Quality Assurance (QA) and Quality Control (QC) Plan CFS Alert (ALT), Nunavut

In support of the
Nunavut Water Board Licence
No. 3BC-ALT1015

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Prepared for:
1 Canadian Air Division,
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Originally prepared by:
Environmental Services
Defence Construction Canada

Revised by:
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Canada

Revision Control Page

Revision No.	Revised By	Date	Issue/Revision Description
1.0	Defence Construction Canada	November 2010	Final.
2.0	Department of National Defence	January 2014	Final. Added new landfarm facility at ALT-10. Revised contracted external CALA-accredited laboratory.
3.0	Department of National Defence	January 2015	Final. Added new external CALA-accredited laboratory: Exova Canada Inc.

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ACRONYMS

AGAT	AGAT Laboratories Ltd. (former contracted laboratory)
ALT	CFS Alert
BOD	Biological Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
cBOD	Carbonaceous Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
CFS	Canadian Forces Station
EXOVA	Exova Canada Inc. (current contracted laboratory)
NWB	Nunavut Water Board
PAH	Polycyclic Aromatic Hydrocarbons
pH	Measure of acidity and alkalinity
QA	Quality Assurance
QC	Quality Control
SNP	Surveillance Network Program
TPH	Total Petroleum
TSS	Total Suspended Solids

1. INTRODUCTION

This document has been prepared in response to the requirements of the Nunavut Water Board (NWB) for the submission of a Quality Assurance and Quality Control Plan , under licence number 3BC-ALT1015, issued to the Department of National Defence (DND) on August 4, 2010. This Class B Water Licence issued allows for the use of water and the disposal of waste during operation and maintenance of Canadian Forces station (CFS) Alert ("Alert"). Alert is located on the north-eastern tip of Ellesmere Island within the Qikiqtani Region of Nunavut (latitude $82^{o}30'1"$N/ longitude $62^{0}20'37"$ W).

Alert was originally established as a High Arctic weather station in 1950, and is currently a remote camp maintained by DND that has been continually operational since 1958. the nearest communities to Alert are Grise Fiord and Resolute Bay, and are located approximately 780 km and 1080 km from the station. This station is active year round. During the summer months the population on site can expand to 200 people; however, on average the population ranges between 50 to 100 people.

This document has been prepared in accordance with the Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage an Solid Waste Disposal Facilities in the Northwest Territories, published in 1996.As outlined in the licence, 11 monitoring stations shall be maintained at Alert at the following locations: Water Supply Intake, Sewage Outfall, Discharge Point, Sewage Treatment Facility Discharge Point, Main Station Landfill, Battery Dump, Millionaires Dump, Dump 3, secondary containment discharge from the Airfield Fuel Tank Farm, Upper Fuel Tank Farm, and the Landfarms, primarily for the purpose of assessing water quality. The original QA/QC Plan at was approved by the NWB and implemented; this revised QA/QC Plan will be implemented one month after NWB approval.

2. SAMPLE COLLECTION

2.1 Sampling Locations

As part of the NWB Licence, the surveillance Network Program (SNP) consists of 11 monitoring stations at Alert, which include:

Station No.	Monitoring Station
ALT-1	Water Supply at Raw Water Intake (or Pumphouse)
ALT-2	Discharge Point at the Sewage Outfall
ALT-3	Final Discharge Point of the Sewage Treatment Facility (at weir box or similar structure, prior to entry into Parr Inlet)
ALT-4	Runoff and Leachate from the Main Station Landfill
ALT-5	Runoff and Leachate from the Battery Dump
ALT-6	Runoff and Leachate from the Millionaire's Dump
ALT-7	Runoff and Leachate from Dump 3
ALT-8	Discharge from Lower (Airfield) Fuel Tank Farm (secondary containment)
ALT-9	Discharge from Upper Fuel Tank Farm (secondary containment)
ALT-10	Discharge from Day Fuel Tank Farm (secondary containment) Discharge from the Landfarm*
ALT-11	Discharge from the Landfarm

*Landfarm at ALT-10 was added in summer 2013, the criteria and measures from the ALT-11 Landfarm will be adopted for the ALT-10 Landfarm effective summer 2014.

Sampling listed above were established by the NWB and are identified in Figure 1, Appendix A. The exact sampling locations as per the NWB licence will be identified at the commencement of the sampling program, and if feasible with assistance of an Inspector. GPS coordinates and photographic records of the sampling locations will be documented, and locations will be identified using markers for consistency and repeatability in subsequent months and years.

Timing of sampling

Timing of the collection of the water samples at Alert is outlined in the requirements of the NWB licence, which specify:

Monitoring Station Timing of Sampling

Station No.	**Timing of Sampling**
ALT-1	• Shall be measured and recorded *daily* and *annually* in cubic metres to document the quantity of water utilized.

