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SOW Ref: 16.F.5.d

2017 ANNUAL NUNAVUT WATER BOARD

REPORT FOR FOX-M

FOR THE
North Warning System

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

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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 When the revised document is issued, the previous issue is automatically superseded.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

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EXECUTIVE SUMMARY IN ENGLISH FOLLOWS

3BC-FOH0919, Δεύτερη 10 ΔΛ. Το ίδιο σύμβολο απαντάται στην πλατεία της Αρχαίας Σπάρτης.

FOX-M-Γ^b ΔΓ CDσΔ^b Ο^c ΔΓ ΔΓ^c 2017-Γ. ΔΓ^a ΔΓ^b ΔΓ^c
ΔΓ^c Ο^b CDΔ^b ΔΓ^c ΔΓ^a Safety Kleen, 2730 Boulevard Industriel, Chambly, QC, J3L 4V2. ΔΓ^a ΔΓ^b ΔΓ^c ΔΓ^b CDΔ^c 45-ΔΓ^b ΔΓ^a ΔΓ^c ΔΓ^a ΔΓ^b ΔΓ^c ΔΓ^b ΔΓ^a ΔΓ^c ΔΓ^b ΔΓ^a ΔΓ^c ΔΓ^b



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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-FOH0919 – 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 FOX-M, the attended (manned) NWS radar site located at Hall Beach, Nunavut.

The water usage at FOX-M in 2017 was 1105 cubic meters, which is an average of 3.0 cubic meters per day. 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.

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 discharged treated effluent is of potable water quality. A sample of the treated effluent was sent for laboratory analysis each month in 2017 with the exception of June.

Samples of the water contained in the berms of fuel storage facilities was sent for laboratory analysis and confirmed to be within effluent quality limits of the NWB licence 3BC-FOH0919, Part D, item 10 before the water was pumped out of the berms.

Hazardous waste was removed from FOX-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 45 drums of assorted waste (oil, fuel, glycol, etc.) and 6 bags of unused urea.

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

One outdoor spill occurred at FOX-M in 2017:

NT-NU Spill Line Report Number 17-412. On 08Nov2017, the loader was outside of the garage and failed to start. While attempting to start the loader a small amount of fuel spilled from a hose on the loader outside of the drip tray that was in place during this work. Once started, the loader was moved into the garage to complete the repairs and the impacted snow was cleaned up.

The Spill Contingency Plan was successfully implemented.

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TABLE OF CONTENTS

Change History	2
Executive Summary	4
Table of Contents	5
List of Tables	5
List of Figures	6
1.0 Introduction	7
1.1 Report Details	7
2.0 Water Use	7
3.0 Treated Sewage Discharge	8
4.0 Hazardous Waste and Waste Oil Disposal	9
5.0 Non-Hazardous Solid Waste Disposal	11
6.0 Monitoring Program	11
7.0 Spills (Unauthorized Discharges)	12
8.0 Revisions to the Spill Contingency Plan	12
9.0 Progressive Reclamation Work UnderTaken	12
10.0 Acronyms	12
Annex A: Hazardous Waste and Waste Oil Disposal in 2017	13
Annex B: Treated Sewage Effluent Outfall (FOH-2) Location with Co-ordinates	19
Annex C: Analysis of Treated Sewage Effluent	20
Annex D: Location of Bermed Fuel Storage Facilities and Analysis of Berm Water	43

LIST OF TABLES

Table 2-1: Monthly Raw Water Usage at FOX-M in 2017	7
Table 3-1: Monthly and Annual Volume of Sewage and Grey Water Treated at FOX-M in 2017	9
Table 4-1: Hazardous Waste and Waste Oil Sent for Disposal from FOX-M in 2017	10
Table 5-1: Non-hazardous Domestic Solid Waste Sent for Disposal from FOX-M in 2017	11
Table 10-1: Acronyms	12
Table C-1: Summary of Analysis of Treated Sewage Effluent at FOX-M in 2017	20
Table D-1: Analysis of Berm Water at FOX-M in 2017	43

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LIST OF FIGURES

Figure 1: Movement Document 2581551-5	13
Figure 3: NWS Shipping Manifest TCN-37052	14
Figure 4: NWS Shipping Manifest TCN-37057	15
Figure 5: NWS Shipping Manifest TCN-37070	16
Figure 6: NWS Shipping Manifest TCN-37131	17
Figure 7: NWS Shipping Manifest TCN-37069	18
Figure 24: January 2017, sewage effluent laboratory results page 1 of 2	21
Figure 25: January 2017, sewage effluent laboratory results page 2 of 2	22
Figure 26: February 2017, sewage effluent laboratory results page 1 of 2	23
Figure 27: February 2017, sewage effluent laboratory results page 2 of 2	24
Figure 28: March 2017, sewage effluent laboratory results page 1 of 2	25
Figure 29: March 2017, sewage effluent laboratory results page 2 of 2	26
Figure 30: April 2017, sewage effluent laboratory results page 1 of 2	27
Figure 31: April 2017, sewage effluent laboratory results page 2 of 2	28
Figure 32: May 2017, sewage effluent laboratory results page 1 of 2	29
Figure 33: May 2017, sewage effluent laboratory results page 2 of 2	30
Figure 34: July 2017, sewage effluent laboratory results page 1 of 2	31
Figure 35: July 2017, sewage effluent laboratory results page 2 of 2	32
Figure 36: August 2017, sewage effluent laboratory results page 1 of 2	33
Figure 37: August 2017, sewage effluent laboratory results page 2 of 2	34
Figure 38: September 2017, sewage effluent laboratory results page 1 of 2	35
Figure 39: September 2017, sewage effluent laboratory results page 2 of 2	36
Figure 40: October 2017, sewage effluent laboratory results page 1 of 2	37
Figure 41: October 2017, sewage effluent laboratory results page 2 of 2	38
Figure 42: November 2017, sewage effluent laboratory results page 1 of 2	39
Figure 43: November 2017, sewage effluent laboratory results page 2 of 2	40
Figure 44: December 2017, sewage effluent laboratory results page 1 of 2	41
Figure 45: December 2017, sewage effluent laboratory results page 2 of 2	42
Figure 46: HAL W20D&E berm water laboratory results, page 1 of 2	45
Figure 47: HAL W20D&E berm water laboratory results, page 2 of 2	45
Figure 50: HAL W22B berm water laboratory results, page 1 of 2	46
Figure 51: HAL W22B berm water laboratory results, page 2 of 2	46
Figure 52: HAL W22A berm water laboratory results, page 1 of 2	47
Figure 53: HAL W22A berm water laboratory results, page 2 of 2	48

