2021 ANNUAL NUNAVUT WATER BOARD

REPORT FOR CAM-3

FOR THE

North Warning System

Contract # W8485-100224/001/NX

SOW Ref: 16.F.5.d

Document Number

NWB-C3-2021, Rev 2, 22-Mar-2022

Prepared for

North Warning System & Assoc. Projects

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EXECUTIVE SUMMARY IN ENGLISH FOLLOWS

ᐅძᐊ 2021 ᐊᖏᕐᕿᒍᒫᒃᑕ ᐅᓂᒃᑲᑦ ᓄᓇᕗᒻᒥ ᐃᒥᓕᓚᔨᑦ ᑲᑎᒪᔨᖏᓐᓄᑦ (NWB) ᑎᑎᕐᓭᐅᔪᒪᔪᑦ ᐅძᓄᖓ Raytheon Canada (RC) ᐅᓇᒡᖏᑐᓚᔨᒃძᓐᓄᑦ ᑎᑭᑦᑎᓐᓇᓂᐊᖏᓪᓗᑎ ᐱᒡᖏᑲᐊᖅᖏᓭᐅᔪᓂᑦ ᐃᓕᖓ B “ᖃᓄᐃᓐᓂᑦᑭᐊᖅᖏᒡᒎᖏᓪᓂ”, ᑎᑎᕐᓭᔪᒪᓂᖏᓪᓂ 1 ᓕᐃᔨᓪᓴᖓᓄᑦ 8BC-SHE1929. ᐅძᐊ ᐅᓂᒃᑲᑦ ᐱᖃᓯᐅᔨᔪᑦ 01 ᑲᓐᓄᐊᓗ ᑎᑭᒡᒐᒍ 31 ᑎᓯᐱᓗ 2021.

RC ᐊᐅᓕᓂᖏᓐᓄᑦ ᐊᒻᒪ ᒪᑭᒪᓂᖏᓐᓄᑦ (O&M) ᑲᓐᑐᕐᖃᑎᐅᔪᖅ ᐅᑭᐅᒡᖏᑐᒥ ᐅᓇᒡᖏᑎᓄᑦ ᖃᐅᔨᔫᕐᓂᓂᐅᓂ (NWS), ᐱᖃᓯᐅᑎᓕᔭᑎ CAM-3. CAM-3 ᐅᒡᒡᑕᐅᓯᒪᖏᑦᑐᖅ (ᐃᓐᓄᖃᖏᑦᑐᖅ) NWS ᖃᐅᔨᔫᕐᕕᐃᑦ ᓇᔪᖅᑕᖓ Shepherd Bay, ᓄᓇᕗᑦ. ᓇᔪᖅᑕᖓ ᐅᒡᒡᑕᐅᕙᒡᑐᖅ ᐱᖓᓱᓂᒃ ᑕᖅᑭᓂᑕᒫᑦ ᒪᑭᒪᑎᓂᓕᒫᑦ ᖃᐅᔨᔫᖅᑐᑎ ᐊᒻᒪ ᐊᓯᖏᓐᓄᑦ ᐱᒡᖏᑲᐊᖅᖏᑎᑕᐅᔪᑦ RC ᐃᖅᑲᓇᐃᔨᖅᑎᖏᓐᓄᑦ MAM-M, ᐃᖅᓗᓪᓕᔾᔪᑎᐊᖅ, ᓄᓇᕗᑦ.

ᐃᒥᖏᑦ ᐊᑐᖏᑕᐅᓂᖓ CAM-M 2021–ᒥᑦ ᐅᓇᐅᓪᓚᐅᖅᑐᖅ 1268.9 m³, ᑐᖓᓂᓂ ᐊᖏᕐᕿᒍᒫᒃᑕ ᑭᓪᓕᖓᓄ 3650 m³. ᐊᓯᐅᓪᓚᔨᓴᖅᑕᖓ ᐃᒥᖅ ᐲᖅᑕᐅᔨᑦ ᐊᑕᐅᔪᖏᒥ ᐅᓪᓗᒥ ᐅᓇᐅᓪᓚᐅᖅᑐᖅ 12.31 m³, ᑐᖓᓂᓕᑐᖅ ᖃᐅᑕᒫᑦ ᑭᓪᓕᖓᓄᑦ 300 m³.

