



SNAP LAKE MINE

Quality Assurance and Quality Control Plan V.3

March 2019

DE BEERS GROUP

REVISIONS HISTORY

Version	Date	Notes/Revisions
3	March 2019	Update to the previously approved QA/QC Plan to reflect Final Closure

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ACRONYMS AND ABBREVIATIONS

AEMP	Aquatics Effects Monitoring Program
AN	Ammonium nitrate
BTEX	Benzene, toluene, ethylbenzene, and xylene
CALA	Canadian Association for Laboratory Accreditation
CoC	Chain of custody
EAR	Environmental Assessment Report
GPS	Global Positioning System
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
QA/QC	Quality Assurance and Quality Control
SNP	Surveillance Network Program
TSS	Total suspended solids
UTM	Universal Transverse Mercator
WTP	Water treatment plant

UNITS OF MEASURE

km	kilometre
m	metre

1. INTRODUCTION

1.1 Background

De Beers Canada Inc. (De Beers) owns and operates the Snap Lake Mine located approximately 220 kilometres (km) northeast of Yellowknife, Northwest Territories, 30 km south of MacKay Lake, and 100 km south of Lac de Gras where the Diavik Diamond Mine, and the Dominion Diamond Mine are located (Figure 1-1). An Environmental Assessment Report (EAR) for the Mine (De Beers 2002) was submitted to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) in February 2002. The Mine received approval from the Minister of Indian and Northern Affairs in October 2003, based on MVEIRB (2003). Final regulatory approvals for construction and operation of the Mine were granted in May 2004 and construction began in April 2005. The Mine reached full production in 2008 and was expected to continue operations for approximately 20 years. However, on December 4, 2015, De Beers announced that it would be suspending operations at Snap Lake Mine, and that the Mine would be placed under “care and maintenance”. An Extended Care and Maintenance Plan was submitted to the Mackenzie Valley Land and Water Board (MVLWB) in April 2016 (De Beers 2016). In December 2017, following an on-going evaluation of the Mine, De Beers announced the Mine would enter into final closure.

This Quality Assurance and Quality Control (QA/QC) Plan is an update to previously prepared plans and has been modified for final closure.

1.2 Requirements of the Water Licence

Practices to be implemented for the collection, transport, and laboratory analysis of field water quality samples as a requirement of the Type A Water Licence are outlined in this QA/QC Plan. The plan was developed following the guidelines for a QA/QC Plan (INAC 1996) and to meet the requirement of Annex A of Water Licence MV2011L2-0004, which states:

- A quality assurance/quality control (QA/QC Plan) plan which includes both field and laboratory requirements shall be submitted to an analyst for approval not less than 60 days in advance of any sampling conducted.
- The Licensee shall act in accordance with the approved QA/QC Plan and shall review the Plan annually or as directed by the Board and make any necessary revisions to reflect changes in operations. Revisions to the Plan shall be submitted to an Analyst, for approval.
- If the Quality Assurance and Quality Control Plan is not approved by the Analyst, the Licensee shall revise the Plan according to the Analyst’s direction and re-submit it to the Analyst for a decision.

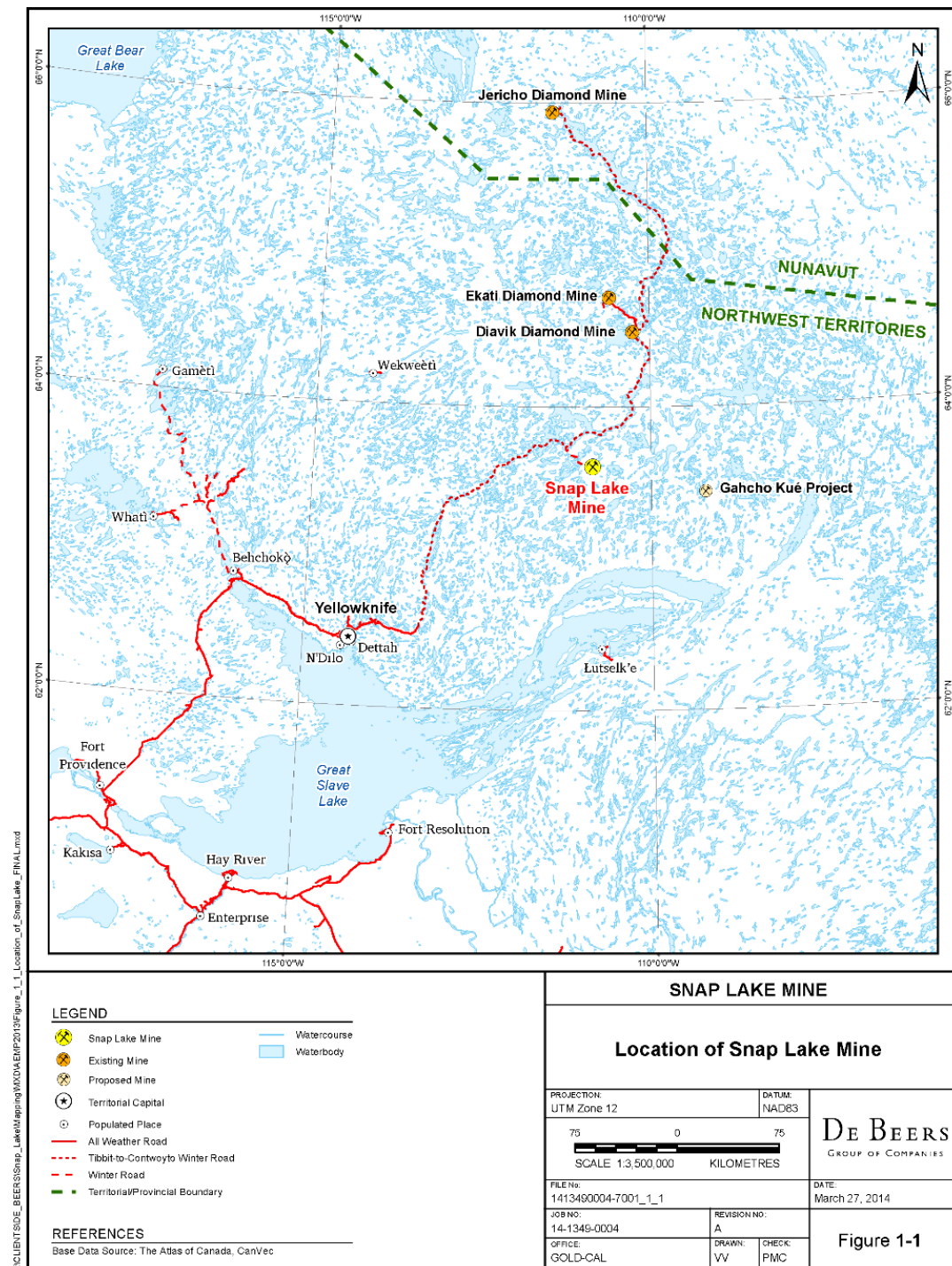
1.3 Document Organization

This document has been structured as follows:

- Section 2.0: Sample Collection (locations, equipment, data recording, etc.)
- Section 3.0: Sample Handling (preservation, sample identification, etc.)

- Section 4.0: Laboratory Analysis (laboratory requirements, accreditation, detection limits, etc.)
- Section 5.0: Reporting Requirements (Surveillance Network Program reporting)

Figure 1-1 Location of the Snap Lake Mine, Northwest Territories



2. SAMPLE COLLECTION

Overall responsibility for sample collection under this plan rests with trained personnel using standard techniques and equipment. To avoid sample contamination during sample collection, proper sample-handling techniques, atmospheric input, adequately cleaned equipment and the use of equipment constructed of materials appropriate for the analysis targeted for study. The process of sample collection will be separated to prevent contamination of other monitoring or sampling in progress. The series of sites will be sampled from the least to the most impacted.

2.1 Stations

The list of proposed SNP stations applying to Closure Monitoring are identified in Table 2-1. Those stations listed with the recommendation of 'retain' or 'eliminate' are active stations under Water Licence MV2011L2-0004; those stations listed with the recommendation to 'create' are new proposed stations specific to Closure. Permanent signs have been (or will be) erected to mark sampling stations (i.e., water intakes, discharge lines, sumps and seepage sites) to ensure all samples will be taken from the same location. Sampling stations will be identified with Universal Transverse Mercator (UTM) co-ordinates using a Global Positioning System (GPS).

Sampling information including QA/QC for SNP Stations 02-20 (d through k) is provided in the Aquatic Effects Monitoring Plan (AEMP; Golder 2019). The following Sections do not apply to these stations located in Snap Lake.

Table 2-1 Surveillance Network Program (SNP) Sampling Stations

Station ^(a)	Description	Recommendation	Station Purpose
SNP 02-01	Final Mine water collection Sump, underground	Eliminate	n/a
SNP 02-02	North Pile Drainage collection ditch north of Water Management Pond	Retain	Regular Monitoring
SNP 02-03	Core facilities area collection ditch east of the centre of the water management pond	Eliminate	n/a
SNP 02-04.1 SNP 02-04.2 SNP 02-04.3	<ul style="list-style-type: none"> Uncontrolled surface runoff at culvert on north side of center of airstrip Uncontrolled surface runoff at culvert on north side of western end of airstrip Uncontrolled surface runoff at culvert on north side of airstrip 	Eliminate	n/a
SNP 02-05	Uncontrolled surface runoff at Bulk Sample Mine Rock Pad	Eliminate	n/a
SNP 02-06	Uncontrolled surface runoff at Quarry Site on south side of North Pile	Eliminate	n/a

Station ^(a)	Description	Recommendation	Station Purpose
SNP 02-07.1 SNP 02-07.2 SNP 02-07.3	<ul style="list-style-type: none"> Uncontrolled surface runoff and standing water at Road to Bulk Emulsion Plant, pond downstream of explosive magazine Uncontrolled surface runoff and standing water at Road to Bulk Emulsion Plant, pond west of small AN Pad Uncontrolled surface runoff and standing water at Road to Bulk Emulsion Plant, pond west side of small AN Pad 	Eliminate	n/a
SNP 02-08	Uncontrolled surface runoff at Winter Access Road	Eliminate	n/a
SNP 02-09.1 SNP 02-09.2 SNP 02-09.3 SNP 02-09.4 SNP 02-09.5	<ul style="list-style-type: none"> Uncontrolled surface runoff and standing water at Emulsion Plant Area; pond north of Bulk Emulsion Ammonium Nitrate Pad Pond downslope and north-northeast from Ammonium Nitrate Pad Downslope from SNP station 02-09 Base of Ammonium Nitrate Pad Sump, south of Ammonium Nitrate Pad Pond downslope of Ammonium Nitrate Pad 	Eliminate	n/a
SNP 02-10	Any other points where observable flow to Snap Lake or Inland Lake 5 (IL5) is observed.	Eliminate	n/a
SNP_02-11	Seepage monitoring well down gradient from Water Management Pond Dam 1, near Snap Lake shoreline	Eliminate	n/a
SNP 02-12:	Seepage monitoring well down gradient from Water Management Pond Dam 1	Eliminate	n/a
SNP 02-13	Seepage monitoring well down gradient from Water Management Pond Dam 2	Eliminate	n/a
SNP 02-14	Water Management Pond	Retain	Regular Monitoring
SNP 02-15	Water Intake from Snap Lake	Retain	Regular Monitoring
SNP 02-16j	Sewage Treatment Plant Effluent	Retain	Regular Monitoring
SNP 02-17	Final Combined Water Treatment Plant and Sewage Treatment Plant Effluent discharged via diffuser into Snap Lake	Eliminate	n/a
SNP 02-17b	Final Combined Water Treatment Plant and Sewage Treatment Plant Effluent	Retain	Compliance Monitoring
SNP 02-17c	Discharge from East Passive wetland system to Snap Lake	Create	Compliance Monitoring

Station ^(a)	Description	Recommendation	Station Purpose
SNP 02-17d	Discharge from West Passive wetland system to Snap Lake	Create	Compliance Monitoring
SNP 02-18	Monitoring stations in the main basin of Snap Lake used to calculate a whole lake average concentration of TDS	Eliminate	n/a
SNP 02-19	Sewage discharge from the temporary Sewage Disposal Facility	Eliminate	n/a
SNP 02-20defg	Mixing Zone Stations (from Diffuser) within Snap Lake	Retain 2 of 4	AEMP
SNP 02-20h,i	Mixing Zone Stations (from East Passive Wetland) within Snap Lake	Create	AEMP
SNP 02-20j,k	Mixing Zone Stations (from West Passive Wetland) within Snap Lake	Create	AEMP
SNP 02-21	Outflow from Snap Lake flowing into the Lockhart River System	Eliminate	n/a
SNP 02-22	Diffuser construction	Eliminate	n/a
SNP 02-23	Water intake construction	Eliminate	n/a
SNP 02-24	Snap Lake sites in close proximity to fisheries compensation works. Corresponds to AEMP stations SNAP05, and SNAP29 (Water intake).	Eliminate	n/a

Notes:

AEMP = aquatic effects monitoring program; n/a = not applicable

^a Stations listed as retain or eliminate are currently monitored under Water Licence MV2011L2-0004; stations listed as "create" are new and aligned with Closure.

2.2 Sampling Equipment

Handheld instruments will be used to collect field parameter readings including pH, temperature, and conductivity. Field analysis is necessary for temperature, transparency and pH. Dissolved oxygen may be determined in the field or the sample may be treated (fixed) in the field and the remainder of the analysis completed in a laboratory. If samples are to be chemically preserved before being transported to the laboratory, conductivity (if required) must be measured before preservative chemicals are added. Where there are no laboratories within a reasonable distance of the sampling stations, field analysis may be the only feasible way to obtain water quality information.

All field tests are conducted according to manufacturer instructions. Training in the proper use of the equipment necessary for testing, along with scheduled regular maintenance and calibration eliminate risks of improper or inexact indicators. Instruments and equipment are regularly maintained and calibrated with maintenance logs kept on file.

The accuracy and stability of calibrations will be established by setting requirements for the following as appropriate:

- Control and verification standards to verify accuracy and stability; and
- Associated control limits and specified corrective action.

