

2022 FOX-M ANNUAL NUNAVUT WATER BOARD REPORT

FOR THE NORTH WARNING SYSTEM

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EXECUTIVE SUMMARY

This 2022 Annual Report for the Nunavut Water Board (NWB) has been prepared by Nasittuq for the Department of National Defence (DND) in order to meet the requirements of Part B “General Conditions”, paragraph 1 of its licence 8BC-FOH1929. This report covers 01 January to 31 December 2022.

As of 1-Aug-2022, Nasittuq is the Operations and Maintenance (O&M) Contractor for the North Warning System (NWS), including FOX-M, the attended (manned) NWS radar site located at Sanirajak (Hall Beach), Nunavut.

The water usage at FOX-M in 2022 was **828.5 cubic metres**, which is an average of **2.3 cubic metres** per day. There is no water usage limit in the licence for FOX-M.

Sewage at FOX-M was processed by the tertiary wastewater treatment system. Some of the treated effluent is recycled as on-site urinal/toilet flush water. The treated sewage was sampled monthly with the exception of June to November.

Samples of the water contained in the berms of fuel storage facilities was tested on-site using hydrocarbon test strips and confirmed to be within effluent quality limits of the NWB licence before the water was discharged.

No hazardous waste and waste oil were shipped off-site in 2022 due to the NWS contract transition. In 2023 hazardous waste and waste oil will be sent to an approved hazardous waste disposal site outside of Nunavut as required by the licence.

Non-hazardous domestic solid waste was disposed of at the local landfill through a contract with the Hamlet of Sanirajak (Hall Beach). Nasittuq has documented authorization from the community for receiving the waste.

Three spills to the environment occurred at FOX-M in 2022:

- 09-Aug-2022, NT-NU Spill # 2022-409: A spill of 50 L of sewage occurred from a failed seal in the sewage treatment plant. The seal has been repaired and impacted soil removed.
- 16-Aug-2022, NT-NU Spill #2022-419: A leaking connection caused a spill of 20 L of fuel from the aircraft refueler. The connection has been repaired and impacted soil removed.
- 14-Dec-2022, NT-NU Spill# 2022-550, A leaking connection caused a spill of 2 L from a loader. The connection has been repaired and impacted soil removed.

The Spill Contingency Plan was successfully implemented, and updated on 1-Aug-2022.

No progressive reclamation work was undertaken in 2022.



1.0 INTRODUCTION

This 2022 Annual Report for the Nunavut Water Board (NWB) has been prepared by Nasittuq for the Department of National Defence (DND) in order to meet the requirements of Part B “General Conditions”, paragraph 1 of its licence 8BC-FOH1929 issued 01 September 2019. This report covers 01 January to 31 December 2022.

As of 1-Aug-2022, Nasittuq is the Operations and Maintenance Contractor for the North Warning System (NWS), including FOX-M. An O&M contract transition occurred over the summer of 2022.

FOX-M is an attended (manned) North Warning System radar site located at Sanirajak (Hall Beach), Nunavut.

1.1 Report Details

Licensee:	Department of National Defence, Government of Canada
Licence:	8BC-FOH1929 – Type “B”
Location:	FOX-M North Warning System Site, Sanirajak (Hall Beach), Qikiqtani Region, Nunavut
Report Prepared by:	Alaina Leslie and reviewed by Don Beattie Nasittuq Corporation, 30-Mar-2023
Time period covered:	01 January to 31 December 2022

2.0 WATER USE

The water usage at FOX-M in 2022 was **828.5 cubic metres**, which is an average of **2.3 cubic metres** per day. See Table 2-1 for the volume of water drawn at FOX-M each month in 2022.

There is no water usage limit in the licence for FOX-M because water is drawn from an artificial (man-made) reservoir and not from a natural source.

Table 2-1: Monthly Raw Water Usage at FOX-M in 2022

Month	Raw water usage (m ³)
January	76.5
February	44.5
March	76
April	68.7
May	46.2
June	82.7*
July	82.7*
August	74
September	59.5
October	70.7
November	75
December	72
TOTAL	828.5
* Water usage for June and July was tracked however tracking sheets were misplaced due to the NWS contract transition. Water usage was estimated based on approximate site load and 150L per person per day.	

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3.0 TREATED SEWAGE DISCHARGE

At FOX-M, the sewage and grey water were both processed through a Cycle-let® advanced tertiary wastewater treatment system. Some of the treated water is recycled as urinal/toilet flush water; the remainder is discharged at the designated outfall and is potable water quality. See Table 3-1 for the volume of sewage and grey water treated by the Cycle-let® system. See **Section 6.0 – Monitoring Program** for details on sewage effluent monitoring.

The location and coordinates of treated sewage effluent outfall location (FOH-2) is contained in **Annex B**. Sewage sample analytical results and certificates of analysis are contained in **Annex C**.