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UNCLASSIFIED

SOW Ref: 16.F.5.d

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-FOH0919 – 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 FOX-M. FOX-M is an attended (manned) North Warning System radar site located at Hall Beach, Nunavut.

1.1 Report Details

Licensee: Department of National Defence, Government of Canada
Licence: 3BC-FOH0919 – Type “B”
Location: FOX-M North Warning System Site, Hall Beach, 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

The water usage at FOX-M in 2017 was 1,105 cubic meters, which is an average of 3.0 cubic meters per day. See Table 2-1 for raw water usage.

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. The quantity drawn is greater than what is actually used on-site because the water is recirculated to prevent the water line from freezing.

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

Month	Raw water usage (m ³)
January	57
February	37
March	29
April	41
May	92
June	91
July	147
August	125
September	131
October	116
November	87.5
December	151.5
TOTAL	1,105

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SOW Ref: 16.F.5.d

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 for details on sewage effluent monitoring.

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Table 3-1: Monthly and Annual Volume of Sewage and Grey Water Treated at FOX-M in 2017

Month	Volume of sewage and greywater treated then discharged or recycled (m³)
January	57
February	39
March	42
April	41
May	90
June	91
July	147
August	125
September	131
October	111
November	87.5
December	151.5
TOTAL	1,113

4.0 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. The hazardous waste consisted of 45 drums of assorted waste (oil, fuel, glycol, etc.) and 6 bags of unused urea.

See

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Table 4-1 for the list of items sent for disposal.

See Annex A for the shipping documents including the completed movement documents for waste regulated under the Transportation of Dangerous Goods Regulations (TDGR) and NWS Manifests for non-regulated waste.

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SOW Ref: 16.F.5.d

Table 4-1: Hazardous Waste and Waste Oil Sent for Disposal from FOX-M in 2017

Description, TDG shipping name	Quantity	Movement Document or Manifest #
Waste Jet A1 fuel and water mixture	1 Drum	Movement Document 2581551-5
Waste fuel, aviation, turbine engine mixture		
Waste Jet A1 fuel and water mixture	1 Drum	Movement Document 2581551-5
Waste fuel, aviation, turbine engine mixture		
Waste fuel contaminated soil	7 Drums	Movement Document 2581551-5
Waste solids containing flammable liquids, not otherwise specified (n.o.s) (fuel, aviation, turbine engine)		
Waste Jet A1 fuel fuel filters	1 Drum	Movement Document 2581551-5
Waste solids containing flammable liquids, n.o.s (fuel, aviation, turbine engine)		
Waste oily rags	2 Drums	Movement Document 2581551-5
Waste solids containing flammable liquids, n.o.s (fuel, aviation, turbine engine)		
Urea	6 Bags	NWS Manifest 37052
Not TDG Regulated		
Waste activated carbon filter	2 Drums	NWS Manifest 37057
Not TDG Regulated		
Waste glycol (drum)	1 Drum	NWS Manifest 37070
Not TDG Regulated		
Waste oil	29 Drums	NWS Manifest 37070, 37131
Not TDG regulated		
Waste oil filters	1 Drum	NWS Manifest 37069
Not TDG regulated		

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SOW Ref: 16.F.5.d

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 Hall Beach. RCL has documented authorization from the community for receiving the waste. See Table 5-1 for the quantity of non-hazardous waste generated.

Table 5-1: Non-hazardous Domestic Solid Waste Sent for Disposal from FOX-M in 2017

Month	Waste Generated (kg)
January	1,506
February	1,583
March	1,458
April	1,126
May	914
June	1,256
July	1,306
August	1,608
September	1,873
October	1,642
November	1,329
December	1,279
TOTAL	16,880

6.0 MONITORING PROGRAM

In 2017, a monitoring program was implemented at FOX-M as required by the water licence, Part I. 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. The results of the analyses are shown in **Annex C: Analysis of Treated Sewage Effluent**
3. Quality of the water contained in the berms of fuel storage facilities prior to discharge (FOH-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 Bermed Fuel Storage Facilities and Analysis of Berm Water**. All samples met the effluent requirements of the water licence, Part D. No berm water was discharged at FOX-M in 2017.

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SOW Ref: 16.F.5.d

7.0 SPILLS (UNAUTHORIZED DISCHARGES)

Date, NT-NU Spill #	Product	Quantity	Cause and follow-up action	On-site location
08-Nov-2017, Spill # 17-412	Jet A1	1 L	On 08-Nov-2017, the loader was outside of the garage and failed to start. In the process of getting the loader going a small amount of fuel spilled from a hose outside of the drip tray that was in place during this work. Once started, the loader was moved into the garage to complete the repairs and the impacted snow was cleaned up.	Outside Garage (68°45'43.93"N, 81°13'36.23"W)

The Spill Contingency Plan was successfully implemented.

