



# **2018 ANNUAL NUNAVUT WATER BOARD REPORT FOR BAF-3 FOR THE North Warning System**

Contract # W8485-100224/001/NX  
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## EXECUTIVE SUMMARY

This 2018 Annual Report for the Nunavut Water Board (NWB) has been prepared by Raytheon Canada Limited (RCL) for the Department of National Defence in order to meet the requirements of the licence issued 10 September 2009 3BC-BAF0919 – Type “B”, Part B “General Conditions”, paragraph 1. This report covers the period from 01 January to 31 December 2018.

RCL is the Operation and Maintenance Contractor for the North Warning System (NWS), including BAF-3, the unattended (unmanned) North Warning System radar site located on Brevoort Island, Nunavut. The site is visited quarterly by RCL staff based out of Iqaluit, Nunavut for preventive maintenance inspections and as required for other work.

A total of 345.5 cubic meters was drawn from the water supply lake. This is below the annual maximum of 1,750 cubic meters allowed by the current licence.

Fuel tanks within the berms were demolished in 2012 and 2013, and the berms were intentionally breached in 2012 and 2015. No effluent (berm water) samples were taken in 2018.

Hazardous waste and waste oil were sent to an approved hazardous waste disposal facility 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 shipped from BAF-3 in 2018 consisted of 53 drums, 1 crate of waste of waste batteries, and 1 crate of unused battery acid.

Non-hazardous domestic solid waste was flown out to the Logistics Support Site in Iqaluit and disposed of at Iqaluit's landfill. RCL has documented authorization from the community for receiving the waste.

No unauthorized discharges to the environment at BAF-3 in 2018.

The Spill Contingency Plan was updated on 29-Mar-2018.

Groundwater monitoring activities (BAF-5) of the 2015 Jet A1 spill continued in 2018.



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## 1.0 INTRODUCTION

This 2018 Annual Report for the Nunavut Water Board (NWB) has been prepared by Raytheon Canada Limited (RCL) for the Department of National Defence in order to meet the requirements of the licence issued 10 September 2009 3BC-BAF0919 – Type “B”, Part B “General Conditions”, paragraph 1. This report covers the period from 01 January to 31 December 2018.

RCL is the Operations and Maintenance Contractor for the North Warning System (NWS), including BAF-3, the unattended (unmanned) North Warning System radar site located on Brevoort Island, Nunavut. The site is visited quarterly by RCL staff based in Iqaluit for preventive maintenance inspections and as required for other work.

## 1.1 Report Details

Licensee: Department of National Defence, Government of Canada  
Licence: 3BC-BAF0919 – Type “B”  
Location: BAF-3 North Warning System Site, Brevoort Island, Qikiqtani Region, Nunavut  
Report Prepared by: Raytheon Canada Limited, 05-Feb-2019  
Time period covered: 01 January to 31 December 2018

## 2.0 WATER USE

A total of 863.1 cubic meters was drawn from the water supply lake. This is below the annual maximum of 1,750 cubic meters allowed by the current licence. See Table 2-1 for the volume of raw water drawn at BAF-3 in 2018.

Table 2-1: Monthly Raw Water Usage at BAF-3 in 2018

Month	Raw water usage (m <sup>3</sup> )
January	0
February	0
March	0
April	0
May	0
June	0
July	345.5
August	0
September	0
October	0
November	0
December	0
<b>TOTAL</b>	<b>345.5</b>

## 3.0 HAZARDOUS WASTE AND WASTE OIL DISPOSAL

Hazardous waste and waste oil from BAF-3 were sent to an approved hazardous waste disposal facility outside of Nunavut as required by the licence. The hazardous waste was shipped to Qikiqtaaluk Environmental, through their subcontractor Veolia. See Table 3-1 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 NWS Manifests for



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non-regulated waste. The hazardous waste shipped from BAF-3 in 2018 consisted of 53 drums, 1 crate of waste of waste batteries, and 1 crate of unused battery acid.

**Table 3-1: Hazardous Waste and Waste Oil Sent for Disposal from BAF-3 in 2018**

Description, TDG shipping name	Quantity	Movement Document or Manifest #
Waste tank bottom water/ tank cleaning effluent	14 Drums	Movement Document 2539182-2
Waste fuel, aviation, turbine engine mixture		
Waste Jet A1 fuel	11 Drums	Movement Document 2539182-2
Waste fuel, aviation, turbine engine		
Waste batteries, wet, filled with acid	1 Crate	Movement Document 2539182-2
Waste Jet A1 fuel and water mixture	6 Drums	Movement Document 2539182-2
Waste fuel, aviation, turbine engine mixture		
Waste Jet A1 fuel soaked sorbent	2 Drums	Movement Document 2539183-0
Waste solids containing flammable liquids, n.o.s (fuel, aviation, turbine engine)		
Waste Sulfuric Acid	1 Crate	Movement Document 2539182-2
Waste Glycol soaked absorbent		
Not TDG Regulated	2 Drums	NWS Manifest TCN38802
Waste glycol (drum)		
Not TDG Regulated	8 Drums	NWS Manifest TCN38804, TCN38810, TCN38828
Waste oil		
Not TDG regulated	6 Drums	NWS Manifest TCN38829, TCN38807, TCN38808
Waste oil filters		
Not TDG regulated	4 Drums	NWS Manifest TCN38831, TCN38832

