# Project 2011-01: Types of gold mineralisation along the Cadillac Fault

The Cadillac Fault (CF), located in the Abitibi Subprovince, is a world-class metallotect containing 3 600 tonnes of gold discovered within 15 km of the fault line (all deposits combined). It includes 10 world-class deposits (> 100 t Au) and 48 major deposits (> 10 t Au) in a total of 208 gold deposits, which comprise 60 % of the total in the Abitibi (55 % of the total gold tonnage from the Abitibi). The objective of the present project was to compile a purely descriptive metallogenic classification for these deposits without relying on conceptual notions. This work aims to verify the existence of several **distinct goldfields** along the CF in terms of metal assemblages, gangue mineral assemblages, alteration, structure, chronology etc., and determine spatial limits for them. The study area was restricted to 10 km on both sides of the fault, representing an envelope of higher density of gold deposits.

This is Phase 1 of the project (2010-2011); it focused on the Malartic – Val-d'Or segments of the CF. Phase 2 will concentrate on the Rouyn – Kirkland Lake segments. The targeted documentation consists of deposit descriptions exclusively: company reports (statutory, NI 43-101), academic research (PhD, MSc), ministry reports, monographs and special volumes published by the government and excursion guidebooks (symposiums). For each deposit, the collected information was grouped in formatted text files and assembled into a searchable pdf document that is one of the project's deliverables.

Five well-defined metallogenic fields were identified in the eastern section of the CF during the current phase. Distinctive features that led to the definition of these fields are given in the attached figure. Mineralogical characteristics of the deposits (vein filling and alterations) obtained from the documentation were compared to quantitative geochemical data (from the databases of partner
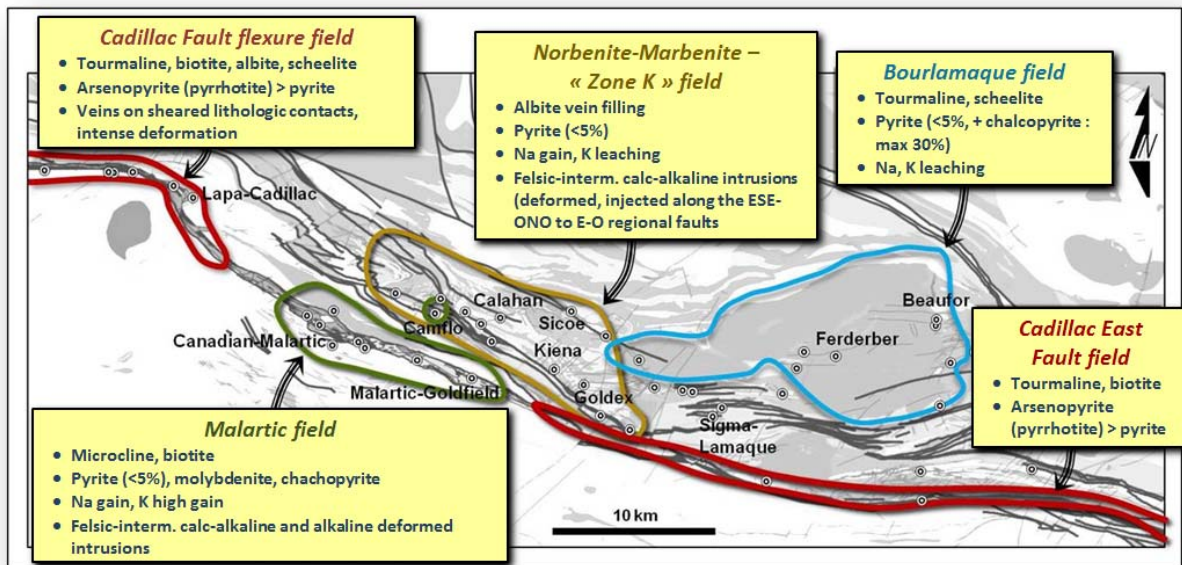
Metallogenic zones in the area affected by the Cadillac Fault – eastern section

companies and Sigéom). Mass balance calculations with precursor modelling, carried out using the Lithomodeleur software, shows a zone of strong potassic metasomatic gain superimposed on the Malartic field, whereas the Norbenite-Marbenite - « Zone K » fault field shows a gain in Na and leaching of K. These results confirm the information obtained from the deposits descriptions. The Bourlamaque

field shows Na and K leaching, a hydrothermal signature similar to the Val-d'Or Formation. The latter is also marked by very strong local increases in K, typical of VMS alteration (proximal sericite zone).

The Malartic and the Norbenite-Marbenite « Zone K » fields, two adjacent fields located along the ESE regional segment, have some physical characteristics in common: deposits containing veins/veinlets hosted in deformed intermediate felsic intrusions (concordant tabular stocks and intrusions) injected along the ESE regional faults. The intrusions of the Norbenite-Marbenite – « Zone K » field have calc-alkaline affinity exclusively, whereas the Malartic field can be described more as alkaline (in particular the porphyritic intrusions, see Project 2011-02). Potassium metasomatism and the more polymetallic nature of the sulphide assemblage (pyrite, chalcopyrite, molybdenite, galena and sphalerite) underscore a magmatic hydrothermal contribution. In addition, the Malartic field is a break in the continuity of the metallogenic style along the CF, especially in mineralogy (gangue, alteration, sulphide assemblage). This relationship, coupled with the magmatic hydrothermal signature, suggests a separate and subsequent hydrothermal event.

The five fields defined in this study can be used directly as mineral exploration guides. However, they are limited to the position of known deposits and the lithogeochemical sample coverage (16 000 samples in the study area).

Project 2011-01: Summary	
Objectives	• To verify the existence of several **distinct goldfields** along the Cadillac Fault in terms of metal assemblage, gangue minerals, alteration, structure, chronology, etc. • To determine the spatial boundaries of these fields, and in an interpretive phase, their geological and structural meaning. • To confirm the possibility of anticipating mineralisation characteristics in an area based on the geometry of the established fields → A variety of exploration guides along the fault. • To look for an integrated vision of the Cadillac Fault using a purely descriptive summary, without relying on metallogenic models.
Results	• Recognition of 5 distinct, well-characterised metallogenic fields in the study area examined in the first phase (section located east of the city of Cadillac). • Mineralogical characteristics obtained from the deposit descriptions (government, university and industrial documentation) fully corroborated by quantitative geochemistry (mass balance calculations).
Innovations	• The fields identified can be used as exploration guides in the field. • Innovative features for the understanding of metallogenic evolution of the Val-d'Or, Malartic and Cadillac mining camps, extremely active exploration areas.