All calibration results and remedial actions are recorded. Instruments deployed long-term in the field will be verified upon removal by analyzing a reference and compared to the initial value to determine drift and ensure validity of reported data at the end of the monitoring period.

The list of instrumentation used in the laboratory and their respective calibration and verification schedule is provided (Table 2-2).

Table 2-2 List of Instruments and Calibration Frequency

Instrument	Parameter	Verification Schedule	Calibration Frequency
Hach Model 2100P Turbidimeter	Turbidity	Prior to use	
YSI 600QS Sonde	pH	Prior to use	Prior to use
	Conductivity	Prior to use	Prior to use
	Dissolved oxygen	Prior to use	Prior to use
	Temperature	-	-
Mettler Balance	Mass	Prior to use	Prior to use
Hach HQ40d Portable Meter	pH	Prior to use	Prior to use
	Conductivity	Prior to use	Prior to use
	Temperature	-	-
Hach DR/890 Colorimeter	Nitrate	Weekly or if new kit opened	Annual
Hach Pocket Colorimeter II	Ammonia	Weekly or if new kit opened	Annual

A peristaltic pump with tubing will be used to collect groundwater samples. Calibration and maintenance procedures will be followed for each instrument as set out by the supplier's operation manual.

Samples will be collected into appropriate bottles so they do not contaminate or alter the sample. Sizes and types of container (i.e., plastic or glass) used for water quality sampling are described in Appendix A. These sample containers are supplied by the analyzing laboratory pre-cleaned, capped and sealed in plastic-film dust-protection; in some cases the laboratory bottles are pre-charged with preservative. The exact list of type of bottle provided by the laboratory may change at their discretion as laboratory methods are revised or updated.

2.3 Sampling Methods

2.3.1 Field Data Recording

All sample collection and measurement activities will be traceable through field records to the person collecting the sample or making the measurement. All maintenance and calibration records for sampling and measurement equipment (where appropriate) will be kept so that they are similarly traceable.

Before samples are collected, all pertinent information on water sampling efforts will be recorded in a bound waterproof notebook.

The following procedures are required for all field notes:

- Number and date each page;
- Ambient wind and weather conditions; and
- All corrections are made by a single-line cross out of the error, initialed and dated.

Field notes, considered legal documents, are a vital source of reference and are to remain accessible at all times.

2.3.2 Sampling Protocol

The same general sampling protocol applies to both surface water and groundwater sample collection. Protocol specific to only surface water or groundwater are identified.

1. Sample Identification

All sample bottles will be labeled with unambiguous identification before sampling begins. Sample bottles will be clearly identified by marking the bottle or label with waterproof, non-smear felt pen. Labels will include:

- Company name;
- Unique sample control number;
- Date and time sampled;
- Initials of sampler; and
- Analysis required.

Once at the SNP site, the sampler will record all details relevant to the sampling in the field notebook: date, SNP sampling station (i.e., 02-14), initials of the sampler, supporting field measurements and samples. Any unusual conditions and variations from usual sampling techniques will be documented.

2. Documentation

Document supporting field measurements at the sampling location in the field notebook using the field meters: pH, water temperature, conductivity, ambient wind and weather conditions.

3. Field Measurements

For running water (i.e., water flowing out of pipes), take supporting field measurements from water filled in a plastic beaker that is pre-rinsed 3 times with the sample water or suspend monitoring probes within the water column. If using a container, do not rest the probe on the bottom or sides of the container. Do not touch the tip of the probes. Air bubbles under the sensor tip when submerged can cause slow response or error in measurement. If bubbles are present, gently shake the probe until bubbles are removed.

All field meter probes will be well rinsed with site water before sampling at the next station.

Ensure sensors are completely submerged. Stabilization times with small concentration changes generally will be longer and can be minimized by correct stirring and conditioning. In the case of multiple sample collections, field meters will be calibrated at the start of each day of use and verified against a reference at the end of the sampling day to confirm data results have not drifted. Calibration and calibration checks will be recorded in the field logbook. Field meters will be used, calibrated and maintained as per the manufacturer's specifications.

Pertinent field observations and any deviations from the sample collection procedure will be recorded in the field notebook.

4. Surface Water Sample Collection

In order to prevent cross-contamination during sample collection, nitrile gloves will be worn during all stages of sample collection. Extra sets of nitrile gloves will be carried in a clean, dry zip lock bag.

Unless otherwise instructed by the laboratory, plastic bottles will be triple rinsed with ambient water before collecting the water sample. Glass bottles are not rinsed: Oil and Grease, Total Organic Carbon, BTEX, F1-F2, microbiological analysis (i.e., Faecal Coliforms, *E. coli*), and any bottles pre-charged with preservative. Samples being added to these types of bottles will be collected during the first submersion.

For samples that require filtering before being preserved, confirm that the sample is not being added to a bottle pre-charged with preservative. For samples that need to be filtered, the sample should be collected in a separate clean bottle, filtered through 0.45-µm membrane filter (as soon as possible after sample collection) directly into the laboratory supplied bottle, and preserved as soon as possible after filtering.

For samples that do not require filtering, the sample bottle will be immersed just below the water surface or in the center of the pipe discharge, and allowed to fill.

Enough space will be left to add the appropriate preservative (see Section 3.1) (unless the bottle has been pre-charged with preservative). The time and analyses required (i.e., pH, Total Suspended Solids [TSS], Oil and Grease, etc.) will be recorded in the field notebook for each sample.

Collection of samples and sample preparation will follow specific instructions as noted in Appendix A.

5. Groundwater Sample Collection

In order to prevent cross-contamination during sample collection, nitrile gloves will be worn during all stages of sample collection. Extra sets of nitrile gloves will be carried in a clean, dry zip lock bag.

The purge volume is calculated using the height of the water column to the bottom of the well. This minimizes the effects on groundwater chemistry from vertical and/or horizontal exchange of water in the open or screen interval with the aquifer as well as diffusion of oxygen from air above the water column into the column of standing water within the open or screened interval. To adequately purge a well, monitor the pH, temperature and conductivity of the water during the purging process, and assume purging is complete when these measurements stabilize.

Sampling equipment are dedicated for use at a specific well to eliminate risk of cross contamination.

- For undeveloped wells, purge three well volumes (including the sand pack) to develop the well.
- Allow the well to recharge and then purge one well volume and collect a sample.
- For wells that are already developed, purge a few well volumes prior to collecting a sample (or one if the well is slow to recharge).
- Once the sample is collected, the sample will be allowed to settle, decanted, and filtered through 0.45- μ m membrane filter (as soon as possible after sample collection).

Sampling equipment will be quality assured with an equipment blank to verify that the equipment is suitable for the purpose of the study (see more details on quality control in Section 2.3.3).

6. Storage and Shipping

Filled sample bottles will be stored at 4 °C (Celsius) and shipped to the appropriate lab in coolers with ice packs as soon as possible. The date the samples are shipped will be recorded in the field notebook. Chain-of-Custody (CoC) forms will be filled out and shipped with the samples (see Section 3.2).

2.3.3 Field Quality Control

Field quality control (QC) samples (i.e., Travel blanks, field blanks, and replicate samples) will be prepared and shipped monthly with the water samples collected for laboratory analysis. These samples should be identified with a unique sample number (e.g., YEAR-MM-#) so the laboratory does not know they are QC samples. The unique number needs to be recorded on the field data sheets.

A description of each field QC sample type is provided below:

- **Travel Blank:** Travel blanks detect sample contamination during transport. Travel blanks consist of pre-filled bottles provided by the analytical laboratory. They accompany empty sample bottles to the field site, where they are left intact and unopened in the shipping cooler. The unopened blanks are then returned to the analytical laboratory to be analyzed along with the collected samples.
- **Field Blank:** Field blanks are used to detect sample contamination during collection, transport, and analysis. They are prepared during a sampling event by filling the appropriate containers with laboratory provided de-ionized water.
- **Field Replicate:** To measure the precision of field sampling and measurement precision, duplicate samples will be collected from pre-assigned sampling locations. Replicate site locations will rotate.

- **Multi-Agency Same Site Replicates:** It is often important to show that different studies provide comparable data. A series of duplicates or replicate samples collected at one site and sent to two laboratories for analysis and comparison.
- **Equipment Blanks:** Equipment blank is blank water that is processed under controlled conditions in the office laboratory by being passed sequentially through each component of the sample processing and collection equipment. Equipment blanks are prepared in a clean, controlled environment (Water Handling Facility), after the equipment has been cleaned using standard laboratory procedures. Deionized water is processed through clean equipment and collected into sample containers. If the data indicate unacceptable concentrations of analytes of interest, the cause must be identified and the equipment or cleaning procedures changed or modified.

Holding time is the elapsed period between sampling collection and analysis. Samples are required to be analyzed within recommended holding times to minimize the possibility of changes in constituent concentrations caused by volatilization, decomposition or other chemical processes. Samples are also refrigerated to slow potential chemical reactions within the sample matrix.

2.4 Sampling Frequency

De Beers' water quality sample stations and frequency of sampling are provided in Table 2-3 below.

Table 2-3 Sampling Frequency

Station	Description	Station Purpose	Weekly Sampling	Bi-Weekly Sampling	Monthly Sampling	Quarterly Sampling	Annual Sampling
SNP 02-02	North Pile Drainage collection ditch north of Water Management Pond	Regular Monitoring	X ^(a)		X		
SNP 02-14	Water Management Pond	Regular Monitoring	X ^(b)			X ^(c)	
SNP 02-15	Water Intake from Snap Lake	Regular Monitoring			X	X ^(c)	X
SNP 02-16j	Sewage Treatment Plant Effluent	Regular Monitoring	X ^(d)				X
SNP 02-17b	Final Combined Water Treatment Plant and Sewage Treatment Plant Effluent	Compliance Monitoring	X ^(d)		X	X	
SNP 02-17c	Discharge from East Passive wetland system to Snap Lake	Compliance Monitoring	X ^(d)		X	X	
SNP 02-17d	Discharge from West Passive wetland system to Snap Lake	Compliance Monitoring	X ^(d)		X	X	
SNP 02-20defg	Mixing Zone Stations (from Diffuser) within Snap Lake	AEMP			X		X
SNP 02-20h,i	Mixing Zone Stations (from East Passive Wetland) within Snap Lake	AEMP			X		X
SNP 02-20j,k	Mixing Zone Stations (from West Passive Wetland) within Snap Lake	AEMP			X		X

Notes:

^a During spring freshet and heavy rainfall events

^b During periods of pumping to WTP

^c When not pumping to the WTP

^d Every 6 days

3. SAMPLE HANDLING

3.1 Preservation

In order to stabilize samples for certain tests it is necessary to add a chemical preservative, in addition to immediate cooling, storage, and transport on ice. Failure to add the proper preservative, or amount, could result in samples deteriorating to the point of being useless for analysis. Samples will be preserved within four hours of collection to prevent chemical or biochemical changes. Samples will be stored at 4°C immediately after collection. Type of preservative, preservation method and appropriate holding times are provided in Appendix A. Laboratories provide preservatives.

3.2 Shipping

After sample collection, sample handling should be minimized. Field investigators should use extreme care to ensure that samples are not contaminated during storage. Environmental and waste samples are typically stored in coolers. To reduce the risk of cross contamination, smaller sample containers (e.g., 125 mL glass jars, 40 mL VOA vials, and one-liter amber bottles) should be placed inside of sealed, plastic bags before being placed in the cooler.

Upon return to the Water Handling Facility, samples will be placed upright in cooler(s), packed tightly with appropriate packing materials and ice packs, and shipped to the appropriate laboratory as soon as possible after they are collected. When sealed ice packs are not available, ensure ice is added prior to shipping, contained in a plastic bag or equivalent to prevent the potential for cross contamination of samples by water produced from melting ice. A completed Chain-of-Custody (CoC) form will accompany the samples.

The individual(s) collecting the field samples will complete the CoC form. It documents the site sampled, date and time of sampling, and analysis required. A copy of the CoC form is maintained in the field records. The shipping memo record will be maintained with the field copy of the CoC for sample tracking and confirmation of shipment.

4. LABORATORY ANALYSIS

4.1 Laboratory Accreditation

Only laboratories accredited by the Canadian Association for Laboratory Accreditation (CALA), an organization whose standards are maintained at the international quality assurance level, will be used. Accreditation is the formal recognition by CALA of the competence of an environmental analytical laboratory to carry out specific tests, conforming with the requirements of ISO/IEC 17025. This formal recognition is based on an on-going evaluation of laboratory capability and performance. The laboratories selected to analyze samples may change over time, but current selected laboratories include ALS Environmental, Taiga Environmental, Maxxam Analytics, Nautilus Environmental, and Flett Research. The current accreditation for these laboratories are provided in Appendix B.

4.2 Analytical Methods

Methods used by the laboratories for analyses of individual parameters are validated prior to approval for use in the lab. All approved methods include quality control and performance criteria that must be achieved prior to release of any data. By ensuring the quality assurance data meets method specific quality objectives, the labs ensure that the analytical results are traceable and defensible prior to their release.

5. REPORTING REQUIREMENTS

5.1 Monthly Reports

De Beers will submit all water quality data required by the Surveillance Network Program, including the results of the field quality control samples, to the Mackenzie Valley Land and Water Board within 30 days of the end of each month of collection. The proposed sampling schedule for each station is provided in Table 2-1. De Beers will submit monthly reports to the Mackenzie Land and Water Board based on this schedule. Modifications to the schedule may occur due to weather and site conditions; modifications will be reported to and discussed with an Inspector.

The monthly reports will contain:

- Data results for sampled SNP stations;
- Travel blank and field blank results;
- Replicate sample results displayed in side by side columns;
- Deviations from sample collection methods (if any); and
- As per proposed conditions in the Water License, De Beers will also submit an annual report by March 31 of the year following the calendar year reported which shall contain the information in accordance with Schedule 1, Item 1.