#### 4.0 NON-HAZARDOUS SOLID WASTE DISPOSAL

Non-hazardous domestic solid waste was flown out to the Logistics Support Site in Iqaluit and disposed of at Iqaluit's landfill. RCL 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 BAF-3 in 2018**

Month	Waste Generated (kg)
January	0
February	0
March	45
April	231
May	227
June	354
July	689

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Month	Waste Generated (kg)
August	91
September	218
October	204
November	227
December	159
<b>TOTAL</b>	<b>2,445</b>

## 5.0 MONITORING PROGRAM

In 2018, a monitoring program was implemented at BAF-3 as required by the water licence, Part J. The monitoring program included the following:

1. Volume of raw water drawn from the water Supply Lake (BAF-1). The information gathered from this requirement 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 (BAF-2). The location of the sewage effluent outfall is shown in **Annex C**, including coordinates. A sump for the sewage outfall was constructed in 2010. The sewage outfall sump was sampled three times in 2018. The results are shown in **Annex D: Analysis of Discharged Sewage Effluent**.
3. Fuel tanks within the berms were demolished in 2012 and 2013, and the berms were intentionally breached in 2012 and 2015. As there are no intact berms, no effluent (berm water) samples (BAF-4) were taken in 2018, **Annex E: Analysis of Berm Water** has been left blank.
4. Groundwater monitoring activities (BAF-5) of the 2007 Jet A1 spill ended in 2015 as per the recommendation by Stantec Consulting Ltd. Groundwater monitoring of the 2015 Jet A1 spill continued in 2018. A summary of the work completed in 2018 is included in **Annex F: Monitoring Activities**.

## 6.0 SPILLS (UNAUTHORIZED DISCHARGES)

Date, NT-NU Spill #	Product	Quantity	Cause and follow-up action	On-site location
No unauthorized discharges to the environment at BAF-3 in 2018.				

## 7.0 REVISIONS TO THE SPILL CONTINGENCY PLAN

The Spill Contingency Plan was updated on 29-Mar-2018. An updated copy of the Spill Contingency Plan was submitted to the NWB with the application for water licence renewal.

## 8.0 PROGRESSIVE RECLAMATION WORK UNDERTAKEN

2018 was the Fourth year of clean-up following the 19-Mar-2015 fuel spill. Environmental staff mobilized to the site from 11-Jul-2018 to 14-Jul-2018 and from 05-Aug-2018 to 03-Sep-2018. A summary of the work completed in 2018 is included in **Annex F: Monitoring Activities**.





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## 9.0 ACRONYMS

Table 9-1: Acronyms

Acronym	Definition
NWB	Nunavut Water Board
NWS	North Warning System
NWSO	North Warning System Office
PCB	Polychlorinated Biphenyl
RCL	Raytheon Canada Limited
TDGR	Transportation of Dangerous Goods Regulations



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## ANNEX A: HAZARDOUS WASTE AND WASTE OIL DISPOSAL IN 2018

The 2018 Movement Documents for TDG Regulated waste and NWS Manifests for non-TDG Regulated waste described in Table 3-1 are below.

### MOVEMENT DOCUMENT / MANIFEST DOCUMENT DE MOUVEMENT / MANIFESTE

This Movement document/manifest conforms to all federal and provincial transport and environmental legislation.  
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

Movement Document / Manifest Reference No.  
N° de référence du document de mouvement/manifeste

