



## **Demande de la CNER faisant l'objet d'un examen préalable #125539**

### **Access to safe drinking water in a changing Arctic**

**Type de demande :** New

**Type de projet:** Scientific Research

**Date de la demande :** 6/8/2020 11:08:45 AM

**Period of operation:** from 0001-01-01 to 0001-01-01

**Autorisations proposées:** from 0001-01-01 to 0001-01-01

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# DÉTAILS

## Description non technique de la proposition de projet

Anglais: Global warming is causing large-scale transformations in the Arctic, including rapid reduction in the extent of permafrost, which can threaten drinking water supplies. Increasing transfers of dissolved organic matter (DOM) from permafrost to surface waters results in the 'browning' of water, which can indirectly contribute to the prevalence of cyanobacteria, changes in the nutritional quality of aquatic food resources, and toxin production. Furthermore, contaminants and pathogens trapped in thawing soils are now released to water sources. To insure drinking water safety, chlorine is typically used to inactivate pathogens. However, the practice of chlorinating water has both biomedical and belief-based problems; it can generate unwanted disinfection by-products (DBPs) when DOM is elevated in water, and northern communities have differing understandings of how to ensure purity of water. This transdisciplinary project aims to investigate and measure emerging risks from compounds and microorganisms released from permafrost thawing using a community-based participatory water quality sampling program. This transdisciplinary project led by Jérôme Comte, professor at INRS (Quebec City) brings together experts from different disciplines to work together with the communities. This project also represents a unique capacity-building opportunity allowing the implementation of a water quality monitoring program that will be executed by Northerners and serve as a direct conduit for knowledge dissemination. Specifically, the project aims (1) engage and work with local communities to undertake a drinking water quality monitoring program; (2) characterize the link between DOM properties and DBP formation and the microbial communities in sources of drinking water for indigenous communities, and (3) investigate the fate of microbial communities and chemical contaminants across water purification procedures, delivery and storage. Aquatic ecosystems used by the communities of Pond Inlet, Cambridge Bay and Resolute Bay as drinking water supplies will be sampled during summers between 2020-2023. Communities will be invited to participate in sampling (especially in 2020 given the Covid-19 situation) and to inform where we survey and blend both ecological and traditional knowledge on water and climate change. Their contribution will allow assessing water quality seasonally. Site visits will include measuring basic limnological properties (e.g. temperature, oxygen, pH) of drinking water sources, along with sampling for the measurement of DOM properties, microbial communities and chemical properties (DBPs, cyanotoxins, chlorine demand, contaminants). Water samples will also be collected at other natural sources of high traditional values, as well as at water treatment facilities (after chlorination), in holding tanks and at the tap. This project addresses one of the most important issues for northern communities: access to safe drinking water. This research will help characterize the environmental conditions that may lead to water quality issues, to better predict future changes in drinking water quality in a warming climate. Previous studies have mainly investigated fecal pollution of water by humans or animals in drinking water sources or in household cisterns. This project expands the scope of water quality to also consider Indigenous sciences, knowledge, lived experience, practices and policy preferences. This project will ensure Indigenous access, ownership, and control over data and information that will strengthen their autonomy in the monitoring of water quality. We foresee that the water quality metrics generated through this project will serve to develop new guidelines for water treatment strategies, implement northern community science initiatives, and inform on the accessibility to potable drinking water in the North.

Français: Le réchauffement climatique entraîne des transformations à grande échelle dans l'Arctique, notamment une réduction rapide de l'étendue du pergélisol, ce qui peut menacer l'approvisionnement en eau potable. L'augmentation des transferts de matière organique dissoute (MOD) du pergélisol vers les eaux de surface entraîne le brunissement de l'eau, ce qui peut contribuer indirectement à la prévalence des cyanobactéries, aux changements dans la qualité nutritionnelle des ressources alimentaires aquatiques et à la production de toxines. En outre, les contaminants et les agents pathogènes piégés dans le pergélisol en transition sont désormais libérés dans les sources d'eau. Pour assurer la sécurité de l'eau potable, le chlore est généralement utilisé pour inactiver les agents pathogènes. Cependant, la pratique de la chloration de l'eau peut poser des problèmes à la fois de santé et de culture ; elle peut générer des sous-produits de désinfection (SPD) indésirables lorsque la teneur en MOD est élevée dans l'eau, et les communautés du Nord ont des conceptions différentes de la manière de garantir la pureté de l'eau. Ce projet transdisciplinaire vise à étudier et à mesurer les risques émergents liés aux composés et aux microorganismes libérés par le dégel du pergélisol, en utilisant un programme d'échantillonnage participatif des communautés nordiques de la qualité de l'eau. Ce projet transdisciplinaire dirigé par Jérôme Comte, professeur à l'INRS (Québec), réunit des experts de différentes disciplines pour travailler avec les communautés. Ce projet représente également une opportunité unique de renforcement des capacités permettant la mise en place d'un programme de surveillance de la qualité de l'eau qui sera exécuté par les habitants du Nord et servira de canal direct pour la diffusion des connaissances. Plus précisément, le projet vise à (1) engager et travailler avec les communautés locales pour entreprendre un programme de surveillance de la qualité de l'eau potable ; (2) caractériser le lien entre les propriétés du DOM et la formation de DBP et les communautés microbiennes dans les sources d'eau potable pour les communautés, et (3) étudier le devenir des communautés microbiennes et des contaminants chimiques à travers les procédures de purification de l'eau, la livraison et le stockage. Les écosystèmes aquatiques

