Demande de la CNER faisant l’objet d’un examen préalable #126161

Mars Exploration through Analog-site Drilling (MEAD)

Type de demande : New

Type de projet: Scientific Research

Date de la demande : Thursday, March 20, 2025

Period of operation: from 2025-07-27 to 2025-08-06

Promoteur du projet:
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DÉTAILS

Description non technique de la proposition de projet

Anglais: We propose to use a low-power, shallow (<1m depth) drill to excite the local surface, the vibrations then are sensed with geophones to create a shallow seismic map. This enables future Mars and lunar missions to generate target maps before drilling and sampling. MEAD drilling will also bring up small ~50gm samples that will be fed to two prototype Mars life-detection instruments and contribute to a study of microbial population changes in a polar desert (Haughton impact crater) in summer, above and below the frozen boundary (active layer, about 0.6m deep). MEAD results will improve our knowledge of where to look for possible Mars life, how to target it for sampling, and the efficacy of two potential life-detection instruments.

Français: Nous proposons d'utiliser une foreuse de faible puissance et peu profonde (< 1 m de profondeur) pour exciter la surface locale. Les vibrations sont ensuite captées par des géophones afin de créer une carte sismique peu profonde. Cela permettra aux futures missions martiennes et lunaires de générer des cartes de cibles avant le forage et l'échantillonnage. Le forage MEAD permettra également de prélever de petits échantillons d'environ 50 g qui alimenteront deux prototypes d'instruments de détection de vie sur Mars et contribueront à l'étude de l'évolution des populations microbiennes dans un désert polaire (cratère d'impact Haughton) en été, au-dessus et en dessous de la limite gelée (couche active, environ 0,6 m de profondeur). Les résultats de MEAD amélioreront nos connaissances sur les endroits où rechercher une éventuelle vie sur Mars, comment la cibler pour l'échantillonnage et l'efficacité de deux instruments potentiels de détection de vie.

Inuktitut: ᐊᑐᕈᒪᕗᒍᑦ ᐆᒪᖅᑯᑎᑭᑦᑐᒥᒃ, ᐃᑎᔪᒥᒃ (<1m ᐃᑎᓂᖃᖅᑐᒥᒃ) ᐃᑰᑕᕐᒥᒃ ᖁᕕᐊᓇᖅᓯᑎᑦᑎᓇᓱᐊᖅᑐᑕ ᓄᓇᐅᑉ ᖄᖓᓂᒃ, ᖁᐊᖅᕵᕐᓇᕐᓂᖏᑦ ᖃᐅᔨᔭᐅᕚᑉᐳᑦ ᓄᓇᐅᑉ ᓂᐱᓕᐅᕈᑎᖏᓐᓄᑦ ᓴᖅᑭᑎᖁᓪᓗᒋᑦ ᐃᑎᔪᒥᒃ ᓄᓇᐅᑉ ᖄᖓᓂᒃ ᓄᓇᙳᐊᒥᒃ. ᑕᒪᓐᓇ ᐱᔪᓐᓇᖅᑎᑦᑎᕗᖅ ᓯᕗᓂᒃᓴᒥ ᓯᓚᕐᔪᐊᑉ ᖄᖓᓄᑦ ᐊᒻᒪ ᑕᖅᑭᕐᒧᑦ ᑎᑭᑕᐅᓂᐊᖅᑐᓄᑦ ᓴᖅᑭᑎᔪᓐᓇᖁᓪᓗᒋᑦ ᑐᕌᖓᕆᔭᐅᔪᓂᒃ ᓄᓇᙳᐊᓂᒃ ᐃᑰᑕᓚᐅᙱᓐᓂᖏᓐᓂ ᐊᒻᒪ ᐆᒃᑐᕋᐃᓚᐅᙱᓐᓂᖏᓐᓂ. MEAD-ᑯᑦ ᐃᑰᑕᕐᓂᖏᑦ ᓴᖅᑭᑎᓂᐊᕐᒥᔪᑦ ᒥᑭᔪᓂᒃ ~50gm-ᓂᒃ ᖃᐅᔨᓴᕈᑎᓂᒃ ᑐᓂᔭᐅᓂᐊᖅᑐᓂᒃ ᒪᕐᕉᖕᓄᑦ ᐆᒃᑑᑎᓄᑦ ᓯᓚᕐᔪᐊᑉ ᖄᖓᓂ ᐃᓅᓯᕐᒥᒃ ᖃᐅᔨᓴᕈᑎᓄᑦ ᐊᒻᒪᓗ ᐃᑲᔪᕐᓂᖃᕐᓂᐊᖅᑐᑦ ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᒥᑭᑦᑑᑎᓂᒃ ᐆᒪᔪᓂᒃ ᐊᓯᔾᔨᖅᐸᓪᓕᐊᓂᖏᓐᓂᒃ ᓯᓚᕐᔪᐊᑉ ᖄᖓᓂ ᓯᑯᖃᙳᖏᑦᑐᒥ (Haughton impact crater) ᐊᐅᔭᒃᑯᑦ, ᖁᓛᓂ ᐊᒻᒪᓗ ᐊᑖᓂ ᖁᐊᖑᔪᖅ ᑭᒡᓕᖓᑕ (ᐊᒃᑐᐃᓂᖃᖅᑐᖅ 0.6m). MEAD-ᑯᑦ ᖃᐅᔨᔭᐅᔪᑦ ᐱᐅᓯᕚᓪᓕᖅᑎᑦᑎᓂᐊᖅᑐᑦ ᖃᐅᔨᒪᓂᑦᑎᓐᓂᒃ ᓇᑭᑦ ᕿᓂᕈᓐᓇᕐᒪᖔᑦᑕ ᓯᓚᕐᔪᐊᑉ ᖄᖓᓂ ᐆᒪᔪᓂᒃ, ᖃᓄᖅ ᑐᕌᖃᕈᓐᓇᕐᒪᖔᑦᑕ ᖃᐅᔨᓴᕈᑎᒃᓴᓂᒃ, ᐊᒻᒪᓗ ᐊᑑᑎᖃᕐᓂᖏᓐᓂᒃ ᒪᕐᕉᒃ ᐆᒪᔪᓂᒃ ᖃᐅᔨᓴᕈᑎᐅᔪᓐᓇᖅᑑᒃ.

