

Water Use Report

Nunavut Water Board Permit to use water without a licence #8WLC-IDC1920

Issued to Derek Mueller, Carleton University

Field season 2019

Submitted to NWB on 2021-04-17

The following report describes the water use and greywater release during July 2019 for Carleton University field research in the Milne Fiord area, Ellesmere Island, Nunavut.

Two field camps were established consecutively and there were 4 individuals in the field party, although a helicopter pilot did stay with us for a few days at the Purple Valley Strip location.

Locations [Sect 1, 7a iv]

The camp at Purple Valley is located at 82.4629°N, 80.7294°W and the camp on the Milne Ice Shelf is located at 82.7203°N, 81.4813°W.

Water use and waste deposition procedures, adverse impact mitigation [Sect 1, 7a vii]

At the Purple Valley camp water was taken from a nearby stream and greywater from dishes was dumped in a sump near the tent. The distance from the stream to the sump exceeds 50 m. On the Milne Ice Shelf, we gathered water from a meltpond to the south of camp and dumped greywater from dishes on the ice to the north side of the tent. Any food scraps on the ground/ice were removed. Liquid human waste (urine) was deposited away from water sources and scattered about the site to avoid concentrating the effect of nutrient deposition. Solid human waste was bagged and removed from both sites. Refuelling of small motors took place over a portable fuel berm and no fuels spills occurred. Refuelling of the helicopter took place at a fuel cache well over 100 m from any stream and no spills occurred.

Concentrations and methods for calculating water use and waste [Sect 1, 7a v, vi]

We used no more than one 20 L container of water per day at our campsite and so this amount was a convenient way to record water use when the exact amount in Litres was unknown. We did dishes typically once a day. The dish pan contained 4-5 L so an amount of 5 L was recorded can be considered an upper bound unless more than one load of dishes was done. Greywater contains contaminants such as soap and grease. Concentrations of these were estimated at no more than 3% each (1 tablespoon per 5 L). Urine was estimated at 1.5 L per person per day [<https://healthfully.com/normal-urinary-output-for-an-adult-8128459.html>]. Urine is 91 to 96% water [<https://www.news-medical.net/health/Urine-Composition-Whats-Normal.aspx>] so the contaminant load (mainly nitrogenous compounds and electrolytes) is likely no more than 9%.



Photo of the Milne Ice Shelf camp site (July 15, 2019) [left] and Purple Valley Strip (July 18, 2019) [right]. At Purple Valley a camp cache remains (foreground) and the aircraft fuel cache is in the background.

The following table gives the quantity of water used and each waste deposited for each day. [Sect 1, 7a i, ii, iii]

Date	Location	Water used (L)	Greywater (L)	Urine (L)	Water used (m³)	Greywater (m³)	Urine (m³)
2019-07-04	Purple Valley Strip	20	0	6	0.02	0.000	0.006
2019-07-05	Purple Valley Strip	20	5	8	0.02	0.005	0.008
2019-07-06	Purple Valley Strip	20	5	8	0.02	0.005	0.008
2019-07-07	Purple Valley Strip	20	5	8	0.02	0.005	0.008
2019-07-08	Purple Valley Strip	20	5	8	0.02	0.005	0.008
2019-07-08	Milne Ice Shelf	20	0	6	0.02	0.000	0.006
2019-07-09	Milne Ice Shelf	20	5	6	0.02	0.005	0.006
2019-07-10	Milne Ice Shelf	20	5	6	0.02	0.005	0.006
2019-07-11	Milne Ice Shelf	15	6	6	0.02	0.006	0.006
2019-07-12	Milne Ice Shelf	17	4	6	0.02	0.004	0.006
2019-07-13	Milne Ice Shelf	16	6	6	0.02	0.006	0.006
2019-07-14	Milne Ice Shelf	18	6	6	0.02	0.006	0.006
2019-07-15	Milne Ice Shelf	20	5	6	0.02	0.005	0.006
2019-07-16	Purple Valley Strip	20	4	8	0.02	0.004	0.008
2019-07-17	Purple Valley Strip	20	8	8	0.02	0.008	0.008
2019-07-18	Purple Valley Strip	10	3	6	0.01	0.003	0.006
Total	Purple Valley Strip	150	35	57	0.15	0.035	0.057
Total	Milne Ice Shelf	146	36.6	48	0.146	0.0366	0.048
Grand total		296	71.6	105	0.296	0.0716	0.105