	• Presently the quantity of water utilized daily is recorded and reported monthly.
ALT-2	• Shall correspond to timing of sampling of ALT-3.
ALT-3	• Inspections will be conducted weekly (at a minimum) during June to September inclusively, to determine periods of flow. • Shall be sampled and analysed *monthly* during periods of flow.
ALT-4-5-6-7	• Inspections will be conducted weekly (at a minimum) during June to September inclusively, to determine periods of runoff and/or seepage. • Shall be sampled and analysed *annually* during periods of runoff or seepage.
ALT-8-9-10-11	• Shall be sampled and analysed prior to the release of effluent.

Documenting Non-sampling Events

In the event that the water samples are not successfully collected and submitted for analysis, the following will be documented:

- Location(s) of the sampling attempts will be recorded (i.e. GPS coordinates, photographic records and the sampling locations will be identified on a map); and
- Justification outlining why a sampling was not successfully collected.

Attempted unsuccessful sampling event(s) and justification will be reported to the NWB in the Annual report for Alert.

2.2 Sampling Equipment

As of June 2014, Exova Canada Inc. is the external CALA-accredited Laboratory in support of this licence.

No specialized equipment will be required for the collection of the water samples at Alert. New sample bottles will be supplied by an external CALA-accredited Laboratory and used for the collection of all water samples. Samples are not to be filtered.

The table below identifies the samples necessary for each sampling round. Extra bottles will requested for duplicate samples, field blanks and/or in case of breakage.

Sewage Outfall & Discharge Point (ALT-2-3)	**Runoff/Leachate from Landfill & Dumps (ALT-4-5-6-7)**
<u>6 Bottles/Monitoring Station:</u> 1 x 500 ml plastic (BOD) 1 x 250 ml plastic (TSS, pH) 1 x 100 ml plastic H2SO4 (COD) 2 x 1L glass amber bottles HCl (oil and	<u>16 Bottles/Monitoring Station:</u> 1 x 500 ml glass amber bottle (TPH, F2-F4) 2 x 1L glass amber bottles (PAHs) 3 x 40 ml vials NaHSO4 (BTEX, F1) 1 x 500 ml plastic (BOD)

grease) 1 x 500 ml plastic (cBOD)*	1 x 250 ml plastic (pH, nitrate-nitrite, conductivity, alkalinity, hardness, Mg, Na, Ca, K, SO2) 1 x 500 ml plastic (TSS) 1 x 120 ml glass amber bottle H2SO4 (phenols) 1 X 120 ml plastic bottle H2SO4 (ammonia nitrogen) 1 X 120 ml plastic HNO3 (total As,Cu,Fe,Cd,Cr, Pb,Ni) 1 X 120 ml glass HCL (total Hg) 1 x 250 ml plastic Na2S2O3 (fecal coliform) 2 x 1L glass amber bottle HCl (oil and grease)
Tank Farms & Landfarms (ALT-8-9-10[A]-11)	
7 Bottles/Monitoring Station: 3 x 40 ml vials Na2s2O3 (benzene, toluene, ethylbenzene) 1 x 100 ml metals bottle HNO3 (lead) 2 x 1L glass amber bottles HCl (oil and grease) 1 x 100 ml glass amber bottle H2SO4 (phenols)	

NOTES:
* Laboratory analysis optional. Decision to analyse is to be determined by DND as per page 3 of the NWB Licence No. 3BC-ALT1015.

[A]–ALT-10, two sets of sampling will be conducted at the Day Tank Secondary Containment and the newly added Landfarm Facility.

Sampling Methods

Sample collection instructions provided by an external CALA-accredited Laboratory are provided in Appendix B. Refer to Table 1 (Appendix C) for additional laboratory considerations including minimum sample size, rinsing, filtering, and preservation and storage requirements for the parameters. Additionally, samples for ALT-3-8-9-10-11 will be collected prior to the release of any effluent to demonstrate compliance with the criteria set out by the NWB (refer to section 4.4).

Duplicates and blanks

Duplicate samples and blanks shall be submitted to and analysed by the accredited laboratory to provide an internal (i.e. laboratory) and external (i.e. at the time of sampling, shipping) QA/QC check to verify the reliability of the sample results. Duplicates samples shall be collected for approximately 10 percent of the samples. A duplicate sample is a repeat sample collected and handled using the same methods and submitted blindly for analysis. Based on the analytical results the laboratory will match the blind duplicate to the corresponding sample.

