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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

EXPLORATION/ REMOTE CAMP SUPPLEMENTARY QUESTIONNAIRE

Applicant: _Shawn Marshall_____Licence No: _____
(For NWB Use Only)

ADMINISTRATIVE INFORMATION

1. Environment Manager: Shawn Marshall Tel: 403-220-4884 Fax: 403-282-6561 E-mail: shawn.marshall@ucalgary.ca

2. Project Manager: Shawn Marshall Tel: 403-220-4884 Fax: 403-282-6561 E-mail: shawn.marshall@ucalgary.ca

3. Does the applicant hold the necessary property rights? No

4. Is the applicant an 'operator' for another company (i.e., the holder of the property rights)? If so, please provide letter of authorization. No

5. Duration of the Project

   X One year or less Start and completion dates: _____
   ☐ Multi Year:

   If Multi-Year indicate proposed schedule of on site activities
   Start: _____ Completion:_____

CAMP CLASSIFICATION

6. Type of Camp

   ☐ Mobile (self-propelled)
   X Temporary
   ☐ Seasonally Occupied: _____
   ☐ Permanent
   ☐ Other:_____

7. What is the design, maximum and expected average population of the camp?

   4 people, two 2-week periods (May and July, 2012). Tent camp.

8. Provide history of the site if it has been used in the past.

   We have camped on the icefield before, but not at the proposed off-glacier site.