8.0 REVISIONS TO THE SPILL CONTINGENCY PLAN

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

9.0 PROGRESSIVE RECLAMATION WORK UNDERTAKEN

No progressive reclamation work was undertaken in 2017.

10.0 ACRONYMS

Table 10-1: Acronyms

Acronym	Definition
n.o.s	Not Otherwise Specified
NWB	Nunavut Water Board
NWS	North Warning System
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 2017

The 2017 Movement Documents for TDG Regulated waste and NWS Manifests for non-TDG Regulated waste described in

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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: RDUBEAU		Date: Jul 26, 2017 3:59 PM	TCN-37052		
Ship To: SAFETY-KLEEN SERVICES LTD. 7305 BOUL. MARIE-VICTORIN SUITE 200 BROSSARD, QC, J4W 1A6 CA 450-923-9999		From: LSS-F/FOX-M, HALL BEACH, DND Storeroom Raytheon Canada Limited, LSS Hall Beach: P.O. Box 46 Hall Beach, NU, X0A 0K0 867-928-8987			Priority 0
Attention:		Attention:			
Carrier: NEAS		Routing: HALL BEACH NU /VALLEYFIELD QC	Waybill #: DR-C16074	Total Pcs. 6 PCS	Total Weight: 11,723 LBS
QTY Order	Type Line Weight	Item Description	WO or PO	B/Code or S/N	Remarks
1	WOOD 2635	3008881 CHEMICAL, UREA, GRANULAR CRATELBS	CRATE # 8		CRATE# 8 60" X 60" X 54" UREA NON-REGULATED
1	WOOD 1777	3008881 CHEMICAL, UREA, GRANULAR CRATELBS	CRATE # 9		CRATE# 9 60" X 60" X 54" UREA NON- REGULATED
1	WOOD 1355	3008881 CHEMICAL, UREA, GRANULAR CRATELBS	CRATE # 10		CRATE# 10 60" X 60" X 34" UREA NON- REGULATED
1	WOOD 2020	3008881 CHEMICAL, UREA, GRANULAR CRATELBS	CRATE # 11		CRATE# 11 60" X 60" X 45" UREA NON- REGULATED
1	WOOD 2417	3008881 CHEMICAL, UREA, GRANULAR CRATELBS	CRATE # 12		CRATE# 12 60" X 60" X 59" UREA NON- REGULATED
1	WOOD 1549	3008881 CHEMICAL, UREA, GRANULAR CRATELBS	CRATE # 13		CRATE# 13 60" X 60" X 39" UREA NON- REGULATED
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 2: NWS Shipping Manifest TCN-37052

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SHIPPING MANIFEST

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

NON NEGOTIABLE

Filled By: RDUBEAU		Date: Jul 28, 2017 9:14 AM	TCN-37057		
Ship To: SAFETY-KLEEN SERVICES LTD. 7305 BOUL. MARIE-VICTORIN SUITE 200 BROSSARD, QC, J4W 1A6 CA 450-923-9999		From: LSS-F/FOX-M, HALL BEACH, DND Storeroom Raytheon Canada Limited, LSS Hall Beach: P.O. Box 46 Hall Beach, NU, X0A 0K0 867-928-8987			Priority 0
Attention:		Attention:			
Carrier: NEAS		Routing: HALL BEACH NU / VALLEYFIELD QC			Waybill #: DR-C16082 Total Pcs.: 2 PCS Total Weight: 2484 LBS
QTY Order	Type Line Weight	Item Description	WO or PO	B/Code or S/N	Remarks
1	STEEL 1601 DRUMS LBS	2002351 WASTE - ACTIVATED CARBON FILTE	PALLET# 10		PALLET# 10 48" X 48" X 42" WASTE CARBON FILTER NON-REGULATED EIN 345464,345465,345466,3
1	STEEL 883 DRUM LBS	2002351 WASTE - ACTIVATED CARBON FILTE	PALLET# 11		PALLET# 11 40" X 47" X 41" WASTE CARBON FILTER NON-REGULATED EIN 345468,345469
NOTE: All claims related to this shipment have to be filed with Raytheon within 45 hours of receipt.			Received By:	Date	
			Received By:	Date	

