



# **2017 ANNUAL NUNAVUT WATER BOARD REPORT FOR DYE-M FOR THE North Warning System**

Contract # W8485-100224/001/NX  
SOW Ref: 16.F.5.d

Document Number  
FM-EHS-13, Rev 2, 12-Feb-2018

**Prepared for**  
**North Warning System & Assoc. Projects**  
Aerospace Equipment Program Directorate  
455 Blvd de la Carrière  
11<sup>th</sup> Floor  
Gatineau, Québec  
K1A 0K2

**Prepared by**

**Raytheon**  
**Canada Limited**

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

**Warning: Information Subject to Export Control Laws** — This document (and/or software, if applicable) may contain export-restricted data whose export/transfer/disclosure is restricted by U.S. and Canadian law. Dissemination to non U.S. persons whether in United States or abroad requires an export license or other authorizations from the United States and Canadian Governments.



## CHANGE HISTORY

This sheet is a record of each issue of this document. When the revised document is issued, the previous issue is automatically superseded.

Revision	Date	Author	Pages Changed	Reason for Change
1	21-Jan-2015	W. Wyman	All	Initial Document Release
2	12-Feb-2018	W. Wyman	All	Updated formatting





## EXECUTIVE SUMMARY

This 2017 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-DYE0919 – Type “B”, Part B “General Conditions”, paragraph 1. This report covers the period of 01 January to 31 December 2017.

RCL is the Operation and Maintenance Contractor for the North Warning System (NWS), including DYE-M, the unattended (unmanned) North Warning System radar site located at Cape Dyer, Nunavut. The site is visited quarterly by RCL staff based in Iqaluit for preventive maintenance inspections and as required for other work.

A total of 29.4 cubic meters was drawn from the raw water sources. In 2017, all water was taken from the melt-water water source, DYE-1(b). This is below the annual maximum of 1,440 cubic meters allowed by the licence.

The water contained in the berms of fuel storage facilities was sent for laboratory analysis and confirmed to be within effluent quality limits before the water was pumped out of the berms.

Hazardous waste was removed from DYE-M for disposal outside of Nunavut in 2017. The hazardous waste was shipped to Safety Kleen, 2730 Boulevard Industriel, Chambly, QC, J3L 4V2. The hazardous waste consisted of 40 drums of assorted waste (oil, fuel, glycol, etc.) and 2 crates of waste batteries.

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.

There were no spills into the environment at DYE-M in 2017.



## TABLE OF CONTENTS

Change History .....	2
Executive Summary .....	4
Table of Contents .....	5
List of Tables .....	5
List of Figures .....	5
1.0 Introduction .....	6
1.1 Report Details .....	6
2.0 Water Use .....	6
3.0 Hazardous Waste and Waste Oil Disposal .....	6
4.0 Non-Hazardous Solid Waste Disposal .....	8
5.0 Monitoring Program .....	8
6.0 Spills (Unauthorized Discharges) .....	8
7.0 Revisions to the Spill Contingency Plan .....	9
8.0 Progressive Reclamation Work UnderTaken .....	9
9.0 Acronyms .....	9
Annex A: Hazardous Waste and Waste Oil Disposal in 2017 .....	10
Annex B: Sewage Outfall Location (DYE-2) with Co-ordinates .....	15
Annex C: Analysis of Discharged Sewage Effluent .....	16
Annex D: Location of Berm Fuel Storage Facilities and Analysis of Berm Water .....	18

## LIST OF TABLES

Table 2-1: Monthly Raw Water Usage at DYE-M in 2017 .....	6
Table 3-1: Hazardous Waste and Waste Oil Sent for Disposal from DYE-M in 2017 .....	7
Table 4-1: Non-hazardous Domestic Solid Waste Sent for Disposal from DYE-M in 2017 .....	8
Table 9-1: Acronyms .....	9
Table D-1: Analysis of Berm Water at DYE-M in 2017 .....	18