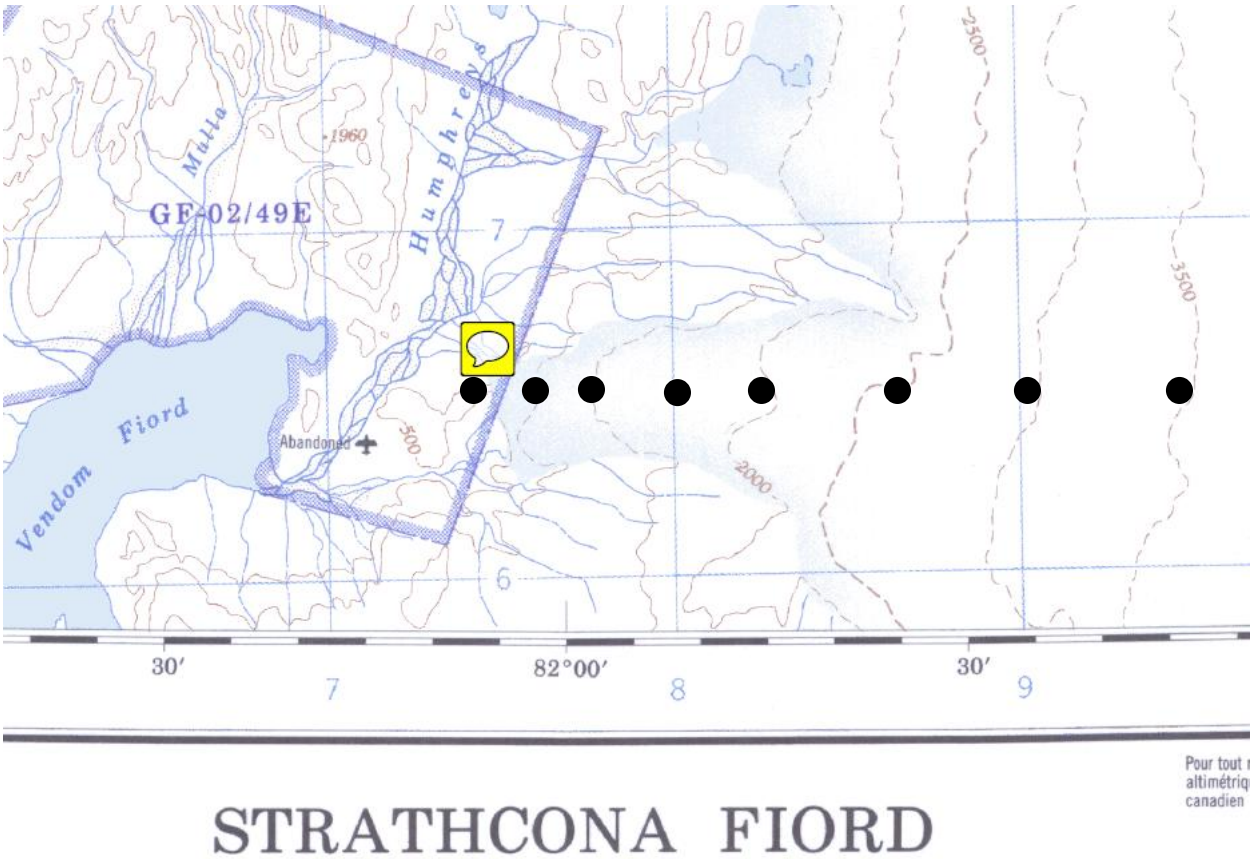
CAMP LOCATION

9. Please describe proposed camp location in relation to biogeographical and geomorphological features, and water bodies.

See map below.

The site is not near any significant historical/archaeological sites that we are aware of. There have been numerous fossil finds nearby (Devonian shells, and also rumours of significant marine reptiles), and we have seen what I believe to be fossilized wood on past visits to the area. We have also seen muskoxen in front of the glacier here, but we are not aware of migratory species' activity here. There is no viable ecology on the glacier, where most of our work will be carried out. The glacier forefield has braided streams, peat, and soils, with some glacial landforms: presumably little ice age moraines and subglacial tills/hummocks from the ice margin retreat of the last ca. 100 years. Humphrey River drains into Vendom Fiord a few km west of our proposed camp. The glacial stream that we will study runs off of the glacier and drains into Humphrey River downstream of our site. The Prince of Wales Icefield itself is a large (ca. 19,000 km^2) glacier complex terminating in Baffin Bay on its western slopes and terminating terrestrially at ca. 400 m elevation at our study site.

10. How was the location of the camp selected? Was the site previously used? Was assistance from the Regional Inuit Association Land Manager sought? Include maps and/or aerial photographs.



Study Site. Cropped from NTS map sheet 49E and showing the 'Humphrey lobe' of the POW Icefield, the proposed field camp site on the icefield margin, and the landing strip for twin otter access. The research instruments (weather stations, melt poles) are indicated with the black circles. The proposed camp is at 78°3′N and 82°7′W. Stream gauging for glacier runoff will be done near the camp.

This site was selected because it was well-suited to our research objectives. Our research group has worked on the icefield near here before, and weather data collected in 2001-2003 indicates strong ice-marginal warming at this site that we wish to better quantify and understand. We also saw this on the northwestern margin of the icefield, which could be an alternate site with respect to our research goals. The Humphrey site on the southwestern margin is logistically preferable due to the proximal landing strip. It is also closer to Resolute, for transport to the site. In prior years we camped on the icefield, but in 2012 we propose to work on and adjacent to the Humphrey outlet glacier. An off-glacier camp is better suited to the stream and weather-balloon measurements and better accessed via the (abandoned) Humphrey landing strip.

11. Is the camp or any aspect of the project located on:

X	Crown Lands	Permit Number (s)/Expiry Date: AANDC, pending
☐	Commissioners Lands	Permit Number (s)/Expiry Date: _____
X	Inuit Owned Lands	Permit Number (s)/Expiry Date: NIRB,KIA: pending

12. Closest Communities (direction and distance in km):

Grise Fiord (220 km to the south)

13. Has the proponent notified and consulted the nearby communities and potentially interested parties about the proposed work?

Yes, via the KIA permitting process. The application has been submitted to KIA.

14. Will the project have impacts on traditional water use areas used by the nearby communities? Will the project have impacts on local fish and wildlife habitats?

No impacts.