Figure 3: NWS Shipping Manifest TCN-37057

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SHIPPING MANIFEST

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

NON NEGOTIABLE

Filled By: RDUBEAU		Date: Jul 29, 2017 9:18 AM	TCN-37070			
Ship To: SAFETY-KLEEN SERVICES LTD. 7305 BOUL. MARIE-VICTORIN SUITE 200 BROSSARD, QC, J4W 1A6 CA 450-923-9999		From: LSS-F/FOX-M, HALL BEACH, DND Storeroom Raytheon Canada Limited, LSS Hall Beach: P.O. Box 46 Hall Beach, NU, X0A 0K0 867-928-8987			Priority 0	
Attention:		Attention:				
Carrier: NEAS		Routing: HALL BEACH NU / VALLEYFIELD QC		Waybill #: DR-C16082, DR-C160898	Total Pcs. 7 PCS	Total Weight: 12,600 LBS
QTY Order	Type Line Weight	Item 1800	Description 2002344 WASTE - GLYCOL (DRUM) LBS	WO or PO PALLET# 12	B/Code or S/N	Remarks PALLET# 12 48" X 47" X42 EIN 342620,340633 NON-REGULATED
1	DRUM	1800	2002406 WASTE - OIL, 45 GAL	PALLET# 12		PALLET# 12 48" X 47" X 42" EIN 345474,345475 NON-REGULATED
2	DRUM	1800	2002406 WASTE - OIL, 45 GAL	PALLET# 13		PALLET# 13 48" X 46" X 43" EIN 344305,339435,342617,34 NON-REGULATED
4	DRUM	1800	2002406 WASTE - OIL, 45 GAL	PALLET# 14		PALLET# 14 48" X 47" X 44" EIN 341298,341301,340634,34 NON-REGULATED
4	DRUM	1800	2002406 WASTE - OIL, 45 GAL	PALLET# 15		PALLET# 15 48" X 48" X 43" EIN 342619,342618,342864,34 NON-REGULATED
4	DRUM	1800	2002406 WASTE - OIL, 45 GAL	PALLET# 16		PALLET# 16 48" X 48" X 43" EIN 341304,341303,341302,34 NON-REGULATED
4	DRUM	1800	2002406 WASTE - OIL, 45 GAL	PALLET# 17		PALLET# 17 48" X 48" X 43" EIN 344607,341299,339625,34 NON-REGULATED
4	DRUM	1800	2002406 WASTE - OIL, 45 GAL	PALLET# 25		PALLET# 25 48" X 48" X 43" EIN 343876,339441,342680,34 NON-REGULATED
NOTE: All claims related to this shipment have to be filed with Raytheon within 45 hours of receipt.				Received By:	Date	
				Received By:	Date	

Figure 4: NWS Shipping Manifest TCN-37070

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SHIPPING MANIFEST

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

NON NEGOTIABLE

Filled By: RDUBEAU		Date: Aug 12, 2017 11:34 AM	TCN-37131		
Ship To: SAFETY-KLEEN SERVICES LTD. 7305 BOUL. MARIE-VICTORIN SUITE 200 BROSSARD, QC, J4W 1A6 CA 450-923-9999		From: LSS-F/FOX-M, HALL BEACH, DND Storeroom Raytheon Canada Limited, LSS Hall Beach: P.O. Box 46 Hall Beach, NU, X0A 0K0 867-928-8987			Priority 0
Attention:		Attention:			
Carrier: NEAS		Routing: HALL BEACH NU / VALLEY FIELD QC	Waybill #: DR-C16082, DR-C16098	Total Pcs. 3 PCS	Total Weight: 5400 LBS
QTY Order	Type Line Weight	Item Description	WO or PO	B/Code or S/N	Remarks
1	DRUMS1800 ON PALLET	2002406 WASTE - OIL, 45 GAL	PALLET# 26		PALLET# 26 48" X 48" X 44" EIN. 340887,339425,342815,34 NON-REGULATED
1	DRUMS1800 ON PALLET	2002406 WASTE - OIL, 45 GAL	PALLET# 27		PALLET# 27 48" X 48" X 42" EIN. 340886,340880,340888,34 NON-REGULATED
1	DRUMS1800 ON PALLET	2002406 WASTE - OIL, 45 GAL	PALLET# 28		PALLET# 28 48" X 48" X 44" EIN 345775,339423,340891,34 NON-REGULATED
NOTE: All claims related to this shipment have to be filed with Raytheon within 45 hours of receipt.				Received By:	Date
				Received By:	Date

Figure 5: NWS Shipping Manifest TCN-37131

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SHIPPING MANIFEST

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

NON NEGOTIABLE

Filled By: RDUBEAU		Date: Jul 28, 2017 4:29 PM	TCN-37069			
Ship To: SAFETY-KLEEN SERVICES LTD. 7305 BOUL. MARIE-VICTORIN SUITE 200 BROSSARD, QC, J4W 1A6 CA 450-923-9999		From: LSS-F/FOX-M, HALL BEACH, DND Storeroom Raytheon Canada Limited, LSS Hall Beach: P.O. Box 46 Hall Beach, NU, X0A 0K0 867-928-8987			Priority 0	
Attention:		Attention:				
Carrier: NEAS		Routing: HALL BEACH NU/ VALLEYFIELD QC			Waybill #: DR-C16074, DR-C16098 Total Pcs.: 3 PCS Total Weight: 2077 LBS	
QTY Order	Type	Line Weight	Item	Description	WO or PO B/Code or S/N	Remarks
1	STEEL	551	2002356	WASTE - OIL FILTERS DRUM LBS	PALLET# 18	PALLET# 18 57" X 28" X 47" EIN 340630 NON- REGULATED
1	STEEL		2002505	WASTE - OILY RAGS DRUM	PALLET# 18	PALLET# 18 57" X 28" X 47" EIN 340632
1	STEEL	437	2003635	WASTE - FUEL FILTERS (DRUM) DRUM LBS	PALLET# 19	PALLET# 19 57" X 28" X 47" EIN 340629,344165
1	STEEL	1089	2002505	WASTE - OILY RAGS DRUM LBS	PALLET# 20	PALLET# 20 57" X 57" X 47" EIN 340046,342485,340631,34
NOTE: All claims related to this shipment have to be filed with Raytheon within 45 hours of receipt.				Received By:	Date	
				Received By:	Date	

Figure 6: NWS Shipping Manifest TCN-37069

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ANNEX B: TREATED SEWAGE EFFLUENT OUTFALL (FOH-2) LOCATION WITH CO-ORDINATES



Coordinates of sewage treatment outfall: 63° 45'39.50"N, 81°13'28.40"W.

