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EARTH SCIENCE SECTOR
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**The Targeted Geoscience Initiative 4
Nickel, Copper, Platinum Group
Elements and Chromium Ore Systems**

Geological Survey of Canada

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The Targeted Geoscience Initiative 4 Nickel, Copper, Platinum Group Elements and Chromium Ore Systems

Canada is a major mineral producer with 16% of the world's nickel, 7% of Platinum Group Elements (PGE) and 3% of both copper and cobalt. Some of the world's largest and most productive nickel and copper mining districts are in Canada, specifically in Sudbury (Ontario), Thompson (Manitoba), Raglan (Quebec), and Voisey's Bay (Newfoundland and Labrador).¹ However, Canadian nickel and copper reserves have decreased by more than 50 % over the past 25 years.²

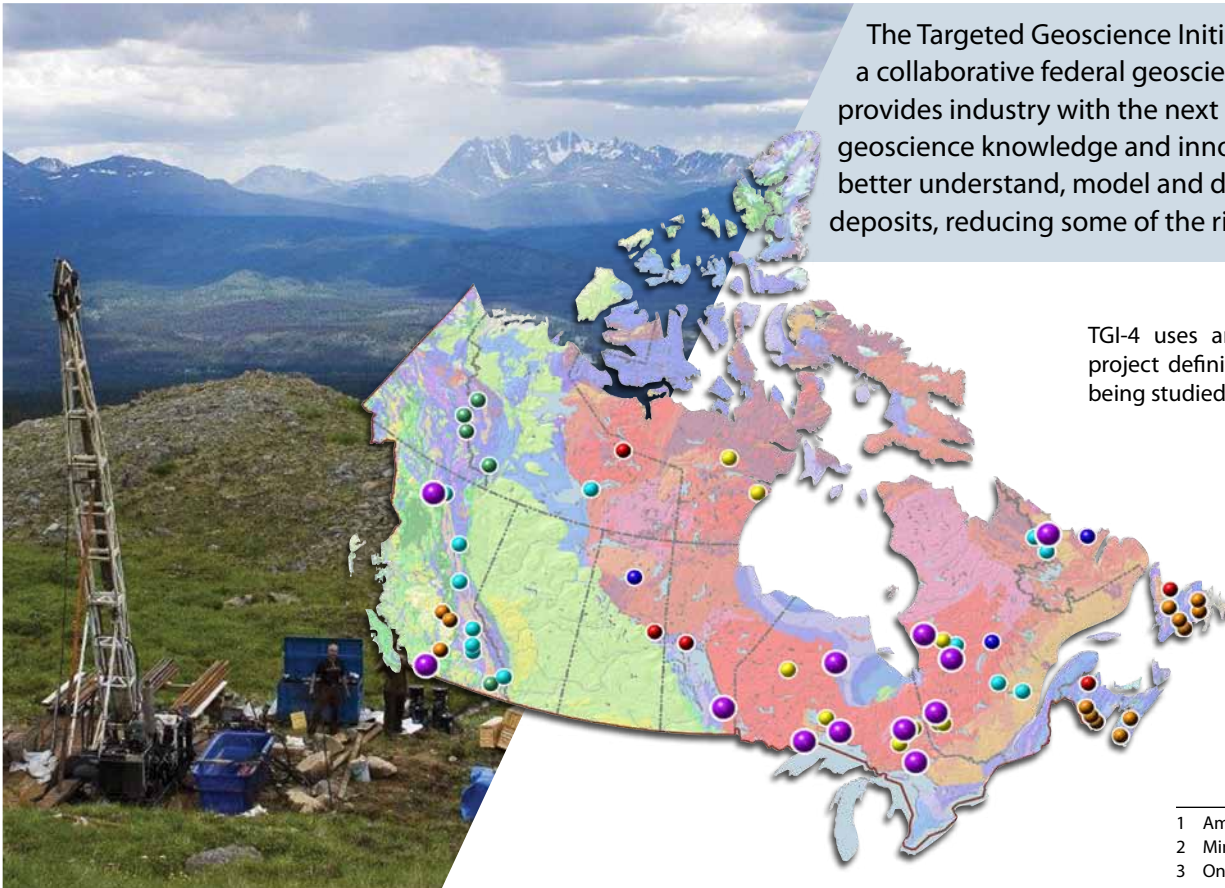
The discovery of chromite in the early 21st century in the Ring of Fire (Ontario) could be as important as the discovery of nickel was in Sudbury in the 19th century.³ Several chromite deposits are now in the advanced stages of exploration in the McFaulds Lake region of northern Ontario.

National-, district- and deposit-scale studies (see map) are focused on determining the key components necessary for detecting hidden or deeply buried nickel-copper-PGE and chromium mineralization. These ore deposits occur in highly variable geologic settings with complex geochemical, mineralogical and geophysical signatures that challenge exploration, particularly in the deeper or covered parts of established and emerging terrains.

The Targeted Geoscience Initiative 4 (TGI-4) is a collaborative federal geoscience program that provides industry with the next generation of geoscience knowledge and innovative techniques to better understand, model and detect buried mineral deposits, reducing some of the risks of exploration.

TGI-4 uses an ore system approach to project definition. Seven ore systems are being studied:

- VMS
- Lode gold
- Intrusion-related
- Ni-Cu-PGE-Cr
- Specialty metals
- SEDEX
- Uranium



1 Ames D.E. 2011
 2 Mineral Association of Canada, 2010
 3 Ontario Budget Speech, 2010



This project has three themes that use a **multidisciplinary approach** focused on determining the genesis of the ore system and deposits, developing or improving vectoring tools (indicators and direction) and the fertility of:

- high-magnesium ultramafic to mafic magmatic systems (e.g. Ring of Fire)
- hydrothermal-magmatic copper-PGE-rich systems (e.g. Sudbury)
- orogenic nickel-copper systems (spatially associated with mountain belts)

New geoscience knowledge is being created by using geological, geochemical and airborne geophysical data at several research sites. The sites in Ontario, Manitoba, British Columbia and Newfoundland and Labrador include mature, emerging and poorly understood nickel-copper-PGE-chromium geologic environments. To achieve project objectives, this project will use the expertise of the Geological Survey of Canada and more than 45 scientists and students from over 10 Canadian universities.

Magmatic ore deposits are derived from accumulations of materials (e.g. crystals) that formed during the cooling of magma (molten rock).



Targeted Geoscience Initiative 4: Increasing Deep Mineral Exploration Effectiveness

For more information about the Nickel, Copper, Platinum Group Elements and Chromium Ore Systems Project, contact

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