Personnel

Personnel on site: 7

Days on site: 10

Total Person days: 70

Operations Phase: from 2025-07-27 to 2025-08-06

Closure Phase: from 2025-08-06 to 2025-08-10

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
Base Camp Location	Camp	Inuit Owned Surface Lands	Site previously used by Western University and others	N/A	N/A
Existing Airstrip Location	Airstrip use or construction	Inuit Owned Surface Lands	Previously used strip by Twin Otters near camp	N/A	N/A
Proposed Study Range	Sampling sites	Inuit Owned Surface Lands	Impact melt breccia deposits inside the crater	N/A	N/A

Engagement de la collectivité et avantages pour la région

Collectivité	Nom	Organisme	Date de la prise de contact
Information is not available			

Autorisations

Indiquez les zones dans lesquelles le projet est situé:

Autorisations

Organisme de régulation	Description des autorisations	État actuel	Date de l'émission/de la demande	Date d'échéance
Gouvernement du Nunavut, Institut de recherche du Nunavut	Research Permit	Applied, Decision Pending		
Office des eaux du Nunavut	Application for Approval without Licence	Applied, Decision Pending		
Qikiqtani Inuit Association	Land Use #320546	Applied, Decision Pending		

Project transportation types

Transportation Type	Utilisation proposée	Length of Use
Air	DHC-6 Twin Otter from Resolute	
Land	4 ATVs on Devon	

Project accomodation types

Temporary Camp

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
Kawasaki Bayou ATVs	4	1m x1m	Visit sites of scientific interest in the study area; logistics to/from airstrip.
Kawasaki Bayou ATVs	4	1m x1m	Visit sites of scientific interest in the study area; logistics to/from airstrip.
Shallow 1m TRIDENT drill	1	1.5m x 0.4m	Mars prototype drill (Honeybee Robotics), max 1m depth, 3cm diameter, for sampling and local seismic vibration.
2kW generator	1	1.5m x 0.4m	(a) Base camp instruments and communications (b) field site of interest (drill, instruments); located in spill kit catchments.
2kW generator	2	0.3m x 0.5m	(a) Base camp instruments and communications (b) field site of interest (drill, instruments); located in spill kit catchments.

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	2	205	410	Liters	ATVs, 2kW generators
Propane	fuel	2	20	40	Liters	Cooking
Other	fuel	1	1	1	Liters	motor oil for ATVs

Consommation d'eau

Quantité quotidienne (m3)	Méthodes de récupération de l'eau proposées	Emplacement de récupération de l'eau proposé
0	Water pulled by bucket and used for cooking, drinking and camping.	Haughton River bank

Déchets

Gestion des déchets

Activités du projet	Type des déchets	Quantité prévue	Méthode d'élimination	Procédures de traitement supplémentaires
Waste disposal	Eaux grises	300L total	disposed in a sump dug out far from the river	filled in upon departure
Waste disposal	Déchets non combustibles	3-4 large 100L trash bags	Backhaul to Resolute	coordinate disposal with Polar Shelf
Drilling	Mort-terrain (sol organique, déchets, résidus)	100-200 gm per 1m sample hole	backfilled into hole after sampling	N/A
Waste disposal	Eaux usées (matières de vidange)	50L total	disposed in a sump dug out far from the river	filled in upon departure

Répercussions environnementales :

2cm x 1m depth boreholes at sampling sites: will be filled in ATV tracks: will stay on existing trails Wastes: gray/blackwater in sump away from river, will be filled in Trash: backhauled to Polar Shelf

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

22 million year old meteor impact crater with well-preserved gray impact rocks and no overburden.

Description de l'environnement existant : Environnement biologique

Polar desert with almost no plant life and very rare inland sightings of seagulls or foxes. Bears occasionally traverse Devon Island and their tracks or scat are sometimes found (away from camp).

