

Critical minerals research at the British Columbia Geological Survey



Ministry of Mining and Critical Minerals



British Columbia Geological Survey
Information Circular 2025-06

Critical minerals are required to make electric vehicles, mobile phones, solar panels, wind turbines, electrical transmission lines, batteries, and medical devices, and to manufacture products needed for national defence.

With increased global demand, long-term critical minerals shortages are predicted. Consequently, jurisdictions around the world are developing strategies to ensure supply chains are robust and resilient.

British Columbia is developing a Critical Minerals Strategy. Together with strong environment, social, and governance (ESG) performance and the geological potential of the province, the Strategy presents a generational opportunity to support a thriving economy, attract investment, and build meaningful partnerships with Indigenous Peoples.

The British Columbia Geological Survey is contributing information foundational to the Strategy. The Critical Minerals Atlas, released in 2024, was the initial step in evaluating the critical minerals endowment of the province and in building awareness of critical minerals opportunities for the exploration and mining industries.

Al Aluminum	Co Cobalt	Cu Copper	Ge Germanium
In Indium	Mg Magnesium	Mo Molybdenum	Ni Nickel
Nb Niobium	Critical Minerals in British Columbia An atlas of occurrences and producing mines, 2023		
PGE Platinum group elements	REE Rare earth elements	Ag Silver	Ta Tantalum
 British Columbia Geological Survey Open File 2023-02		W Tungsten	Zn Zinc

Download atlas



Download strategy



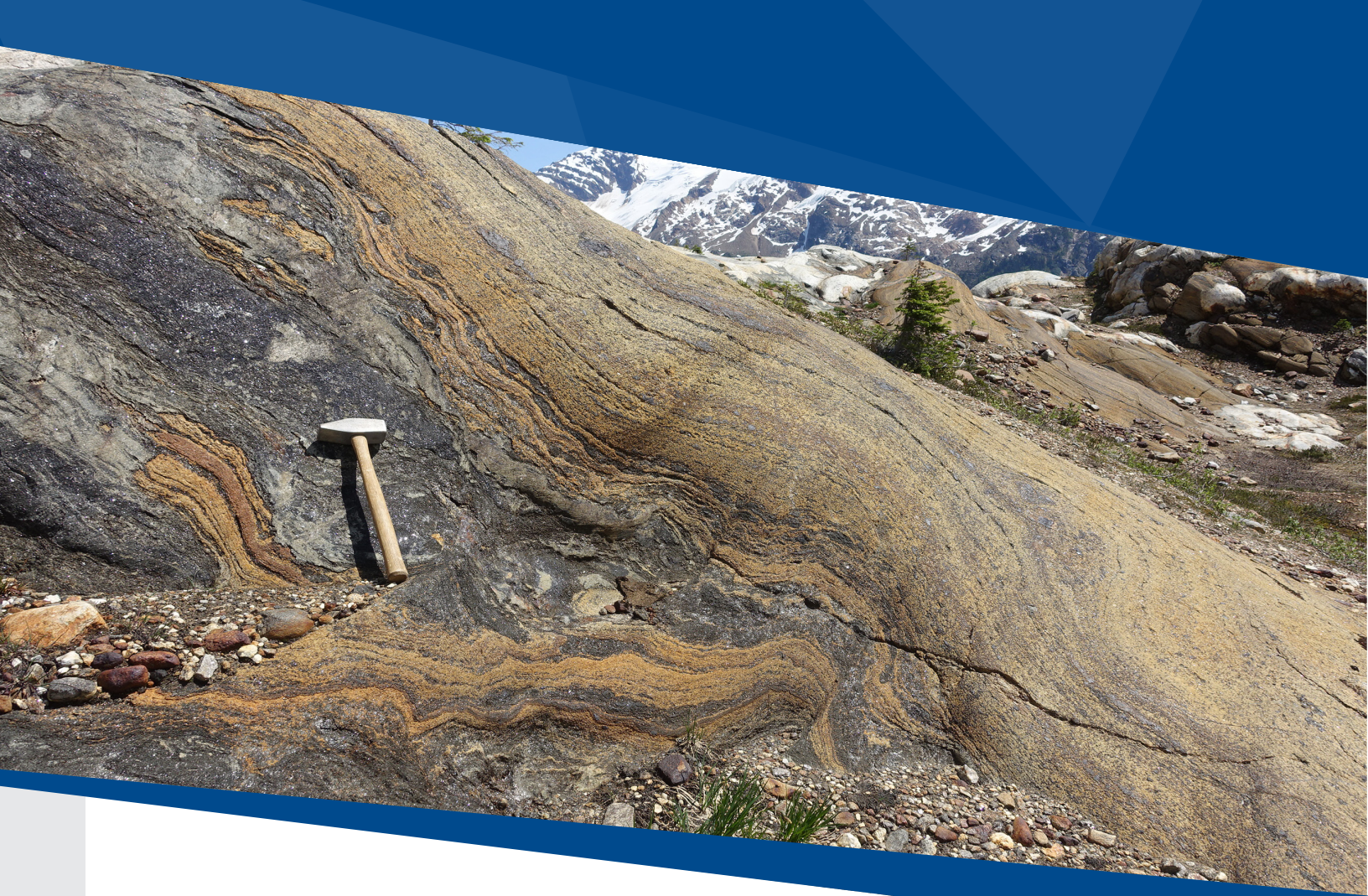
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Critical minerals and mineral systems in British Columbia

Hickin, A.S., Ootes, L., Orovan, E.A., Brzozowski, M.J., Northcote, B.K., Rukhlov, A.S., and Bain, W.M., 2024. In: Geological Fieldwork 2023, British Columbia Ministry of Energy, Mines and Low Carbon Innovation, British Columbia Geological Survey Paper 2024-01, pp. 13-51.