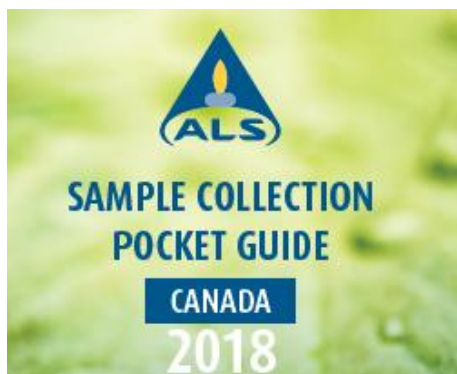
As per proposed conditions Condition B, Item 5N in the Water License, De Beers will also submit an annual report by March 31 of the year following the calendar year reported which shall contain the information in accordance with Schedule 1, Item 1.


6. REFERENCES

- De Beers (De Beers Canada Inc.). 2016. *Snap Lake Mine 2016 Extended Care and Maintenance Plan*. MV2011L2-0004. Submitted to the Mackenzie Valley Land and Water Board. Yellowknife, NT, Canada.
- De Beers. 2002. *Snap Lake Diamond Project: Environmental Assessment Report*. Submitted to the Mackenzie Valley Environmental Impact Review Board. Yellowknife, NT, Canada.
- Golder (Golder Associates Ltd.). 2019. *2019 AEMP Design Plan for Closure and Post-Closure, Snap Lake Mine*.
- INAC (Indian and Northern Affairs Canada). 1996. *Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class "A" Licences in Meeting SNP Requirements and for Submission of a QA/QC Plan*. Prepared by Department of Indian and Northern Affairs Canada, Water Resources Division, and the Northwest Territories Water Board. July 1996.
- MVEIRB (Mackenzie Valley Environmental Impact Review Board). 2003. *Report of Environmental Assessment and Reasons for Decision on the De Beers Canada Mining Inc. Snap Lake Diamond Project*. Yellowknife, NT, Canada.

APPENDIX A SAMPLE COLLECTION REQUIREMENTS

Appendix A. Sample Collection Requirements



WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
SEMI VOL ORGANICS I	SEMI VOL ORGANICS II	ALCOHOLS+ GLYCOLS	SPECIALTY ORGANICS I	NAPHTHENIC ACID/SOIL STERILANTS	SPECIALTY ORGANICS II	SPECIALTY ORGANICS III	ORGANOTINS	ALDICARB/ DIURON	SPECIALTY ORGANICS IV	MICROBIOLOGY	RESIN & FATTY ACIDS	TOXICOLOGY I	TOXICOLOGY II	TOXICOLOGY III
SAMPLE CONTAINER 2 x 500 mL amber glass / Teflon™ lined cap	SAMPLE CONTAINER 60 mL amber glass/Teflon™ lined cap	SAMPLE CONTAINER 2 x 40 mL glass vials	SAMPLE CONTAINER 2 x 1 L amber glass/Teflon™ lined cap	SAMPLE CONTAINER 2 x 250 mL amber glass/ Teflon™ lined cap	SAMPLE CONTAINER 60 mL hdpe (Teflon™ free)	SAMPLE CONTAINER 125 mL hdpe (Teflon™ free)	SAMPLE CONTAINER 250 mL opaque hdpe	SAMPLE CONTAINER 60 mL amber glass/Teflon™ lined cap (Nasidob)	SAMPLE CONTAINER 60 mL hdpe (Nasidob)	SAMPLE CONTAINER 250 mL sterile hdpe (Nasidob)	SAMPLE CONTAINER 2 x 500 mL amber glass (Schlenk/Nasidob)	SAMPLE CONTAINER 100 mL amber glass	SAMPLE CONTAINER 1-2 x 1 L hdpe	SAMPLE CONTAINER 4 x 10 L carboy
PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION Sodium thiosulfate Chill to ≤10°C	PRESERVATION Sodium thiosulfate Chill to ≤10°C	PRESERVATION Ascorbic acid/Sodium Hydroxide Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C	PRESERVATION NI Chill to ≤10°C
TEST PARAMETERS PCB (OCF)/OPP (at Low Level) PAH (OH) (at 50°C) (OH) or Resin and Fatty Acids (OH-HGA)	TEST PARAMETERS Alkanolamines (MA, DA, DPA) (at NFE or Sulfonate or BPA or Carbamates	TEST PARAMETERS Alcohols and glycols	TEST PARAMETERS Diols/ Furans, PBDE, PBB or Bisphenols (at 625-50°C) or Alkylated PAH and PAH or NOMA	TEST PARAMETERS Naphthenic Acid (at Soil Sterilants	TEST PARAMETERS Hormones/ Steroids (at PPCPs/ Neonicotinoids	TEST PARAMETERS PAHs	TEST PARAMETERS Organotins (MOT, DOT, TBT)	TEST PARAMETERS Aldicarb/ Diuron	TEST PARAMETERS Orignal/Paragent and Glyphosate/ AMPA	TEST PARAMETERS E. coli / Fecal/ Total Coliforms (Coli-Test) (at HPC or Pseudomonas aeruginosa BET) and Enterococcus	TEST PARAMETERS Resin and Fatty Acids	TEST PARAMETERS Microtox	TEST PARAMETERS Daphnia magna LC50 (2x1 L) at Daphnia magna Pass/ Fail (1x1 L)	TEST PARAMETERS Rainbow trout LC50 (4x10 L) at Rainbow trout Pass/ Fail (2x10 L)
NOTES Ordnal requires 2x 250 mL amber glass/Teflon™ lined cap for PCB.	NOTES	NOTES	NOTES	NOTES	NOTES	NOTES Please submit an additional 125 mL hdpe if low level (SPE) is required	NOTES	NOTES	NOTES	NOTES	NOTES	NOTES	NOTES LC50 requires 2 x 1 L hdpe Pass/ Fail requires 1 x 1 L hdpe	NOTES LC50 requires 4 x 10 L carboy filled completely. pH stabilized LC50 requires an additional 2 x 10 L carboy in order to complete both tests. NI with zero-headspace. Pass/ Fail requires 2 x 10 L carboy
HOLDING TIME PCB - unlimited OCF/OPP/ARA - 7 days PCB/OCF/OPP/50°C (OH) - 14 days	HOLDING TIME Alkanolamines - 7 days Carbamates - 7 days Sulfonate - 7 days NFE/BPA - 28 days	HOLDING TIME 7 days	HOLDING TIME Diols/ Furans/ PBDE - unlimited Bisphenols - 7 days Alkylated PAH/ PAHs - 14 days NOMA - 7 days	HOLDING TIME Naphthenic acid - 14 days Soil sterilants - 7 days	HOLDING TIME 28 days	HOLDING TIME 28 days	HOLDING TIME 28 days if frozen within 72 hours of sampling. 7 days if unpreserved	HOLDING TIME 7 days	HOLDING TIME 14 days	HOLDING TIME 14 days E. coli/Coliforms - 30 hours 48 hours ONMAB HPC - 24 hours Pseudomonas - 30 hours Enterococcus - 30 hours	HOLDING TIME 14 days GHS - Danger Corrosive 	HOLDING TIME 5 days	HOLDING TIME 5 days	HOLDING TIME 5 days
ORANGE	ORANGE	ORANGE	ORANGE	ORANGE	GREY	GREY	BLACK	CYAN	CYAN	CYAN	DARK BLUE	GREY	GREY	GREY

SAMPLE CONTAINER AND PRESERVATION INFORMATION										
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM										
WATER						SOIL				
Inorganic	Analysis	Sample Bottle	Preservative	Colour Code	Hold Time ²	Physical & Inorganic	Analysis	Sample Bottle	Preservative	Hold Time ²
	Routine Water Package ¹	500mL P	None	N/A	7 Days		Salinity or Nutrients Package Metals, Mercury, pH, EC, Anions, TKN, TOC, NH4	1L Bag	N/A	6 Months 28 Days - Mercury only
		125mL P (Dissolved Metals)	Field Filter 1mL 50% HNO3 ⁴	RED	6 months		Texture, Sieve, Grain Size	1L Bag	N/A	N/A
	pH, EC, Colour, Ortho-PO4, Acids, NO2,NO3	500mL P	None	N/A	7 Days		Spontaneous Combustion	2 x 1L Bag	N/A	N/A
	Anions, DIC, TIC, F, Silica, Bromide, Amines, DIPA	500mL P	None	N/A	14 Days 28 Days - Amines & DIPA only					
	Chlorine (Free/Total) Chloramines	250mL P	None	N/A	Immediate ³					
	Chlorite	150mL P	1.5mL EDA ⁴	N/A	14 Days (preserved) Immediate ³ (Unpreserved)					
	TDS or TSS or TURB / (TDS+TSS+TURB)	250mL P / (500mL P)	None	N/A	7 Days	VOCs	1 x 125mL Jar	Zero Headspace	14 Days	
	TKN, COD, NH4, Total P, TOC/DOC ³	250mL P	2mL 50% H2SO4 ⁴	YELLOW	28 Days	BTEX/F1	1 x 125mL Jar	Zero Headspace	7 Days	
	Metals Scan ³	125mL P	1mL 50% HNO3 ⁴	RED	6 Months	F2-F4, PAH	1 x 125mL Jar	N/A	14 Days	
	Mercury ³	100mL CG	1mL 50% HCl ⁴	N/A	28 Days	Organic Semivolatiles	1 x 125mL Jar	N/A	14 Days	
	Manganese 2+	250mL P	1mL of 50% HCl ⁴	BLUE	14 Days	TCLP BTEX	1 x 125mL Jar	Zero Headspace	14 Days	
	Hexavalent Chromium - Cr (VI) ³	60mL P	1mL 10N NaOH ⁴	N/A	28 Days	Flashpoint	1 x 125mL Jar	Zero Headspace	7 Days	
	Iron (Ferric-Fe3+/Ferrous-Fe2+)	250mL AG	Field Filter 10mL 50% HCl ⁴	N/A	48 Hours	Basic Class II Landfill TCLP BTEX, Flashpoint, pH, TCLP Metals, Free Liquid	2 x 125mL Jar 1 x 1L Bag	Zero Headspace in jars	7 Days - Flashpoint only	
	Phenolics (4-AAP)	100mL AG	2mL 50% H2SO4 ⁴	YELLOW	28 Days					
	Cyanide (WAD / SAD)	125mL P	1mL 10N NaOH ⁴	PURPLE	14 Days					
	Sulphide	250mL P	1mL 10N NaOH & 1mL 2N ZnAc ⁴	GREEN	7 Days					
	Sulphite	125mL P	1.25mL of glycerol ⁴	N/A	28 Days (preserved) Immediate ³ (Unpreserved)					
	Microbiological - Total E. Coli & Coliforms, Fecal Coliforms, HPC, SRB, IRB ⁵	250mL P	Sodium Thiosulfate ⁴	N/A	24 Hours					
	Biological Oxygen Demand - BOD	500mL P	None	N/A	48 Hours					
	Dissolved Oxygen - DO	300mL CG	MnSO4 / Alk. Iodide Pour Contents of Pillows into Bottle (Zero Headspace)	N/A	24 Hours					
	Chlorophyll A	1L P	Minimize Light Exposure	N/A	24 Hours					
	Cellulose Nitrate filter wrapped in aluminum foil	Field filtered and frozen ⁷	N/A	30 Days						
Organic	F2, F2-F4, PAH	2 x 100mL AG	NaHSO4 ⁴	N/A	14 Days	Bottle Types				
	VOCs, BTEX, F1, THM	2 x 44mL CG	NaHSO4 ⁴	N/A	14 Days	AG- Amber Glass CG- Clear Glass P- Plastic				
	Semivolatile Phenol (GCMS), Phenoxy Herbicides	1L AG	None	N/A	7 Days	NOTE: Samples with more than one test with similar bottle requirements, may share a sample container as long as there is sufficient sample to cover minimum requirements for all tests requested. Please use a sample container which will provide sufficient sample.				
	Sulfolane	2 x 500mL AG	NaHSO4 ⁴	N/A	14 Days					
	PCB	2 x 500mL AG	None	N/A	7 Days					
	Naphthenic Acids, HCB	2 x 250mL AG	None	N/A	14 Days					
	Glycol, Alcohol	2 x 44mL CG	NaHSO4 ⁴	N/A	14 Days					
	Flashpoint	3 x 44mL CG	None	N/A	7 Days					
	OGIR/TPHIR/OGH (Gravimetric)	250mL AG	1mL 50% H2SO4 ⁴	YELLOW	14 Days					

1 Routine water Package: ALK, HCO3, CO3, pH, EC, OH, Ion Balance, Ion Sum (Ca, Mg, Na, K), Fe, Mn, Cl, SO4, NO2, NO3, TDS (Calc.), Hardness (Calc.)

2 Hold time for when multiple analysis are listed is based on the shortest hold time of the group.

3 Dissolved parameters require field filtration prior to filling sample container. If field filtration is not possible, please submit extra raw sample. Preservative will need to be removed and bottle rinsed before filling with raw sample.

4 Preservative is pre-charged in the sample bottle and/or vial.

5 Please provide 2 bottles if multiple analyses are required.

6 Analysis must be done ASAP upon arrival at the lab.

7 Volume of sample filtered required (1L minimum).

Calgary: 4000 19th St. NE, T2E 6P8, Toll Free (800) 386-7247
Edmonton: 9331-48 St. T6B 2R4, Toll Free (800) 386-7247

Maxxam

¹ Routine water Package: ALK, HCO₃, CO₃, pH, EC, OH, Ion Balance, Ion Sum (Ca, Mg, Na, K), Fe, Mn, Cl, SO₄, NO₂, NO₃, TDS (Calc.), Hardness (Calc.)

² Hold time for when multiple analysis are listed is based on the shortest hold time of the group.

³ Dissolved parameters require field filtration prior to filling sample container. If field filtration is not possible, please submit extra raw sample. Preservative will need to be removed and bottle rinsed before filling with raw sample.

⁴ Preservative is pre-charged in the sample bottle and/or vial.

⁵ Please provide 2 bottles if multiple analyses are required.

⁶ Analysis must be done ASAP upon arrival at the lab.

⁷ Volume of sample filtered required (1L minimum).