## LIST OF FIGURES

Figure 1: Movement Document 2539175-6 .....	10
Figure 2: Movement Document 2539176-4 .....	11
Figure 3: NWS Shipping Manifest TCN-35705 .....	12
Figure 4: NWS Shipping Manifest TCN-35713 .....	12
Figure 5: NWS Shipping Manifest TCN-35714 .....	13
Figure 6: NWS Shipping Manifest TCN-35716 .....	13
Figure 7: NWS Shipping Manifest TCN-35717 .....	14
Figure 8: NWS Shipping Manifest TCN-35721 .....	14
Figure 9: DYE W20A berm water laboratory results, page 1 of 2 .....	19
Figure 10: DYE W20A berm water laboratory results, page 2 of 2 .....	19



## 1.0 INTRODUCTION

This 2017 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-DYE0919 – Type “B”, Part B. General Conditions, paragraph 1. This report covers the period from 01 January to 31 December 2017.

RCL is the Operation and Maintenance Contractor for the North Warning System (NWS), including DYE-M, the unattended (unmanned) North Warning System radar site located at Cape Dyer, 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-DYE0919 – Type “B”  
Location: DYE-M North Warning System Site, Cape Dyer, Qikiqtani Region, Nunavut  
Report Prepared by: Raytheon Canada Limited, 15-Mar-2017  
Time period covered: 01 January to 31 December 2017

## 2.0 WATER USE

A total of 29.4 cubic meters was drawn from the raw water sources. In 2017, all water was taken from the melt-water water source, listed in the licence as “DYE-1(b)”. This is below the annual maximum of 1,440 cubic meters allowed by the licence. See Table 2-1 for the volume of raw water drawn at DYE-M in 2017.

Table 2-1: Monthly Raw Water Usage at DYE-M in 2017

Month	Raw water usage (m <sup>3</sup> )
January	0
February	0
March	0
April	0
May	0
June	8
July	10.9
August	7.1
September	1.1
October	0
November	2.3
December	0
<b>TOTAL</b>	<b>29.4</b>

## 3.0 HAZARDOUS WASTE AND WASTE OIL DISPOSAL

Hazardous waste and waste oil were sent to an approved hazardous waste disposal site outside of Nunavut as required by the licence. The hazardous waste was shipped to Safety Kleen, 2730 Boulevard Industriel, Chambly, QC, J3L 4V2. See Table 3-1 for the list of items sent for disposal.



UNCLASSIFIED

SOW Ref: 16.F.5.d

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 non-regulated waste. The hazardous waste consisted of 40 drums of assorted waste (oil, fuel, glycol, etc.) and 2 crates of waste batteries.

**Table 3-1: Hazardous Waste and Waste Oil Sent for Disposal from DYE-M in 2017**

Description, TDG shipping name	Quantity	Movement Document or Manifest #
Waste batteries, wet, filled with acid	1 Crate	Movement Document 2539500-5
Waste batteries, wet, non-spillable	1 Crate	Movement Document 2539500-5
Waste Jet A1 fuel	1 Drum	Movement Document 2539500-5
Waste fuel, aviation, turbine engine		
Waste Jet A1 fuel soaked sorbent	1 Drum	Movement Document 2539500-5
Waste solids containing flammable liquids, n.o.s (fuel, aviation, turbine engine)		
Waste tank bottom water/ tank cleaning effluent	17 Drums	Movement Document 2539500-5
Waste fuel, aviation, turbine engine mixture		
Waste oily rags	2 Drums	Movement Document 2539501-3
Waste solids containing flammable liquids, n.o.s (fuel, aviation, turbine engine)		
Waste Paint related materials, flammable	1 Drum	Movement Document 2581513-5
Waste paint related materials		
Waste glycol (drum)	3 Drums	NWS Manifest 36908, 36903
Not TDG Regulated		
Waste oil	14 Drums	NWS Manifest 36904, 36908, 36909, 36914, 36918
Not TDG regulated		
Waste oil filters	1 Drum	NWS Manifest 36909
Not TDG regulated		

