fosse du Labrador, Québec. Thèse de doctorat de 3^{e} cycle, Université Pierre et Marie Curie, Paris 6, Paris, France.

Lacroix, S., 1984 - Gîtologie du Cu-Ni dans la région du lac Aulneau. Ministère de l'Energie et des Ressources, Québec, MB 84-20.

Lacroix , S. 1985 - Incidence de la tectonique hudsonienne sur la minéralisation de Cu-Ni du lac Aulneau, Fosse du Labrador. Ministère de l'Energie et des Ressources, Québec; MB 85-62.

Rohon, M.-L., 1986 - Indices de Cu-Ni et de pyrite-pyrrhotite des lacs Retty et Doublet, Fosse du Labrador. Ministère de l'Energie et des Ressources, Québec; MB 86-52.

Rohon, M.-L. (in press) - Indices de Cu-Ni, de Ni-Cu et de pyrite-pyrrhotite entre les lacs Retty et Low, Fosse du Labrador. Ministère de l'Energie et des Ressources, Québec.

Sauvé, P., - Bergeron, R., 1965 - Gerido Lake - Thevenet Lake area, New Quebec. Ministère de l'Energie et des Ressources, Québec; G.R. 104.