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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYIT
OFFICE DES EAUX DU NUNAVUT

APPLICATION FOR APPROVAL FOR THE USE OF WATER OR DEPOSIT OF WASTE WITHOUT A LICENCE

Refer to the *Guide to the Approval for the Use of Water or Deposit of Waste Without a License* (Guide) in completing this Application.

APPLICATION NO:
(for NWB use only)

1. APPLICANT CONTACT INFORMATION (name, address)

Martin Sharp
1-26 Earth Science Building
University of Alberta
Edmonton, AB, T6G 2E3

Phone: _(780) 492-8546_____
Fax: _(780) 492-2030_____
e-mail: msharp@ualberta.ca

2. APPLICANT REPRESENTATIVE CONTACT INFORMATION if different from Block 1 (name, address)

Phone: _____
Fax: _____
e-mail: _____
(Attach authorization letter)

3. NAME OF THE OWNER OF THE LAND THAT WILL BE USED IN RELATION TO THE WATER TO BE USED OR THE WASTE TO BE DEPOSITED

Crown

4. NAME OF PROJECT (consistent with the name of the project issued by other regulatory agencies)

Dynamics and Change of the Devon Ice Cap, Nunavut
Previous NWB license: 3BC-BGI0813
Previous Annual Approval: 8WLC-BGI1516

5. LOCATION OF UNDERTAKING

Project Extents (decimal degree format)

NW	N75.744892	W83.237447
NE	N75.457849	W79.662064
SE	N74.669475	W80.369964
SW	N74.859053	W85.726908

Camp Location(s) (decimal degree format)

Summit Camp (main camp)	N75.20393	W82.40579
Belcher Glacier	N75.31827	W81.28288
Sverdrup Glacier	N75.722528	W83.196639
Western Lobe	N75.490029	W84.598167

Name of the Water Management Area in which the Undertaking is located. (Please see Appendix D of the Guide):
57: Eastern Devon Island Watershed; 56: Western Devon Island Watershed

6. CLASSIFICATION OF UNDERTAKING - Indicate the classification of undertaking by checking one of the following boxes.

☐ Industrial
☐ Mining
☐ Conservation
☐ Municipal
☐ Agricultural
☐ Recreational
☐ Power
☒ Other: (describe)

Scientific Research project. Small field research camp with domestic water use and disposal of domestic waste water.

See Appendix C of the Guide for descriptions of classifications of undertakings.

7. DESCRIPTION OF UNDERTAKING AND EQUIPMENT USED – Provide a brief description of the undertaking including a description of any equipment that will be used in using water or depositing waste.

The research program 'Dynamics and change of the Devon Ice Cap, Nunavut' aims to measure changes in how much ice is stored in Canada's Arctic ice caps, and to determine what is causing the observed changes and how they affect global sea level.

Our research relies on measurements collected remotely from satellites and aircraft as well as measurements collected in the field on the Devon Ice Cap. Field work related to this project was initiated in 2004. We anticipate work to continue until 2017. While working on the Devon Ice Cap every effort is made to minimize our impacts on the ice and watershed. Annual reporting of activities including water usage is provided to the NRI and NWB. Our camps are minimal with no permanent buildings or structures (temporary tents only) and every effort is made to keep the camp clean. Scientific equipment is stored in a separate tent to ensure no equipment is lost or buried during snow and wind storms. Greywater is disposed of in glacier crevasses where possible. If this is not possible, a single greywater disposal site is identified (as well as a separate area for toilet waste) so that dirty snow can be backhauled at the end of the field season. Melted snow used for drinking is collected from a location separate from the disposal sites.

Fuel
Fuel required to operate on the Devon Ice Cap includes:
Diesel: furnace fuel at the summit camp (1-2 drums on site);
Gasoline: used for snow machines, generators and ice coring drills. Stored in 45-gallon drums or 5-gallon portable containers. (5 drums on site);
Jet-B/JP-4: used for refuelling helicopters. Stored in 45-gallon drums. (7 drums on site)
Propane: cooking fuel. Stored and transported in 25lb tanks. Typically require 4 tanks per field season.
Skidoo oil: 1L bottles. (typically not stored on site when camp not active)

Empty steel fuel drums remain at the Summit camp and are removed whenever space in aircraft allows. Bottles are stored in rubber bins at main camp until used and removed when empty.