UNCONTROLLED WHEN PRINTED



#### 4.0 NON-HAZARDOUS SOLID WASTE DISPOSAL

Non-hazardous domestic solid waste was flown out to the Logistics Support Site in Iqaluit and was 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 DYE-M in 2017**

Month	Waste Generated (kg)
January	0
February	125
March	0
April	68
May	136
June	816
July	91
August	0
September	0
October	227
November	136
December	34
<b>TOTAL</b>	<b>1,633</b>

#### 5.0 MONITORING PROGRAM

In 2017, a monitoring program was implemented at DYE-M as required by the water licence, Part I. The monitoring program included the following:

1. Volume of raw water drawn from the water Supply Lake (DYE-1a) and the melt water source (DYE-1b). The information from this monitoring program is shown in **Section 2.0 Water Use**. The 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 (DYE-2). The location of the sewage effluent outfall is shown in **Annex B**, including coordinates. A sump for the sewage outfall was constructed in 2010. The sewage outfall sump was sampled once in 2017. The results are shown in **Annex C: Analysis of Discharged Sewage Effluent**.
3. Quality of the water contained in the berms of fuel storage facilities prior to discharge (DYE-3) was analyzed 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 **Annex D: Location of Bermmed Fuel Storage Facilities and Analysis of Berm Water**. All samples met the effluent requirements of the water licence, Part D.

#### 6.0 SPILLS (UNAUTHORIZED DISCHARGES)

Date, NT-NU Spill #	Product	Quantity	Cause and follow-up action	On-site location
No spills to the environment at DYE-M in 2017.				





## 7.0 REVISIONS TO THE SPILL CONTINGENCY PLAN

There were no revisions to the Spill Contingency Plan in 2017.

## 8.0 PROGRESSIVE RECLAMATION WORK UNDERTAKEN

No progressive reclamation work was undertaken in 2017.

## 9.0 ACRONYMS

Table 9-1: Acronyms

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



UNCLASSIFIED

SOW Ref: 16.F.5.d

## ANNEX A: HAZARDOUS WASTE AND WASTE OIL DISPOSAL IN 2017

The 2017 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 is conform 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