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ANNEX C: ANALYSIS OF TREATED SEWAGE EFFLUENT

Table C-1: Summary of Analysis of Treated Sewage Effluent at FOX-M in 2017

Sample Date ¹	Parameter				
	pH	Oil and Grease (Present - P / Absent - A)	Biological Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)	Faecal Coliforms ²
Maximum Concentration	6.0 to 9.0 (pH units)	No visible sheen	120 mg/L	180 mg/L	10,000 CFU/100 mL
9-Jan-17	7.54	A	<1	<2	0
8-Feb-17	7.63	A	7	<2	0.7
6-Mar-17	7.55	A	<1	<2	Not available ³
6-Apr-17	6.91	A	<1	<2	0
4-May-17	7.04	A	1	<2	12
5-Jun-17	6.98	A	<1	<2	2
29-Jul-17	6.24	A	<1	<2	4
25-Aug-17	7.1	A	5	<2	0
9-Sep-17	7.26	A	<1	<2	3
4-Oct-17	6.56	A	<1	<2	66
3-Nov-17	6.49	A	<1	<2	4
4-Dec-17	7.41	A	<1	<2	0

¹ Given that for multiple months in 2017 samples were missed in one month and made up early in the following month, the requirement for this sampling was moved to early in the month. This should ensure that the sampling is completed in each calendar month.

² This column contains the average of the Cyclet 1A, Cyclet 1B, and Cyclet 1C

³ Samples frozen solid when arrived at Lab and could not be analyzed for Faecal Coliforms.

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EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

EXOVA

Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1600997
Date Submitted: 2016-01-21
Date Reported: 2016-01-29
Project: Fox-Main
COC #: 505625

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00		7.24	1223203 Sewage
Subcontract	Total Suspended Solids	1	mg/L	<1	
	BOD5	1	mg/L	<1	
	Oil & Grease - Mineral	1	mg/L	<1	
	Oil & Grease - Non-mineral	1	mg/L	<1	
	Oil & Grease - Total	1	mg/L	<1	
Visible Sheen	Visible Sheen		P/A	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 Q/AQC 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 7: January 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Exova

Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1600996
Date Submitted: 2016-01-21
Date Reported: 2016-01-22
Project: Fox-Main
COC #: 505625

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1223200 Sewage 2016-01-16 Fox-M Cyclet - 1A	1223201 Sewage 2016-01-16 Fox-M Cyclet - 1B	1223202 Sewage 2016-01-16 Fox-M Cyclet - 1C
Others	Faecal Coliforms	0	cf/100mL		0	0	0	

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.
Analytical Method: AMBCOLM1
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 2

Figure 8: January 2017, sewage effluent laboratory results page 2 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Client: Raytheon Canada Limited Ottawa
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Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1603840
Date Submitted: 2016-03-16
Date Reported: 2016-03-23
Project: Fox Main
COC #: 178107

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00			1231282 Wastewater 2016-03-07 Fox-M-Cycljet Jet 1
Subcontract	Total Suspended Solids	1	mg/L		<2
	BOD5	1	mg/L		<1
	Oil & Grease - Mineral	1	mg/L		<1
	Oil & Grease - Non-mineral	1	mg/L		<1
Visable Sheen	Oil & Grease - Total	1	mg/L		<1
	Visable Sheen	P/A			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.

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 9: February 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Exova

Client: Raytheon Canada Limited Ottawa
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Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1603841
Date Submitted: 2016-03-16
Date Reported: 2016-03-17
Project: Fox Main
COC #: 178107

		Lab I.D.	1231283	1231284	1231285
Group	Analyte	MRL	Sample Matrix	Wastewater	Wastewater
Others	Faecal Coliforms	0	ct/100mL	Water	18
				2016-03-07 Fox-M Cycl Jet 1 A	2016-03-07 Fox-M Cycl Jet 1 B
					2016-03-07 Fox-M Cycl Jet 1 C

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.
Analytical Method: AMBCOLM1
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 2

Figure 10: February 2017, sewage effluent laboratory results page 2 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Exova

Client: Raytheon Canada Limited Ottawa
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Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1605796
Date Submitted: 2016-04-20
Date Reported: 2016-04-27
Project: 140340
COC #: 177781

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00			1235747 Sewage
PHC (Hydrocarbons)	Total Suspended Solids	1	mg/L		2016-03-23 FOX-M-CYCLET
Subcontract	Visible Sheen	0	A/P	A	
	BOD5	1	mg/L	<1	
	Oil & Grease - Mineral	1	mg/L	<1	
	Oil & Grease - Non-mineral	1	mg/L	<1	
	Oil & Grease - Total	1	mg/L	<1	

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 11: March 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#:
15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1605823
Date Submitted: 2016-04-20
Date Reported: 2016-04-21
Project: 140340
COC #: 177781

Group	Analyte	MRL	Units	Guideline	Lab ID. Sample Matrix Sample Type Sampling Date Sample I.D.	1235839 Wastewater 2016-03-23 Fox-M Cycl 1A	1235840 Wastewater 2016-03-23 Fox-M Cycl 1B	1235841 Wastewater 2016-03-23 Fox-M Cycl 1C
Others	Faecal Coliforms	0	cf/100mL			0	0	0

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.
Analytical Method: AMBCOLM1
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

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Figure 12: March 2017, sewage effluent laboratory results page 2 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Exova

Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1607070
Date Submitted: 2016-05-09
Date Reported: 2016-05-16
Project: 140340 Fox Main
COC #: 177719

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00			1238865 Sewage
Subcontract	Total Suspended Solids	1	mg/L	<1	2016-04-26 Fox M Cyclot 1
	BOD5	1	mg/L	<1	
	Oil & Grease - Mineral	1	mg/L	<1	
	Oil & Grease - Non-mineral	1	mg/L	<1	
Visible Sheen	Visible Sheen	0	P/A	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 Q/AQC 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

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Figure 13: April 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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EXOVA

