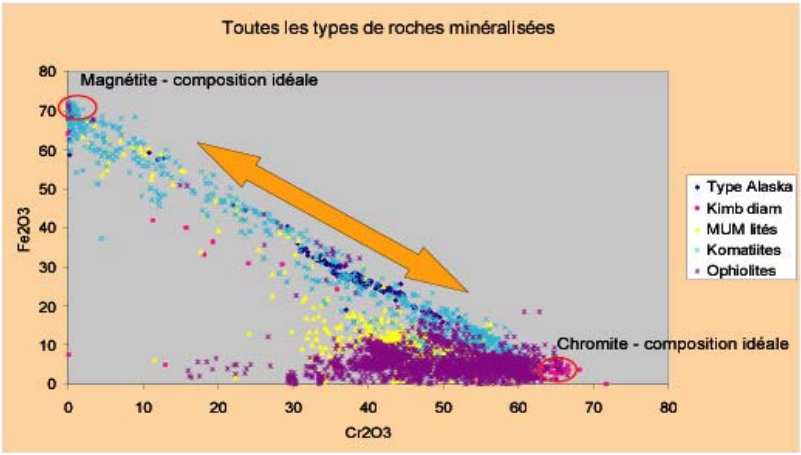
Project 2003-10: Indicator minerals in exploration: chromite and tourmaline

A comprehensive database of chemical analyses of chromites (Barnes and Roedder, 2002) was used to assess their potential as an exploration guide. The database allowed a comparison to be made between chromite compositions based on various tectonic settings, distinct metamorphic facies, and sterile and fertile environments.

Several diagrams were created to determine the characteristics of the chemical composition of chromites from different rock types and of chromites associated or not associated with mineralised zones. Among the features that can be used as exploration tools, we can include the presence or absence of oxide substitution in the Y-site, the percentage of Fe^{2+} replacement by Mg^{2+} in the X-site and the changes in the normalised levels by atomic weight.



Graph showing the composition of chromites from mineralised rocks.

For tourmaline, a database was created using data published in the literature. The database includes major and trace element compositions of the tourmalines, structural formulas, location, host lithology, metamorphic facies, mineralisation type, metallogenic model, associated minerals, age and reference. Most of the chemical analyses come from tourmalines associated with mineralised zones and very few from sterile zones. Notwithstanding, some criteria were identified that are favourable to mineralisation.

Summary: Project 2003-10	
Objectives	• To assess the chemical composition of tourmaline and chromite in a variety of lithological, tectonic and metamorphic environments. • To assess the composition of tourmaline and chromite based on metamorphic grade. • To assess the potential of using tourmaline and chromite as markers of mineralised zones.
Results	• Diagrams from a lithogeochemical database of chromite (26000 samples) for a variety of environments; • Tourmaline database and diagrams created using published data; • Favourable criteria determined for chromite and tourmaline.
Tools and Innovations	• Chromite and tourmaline databases can be used for comparison.