Inuktitut:

[illegible]

Inuinnagtun: Hilakyoap onnakpalianingga kinggoknakhitivaliaginnaktuk honavaloit alanggokpalianinggitigot Okioktaktomi, hapkonongga nunap eloani kiki aoktoyoituk aoktokpaliaginnalikmat, hivogaanakhitinialiktuk imaknut imikpaktaptiknik. Imaa aoktokpalianingganit hakvalikpaliagomik imaknut kayangnakhitinialiktot (DOM-gonigaktaoyonik) imatlo kingnagikhivalialojitigilogo, naonaituk taimaahilikkat immat koyaginnak kopilgokalikniaktut annialakinnaktonik imaknik imigiami hapingnakhitinialiktuk nikivaloknollo atalikniakhoni, ovalo tokonavaloknollo amigaigotaovalianiakhoni pitjotaoniaktuk. Talvalo, honavaloknot nunami halomaigotaovalianiakhoni, nunap iloa aoktokpalianginnalikat ehomaloknakhitiliktok kanogilivalianighap mighaanot. Kihimitaok hapkoa kolpilgoiyaotitn atoktaovaktot elanggagot naamakpaalaayoinmiyut. Kihimi atokhimmaakpakkoptigik nakoonighaoniaktuk imaotiptiknot, okioktaktomi nunaliit hapkoningga ilittogimatiagiakakmata imaotitik halomavagiaginni annialakinnaitomik enoogiknaktomiklo enoohikatiagiaginni immat halomatiakpakpata. Imam alatkiniik honavalokakmata taimaitomik nahogiyaotiakpaklakivut immat imikpaktavot nunaptikni, ilaaniilo ilihimanggitaptiknik kaoyimanggitaptiknik honavalokalikpakmata ehoonokmot nakoovalaanggitonik taimaitomik elitoghaktaogaaginaklakivakput imam imikpaktavot imikavot halomatiakpagiaginni enoohiginnaktomik. Hapkoa naonaiyaktaovaktut oma hivokhikhokhogit Jérôme Comte, ayoighajiyi INRS (Quebec City-mi) pikatikakhoni ayoghanggitonik havakatigiyaminik naonaiyaktit elittoghaiyiolotiklo imalikinikmik okioktaktot pitjotigiplogo. Havaagiyait piksani naonaiyatiakhimavot takyaghat homilikaa imaknik naotiktoivaktot immat imagikpaohiitigot elittogimanahoakhogit. Imakakvikniklo takoogilikpakhotik havaagivagiat hapkoa imangnik takoogivaktot anniagotikagiakhainik immat tamaat halomatkoplogit havaagigamiko. Imangmiotavaloknik takooghiimayut imangnik atoktaoyonik Mittimatalikmi ekaluktutiamilo Kaohoitomilo immat imigaovaktut tahapkonani nunalingni holi naonaiyakhimmakniaktait takookhimmaaklogit okioni 2020-minggaat 2023-mot pilotik. Nunalitt hapkoa kaitkoyaoniaktut takopkaktitaoyaaginni immanik naonaiyaktaohimayonik (immakaa aoyagiak 2020-mi ehoilijotaohimalikmat anniagotikyoak Covid-19-gonigaktaoyok) ovalo tohaktitaoyaaginni imaktigot imikpagainnik kanoginmagaagitigot kanoklo alanggokhimalingmagaagita hilap okkoohivalianingga kinggoknakhitikmat tamainnot honavaloknot. Kanoklo nunaliit ehomagiyait naonaiyaotaoyotigot elittoghaotaoyotigollo ovaptiknot ekayoghiotiniakmata havaagiyaghaptiknio. Imakaknikqit takooktaoniaktot imaa naonaiyatiaklogit

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ehomaalongnaitomik imakagiaginni imiktakhamingnik oblotoagaikpat. Hivonighaptikni  
taotokniaktogot tamaat halomayonik imaotikaligiaginni nunalaat maligaghakalikniakhonilo  
imaliginikot halomanighaitigollo immat tamainik okioktakomi nunalingnut pihimayaagani.

**Personnel**

Personnel on site: 3

Days on site: 14

Total Person days: 42

Operations Phase: from 2020-09-01 to 2023-03-31

## Activités

Emplacement	Type d'activité	Statut des terres	Historique du site	Site à valeur archéologique ou paléontologique	Proximité des collectivités les plus proches et de toute zone protégée
Pond Inlet	Scientific/International Polar Year Research	Inuit Owned Surface Lands	NA	NA	The research will take place in the community of Pond Inlet as well as nearby waterbodies that are used by the community as drinking water source.
Resolute Bay	Scientific/International Polar Year Research	Inuit Owned Surface Lands	NA	NA	The research will take place in the community of Resolute Bay as well as nearby waterbodies that are used by the community as drinking water source.
Cambridge Bay	Scientific/International Polar Year Research	Inuit Owned Surface Lands	NA	NA	The research will take place in the community of Cambridge Bay as well as nearby waterbodies that are used by the community as drinking water source.