A spill contingency plan was prepared in December 2010 in accordance with the Consolidation of Spill Contingency Planning and Reporting Regulations R-068-93, as set by the Nunavut Water Board, with regard to our license 3BC-BGI0813. The spill contingency plan is reviewed before and after each field campaign and changes are made if necessary. As a precautionary measure, spill kits are carried with our field team.

Equipment
Transportation:
DHC-6 Twin Otter on wheel skis for transport to and from Summit camp (from Resolute Bay).
Snowmobiles (Tundra, 4) for transportation between camps and worksites and to collect measurements.
Helicopter [Bell 206L with skid gear] used for transport to work sites not accessible by snowmobile, namely the rock outcrops overlooking the Belcher Glacier, SE6 Glacier, Western Margin and South Croker Glacier where GPS stations are installed.
Other equipment:
Portable generator (Honda 1000W) used as an auxiliary power source. Small Echo ED-2000 gas drill powerhead used to drill 2" or 4" boreholes to install stakes or retrieve ice cores. Temporary installations (science equipment): temperature and precipitation sensors (combination of solar and battery power), global positioning systems (combination or solar and battery power). For equipment requiring batteries for power, any batteries that are no longer functioning are removed and backhauled separately from the regular solid waste to PCSP in Resolute Bay for disposal.

Current field research on the Devon Ice Cap:
Our current research involves using 5 continuously recording GPS stations mounted on tripods fixed to bedrock adjacent to the Devon Ice Cap to measure the uplift and subsidence of the bedrock in response to changes in the mass of ice stored in the ice cap. We expect to see a seasonal cycle with bedrock subsidence in winter when snowfall adds mass to the ice cap, and uplift in summer when surface melting and iceberg calving remove more mass than is replaced by snowfall. This cycle will be superimposed on any longer term trend related to increase in ice cap mass (which will cause subsidence) or decrease in ice cap mass (which will cause uplift). The purpose of having multiple GPS units is to determine whether patterns of mass change (and hence uplift/subsidence) over time differ between drainage basins containing fast and slow flowing glaciers. The GPS units are powered by sealed batteries charged by both solar panels and a small wind turbine. These sites will all be accessed using a helicopter working from a base camp on the ice cap summit, where all refuelling will take place. Plastic receptacles are placed on the snow surface in the refuelling area to collect any excess fuel (drips). The summit camp is accessed by Twin Otter aircraft from Resolute Bay.

Study of basal ice: Collect samples of basal ice at the edge of the ice cap. To minimize our impacts on the watershed, the number and size of samples collected is kept to a minimum and no chemicals are used to analyze any samples while on the Devon Ice Cap. This work is conducted from temporary camps of 2 team members at Sverdrup and Western Lobe. Camp procedures are the same as those outlined for the Summit Camp.

8. **SCHEDULE** – Applicants are advised that approvals without a license are issued for a one year term.

Proposed Start Date: __04/2016____ (Month/Year) Proposed Completion Date: _____03/2017_____ (Month/Year)

9. **TYPE OF USE OF WATER WITHOUT A LICENCE PROPOSED -** Check the box that applies to the type of water use proposed. If none of the water uses listed below applies to the proposed water use, an application for a water licence will be required. See the NWB's *Guide 4 – Completing and Submitting a Water Licence Application for a New Licence*.

☐ For an undertaking other than a Power undertaking and for a use of water related to the construction of a structure across a watercourse that is less than 5 metres wide at the ordinary high water mark at the point of construction.

☐ For an undertaking other than a Power undertaking and for a use of water related to the training of an intermittent watercourse.

☐ For an undertaking other than a Power undertaking and for a use of water related to the training of a watercourse that involves the infilling of the watercourse, if the watercourse has no inflow or outflow and a surface area of less than 0.5 hectares.