ᑲᑎᑦᑐᑦ 71.3 ᖁᓕᑦᓴᓪᓕᑦ ᒥᑕᐃᑦ (m³) ᐱᔪᐅᓪᓚᐅᖅᑐᑦ ᐃᒪᖃᕐᕕᐅᔨᒥᑦ ᑕᓪᓕᒥᑦ 2021–ᒥᑦ. ᑕᐅᓇ ᑐᖓᓂᓕᑐᖅ ᐊᖏᕐᕿᒍᒫᒃᑕ ᐊᓯᐅᓪᓚᔨᓴᖅᑕᖓᓂ 1,440 m³ ᐱᔨᓴᖅᑎᑕᐅᔨᖅ ᓯᐃᔨᓴᓪᓕᒥᑦ.

ᐊᑦᑕᓇᖅᑐᑦ ᐊᑦᑕᑯᐃᑦ ᐊᒻᒪ ᐊᑦᑕᑯᐃᑦ ᐅᖅᓯᐊᓗᒥᓂᑦ ᐊᐅᑦᓯᖅᑎᑕᐅᓯᐅᖅᑐᑦ ᐊᖏᖅᑕᐅᓯᒪᔨᒧᑦ ᐊᑦᑕᓇᖅᑐᓄᑦ ᐊᑦᑕᑯᐃᓄᑦ ᐃᒋᑦᑎᐃᓐᓂᑦ ᓯᓚᑕᓂ ᓄᓇᕗᑦ ᐱᑕᖃᖅᑎᖅᑎᑕᐅᔪᖁᔨᔪᑦ ᓯᓚᑦᓴᖅᑐᑦ. ᐊᑦᑕᓇᖅᑐᑦ ᐊᑦᑕᑯᓗᓚᐅᖅᑐᑦ ᒪᖁᑐᑦ ᐅᖃᐅᔨᑦ ᐊᑦᑕᑯᐃᓄᑦ, ᐊᐅᑦᓯᖅᑎᑕᐅᓯᐅᖅᑐᑦ ᐃᒋᑦᑎᐃᓐᓂᑦ ᐊᑦᑕᑯᐃᑦ ᐅᖅᓯᐊᓂᑎᑦᑐᑦ, ᐊᓯᖏᓐᓚᓗ).

ᐊᑦᑕᓇᖏᓐᓄᑦ ᑎᓯᔨᑦ ᐊᑦᑕᑯᐃᑦ ᓄᓇᕗᒻᒥ ᐊᔨᓯᕐᒧᑦᑕᐅᓚᐅᖅᑐᑦ ᑲᓐᑐᕐᖃᑎᐅᔪᓄᑦ Hᐊᒻᒪᓚᖓᓐᓄ ᐃᖅᓗᓪᓕᑎᐊᖅ. RC ᑎᑎᕐᓭᓯᒪᔨᑦ ᐱᔨᓴᐅᑎᖅᓂᖅᓴᖏᓪᓗᑎ ᓄᓇᕗᒻᒥ ᐱᔭᐅᓂᖏᓐᓄᑦ ᐊᑦᑕᑯᐃᑦ.

ძᕐᓂᑕᐅᓚᐅᖅᑎᓇᒋᑦ, ᐃᒥᖅ ძᕐᓂᑎᑎᔭᐅᑦᑎᐊᓂᕐᑐᑦ ᐅᖅᓯᐊᓗᖅᑐᑎᖅᓂᖅᓴᖏᓪᓂ (CDL-3) ᖃᐅᔨᔫᖅᑕᐅᓚᐅᖅᑐᖅ ᐊᑐᖅᑐᑎ hydrocarbon ᖃᐅᔨᔫᐅᑎᓄᑦ. ᖃᐅᔨᔫᐅᑎᑦ ᓇᓗᓇᐃᖅᓯᓚᐅᖅᑐᑦ ᐃᒥᖅ ᐃᓗᐊᓂᑐᓄ ᐃᒥᖁᓄᑦ ᐊᑐᐃᖅᓯᒪᔪᓄᑦ ᐱᐅᓂᖓᓄ ᐳᓚᕐᓂᓄ ᑎᑎᕐᓭᑕᐅᓯᒪᔪᑦ ᐃᒥᓗᑦ ᓚᐃᔨᔪᒥᑦ, ᐃᓚᖓ D. ᓇᒡᒐᓄᖅᑐᑦ ᐊᒻᒪ ᐊᑲᓴᖓᐊᑦ ᑎᑎᕐᓭᑕᐅᓯᒪᔪᑦ ᖃᐅᔨᔫᐅᑎᑦ ᖃᐅᔨᔫᖅᑕᐅᓚᐅᖅᑎᓪᓗᑎᑦ ᑕძᔨᔫᐅᑎᑕᐅᔪᑦ **ᐃᓚᒍᑦᖓ D.**