Description de l'environnement existant : Environnement socio-économique

Haughton Crater has no settlements or lodges. 7km northwest of the proposed campsite is both the Mars Society habitat camp and Pascal Lee's HMP camp area, but neither is expected to be in use this year.

Miscellaneous Project Information

Re-use of campsite previously used by Western University and others

Identification des répercussions et mesures d'atténuation proposées

This project is primarily observational except for small drilled soil samples (< 200g each, no deeper than 1m, using a low-power electric drill with no lubricants or fluids). Traverses to study sites may leave minor ATV tracks.

Répercussions cumulatives

Reinforcement of existing ATV trails

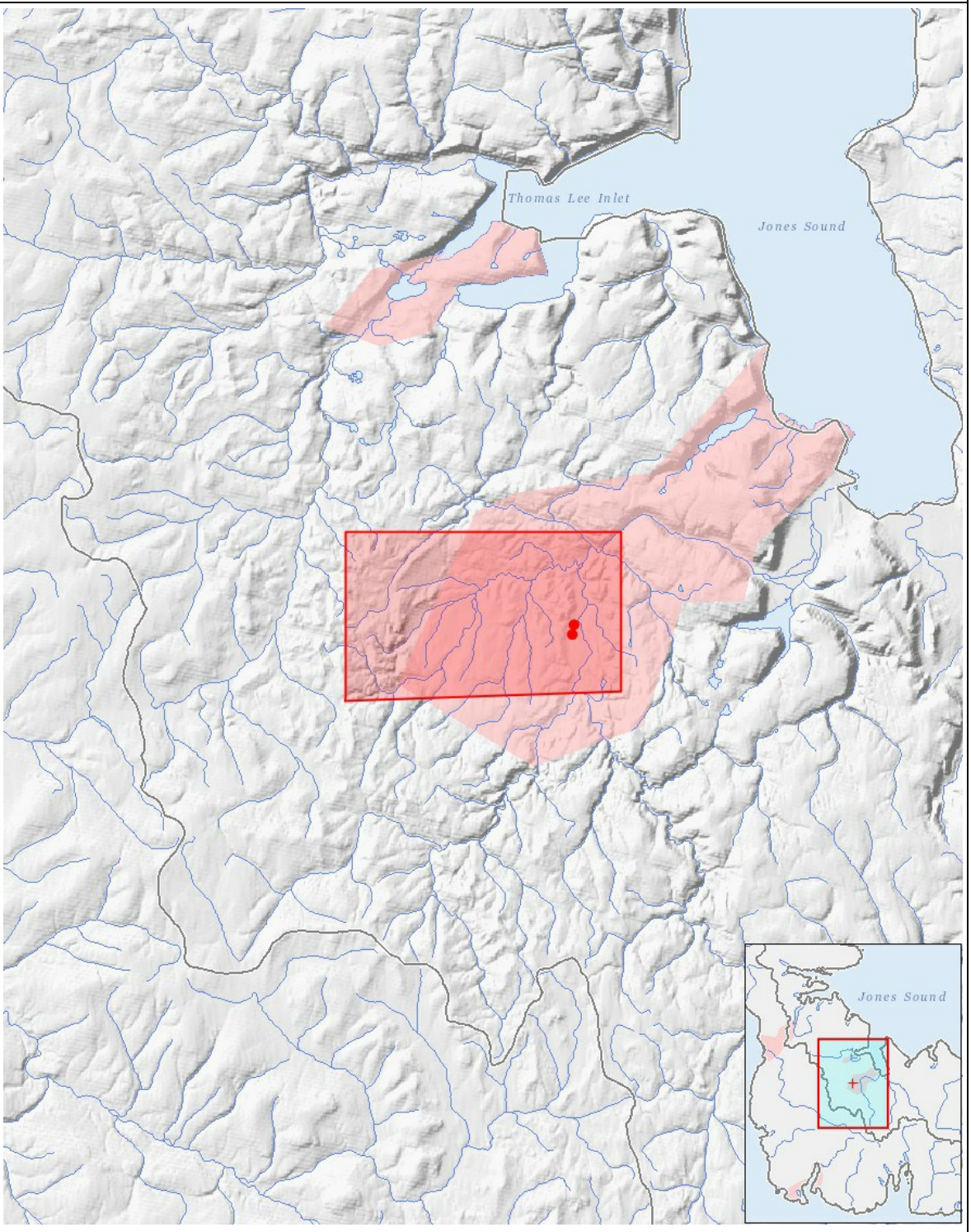
Impacts

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																									
Airstrip use or construction		-	-	-	-	-	-	-	-	-	-	-	N		-	-	-	-	-		-	-	-	-	-
Camp		-	-	-	-	-	-	-	-	N	-	-	-		-	-	-	-	-		-	-	-	-	-
Sampling sites		-	-	M	-	-	-	-	-	M	-	-	-		-	-	-	-	-		-	-	-	-	-
Désaffectation																									
Airstrip use or construction		-	-	-	-	-	-	-	-	-	-	-	N		-	-	-	-	-		-	-	-	-	-

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

Site du projet



Liste des géométries de projet

1	polygon	Proposed Study Range
2	point	Base Camp Location
3	point	Existing Airstrip Location