2539500-5

<b>A Generator / consigneur</b> Producteur / expéditeur Registration No. / Provincial ID No. N° d'immatriculation - d/d provincial 27011824-1 Company name / Nom de l'entreprise Department of National Defence / RCL Mailing address / Adresse postale 22 Wing Bldg 109, Hornell Highway, PO Box 100 City / Ville Tel. No. / N° de tél. E-mail / Courriel électronique 205 494 2011 2861		<b>B Carrier</b> Transporteur Registration No. / Provincial ID No. N° d'immatriculation - d/d provincial 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. Vehicle / Véhicule Trailer - Rail car No. 1 Trailer - Rail car No. 2 Trailer - Rail car No. 3		<b>C Receiver / consignee</b> Réceptionnaire / destinataire Registration No. / Provincial ID No. N° d'immatriculation - d/d provincial 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 destination Date received / Date de réception Year / Année Month / Mois Day / Jour Time / Heure AM / PM	
Shipping site address / Adresse du lieu de l'expédition City / Ville Province Postal code / Code postal NWS LRR DYE-M CAPE DYER NU		Port of entry / Port d'entrée Port of exit / Port de sortie Carrier Certification / Certification du transporteur 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 récepteur / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.		If waste or recyclable material to be transferred, specify intended company name. Si les déchets ou matières recyclables doivent être transférés, précisez le nom du destinataire. Registration No. / Provincial ID No. N° d'immatriculation - d/d provincial	
Intended Receiver / consignee Récepteur / destinataire prévu Registration No. / Provincial ID No. N° d'immatriculation - d/d provincial 27011824-1 Company name / Nom de l'entreprise Safety-Kleen Mailing address / Adresse postale City / Ville Province Postal code / Code postal Clean Harbors, 6785 Route 12, Wille St. Catherine City / Ville Tel. No. / N° de tél. E-mail / Courriel électronique JSCIB6 Receiving site address / Adresse du lieu de destination City / Ville Province Postal code / Code postal 2730 Boulevard Industriel Chambly QC J3L 4V2		Class / Classe Sub. class / Sous-classe Class / Classe UN 2800 UN 2791 UN 1863 Quantity shipped / Quantité expédiée 410 kg 770 kg 3060 L Units / Unités 1 07 S 1 07 S 01 L Packaging / Conteneur Codes 1 07 S 1 07 S 01 L Phys. state / État phys.		Quantity received / Quantité reçue Units / Unités Comments / Commentaires Handling Code / Code de manipulation Shipment / Envoi Accepted / Accepté Refused / Refusé Decom. / Décom.	
Notice No. / N° de notification Flash Point 38°C Notice Line No. / N° de ligne de la notification International use only 24 hour Number: 1613 996 6666 USE IN CASE OF DANGEROUS GOOD EMERGENCY		National code in country of / Code du pays Export / Exportation Import / Importation Customs code(s) / Code(s) de douane If handling code "Other" (specify) / Si code de manipulation "autre" (spécifier) Receiver / consignee certification / I certify that the information contained in Part C is correct and complete / Attestation du récepteur / destinataire : J'atteste que tous les renseignements à la partie C sont exacts et complets. Signature Tel. No. / N° de tél.		Special handling / Manipulation spéciale Attached / Joint As follows / Comme suit Date shipped / Date d'expédition Year / Année Month / Mois Day / Jour Time / Heure AM / PM Scheduled arrival date / Date d'arrivée prévue Year / Année Month / Mois Day / Jour	
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 (casselette d'impression) P. Sheppard Signature Tel. No. / N° de tél. 205 494 2011 2861		Name of authorized person (print) / Nom de l'agent autorisé (casselette d'impression) Signature Tel. No. / N° de tél.		Date shipped / Date d'expédition Year / Année Month / Mois Day / Jour Time / Heure AM / PM 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 / blanc)

Figure 1: Movement Document 2539500-5

UNCONTROLLED WHEN PRINTED

UNCLASSIFIED

**SOW Ref: 16.F.5.d**

**MOVEMENT DOCUMENT / MANIFEST**  
**DOCUMENT DE MOUVEMENT / MANIFESTE**

This Movement document/manifesto 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.

2539501-3

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

[illegible]

**Figure 2: Movement Document 2539501-3**

**UNCONTROLLED WHEN PRINTED**



UNCLASSIFIED

**Raytheon**  
Canada Limited

SOW Ref: 16.F.5.d

**SHIPPING MANIFEST**

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

NON NEGOTIABLE

Filled By: RSTLOUIS		Date: Jul 10, 2017 2:32 PM		TCN-36903	
Ship To: CLEAN HARBORS CANADA INC.  6785 ROUTE 132  SAINTE-CATHERINE, QC, J5C 1B6 CA  450-632-6640		From: DYE-M, CAPE DYER, 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 #: DR-C15856	Total Pcs. 1 PALLET	Total Weight: 511 KGS

QTY Order	Type	Line Weight	Item	Description	WO or PO	B/Code or S/N	Remarks
2			2002344	WASTE - GLYCOL (DRUM)	RETROGRAD		ASSET'S: 344255, 341070.

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-36903

**SHIPPING MANIFEST**

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

NON NEGOTIABLE

Filled By: RSTLOUIS		Date: Jul 10, 2017 2:39 PM		TCN-36904	
Ship To: CLEAN HARBORS CANADA INC.  6785 ROUTE 132  SAINTE-CATHERINE, QC, J5C 1B6 CA  450-632-6640		From: DYE-M, CAPE DYER, 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 #: DR-C15860	Total Pcs. 1 PALLET	Total Weight: 820 KGS

QTY Order	Type	Line Weight	Item	Description	WO or PO	B/Code or S/N	Remarks
4			2002406	WASTE - OIL, 45 GAL	RETROGRAD		ASSET'S: 342621, 342622, 342623, 343984.