ᒪᖁᑐᑦ ძᓚᖅᐅᔪᑦ / ძᓚᑎᑕᐅᔪᑦ ᐊᐸᑎᒍᑦ ᐅᐸᓂ CAM-3 2021–ᒥᑦ:

- 6-ᐋᑲᕈᓯ-2021, ᓄᓇᑦᓯᐊᖅ–ᓄᓇᕗᑦ ძᓚᔪᖅᑐᖅᓄᑦ ᓀᔨᐅᑎᖅᓖ 2021-333: ᖁᓕᓭᖅᑐᖅ ᓯᓕᓗᑦᓖᖓᓂ ᐊᐅᓕᓭᑎᑦᑎᓂᕐᑎᓐᓂᖅᓖᓄ ᒥᓕᓗᐊᑭᑎᖅᓖᓄ ძᓚᓂᖅᑎᑦᑎᓂᓕᒫᖅᑐᖅ 8 ᓕᒋᓂ ᐅᖅᓯᐊᓗᑦᑭ ᖃᖓᑕᒋᖅᓯᐅᑦᒥᑦ (Jet-A1).A ᒥᓕᓗᐊᑭᑦ ᓴᓇᔨᐅᓕᒫᖅᑐᖅ ᐊᒻᒪ ᓇᐋᐅᖅᑐᑦ ᐊᐱᖅᑕᐅᓕᓗᓂ ᐊᒻᒪ ᐃᓗᓕᓕᖅᑐᓗᓂ ᓴᓗᒪᔪᑦ.
- 20-ᓄᘁᐱᑦ-2021, ᓄᓇᑦᓯᐊᖅ–ᓄᓇᕗᑦ ძᓚᔪᖅᑐᖅᓄᑦ ᓀᔨᐅᑎᖅᓖ 2021-472: ᐊᐅᓕᔪᓇᐃᓕᓕᓂᖓᓐᓂ ᐳᓵᓕᓗᖅᑐᑦ ᓴᖅᔪᑎᑦᑎᓵᔨᖏᓐᓄᑦ ძᓚᑎᑦᑎᓕᐅᖅᑐᑦ 450 lbs CO2–ᓂᑦ. ᓇᒡᒐᓂᖓ ᐲᖅᑕᐅᓕᓗᓂ ᐊᒻᒪ ᐃᓗᓕᓕᖅᑕᐅᖅᑎᓂᖅᓂᖅᑐᖅ ᓴᓗᒪᔪᑦ.

ძᓚᔪᖅᑐᖅᓄᑦ ᑐᐊᘁᓴᖅᑐᖅᓄᑦ ᐸᓴᐅᑦ ᐊᑐᓕᖅᑎᑦᑎᐊᓕᐅᖅᑐᖅ.

ᐱᓯᓕᐊᑎᑕᐅᔪᓂᑦ ᐅᑎᖅᑎᑦᑎᓂᓕᒫᑦ ᐃᖅᑲᓇᐃᔨᖅᑐᑎᓂᖅᓴᖏᓪᓂ ᐱᖁᔭᓐᓄᑦ ᐱᖁᔭᓐᓄᑦ ᐅᖅᓯᐊᓗᖅᑐᑎᖅᓂᖅᓴᖏᓪᓂ ᐊᑦᑕᓇᖅᑐᑦ ᐊᑦᑕᑯᐃᑦ.

EXECUTIVE SUMMARY

This 2021 Annual Report for the Nunavut Water Board (NWB) has been prepared by Raytheon Canada (RC) for the Department of National Defence in order to meet the requirements of Part B "General Conditions", paragraph 1 of its licence 8BC-SHE1929. This report covers 01 January to 31 December 2021.