### Engagement de la collectivité et avantages pour la région

Collectivité	Nom	Organisme	Date de la prise de contact
Pond Inlet	David Stockley	SAO	2019-06-06
Resolute Bay	Nancy Amarualik	SAO	2019-08-09
Cambridge Bay	Beverly Maksagak	HTO	2020-06-12

## Autorisations

Indiquez les zones dans lesquelles le projet est situé:

Kitikmeot  
North Baffin

### Autorisations

Organisme de régulation	Description des autorisations	État actuel	Date de l'émission/de la demande	Date d'échéance
Institut de recherche du Nunavut	An Authorization application has been submitted on 25 May 2020.	Applied, Decision Pending		
Office des eaux du Nunavut	Application for approval for the use of water or deposit of waste without a licence has been submitted on 12 June 2020	Applied, Decision Pending		

### Project transportation types

Transportation Type	Utilisation proposée	Length of Use
Land	Waterbodies on land and the water treatment plant will be accessed by all-terrain vehicles or truck. These vehicles will be accessed through local hiring. A person will be hired to assist the team during sampling and the project will cover for gas. Alternatively, logistical support will be asked to PCSP and CHARS (Cambridge Bay). Sampling public tap water and houses will be done by foot.	

### Project accomodation types

Collectivité

## Utilisation de matériel

Équipement à utiliser (y compris les perceuses, les pompes, les aéronefs, les véhicules, etc.)

Type d'équipement	Quantité	Taille – Dimensions	Utilisation proposée
All terrain vehicle or truck	1	unknown	vehicles will be used to access sampling sites

Décrivez l'utilisation du carburant et des marchandises dangereuses

Décrivez l'utilisation de carburant :	Type de carburant	Nombre de conteneurs	Capacité du conteneur	Quantité totale	Unités	Utilisation proposée
Gasoline	fuel	5	20	100	Liters	Fuel for vehicles

Consommation d'eau

Quantité quotidienne (m3)	Méthodes de récupération de l'eau proposées	Emplacement de récupération de l'eau proposé
0	Fill containers from municipal facilities and natural aquatic ecosystems	drinking water sources, delivery truck and taps (public, houses)



# Déchets

## Gestion des déchets

Activités du projet	Type des déchets	Quantité prévue	Méthode d'élimination	Procédures de traitement supplémentaires
Scientific/International Polar Year Research	Déchets combustibles	less than 5 kg	waste will be brought back to Quebec	no additional treatment procedures

## Répercussions environnementales :

The proposed research will not impact the integrity of natural ecosystems (lakes, rivers) or infrastructure. Visits to alternate traditional drinking water sources on land will be limited in order to minimize disturbances to wildlife. No instrument or waste will be left behind after site visits.

# **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**

### **Description de l'environnement existant : Environnement physique**

The study will be mainly conducted within the hamlet of Pond Inlet, Cambridge Bay and Resolute Bay, and will focus on the quality of water from the drinking water source through out the water treatment process at the treatment plant to the delivery by truck and to the tap. Traditional drinking water sources (lakes, streams) used by the communities will also be investigated.

### **Description de l'environnement existant : Environnement biologique**

Water quality is regularly check at the water treatment plant for E. coli presence, amount of chlorine used.

### **Description de l'environnement existant : Environnement socio-économique**

The research will be conducted in the hamlets, representing opportunities for local hiring in order to implement, conduct and inform on the research.

### **Miscellaneous Project Information**

This project aims to implement a community-based water quality program.

### **Identification des répercussions et mesures d'atténuation proposées**

The research will have not direct impact on the environment. Visits to traditional drinking water sources on land will be limited to minimize disturbance to wildlife.

### **Répercussions cumulatives**

No cumulative impact is related to the proposed research.

# Impacts

## Identification des répercussions environnementales

	PHYSICAL	Designated environmental areas	Ground stability	Permafrost	Hydrology / Limnology	Water quality	Climate conditions	Eskers and other unique or fragile landscapes	Surface and bedrock geology	Sediment and soil quality	Tidal processes and bathymetry	Air quality	Noise levels	BIOLOGICAL	Vegetation	Wildlife, including habitat and migration patterns	Birds, including habitat and migration patterns	Aquatic species, incl. habitat and migration/spawning	Wildlife protected areas	SOCIO - ECONOMIC	Archaeological and cultural historic sites	Employment	Community wellness	Community infrastructure	Human health
Construction																									
-		-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
Exploitation																									
Scientific/International Polar Year Research		-	-	-	-	-	P	-	-	-	-	-	-	-		-	P	-	P	-	-	P	P	-	P
Désaffectation																									
-		-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-

(P = Positive, N = Négative et non gérable, M = Négative et gérable, U = Inconnue)

## Site du projet



## Liste des géométries de projet

1	point	Pond Inlet
2	point	Resolute Bay
3	point	Cambridge Bay