2539182-2

<b>A Generator / consigneur</b> Producteur / expéditeur Registration No. / Provincial ID No. N° d'immatriculation - d'Id. provincial <b>NUG 100003</b>		<b>B Carrier</b> Transporteur Registration No. / Provincial ID No. N° d'immatriculation - d'Id. provincial		<b>Reference Nos. of other movement document(s) used /</b> N° de référence des autres documents de mouvement/manifeste utilisés	
Company name / Nom de l'entreprise <b>DEPARTMENT OF NATIONAL DEFENCE</b>		Company name / Nom de l'entreprise		<b>C Receiver / consignee</b> Réceptionnaire / destinataire Registration No. / Provincial ID No. N° d'immatriculation - d'Id. provincial	
Mailing address / Adresse postale City / Ville Province Postal code / Code postal <b>22 WING BLDG 109 HORNELL HEIGHTS ON PCH 1P0</b>		Mailing address / Adresse postale City / Ville Province Postal code / Code postal		Receiver / consignee information same as in Part A Les renseignements du réceptionnaire / destinataire est le même qu'à la Partie A <input type="checkbox"/> Yes / Oui <input type="checkbox"/> No, complete the box below / Non, remplir la case ci-dessous	
E-mail / Courriel électronique Tel. No. / N° de tél. <b>105-494-2011 ext. 2861</b>		E-mail / Courriel électronique Tel. No. / N° de tél. <b>105-494-2011 ext. 2861</b>			
Shipping site address / Adresse du lieu d'expédition City / Ville Province Postal code / Code postal <b>WALSLEY ROAD (BREVORT ISLAND BAF-3)</b>		Vehicle / Véhicule Trailer - Rail car No. 1 1 <sup>re</sup> remorque - wagon Trailer - Rail car No. 2 2 <sup>e</sup> remorque - wagon Registration No. / N° d'immatriculation Prov.		Company name / Nom de l'entreprise	
Intended Receiver / consignee Réceptionnaire / destinataire prévu Registration No. / Provincial ID No. N° d'immatriculation - d'Id. provincial <b>CHIKITA LUK ENVIRONMENTAL</b>		Port of entry Point d'entrée International use only Port of exit Point de sortie International use only		Mailing address / Adresse postale City / Ville Province Postal code / Code postal	
Mailing address / Adresse postale City / Ville Province Postal code / Code postal <b>2630 BOUL INDUSTRIEL</b>		Center Certification: I certify that I have received waste or recyclable material from the generator / consigneur for delivery to the receiver / consignee as set out in Part A and that the information contained in Part B is complete and correct. Attestation du transporteur: J'atteste avoir reçu les déchets ou matières recyclables du producteur / expéditeur en vue de leur livraison au réceptionnaire / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.		E-mail / Courriel électronique Tel. No. / N° de tél. <b>105-494-2011 ext. 2861</b>	
E-mail / Courriel électronique Tel. No. / N° de tél. <b>105-494-2011 ext. 2861</b>		Name of authorized person (print) Nom de l'agent autorisé (caractères d'imprimerie): <b>RODNEY IVES</b>		Receiving site address / Adresse du lieu de destination City / Ville Province Postal code / Code postal <b>CHAMBLY QC</b>	
Receiving site address / Adresse du lieu de destination City / Ville Province Postal code / Code postal <b>CHAMBLY QC</b>		Year / Année Month / Mois Day / Jour <b>2018 01 29</b>		Date received / Date de réception Year / Année Month / Mois Day / Jour <b>2018 01 29</b>	
Prev. code Code prov.		Shipping name Appellation réglementaire		Quantity received Quantité reçue	
(i) Waste batteries, wet filled with acid		Class / Classe Sub. class(es) Chen(s) de subs.		Units Unités	
(ii) Waste battery fluid, ACW		UN No. N°NU		Comments Commentaires	
(iii) Waste fuel, aviation turbine engine		Packing / risk gr. Gr. d'emballage / de risque		Handling Code / Code de manipulation	
(iv) Waste fuel, aviation turbine engine mixture		Quantity shipped Quantité expédiée		Shipment / Envoi Accepted / Refusé	
Flash Point 38°C.		Units Unités		Decom. / Décont. Pack. / Veh.	
Notice No. N° de notification		Base/Annex VIII or OECD Code		If handling code "Other" (specify) Si code de manipulation « autre » (spécifier)	
Notice Line No. N° de ligne de la notification		H code Code H		Receiver / consignee certification: I certify that the information contained in Part C is correct and complete. Attestation du réceptionnaire / destinataire: J'atteste que tous les renseignements à la partie C sont exacts et complets.	
D or R code Code E ou R		Y code Code Y		Name of authorized person (print) Nom de l'agent autorisé (caractères d'imprimerie): <b>RODNEY IVES</b>	
C code Code C		Export Exportation		Signature Tel. No. / N° de tél. <b>105-494-2011 ext. 2861</b>	
D or R code Code E ou R		Import Importation		Special handling / Manipulation spéciale <input type="checkbox"/> Attached / Ci-joint: <input type="checkbox"/> As follows / Ci-dessous:	
C code Code C		Customs code(s) Code(s) de douanes		Date shipped / Date d'expédition Year / Année Month / Mois Day / Jour <b>2018 01 29</b>	
Generator / consigneur certification: I certify that the information contained in Part A is correct and complete. Attestation du producteur / expéditeur: J'atteste que tous les renseignements à la partie A sont exacts et complets.		Name of authorized person (print) Nom de l'agent autorisé (caractères d'imprimerie): <b>RODNEY IVES</b>		Time / Heure A.M. P.M. <b>11 09 29</b>	
		Signature <b>RODNEY IVES</b>		Scheduled arrival date / Date d'arrivée prévue Year / Année Month / Mois Day / Jour	