Field blanks and travel blanks will also be analysed to ensure reliability of the sampling method and to ensure the integrity of the samples was maintained during transport. Blanks will be provided by the laboratory to accompany the shipment of the sample bottles round trip and will contain reverse-osmosis de-ionized (RODI) water.

3. SAMPLE HANDLING

3.1 Preservation

Samples will be preserved in accordance with requirements identified by the external CALA-accredited Laboratory for the parameters to be analysed (refer to Appendix C). The following six preservatives will be used: nitric acid (HNO_3), sulphuric acid (H_2SO_4), hydrochloric acid (HCl), sodium thiosulfate (Na_2S2O_3) and transported in the sampling bottling corresponding to the analysis to be conducted. The sample bottles by the laboratory identify the preservative contained in the sample bottle.

Samples requiring analysis within 48 hours or less will be collected immediately prior to shipping. All samples will be stored on ice and kept cool at approximately $4^{\circ}C$ prior to and during shipping.

3.2 Sample Identification

Samples collected will be labelled using consistent terminology, identifying the water monitoring station (corresponding to the facility), including the date and testing analysis. For example, ALT-10, 2011-06-01, BTEX, denotes a water sample collected at the Day Tank Secondary Containment at ALT-10, on June 2011, for the BTEX parameter.

Similarly, blind duplicate samples collected will be labelled using consistent terminology, identifying the station, followed by the year, month and duplicate sample number. For example, ALT-2011-06 DUP1 denotes a blind duplicate water sample collected in Alert, in June 2011, and is the first duplicate collected for the month. Trip and field sample will be labelled as such. Blind duplicate samples will be provided by the external CALA-accredited Laboratory.

At time of collection, sample identification will be recorded in a field notebook for consistency in terminology, and to ensure the sample identifiers are unique. Sample labels will also include the following information: name of organization, time and date. Information provided on the sample labels will be clearly printed in permanent (i.e. waterproof) non-smear ink (marker or pen).

A Chain of Custody shall be completed for each sampling round and will accompany the samples to the laboratory.

3.3 Transportation

Samples will be packed appropriately (i.e. packed upright, immobile) in coolers, sealed and shipped to 8 Wing Trenton via a scheduled flight. When possible, extreme coolers will be used for transporting the samples. Scheduled round trip commercial charter flights (direct) and military flights (direct and/or overnight stop over in other Canadian cities or in Greenland) depart weekly from Trenton for Alert. Direct flights will be preferred and sought when possible; however, the required timing for the sample may ultimately determine flight(s) and some sampling is dependant on environmental factors leading to periods of flow, runoff, and or/seepage. DND will notify the designated courier company of the scheduled flight arrival time in Trenton for immediate pick-up at the time of arrival. The samples will be transported by courier to the external CALA-accredited Laboratory in a timely manner.

In addition, the external CALA-accredited Laboratory will be immediately notified when the samples are in transit, in order to start analysis as quickly as possible on samples with a maximum storage of 24-48 hours. A Chain of Custody will accompany the sample shipment and will clearly identify the location of samples requiring immediate analysis.

4. LAB ANALYSIS

4.1 Lab Accreditation

An external CALA-accredited Laboratory* will analyze all the samples collected in support of this licence.

As of June 2014, Exova Canada Inc. is the external CALA-accredited Laboratory in support of this licence.

Exova Canada Inc. is accredited to conduct analysis on each of the required sampling parameters, with the exception of total hardness. Refer to Appendix D for proof of valid laboratory accreditation in accordance with ISO/IEC17025:2005.

*Prior to Exova Canada Inc. (June 2014), AGAT Laboratories Ltd. in Mississauga, ON, was the previous DND contract holder from 2010-2013.

4.2 Detection Limits

Laboratory detection for all parameters required by the NWB are identified in Table 1 (Appendix). In addition, the laboratory shall report the detection limits of the methods used for analysis of the samples.

4.3 Methodology

The laboratory will conduct the analysis of the samples in accordance with the *Standard Methods (SM) for the Examination of Water and Wastewater* (2012, US Environmental Protection Agency (EPA), or the Ontario Ministry of Environment (MOE) methodologies. The- external CALA-accredited Laboratory identified the following methods to be implemented for the parameters to be analysed:

Parameter	**Method**	**Parameter**	**Method**
TPH	MOE E3397A	**Total Iron**	EPA SW846 3050/EPA 200.8
PAH	EPA SW856/8270C	**Total Mercury**	SM 3112 B
BTEX/F1	EPA 8260C	**Fecal Coliform**	SM 9222 D
BOD	SM 5210 B	**Conductivity**	SM 2510 B
COD	SM 5220 D	**Oil and Grease**	MOE DECPH-E 3421
cBOD	SM 5210 B	**Ammonia Nitrogen**	SM 4500 NH3 – F+G
pH	SM 4500-H B	**Total Alkalinity**	SM 2320 B
TSS	SM 2540D	**Calcium**	EPA SW846 3050/EPA SM 3111
Nitrate-Nitrite	SM 4500	**Potassium**	EPA SW846 3050/EPA SM3111
Total Phenols	SM 5530D	**Sulphate**	SM 4110 B
Total Hardness	Calculation	**Total Cadmium**	EPA SW846 3050/EPA 200.8
Magnesium	EPA SW846 3050/SM3111	**Total Chromium**	EPA SW846 3050/EPA 200.8
Sodium	EPA SW846 3050/SM3111	**Total Lead**	EPA SW846 3050/EPA 200.8
Total Arsenic	EPA SW846 3050/EPA 200.8	**Total Nickel**	EPA SW846 3050/EPA 200.8
Total Copper	EPA SW846 3050/EPA 200.8		

4.4 Reporting Requirements

As previously stated in Section 2.3, duplicates samples shall be collected for approximately 10 percent of the samples to verify the reliability of the sample results.

NWB Effluent Standards

Analytical results of the effluent discharged from the sewage Treatment Facility, Tank Farms, and the Landfarm Facilities will be reported against the following effluent quality standards provided by the NWB:

Parameter	Maximum Concentration of any Grab Sample
Sewage Treatment Facility Final Discharge Point (ALT-3)	
BOD5	80 mg/L
Total Suspended Solids	70 mg/L
Oil and Grease	5mg/L and no visible sheen

pH	Between 6 and 9
Tank Farms and Landfarms (ALT-8-9-10-11)	
Benzene	370 µg/L
Toluene	2 µg/L
Ethylbenzene	90 µg/L
Lead	1 µg/L
Oil and Grease	15 mg/L and no visible sheen
Phenols	20 µg/L

Effluent standards provided by the NWB are consistent with the *Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories* (1992), or are consistent with other municipal licences.

5. QA/QC PLAN REVIEW

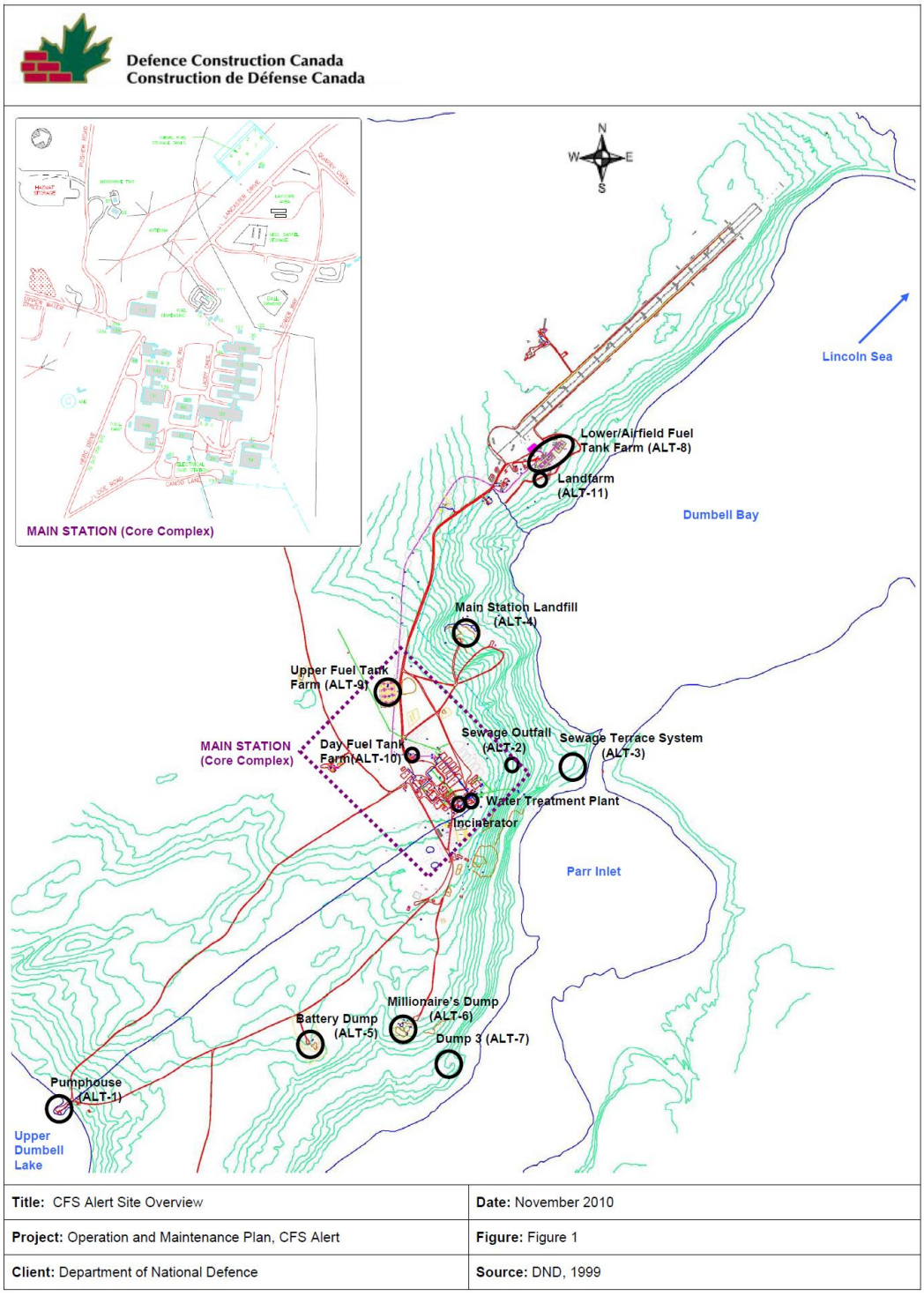
All contracted external CALA-accredited Laboratory will be informed and given opportunities to review this document, *QA/QC Plan for CFS Alert*. DND may request the external CALA-accredited Laboratory to provide a confirmation letter of acceptance of this plan, which would be submitted to the NWB.