RC is the Operations and Maintenance (O&M) Contractor for the North Warning System (NWS) including CAM-3. CAM-3 is an unattended (unmanned) North Warning System radar site located at Shepherd Bay, Nunavut. The site is visited quarterly for preventive maintenance inspections and as required for other work by RC staff from CAM-M, Cambridge Bay, Nunavut.

A total of 71.3 cubic meters (m^3) was drawn from the water supply lake in 2021. This is below the annual maximum of 1,440 m^3 allowed by the licence.

Hazardous waste and waste oil were sent to a approved hazardous waste disposal sites outside of Nunavut as required by the licence. The hazardous waste consisted two crates of waste batteries and 44 drums of assorted waste (waste fuel, waste oil, etc.).

Non-hazardous domestic solid waste was disposed of through a contract with the Hamlet of Cambridge Bay at the local landfill. RC has documented authorization from the community for receiving the waste.

Prior to discharge, water contained in the berms of the fuel storage facilities was assessed using hydrocarbon test strips. The test strips confirmed the water was within the effluent quality limits listed in the water licence, Part D. The coordinates and the photo log of the test strips after analysis are shown in **Annex D**

Two spills / releases to the environment occurred at CAM-3 in 2021:

- 6-Aug-2021, NT-NU Spill# 2021-333: A leaking line on a transfer pump caused a spill of 8 L of Jet-A1. The pump was repaired and the area was excavated and backfilled with clean fill.
- 20-Nov-2021, NT-NU Spill# 2021-472: A malfunction of a cylinder actuator caused a release of 450 lbs of CO2. The area was ventilated and the actuator repaired.

The Spill Contingency Plan was successfully implemented.

No progressive reclamation work was completed at CAM-3.

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LIST OF FIGURES

1.0 INTRODUCTION

This 2021 Annual Report for the Nunavut Water Board (NWB) has been prepared by Raytheon Canada (RC) for the Department of National Defence in order to meet the requirements of Part B "General Conditions", paragraph 1 of its licence 8BC-SHE1929 issued on 01 September 2019. This report covers 01 January to 31 December 2021.

RC is the Operations and Maintenance (O&M) Contractor for the North Warning System (NWS) including CAM-3. CAM-3 is an unattended (unmanned) North Warning System radar site located at Shepherd Bay, Nunavut. The site is visited quarterly for preventive maintenance inspections and as required for other work by RC staff from CAM-M, Cambridge Bay, Nunavut.

1.1 Report Details

Licensee:	Department of National Defence, Government of Canada
Licence:	8BC-SHE1929 – Type "B"
Location:	CAM-3 North Warning System Site, Shepherd Bay, Kitikmeot Region, Nunavut
Report Prepared by:	Alaina Leslie and reviewed by Don Beattie Raytheon Canada, 22-Mar-2022
Time period covered:	01 January to 31 December 2021

2.0 WATER USE

A total of 71.3 cubic meters (m^3) was drawn from the water supply lake in 2021. The daily water usage was below the maximum of 299 m^3 per day allowed by the licence. The total water used in 2021 was below the threshold set in the licence of 1,440 m^3 per year. See Table 2-1 for the volume of water drawn at CAM-3 each month in 2021.

Table 2-1: Monthly Raw Water Usage at CAM-3 in 2021

Month	Raw water usage (m^3)
January	0
February	0
March	0
April	0
May	0
June	0
July	31.9
August	31
September	8.4
October	0
November	0
December	0
TOTAL	**71.3**

3.0 HAZARDOUS WASTE AND WASTE OIL DISPOSAL

Hazardous waste and waste oil were sent to approved hazardous waste disposal facilities outside of Nunavut as required by the licence. The hazardous waste was shipped to Qikiqtaaluk Environmental, through their subcontractor Veolia, 2630, boul. Industriel, Chambly, QC J3L 4V2.

The hazardous waste consisted of 44 drums of assorted waste (oil, fuel, glycol, etc.), and two crates of waste batteries.

See Table 3-1, below, for the list of items sent for disposal. See **Annex A** for the shipping document including the completed movement documents for waste regulated under the Transportation of Dangerous Goods Regulations (TDGR) and non-regulated waste.