MOE 04-1917 (07/07)

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

Copy / Copie 1 (white / blanche)

Figure 1: Movement Document 2539182-2

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MOVEMENT DOCUMENT / MANIFEST  
DOCUMENT DE MOUVEMENT / MANIFESTE

This Movement document/manifest conforms to all federal and provincial transport and environmental legislation.  
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

2539183-0

Movement Document / Manifest Reference No.  
N° de référence du document de mouvement/manifeste

<b>A Generator / consigneur</b> Producteur / expéditeur Registration No. / Provincial ID No. N° d'immatriculation - d'id. provincial NUG 100003		<b>B Carrier</b> Transporteur Registration No. / Provincial ID No. N° d'immatriculation - d'id. provincial		<b>27</b> Reference Nos. of other movement document(s) used / N° de référence des autres documents de mouvement/manifeste utilisés	
Company name / Nom de l'entreprise DEPARTMENT OF NATIONAL DEFENCE 46 RCL Mailing address / Adresse postale 22 WING BLVD 109 HOLBELL HEIGHTS ONTARIO City / Ville Tel. No. / N° de tél. 105-494-2011 ext. 3861		Company name / Nom de l'entreprise		<b>C Receiver / consignee</b> Réceptionnaire / destinataire Registration No. / Provincial ID No. N° d'immatriculation - d'id. provincial	
Shipping site address / Adresse du lieu de l'expédition NWSLSS ISLAND (BREVETED ISLAND) BAR-3 City / Ville Tel. No. / N° de tél. 105-494-2011 ext. 3861		Mailing address / Adresse postale City / Ville Province Postal code / Code postal		Receiver / consignee information same as in Part A Les renseignements du réceptionnaire / destinataire est la même qu'à la Partie A <input type="checkbox"/> Yes / Oui <input type="checkbox"/> No, complete the box below / Non, remplir la case ci-dessous	
Intended Receiver / consignee Réceptionnaire / destinataire prévu CHAMBLAY ENVIRONMENTAL Mailing address / Adresse postale 230 BOUL INDUSTRIEL City / Ville Tel. No. / N° de tél. 536 402		Vehicle / Véhicule Trailer - Rail car No. 1 1 <sup>er</sup> remorque - wagon Trailer - Rail car No. 2 2 <sup>e</sup> remorque - wagon		Company name / Nom de l'entreprise Mailing address / Adresse postale City / Ville Province Postal code / Code postal E-mail / Courriel électronique Tel. No. / N° de tél.	
Receiving site address / Adresse du lieu de l'expédition City / Ville Province Postal code / Code postal		Port of entry / Port d'entrée International use only Port of exit / Port de sortie International use only		Date received / Date de réception Year / Année Month / Mois Day / Jour Time / Heure <input type="checkbox"/> A.M. <input type="checkbox"/> P.M.	
Prov. code Code prov.		Shipping name Appellation réglementaire Waste Solids Containing Flammable Liquid, nes. (Used Aviation Turbine Engine)		If waste or recyclable material to be transferred, specify intended company name / Si les déchets ou matières recyclables doivent être transférés, préciser le nom du destinataire	
UN No. N° UN		Quantity shipped Quantité expédiée 500		Registration No. / Provincial ID No. N° d'immatriculation / d'id. provincial	
Class / Classé (Sub. class) / (Sub. classé)		Units Unités K		Quantity received Quantité reçue	
H code Code H		Y code Code Y		Comments Commentaires	
National code in country of / Code du pays		Export Exportation		Handling Code / Code de manipulation	
Import Importation		Customs code(s) Code(s) de douanes		Shipment / Envoi Accepted / Refused	
Notice No. N° de notification		Notice Line No. N° de ligne de la notification		If handling code "Other" (specify) Si code de manipulation « autre » (spécifier)	
Shipment Envoyé		Of / De		Receiver / consignee certification: I certify that the information contained in Part C is correct and complete. Attestation du réceptionnaire / destinataire: J'atteste que tous les renseignements à la partie C sont exacts et complets.	
D or R code Code E ou R		C code Code C		Name of authorized person (print) Nom du représentant autorisé (inscrivez l'imprimé)	
Based Annex VII or OECD Code Annexe VII de l'OCDE		H code Code H		Signature Tel. No. / N° de tél.	
Y code Code Y		Export Exportation		Special handling / Manipulation spéciale <input type="checkbox"/> Attached / Joindre: <input type="checkbox"/> As follows / Comme ci:	
Import Importation		Customs code(s) Code(s) de douanes		Date shipped / Date d'expédition Year / Année Month / Mois Day / Jour Time / Heure <input type="checkbox"/> A.M. <input type="checkbox"/> P.M.	
Generator / consigneur certification: I certify that the information contained in Part A is correct and complete. Attestation du producteur / expéditeur: J'atteste que tous les renseignements à la partie A sont exactes et complets.		Name of authorized person (print) Nom du représentant autorisé (inscrivez l'imprimé) Rodney Ives		Scheduled arrival date / Date d'arrivée prévue Year / Année Month / Mois Day / Jour	