Table 3-1: Monthly and Annual Volume of Sewage and Grey Water Treated at FOX-M in 2022

Month	Volume of sewage and greywater treated then discharged or recycled (m³)
January	77
February	45
March	76
April	69
May	46
June	83 *
July	83 *
August	74
September	60
October	71
November	75
December	72
TOTAL	829

*June and July are estimated based on the same calculation used for water draw.

4.0 HAZARDOUS WASTE AND WASTE OIL DISPOSAL

No hazardous waste and waste oil were shipped off-site in 2022 due to the NWS contract transition. In 2023 hazardous waste and waste oil will be sent to an approved hazardous waste disposal site outside of Nunavut as required by the licence.

5.0 NON-HAZARDOUS SOLID WASTE DISPOSAL

Non-hazardous domestic solid waste was disposed of at the local landfill through a contract with the Municipality of Sanirajak (Hall Beach). Nasittuq has documented authorization from the community for receiving the waste. See Table 5-1, below, for the quantity of non-hazardous waste generated.

Table 5-1: Non-hazardous Domestic Solid Waste Sent for Disposal from FOX-M in 2022

Month	Waste Generated (kg)
January	2395
February	3190

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Month	Waste Generated (kg)
March	2725
April	2250*
May	1860*
June	2756*
July	2756*
August	2060*
September	2750
October	2384
November	3810
December	1335
TOTAL	30,271
* April to August were estimated as tracking sheets were misplaced due to the NWS contract transition. Waste was estimated based on 2.26 kg per person per day.	

6.0 MONITORING PROGRAM

In 2022, a monitoring program was implemented at FOX-M as required by the water licence. The monitoring program included the following:

1. Volume of raw water drawn from the reservoir (FOH-1). The raw water monitoring information is shown in **Section 2.0 Water Use**.
2. Quality of sewage discharged from the final discharge point of the sewage treatment facility (FOH-2). The location of the sewage effluent outfall is shown in **Annex B**, including coordinates. The treated sewage was sampled monthly with the exception of June to November. The sample was not sent to the laboratory during these months due to miscommunications during the NWS contract transition.

The results of the analyses are shown in **Annex C**.

3. Quality of the water contained in the berms of fuel storage facilities prior to discharge (FOH-3) was analyzed using hydrocarbon test strips and confirmed within the effluent quality limits listed in the water licence, Part D. The coordinates and the results of the analysis are shown in **Location of Bermed Fuel Storage Facilities**. All samples met the effluent requirements of the water licence, Part D.
4. Final Discharge Point from the Landfarm (FOH-4). No landfarm has been established at FOX-M, so this monitoring station remains inactive.

7.0 SPILLS (UNAUTHORIZED DISCHARGES)

Three spills to the environment occurred at FOX-M in 2022. Table 7-1, below, describes the spill (unauthorized discharge) details.

The Spill Contingency Plan was successfully implemented.

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Table 7-1: Unauthorized Discharges at FOX-M in 2022

Date, NT-NU Spill #	Product	Quantity	Cause and follow-up action	On-site location
09-Aug-2022, Spill NT-NU# 2022-409	Sewage	50 L	A failed seal on the sewage plant caused a spill of sewage from the treatment plant. Approximately 50 L of sewage leaked out of the building envelope on to the gravel pad below. The impacted gravel was shoveled and containerized for off-site disposal. The connection was repaired and the leak was stopped.	Module Train B (68 45' 41" N, 81 13' 39" W)
16-Aug-2022, Spill NT-NU# 2022-419	JET-A1	20 L	A leaking connection on the aircraft re-fueler caused a spill of approximately 20 L of JET-A1. Impacted soil was removed and containerized for off-site disposal. The connection was repaired and the leak was stopped.	Airstrip Apron (68°46'16.78"N, 81°13'52.73"W)
14-Dec-2022, Spill # 2022-550	Hydraulic Fluid	2 L	A leaking connection on a hydraulic line of a loader caused a spill of 2 L of hydraulic fluid. Impacted soil was removed and containerized for off-site disposal. The connection was repaired and the leak was stopped.	Road to warehouse (68 45' 56"N, 81 13' 40" W)

8.0 REVISIONS TO THE SPILL CONTINGENCY PLAN

The Spill Contingency Plan was updated on **1-Aug-2022**. An updated copy of the Spill Contingency Plan has been submitted to the NWS with this annual report.

9.0 PROGRESSIVE RECLAMATION WORK UNDERTAKEN

No progressive reclamation work was undertaken in 2022.

10.0 ACRONYMS

Table 10-1: Acronyms

Acronym	Definition
n.o.s	Not Otherwise Specified
NWB	Nunavut Water Board
NWS	North Warning System
O&M	Operations and Maintenance
PCB	Polychlorinated Biphenyl
POL	Petroleum, Oil & Lubricant
TDGR	Transportation of Dangerous Goods Regulations

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ANNEX A. HAZARDOUS WASTE AND WASTE OIL DISPOSAL

n/a

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ANNEX B. TREATED SEWAGE EFFLUENT OUTFALL (FOH-2) LOCATION WITH COORDINATES



Figure 1: Location and coordinates of sewage treatment outfall: 68° 45'39.50" N, 81°13'28.40" W

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ANNEX C. ANALYSIS OF TREATED SEWAGE EFFLUENT

Table C-1 contains the results of sampling analysis of treated sewage effluent. Samples were collected monthly. The laboratory certificates of analysis are included in the pages which follow.

