Mineral deposit and metallogenic synthesis of Québec's Far North

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For six straight summers, from 1998 to 2003, MRNFP teams have mapped a huge area of northern Québec at the 1:250 000 scale. More than 25 NTS sheets were completely or partially covered. In conjunction with this mapping, a metallogenic study was also carried out to document mineralized showings, in order to produce a metallogenic synthesis. Visits to most of the mapping teams allowed the study of most of the mineralized known showings.

This project involving mineral deposit and metallogenic syntheses of Québec's Far North is aimed at providing the mineral industry with exploration guidelines for this vast and still poorly-known region. Three products are planned: a Far North mineral deposit map, in ArcGIS format, to which a showing database will be attached; a mineral deposit synthesis describing the showings and the different mineralization types observed; and finally, an interpretative metallogenic synthesis in which the different mineralization types will be placed in their lithotectonic contexts. This progress report contains the results of the first of the three years work planned.

Work accomplished in 2003-2004

Little fieldwork was done on mineralized showings in the summer of 2003 in comparison to the previous summers, since the two regions being mapped, those of Lac Minto (34F and 34G) and Kogaluc Bay (34N and 34M), contain only a few known showings to date. We however paid special attention to certain Ni-Cu-PGE mineralizations associated with mafic and ultramafic intrusions, in the Lac Minto area, as well as to favourable settings for polymetallic volcanogenic mineralizations in the Roulier Belt, Kogaluc Bay area.

For the purposes of the synthesis, a geochemical study was undertaken to evaluate the PGE potential of different mafic and ultramafic units. We have analysed more than 400 samples from: 1) mafic and ultramafic rocks associated with belts of volcanoclastic sediments, 2) mafic and ultramafic rocks associated with intrusive suites, 3) mafic and ultramafic rocks in isolated layers in felsic units (non-mappable layers), and finally, 4) Proterozoic diabase dykes.

In order to highlight rocks with chemical characteristics favourable to the formation of magmatic PGE mineralizations, Cu/Pd, Cu/Pt and Ni/Pd element ratios have been used. Rocks with Cu/Pd and Cu/Pt ratios inferior to the ones generally observed in the mantle (6000 and 3000, respectively) are enriched in PGE and thus represent a magma which originally was likely to form PGE mineralizations.

The results obtained within the framework of this study are interesting, especially those associated to several belts of volcanoclastic sediments, such as the Gayot, Qalluviartuuq-Payne, Faribault-Thury and Innuksuac complexes. Some intrusive suites, such as those of Couture, Lac Calme and Qullinaaraaluk also present a favourable chemistry for PGE mineralizations. The same applies to several isolated mafic or ultramafic levels in large felsic intrusions, primarily in the northern part of the region covered by the Far North project. For their part, diabase dykes of Proterozoic age do not possess a favourable chemistry for PGE mineralizations. Generally, Cu/Pd, Cu/Pt and Ni/Pd ratios favourable for mineralizations are observed mainly in rocks of ultramafic composition and seem less meaningful in gabbroic rocks. A report on this geochemical study of PGE in mafic and ultramafic rocks is currently at the publication stage and should be released in 2004. Moreover, about thirty new deposit files have been included in SIGEOM (GM maps) and a few more have been updated. These files will be used to build the mineral deposit map in ArcGIS format, as well as the database which accompanies it.

Forthcoming work

For 2004-2005, we expect to finalize the mineral deposit map and synthesis. The mineral deposit map is planned at the scale of 1:750 000 and will contain a simplified geology as well as the location of various known showings in the Minto Subprovince. A database summarizing the deposit file will be linked to the map. The mineral deposit synthesis will consist of a descriptive report addressing the various mineralization types. This report will contain descriptive elements already released in MRNFP publications. In a certain way, it will constitute a mineral deposit catalogue.

Finally, in 2005-2006, our efforts should be directed at the metallogenic synthesis. Our aim will be to integrate the different mineralization types into geological evolution models. In contrast to the descriptive mineral deposit synthesis, the metallogenic synthesis will be interpretative in nature.

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