In addition, this document shall be reviewed annually by DND to ensure that this plan remains current and consistently reflects the operations, activities and technology at Alert. Revisions required to this document shall be made as necessary. Revised plans will include an updated confirmation letter of acceptance from the accredited laboratory and shall subsequently be submitted to the NWB. Changes to this plan will be reflected in the Annual Report.

6. REFERENCES

Department of Indian and Northern Affairs Canada Water Resources Division and the Northwest
Territories Water Board. *Quality Assurance (QA) and Quality Control (QC) Guidelines for Use*
by Class "B" Licensees in Collecting Representative Water Samples in the Field and for Submission of a QA/QC Plan. July 1996.
Eaton, A., Clesceri, L., Rice, E., and A. Greenberg. *Standard Methods for the Examination of*
Water and Wastewater – 21st Edition. 2005.
Nunavut Water Board. *Letter, RE:NWB Licence No. 3BC-ALT1015.* August 5, 2010.
Nunavut Water Board. *NWB Licence No. 3BC-ALT1015.* August 4, 2010.
Taiga Environmental Laboratory (Taiga). *Watersampling Instructions- Collecting the sample January 18, 2010.*

Appendix A: Figure 1: CFS Alert Site Overview and Sampling Locations



Title: CFS Alert Site Overview	**Date:** November 2010
Project: Operation and Maintenance Plan, CFS Alert	**Figure:** Figure 1
Client: Department of National Defence	**Source:** DND, 1999

Appendix B: Exova Canada Inc.: Instructions for Collecting and Submitting Samples

Exova
2395 Speakman Dr.
Mississauga
Ontario
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L5K 1B3

T: +1 (905) 822-4111
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E: sales@exova.com
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Exova

Testing, calibrating, advising

Ontario Exova Locations:
Exova has four environmental locations in Ontario. The main environmental lab is located in Ottawa. Exova has labs located worldwide that service a wide range of industries.

Location	Address	Contact Information	Hours of Operation
Ottawa Lab	8-146 Colonnade Rd. Ottawa, ON K2E 7Y1	613-727-5692 Dedicated PM – Scott Clark ext. 323	M-F 8:00am – 6:00pm S – 9:00am – 2:00pm
Mississauga Lab	2395 Speakman Dr. Mississauga, ON L5K 1B3	905-822-4111	M-F 8:00am – 5:00pm
Kingston Depot	608 Norris Court Kingston, ON K7P 2R9	613-634-9307	M-F 8:00am – 5:00pm
St. Catharines Depot	630-380 Vansickle Rd. St. Catharines, ON L2R 6P7	905-680-8887	M-F 8:00am – 5:00pm

Representative Samples

A *representative* sample is one that reflects the same characteristics as, and can be considered an accurate subset of the material being measured. Representative samples taken in a similar manner at the same time and location have an equal probability of yielding the same result. The location, time and method of sample collection must adequately define and isolate the material of interest or concern.

