2014-03:

CORRIDOR ALONG THE EXTENSION OF HIGHWAY (ROUTE 167) : GEOLOGICAL SYNTHESIS AND ASSESSMENT OF MINERAL FAVOURABILITY

The extension of Highway 167, from Lake Albanel to the Renard de Stonorway Diamond Mine, completed in September 2013, opens new access to the James Bay region. The corridor along this new route contains a diversity of known mineral indices, including gold, silver, copper, zinc, but also including uranium and diamonds. Nonetheless, the sector remains relatively poorly explored and regional geological information is fragmentary. The Eastmain volcano-sedimentary belt is at the heart of the exploration in the region, being the source of most of regional geological information and playing the role of metallotect for orogenic gold and the Cu-Zn *volcanogenic massive sulphide* (VMS) deposits. Beyond this zone, little is known and is deserving of a new look. The focus of this project is, therefore, to assess the mineral potential (except for uranium) of this new corridor.

The project's approach is initially based on a phase of compilation and integration of new geological data. This includes analysis of outcrops, rock samples, and sediment as well as geophysical information pulled from government reports, statutory exploration reports, and academic research. A total of 3 290 rock samples were compiled and then analyzed for geochemistry using the LithoModeleur 3.6.0 software. Information related to the total magnetic field were assessed with Geosoft to obtain gradients and 'tilts' to identify discontinuities and geophysical changes. Lake sediments were used to trace Ni and Cu, after standardizing surveys and enhancing the anomalies using spatial regression.

A new geological and structural portrait is proposed for the Highway 167 corridor (**Figure 1**), at both the regional scale and at the scale of the Eastmain Belt.

At the regional scale, based on geophysical lineaments, the new geophysical information allowed for an interpretation of the ductile fault zones as well as regionally identifying the magnetic domains and limits of the Opinaca/Opatica sub-province, which now surround the branches located to the east and south of the Eastmain Belt. The recognition of sedimentary rocks and new greenstone belts is one of the project's highlights. The area covered by sediments was increased by more than 300 % to reach more than 8 500 km^2 compared to a previous area of approximately 2 800 km^2. Moreover, these sedimentary rocks could be part of the Laguiche Group, widely recognized to the west. Several newly identified greenstone belts cover more than 120 km^2, in particular within some extensions of the Eastmain Belt, which create new sectors of interest for metals.

