

Institut National de la Recherche Scientifique

Eau - Terre - Environnement

SUMMARY

**EVALUATION OF THE DEEP GEOTHERMAL POTENTIAL OF
BAKER LAKE, NUNAVUT, CANADA**

01.2024

For Nunavut Research Institute

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1 Non-technical Summary

1.1 Project Title:

Evaluation of the Deep Geothermal Potential of Baker Lake, Nunavut, Canada

1.2 Lead Researchers and Affiliation:

Ysaline Bacon, Dr. Mafalda Miranda, Pr. Jasmin Raymond

1.3 Research Questions:

In partnership with QEC and RESPEC, the objective of this research project is to assess the deep geothermal potential of Baker Lake by addressing the following question :

- Can the geothermal resources beneath Baker Lake meet the community's heating and electricity needs?
- Are the deep geothermal resources in Baker Lake obtainable at a competitive cost?

To answer these questions, we plan to conduct fieldwork, laboratory analyses, numerical modeling, and life-cycle cost analysis. These cost-effective tools will provide a preliminary assessment of Baker Lake's deep geothermal potential.

1.4 Research Objectives:

This project aims to evaluate the thermal energy stored beneath Baker Lake and how much of this energy could be extracted by a geothermal system. Objectives include studying local structural geology, characterizing thermophysical properties of rocks, evaluating geothermal potential, developing numerical models, and analyzing life-cycle costs. The results could support geothermal development in the northern Canada and contribute to a thermo-hydro-mechanical properties database. The ultimate goal is to promote sustainable energy independence while respecting the environmental values of the Baker Lake community.

1.5 Where, When, and Duration of Field Research:

Field research is scheduled for the summer of 2024 (between June 1, 2024, to September 30, 2024) and will be conducted within a limited area (less than 10 km) surrounding the Baker Lake community. The fieldwork is expected to span over three weeks.

1.6 Methods for Fieldwork:

Research methods include fracture studies on outcrops, geological mapping, and surface rock sample collection. Fracture data will be gathered through linear scanline and rectangular window sampling methods. Linear scanline involves measuring attributes of fractures intersecting a tape laid on an outcrop. In addition, hand-sized surface rock samples will be taken using a geological hammer and transported for physico-chemical analysis in our laboratories

1.7 Environmental, Wildlife, and Societal Impacts:

With no drilling planned, we expect minimal environmental and societal impacts from our research. Our field activities will be conducted quietly and with utmost respect for the environment. Despite the research's proximity to the community, no impacts on wildlife are expected. Regarding concerns of the community, Baker Lake has already experienced Respec's work in December 2022, which involved engaging in dialogue with local residents. Based on this, we anticipate a positive community response. Additionally, we'll conduct follow-up activities with the Qulliq Energy Corporation (QEC). This proactive approach underscores our commitment to transparent communication, community engagement, and potential collaboration for the benefit of Baker Lake and its residents .

1.8 Data Storage and Management:

The results obtained from the 2024 fieldwork will remain within our institution until their public release in spring 2025, in the English language.

1.9 Involvement of Nunavut Residents:

The Baker Lake community will be actively engaged in the research by sharing their expectations and limits. Their preferences for heating and energy sources will contribute to building a realistic model for assessing the potential and feasibility of installing a geothermal heating system within the community.

1.10 Communication of Research Results in Nunavut:

The Baker Lake community will actively participate in the research by expressing their expectations and constraints. Their preferences for heating and energy sources will contribute to building a realistic model for assessing the potential and feasibility of installing

a geothermal heating system within the community. Additionally, based on the community's desires, we are open and motivated to organize a workshop during the fieldwork.