MOE 04-1917 (07/07)

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

Copy / Copie 1 (white / blanche)

Figure 2: Movement Document 2539183-0

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## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

Filled By: PSHEPPARD		Date: Sep 27, 2018, 1:19 PM		TCN-38802		
Ship To: QIKIQTAALUK ENVIRONMENTAL (QE) C/O VEOLIA 2630, BOUL. INDUSTRIEL CHAMBLY, QC, J3L 4V2 1-866-634-6367		From: BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818			Priority <b>0</b>	
Attention:		Attention:				
Carrier: NEAS	Routing:	Waybill #:	Total Pcs. 1	Total Weight: 600 LBS		
QTY Order	Type	Line Weight	Item	Description	WO or PO B/Code or S/N	Remarks
0						*Original Asset 349538 was duplicated on TCN 38600. Created new Asset 350464.
2		3005411		WASTE - GLYCOL SOAKED ABSORBEN		ASSET 349538 / 349550
NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.						Received By: _____ Date _____
						Received By: _____ Date _____

Figure 3: NWS Shipping Manifest TCN-38802



## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

Filled By: PSHEPPARD		Date: Sep 27, 2018, 1:22 PM		TCN-38804		
Ship To: QIKIQTAALUK ENVIRONMENTAL (QE) C/O VEOLIA 2630, BOUL. INDUSTRIEL CHAMBLY, QC, J3L 4V2 1-866-634-6367		From: BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818			Priority <b>0</b>	
Attention:		Attention:				
Carrier: NEAS	Routing:	Waybill #:	Total Pcs. 1	Total Weight: 1700 LBS		
QTY Order	Type	Line Weight	Item	Description	WO or PO B/Code or S/N	Remarks
4		2002344		WASTE - GLYCOL (DRUM)		ASSET 345335 / 348998 / 348999 / 348149
NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.						Received By: _____ Date _____
						Received By: _____ Date _____

Figure 4: NWS Shipping Manifest TCN-38804

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SOW Ref: 16.F.5.d



## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

Filled By: PSHEPPARD		Date: Sep 27, 2018, 1:27 PM		TCN-38807		
Ship To: QIKIQTAAALUK ENVIRONMENTAL (QE) C/O VEOLIA 2630, BOUL. INDUSTRIEL CHAMBLY, QC, J3L 4V2 1-866-634-6367		From: BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818		Priority <b>0</b>		
Attention:		Attention:				
Carrier: NEAS	Routing:	Waybill #:	Total Pcs. 1	Total Weight: 800 LBS		
QTY Order	Type	Line Weight	Item	Description	WO or PO B/Code or S/N	Remarks
0						*Original Asset 341703 was listed as a Communications Cable (item 4001333) on TCN 38807. Created new Asset 350460.
2		2002406		WASTE - OIL, 45 GAL		ASSET 350460 / 345333
NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.						Received By: _____ Date _____
						Received By: _____ Date _____

Figure 5: NWS Shipping Manifest TCN-38807



## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

Filled By: PSHEPPARD		Date: Sep 27, 2018, 1:29 PM		TCN-38808		
Ship To: QIKIQTAAALUK ENVIRONMENTAL (QE) C/O VEOLIA 2630, BOUL. INDUSTRIEL CHAMBLY, QC, J3L 4V2 1-866-634-6367		From: BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818		Priority <b>0</b>		
Attention:		Attention:				
Carrier: NEAS	Routing:	Waybill #:	Total Pcs. 1	Total Weight: 800 LBS		
QTY Order	Type	Line Weight	Item	Description	WO or PO B/Code or S/N	Remarks
2		2002406		WASTE - OIL, 45 GAL		ASSET 346588 / 346587
NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.						Received By: _____ Date _____
						Received By: _____ Date _____