PURPOSE OF THE CAMP

15.
- ☐ Mining (includes exploration drilling)
- ☐ Tourism (hunting, fishing, wildlife observation, adventure/expedition, etc.) (Omit questions # 16 to 21)
- X Other ____scientific (climate) research_____

16. Activities (check all applicable)

- ☐ Preliminary site visit
- ☐ Prospecting
- ☐ Geological mapping
- ☐ Geophysical survey

- ☐ Diamond drilling
- ☐ Reverse circulation drilling
- ☐ Evaluation Drilling/Bulk Sampling (also complete separate questionnaire)
- X Other: glacier, atmosphere, snowpack, and stream measurements

17. Type of deposit (exploration focus):

- ☐ Lead Zinc
- ☐ Diamond
- ☐ Gold
- ☐ Uranium
- ☐ Other: n/a

DRILLING INFORMATION

18. Drilling Activities

- ☐ Land Based drilling
- ☐ Drilling on ice

19. Describe what will be done with drill cuttings?

20. Describe what will be done with drill water?

21. List the brand names and constituents of the drill additives to be used? Includes MSDS sheets and provide confirmation that the additives are non-toxic and biodegradable.

22. Will any core testing be done on site? Describe.

SPILL CONTINGENCY PLANNING

23. The proponent is required to have a site specific Spill Contingency Plan prepared and submitted with the application This Plan should be prepared in accordance with the *NWT Environmental Protection Act, Spill Contingency Planning and Reporting Regulations, July 22, 1998* and *A Guide to the Spill Contingency Planning and Reporting Regulations, June 2002*. Please include for review.

We require about 4 10-L jerry cans to fuel the generator. We will pour over a plastic tarp and mop up any spills. Gasoline will be stored wrapped in tarps. All of our travel is on foot/ski, so fuel needs are minimal and we will not have fuel or oil drums.

24. How many spill kits will be on site and where will they be located?

One spill kit, kept at our camp gear cache with the fuel.

25. Please describe the types, quantities, and method of storage of fuel and chemicals on site, and provide MSDS sheets.

6 20-lb propane tanks
4 10-L jerry cans gasoline; wrapped in tarps
All fuel cached at our camp, near to the Humphrey landing strip

WATER SUPPLY AND TREATMENT

26. Describe the location of water sources.

Snowpack (May) and the glacier meltwater stream (July), adjacent to our camp.

27. Estimated water use (in cubic metres/day): 25 L/day = 0.025 m^3/day

- X Domestic Use: (cooking, drinking) Water Source: _snow, glacial stream____
- ☐ Drilling: _____ Water Source: _____
- ☐ Other: _____ Water Source: _____

28. Describe water intake for camp operations? Is the water intake equipped with a mesh screen to prevent entrapment of fish? (see *DFO 1995, Freshwater Intake End-of-Pipe Fish Screen Guideline*) Describe:

We will directly scoop from the stream and the snowpack (to be melted on cook stoves)

29. Will drinking water quality be monitored? What parameters will be analyzed and at what frequency?

No, no need – all fresh snow/ice melt

30. Will drinking water be treated? How?

No, no need – all fresh snow/ice melt

31. Will water be stored on site?

No

WASTE TREATMENT AND DISPOSAL

32. Describe the characteristics, quantities, treatment and disposal methods for:

X Camp Sewage (blackwater)

We will use portable camp toilets and ship out all solid waste on conclusion of the work

X Camp Greywater

Greywater from cooking, cleaning to be poured into the soil away from surface water bodies

X Solid Waste

All solid waste and garbage to be shipped out on conclusion of the work.

☐ Bulky Items/Scrap Metal

_____n/a_____

☐ Waste Oil/Hazardous Waste

_____ n/a _____

☐ Empty Barrels/Fuel Drums

_____ n/a _____

☐ Other:

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33. Please describe incineration system if used on site. What types of wastes will be incinerated?

n/a

34. Where and how will non-combustible waste be disposed of? If in a municipality in Nunavut, has authorization been granted?

Waste shipped back to Resolute will be disposed of at PCSP facilities

35. Describe location (relative to water bodies and camp facilities) dimensions and volume, and freeboard for all sumps (if applicable).

n/a

36. Will leachate monitoring be done? What parameters will be sampled and analyzed, and at what frequency?

n/a – all camp waste to be stored/contained in rubber-maid bins until shipped out

OPERATION AND MAINTENANCE

37. Have the water supply and waste treatment and disposal methods been used and proven in cold climate? What known O&M problems may occur? What contingency plans are in place?

Yes, we have experience with water access in spring; our needs are limited, so melting of snow and ice works fine. We bring extra propane for this.