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-36904

UNCONTROLLED WHEN PRINTED



UNCLASSIFIED

SOW Ref: 16.F.5.d



SHIPPING MANIFEST						
Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8					NON NEGOTIABLE	
Filled By: RSTLOUIS		Date: Jul 10, 2017 3:21 PM		TCN-36908		
Ship To: CLEAN HARBORS CANADA INC.  6785 ROUTE 132  SAINTE-CATHERINE, QC, J5C 1B6 CA  450-632-6640		From: DYE-M, CAPE DYER, 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 #: DR-C15856	Total Pcs. 1 PALLET	Total Weight: 820 KGS
QTY	Type	Line	Item	Description	WO or PO	B/Code or S/N
3		2002406	WASTE - OIL, 45 GAL		RETROGRAD	ASSET'S: 343852, 339177, 341067.
1		2002344	WASTE - GLYCOL (DRUM)		RETROGRAD	ASSET: 341072.
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-36908



SHIPPING MANIFEST						
Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8					NON NEGOTIABLE	
Filled By: RSTLOUIS		Date: Jul 10, 2017 3:32 PM		TCN-36909		
Ship To: CLEAN HARBORS CANADA INC.  6785 ROUTE 132  SAINTE-CATHERINE, QC, J5C 1B6 CA  450-632-6640		From: DYE-M, CAPE DYER, 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 #: DR-C15856	Total Pcs. 1 PALLET	Total Weight: 309 KGS
QTY	Type	Line	Item	Description	WO or PO	B/Code or S/N
1		2002356	WASTE - OIL FILTERS		RETROGRAD	ASSET: 341069.
1		2002406	WASTE - OIL, 45 GAL		RETROGRAD	ASSET: 341073.
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-36909

UNCONTROLLED WHEN PRINTED



UNCLASSIFIED

SOW Ref: 16.F.5.d



SHIPPING MANIFEST						
Suite 3000, 400 Cooper Street, Ottawa, ON K2P 2H8					NON NEGOTIABLE	
Filled By: RSTLOUIS		Date: Jul 10, 2017 3:54 PM		TCN-36914		
Ship To: CLEAN HARBORS CANADA INC.  6785 ROUTE 132  SAINTE-CATHERINE, QC J5C 1B6 CA  450-632-6640		From: DYE-M, CAPE DYER, 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 #: DR-C15860	Total Pcs. 1 PALLET	Total Weight: 745 KGS
QTY	Type	Line	Item	Description	WO or PO	B/Code or S/N
Order		Weight				Remarks
3			2002406	WASTE - OIL, 45 GAL	RETROGRAD	ASSET'S: 343980, 343982, 328465*
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-36914

Figure 8: NWS Shipping Manifest TCN-36918

UNCONTROLLED WHEN PRINTED





UNCLASSIFIED

SOW Ref: 16.F.5.d

## ANNEX B: SEWAGE OUTFALL LOCATION (DYE-2) WITH CO-ORDINATES



Coordinates of Sewage Outfall Location (DYE-2): 66° 39' 51.26"N, 61° 21' 16.54"W

UNCONTROLLED WHEN PRINTED



UNCLASSIFIED

SOW Ref: 16.F.5.d

## ANNEX C: ANALYSIS OF DISCHARGED SEWAGE EFFLUENT

The sewage outfall sump sampled on 8-Aug-2017. The sample was analysed for the parameters listed in the water licence Part I, Item 3.

Table C-1: Summary of Analysis of Discharged Sewage Effluent at DYE-M in 2017

Sample Date	Parameter				
	pH	Oil and Grease (Present - P / Absent - A)	Biological Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)	Faecal Coliforms
8-Aug-17	7.95	A	947	3640	720000



Environment Testing

### Certificate of Analysis

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

Report Number: 1715296  
Date Submitted: 2017-08-11  
Date Reported: 2017-08-17  
Project: Dye Main West Lagoon  
COC #: 164396

