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Resolute Bay Geothermal Potential

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Scientific Research

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Friday, April 4, 2025

Period of operation:

from 2025-07-30 to 2025-08-15

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ᐅᓴᓂᓄᓇᓂᓗ: Project title: Geothermal Resource Potential of Resolute Bay Applicant: Stephen Grasby, Research Scientist, Geological Survey of Canada Background, research questions and objectives Geothermal resources could provide significant benefit to northern communities. For instance, some have estimated that geothermal heating in greenhouses at Resolute Bay can yield fresh produce with an average cost that is 50% lower than having to ship them to the community, supporting food security and nutrition. In 2018 Qulliq Energy conducted a prefeasibility study of geothermal energy in Nunavut, results of which highlighted the community of Resolute Bay, on Cornwallis Island, as one of three areas of interest worthy of further investigation. Following the initial study, Qulliq Energy contracted geophysical surveys by University of Alberta (magnetotelluric/ gravity) around the town of Resolute Bay in 2022/23 to identify potential subsurface reservoirs. Interpretation of these geophysical results requires geoscience knowledge on physical/geochemical properties of rock units in the subsurface. The community of Resolute Bay is underlain by over 4 km of sedimentary rocks. Previous work suggests that a rock units known as the Eleanor Bay Formation, > 3 km deep, could potentially form a geothermal reservoir. Knowledge of the rock properties is limited, however, and there are only two old petroleum wells drilled on the island with subsurface data. To understand the reservoir rocks that currently lie >3 km depth below Resolute Bay, we can examine them where they are exposed, in a geological feature known as the Central Dome, in the centre of Cornwallis Island. Rocks of the Eleanor Bay Formation are well exposed along river channels in the Central Dome but remain poorly described. A second location is a site at Lyall River on Devon Island. To assess the total potential energy production from a rock unit, several physical properties are required to develop models for both heat conduction (heat transfer to the fluid) as well as hydrogeologic (water movement through the rock mass). Basic examination of the rock outcrops are required to understand lateral and vertical heterogeneities of these properties. Equally important is characterisation of rocks that form seals above the reservoir, which limit upward movement of reinjected fluids (i.e. leakage to surface). All of these properties are currently unknown for the units of interest. Study of the two research sites would allow characterisation of both the rock units that could form productive reservoirs of geothermal fluids in the subsurface, as well as cap rocks that would form seals. Where, when, and how long is the field research We wish to conduct focused field work by establishing small 6 person tent camps for the first 2 weeks in July, 2025, including a wildlife monitor hired from Resolute Bay. Small individual tents will be used, one per person, plus an additional cooking/eating tent. All materials and food will be brought in and removed at the end. No fuel caches are required. The field team will have appropriate safety training including wildlife awareness. All efforts will be made to minimize wildlife encounters. Methods Access to the field site will be by helicopter from Resolute Bay and then by foot while on site. Measurements will be made by handheld devices and small hand size rock samples will also be collected for detailed study in laboratories. These will be curated and stored at the Geological Survey of Canada in Calgary. No more than 100 kg of rocks in total will be collected. There will be no collection of fossils. Sharing of Results All results and data will be made publicly available through online publication of Geological Survey of Canada Open File reports. Results will also be used in scientific publications. After completion of study, the lead researcher will travel to Resolute Bay and Iqaluit to make in person presentations of results. The timing will be determined through consultation as to when is best (e.g. to link to any planned science events).

Déclaration : Titre du projet : Potentiel des ressources géothermiques de Resolute Bay
Demandeur : Stephen Grasby, chercheur scientifique, Commission géologique du Canada
Contexte, questions de recherche et objectifs Les ressources géothermiques pourraient apporter des avantages importants aux collectivités du Nord. Par exemple, certains ont estimé que le chauffage géothermique dans les serres de Resolute Bay peut produire des produits frais à un coût moyen inférieur de 50 % à celui de leur expédition à la communauté, ce qui favorise la sécurité alimentaire et la nutrition. En 2018, Qulliq Energy a mené une étude de pré faisabilité de l'énergie géothermique au Nunavut, dont les résultats ont mis en évidence la communauté de Resolute Bay, sur l'île Cornwallis, comme l'un des trois secteurs d'intérêt méritant une étude plus approfondie. À la suite de l'étude initiale, Qulliq Energy a commandé des levés géophysiques à l'Université de l'Alberta (magnétotellurique/gravité) autour de la ville de Resolute Bay en 2022-23 afin d'identifier des réservoirs souterrains potentiels. L'interprétation de ces résultats géophysiques nécessite des connaissances géoscientifiques sur les propriétés physiques/géochimiques des unités rocheuses dans le sous-sol. La communauté de Resolute