☐ For an undertaking other than a Power undertaking and for a use of water related to the training of a watercourse that involves removal or placement of less than 100 m^3 of material.

☐ For an undertaking other than a Power undertaking and for a use of water related to the construction of a temporary structure in a watercourse for the purpose of flood control.

☐ For an undertaking other than a Power undertaking and for any use of water related to the storage of 2,500 m3 or less.

☒ For an undertaking other than a Power undertaking and for any use of water less than 50 m^3 per day.

10. QUANTITY AND QUALITY OF WATER INVOLVED - For each type of water use indicated in Block 9, provide the source of water, the estimated quantity to be used in cubic metres per day, and the periods during which water will be extracted.

Type of Water Use indicated in Block 9	Name of water source	Estimated quantity of water to be used in cubic metres per day	Periods during which water will be extracted
Water for domestic use (drinking, cooking, personal hygiene)	Melted snow from Devon Ice Cap	0.05 cu. m/day	Spring (April-May)

11. TYPE OF DEPOSIT OF WASTE PROPOSED - Check the box that applies to the type of deposit of waste proposed. If none of the deposits of waste listed below apply to the proposed deposit of waste, an application for a water licence will be required. See the NWB's *Guide 4 – Completing and Submitting a Water Licence Application for a New Licence*.

☐ For an Industrial undertaking, for an activity related to hydrostatic testing or cleaning of storage tanks and pipelines, and for any deposit of waste resulting from hydrostatic testing or cleaning of unused storage tanks or pipelines.

☐ For an Industrial undertaking, for an activity related to quarrying and gravel washing, and for any deposit of waste that is not deposited to surface water and that results from quarrying or gravel washing above the ordinary high water mark.

☐ For a Mining undertaking, for an activity related to exploratory work, any deposit of sewage to a sump.

☐ For a Power undertaking, any deposit of sewage to a sump.

☐ For an Agricultural undertaking, any deposit of sewage to a sump.

☐ For a Recreation undertaking, any deposit of sewage to a sump.

☒ For any Other type of undertaking not listed above, other than Municipal, any deposit of sewage to a sump.

12. QUANTITY AND QUALITY OF WASTE INVOLVED – For each type of waste indicated in Block 11, describe the quantity in cubic metres/day, measures to avoid or mitigate adverse impacts, and periods of deposition.

Type of Waste indicated in Block 11	Quantity to be deposited in cubic metres per day	Measures to avoid or mitigate any adverse impacts	Periods during which waste will be deposited
Sewage	0.006m^3/day	Disposed of in glacier crevasse or backhauled to PCSP Resolute Bay	Spring (April-May)
Greywater	0.00175m^3/day	Camp dishes and domestic tasks are performed using minimal water. Greywater disposed of in glacier crevasse.	Spring (April-May)
Solid waste (non-combustible wastes)	0.004m^3/day	Backhaul to PCSP Resolute Bay.	Spring (April-May)

13. SIGNATURE

I, _____MARTIN SHARP_____ (print name), certify that the information given on this form is, to the best of my knowledge, correct and complete.

X Yes ☐ No

OR

I, _____ (print name), as an authorized representative of the Applicant, _____, certify that the information given on this form is, to the best of my knowledge, correct and complete.

☐ Yes ☐ No

I certify that the Nunavut Planning Commission's land use planning requirements under Article 11 of the Nunavut Land Claims Agreement have been met.

X Yes ☐ No

I certify that the Nunavut Impact Review Board's development impact review requirements under Article 12 of the NLCA have been met.

X Yes ☐ No

I certify that the proposed water use is of a type set out in column 2 of Schedule 2 of the Regulations that is further specified by column 3, in respect of an undertaking set out in column 1. See list in Block 9.

X Yes ☐ NA ☐ No

I certify that the proposed deposit of waste is an activity that is set out and then further specified in columns 2 and 3 of Schedule 3 of the Regulations, in respect of an undertaking that is set out in column 1 of Schedule 3. See list in Block 11.