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: 1607068
Date Submitted: 2016-05-09
Date Reported: 2016-05-10
Project: 140340 Fox-Main
COC #: 177719

		Lab I.D.	1238861	1238862	1238863
Group	Analyte	Sample Matrix	Sewage	Sewage	Sewage
Others	Faecal Coliforms	Sampling Date	2016-04-26	2016-04-26	2016-04-26
		Sample I.D.	Fox-M Cyclet 1A	Fox-M Cyclet 1B	Fox-M Cyclet 1C

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.
Analytical Method: AMBCOLM1
additional QAQC 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

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Figure 14: April 2017, sewage effluent laboratory results page 2 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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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: 1609354
Date Submitted: 2016-06-09
Date Reported: 2016-06-16
Project: 140340 Main
COC #: 178108

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00			8.07
	Total Suspended Solids	1	mg/L		<2
Subcontract	BOD5	1	mg/L		<1
	Oil & Grease - Mineral	1	mg/L		<1
	Oil & Grease - Non-mineral	1	mg/L		<1
	Oil & Grease - Total	1	mg/L		<1
Visible Sheen	Visible Sheen		P/A		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.

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

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Figure 15: May 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Exova

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: 1609346
Date Submitted: 2016-06-09
Date Reported: 2016-06-10
Project: Fox-Main
COC #: 178108

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1244418 Sewage 2016-05-31 Fox-M Cyclet 1A	1244419 Sewage 2016-05-31 Fox-M Cyclet 1B	1244420 Sewage 2016-05-31 Fox-M Cyclet 1C
Others	Faecal Coliforms	0	cf/100mL		0	0	0	

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.
Analytical Method: AMBCOLM1
additional QA/QC information available on request.

146 Colonnade Rd. Unit B, 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

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Figure 16: May 2017, sewage effluent laboratory results page 2 of 2

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EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

Exova

Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1612514
Date Submitted: 2016-07-19
Date Reported: 2016-07-27
Project: COC #: 505601

Group	Analyte	MRL	Units	Guideline	
General Chemistry	BOD5	4	mg/L		<4
	pH	1.00			6.60
Subcontract	Total Suspended Solids	1	mg/L		<1
	Oil & Grease - Mineral	1	mg/L		1
	Oil & Grease - Non-mineral	1	mg/L		<1
Visible Sheen	Oil & Grease - Total	1	mg/L		1
	Visible Sheen	P/A			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.

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

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Figure 17: July 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Exova

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: 1612512
Date Submitted: 2016-07-19
Date Reported: 2016-07-20
Project: 140340
COC #: 505601

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1251625 Wastewater 2016-07-14 FOX-M Cyclet 1A	1251626 Wastewater 2016-07-14 FOX-M Cyclet 1B	1251627 Wastewater 2016-07-14 FOX-M Cyclet 1C
Group	Analyte	MRL	Units	Guideline				
Others	Faecal Coliforms	0	ct/100mL		103	77	61	

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.
Analytical Method: AMBCOLM1
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

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Figure 18: July 2017, sewage effluent laboratory results page 2 of 2

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EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis



Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Gabe Landry
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1616551
Date Submitted: 2016-09-16
Date Reported: 2016-09-23
Project: COC #: 183412

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00			1260730 Sewage
	Total Suspended Solids	2	mg/L		2016-09-07 FOX-M-Cylet 1
Subcontract	BOD5	1	mg/L		
	Oil & Grease - Mineral	1	mg/L		
	Oil & Grease - Non-mineral	1	mg/L		
	Oil & Grease - Total	1	mg/L		
Visible Sheen	Visible Sheen		P/A		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.

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

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Figure 19: August 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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: 1618016
Date Submitted: 2016-10-07
Date Reported: 2016-10-09
Project: 140340 FOX-MAIN
COC #: 183422

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1264076 Wastewater 2016-10-01 FOX-M Cycle-Let 1A	1264077 Wastewater 2016-10-01 FOX-M Cycle-Let 1B	1264078 Wastewater 2016-10-01 FOX-M Cycle-Let 1C
Others	Faecal Coliforms	0	ct/100mL			0	2	5

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.
Analytical Method: AMECOLM1
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

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Figure 20: August 2017, sewage effluent laboratory results page 2 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Exova

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400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1618019
Date Submitted: 2016-10-07
Date Reported: 2016-10-17
Project: 140340 Fox-Main
COC #: 183422

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00		7.13	1264082 Sewage
	Total Suspended Solids	2	mg/L	<2	2016-10-07 Fox-M Cycle-Let
Oil & Grease	Oil & Grease - Mineral	1	mg/L	<1	
	Oil & Grease - Non-mineral	1	mg/L	1	
	Oil & Grease - Total	1	mg/L	<1	
Subcontract	BOD5	1	mg/L	<1	
Visible Sheen	Visible Sheen		P/A	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

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Figure 21: September 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

Exova

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: 1618016
Date Submitted: 2016-10-07
Date Reported: 2016-10-09
Project: 140340 FOX-MAIN
COC #: 183422

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1264076 Wastewater 2016-10-01 FOX-M Cycle-Let 1A	1264077 Wastewater 2016-10-01 FOX-M Cycle-Let 1B	1264078 Wastewater 2016-10-01 FOX-M Cycle-Let 1C
Others	Faecal Coliforms	0	ct/100mL		0	0	2	5

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.
Analytical Method: AMBCOLM1
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

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Figure 22: September 2017, sewage effluent laboratory results page 2 of 2

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SOW Ref: 16.F.5.d

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

EXOVA

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: 1618593
Date Submitted: 2016-10-18
Date Reported: 2016-10-27
Project: 140340 Fox Main
COC #: 183420