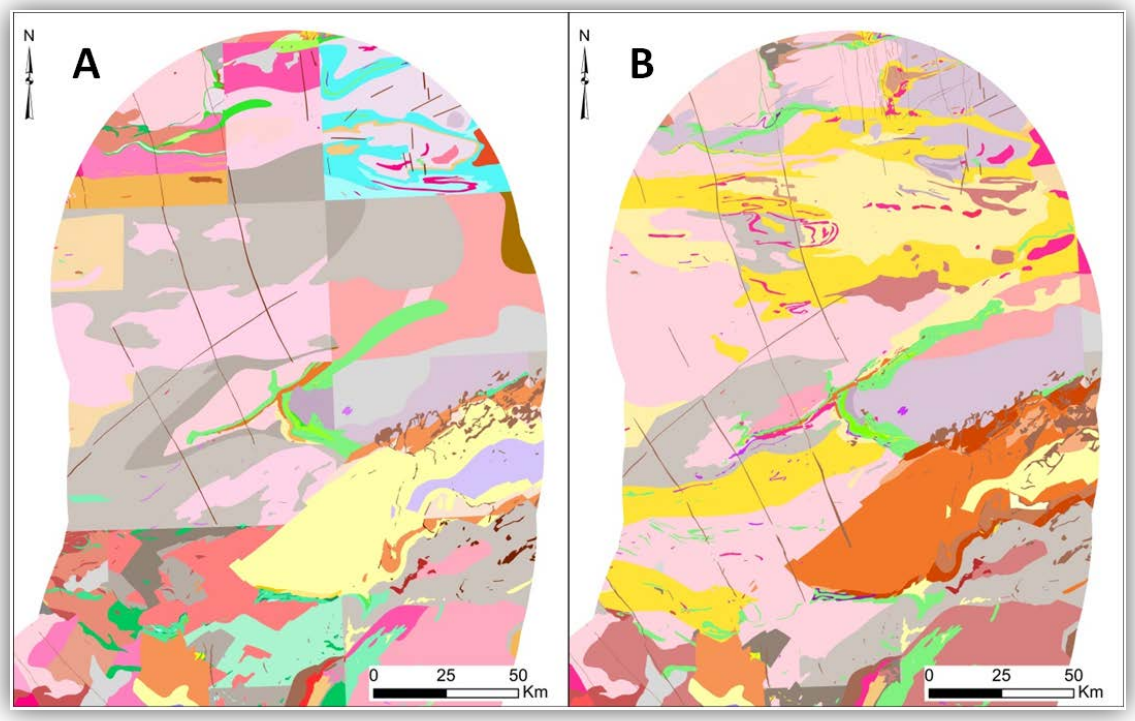

Figure 1. A) Geological map of the sector from SIGÉOM; (B) A new geological interpretation of the Highway 167 corridor.

At the scale of the Eastmain Belt, the new geological portrait provides an improved assessment of mineral potential for the region. The surface area of the belt was increased by 35 % to 879 km^2 (from a previous 578 km). Several geological units that were poorly recognized in government maps are now identified across a larger area. This is particularly the case for rhyolites-rhyodacites (19.6 km^2 versus 1.3 km^2 pre-project) and felsic intrusions of granite-, monzonite-, and syenite-types (39.7 km^2 versus 1.1 km^2 pre-project). The footprint from ductile deformation is a dominant component across all the Eastmain Belt; the western and eastern branches, including the proposed extensions, could represent a major corridor for ductile deformation (without information on the kinematics) that would be at the origin of the current architecture of the belt. The new metamorphic portrait of the Eastmain Belt is unusual; in fact, previously recognized to be uniformly amphibolite, many facies are now interpreted as being greenschist with granulite. Greenschist and upper greenschist sectors coincide with shear zones and could indicate retro-metamorphism associated with the flow of hydrothermal fluids.

Several exploration guides are proposed for various substances and types of deposits (**Figure 2**). According to the criteria of metamorphic transition, structural footprint, and lithological environment, the Eleanor-type of gold is favourable within eight sectors of the corridor, particularly in the branches found to the south and west of the Eastmain Belt. Approximately 200 km^2 of areas of interest for orogenic gold are proposed, based on the criteria for the presence of sediment (and iron formations) in (or upon contact with) greenstone belts and belts associated with areas of deformation. The porphyritic Cu-Au systems are an area of interest for six areas based on geophysical surveys of demagnetization and circular structure, coupled with

Cu anomalies in lake sediments. Magmatic Ni (and Cu) also deserves to be explored as 33 targets are proposed based on Ni anomalies in lake sediments.