X Yes ☐ NA ☐ No

I certify that the proposed water use or deposit of waste will not substantially affect the quality, quantity or flow of the watercourse whose waters are used.

X Yes ☐ No

I certify that the proposed water use or deposit of waste will not substantially affect the quality, quantity or flow of waters flowing through Inuit Owned Lands.

X Yes ☐ No

I certify that the proposed water use or deposit of waste will not affect the use of waters by a person who would be entitled to compensation under sections 58 or 60 of the *Nunavut Waters Nunavut Surface Rights Tribunal Act* (Act*)* if their use of these waters were to be adversely affected by an applicant for a licence.

X Yes ☐ No

I certify that a licence is not required for another use of water, or deposit of waste in respect of the proposed undertaking.

X Yes ☐ No

I have read and agree to comply with the following conditions outlined in sections 4(3), 5(4), 5(5) and 6 of

the *Nunavut Waters Regulations*:

1. In the case of an applicant who has a mineral right and who intends to use waters or deposit waste in relation to that right, the applicant shall respect the priority conferred on Inuit by section 62 of the *Act* as if that applicant had a licence for the use or deposit.

2. Measures must be taken prior to using water to minimize any alteration to the bed or banks of a watercourse whose waters are to be used, and the measures shall be maintained during the operation of the undertaking.

3. No waste is to be deposited to surface water or within 31 metres of the ordinary high water mark of any body of water.

4. The waste shall not contain more than 15 milligrams per litre of petroleum or petroleum product and must not have a visible hydrocarbon sheen.

5. Prior to the closure or abandonment of the undertaking or end of the period authorized for the use of water or deposit of waste without a licence, whichever occurs first, the site shall be restored — to the extent practicable — to the state in which it was before the water was used or the waste was deposited.[a]

6. An applicant who is authorized under the Regulations to use waters or deposit waste without a licence shall:
   a. maintain accurate and detailed books and records of:
      i. the quantity of water, in cubic metres, used each day,
      ii. the quantity, in cubic metres, of waste deposited each day,
      iii. the type of waste deposited each day,
      iv. where the waste is deposited,
      v. the concentration of the substance, or substances, in the deposited solid or liquid that has the effect of making the deposit waste,
      vi. the methodology used to calculate or determine the information referred to in items (i) to (iv), and
      vii. the measures that were taken to avoid or mitigate any adverse impacts of the deposit of waste.
   b. keep the books and records on the site of the undertaking during the period of its operation and make them available during that period to an inspector on request;
   c. submit to the Board a report containing a summary description and supporting photographs of the restoration of the site of the undertaking within 30 days after the earliest of (i) the day on which the undertaking is closed or abandoned, and (ii) the last day of the period authorized for the use or deposit without a licence;[b] and
   d. keep the books and records for two years after submitting the report describing the restoration of the site of the undertaking.

   Notes:

   a) A site need not be restored prior to the end of the period authorized for the water use or deposit of waste without a licence, as required by Item 5, if the Board issues a licence for the use of water or deposit of waste on that site prior to the end of that period.

   b) An applicant need not submit the report referred to in Item 6 (c), to the Board if the applicant obtains the Board's approval for a use of water or deposit of waste without a licence, or a licence for a use of water or deposit of waste, on the same site within thirty (30) days after the last day of the period authorized for the use or deposit.

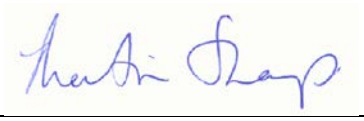
X Yes ☐ No

I understand that any approval granted by the Board for the use of water or deposit of waste without a licence will be authorized for a period of one year after the day on which the Board approves the Application. The use or deposit is not authorized until the Board approves the Application and it is only valid as long as the applicant is in compliance with the conditions set out in the declaration above.

X Yes ☐ No

I understand that if I have answered "No" to any of the above statements a water license is required from the Nunavut Water Board prior to the use of water or deposit of waste.

X Yes ☐ No

Name (Print)	Title (Print)	Signature	Date
Martin Sharp	Professor		February 10, 2016