Table 3-1: Hazardous Waste and Waste Oil Sent for Disposal from CAM-3 in 2021

Description	TDG shipping name	Movement Document	Manifest #	Quantity
Waste batteries, wet, filled with acid	Waste Batteries, Wet, Filled With Acid	2539517-9	44181,42123	2 Crates
Waste Fuel, Aviation, Turbine Engine	Waste Fuel, Aviation, Turbine Engine	2539517-9	44037,44178	2 Drums
Waste Fuel, Aviation, Turbine Engine Mixture	Waste Fuel, Aviation, Turbine Engine Mixture	2539517-9	44037,44178	4 Drums
Waste tank bottom water/ tank cleaning effluent	Waste Fuel, Aviation, Turbine Engine Mixture	2539517-9	44034	4 Drums
Waste Jet A1 fuel filters	Waste Solids Containing Flammable Liquid, N.O.S. (Fuel, Aviation, Turbine Engine)	2539517-9	42122	1 Drum
Waste oily rags	Waste Solids Containing Flammable Liquid, N.O.S. (Fuel, Aviation, Turbine Engine)	2539517-9	44173,42117, 42122	4 Drums
Waste POL soaked absorbent	Waste Solids Containing Flammable Liquid, N.O.S. (Fuel, Aviation, Turbine Engine)	2539517-9	42117	1 Drum
Waste paint flammable	Waste Paint	2539517-9	42118	1 Drum
Waste Asbestos-containing Material	Not Regulated	2539518-7	42120,42121	3 Drums
Waste glycol (drum)	Not Regulated	2539518-7	42124	4 Drums
Waste glycol filters	Not Regulated	2539518-7	42119	1 Drum
Waste oil filters	Not Regulated	2539518-7	42119	1 Drum
Waste oil	Not Regulated	2539518-7	44036,44174, 44179,42092, 42094	18 Drums

4.0 NON-HAZARDOUS SOLID WASTE DISPOSAL

Non-hazardous domestic solid waste was flown from CAM-3 to CAM-M and disposed of through a contract with the Municipality of Cambridge Bay at the local landfill. RC has documented authorization from the community for receiving the waste.

See Table 4-1 for the quantity of waste generated.

Table 4-1: Non-hazardous Domestic Solid Waste Sent for Disposal from CAM-3 in 2021

Month	Waste Generated (kg)
January	0
February	0
March	0
April	0
May	0
June	168
July	544
August	447
September	120
October	0
November	0
December	319
TOTAL	**1,598**

5.0 MONITORING PROGRAM

In 2021 a monitoring program was implemented at CAM-3 as required by the water licence.

The monitoring program included the following:

1. Volume of raw water drawn from the water Supply Lake (SHE-1). The raw water monitoring information is shown in **Section 2.0 Water Use**. The volume of water drawn was within the limit stated in the water licence.
2. Quality of sewage discharged from the final discharge point of the sewage disposal facility (SHE-2). The location of the sewage effluent outfall is shown in **Annex B: Sewage Effluent Outfall (CDL-2) Location with Coordinates**, including coordinates. A sump for the sewage outfall was constructed in 2010.

   The sewage outfall was not discharged in 2021 and therefore no samples were required. **Annex C: Analysis of Discharged Sewage Effluent** has been left blank**.**.
3. Accumulated rain and meltwater contained in the berms of fuel storage facilities was analyzed with hydrocarbon test strips and confirmed to be within the effluent quality limits listed in the water licence, Part D, prior to discharge (SHE-3). The coordinates of the facilities are shown in **Annex D: Location of Bermed Fuel Storage Facilities**.
4. Final Discharge Point from the Landfarm (SHE-4). No landfarm has been established at CAM-3, so this monitoring station remains inactive.