Figure 6: NWS Shipping Manifest TCN-38808

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SOW Ref: 16.F.5.d



## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

Filled By: PSHEPPARD		Date: Sep 27, 2018, 1:32 PM		TCN-38810	
Ship To: QIKIQAALUK ENVIRONMENTAL (QE) C/O VEOLIA 2630, BOUL. INDUSTRIEL CHAMBLY, QC, J3L 4V2 1-866-634-6367		From: BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818		Priority <b>0</b>	
Attention:		Attention:			
Carrier: NEAS		Routing:		Waybill #: Total Pcs. Total Weight:	
				1 850 LBS	
QTY	Type	Line	Item	Description	WO or PO B/Code or S/N Remarks
Order		Weight			
2		2002344		WASTE - GLYCOL (DRUM)	ASSET 349000 / 349001
NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.					
				Received By:	Date
				Received By:	Date

Figure 7: NWS Shipping Manifest TCN-38810



## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

Filled By: PSHEPPARD		Date: Sep 28, 2018, 2:19 PM		TCN-38828	
Ship To: QIKIQAALUK ENVIRONMENTAL (QE) C/O VEOLIA 2630, BOUL. INDUSTRIEL CHAMBLY, QC, J3L 4V2 1-866-634-6367		From: BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818		Priority <b>0</b>	
Attention:		Attention:			
Carrier: NEAS		Routing:		Waybill #: Total Pcs. Total Weight:	
				1 850 LBS	
QTY	Type	Line	Item	Description	WO or PO B/Code or S/N Remarks
Order		Weight			
2		2002344		WASTE - GLYCOL (DRUM)	ASSET 346932 / 346931
NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.					
				Received By:	Date
				Received By:	Date

Figure 8: NWS Shipping Manifest TCN-38828

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SOW Ref: 16.F.5.d



## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

Filled By: PSHEPPARD		Date: Sep 28, 2018, 2:20 PM		TCN-38829		
Ship To: QIKIQTAAALUK ENVIRONMENTAL (QE) C/O VEOLIA 2630, BOUL. INDUSTRIEL CHAMBLY, QC, J3L 4V2 1-866-634-6367		From: BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818		Priority <b>0</b>		
Attention:		Attention:				
Carrier: NEAS	Routing:	Waybill #:	Total Pcs. 1	Total Weight: 800 LBS		
QTY Order	Type	Line Weight	Item	Description	WO or PO B/Code or S/N	Remarks
2			2002406	WASTE - OIL, 45 GAL		ASSET 348126 / 345333
0						*Original Asset 345333 was duplicated on TCN 38807. Created new Asset 350461.
NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.				Received By:	Date	
				Received By:	Date	

Figure 9: NWS Shipping Manifest TCN-38829



## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

Filled By: PSHEPPARD		Date: Sep 28, 2018, 2:23 PM		TCN-38831		
Ship To: QIKIQTAAALUK ENVIRONMENTAL (QE) C/O VEOLIA 2630, BOUL. INDUSTRIEL CHAMBLY, QC, J3L 4V2 1-866-634-6367		From: BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818		Priority <b>0</b>		
Attention:		Attention:				
Carrier: NEAS	Routing:	Waybill #:	Total Pcs. 1	Total Weight: 550 LBS		
QTY Order	Type	Line Weight	Item	Description	WO or PO B/Code or S/N	Remarks
2			2002356	WASTE - OIL FILTERS		ASSET 345334 / 340466
NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.				Received By:	Date	
				Received By:	Date	

Figure 10: NWS Shipping Manifest TCN-38831

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SOW Ref: 16.F.5.d



## SHIPPING MANIFEST

Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8

NON NEGOTIABLE

<b>Filled By:</b> PSHEPPARD		<b>Date:</b> Sep 28, 2018, 2:27 PM		<b>TCN-38832</b>	
<b>Ship To:</b> QIKIQTAAALUK ENVIRONMENTAL (QE) C/O VEOLIA  2630, BOUL. INDUSTRIEL  CHAMBLY, QC, J3L 4V2  1-866-634-6367		<b>From:</b> BAF-3, BREVOORT ISLAND, DND Storeroom Raytheon Canada Limited, NWS LSS Iqaluit, P.O. Box 1089 Iqaluit, NU, X0A 0H0 867-979-4818		<b>Priority</b>  <b>0</b>	
<b>Attention:</b>		<b>Attention:</b>			
<b>Carrier:</b> NEAS		<b>Routing:</b>		<b>Waybill #:</b>	
				<b>Total Pcs.</b> 1	
				<b>Total Weight:</b> 550 LBS	
<b>QTY</b>	<b>Type</b>	<b>Line</b>	<b>Item</b>	<b>Description</b>	<b>Remarks</b>
<b>Order</b>		<b>Weight</b>			
0					*Original Asset 340363 was listed as an RF Amplifier in NC-USAF (item 1070692) on TCN 38832. Created new Asset 350459.
2		2002356		WASTE - OIL FILTERS	ASSET 350459 / 349350
<b>NOTE: All claims related to this shipment have to be filled with Raytheon within 45 hours of receipt.</b>					<b>Received By:</b>
					<b>Date</b>
					<b>Received By:</b>
					<b>Date</b>