The integrity of the target analyte of interest must be maintained by taking steps to ensure that the physical, chemical and biological characteristics of the sample are not compromised. Sample collection and handling procedures are the key steps in ensuring that the sample remains representative. Temperature control and chemical preservation are two measures that may be taken to stabilize a sample after collection. The sample should also be protected from contamination by extraneous materials. Best practices must also be followed for recording sample information, maintaining chain-of-custody, and for sample labelling, transportation and storage procedures. In summary, a water sample arriving at the laboratory must be traceable to its origin, and time and date of collection, and must continue to accurately reflect the concentration of target analyte at the location and time of sampling.

Sample Containers

Sampling containers are usually provided by the laboratory that is conducting the testing. Generally, plastic or glass containers are recommended for inorganic and microbiological tests but most tests for organic compounds require glass bottles. General bottles requirements can be found on the back of Exova's chain-of-custody. Bottle requirements specific to DCC's site can be found in Appendix C.

EXOVA

Sample Collection

The collection and handling of samples is crucial to obtaining valid data. Person(s) collecting samples should be properly trained, with respect to sample handling considerations, including aseptic procedures for the collection of samples for microbiological testing. Disposable gloves may be worn and care must be taken that the inside of the container and cap do not come into contact with anything other than the atmosphere. If the inside of the sampling container is touched, it must be considered contaminated and should not be used. While the sample is being taken, the exterior of the cap should be held in the sampler's fingertips.

Samplers should take care to avoid inadvertently contaminating the sample with the target analyte. This can occur in instances where the sample comes into contact with an unsuitable preservative that is not required to stabilize the analyte in the sample. Common examples include: residual nitric acid preservative on hands or gloves causing contamination in samples taken for nitrate analysis; or sodium thiosulphate preservative causing sodium contamination in samples taken for cation measurements.

For those sampling containers that contain pre-charged preservatives it is important to note that these containers should not be rinsed out prior to use in the field.

Specialized Sampling Techniques

Specialized sampling techniques for particular tests warrant further discussion.

Volatile Organic Compounds (VOCs)

Volatile organic compounds are, as their name suggests, volatile and are easily vaporized from the sample. For this reason, some methods allow for sample collection in vials with septum (hole) screw caps, with Teflon™-lined silicone discs which can be placed directly in the auto-sampler of the analytical instrument. This eliminates the sample transfer step, which could induce a loss of volatile compounds to the atmosphere. Samples should be collected in duplicate.

Microbiological

Aseptic techniques must be followed when handling the sterile sample bottles used for microbiological sample collection. Failure to do so will compromise the results. As it is especially important that the sterile bottles remain closed until the time of sampling, it is recommended that sample bottles for microbiological testing have caps with tamper-proof seals. If the seal is broken the bottle should be discarded. Appropriate care should be taken to ensure that only the outer surface of the cap and the bottle is touched/handled. The inside of the cap should not be allowed to come into contact with anything other than the atmosphere and the sample. After the sample is taken the bottle should be recapped immediately. When filling the
bottle, the sampler should hold the bottle near the base and fill to the fill line on the label of the bottle (if indicated) or the shoulder of the bottle. To prevent further bacterial growth in the sample after it has been collected, the sample should be refrigerated and transported to the laboratory on ice.

EXOVA

Oil and Grease (Immiscible Liquids)
Oil and grease will float on top of the water body or well and the sampler must take great care to ensure that the sample adequately addresses the presence of immiscible liquids. The best practice is to choose a sampling location in the area of greatest mixing to ensure that a representative sample is collected. The sample container should not be rinsed, as the hydrophobic nature of the oil and grease will cause it to coat the inside of the sampling container resulting in inflated results which are not representative of the water sampled.

Sample Preservation
Preservation may be required to stabilize the analyte of interest in the sample prior to its transportation to the laboratory. Refrigeration is also a form of preservation and is important to minimize chemical reactions and microbial growth in a sample. However, freezing a sample is not acceptable for some tests. In the case of microbiological testing, samples cannot be analyzed if they have been frozen. It is very important that samples for these tests are shipped to the laboratory as soon as possible after collection.

Sample Holding Times
For certain tests, the sample must be received at the laboratory and analyzed within a short period of time. Examples of perishable parameters include turbidity, microbiological contaminants, and volatile organic compounds. Preservation stabilizes the sample to differing degrees. For example, in the case of metals, preservation may extend the allowable storage time to weeks or even months. However, some reactions (e.g., changes in nitrogenous compounds) continue unabated and preservation to prevent these reactions without compromising the sample is not possible. Consequently, refrigeration and transportation of all water samples to the laboratory immediately after collection is encouraged to ensure that samples may be analyzed within the appropriate time frames. The specific holding times pertinent to DCC are included in Appendix C.