Bottle Types		
AG- Amber Glass	CG- Clear Glass	P- Plastic

NOTE:
Samples with more than one test with similar bottle requirements, may share a sample container as long as there is sufficient sample to cover minimum requirements for all tests requested. Please use a sample container which will provide sufficient sample.



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Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
maxxam.ca



Taiga Environmental Laboratory

4601 52nd Avenue – Yellowknife, NT X1A 2R3
Phone: (867) 669-2788 Fax: (867) 669-2718 Email: taiga@gov.nt.ca

Parameter Group		Marking	Preservative	Instructions
	Routine	GREEN	Keep cool at 4°C	1. Rinse bottle three (3) times with sample 2. Fill to top and cap bottle.
	Nutrients	BLACK	Keep cool at 4°C	
	Biochemical Oxygen Demand (BOD)	PURPLE	Keep cool at 4°C	1. Rinse bottle three (3) times with sample 2. Fill to top and cap bottle. 3. Sample must be sent to laboratory within 24 hours
	Microbiological	STERILE	Sodium thiosulphate and Keep cool at 4°C	1. DO NOT RINSE BOTTLE 2. Fill to top and cap bottle. 3. Sample must be sent to laboratory within 24 hours
	Total Metals	RED	5mL of 1:3 nitric acid in RED-dot vials	1. Rinse bottle three (3) times with sample 2. Fill to near the top. 3. Add contents of preservative vial 4. Cap bottle and mix.
	Dissolved Metals	RED	5mL of 1:3 nitric acid in RED-dot vials	1. Filter Sample with 0.45 µm Cellulose Acetate filter 2. Rinse bottle three (3) times with filtrate 3. Fill to near the top. 4. Add contents of preservative vial 5. Cap bottle and mix.
	Hexane Extractable Material (HEM) (also known as Oil and Grease)	YELLOW	4mL 1:1 sulphuric acid in YELLOW-dot vial	1. DO NOT RINSE BOTTLE 2. Fill to shoulder of bottle. 3. Add contents of preservative vial 4. Cap bottle and mix.
	BTEX, THM & Purgeable Hydrocarbons	40 mL CLEAR GLASS W/ WHITE LID	Keep cool at 4°C	1. DO NOT RINSE BOTTLE 2. Fill bottle completely leaving NO air bubbles
	Extractable Hydrocarbons	1 L AMBER GLASS W/ WHITE LID	Keep cool at 4°C	1. DO NOT RINSE BOTTLE 2. Fill to top and cap bottle.
	Cyanide	BLUE	1mL of 6N sodium hydroxide	1. Rinse bottle three (3) times with sample 2. Fill to near the top. 3. Add contents of preservative vial 4. Cap bottle and mix.
	Thiocyanate	ORANGE	2mL of 25% sulphuric acid	
	Phenol	YELLOW with P	2mL of 20% sulphuric acid	
	Sulphide	ORANGE with S	2mL of 25% zinc acetate	
	Radionuclide	RED with R	25mL of 17.5% nitric acid	
	Chlorophyll A	1L BROWN PLASTIC BOTTLE	Keep cool at 4°C	1. Rinse bottle three (3) times with sample 2. Fill to top and cap bottle. 3. Sample must be sent to laboratory within 24 hours

APPENDIX B LABORATORY ACCREDITATION

Appendix B1	ALS Environmental
Appendix B2	Taiga Environmental Laboratory
Appendix B3	Maxxam Analytics International Corporation
Appendix B4	Nautilus Environmental Inc.
Appendix B5	Flett Research Ltd.

Appendix B1 ALS Environmental



CALA

Canadian Association for
Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 1352
Laboratory Name: ALS Environmental (Edmonton)
Parent Institution: ALS Canada Ltd.
Address: 9450-17th Ave. NW Edmonton AB T6N 1M9
Contact: Ms. Sarah Stilson
Phone: (780) 413-5226
Fax: (780) 437-2311
Email: alsed.quality@alsglobal.com

Standard: Conforms with requirements of ISO/IEC 17025
Clients Served: All Interested Parties
Revised On: November 19, 2018
Valid To: April 29, 2021

Scope of Accreditation

Air (Inorganic)

Dustfall - Air [Dustfall] (120)
ED-TM-1030; modified from ALBERTA ENVIRONMENT 32020
GRAVIMETRIC
Dustfall, Fixed
Dustfall, Total

Air (Inorganic)

Fluoride - Air (188)
ED-TM-1028; modified from SM 4500-F- C
SELECTIVE ION ELECTRODE
Fluoride

Air (Inorganic)

Fluoride - Air [Filter] (219)
ED-TM-1008, NA-TM-1001; modified from NIOSH 7906
ION CHROMATOGRAPHY
Hydrogen Fluoride (as F)

Air (Inorganic)

Mercury - Air [Filter] (190)
ED-TP-2001, NA-TM-1005; modified from EPA 245.1 and NIOSH 6009
COLD VAPOUR AA - DIGESTION
Mercury

Air (Inorganic)

Metals - Air [Filter] (016)
ED-TP-2001, NA-TM-1002; modified from EPA 6020A and NIOSH 7303
ICP/MS - DIGESTION
Aluminum

† "OSDWA" indicates the appendix is used for the analysis of Ontario drinking water samples, which is subject to the rules and related regulations under the Ontario "Safe Drinking Water Act" (2002).

Antimony
Arsenic
Barium
Beryllium
Bismuth
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Selenium
Silver
Sodium
Strontium
Sulfur
Thallium
Tin
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Air (Inorganic)

Particulates - Air [Particulate] (223)
ED-TM-1140; modified from NIOSH 0500 and NIOSH 0600
GRAVIMETRIC
Particulates

Air (Inorganic)

Total Solids - Air [Impinger] (205)
ED-TM-1157; modified from EPA 5
GRAVIMETRIC
Total Solids

Air (Organic)

Formaldehyde - Air (221)
ED-TM-1151; modified from EPA TO-11A and NIOSH 2016
HPLC/UV - EXTRACTION
Formaldehyde

Air (Organic)

Gas - Air [Compressed Breathing Air] (218)
ED-TM-1144; modified from ASTM D1946 and CSA 180 and EPA 3C
GC/TCD
Nitrogen
Oxygen

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Air (Organic)

Hydrocarbons - Air (217)

ED-TM-1142, ED-TM-1144; modified from CSA Z180 and EPA 18

GC/FID

Carbon dioxide

Carbon monoxide

Ethane

Methane

Total Volatile Hydrocarbons (TVH): C1-C16

Air (Organic)

Volatile Organic Compounds (VOC) - Air (216)

ED-TM-1142; modified from EPA 018 and EPA 25C

GC/FID

Benzene

Ethylbenzene

Non-methane organic carbons

Toluene

Xylenes

Oil (Organic)

Polychlorinated Biphenyls (PCB) - Oil (002)

ED-TM-1104, ED-TM-1116; modified from ASTM D4059 and EPA 8082

GC/ECD - EXTRACTION

Aroclor 1016

Aroclor 1221

Aroclor 1232

Aroclor 1242

Aroclor 1248

Aroclor 1254

Aroclor 1260

Aroclor 1262

Aroclor 1268

Total PCB

Paint (Inorganic)

Lead - Paint (153)

ED-TM-1021, NA-TP-2004; modified from EPA 200.2 and EPA 200.7

ICP - DIGESTION

Lead

Soil (Inorganic)

Ammonia - Solids [Soil] (225)

ED-TM-1024, ED-TP-2019; modified from EPA 350.1 and SM 4500-NH3 and SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 15.2.1

COLORIMETRIC - SATURATED PASTE

Ammonia

Solids (Inorganic)

Anions - Solids [Soil] (176)

ED-TP-2019, NA-TM-1001; modified from EPA 300.1 and SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 15.2.1

ION CHROMATOGRAPHY (IC) - SATURATED PASTE

Chloride

Nitrate

Nitrate-N

Nitrite

Sulphate

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Solids (Inorganic)

Asbestos - Solids [Bulk] (222)
ED-TM-1152; modified from EPA 600/R-93/116 and NIOSH 9002
POLARIZED LIGHT MICROSCOPY (PLM)
Bulk Asbestos

Solids (Inorganic)

Barium - Solids [Soil] (172)
ED-TM-1021, ED-TM-1055; modified from EPA 200.7 and SSSA PART 3, 1996, PG 202
ICP - FUSION
Barium

Solids (Inorganic)

Chloride - Solids [Saturated Paste, Soil] (168)
ED-TM-1032, ED-TP-2019; modified from SM 4500-CL- E and SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 15.2.1
COLORIMETRIC
Chloride

Solids (Inorganic)

Conductivity - Solids [Soil] (156)
ED-TM-1004, ED-TP-2019; modified from SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 15.2.1 and SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 15.3
SATURATED PASTE, METER
Conductivity

Solids (Inorganic)

Density - Solids [Soil] (170)
ED-TM-1025; modified from ASTM D5057
GRAVIMETRIC
Density

Solids (Inorganic)

Extractable Barium - Solids [Soil] (182)
ED-TM-1021, ED-TM-1051; modified from BARITE WASTE GUIDELINES
ICP - EXTRACTION
Barium

Solids (Inorganic)

Grain Size - Solids [Soil] (028)
ED-TM-1014; modified from ASTM D422-63
SIEVING
PSA% >75um

Solids (Inorganic)

Hexavalent Chromium - Solids [Soil] (148)
ED-TM-1023; modified from EPA 3060A
IC-ALKALINE DIGESTION
Chromium

Solids (Inorganic)

Hot Water Soluble Boron - Solids [Soil] (145)
ED-TM-1021, ED-TM-1040; modified from KEREN 1996 METHODS OF SOIL ANALYSIS
ICP - EXTRACTION
Boron

Solids (Inorganic)

Mercury - Solids [Soil] (164)
NA-TM-1005, NA-TP-2004; modified from EPA 200.2 and EPA 245.1
COLD VAPOUR AA - DIGESTION
Mercury

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Solids (Inorganic)

Metals - Solids [Soil] (023)

NA-TM-1002, NA-TP-2004; modified from EPA 200.2 and EPA 6020

ICP/MS - DIGESTION

Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Selenium
Silver
Sodium
Strontium
Sulfur
Thallium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Solids (Inorganic)

Oil and Grease - Solids [Soil] (029)

ED-TM-1131; modified from SM 5520

GRAVIMETRIC - EXTRACTION

Oil and Grease

Solids (Inorganic)

Paint Filter - Solids [Paint, Soil] (231)

ED-TM-1042; EPA 9095A

FILTRATION

Paint Filter (Free Liquid)

Solids (Inorganic)

Particle Size Analysis (PSA) - Solids [Soil] (110)

ED-TM-1010; modified from SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 55.3

PARTICLE SIZE

% clay

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% Sand
Silt

Solids (Inorganic)

Percent Moisture - Solids [Soil] (179)
ED-TM-1200; modified from ASTM D2216-80
GRAVIMETRIC
Percent Moisture

Solids (Inorganic)

Percent Saturation - Solids [Soil] (169)
ED-TP-2019; modified from SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 15.2.1
GRAVIMETRIC
Percent Saturation

Solids (Inorganic)

pH - Solids [Soil] (099)
ED-TM-1003, ED-TP-2019; modified from SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 15.2.1 and
SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 16.2
SATURATED PASTE, METER
pH

Solids (Inorganic)

pH - Solids [Soil] (100)
ED-TM-1003; modified from SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 16.2
EXTRACTION, METER
pH (1:1)
pH (1:2)

Solids (Inorganic)

pH - Solids [Soil] (163)
ED-TM-1015; modified from SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 16.3
1:2 CaCl₂ EXTRACTION - METER
pH (1:2): CaCl₂

Solids (Inorganic)

Salinity - Solids [Soil] (160)
ED-TM-1021, ED-TP-2019; modified from EPA 200.7 and SOIL SAMPLING & METHODS OF ANALYSIS,
CARTER 15.2.1
ICP (SATURATED PASTE)
Boron
Calcium
Magnesium
Potassium
Sodium
Sulfur
Sulphate

Solids (Inorganic)

Sulfate - Solids (173)
ED-TM-1046, NA-TM-1001; modified from CSA A23.2
IC - DIGESTION
Sulfate

Solids (Organic)

Alkanolamines - Solids [Soil] (210)
ED-TM-1155; modified from "QUANTITATIVE ANALYSIS OF AMINO ACIDS" T. NASHOLM, G. SANDLBERG, &
A. ERICSSON. J. CHROMATOGRAM. 396:225-236 (1987)
HPLC - EXTRACTION
DEA (Diethanolamine)

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DIPA (Diisopropanolamine)
MEA (Monoethanolamine)
MIPA (Monoisopropanolamine)

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Solids [Soil] (154)

NA-TM-1102, NA-TP-2102; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD and EPA 8260

GC/MS - HEADSPACE

Benzene

Ethylbenzene

m/p-xylene

o-xylene

Toluene

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Solids [Soil] (155)

NA-TM-1102, NA-TP-2102; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD and EPA 5021 and EPA 8260

GC/FID - HEADSPACE

F1: C6-C10

VH: C6-C10

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Solids [Soil] (158)

NA-TM-1100, NA-TP-2100; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD

GC/FID - EXTRACTION TUMBLER

F2: C10-C16

F3: C16-C34

F4: C34-C50

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Solids [Soil] (171)

NA-TM-1100, NA-TP-2100; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD

GRAVIMETRIC - TUMBLER

F4: Gravimetric

Solids (Organic)

Phenols - Solids [Soil] (077)

ED-TM-1113; modified from EPA 3540 and EPA 8270

GC/MS - EXTRACTION

2-Chlorophenol

2-Methylphenol (o-Cresol)

