

Plain Language Project Description

Tavis Enno, on behalf of the Canada-Nunavut Geoscience Office (CNGO) is proposing the Central Baffin Geoscience Project to map and study the geology of an area southeast of the Barnes Ice Cap, central Baffin Island, Nunavut. The project will consist of a 21-day field program conducted between July 19 and August 15, 2026, followed by laboratory work. It is the second phase of the CNGO's Granite-Hosted Critical Minerals program, funded by the Government of Nunavut.

Central Baffin Island's bedrock geology is made up of rocks formed and altered between 3.0 and 1.8 billion years ago, culminating with a Himalayas-scale mountain building event. Major rock types include igneous rocks of the Rae Craton and Cumberland Batholith, and sedimentary rocks of the Piling Group.

Existing bedrock geological map coverage of the project's study area is limited in both area and level of detail, particularly in comparison with the central to western portions of Baffin Island. The study area's geology is complex and requires detailed mapping and study to improve the geoscientific understanding of the area, and its potential to host economic mineral deposits. Both precious and critical metal occurrences have been reported throughout central Baffin Island, but work in the study area has consisted only of limited mineral exploration and scientific research and is insufficient to understand the geologic history and the origin and regional economic potential of mineral occurrences.

The project will include the following research topics:

- 1) Bedrock mapping

Detailed mapping will improve the existing geological map coverage and will focus on investigating the origin and tectonic history of the study area. Specifically, the age and structure of the Piling Group will be compared with similar rock units at Ege Bay to the north. Though rocks of the Cumberland Batholith have not been identified in the study area, it hosts exposures of igneous rock that may be of similar origin.

- 2) Thematic studies

Thematic studies in the area will investigate the origin and economic potential of critical and/or other economic mineral occurrences in the area.

- a) Occurrences of sulfide minerals will be investigated for their potential to host metals including gold, silver, nickel, copper, and zinc. The interactions of these sulfide-rich occurrences with their environment will be studied to better understand how economic metals are redistributed near Earth's surface, with an

emphasis on the role of micro-organisms in this process. The goal of this work is to understand how microbes impact the redistribution of metals into the Arctic environment, either as potential contaminants or reconstituted as new economic minerals.

- b) Occurrences of niobium, tantalum, and other critical minerals hosted in igneous rocks will be studied to determine their processes of mineralization. The goal of this work is to expand upon research performed in the study area during the 1990s and understand the source and evolution of the metal-bearing igneous melts.

Analytical and laboratory methods:

Rock samples collected during field work will be studied using a diverse suite of laboratory techniques.

- a) Some rock samples will be cut and polished into ‘thin sections’, very thin slices of rock mounted on slides which can be studied under a microscope to identify the geological characteristics of a sample. The chemistry of thin sections can be examined using X-ray fluorescence – in which exposure to X-rays causes elements to emit light at certain energies – and laser ablation inductively coupled plasma mass spectrometry – where a laser is used to aerosolize small quantities of rock.
- b) Whole-rock lithogeochemistry, the chemical analysis of powdered rock samples, will be used to identify bulk chemical characteristics of rocks. Minerals can also be characterized using X-ray diffraction by examining how X-rays are scattered as they pass through powdered samples.
- c) Geochronology will be used to calculate the age of rock samples using the amounts of the elements uranium and lead it contains.
- d) Microbial material in some samples will be characterized using scanning electron microscopy, and will be sent for culturing, DNA extraction and DNA sequencing to identify the types of microbes present.

Results and data distribution

Research results and analytical data will be released free of charge for public download and consumption. The data will be of use to Nunavummiut, academic institutions, and the mineral exploration industry.

Publications and presentations will be generated by researchers involved in the project using the data collected. Outputs of this work will be publicly distributed through the CNGO and Natural Resources Canada publication systems. This information will be presented at scientific venues, and in non-technical talks and posters to Nunavummiut.