6.0 SPILLS (UNAUTHORIZED DISCHARGES)

Date, NT-NU Spill #	Product	Quantity	Cause and follow-up action	On-site location
6-Aug-2021, NT-NU Spill# 2021-333	JET-A1	10 L	On 06-Aug-2021, personnel on-site were conducting fuel transfer when they noticed a leaking line on the portable pump resulting in a 8 L spill of Jet-A1. The technicians shut off the pump as soon as they noticed the spill. The spill contaminated an area of 1 sq. m. The contaminated gravel was shoveled and transferred into a containment drums for off-site disposal.	Helipad (Fuel transfer pump for heli bladder) (68°47’34”N, 93°26’22”W)
20-Nov-2021, NT-NU Spill# 2021-472	CO2	204 kg	On 20Nov2021, technicians at CAM-3 were working on the Remote Integrated Communications Control (RICC) fire system. Technicians were removing actuators on the CO2 cylinders when a releasing pin activated and caused the CO2 cylinders to discharge. Personnel were able to vacate the area, the room was properly ventilated and there were no injuries. It was determined that about 450lbs of CO2 discharged from the reserve bank.	PGS Area (68°47'34.2"N 93°26'24.5"W)

7.0 REVISIONS TO THE SPILL CONTINGENCY PLAN

The Spill Contingency Plan was updated on 20-Jul-21. An updated copy of the Spill Contingency Plan has been submitted to the NWB with this annual report.

8.0 PROGRESSIVE RECLAMATION WORK UNDERTAKEN

No progressive reclamation work was undertaken in 2021.

9.0 ACRONYMS

Table 9-1: Acronyms

Acronym	Definition
CO2	Carbon Dioxide
n.o.s.	Not Otherwise Specified
NWB	Nunavut Water Board
NWS	North Warning System
O&M	Operations and Maintenance
RC	Raytheon Canada

Acronym	Definition
TDGR	Transportation of Dangerous Goods Regulations

Annex A.Hazardous Waste and Waste Oil Disposal in 2021

The 2021 Movement Document for TDG Regulated waste and non-TDG Regulated waste (as previously described in Table 3-1) are included in the following pages.

1. Movement Document 2539517-9
2. Movement Document 2539518-7

MOVEMENT DOCUMENT / MANIFEST
DOCUMENT DE MOUVEMENT / MANIFESTE

2539518-7
2539517-9-5

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Instructions for completion and distribution on reverse / Instructions pour compléter et distribuer au verso

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MOE 04-1917 (07/01)

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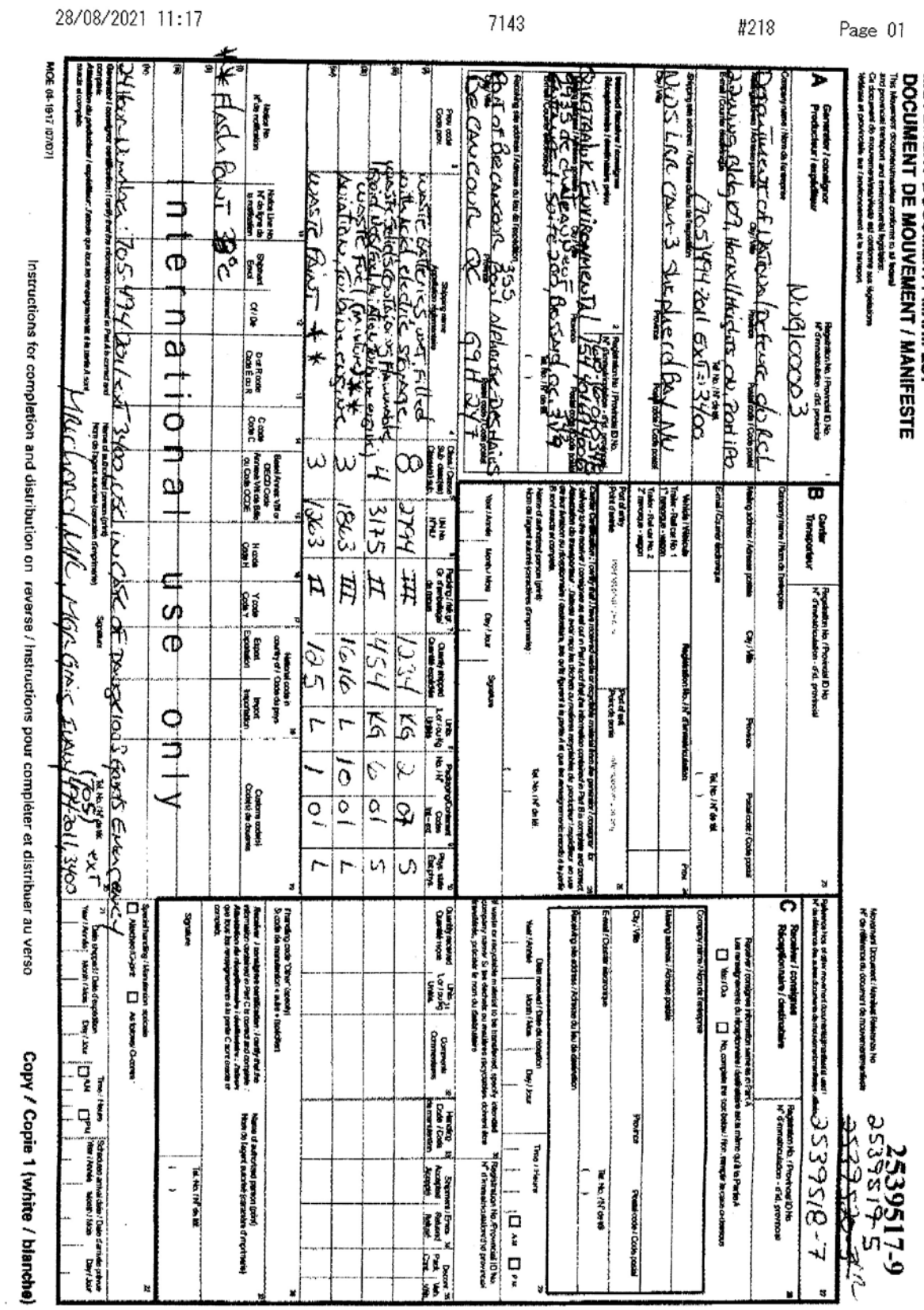