2-Nitrophenol

2,3-Dichlorophenol

2,3,4-Trichlorophenol

2,3,4,5-Tetrachlorophenol

2,3,4,6-Tetrachlorophenol

2,3,5-Trichlorophenol

2,3,5,6-Tetrachlorophenol

2,3,6-Trichlorophenol

2,4 + 2,5-Dichlorophenol

2,4-Dimethylphenol

2,4-Dinitrophenol

2,4,5-Trichlorophenol

2,4,6-Trichlorophenol

2,6-Dichlorophenol

3-Chlorophenol

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3-Methylphenol (m-Cresol)
3,4-Dichlorophenol
3,4,5-Trichlorophenol
3,5-Dichlorophenol
4-Chloro-3-methyl phenol
4-Chlorophenol
4-Methylphenol (p-Cresol)
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Pentachlorophenol
Phenol

Solids (Organic)

Polychlorinated Biphenyls (PCB) - Solids [Soil] (097)

ED-TM-1102, ED-TM-1116; modified from EPA 3550 and EPA 8082

GC/ECD - EXTRACTION

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Total PCB

Solids (Organic)

Polycyclic Aromatic Hydrocarbons (PAH) - Solids (227)

NA-TM-1105, NA-TP-2103; modified from EPA 3570 and EPA 8270

GC/MS - EXTRACTION

1-Methylnaphthalene
2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo (a) anthracene
Benzo (a) pyrene
Benzo (b,i) fluoranthene
Benzo (g,h,i) perylene
Benzo (k) fluoranthene
Chrysene
Dibenzo (a,h) anthracene
Fluoranthene
Fluorene
Indeno (1,2,3 - cd) pyrene
Naphthalene
Perylene
Phenanthrene
Pyrene
Quinoline

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Solids (Organic)

Volatile Organic Compounds (VOC) - Solids [Soil] (167)

ED-TM-1111, NA-TM-1102, NA-TP-2102; modified from EPA 5021 and EPA 8260

GC/MS - HEADSPACE/EXTRACTION

1,1-Dichloroethane
1,1-dichloroethylene
1,1-Dichloropropene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-Dibromo-3-chloropropane (DBCP)
1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,3,5-Trimethylbenzene
1,4-dichlorobenzene
2-Chlorotoluene
2-Hexanone (MBK)
2,2-Dichloropropane
4-Chlorotoluene
Acetone (2-Propanone)
Acrylonitrile
Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
Carbon disulfide
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
cis-1,2-Dichloroethylene
cis-1,3-Dichloropropene
cis-1,4-Dichloro-2-butene
Dibromomethane
Dichlorodifluoromethane
Dichloromethane
Ethyl alcohol
Ethyl methacrylate
Ethylbenzene
Ethylene Dibromide
Hexachlorobutadiene

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Isopropylbenzene
m/p-xylene
Methyl Ethyl Ketone
Methyl iodide
Methyl isobutyl Ketone
Methyl t-butyl ether
n-Butylbenzene
n-Propylbenzene
o-xylene
p-Isopropyltoluene
sec-Butylbenzene
Styrene
tert-Butylbenzene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
trans-1,4-Dichloro-2-butene
Trichloroethylene
Trichlorofluoromethane
Vinyl chloride

Swab (Inorganic)

Mercury - Solids [Swab] (211)
ED-TP-2004, NA-TM-1005; modified from EPA 245.1 and EPA 3050B
COLD VAPOUR AA - DIGESTION
Mercury

Swab (Inorganic)

Metals - Solids [Swab] (201)
ED-TP-2004, NA-TM-1002; modified from EPA 200.2 and EPA 6020
ICP/MS - EXTRACTION
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Molybdenum
Nickel
Potassium
Selenium
Silver
Sodium
Strontium
Tin
Vanadium

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Zinc

Swab (Organic)

Polychlorinated Biphenyls (PCB) - Solids [Swab] (202)

ED-TM-1102, ED-TM-1116; modified from EPA 3550 and EPA 8082

GC/ECD - EXTRACTION

Aroclor 1016

Aroclor 1221

Aroclor 1232

Aroclor 1242

Aroclor 1248

Aroclor 1254

Aroclor 1260

Aroclor 1262

Aroclor 1268

Total PCB

Waste (Inorganic)

Flashpoint - Waste (055)

ED-TM-1012; modified from ASTM 93-D

PENSKE-MARTEN CLOSED CUP

Flashpoint

Waste (Inorganic)

Mercury - Waste (162)

NA-TM-1005, NA-TM-1700; modified from EPA 1311 (PREPARATION) and EPA 245.1 (ANALYSIS) and EPA 245.7 (ANALYSIS)

COLD VAPOUR AA - DIGESTION - TCLP

Mercury

Waste (Inorganic)

Metals - Waste (141)

NA-TM-1002, NA-TM-1700, NA-TP-2001; modified from EPA 1311 (PREPARATION) and EPA 6020 (ANALYSIS)

ICP/MS - TCLP

Antimony

Arsenic

Barium

Beryllium

Boron

Cadmium

Chromium

Cobalt

Copper

Iron

Lead

Nickel

Selenium

Silver

Thallium

Uranium

Vanadium

Zinc

Zirconium

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Waste (Inorganic)

Specific Gravity - Waste (174)
ED-TM-1025; modified from ASTM D5057
GRAVIMETRIC
Specific Gravity

Waste (Organic)

BTEX - Waste (135)
ED-TP-2005, NA-TM-1102; modified from EPA 1311 (PREPARATION) and EPA 8260B (ANALYSIS)
GC/MS - TCLP
Benzene
Ethylbenzene
m,p-Xylene
o-Xylene
Toluene

Water (Inorganic)

Acidity - Water (206)
ED-TM-1049; modified from SM 2310
TITRATION
Acidity

Water (Inorganic)

Acidity - Water (212)
ED-TM-1049; modified from SM 2310
TITRATION - POTENTIOMETRIC
Acidity

Water (Inorganic)

Acidity - Water (229)
ED-TM-1026; modified from SM 2310
TITRIMETRIC
Acidity

Water (Inorganic)

Alkalinity - Water (004)
ED-TM-1026; modified from SM 2320 B
TITRIMETRIC
Alkalinity (pH 4.5)
Alkalinity (pH 8.3)

Water (Inorganic)

Ammonia - Water (178)
ED-TM-1016; modified from SM 4500-NH3
COLORIMETRIC
Ammonia

Water (Inorganic)

Ammonia - Water (213)
ED-TM-1024; modified from EPA 350.1
COLORIMETRIC
Ammonia

Water (Inorganic)

Anions - Water (005)
NA-TM-1001; modified from EPA 300.1
ION CHROMATOGRAPHY
Bromide
Chloride
Fluoride

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Nitrate
Nitrite
Sulfate

Water (Inorganic)

Biochemical Oxygen Demand (BOD) - Water (013)
ED-TM-1007, ED-TM-1037; modified from SM 5210 B
D.O. METER
BOD (5 day)
BOD_u (ultimate)
CBOD (5 day)

Water (Inorganic)

Carbon - Water (118)
ED-TM-1002; modified from SM 5310 B
IR - COMBUSTION
Inorganic Carbon
Organic Carbon
Total Carbon

Water (Inorganic)

Chemical Oxygen Demand (COD) - Water (051)
ED-TM-1009; modified from SM 5220 D
COLORIMETRIC - DIGESTION
COD

Water (Inorganic)

Chlorine - Water (123)
ED-TM-1036; modified from SM 4500-CL A and SM 4500-CL F and SM 4500-CL G
COLORIMETRIC
Free Chlorine
Total Chlorine

Water (Inorganic)

Colour - Water (152)
ED-TM-1038; modified from SM 2120 A and SM 2120 C
SPECTROPHOTOMETRIC
True Colour

Water (Inorganic)

Conductivity - Water (006)
ED-TM-1026; modified from SM 2510 B
CONDUCTIVITY METER
Conductivity (25°C)

Water (Inorganic)

Dissolved Metals - Water (007)
NA-TM-1002, NA-TP-2002; modified from EPA 6020
ICP/MS
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Cesium

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Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Rubidium
Selenium
Silicon
Silver
Sodium
Strontium
Sulphur
Tellurium
Thallium
Thorium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Water (Inorganic)

Dissolved Oxygen - Water (214)
ED-TM-1054; modified from SM 4500-O
TITRATION
Dissolved Oxygen

Water (Inorganic)

Hexavalent Chromium - Water (035)
ED-TM-1023; modified from SM 3500-CR C
ION CHROMATOGRAPHY
Hexavalent Chromium

Water (Inorganic)

Mercury - Water (149)
NA-TM-1005; modified from EPA 245.1 and EPA 245.7
COLD VAPOUR AA, COLD OXIDATION
Mercury

Water (Inorganic)

Microtox - Water (161)
NA-TM-1400; modified from AER D50
BIOLUMINESCENCE
Microtox IC50 (15 min)

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Water (Inorganic)

Oil and Grease - Water (038)

ED-TM-1132; modified from SM 5520 A and SM 5520 B and SM 5520 F

GRAVIMETRIC

Total Oil and Grease

Water (Inorganic)

Oil and Grease - Water (159)

ED-TM-1133; modified from SM 5520 C and SM 5520 F

INFRA-RED

Hydrocarbon Oil and Grease

Total Oil and Grease

Water (Inorganic)

pH - Water (015)

ED-TM-1026; modified from SM 4500-H+ A and SM 4500-H+ B

pH METER

pH

Water (Inorganic)

Phosphate - Water (084)

ED-TM-1031; modified from SM 4500-P

COLORIMETRIC

Phosphate

Water (Inorganic)

Phosphate - Water (183)

ED-TM-1018; modified from SM 4500-P

COLORIMETRIC - TECHNICON

Phosphate

Water (Inorganic)

Phosphorus - Water (011)

ED-TM-1031; modified from SM 4500-P B and SM 4500-P E

COLORIMETRIC - DIGESTION

Total Dissolved Phosphorus

Total Phosphorus

Water (Inorganic)

Phosphorus - Water (119)

ED-TM-1031, ED-TP-2006; modified from SM 4500 A and SM 4500 B and SM 4500 E

COLORIMETRIC

Inorganic Phosphorus

Water (Inorganic)

Phosphorus - Water (184)

ED-TM-1018; modified from SM 4500-P B and SM 4500-P E

COLORIMETRIC - TECHNICON

Total Dissolved Phosphorus

Total Phosphorus

Water (Inorganic)

Phosphorus - Water (224)

ED-TM-1018; SM 4500-P

COLORIMETRIC - TECHNICON

Inorganic Phosphorus

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Water (Inorganic)

Reactive Silica - Water (200)

ED-TM-1053; modified from SM 4500-SIO2 A and SM 4500-SIO2 E

COLORIMETRIC

Reactive Silica

Water (Inorganic)

Solids - Water (012)

ED-TM-1005; modified from SM 2540 A and SM 2540 B and SM 2540 C and SM 2540 D and SM 2540 E

GRAVIMETRIC

Fixed Suspended Solids

Total Dissolved Solids

Total Suspended Solids

Volatile Suspended Solids

Water (Inorganic)

Sulphide - Water (033)

ED-TM-1001; modified from SM 4500-S2- A and SM 4500-S2- D and SM 4500-S2- E

COLORIMETRIC

Sulphide

Water (Inorganic)

Total Kjeldahl Nitrogen (TKN) - Water (010)

ED-TM-1017, NA-TM-1006; modified from EPA 351.2

COLORIMETRIC - DIGESTION

Dissolved Kjeldahl Nitrogen

Total Kjeldahl Nitrogen

Water (Inorganic)

Total Metals - Water (082)

NA-TM-1002, NA-TP-2001; modified from EPA 6020 and SM 3030 E

ICP/MS - DIGESTION

Aluminum

Antimony

Arsenic

Barium

Beryllium

Bismuth

Boron

Cadmium

Calcium

Cesium

Chromium

Cobalt

Copper

Iron

Lead

Lithium

Magnesium

Manganese

Molybdenum

Nickel

Phosphorus

Potassium

Rubidium

Selenium

Silicon

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Silver
Sodium
Strontium
Sulphur
Tellurium
Thallium
Thorium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Water (Inorganic)

Turbidity - Water (078)
ED-TM-1011; modified from SM 2130 A and SM 2130 B
TURBIDIMETRIC
Turbidity

Water (Inorganic)

UV Absorbance and Transmittance - Water (230)
ED-TM-1058; modified from SM 5910 B
SPECTROPHOTOMETRIC
UV Absorbance
UV Transmittance

Water (Microbiology)

Coliforms - Water (196)
NA-TM-1300; modified from SM 9223 B
MOST PROBABLE NUMBER (QUANTI-TRAY)
Escherichia coli (E. coli)
Total Coliforms

Water (Microbiology)

Fecal (Thermotolerant) Coliforms - Water (197)
NA-TM-1300; modified from SM 9223 B
MOST PROBABLE NUMBER (QUANTI-TRAY)
Fecal (Thermotolerant) Coliforms

Water (Microbiology)

Heterotrophic Plate Count (HPC) - Water (198)
NA-TM-1300; modified from SM 9215 E
MOST PROBABLE NUMBER (QUANTI-TRAY)
Heterotrophic Plate Count (HPC)

Water (Organic)

Alkanolamines - Water (209)
ED-TM-1155; modified from "QUANTITATIVE ANALYSIS OF AMINO ACIDS" T. NASHOLM, G. SANDLBERG, & A. ERICSSON. J. CHROMATOGRAM. 396:225-236 (1987)
HPLC - EXTRACTION
DEA (Diethanolamine)
DIPA (Diisopropanolamine)
MEA (Monoethanolamine)
MIPA (Monoisopropanolamine)

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Water (Organic)

Base Neutral Extractables - Water (117)

ED-TM-1124; modified from EPA 3510 and EPA 8270

GC/MS - EXTRACTION

1,2,3-Trichlorobenzene

1,2,4-Trichlorobenzene

2-Chloronaphthalene

2,4-Dinitrotoluene

2,6-Dinitrotoluene

Hexachlorobenzene

Hexachlorobutadiene

Hexachlorocyclopentadiene

Hexachloroethane

Pentachlorobenzene

Water (Organic)

Petroleum Hydrocarbons (PHC) - Water (075)

NA-TM-1112; modified from EPA 3511

GC/FID - EXTRACTION

F2: C10-C16

F3: C16-C34

F4: C34-C50

Total Extractable Hydrocarbons (TEH): C11-C30

Water (Organic)