New Survey critical mineral geoscience projects are providing the knowledge that will attract investment and inform decisions, enabling British Columbia to responsibly contribute the raw materials needed to transition to a green economy and curb climate change.



Critical minerals programs at the Survey

By increasing awareness of critical mineral opportunities for the exploration and mining industries, and by enhancing the critical minerals knowledge base, the province seeks to encourage investment that could lead to British Columbia being a significant supplier of the raw materials needed to reduce greenhouse gas emissions. Ongoing exploration for, and development of, critical minerals will help grow the provincial economy, mitigate climate change, and reduce global supply pressures.

The Survey initiated new multi-year programs to address knowledge gaps and gain insights into the mineral systems that contain critical minerals, the origin, age, and geographic distribution of mineralized rocks, and the spatial distribution of critical minerals within ore bodies.

One stream of projects examines the mineral systems that host significant deposits and mines (past and present). These projects are assessing if critical minerals might be added to production as co- or by-products in the short term. A second stream focusses on the longer term to identify new deposits and to encourage investment for under-explored mineral systems that may produce critical minerals in the future. These projects include foundational mapping, geochronology, geochemistry, and geophysics, and developing new exploration techniques.

Supporting access to critical mineral information, the Survey is also modernizing its database infrastructure.





Province-wide studies

- Revitalized mineral potential modelling of critical mineral-bearing systems to establish which regions are favourable for hosting mineralization.
- Developing a modernized magmatic framework for critical mineral-bearing intrusive systems using high-precision CA-TIMS dating and isotopic tracer data to establish the age, emplacement setting, and geographic distribution of both fertile and barren intrusions.
- Re-analyzing archived samples using modern whole-rock, trace element, and isotopic methods to classify and understand the geological settings important for mineralization and aid exploration targeting.
- Critical metals in volcanogenic massive sulfide (VMS) deposits.
- Sediment-hosted mineralization and critical minerals.
- Digitization of assessment reports and database creation to enable extraction of critical mineral occurrences that may have originally been overlooked.
- Geoscience data repository (data lake) of historical records to enable machine learning and artificial intelligence interrogation of unrecognized critical mineral-bearing mineral occurrences.
- Measuring the physical properties (density, magnetic susceptibility, porosity) of archived samples to improve geophysical interpretations and enhance critical mineral fertility assessments remotely.
- Review of cobalt occurrences in BC.

Selected deposit studies

- Huckleberry and Berg porphyry deposits.
- New Afton porphyry deposit.
- Mount Polley porphyry deposit.
- Kitsault porphyry deposit.
- Galore Creek porphyry deposit.
- E&L Ni-Cu-PGE deposit.
- Ranch epithermal deposit.
- Sullivan sedimentary exhalative deposit
- Cirque sedimentary exhalative deposit.
- Cobalt-bearing iron skarns, Vancouver Island and Texada Island

Regional studies

- Bedrock mapping in the Golden Triangle addressing volcanogenic massive sulphide (VMS), porphyry, and epithermal deposits.
- Evaluating geochemistry and indicator minerals in modern drainages to develop exploration tools for fingerprinting upstream carbonatite-hosted niobium, tantalum, rare earth element (REE), and other critical mineral deposits.

Information systems

- Geoscience Spatial Data Infrastructure (gSDI) to merge geoscience and mineral resource databases into a modern system ready for applied analytics using machine learning.



Mining, exploration, and critical minerals in BC

Mining contributes greatly to the economy of British Columbia, and exploration is the backbone of mining. More than 1000 global exploration and mining companies are headquartered in Vancouver. In addition, the exploration and mining industry is particularly important for northern communities and some Indigenous groups, employing more than 40,000 people. Between 2019 and 2023, the total value of mining production was \$63.4 billion and the exploration expenditure was \$2.8 billion. These industries will continue to provide jobs, revenue, and economic opportunities.

Critical minerals are defined by different jurisdictions for different purposes. Typically, critical minerals serve an essential purpose (e.g., national security, economic health) and may be at risk of supply disruption. Based on specific demands and supply vulnerabilities, critical mineral list variations reflect supply chain access, geography, and geopolitical circumstance. As demand shifts and technology evolves, the critical minerals list of any jurisdiction may change.

British Columbia is Canada's largest producer of copper only producer of molybdenum, both on Canada's 2024 critical minerals list. The province has near-term potential to contribute to the production of other critical metals on the 2024 national list including cobalt, nickel, magnesium, niobium, rare earth elements, silica, tungsten, and zinc. Not on the Canadian list, but on current or past lists of trading partners, British Columbia mines barite, gold, lead, and silver and is the nation's largest producer of metallurgical coal, which is required to produce high-quality steel. Aluminum is produced by Rio Tinto at their smelter in Kitimat, and lead, zinc, gold, silver, germanium, indium, and cadmium are refined by Teck Resources Limited at their facility in Trail.