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00			1265409 Wastewater
	Total Suspended Solids	2	mg/L		2016-10-10 Fox-M Cyclst 1
Oil & Grease	Oil & Grease - Mineral	1	mg/L		<2
	Oil & Grease - Non-mineral	1	mg/L		<1
	Oil & Grease - Total	1	mg/L		1
Subcontract	BOD5	1	mg/L		1
	Visible Sheen		P/A		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 Q/AQC 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 23: October 2017, sewage effluent laboratory results page 1 of 2

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Exova

Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1618589
Date Submitted: 2016-10-18
Date Reported: 2016-10-19
Project: 140340 Fox-Main
COC #: 183420

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1265403 Wastewater 2016-10-10 Fox-M-Cyclet 1A	1265404 Wastewater 2016-10-10 Fox-M-Cyclet 1B	1265405 Wastewater 2016-10-10 Fox-M-Cyclet 1C
Others	Faecal Coliforms	0	ct/100mL	Water		2	2	3

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.
Analytical Method: AMBCOLM1
additional QAQC 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 2

Figure 24: October 2017, sewage effluent laboratory results page 2 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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Exova

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: 1620434
Date Submitted: 2016-11-15
Date Reported: 2016-11-22
Project: 140340 Fox-Main
COC #: 183425

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1270102 Wastewater 2016-11-01 Fox-M Cyclst 1
General Chemistry	pH	1.00				6.80
	Total Suspended Solids	2	mg/L			<2
Oil & Grease	Oil & Grease - Mineral	1	mg/L			<1
	Oil & Grease - Non-mineral	1	mg/L			<1
	Oil & Grease - Total	1	mg/L			<1
Subcontract	BOD5	1	mg/L			<1
Visible Sheen	Visible Sheen		P/A			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.

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

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Page 2 of 3

Figure 25: November 2017, sewage effluent laboratory results page 1 of 2

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EXOVA ENVIRONMENTAL ONTARIO

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EXOVA

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: 1620435
Date Submitted: 2016-11-15
Date Reported: 2016-11-16
Project: 140340 Fox-Main
COC #: 183425

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1270103 Wastewater 2016-11-01 Fox-M Cyclt 1A	1270104 Wastewater 2016-11-01 Fox-M Cyclt 1B	1270105 Wastewater 2016-11-01 Fox-M Cyclt 1C
Others	Faecal Coliforms	0	ct/100mL			0	0	0

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.
Analytical Method: AMBCOLM1
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 2

Figure 26: November 2017, sewage effluent laboratory results page 2 of 2

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Environment Testing

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Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 15-00344-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1621980
Date Submitted: 2016-12-09
Date Reported: 2016-12-16
Project: 140340 Fox-Main
COC #: 183406

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00			1273797 Sewage
Oil & Grease	Total Suspended Solids	2	mg/L		2016-12-01 Fox-M Cycle-Let
	Oil & Grease - Mineral	1	mg/L	<2	
	Oil & Grease - Non-mineral	1	mg/L	<1	
Subcontract	Oil & Grease - Total	1	mg/L	<1	
	BOD5	1	mg/L	<1	
Visible Sheen	Visible Sheen		P/A		A

Guideline = * = Guideline Exceedence

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates analysis was completed in Mississauga, Ontario).
Results are 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 27: December 2017, sewage effluent laboratory results page 1 of 2

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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: 1621981
Date Submitted: 2016-12-09
Date Reported: 2016-12-11
Project: 140340 Fox-Main
COC #: 183406

Group	Analyte	MRL	Units	Guideline	Lab I.D.	Sample Matrix	Sample Type	Sampling Date	Sample I.D.	1273798 Sewage 2016-12-01 Fox-M Cycle-Let 1A	1273799 Sewage 2016-12-01 Fox-M Cycle-Let 1B	1273800 Sewage 2016-12-01 Fox-M Cycle-Let 1C
Others	Faecal Coliforms	0	cf/100mL	Water						0	0	0

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.
Analytical Method: AMBCOLM1
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 2

Figure 28: December 2017, sewage effluent laboratory results page 2 of 2

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ANNEX D: LOCATION OF BERMED FUEL STORAGE FACILITIES AND ANALYSIS OF BERM WATER⁴

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

Berm	Maximum concentration of any grab sample (ug/L)	HAL W20B	HAL W20D&E	HAL W20F	HAL W22B	HAL W22A
Location on-site		Beach	Airstrip	Beach	Summit	Summit
Discharge Latitude ⁵		68°46'23.93 "N	68°46'15.85" N	68°46'23.75 "N	68°45'43.00" N	68°45'42.24 "N
Discharge Longitude		81°12'51.11 "W	81°13'58.33" W	81°12'46.12 "W	81°13'27.27" W	81°13'25.04 "W
Date		19-Sep-17			19-Sep-17	19-Sep-17
pH (pH Units)	6 to 9	No sample in 2017	8.19	No sample in 2017	8.25	8.12
Oil and Grease (ug/L)	5000		1000		<1000	<1000
Arsenic (total) (ug/L)	100		<20		<20	<20
Cadmium (dissolved) (ug/L)	10		<0.1		<0.1	<0.1
Chromium (dissolved) (ug/L)	100		<1		<1	<1
Cobalt (dissolved) (ug/L)	50		<0.2		<0.2	<0.2
Copper (dissolved) (ug/L)	200		4		1	1
Lead (dissolved) (ug/L)	50		<1		<1	<1
Mercury (total) (ug/L)	0.6		0.1		<0.1	<0.1
Nickel (dissolved) (ug/L)	200		<5		<5	5
PCB (total) (ug/L)	1000		<0.1		<0.1	<0.1

⁴ Effluent from bermed fuel storage facilities.