Petroleum Hydrocarbons (PHC) - Water (165)

NA-TM-1102; modified from EPA 5021 and EPA 8260

GC/FID - HEADSPACE

F1: C6-C10

Volatile Hydrocarbons (VH): C6-C10

Water (Organic)

Phenols - Water (076)

ED-TM-1114; modified from EPA 3510 and EPA 8270

GC/MS - EXTRACTION

2-Chlorophenol

2-Methylphenol (o-Cresol)

2-Nitrophenol

2,3-Dichlorophenol

2,3,4-Trichlorophenol

2,3,4,5-Tetrachlorophenol

2,3,4,6-tetrachlorophenol

2,3,5-Trichlorophenol

2,3,5,6-Tetrachlorophenol

2,3,6-Trichlorophenol

2,4 + 2,5-Dichlorophenol

2,4-Dimethylphenol

2,4-Dinitrophenol

2,4,5-Trichlorophenol

2,4,6-trichlorophenol

2,6-Dichlorophenol

3-Chlorophenol

3-Methylphenol (m-Cresol)

3,4-Dichlorophenol

3,4,5-Trichlorophenol

3,5-Dichlorophenol

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4-Chloro-3-methyl phenol
4-Chlorophenol
4-Methylphenol (p-Cresol)
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Pentachlorophenol
Phenol

Water (Organic)

Phenols - Water (228)
ED-TM-1057; modified from EPA 9066
COLORIMETRIC
Total Phenolics

Water (Organic)

Polyaromatic Hydrocarbons (PAH) - Water (226)
NA-TM-1112, NA-TP-2019; modified from EPA 3511 and EPA 8270D
GC/MS - MICROEXTRACTION
1-Methylnaphthalene
2-Methylnaphthalene
Acridine
Benzo(e)pyrene
Perylene
Quinoline

Water (Organic)

Resin and Fatty Acids - Water (020)
ED-TM-1106; modified from ALBERTA ENVIRONMENT 129.0
GC/MS - EXTRACTION
12-Chlorodehydroabietic acid
12,14-Dichlorodehydroabietic Acid
14-Chlorodehydroabietic acid
9,10-Dichlorostearic acid
Abietic acid
Arachidic acid
Dehydroabietic acid
Isopimaric acid
Levopimaric acid
Linoleic acid
Linolenic acid
Myristic acid
Neoabietic acid
Oleic acid
Palmitic acid
Palustric acid
Pimaric acid
Sandaracopimaric acid
Stearic acid

Water (Organic)

Resin and Fatty Acids - Water (132)
ED-TM-1106; modified from ALBERTA ENVIRONMENT 129.0
GC/MS - EXTRACTION (RFA-Low ED)
12-Chlorodehydroabietic acid
12,14-Dichlorodehydroabietic Acid
14-Chlorodehydroabietic acid
9,10-Dichlorostearic acid

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Abietic acid
Arachidic acid
Dehydroabietic acid
Isopimaric acid
Levopimaric acid
Linoleic acid
Linolenic acid
Myristic acid
Neoabietic acid
Oleic acid
Palmitic acid
Palustric acid
Pimaric acid
Sandaracopimaric acid
Stearic acid

Water (Organic)

Volatile Organic Compounds (VOC) - Water (166)

NA-TM-1102; modified from EPA 5021 and EPA 8260

GC/MS - HEADSPACE

1,1-Dichloroethane
1,1-dichloroethylene
1,1-Dichloropropene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-Dibromo-3-chloropropane (DBCP)
1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,3,5-Trimethylbenzene
1,4-dichlorobenzene
2-Chlorotoluene
2-Hexanone (MBK)
2,2-Dichloropropane
4-Chlorotoluene
Acetone (2-Propanone)
Acrylonitrile
Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
Carbon disulfide
Carbon Tetrachloride
Chlorobenzene

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Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
cis-1,2-Dichloroethylene
cis-1,3-Dichloropropene
cis-1,4-Dichloro-2-butene
Dibromomethane
Dichlorodifluoromethane
Dichloromethane
Ethyl alcohol
Ethyl methacrylate
Ethylbenzene
Ethylene Dibromide
Hexachlorobutadiene
Isopropylbenzene
m/p-xylene
Methyl Ethyl Ketone
Methyl iodide
Methyl isobutyl Ketone
n-Butylbenzene
n-Propylbenzene
Naphthalene
o-xylene
p-Isopropyltoluene
sec-Butylbenzene
Styrene
tert-Butylbenzene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
trans-1,4-Dichloro-2-butene
Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

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Appendix B2 Taiga Environmental Laboratory



CALA

Canadian Association for
Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 2635
Laboratory Name: Taiga Environmental Laboratory
Parent Institution: Government of Northwest Territories (GNWT)
Address: P.O. Box 1320 4601 - 52nd Avenue Yellowknife NT X1A 2L9
Contact: Mr. Bruce Stuart
Phone: (867) 767-9235
Fax: (867) 920-8740
Email: bruce_stuart@gov.nt.ca; taiga@gov.nt.ca; Glen_hudy@gov.nt.ca

Standard: Conforms with requirements of ISO/IEC 17025
Clients Served: All Interested Parties
Revised On: December 5, 2018
Valid To: March 8, 2020

Scope of Accreditation

Solids (Inorganic)

Moisture - Solids [Soil] (030)
TEL007; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD
GRAVIMETRIC
Moisture %

Solids (Organic)

BTEX - Solids [Soil] (072)
TEL038; modified from EPA 502.2 and EPA 5030B and EPA 602
GC/MS - PURGE AND TRAP
Benzene
Ethylbenzene
m/p-xylene
o-xylene
Toluene

Solids (Organic)

Purgeable Hydrocarbons - Solids [Soil] (074)
TEL056; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD
GC/FID - PURGE AND TRAP
F1: C6-C10

Water (Inorganic)

Alkalinity - Water (066)
TEL060:PC TITRATE; modified from SM 2320 A and SM 2320 B
AUTO TITRIMETRIC
Alkalinity (pH 4.5)

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Water (Inorganic)

Ammonia Nitrogen - Water (089)
TEL068; modified from SM 4500-NH3 G
COLORIMETRIC - DISCRETE
Ammonia

Water (Inorganic)

Anions - Water (059)
TEL055; modified from SM 4110 B
ION CHROMATOGRAPHY
Chloride
Fluoride
Nitrate
Nitrite
Sulfate

Water (Inorganic)

Biochemical Oxygen Demand (BOD) - Water (004)
TEL019; modified from SM 5210 A and SM 5210 B
D.O. METER
BOD (5 day)
CBOD (5 day)

Water (Inorganic)

Carbon - Water (029)
TEL033; modified from SM 5310 B
INFRARED
Organic Carbon

Water (Inorganic)

Cations - Water (042)
TEL055; modified from SM 4110 B
ION CHROMATOGRAPHY
Calcium
Magnesium
Potassium
Sodium

Water (Inorganic)

Chemical Oxygen Demand (COD) - Water (061)
TEL016; modified from SM 5220 D
REFLUX - COLORIMETRIC
COD (Parameter suspended on 12/5/2018)

Water (Inorganic)

Colour - Water (063)
TEL051; modified from SM 2120 C
HACH - SPECTROPHOTOMETRIC
Apparent Colour
True Colour

Water (Inorganic)

Conductivity - Water (068)
TEL059:PC TITRATE; modified from SM 2510 B
AUTO CONDUCTIVITY METER
Conductivity (25°C)

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Water (Inorganic)

Dissolved Metals - Water (013)

TEL035; modified from EPA 200.8

ICP/MS

Aluminum

Antimony

Arsenic

Barium

Beryllium

Boron

Cadmium

Cesium

Chromium

Cobalt

Copper

Iron

Lead

Lithium

Manganese

Molybdenum

Nickel

Rubidium

Selenium

Silver

Strontium

Thallium

Tin

Titanium

Uranium

Vanadium

Zinc

Water (Inorganic)

Mercury - Water (080)

TEL062; modified from EPA 245.7

ATOMIC FLUORESCENCE MERCURY ANALYSIS SYSTEM

Mercury

Water (Inorganic)

Oil and Grease - Water (060)

TEL024: HEM ; modified from EPA 1664A (REVISION A)

GRAVIMETRIC - EXTRACTION

Total Oil and Grease

Water (Inorganic)

pH - Water (067)

TEL058:PC TITRATE; modified from SM 4500-H+ A and SM 4500-H+ B

AUTO - pH METER

pH

Water (Inorganic)

Phosphate - Water (087)

TEL069; modified from SM 4500-P F

COLORIMETRIC - DISCRETE

Phosphate

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Water (Inorganic)

Reactive Silica - Water (090)

TEL070; modified from SM 4500-SI F

COLORIMETRIC - DISCRETE ANALYZER

Reactive Silica

Water (Inorganic)

Solids - Water (011)

TEL008, TEL009; modified from SM 2540 C and SM 2540 D

GRAVIMETRIC

Total Dissolved Solids

Total Suspended Solids

Water (Inorganic)

Total and Dissolved Nitrogen - Water (086)

TEL066; modified from ASTM D5176-91 and ISO 11905

PYROLYSIS AND CHEMILUMINESCENCE DETECTION

Dissolved Nitrogen

Total Nitrogen

Water (Inorganic)

Total and Dissolved Phosphorus - Water (088)

TEL069; modified from SM 4500-P F

COLORIMETRIC - DISCRETE

Dissolved Phosphorus

Total Phosphorus

Water (Inorganic)

Total Metals - Water (054)

TEL035; modified from EPA 200.8

ICP/MS

Aluminum

Arsenic

Barium

Beryllium

Boron

Cadmium

Cesium

Chromium

Cobalt

Copper

Iron

Lead

Lithium

Manganese

Mercury

Molybdenum

Nickel

Rubidium

Selenium

Silver

Strontium

Thallium

Tin

Titanium

Uranium

Vanadium

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Water (Inorganic)

Turbidity - Water (028)
TEL006; modified from SM 2130 B
NEPHELOMETRY
Turbidity

Water (Microbiology)

Coliforms - Water (045)
TEL053; modified from IDEXX QUANTI-TRAY
MOST PROBABLE NUMBER (QUANTI-TRAY)
Escherichia coli (E. coli)
Total Coliforms

Water (Microbiology)

Fecal (Thermotolerant) Coliforms - Water (041)
TEL017; modified from SM 9222 D
MEMBRANE FILTRATION (mFC)
Fecal (Thermotolerant) Coliforms

Water (Microbiology)

Fecal Streptococci - Water (055)
TEL053; modified from IDEXX QUANTI-TRAY
MOST PROBABLE NUMBER (QUANTI-TRAY)
Fecal streptococcus

Water (Organic)

BTEX - Water (070)
TEL037:BTEX; modified from EPA 502.2 and EPA 5030B and EPA 602
GC/MS - PURGE AND TRAP
Benzene
Ethylbenzene
m/p-xylene
o-xylene
Toluene

Water (Organic)

Extractable Hydrocarbons - Water (085)
TEL067; modified from EPA 3510C and EPA 3630C and SM 6010
GC/FID - SOLID PHASE EXTRACTION
C10-C50

Water (Organic)

Purgeable Hydrocarbons - Water (084)
TEL044; modified from EPA 5030 and EPA 8000 and EPA 8015 and EPA 8260B
GC/FID - PURGE AND TRAP
C6-C10

Water (Organic)

Trihalomethanes (THM) - Water (077)
TEL039:THM; modified from EPA 502.2 and EPA 5030B and EPA 602
GC/MS - PURGE AND TRAP
Bromodichloromethane
Bromoform
Chlorodibromomethane
Chloroform

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Appendix B3 Maxxam Analytics International Corporation



CALA

Canadian Association for
Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 2168

Laboratory Name: Maxxam Analytics (Burnaby, Canada Way)

Parent Institution: Maxxam Analytics International Corporation

Address: 4606 Canada Way Burnaby BC V5G 1K5

Contact: Mr. Ray Chapman-Chen

Phone: (604) 639-2619

Fax: (604) 731-2386

Email: rchen2@maxxam.ca

Standard: Conforms with requirements of ISO/IEC 17025

Clients Served: All Interested Parties

Revised On: January 2, 2019

Valid To: November 25, 2020

Scope of Accreditation

Air (Inorganic)

Metals - Air [Cassette] (015)

BBY7SOP-00016, BBY7SOP-00018; modified from NIOSH 7303

ICP - DIGESTION

Aluminum

Antimony

Arsenic

Barium

Beryllium

Boron

Cadmium

Calcium

Chromium

Cobalt

Copper

Iron

Lead

Magnesium

Manganese

Molybdenum

Nickel

Phosphorus

Potassium

Selenium

Sodium

Strontium

Sulphur

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Tin
Titanium
Vanadium
Zinc
Zirconium

Air (Inorganic)

Metals - Air [Filter] (183)

BBY7SOP-00002, BBY7SOP-00016; modified from EPA 6020A

ICP/MS - DIGESTION

Aluminum
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Molybdenum
Nickel
Phosphorus
Selenium
Strontium
Vanadium
Zinc

Air (Inorganic)

Total Particulates - Air [Particulate] (181)

BBY5SOP-00005; modified from BC MOE LABORATORY MANUAL SECTION G and EPA 600/R-94/038B

GRAVIMETRIC

Particulate>2.5 microns

Air (Organic)

Polycyclic Aromatic Hydrocarbons (PAH) - Air (281)

BBY8SOP-00027; modified from BC MOE LABORATORY MANUAL (PREPARATION) and EPA 8270D (ANALYSIS)

GC/MS

Acenaphthene
Acenaphthylene
Anthracene
Benz(a)anthracene
Benzo(a)pyrene
Benzo(b,i)fluoranthene
Benzo(e)pyrene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene

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Naphthalene
Perylene
Phenanthrene
Pyrene

Air (Organic)

Volatile Hydrocarbons (VH) - Air (184)

BBY5SOP-00031; BC MOE LABORATORY MANUAL SECTION H
GC/MS - THERMAL DESORPTION

Volatile Hydrocarbons (VH): C6-C13

Air (Organic)