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MOVEMENT DOCUMENT / MANIFEST
DOCUMENT DE MOUVEMENT / MANIFESTE

2539517-9

MOE 04-1917 (07/07)

Instructions for completion and distribution on reverse / Instructions pour compléter et distribuer au verso

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Annex B.Sewage Effluent Outfall (CDL-2) Location with Coordinates

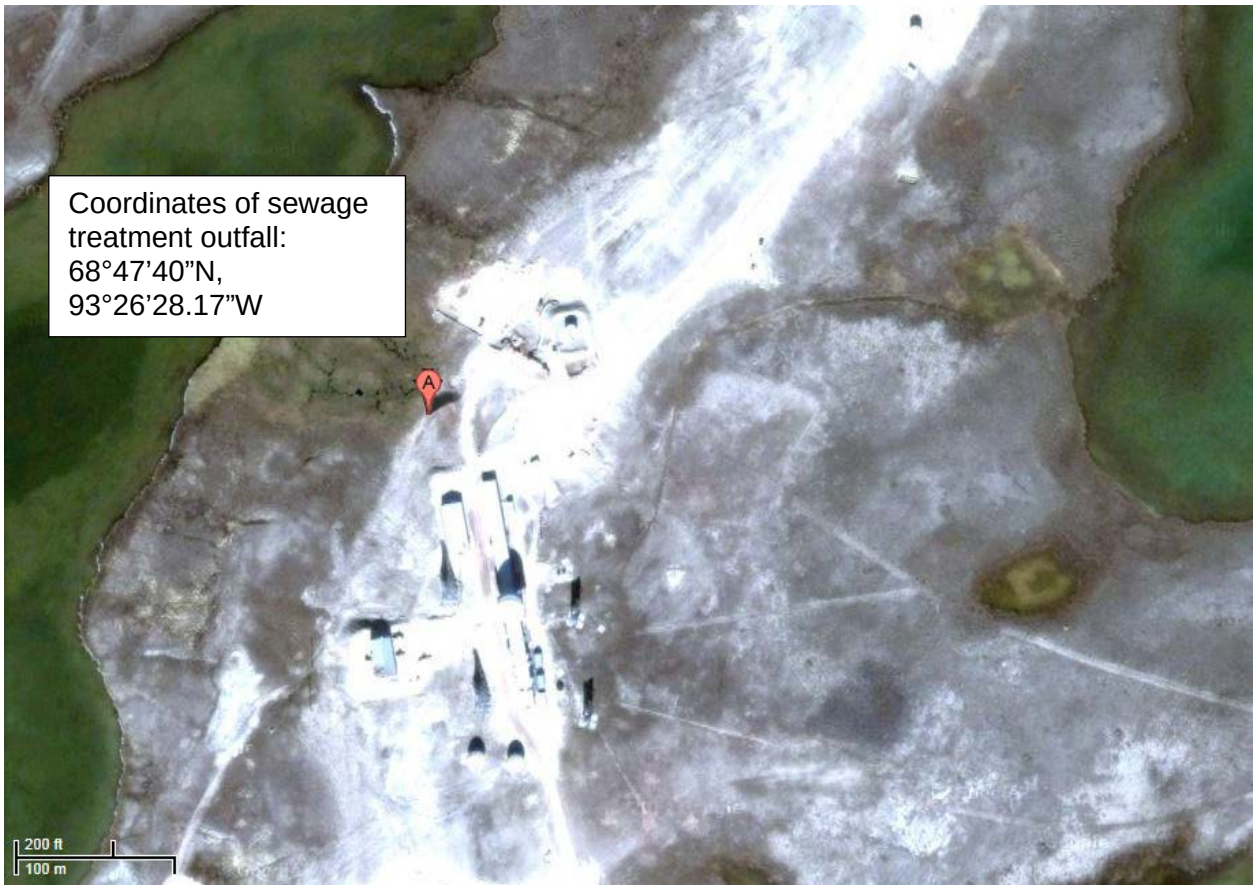

Figure B-1: Coordinates of sewage outfall: 68°47’40”N, 93°26’28.17”W

Annex C. Analysis of Discharged Sewage Effluent

The sewage outfall was not discharged in 2021 and therefore sampling was not required. This annex has been left blank.

Annex D. Location of Bermed Fuel Storage Facilities

Table D-1, below, shows the locations of the bermed facilities.