Group		Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry		pH	1.00			1313569 Sewage
		Total Suspended Solids	2	mg/L		2017-08-08 Dye Main West Lagoon
Oil & Grease		Oil & Grease - Mineral	1	mg/L		
		Oil & Grease - Non-mineral	1	mg/L		
		Oil & Grease - Total	1	mg/L		
Subcontract		BOD5	1	mg/L		
Visible Sheen		Visible Sheen		P/A		

Guideline = \* = Guideline Exceedence  
All analysis completed in Ottawa, Ontario (unless otherwise indicated by \*\* which indicates analysis was completed in Mississauga, Ontario).  
Results relate only to the parameters tested on the samples submitted.  
Methods references and/or additional QA/QC information available on request.  
146 Colonnade Rd. Unit 8, Ottawa, ON K2E 7Y1

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

Page 2 of 3

Figure 9: 8-Aug-2017 sewage effluent results, Page 1 of 2

UNCONTROLLED WHEN PRINTED





UNCLASSIFIED

SOW Ref: 16.F.5.d



**Environment Testing**

**Certificate of Analysis**

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

Report Number: 1715297  
Date Submitted: 2017-08-11  
Date Reported: 2017-08-13  
Project: Dye Main West Lagoon  
COC #: 164396

				Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1313570 Sewage - 2017-08-08 Dye Main West Lagoon
Group	Analyte	MRL	Units	Guideline	
Others	Faecal Coliforms	0	ct/100mL		720000

Figure 10: 8-Aug-2017 sewage effluent results, Page 2 of 2

UNCONTROLLED WHEN PRINTED

**ANNEX D: LOCATION OF BERMED FUEL STORAGE FACILITIES AND ANALYSIS OF BERM WATER<sup>1</sup>**

Table D-1: Analysis of Berm Water at DYE-M in 2017

Berm	Maximum concentration of any grab sample (ug/L)	DYE W20A	DYE W22K,J,I &W20B
Location on-site		Summit	Summit
Discharge Latitude <sup>2</sup>		66°40'0.13"N	66°39'53.59"N
Discharge Longitude		61°21'25.76"W	61°21'23.78"W
Date		8-Aug-17	8-Aug-17
pH (pH Units)	6 to 9	7.67	6.7
Oil and Grease (ug/L)	5000	<1000	2000
Arsenic (total) (ug/L)	100	<20	<20
Cadmium (dissolved) (ug/L)	10	<0.1	0.1
Chromium (dissolved) (ug/L)	100	<1	<1
Cobalt (dissolved) (ug/L)	50	<0.2	0.2
Copper (dissolved) (ug/L)	200	<1	<1
Lead (dissolved) (ug/L)	50	<1	<1
Mercury (total) (ug/L)	0.6	<0.1	0.2
Nickel (dissolved) (ug/L)	200	<5	<5
PCB (total) (ug/L)	1000	<0.1	<0.1
Phenols (ug/L)	20	<1	<1
Zinc (total) (ug/L)	500	<40	200
Benzene (ug/L)	370	<0.5	<0.5
Toluene (ug/L)	2	<0.5	<0.5
Ethyl benzene (ug/L)	90	<0.5	<0.5

<sup>1</sup> Effluent from bermed fuel storage facilities.<sup>2</sup> Final discharge point of bermed fuel storage facility



UNCLASSIFIED

SOW Ref: 16.F.5.d



Environment Testing

Certificate of Analysis

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

Report Number: 1715291  
Date Submitted: 2017-08-11  
Date Reported: 2017-08-18  
Project: Dye Main W20A  
COC #: 183366

Lab I.D. 1313564 Sample Matrix Water Sample Type 2017-08-08 Sampling Date Dye Main W20A Sample I.D.				
Group	Analyte	MRL	Units	Guideline
General Chemistry	pH	1.00		6.5-8.5
Mercury	Hg	0.0001	mg/L	MAC 0.001
Metals	Aqua-Regia Digest			Y
	As	0.02	mg/L	MAC 0.010
	Zn	0.04	mg/L	AO 5.0
Oil & Grease	Oil & Grease - Total	1	mg/L	<1
PCBs	Polychlorinated Biphenyls (PCBs)	0.1	ug/L	<0.1
Phenols	Phenols	0.001	mg/L	<0.001
VOCs	Benzene	0.5	ug/L	MAC 5
	Ethylbenzene	0.5	ug/L	MAC 140
	Toluene	0.5	ug/L	MAC 60
VOCs Surrogates (%)	Toluene-d8	0	%	91