Volatile Organic Compounds (VOC) - Air (180)

BBY8SOP-00058; modified from BC MOE LABORATORY MANUAL SECTION H
GC/MS - THERMAL DESORPTION

1,1-Dichloroethane
1,1-Dichloroethene
1,1-Dichloropropene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3-Butadiene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,3,5-Trimethylbenzene
1,4-Dichlorobenzene
2-Butanone (Methyl ethyl ketone, MEK)
2-Chlorophenol
2-Chlorotoluene
2-Hexanone (MBK)
4-Chlorotoluene
4-isopropyltoluene (cymene)
4-Methyl-2-pentanone (MIBK)
Benzene
Bromobenzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
cis-1,2-dichloroethene
cis-1,3-Dichloropropene
Dibromochloromethane

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Dibromomethane
 Dichlorodifluoromethane (Freon12)
 Dichloromethane
 Ethylbenzene
 Hexachlorobutadiene
 Isopropanol
 Isopropylbenzene (Cumene)
 m,p-Xylene
 Methylcyclohexane
 n-Butylbenzene
 n-Decane
 n-Dodecane
 n-Hexane
 n-Propylbenzene
 n-Tridecane
 Naphthalene
 o-Xylene
 sec-Butylbenzene
 Styrene
 t-Butyl methyl ether (MTBE)
 t-Butylbenzene
 Tetrachloroethene
 Toluene
 trans-1,3-Dichloropropene
 Trichloroethene
 Trichlorofluoromethane
 Trichlorotrifluoroethane
 Vinyl chloride

Leachate (Inorganic)

Fluoride - Leachate (300)

BBY6SOP-00048, BBY7SOP-00009; modified from BC MOE ENVIRONMENTAL MANAGEMENT ACT
 HAZARDOUS WASTE REGULATION (EMA/HWR) SCHEDULE 4, PART 2 (PREPARATION) and SM 4500-F- C
 (ANALYSIS)

ION SELECTIVE ELECTRODE - (BC MLEP/MODIFIED WEP)

Fluoride

Leachate (Inorganic)

Metals - Leachate (308)

BBY7SOP-00001, BBY7SOP-00009; modified from BC MOE ENVIRONMENTAL MANAGEMENT ACT
 HAZARDOUS WASTE REGULATION (EMA/HWR) SCHEDULE 4, PART 2 (PREPARATION) and EPA 6020B
 (ANALYSIS)

ICP/MS

Antimony

Arsenic

Barium

Beryllium

Boron

Cadmium

Chromium

Copper

Lead

Manganese

Mercury

Molybdenum

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Nickel
Selenium
Silver
Thallium
Tin
Uranium
Zinc

Solids (Inorganic)

Chloride - Solids [Saturated Paste, Soil] (185)

BBY6SOP-00011, BBY6SOP-00030; modified from SM 4500-CL- E and SOIL SAMPLING & METHODS OF ANALYSIS, CHAPTER 15, SECTION 15.2.1

AUTO COLOR - KONELAB

Chloride

Solids (Inorganic)

Conductivity - Solids [Saturated Paste, Saturated Paste Extract] (279)

BBY6SOP-00029; modified from SM 2510 B

CONDUCTIVITY METER

Conductivity

Solids (Inorganic)

Extractable Metals - Solids [Saturated Paste, Soil] (303)

BBY6SOP-00030, BBY7SOP-00018; modified from EPA 6010C (ANALYSIS) and SOIL SAMPLING & METHODS OF ANALYSIS, CARTER 15.2.1, 2008 (PREPARATION)

ICP/OES

Soluble Calcium

Soluble Magnesium

Soluble Potassium

Soluble Sodium

Soluble Sulphur

Solids (Inorganic)

Flashpoint - Solids [Ash, Soil] (260)

BBY6SOP-00042; modified from ASTM D3828-12A

SETA FLASH CLOSED TESTER

Flashpoint C

Solids (Inorganic)

Free Liquid - Solids [Soil] (261)

BBY6SOP-00043; modified from EPA 9095B

VISUAL EXAMINATION

Free Liquid

Solids (Inorganic)

Hexavalent Chromium - Solids [Soil] (302)

BBY6SOP-00015; modified from SM 3500-CR B

COLORIMETRIC

Hexavalent chromium

Solids (Inorganic)

Leachable Metals - Solids [Soil] (187)

BBY7SOP-00001, BBY7SOP-00005; modified from EPA 1311 (PREPARATION) and EPA 6020B (ANALYSIS)

ICP/MS - TCLP

Antimony

Arsenic

Barium

Beryllium

Boron

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Cadmium
Calcium
Chromium
Copper
Lead
Mercury
Molybdenum
Selenium
Silver
Thallium
Uranium
Zinc

Solids (Inorganic)

Lead - Solids [Paint] (254)

BBY7SOP-00004, BBY7SOP-00018; modified from BC MOE LABORATORY MANUAL SECTION C
ICP/OES - DIGESTION

Lead

Solids (Inorganic)

Mercury - Solids [Sediment, Soil] (038)

BBY7SOP-00004, BBY7SOP-00012; modified from BC MOE LABORATORY MANUAL SECTION C and EPA
245.7

COLD VAPOUR ATOMIC FLUORESCENCE - DIGESTION

Mercury

Solids (Inorganic)

Metals - Solids [Sediment, Soil] (037)

BBY7 SOP-00004, BBY7SOP-00018; modified from BC MOE LABORATORY MANUAL SECTION C and EPA
6010C

ICP - DIGESTION

Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Selenium
Silver
Sodium
Strontium

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Tin
Titanium
Vanadium
Zinc
Zirconium

Solids (Inorganic)

Mineral Oil and Grease - Solids [Soil] (188)
BBY8SOP-00007; modified from BC MOE LABORATORY MANUAL SECTION D
GRAVIMETRIC - EXTRACTION
Mineral Oil and Grease

Solids (Inorganic)

Moisture - Solids [Soil] (189)
BBY8SOP-00017; modified from ON MOECC E3139
GRAVIMETRIC
Moisture %
Percent Moisture

Solids (Inorganic)

Nitrate plus Nitrite and Nitrite - Solids [Soil] (190)
BBY6SOP-00010, BBY6WI-00009; modified from SM 4500-NO3- I
AUTO COLOR
Nitrate + Nitrite Nitrogen
Nitrate-N
Nitrite

Solids (Inorganic)

Oil and Grease - Solids [Soil] (191)
BBY8SOP-00006; modified from BC MOE LABORATORY MANUAL SECTION D
GRAVIMETRIC - EXTRACTION
Total Oil and Grease

Solids (Inorganic)

Percent Saturation - Solids [Saturated Paste] (193)
BBY6SOP-00030; modified from SOIL SAMPLING & METHOD OF ANALYSIS, CHAPTER 15, SECTION 15.2.1
GRAVIMETRIC
Percent Saturation
Saturated Paste

Solids (Inorganic)

pH - Solids [Saturated Paste] (278)
BBY6SOP-00025; modified from SM 4500-H+ B
pH METER
pH

Solids (Inorganic)

pH - Solids [Soil] (192)
BBY6SOP-00028; modified from BC MOE LABORATORY MANUAL SECTION B and SM 4500-H+ B
PH METER
pH

Solids (Inorganic)

Sulfate - Solids [Saturated Paste, Soil] (194)
BBY6SOP-00017, BBY6SOP-00030; modified from SOIL SAMPLING & METHOD OF ANALYSIS, CHAPTER 15, SECTION 15.2.1
AUTO COLOR - KONELAB
Sulphate

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Solids (Inorganic)

Total Metals - Solids [Soil] (196)

BBY7SOP-00001, BBY7SOP-00004; modified from BC MOE LABORATORY MANUAL SECTION C and EPA 6020B

ICP/MS - DIGESTION

Aluminum
Antimony
Arsenic
Barium
Bismuth
Boron
Cadmium
Calcium
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Mercury
Molybdenum
Phosphorus
Potassium
Selenium
Silver
Sodium
Strontium
Tellurium
Thallium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Solids (Inorganic)

Total Sulphide - Solids [Soil] (312)

BBY6SOP-00006, BBY6SOP-00052; modified from EPA 821-R-91-100 (PREPARATION) and SM 4500 S2- D (ANALYSIS)

SPECTROPHOTOMETRIC

Total Sulphide

Solids (Organic)

BTEX - Solids [Sediment, Soil] (Unit #378) (297)

BBY8SOP-00046; BC MOE LABORATORY MANUAL SECTION D

GC/PID - HEADSPACE

Benzene
Ethylbenzene
m/p-xylene
o-xylene
Toluene

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Solids (Organic)

BTEX and MTBE and Styrene - Solids [Soil] (198)

BBY8SOP-00010; modified from EPA 5021A and EPA 5035 and EPA 8260C

GC/MS - HEADSPACE

Benzene

Ethylbenzene

m/p-xylene

Methyl t-butyl ether

o-xylene

Styrene

Toluene

Solids (Organic)

Extractable Petroleum Hydrocarbons (EPH) - Solids [Soil] (202)

BBY8SOP-00029; modified from BC MOE LABORATORY MANUAL SECTION D

GC/FID - EXTRACTION

EPH C10-C19

EPH C19-C32

Solids (Organic)

Extractable Petroleum Hydrocarbons (EPH) - Solids [Soil] (Unit #378) (273)

BBY8SOP-00029; modified from BC MOE LABORATORY MANUAL SECTION D

GC/FID - EXTRACTION

EPH C10-C19

EPH C19-C32

Solids (Organic)

Leachable Polycyclic Aromatic Hydrocarbons (PAH) - Solids [Soil] (307)

BBY7SOP-00005, BBY8SOP-00021; modified from EPA 8270D (PREPARATION) and EPA (ANALYSIS)

GC/MS

1,4-Dimethylnaphthalene

2-Methylnaphthalene

Acenaphthene

Acenaphthylene

Acridine

Anthracene

Benzo(a)anthracene

Benzo(a)pyrene

Benzo(b,i)fluoranthene

Benzo(e)pyrene

Benzo(g,h,i)perylene

Benzo(k)fluoranthene

Chrysene

Dibenzo(a,h)anthracene

Fluoranthene

Fluorene

Indeno(1,2,3-cd)pyrene

Naphthalene

Perylene

Phenanthrene

Pyrene

Quinoline

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Solids (Organic)

Petroleum Hydrocarbons (PHC) - Solids [Soil] (205)

BBY8SOP-00030; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD
GC/FID - EXTRACTION

F2: C10-C16

F3: C16-C34

F4: C34-C50

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Solids [Soil] (206)

BBY8SOP-00012; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD
GC/FID - HEADSPACE

F1: C6-C10

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Solids [Soil] (264)

BBY8SOP-00003; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD
GRAVIMETRIC - SOXHLET

F4: Gravimetric

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Solids [Soil] (Unit #378) (274)

BBY8SOP-00030; CCME CWS PETROLEUM HYDROCARBONS IN SOIL - TIER 1 METHOD
GC/FID - EXTRACTION

F2: C10-C16

F3: C16-C34

F4: C34-C50

Solids (Organic)

Phenols - Solids [Soil] (207)

BBY8SOP-00054; modified from BC MOE LABORATORY MANUAL
GC/MS - EXTRACTION

2-Chlorophenol

2-Hydroxyphenol (Catechol)

2-Methoxyethyl Acetate

2-Methyl-4,6-dinitrophenol

2-Methylphenol (o-Cresol)

2-Nitrophenol

2,3-Dichlorophenol

2,3,4-Trichlorophenol

2,3,4,5-Tetrachlorophenol

2,3,4,6-Tetrachlorophenol

2,3,5-Trichlorophenol

2,3,5,6-Tetrachlorophenol

2,3,6-Trichlorophenol

2,4 + 2,5-Dichlorophenol

2,4-Dimethylphenol

2,4-Dinitrophenol

2,4,5-Trichlorophenol

2,4,6-Trichlorophenol

2,6-Dichlorophenol

2,6-Dimethylphenol

3 + 4-Methylphenol

3-hydroxyphenol

3,4-Dichlorophenol

3,4-Dimethylphenol

3,4,5-Trichlorophenol

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3,5-Dichlorophenol
4-Chloro-3-Methylphenol
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Pentachlorophenol
Phenol

Solids (Organic)

Polycyclic Aromatic Hydrocarbons (PAH) - Solids [Soil] (208)

BBY8SOP-00022, BBY8SOP-00038; modified from EPA 3570 and EPA 8270D

GC/MS - SHAKE EXTRACTION

1-Methylphenanthrene
2-Chloronaphthalene
2-Methylnaphthalene
3-Methylcholanthrene
4-Nitropyrene
7,12-Dimethylbenz(a)anthracene
9,10-Anthraquinone
Acenaphthene
Acenaphthylene
Acridine
Anthracene
Benzo (a) anthracene
Benzo (a) pyrene
Benzo (b) fluoranthene
Benzo(e)pyrene
Benzo (g,h,i) perylene
Benzo(j)fluoranthene
Benzo (k) fluoranthene
Chrysene
Dibenzo(a,e)pyrene
Dibenzo (a,h) anthracene
Fluoranthene
Fluorene
Indeno (1,2,3 - cd) pyrene
N-Methylaniline
Naphthalene
Perylene
Phenanthrene
Pyrene
Quinoline

Solids (Organic)

Tributyltins - Solids [Soil] (276)

BBY8SOP-00050; modified from RESTEK CORP APPLICATION NOTE# 59550

GC/MS

Tributyl tin

Solids (Organic)

Volatile Hydrocarbons (VH) - Solids [Sediment, Soil] (Unit #378) (296)

BBY8SOP-00046; BC MOE LABORATORY MANUAL SECTION D

GC/FID - HEADSPACE

F1: C6-C10

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Solids (Organic)

Volatile Organic Compounds (VOC) - Solids [Soil] (213)