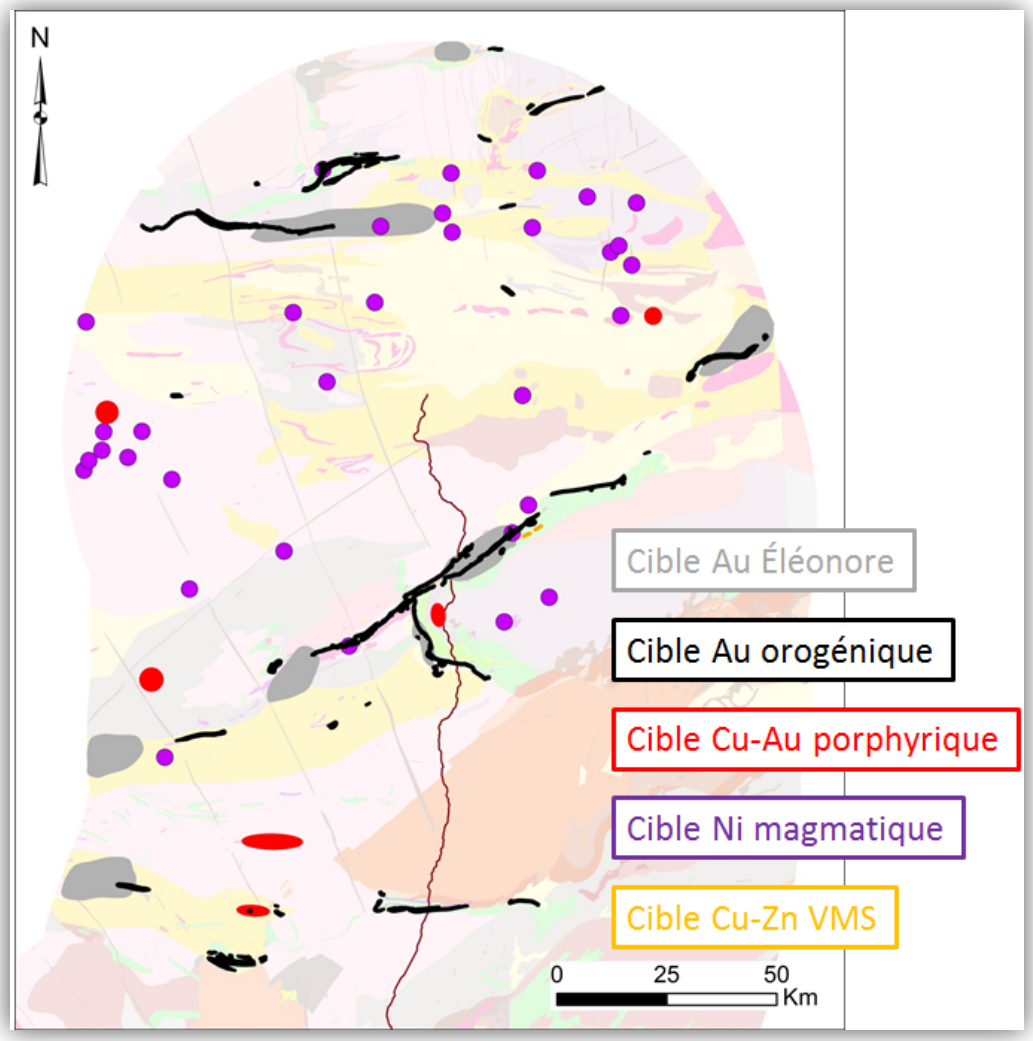

Figure 2. Mineral targets and new geological interpretation of the Highway 167 corridor at the bottom of the map. Éléonore-type Au, grey polygon; Orogenic Au: black polygon; Porphyritic Cu-Au: red polygon; Magmatic Ni: purple dot; Cu-Zn VMS: orange polygon.

Project 2014-03: Summary sheet	
Objectives	➢ Prepare a new geological portrait of the region. ➢ Assess the mineral potential of the region.
Results and innovations	➢ New geological and structural interpretations at the both the regional and the Eastmain Belt scales. ➢ Regional scale: Recognition of zones of ductile faults, magnetic domains, and determination of the boundary of the Opinaca/Opatica sub-provinces; Details regarding the distribution of existing greenstone belts and recognition of new greenstone belts giving a total area of 124 km^2, including extensions of the Eastmain Belt; Recognition of large tracts of sedimentary rocks, increasing the known surface area by more than 300 % to now cover more than 8 500 km^2. ➢ Eastmain Belt scale: a 35 % increase of the belt's surface area to 879 km^2; identification of new lithologies, deformation zones, and a new portrait of regional metamorphism. ➢ Mineral targets: - Éléonore-type Au: eight regional targets; - Orogenic Au: local targets covering 200 km^2; - Porphyritic Cu-Au: 6 local targets; - Cu-Zn VMS: 2 local targets; - Magmatic Ni: 33 local targets. ➢ New geological and structural portrait of a poorly explored sector of the James Bay region. ➢ New geological, structural, and metamorphic interpretation of the Eastmain Belt (regional metallotect for Au-Mo). ➢ Development of some sectors and targeting for various minerals and deposits.