⁵ Final discharge point of bermed fuel storage facility

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Berm	Maximum concentration of any grab sample (ug/L)	HAL W20B	HAL W20D&E	HAL W20F	HAL W22B	HAL W22A
Location on-site		Beach	Airstrip	Beach	Summit	Summit
Discharge Latitude ⁵		68°46'23.93 "N	68°46'15.85" N	68°46'23.75 "N	68°45'43.00" N	68°45'42.24 "N
Discharge Longitude		81°12'51.11 "W	81°13'58.33" W	81°12'46.12 "W	81°13'27.27" W	81°13'25.04 "W
Date			19-Sep-17		19-Sep-17	19-Sep-17
Phenols (ug/L)	20		<1		<1	<1
Zinc (total) (ug/L)	500		80		<40	<40
Benzene (ug/L)	370		<0.5		<0.5	<0.5
Toluene (ug/L)	2		<0.5		<0.5	<0.5
Ethyl benzene (ug/L)	90		<0.5		<0.5	<0.5

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Environment Testing

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400 Cooper St.
Ottawa, ON
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Attention: Mr. Will Wyman
PO#: 17-00919-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1718528
Date Submitted: 2017-09-26
Date Reported: 2017-10-02
Project: COC #: 192676

Group	Analyte	MRL	Units	Guideline	
General Chemistry	pH	1.00			8.19
Mercury	Hg	0.0001	mg/L		0.0001
Metals	Aqua-Regia Digest				Y
	As	0.02	mg/L		<0.02
	Zn	0.04	mg/L		0.08
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		<0.5
	Ethylbenzene	0.5	ug/L		<0.5
	Toluene	0.5	ug/L		<0.5
VOCs Surrogates (%)	Toluene-d8	0	%		77

Guideline = * = Guideline Exceedance
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 29: HAL W20D&E berm water laboratory results, page 1 of 2



Environment Testing

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400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 17-00919-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1718529
Date Submitted: 2017-09-26
Date Reported: 2017-10-03
Project: COC #: 192676

Group	Analyte	MRL	Units	Guideline	
Metals	Cd	0.0001	mg/L	MAC 0.005	<0.0001
	Co	0.0002	mg/L		<0.0002
	Cr	0.001	mg/L	MAC 0.05	<0.001
	Cu	0.001	mg/L	AO 1.0	0.004
	Ni	0.005	mg/L		<0.005
	Pb	0.001	mg/L	MAC 0.010	<0.001

Figure 30: HAL W20D&E berm water laboratory results, page 2 of 2

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Client: Raytheon Canada Limited Ottawa
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Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 17-00919-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1718530
Date Submitted: 2017-09-26
Date Reported: 2017-10-02
Project:
COC #: 192667

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00		8.25	
Mercury	Hg	0.0001	mg/L	<0.0001	
Metals	Aqua-Regia Digest			Y	
	As	0.02	mg/L	<0.02	
	Zn	0.04	mg/L	<0.04	
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	<0.5	
	Ethylbenzene	0.5	ug/L	<0.5	
	Toluene	0.5	ug/L	<0.5	
VOCs Surrogates (%)	Toluene-d8	0	%	96	

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 4

Figure 31: HAL W22B berm water laboratory results, page 1 of 2



Environment Testing

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Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 17-00919-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1718531
Date Submitted: 2017-09-26
Date Reported: 2017-09-28
Project:
COC #: 192667

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	<0.0001
	Co	0.0002	mg/L		<0.0002
	Cr	0.001	mg/L	MAC 0.05	<0.001
	Cu	0.001	mg/L	AO 1.0	0.001
	Ni	0.005	mg/L		<0.005
	Pb	0.001	mg/L	MAC 0.010	<0.001

Figure 32: HAL W22B berm water laboratory results, page 2 of 2

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Attention: Mr. Will Wyman
PO#: 17-00919-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1718526
Date Submitted: 2017-09-26
Date Reported: 2017-10-02
Project: COC #: 192668

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
General Chemistry	pH	1.00		8.12	1322643 Water
Mercury	Hg	0.0001	mg/L	<0.0001	
Metals	Aqua-Regia Digest			Y	
	As	0.02	mg/L	<0.02	
	Zn	0.04	mg/L	<0.04	
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	<0.5	
	Ethylbenzene	0.5	ug/L	<0.5	
	Toluene	0.5	ug/L	<0.5	
VOCs Surrogates (%)	Toluene-d8	0	%	92	

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.

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

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Page 2 of 5

Figure 33: HAL W22A berm water laboratory results, page 1 of 2

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Client: Raytheon Canada Limited Ottawa
400 Cooper St.
Ottawa, ON
K2P 2H8
Attention: Mr. Will Wyman
PO#: 17-00919-OT
Invoice to: Raytheon Canada Limited Ottawa

Report Number: 1718527
Date Submitted: 2017-09-26
Date Reported: 2017-09-28
Project: COC #: 192668

Lab I.D.	1322644
Sample Matrix	Water
Sample Type	
Sampling Date	2017-09-19
Sample I.D.	W22 A Berm Water

Group	Analyte	MRL	Units	Guideline
Metals	Cd	0.0001	mg/L	MAC 0.005
	Co	0.0002	mg/L	<0.0002
	Cr	0.001	mg/L	MAC 0.05
	Cu	0.001	mg/L	AO 1.0
	Ni	0.005	mg/L	0.001
	Pb	0.001	mg/L	MAC 0.010

Figure 34: HAL W22A berm water laboratory results, page 2 of 2

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