
**TGI 3 Deep Search Project: development and testing
of new and improved methods of exploring for
deeply buried base-metal deposits**

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The TGI 3 Deep Search Project is a thematic, multidisciplinary and collaborative project with the primary objective of developing, testing and applying new and innovative methods of exploring for base-metal deposits concealed at depth in the Earth's crust. The Government of Canada instigated the TGI 3 research program to conduct mapping to help sustain the base-metal reserves around existing mining communities. To this end a series of regional projects were established for some of Canada's major base-metal regions, such as the Central Mobile Belt of Newfoundland. In complement to these projects, the

Deep Search Project was instigated to develop and test new methodologies that will assist in the discovery of buried deposits, whether they are hidden beneath 200 m of bedrock or 5 m of till. The project has four primary objectives: (i) to develop and test new and innovative methods of exploring for buried base metal deposits in mature mining camps; (ii) to define potential exploration targets by applying new methodologies in major mining districts, TGI3 project areas; (iii) to transfer new methods and technologies to the exploration industry; and (iv) to mentor and train highly qualified personnel by supervising post-doctoral fellows, graduate students, and students employed during the summer in field programs. To achieve its stated objectives the Deep Search Project consist of five major themes: (1) Primary Vectors: mineralogical and geochemical vectors, and new genetic models for base metal deposits (e.g., alteration and hydrothermal sediment vectors, hyperspectral mapping); (2) Surficial Vectors: mineralogical and geochemical methods of detecting deposits buried beneath glacial sediments (e.g., indicator minerals, groundwater hydrology and geochemistry, soil geochemistry); (3) Geophysics: deeply penetrating methods of detecting buried deposits (e.g., 3D seismics, magnetotellurics (MT), EM, gravity, etc.); (4) 3D Modelling: build 3D geological models of mining camps and belts, map the subsurface distribution of ore horizons, integrate multiparameter data and define potential targets, and develop new interpretive tools; and (5) New Exploration Tools: testing and application of new technology (e.g., Innov-X portable XRF, ASD Field Spec Pro portable hyperspectral system, precision in situ micro-analysis of minerals using ICP-MS and MC-ICP-MS technology).

These research themes are being tested across Canada, some in tandem with other TGI 3 projects in well established mining areas, such as the Kidd-Monroe argillite vectors in the Abitibi Province, and others over undeveloped mineral deposits such as in the Hackett River greenstone belt.