ABANDONMENT AND RESTORATION

38. Provide a detailed description of progressive and final abandonment and restoration activities at the site.

All equipment, gear, and waste to be flown out on completion of the research in August 2012.

BASELINE DATA

39. Has or will any baseline information be collected as part of this project? Provide bibliography.

- [X] Physical Environment (Landscape and Terrain, Air, Water, etc.)
- [ ] Biological Environment (Vegetation, Wildlife, Birds, Fish and Other Aquatic Organisms, etc.)
- [ ] Socio-Economic Environment (Archaeology, Land and Resources Use,
- [ ] Demographics, Social and Culture Patterns, etc.)
- [ ] Other: _____

Published to date:

MSc thesis of Vivian Wasiuta (2007) and PhD thesis of Tara Moran (2011)

Moran, T.A., S.J. Marshall and M.J. Sharp, 2011. Isotope thermometry in melt-affected ice cores. *Journal of Geophysical Research*, 116 (F02010), doi:10.1029/2010JF001738.

Gardner, A.S., M.J. Sharp, R.M. Koerner, C. Labine, S. Boon, S.J. Marshall, D.O. Burgess, and D. Lewis, 2009. Near-surface temperature lapse rates over Arctic glaciers and their implications for temperature downscaling. *Journal of Climate*, 22, 4281-4298.

Mair, D., D. Burgess, M.J. Sharp, J. Dowdeswell, T. Benham, S.J. Marshall, and F. Cawkwell, 2009. Mass balance of the Prince of Wales Icefield, Ellesmere Island, Nunavut, Canada. *Journal of Geophysical Research*, 114, F02011.

Marshall, S.J. and M.J. Sharp, 2009. Temperature and melt modelling on the Prince of Wales Icefield, Canadian High Arctic. *Journal of Climate*, 22 (6), 1454-1468.

Moran, T.A. and S.J. Marshall, 2009. Effects of meltwater percolation on stable isotope stratigraphy in a high Arctic snowpack. *Journal of Glaciology*, 55 (194), 1012-1024.

Marshall, S.J., M.J. Sharp, D.O. Burgess and F.S. Anslow, 2007. Near-surface temperature lapse rate variability on the Prince of Wales Icefield, Ellesmere Island, Nunavut: Implications for regional-scale temperature downscaling. *International Journal of Climatology*, 27 (3), 385-398.

Wasiuta, V.L., A.-L. Norman and S.J. Marshall, 2006. Spatial patterns and seasonal variation of snowpack sulphate isotopes of the Prince of Wales Icefield, Ellesmere Island. *Annals of Glaciology*, 43, 390-396.

REGULATORY INFORMATION

40. At a minimum, you should ensure you have a copy of and consult the documents below for compliance with existing regulatory requirements:

- ✓ ARTICLE 13 – *NCLA -Nunavut Land Claims Agreement*
- ✓ NWNSRTA – *The Nunavut Waters and Nunavut Surface Rights Tribunal Act, 2002*
- ✓ *Northwest Territories Waters Regulations, 1993*
- ✓ NWB - Water Licensing in Nunavut - Interim Procedures and Information Guide for Applicants
- ✓ NWB - Interim Rules of Practice and Procedure for Public Hearings
- ✓ RWED – *Environmental Protection Act, R-068-93- Spill Contingency Planning and Reporting Regulations, 1993*
- ✓ RWED A Guide to the Spill Contingency Planning and Reporting Regulations, 2002
- ✓ NWTWB - Guidelines for Contingency Planning
- ✓ *Canadian Environmental Protection Act, 1999 (CEPA)*
- ✓ *Fisheries Act, RS 1985* - s.34, 35, 36 and 37
- ✓ DFO - Freshwater Intake End of Pipe Fish Screen Guideline
- ✓ NWTWB - Guidelines for the Discharge of Treated Municipal Wastewater in the NWT
- ✓ Canadian Council for Ministers of the Environment (CCME); Canadian Drinking Water Quality Guidelines, 1987
- ✓ Public Health Act - Camp Sanitation Regulations
- ✓ Public Health Act - Water Supply Regulations
- ✓ *Territorial Lands Act* and *Territorial Land Use Regulations*; Updated 2000