Guideline = GCDWG - Canadian Drinking Water \* = Guideline Exceedence

All analysis completed in Ottawa, Ontario (unless otherwise indicated by \*\* which indicates analysis was completed in Mississauga, Ontario).

Results relate only to the parameters tested on the samples submitted.

Methods references and/or additional QA/QC information available on request.

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

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

Page 2 of 5

Figure 11: DYE W20A berm water laboratory 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#:   
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1715292  
Date Submitted: 2017-08-11  
Date Reported: 2017-08-15  
Project: Dye Main W20A  
COC #: 183366

Lab I.D. 1313565 Sample Matrix Water Sample Type 2017-08-08 Sampling Date Dye Main W20A - Dissolved Sample I.D.				
Group	Analyte	MRL	Units	Guideline
Metals	Cd	0.0001	mg/L	MAC 0.005
	Co	0.0002	mg/L	<0.0001
	Cr	0.001	mg/L	<0.0002
	Cu	0.001	mg/L	MAC 0.05
	Ni	0.005	mg/L	AO 1.0
	Pb	0.001	mg/L	<0.001

Figure 12: DYE W20A berm water laboratory results, page 2 of 2

UNCONTROLLED WHEN PRINTED



UNCLASSIFIED

SOW Ref: 16.F.5.d



Environment Testing

**Certificate of Analysis**

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

Report Number: 1715294  
Date Submitted: 2017-08-11  
Date Reported: 2017-08-18  
Project: Dye Main Berm W22K J I W20B  
COC #: 183371

Group		Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry		pH	1.00		6.5-8.5	1313567 Water
Mercury		Hg	0.0001	mg/L	MAC 0.001	2017-08-08 Dye Main Berm W22 J K I W20A
Metals		Aqua-Regia Digest				
		As	0.02	mg/L	MAC 0.010	<0.02*
		Zn	0.04	mg/L	AO 5.0	0.20
Oil & Grease		Oil & Grease - Total	1	mg/L		2
PCBs		Polychlorinated Biphenyls (PCBs)	0.1	ug/L		<0.1
Phenols		Phenols	0.001	mg/L		<0.001
VOCs		Benzene	0.5	ug/L	MAC 5	<0.5
		Ethylbenzene	0.5	ug/L	MAC 140	<0.5
		Toluene	0.5	ug/L	MAC 60	<0.5
VOCs Surrogates (%)		Toluene-d8	0	%		91

Guideline = GCDWQ - Canadian Drinking Water \* = Guideline Exceedence

All analysis completed in Ottawa, Ontario (unless otherwise indicated by \*\* which indicates analysis was completed in Mississauga, Ontario).

Results relate only to the parameters tested on the samples submitted.

Methods references and/or additional QA/QC information available on request.

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

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

Page 2 of 5

Figure 13: DYE W22K, J, I & W20B berm water laboratory 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#:   
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1715293  
Date Submitted: 2017-08-11  
Date Reported: 2017-08-15  
Project: Dye Main Berm W22K J I W20B  
COC #: 183371

Group		Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
Metals		Cd	0.0001	mg/L	MAC 0.005	1313566 Water
		Co	0.0002	mg/L		2017-08-08 Dye Main Berm W22 J K I W20A
		Cr	0.001	mg/L	MAC 0.05	
		Cu	0.001	mg/L	AO 1.0	
		Ni	0.005	mg/L		<0.005
		Pb	0.001	mg/L	MAC 0.010	<0.001

Figure 14: DYE W22K, J, I & W20B berm water laboratory results, page 2 of 2

UNCONTROLLED WHEN PRINTED