Operations Phase: from 2025-07-30 to 2025-08-15

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Central Dome, field camp location, and examination of rock outcrops within walking distance	Sampling sites	Crown	No known previous use, land in natural state	No known archeological locations	~52 km from Resolute Bay
Eleanor Lake field location, rock outcrops examined during day trips	Sampling sites	Inuit Owned Surface Lands	No known previous use, land in natural state	No known archeological locations	~77 km from Resolute Bay
Central Dome, field camp location, and examination of rock outcrops within walking distance	Camp	Crown	No known previous use, land in natural state	No known archeological locations	~52 km from Resolute Bay
Cape Manning field location, rock outcrops examined during day trips	Sampling sites	Crown	No known previous use, land in natural state	No known archeological locations	~81 km from Resolute Bay
Burrow Harbour camp site, at old twin strip on previously disturbed land	Camp	Crown	From satellite images the area was previously used as a camp site with two twin strips, modern tent rings, and potential debris left behind. Uncertain who's camp this was or when.	No known archeological locations	210 km from Resolute Bay
Lyall River field location, rock outcrops	Sampling sites	Crown	No known previous use, land in natural state	No known archeological locations	250 km from Resolute Bay

examined during day trips					
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ᓄᓇᓕᓯᓪᓗ ᓄᓇᓕᓯᓪᓗ	Melanie	Resolute Bay HTA	2024-07-26
ᓄᓇᓕᓯᓪᓗ ᓄᓇᓕᓯᓪᓗ	Melanie	Resolute Bay HTA	2024-08-19
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ᓄᓇᓕᓯᓪᓗ ᓄᓇᓕᓯᓪᓗ	Ian Dudla	Hamlet of Resolute Bay	2024-09-12
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ᓄᓇᓕᓯᓪᓗ ᓄᓇᓕᓯᓪᓗ	in person Community Meeting	Resolute Bay Community open house	2024-09-17

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Project transportation types

Project accomodation types

Temporary Camp

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Aircraft	1	A star	Helicopter from PCSP at Resolute Bay to access field sites
fixed wing	1	twin otter	Flight from Resolute Bay to Borrow Harbour

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Aviation fuel	fuel	10	55	550	Gallons	fuel for helicopter, fueled at Resolute Bay airstrip

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0	retrieval by hand with a bucket	nearby streams and/or snowpack

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Camp	ᐃᐅᐅᑦ ᐃᑦᐅᑦᐅᑦᐅᑦᐅᑦᐅᑦ	~5/L per day	strain out and food particles then pour greywater into a shallow pit dug 50 m from any water body	none
Camp	ᐅᐅᑦᐅᑦᐅᑦᐅᑦ	6 kg/ day	latrine pit hand dug. Backfilled after camp is closed.	none

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We have discussed with Resolute Bay HTA potential camp locations and no concerns were raised in terms of known migration paths or birthing grounds. We will hire a local wildlife monitor from Resolute Bay to mitigate and encounters with wildlife. This will start with seeking advise onsite where to best establish the camp, and extend to how to respond to any wildlife encounters. Our goal is to avoid any encounters or to minimize the risk. Should there be any sign of bear activity we would use detents such as noise makers and bear spray. Firearms would only be used as an absolute last resort to save human life. Travel to the camp site by aircraft will generate noise that could disturb wildlife, we will follow minimum flight altitude guideline to minimise any such risk. Generation of waste water and sewage could risk water quality. This will be mitigated by proper disposal in greywater and latrine pits dug > 50 m from any water body. Our rock sampling will disturb the bedrock geology. We will mitigate this by selecting small handsize samples, and from areas that are not obvious to the naked eye. We will not sample any unique features we may observe in the outcrop. Our standard goal is to minimize any disruption of the outcrop such that future researchers could reproduce our studies. Results of our work will go directly to assessment of renewable geothermal energy potential for Resolute Bay and to support local decision making on if this could be a viable solution for the community should they wish to explore it further, supporting community wellness and infrastructure.

Additional Information

SECTION A1: Project Info

SECTION A2: Allweather Road

SECTION A3: Winter Road

SECTION B1: Project Info

SECTION B2: Exploration Activity

SECTION B3: Geosciences

SECTION B4: Drilling

SECTION B5: Stripping

SECTION B6: Underground Activity

SECTION B7: Waste Rock

SECTION B8: Stockpiles

SECTION B9: Mine Development

SECTION B10: Geology

SECTION B11: Mine

SECTION B12: Mill

SECTION C1: Pits

SECTION D1: Facility

SECTION D2: Facility Construction

SECTION D3: Facility Operation

SECTION D4: Vessel Use

SECTION E1: Offshore Survey

SECTION E2: Nearshore Survey

SECTION E3: Vessel Use

SECTION F1: Site Cleanup

SECTION G1: Well Authorization

SECTION G2: Onland Exploration

SECTION G3: Offshore Exploration

SECTION G4: Rig

SECTION H1: Vessel Use

SECTION H2: Disposal At Sea

SECTION I1: Municipal Development

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tundra environment, mostly rocky areas with little vegetation, rolling hills.

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Very little vegetation and not known as areas for any significant wildlife.

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No human infrastructure in the area although there appears to be an old camp from satellite images at Burrow Harbour (square tent rings, two twin otter strips, etc.)

Miscellaneous Project Information

none

[illegible]

Impacts will be minor and limited to footsteps left behind. We will remove all camp equipment brought to the site and any garbage produced. We will strive to leave no obvious signs of our presence.

Cumulative Effects

none

Impacts

[illegible][illegible][illegible]