Sample Labelling
Accurate and complete labelling of samples ensures that the sample's identity is maintained. This is very important for sample tracking. It is advisable to pre-label all sample containers prior to taking the sample or to label each container **immediately** after the sample is taken to prevent confusion. An indelible (permanent) marker or pen should be used and the material from which the label is comprised should be able to withstand water. The sample ID generated should be simple and unique to the sampling set/batch collected. The following information should be recorded on either the sample label or on an accompanying sample information sheet.

1. A unique sample identifier
2. The date and time of sample collection (critical for perishable tests)
3. The initials of the sampler.

The rapid identification of samples at the laboratory helps to ensure that samples are analyzed promptly.

EXOVA

Sample Storage and Transportation

It is recommended that all samples be delivered to the laboratory as soon as possible after sampling. Samples should be packaged to avoid breakage during shipping. Samples must be shipped to arrive at the laboratory before the holding time for the samples has expired. If possible, the sample should be chilled to below 10°C, but not frozen, prior to packing. Optimal temperatures conditions during transport are less than 10°C. Although samples must be cool, it is important to ensure that samples for microbiological testing do not freeze during shipment. Some courier companies offer shipping in heated vehicles during the winter months. If samples are shipped directly by bus, train or air without the use of a courier, the sampler should notify the laboratory and provide flight/bus numbers, expected arrival times, way bill numbers, etc. to ensure that the laboratory arranges sample pick-up from the airport or bus/train terminal.

Chain of Custody

A sample or set of samples is considered to be "in custody" if it is in a custodian's physical possession or view, if it was in the custodian's physical possession and was then secured to prevent tampering, or if it is placed in a secured area. Each person involved in the chain of possession must sign the custody form when a sample or set of samples is received or relinquished. The intent of this form is to document the transfer of custody of the samples from the sample custodian (sampler) to any other person and to the laboratory. It is recommended that the fewest number of people as possible be responsible for sample collection and transfer to the laboratory.

Once the samples have arrived at the laboratory, the chain-of-custody form must be signed off by an authorized person at the laboratory receiving the samples. The custodian should note either on the chain-of-custody form or on the sample information sheet provided with the samples, any samples that arrive in a condition unsuitable for analysis (e.g., broken, improperly preserved). This includes checking sampling dates recorded on containers and information sheets to make certain that holding times for the tests requested have not been exceeded. Samplers should be notified immediately of samples that cannot be analyzed so that a second sample can be taken.

Laboratory staff must check that the information provided on the sample container tag/label matches information recorded on other sample information sheets and/or chain-of-custody documents.

Samples should be handled and managed within a secure environment. Temporary sample storage must be in a place that is clean, dry, lockable and environmentally-controlled to prevent analyte degradation prior to analysis. A record must be made of the date of analysis and the name of the analyst.

Appendix C: Table 1: Parameter Breakdown – Bottle Requirements, MRL's and Holding Times Considerations

Bottle Requirements, MRL's and Holding Times
Samples ALT-2 and ALT-3

Parameter	Container	Minimum Volume	Preservative	Holding Time	Detection Limit	Accredited
BOD	1L Plastic	500ml	None	7 Days	1 mg/L	Yes
CBOD	1L Plastic	500ml	None	7 Days	1 mg/L	Yes
pH	1L Plastic	50ml	None	14 Days	0.1 units	Yes
TSS	1L Plastic	100ml	None	14 Days	2 mg/L	Yes
Oil & Grease	1L Amber Glass	1000ml	None	7 Days	1 mg/L	Yes
COD	125ml Glass	50ml	H_2SO_4	28 Days	5 mg/L	Yes

Samples ALT-8, ALT-9, ALT-10 and ALT-11

Parameter	Container	Minimum Volume	Preservative	Holding Time	Detection Limit	Accredited
BTE	2x 40ml Glass Vials	40ml	None	14 Days	0.5 mg/L	Yes
Lead	125ml Plastic	100ml	$HN0_3$	60 Days	0.05 ug/L	Yes
Oil & Grease	1L Amber Glass	1000ml	None	7 Days	1 mg/L	Yes
Phenols	125ml Glass	100ml	H_2SO_4	28 Days	0.001 mg/L	Yes