Table C-2: Summary of Analysis of Treated Sewage Effluent at FOX-M in 2022

Sample Date	Parameter				
	pH	Oil and Grease (Present - P / Absent - A)	Biological Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)	Faecal Coliforms ¹
Maximum Concentration	6.0 to 9.0 (pH units)	No visible sheen	120 mg/L	180 mg/L	10,000 CFU/100 mL
21-Jan-22	7.55	A	<1	<2	20.83
14-Feb-22	7.51	A	17	2	35.67
8-Mar-22	7.45	A	<1	<2	5.00
7-Apr-22	6.32	A	18	Unk*	7.17
16-May-22	7.46	A	<1	<2	9.33
1-Jun-22*	n/a	n/a	n/a	n/a	n/a
1-Jul-22*	n/a	n/a	n/a	n/a	n/a
1-Aug-22*	n/a	n/a	n/a	n/a	n/a
1-Sep-22*	n/a	n/a	n/a	n/a	n/a
1-Oct-22*	n/a	n/a	n/a	n/a	n/a
1-Nov-22*	n/a	n/a	n/a	n/a	n/a
30-Dec-22	8.04	A	<3.0	<3.0	11.33
Notes: *In April the sewage sample TSS was analysed and reported by the laboratory, however the report was misplaced due to the NWS contract transition. In June to November samples were not sent to the laboratory due miscommunications during the NWS contract transition.					

The following documents are enclosed:

1. Eurofins Certificate of Analysis Jan-22
2. Eurofins Certificate of Analysis Feb-22
3. Eurofins Certificate of Analysis Mar-22
4. Eurofins Certificate of Analysis Apr-22
5. Eurofins Certificate of Analysis May-22
6. ALS Certificate of Analysis Dec-22

¹ This column contains the average of the Cyclet 1A, Cyclet 1B, and Cyclet 1C

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ANNEX D. LOCATION OF BERMED FUEL STORAGE FACILITIES

Table D-1 contains the locations and sampling dates for the wastewater discharged from the bermed fuel storage facilities.

Table D-3: Location of Bermed Fuel Storage Facilities and Date Sampled in 2022

Berm	Location on-site	Discharge Latitude ²	Discharge Longitude	Date
HAL W20B	Beach	68°46'23.93"N	81°12'51.11"W	15-Jun-2022
HAL W20D&E	Airstrip	68°46'15.85"N	81°13'58.33"W	15-Jun-2022
HAL W20F	Beach	68°46'23.75"N	81°12'46.12"W	15-Jun-2022
HAL W22A	Summit	68°45'42.24"N	81°13'25.04"W	15-Jun-2022
HAL W22B	Summit	68°45'43.00"N	81°13'27.27"W	15-Jun-2022

² Final discharge point of bermed fuel storage facility

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ANNEX E. ANALYSIS OF BERM WATER³

The berms at FOX-M were sampled using hydrocarbon test strips as per the approved QA/QC Plan for Berm Water Sampling as stated in the water licence 8BC-FOH1929, PART D, Item 11. The photo log of the hydrocarbon test strips is included below.

Photo Log



June 17, W22B



June 17, W20B

³ Effluent from bermed fuel storage facilities.

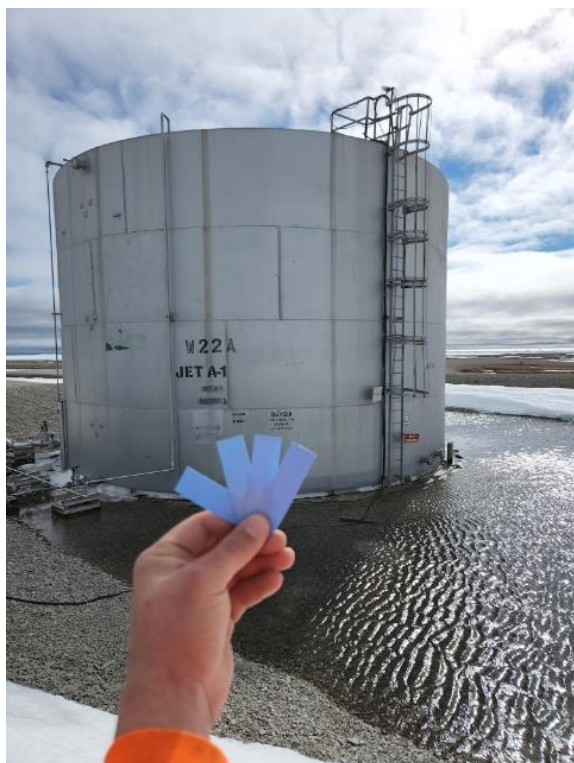


June 17, W20D & W20E



June 17, W20F

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June 17, W22A

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