Table D-1: Location of Bermed Fuel Storage Facilites at CAM-3

Berm	Location on-site	Discharge Latitude[1]	Discharge Longitude	Date
SHE W22A	Summit	68°47'42.00"N	93°26'19.58"W	12-Jul-21
SHE W22D	Beach	68°48'07.82"N	93°36'50.12"W	12-Jul-21

[1] Final discharge point of bermed fuel storage facility

Annex E. Analysis of Berm Water

The berm water[2] at CAM-3 was tested 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 in pages which follow.

The following documents are enclosed:

1. Hydrocarbon Test Strip Photo Log

[2] Effluent from bermed fuel storage facilities.

Photo Log of Hydrocarbon Test Strips

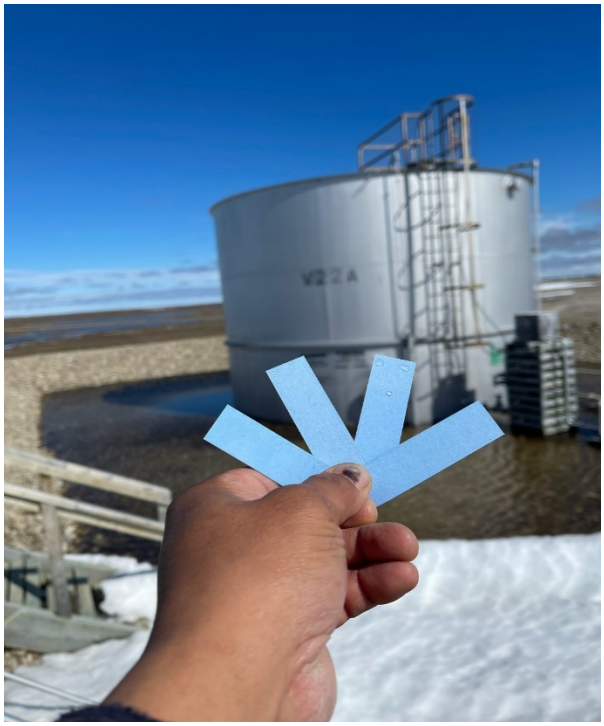

Photo E 1: Hydrocarbon test strips used in berm of tank W22A (12-Jul-2021)

Photo E 2: Hydrocarbon test strips used in berm of tank W22D (12-Jul-2021)