

2013-02: Extension of the Sunday Lake Fault (Detour Gold Mine, Ont.) into Quebec and its potential for gold and base metal mineralisation

The Detour Gold deposit (15.6 Moz) is located along the Sunday Lake Fault in Ontario. It creates a lot of interest for exploration in northwestern Abitibi because this major structure continues eastward into Quebec for over 100 km (Figure 1). This area of the Abitibi is hard to access, has few outcrops and is covered by a thick layer of glacial deposits. The most recent mapping carried out by the *ministère des Ressources naturelles* to the north of the fault date back to 1987-1988 (Lacroix, 1994). An updated understanding of the regional geology of the area has become essential, taking into account that a lot of new drilling and geophysical data has been made public since the early 1990s, but has not been integrated into the regional synthesis. This project aims to improve the position of the Sunday Lake Fault on the Quebec side, to assess its importance relative to other deformation corridors in the Abitibi, and to propose regional exploration guides for gold and base metals in this relatively unknown region. The exploration guides will be created by establishing, among other things, any correlations between the Detour Gold deposit and the Selbaie polymetallic deposit (56.9 Mt @ 1.85% Zn; 0.87% Cu; 39 g/t Ag; 0.55 g/t Au).

Lithological and geochemical data from drill holes and outcrops from to SIGÉOM and member companies of CONSOREM were compiled into unified databases. Data processing combined with the interpretation of airborne magnetic and electromagnetic surveys as well as regional public geophysical surveys resulted in a high-resolution geological interpretation of the area (Figure 1).

The new geological interpretation helped identify new geological features, including: 1) A long and narrow basin of felsic to intermediate calc-alkaline tuffs that is deformed along the Sunday Lake Fault. The geochemistry of the tuffs is similar to the volcanoclastites of the Selbaie volcanic complex (apple green in figure 1); 2) Two conglomerate basins bordered by faults (dark blue). The larger of the two, located in the centre of the region, comprises a conglomerate with rounded polygenic fragments that are occasionally cherty. The basin is comparable in size to Duparquet in southern Abitibi; 3) A greywacke and argillite basin in the Fénelon area oriented NW-SE and truncated by the Sunday Lake Fault; 4) Komatiitic lavas and komatiitic basalts as well as ultramafic intrusions and gabbro-norites (mauve), with chemical compositions similar to the Detour Gold rocks that are wedged along the Sunday Lake Fault or border the Opatica Subprovince between the Martinière and Fénelon showings.

One of the structural elements marking the Detour Gold Mine, which can serve as a regional exploration guide, is the angular relationship between the Sunday Lake Fault (E-W) and the lithological units, and the NE-SW oriented folds (Figure 1). This angular relationship is quite unusual in the Abitibi, but can be found throughout the Quebec section of the Sunday Lake Fault to the east from the smallest conglomerate basins to the north of the Sunday Lake Fault. The magnetic highs, the stratification and the axial traces of folds are at angles greater than 30 degrees with respect to the E-W and NW-SE trending faults. Subsidiary faults were also identified parallel to the Sunday Lake Fault or oriented NW-SE and folding the lithology. The NW-SE structures have the same orientation as the Bapst Fault that borders the Selbaie

Complex to the east and the faults interpreted as being synvolcanic in Matagami (southern flank and western camp).

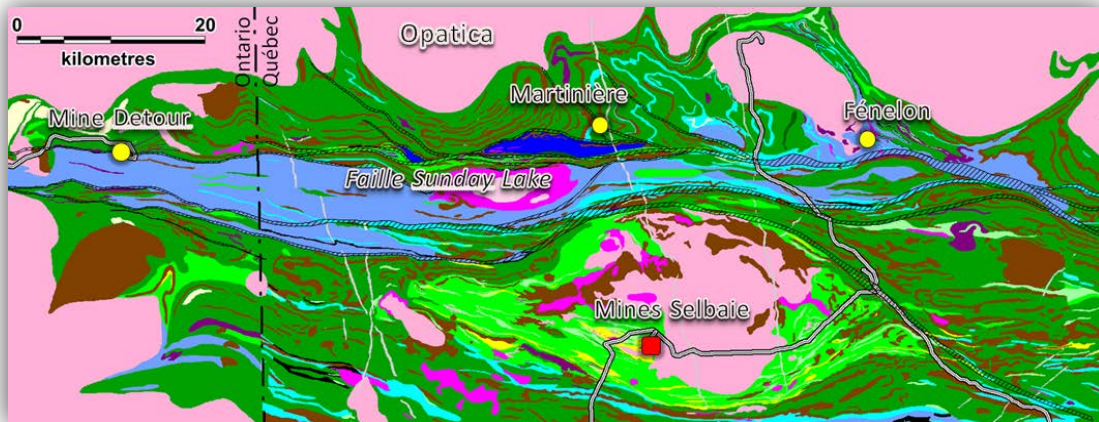


Figure 1. New geological interpretation north of the Sunday Lake Fault (Detour), northwestern Abitibi, showing access roads and gold showings (yellow circles).

The new trace of the Sunday Lake Fault and its subsidiaries was established using information from recent drilling and the interpretation of aeromagnetic surveys. These data will help to better orientate exploration efforts for orogenic gold. The presence of Timiskaming-type sedimentary basins and ultramafic rocks along the Sunday Lake Fault ranks this structure in the same class as the great crustal faults of the Abitibi, such as the Cadillac - Larder Lake and Destor – Porcupine Faults. More precise exploration targets are proposed in the fold hinges that were interpreted using geophysics. The potential for epithermal- or volcanogenic massive sulphide-type (VMS) polymetallic mineralisation at Selbaie or Matagami is considered to be low since there appear to be no synvolcanic plutons in the study area. The potential for mafic-type VMS is considered to be good due to, among other reasons, the presence of mafic to ultramafic intrusions which probably indicate a back-arc basin and quite primitive volcanism north of the Sunday Lake Fault. The series of sills in the centre of the region, between the two NW-SE faults, seem to be a particularly favourable environment for this type of mineralisation. Finally, the potential for magmatic Cu-Ni-PGE mineralisation is considered to be good in the gabbro-norites and the ultramafic rocks as indicated by the economic intersections observed in drill holes by a company in 2013-2014 to the ESE of the Fénélon showing.

Project 2013-02: Summary

Objectives	<ul style="list-style-type: none">• Re-interpret the geology along and to the north of the Sunday Lake Fault on the Quebec side using new geological, geochemical and geophysical data from companies and governments.• Improve the location of the deformation corridor and its subsidiaries.• Propose regional exploration guidelines for gold and base metals by establishing, among other things, correlations with the Detour Gold and Selbaie deposits.
Results and Innovations	<ul style="list-style-type: none">• New high resolution cartographic model for the geology north of the Selbaie camp, NW Abitibi.• Precise delineation of the Sunday Lake Fault and its E-W and NW-SE subsidiaries.• Identification of a new Timiskaming-type basin in northern Abitibi similar in size to the Duparquet basin (Destor - Porcupine Fault).• Highlighting of several ultramafic rock units geochemically similar to the Detour Gold units.