Samples ALT-4, ALT-5, ALT-6 and ALT-7

Parameter	Container	Minimum Volume	Preservative	Holding Time	Detection Limit	Accredited
PHC's F2-F4	1L Amber Glass	1000ml	None	7 Days	F2 – 0.1 mg/L F3-F4 – 0.2 mg/L	Yes
BTEX and PHC F1	2x 40ml amber Vials	40ml	None	14 Days	BTEX – 0.5 ug/L F1 – 0.1 ug/L	Yes
PAH	1L Amber Glass	1000ml	None	7 Days	Benzo(a)Pyrene – 0.01 ug/L Chrysene – 0.05 ug/L Benzo(b)Fluorantene – 0.05 ug/L Benzo(k)Fluoranthene – 0.05 ug/L All other PAH's – 0.1 ug/L	Yes
Oil & Grease	1L Amber Glass	1000ml	None	7 Days	1 mg/L	Yes
BOD	1L Plastic	500ml	None	7 Days	1 mg/L	Yes
pH	1L Plastic	50ml	None	14 Days	0.1 units	Yes
TSS	1L Plastic	100ml	None	14 Days	2 mg/L	Yes
Nitrate-Nitrite	1L Plastic	100ml	None	7 Days	N02 – 0.005 mg/L N03 – 0.10 mg/L	Yes
Conductivity	1L Plastic	50ml	None	28 Days	5 uS/cm	Yes
Alkalinity	1L Plastic	100ml	None	14 Days	5 mg/L	Yes

Sulphate	1L Plastic	100ml	None	28 Days	1 mg/L	Yes
Phenols	125ml Amber Glass	100ml	H_2SO_4	28 Days	0.001 mg/L	Yes
Ammonia	125ml Plastic	100ml	H_2SO_4	28 Days	0.02 mg/L	Yes
Hardness	125ml Plastic	50ml	$HN0_3$	60 Days	1 mg/L	Yes
Calcium	125ml Plastic	50ml	$HN0_3$	60 Days	0.1 mg/L	Yes
Magnesium	125ml Plastic	50ml	$HN0_3$	60 Days	0.1 mg/L	Yes
Potassium	125ml Plastic	50ml	$HN0_3$	60 Days	0.01 mg/L	Yes
Sodium	125ml Plastic	50ml	$HN0_3$	60 Days	0.05 mg/L	Yes
Arsenic	125ml Plastic	100ml	$HN0_3$	60 Days	0.1 ug/L	Yes
Cadmium	125ml Plastic	100ml	$HN0_3$	60 Days	0.01 ug/L	Yes
Chromium	125ml Plastic	100ml	$HN0_3$	60 Days	0.5 ug/L	Yes
Copper	125ml Plastic	100ml	$HN0_3$	60 Days	0.5 ug/L	Yes
Iron	125ml Plastic	100ml	$HN0_3$	60 Days	30 ug/L	Yes
Lead	125ml Plastic	100ml	$HN0_3$	60 Days	0.05 ug/L	Yes
Nickel	125ml Plastic	100ml	$HN0_3$	60 Days	0.5 ug/L	Yes
Mercury	125ml Plastic	100ml	HCL	28 Days	0.00001 mg/L	Yes
Fecal Coliforms	300ml Plastic	100ml	$Na_2S_2O_3$	48 Hours	0 ct/100ml	Yes

Please note that none of these samples require field filtering. All samples should be kept cool during shipping.

Appendix D: Proof of Laboratory Accreditation – EXOVA Canada Inc.

Canadian Association
for Laboratory Accreditation Inc.

CALA

Certificate of Accreditation

Exova Accutest - Ottawa Laboratory
Exova Canada Inc.
Unit 8
146 Colonnade Road
Ottawa, Ontario

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Accreditation No.: A2602
Issued On: February 27, 2013
Accreditation Date: January 3, 2005
Expiry Date: August 28, 2015

CALA

President & CEO

This certificate is the property of the Canadian Association for Laboratory Accreditation Inc. and must be returned on request; reproduction must follow policy in place at date of issue. For the specific tests to which this accreditation applies, please refer to the laboratory's scope of accreditation at www.cala.ca.

Note: As of June 2014, DND retained EXOVA Canada Inc. as the new external CALA-accredited laboratory. This is a copy of their valid Certificate of Accreditation.

Appendix E: Confirmations of Laboratory Acceptance of QA/QC Plan

Testing. Advising. Assuring.

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146 Colonnade Road #8
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Ontario
Canada
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Cameron Chadwick
Defence Construction Canada / Construction de D Défense Canada
8 Wing/CFB Trenton / 8e Ere / BFC Trenton
Astra, Ont
K0K 3W0

19th December 2014

Dear Mr. Cameron;

This letter serves to confirm that Exova Canada Inc. accepts the QA/QC plan for CFS Alert (ALT) for the analysis to be performed under License No. 3BC-ALT1015.

Best Regards,

Josh Hiemstra
Sales Executive
Ontario Industrial & Environmental
CRM Administrator

Exova Americas / Amériques

C: 905 301 2105
D: 905 822 4111 ext 10575
F: 905 823 1446

Note: As of June 2014, DND retained EXOVA Canada Inc. as the new external CALA-accredited laboratory. Attached is the letter of Acceptance of this QA/QC Plan.