Figure 11: NWS Shipping Manifest TCN-38832

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## ANNEX B: LOCATION OF LANDFILL WITH COORDINATES



Coordinates of Landfill Location: 63° 20' 30.00"N, 64° 10' 02.00"W



## ANNEX C: SEWAGE EFFLUENT OUTFALL (BAF-2) LOCATION WITH COORDINATES



Coordinates of Sewage Outfall Location (BAF-2): 63° 20' 21.40"N, 64° 09' 26.63"W



## ANNEX D: ANALYSIS OF DISCHARGED SEWAGE EFFLUENT

The sewage outfall sump was sampled three times in 2018. The samples were analysed for the parameters listed in the water licence Part J, Item 3.

Table D-1: Summary of Analysis of Discharged Sewage Effluent at BAF-3 in 2018

Sample Date	Parameter				
	pH	Oil and Grease (Present - P / Absent - A)	Biological Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)	Faecal Coliforms
24-Jul-18	7.86	A	334	70	422,333,333
26-Aug-18	7.28	A	402	249	192,000
25-Oct-18	7.33	A	534	965	3,990,000



Environment Testing

### Certificate of Analysis

Client: Raytheon Canada Limited Ottawa  
400 Cooper St.  
Ottawa, ON  
K2P 2H8  
Attention: Mr. Will Wyman  
PO#: 002160-OT  
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1813439  
Date Submitted: 2018-07-31  
Date Reported: 2018-08-08  
Project:  
COC #: 183355

Group		Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry		BOD5	1	mg/L		1377652 Sewage
		pH	1.00			2018-07-24 Sewage Lagoon BAF3 (1)
		Total Suspended Solids	2	mg/L		
Oil and Grease		Oil & Grease - Mineral	1	mg/L		
		Oil & Grease - Non-mineral	1	mg/L		
		Oil & Grease - Total	1	mg/L		
		Visible Sheen		P/A		

Guideline = \* = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted.  
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Figure 12: 24-Jul-2018 sewage effluent results, Page 1 of 2

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**Environment Testing**

**Certificate of Analysis**

Client: Raytheon Canada Limited Ottawa  
400 Cooper St.  
Ottawa, ON  
K2P 2H8  
Attention: Mr. Will Wyman  
PO#: 002160-OT  
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1813436  
Date Submitted: 2018-07-31  
Date Reported: 2018-08-02  
Project:  
COC #: 183355

				Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1377636 Sewage  2018-07-24 Sewage Lagoon BAF-3 A	1377637 Sewage  2018-07-24 Sewage Lagoon BAF-3 B	1377638 Sewage  2018-07-24 Sewage Lagoon BAF-3 C
Group	Analyte	MRL	Units	Guideline			
Others	Faecal Coliforms	0	ct/100mL		463000000	398000000	406000000

Figure 13: 24-Jul-2018 sewage effluent results, Page 2 of 2





Environment Testing

Certificate of Analysis

Client: Raytheon Canada Limited Ottawa  
400 Cooper St.  
Ottawa, ON  
K2P 2H8  
Attention: Mr. Will Wyman  
PO#: 002160-OT  
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1815572  
Date Submitted: 2018-08-29  
Date Reported: 2018-09-07  
Project: BAF-3  
COC #: 162787

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	BOD5	1	mg/L		1384074 Sewage
	pH	1.00			2018-08-26 B3 Sewage
	Total Suspended Solids	2	mg/L		
Oil and Grease	Oil & Grease - Mineral	1	mg/L		
	Oil & Grease - Non-mineral	1	mg/L		
	Oil & Grease - Total	1	mg/L		
	Visible Sheen		P/A		

Guideline = \* = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted.  
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

146 Colonnade Rd. Unit 8, Ottawa, ON K2E 7Y1

Page 2 of 3

Figure 14: 26-Aug-2018 sewage effluent results, Page 1 of 2



Environment Testing

Certificate of Analysis

Client: Raytheon Canada Limited Ottawa  
400 Cooper St.  
Ottawa, ON  
K2P 2H8  
Attention: Mr. Will Wyman  
PO#: 002160-OT  
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1815525  
Date Submitted: 2018-08-29  
Date Reported: 2018-08-30  
Project: BAF-3  
COC #: 162787

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
Others	Faecal Coliforms	0	ct/100mL		1383887 Sewage 2018-08-26 B3 Sewage 4

Figure 15: 26-Aug-2018 sewage effluent results, Page 2 of 2

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Environment Testing

**Certificate of Analysis**

Client: Raytheon Canada Limited Ottawa  
400 Cooper St.  
Ottawa, ON  
K2P 2H8  
Attention: Mr. Will Wyman  
PO#: 002160-OT  
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1819861  
Date Submitted: 2018-10-31  
Date Reported: 2018-11-07  
Project:  
COC #: 837383

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
					1396340 Sewage
Group	Analyte	MRL	Units	Guideline	
General Chemistry	BOD5	1	mg/L		534
	pH	1.00			7.33
	Total Suspended Solids	2	mg/L		965
Oil and Grease	Oil & Grease - Mineral	1	mg/L		33
	Oil & Grease - Non-mineral	1	mg/L		49
	Oil & Grease - Total	1	mg/L		82
	Visible Sheen		P/A		A

Guideline = \* = Guideline Exceedence  
Results relate only to the parameters tested on the samples submitted.  
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

146 Colonnade Rd. Unit 8, Ottawa, ON K2E 7Y1

Page 2 of 3

Figure 16: 25-Oct-2018 sewage effluent results, Page 1 of 2

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**Environment Testing**

**Certificate of Analysis**

Client: Raytheon Canada Limited Ottawa  
400 Cooper St.  
Ottawa, ON  
K2P 2H8  
Attention: Mr. Will Wyman  
PO#: 002160-OT  
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1819854  
Date Submitted: 2018-10-31  
Date Reported: 2018-11-01  
Project:  
COC #: 837383

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.		
Group	Analyte	MRL	Units	Guideline			
Others	Faecal Coliforms	0	ct/100mL			1396323 Sewage 2018-10-25 BAF3 #2	1396324 Sewage 2018-10-25 BAF3 #3
						3910000	4070000

Figure 17: 25-Oct-2018 sewage effluent results, Page 2 of 2

## ANNEX E: ANALYSIS OF BERM WATER<sup>1</sup>

Fuel tanks within the berms were demolished in 2012 and 2013, and the berms were intentionally breached in 2012 and 2015. As there are no intact berms, no effluent (berm water) samples (BAF-4) were taken in 2018 and this section has been left blank.

<sup>1</sup> Effluent from bermed fuel storage facilities.



## **ANNEX F: MONITORING ACTIVITIES**

A Jet A1 fuel release was discovered at the North Warning System BAF-3 radar station (Site) located on Brevoort Island, Nunavut, Canada on March 19, 2015. The tank involved in the release was immediately isolated by closing valves, an investigation was conducted to determine the extent of the release, and plans to address the release were prepared. Over the subsequent four summer field seasons of 2015 through 2018, extensive actions were taken to recover the released fuel, define the nature and extent of the release and remediate subsurface impacts.

Progress made to date has achieved several goals, including but not limited to:

1. completing an extensive additional soil, soil vapor, and water investigation to define the nature and extent of petroleum hydrocarbon impacts; this includes establishing and completing on-site laboratory testing and analyses;
2. ensuring minimal migration of non-aqueous phase liquid (NAPL) using engineering controls and booms in drainages;
3. construction and operation of soil vapor extraction (SVE) systems in two distinct areas of the release;
4. maximizing NAPL/fuel recovery, treatment, and analysis of recovered NAPL for reuse on-Site;
5. conducting soil treatment pilot testing, treatment evaluations, and construction of the soil treatment pile; and
6. construction, operation, and maintenance of a water treatment system to enable extracting subsurface water to mitigate migration of fuel and enhance recovery while maintaining compliance of discharge limits in the Site Water License. To date, over 11,200 liters (L) (2958 gallons [gal]) of NAPL has been recovered and collection and over 2,410,678 L (636,834 gal) of petroleum hydrocarbon contaminated water has been collected and treated.

Progress made during the 2018 field season achieved several goals and bolstered the pathway to Site closure, including but not limited to:

- Completing additional soil and water investigation to confirm continued attenuation of residual impacts and confirm the effectiveness of remediation programs implemented since the release in 2015;
- The deployment and application of additional hydrogen peroxide solutions in the RW-1 area, southern drainage, and northern drainage to remediate PHCs in place. A total of 6,050 L of hydrogen peroxide solution were injected and applied during the 2018 field season;
- Continued use of on-Site laboratory testing and analyses of soil allowing for real-time delineation and monitoring of remediation programs;
- Preparation of recovered mixed fuel/water waste for transport and off-Site disposal; and
- Continued mitigation of potential NAPL migration using engineering controls and booms in drainages.