BBY8SOP-00009, BBY8SOP-00052; modified from EPA 5021 and EPA 8260C

GC/MS - HEADSPACE

1,1-Dichloroethane
1,1-dichloroethylene
1,1-Dichloropropene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1,2-Trichloropropane
1,1,2,2-Tetrachloroethane
1,2-Dibromo-3-chloropropane (DBCP)
1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,3-Trichloropropene
1,2,3-Trimethylbenzene
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3-Butadiene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,3,5-Trichlorobenzene
1,3,5-Trimethylbenzene
1,4-dichlorobenzene
2-Chlorotoluene
4-Chlorotoluene
Benzene
Bromobenzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
cis-1,2-Dichloroethylene
cis-1,3-Dichloropropene
cis-1,4-Dichloro-2-butene
Dibromomethane
Dichlorodifluoromethane
Dichloromethane
Ethylbenzene
Ethylene Dibromide
Hexachlorobutadiene
Hexane
Isopropylbenzene
m/p-xylene

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Methyl t-butyl ether
Methylcyclohexane
n-Butylbenzene
n-Decane
n-Propylbenzene
Naphthalene
o-xylene
p-Isopropyltoluene
Pentachloroethane
sec-Butylbenzene
Styrene
tert-Butylbenzene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
trans-1,4-Dichloro-2-butene
Trichloroethylene
Trichlorofluoromethane
Vinyl chloride

Solids (Organic)

Volatile Organic Compounds (VOC) - Solids [Soil] (313)
BBY8SOP-00040; BC MOE LABORATORY MANUAL SECTION D
GC/MS - HEADSPACE

1-Chlorobutane
1,4-Dioxane
2-Butanone (MEK)
2-Hexanone
4-Methyl-2-pentanone (MIBK)
Acetone
Acrylonitrile
Allyl chloride
Alpha-Diisobutylene
Beta-Diisobutylene
Butylated hydroxytoluene
Carbon disulfide
Chloroprene
Cyclohexanone
Cyclohexene
Dicyclopentadiene
Ethyl Acrylate
Ethyl ether
Hexachloroethane
Isobutanol
Isopropanol
Methyl methacrylate
Methylacrylonitrile
n-Butanol
Tetrahydrofuran
trans-Crotonaldehyde
Vinyl Acetate

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Solids (Organic)

Volatile Petroleum Hydrocarbons (VPH) - Solids [Soil] (214)
BBY8SOP-00011; modified from BC MOE LABORATORY MANUAL SECTION D
GC/FID - HEADSPACE
F1: C6-C10

Solids (Organic)

Waste Oil - Solids (306)
BBY8SOP-00008; BC MOE LABORATORY MANUAL SECTION D
GRAVIMETRIC
Waste Oil Content

Solids (Toxicology)

Bivalve Larval Survival and Development - Solids [Sediment] (293)
BBY2SOP-00032; PUGET SOUND ESTUARY PROGRAM 1995 B
GROWTH AND SURVIVAL
Bivalves (48hr)

Solids (Toxicology)

Chironomids - Solids [Sediment] (150)
BBY2SOP-00010; EPS 1/RM/32
SURVIVAL AND GROWTH
Chironomids (10 days)

Solids (Toxicology)

Echinoid Larval Development - Solids [Sediment] (298)
BBY2SOP-00062; EPS 1/RM/58
GROWTH AND SURVIVAL
Echinoid Larval Development (48hr)

Solids (Toxicology)

Hyalella azteca - Solids [Sediment] (149)
BBY2SOP-00011; EPS 1/RM/33
SURVIVAL AND GROWTH
Hyalella azteca (14d)

Solids (Toxicology)

Marine Amphipods - Solids [Sediment] (151)
BBY2SOP-00012; EPS 1/RM/26 and EPS 1/RM/35
ACUTE LETHALITY (SURVIVAL)
Marine Amphipods (10 day)

Solids (Toxicology)

Microtox - Solids [Sediment, Soil] (152)
BBY2SOP-00014; EPS 1/RM/42
BIOLUMINESCENCE
Microtox IC50

Solids (Toxicology)

Neanthes Survival and Growth - Solids [Sediment] (288)
BBY2SOP-00030; PUGET SOUND ESTUARY PROGRAM, 1995
GROWTH AND SURVIVAL
Neanthes (20d)

Tissue (Inorganic)

Mercury - Tissue (255)
BBY7SOP-00012; BBY7SOP-00021; modified from EPA 200.3 and EPA 245.7
COLD VAPOUR ATOMIC FLUORESCENCE - DIGESTION
Mercury

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Tissue (Inorganic)

Total Metals - Tissue (215)

BBY7SOP-00002, BBY7SOP-00021; modified from BC MOE LABORATORY MANUAL SECTION C and EPA 6020B

ICP/MS
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Mercury
Molybdenum
Nickel
Phosphorus
Potassium
Selenium
Silicon
Silver
Sodium
Strontium
Sulfur
Tellurium
Thallium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Water (Inorganic)

Acidity - Water (137)

BBY6SOP-00037; modified from SM 2310 B

TITRATION

Acidity

Water (Inorganic)

Alkalinity - Water (216)

BBY6SOP-00026; modified from SM 2320 B

TITRIMETRIC - AUTOMATED

Alkalinity (pH 4.5)

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Water (Inorganic)

Ammonia Nitrogen - Water (217)
BBY6SOP-00009; modified from EPA 350.1 and SM 4500-NH3 G
AUTO COLOR - PHENATE
Ammonia

Water (Inorganic)

Biochemical Oxygen Demand (BOD) - Water (218)
BBY6SOP-00045; modified from SM 5210 B
D.O. METER
BOD (5 day)
CBOD (5 day)

Water (Inorganic)

Carbon - Water (233)
BBY6SOP-00003; modified from SM 5310 C
COLORIMETRIC
Organic Carbon

Water (Inorganic)

Carbon - Water (277)
BBY6SOP-00018; modified from SM 5310 C
COLORIMETRIC
Carbon (Dissolved Inorganic Carbon)
Carbon, Total Inorganic

Water (Inorganic)

Chemical Oxygen Demand (COD) - Water (220)
BBY6SOP-00024; modified from SM 5220 D
TITRIMETRIC - DIGESTION
COD

Water (Inorganic)

Chloride - Water (221)
BBY6SOP-00011; modified from SM 4500-CL- E
AUTO COLOR - KONELAB
Chloride

Water (Inorganic)

Chlorophyll A and Phaeophytins - Water (122)
BBY6SOP-00002; modified from SM 10200 H
UV/VIS/SPECTROPHOTOMETER
Chlorophyll a
Phaeophytins

Water (Inorganic)

Colour - Water (023)
BBY6SOP-00021; modified from SM 2120 B
VISUAL COMPARISON
Apparent Colour

Water (Inorganic)

Colour - Water (295)
BBY6SOP-00057; modified from SM 2120 C
SPECTROPHOTOMETRIC
True Colour

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Water (Inorganic)

Conductivity - Water (222)

BBY6SOP-00026; modified from SM 2510 B

CONDUCTIVITY METER

Conductivity (25°C)

Water (Inorganic)

Conductivity - Water [Wastewater] (156)

BBY0SOP-00006; modified from SM 2510 B

CONDUCTIVITY METER

Conductivity (25°C)

Water (Inorganic)

Dissolved and Extractable Metals - Water (004)

BBY7SOP-00018, BBY7WI-00004; modified from EPA 6010C

ICP

Aluminum

Antimony

Arsenic

Barium

Beryllium (High)

Bismuth (High)

Boron

Cadmium (High Range)

Calcium

Chromium

Cobalt

Copper

Iron

Lead

Lithium (High)

Magnesium

Manganese

Molybdenum

Nickel

Phosphorus

Potassium

Selenium

Silicon

Silver (High)

Sodium

Strontium

Sulphur

Tin (High)

Titanium

Vanadium

Zinc

Zirconium (High)

Water (Inorganic)

Dissolved Metals - Water (225)

BBY7WI-00004, BY7SOP-00002; modified from EPA 6020B

ICP/MS

Aluminum

Antimony

Arsenic

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Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Cesium
Chromium
Cobalt
Copper
Gold
Iron
Lanthanum
Lead
Lithium
Magnesium
Manganese
Mercury
Molybdenum
Nickel
Palladium
Phosphorus
Platinum
Potassium
Rubidium
Selenium
Silicon
Silver
Sodium
Strontium
Sulphur
Tellurium
Thallium
Thorium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Water (Inorganic)

Fluoride - Water (226)

BBY6SOP-00048; modified from SM 4500-F- C

SELECTIVE ION ELECTRODE

Fluoride

Water (Inorganic)

Hexavalent Chromium - Water (227)

BBY6SOP-00015; modified from SM 3500-CR B

COLORIMETRIC

Hexavalent Chromium

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Water (Inorganic)

Mercury - Water (095)

BBY7SOP-00015; modified from BC MOE LABORATORY MANUAL SECTION C
COLD VAPOUR ATOMIC FLUORESCENCE - DIGESTION

Mercury

Water (Inorganic)

Mercury - Water (299)

BBY7SOP-00022; EPA 1631

COLD VAPOUR ATOMIC FLUORESCENCE SPECTROPHOTOMETRY

Mercury

Water (Inorganic)

Metals - Water [Seawater] (228)

BBY7SOP-00002, BBY7SOP-00007; modified from EPA 200.10

ICP/MS - CHELATION EXTRACTION

Cadmium

Cobalt

Copper

Iron

Lead

Manganese

Nickel

Titanium

Uranium

Zinc

Water (Inorganic)

Mineral Oil and Grease - Water (229)

BBY8SOP-00004; modified from BC MOE LABORATORY MANUAL SECTION D
GRAVIMETRIC - EXTRACTION

Mineral Oil and Grease

Water (Inorganic)

Nitrate plus Nitrite and Nitrite - Water (230)

BBY6SOP-00010; modified from SM 4500-NO3- I

AUTO COLOR

Nitrate plus Nitrite

Nitrite

Water (Inorganic)

Nitrogen - Water (231)

BBY6SOP-00016; modified from SM 4500-N C

AUTO COLOR - DIGESTION

Total Dissolved Nitrogen

Total Nitrogen

Water (Inorganic)

Oil and Grease - Water (232)

BBY8SOP-00004; modified from BC MOE LABORATORY MANUAL SECTION D
GRAVIMETRIC - EXTRACTION

Total Oil and Grease

Water (Inorganic)

pH - Water (155)

BBY0SOP-00003; modified from SM 4500-H+ B

pH METER

pH

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Water (Inorganic)

pH - Water (234)

BBY6SOP-00026; modified from SM 4500-H+ B

pH METER - AUTOMATED

pH

Water (Inorganic)

Phosphorus - Water (236)

BBY6SOP-00013; modified from SM 4500-P E

AUTO COLOR - KONELAB

Phosphate

Total Dissolved Phosphorus

Total Phosphorus

Water (Inorganic)

Reactive Silica - Water (237)

BBY6SOP-00014; modified from SM 4500-SiO₂ E

AUTO COLOR

Reactive Silica

Water (Inorganic)

Solids - Water (238)

BBY6SOP-00033, BBY6SOP-00034; modified from SM 2540 C and SM 2540 D

GRAVIMETRIC

Total Dissolved Solids

Total Suspended Solids

Water (Inorganic)

Solids - Water (280)

BBY6SOP-00035; modified from SM 2540 A

GRAVIMETRIC

Total Solids

Total Solids Fixed

Water (Inorganic)

Sulphate - Water (239)

BBY6SOP-00017; modified from SM 4500-SO₄²⁻ E

AUTO COLOR - KONELAB

Sulfate

Water (Inorganic)

Sulphide - Water (240)

BBY6SOP-00006; modified from SM 4500-S₂- D

SPECTROPHOTOMETRIC - METHYLENE BLUE

Sulphide

Water (Inorganic)

Total Metals - Water (066)

BBY7SOP-00003, BBY7SOP-00018; modified from BC MOE LABORATORY MANUAL SECTION C and EPA 6010C

ICP - DIGESTION

Aluminum

Antimony

Arsenic

Barium

Beryllium

Bismuth

Boron

Cadmium

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Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Selenium
Silicon
Silver
Sodium
Strontium
Sulphur
Tin
Titanium
Vanadium
Zinc
Zirconium

Water (Inorganic)

Total Metals - Water (242)

BBY7SOP-00002, BBY7SOP-00003; modified from BC MOE LABORATORY MANUAL SECTION C and EPA 6020B

ICP/MS - DIGESTION

Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Bromine
Cadmium
Calcium
Cesium
Chromium
Cobalt
Copper
Gold
Iron
Lanthanum
Lead
Lithium
Magnesium
Manganese
Mercury
Molybdenum
Nickel
Palladium

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Phosphorus
Platinum
Potassium
Rubidium
Selenium
Silicon
Silver
Sodium
Strontium
Sulphur
Tellurium
Tellurium
Thallium
Thorium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Water (Inorganic)

Total Metals - Water [Seawater] (241)

BBY7SOP-00002, BBY7SOP-00003; modified from EPA 6020B

ICP/MS

Aluminum
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Silicon
Silver
Sodium
Strontium
Sulfur
Tellurium
Thallium
Titanium
Vanadium

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Zinc
Zirconium

Water (Inorganic)

Turbidity - Water (244)
BBY6SOP-00027; modified from SM 2130 B
TURBIDIMETRIC
Turbidity

Water (Organic)

BTEX and MTBE and Styrene - Water (252)
BBY8SOP-00010; modified from EPA 5021A and EPA 5035 and EPA 8260C
GC/MS - HEADSPACE
Benzene
Ethylbenzene
m/p-xylene
Methyl t-butyl ether
o-xylene
Styrene
Toluene

Water (Organic)

Organotins - Water (310)
BBY8SOP-00059; modified from RESTEK CORP LIT. CAT#59550
GC/MS
Dibutyltin
Monobutyltin
Tributyltin

Water (Organic)

Petroleum Hydrocarbons (PHC) - Water (305)
BBY8SOP-00012 (ANALYSIS), BBY8SOP-00018 (PREP); modified from CCME CWS PETROLEUM
HYDROCARBONS IN SOIL - TIER 1 METHOD (DEC 2000)
GC/FID - HEADSPACE
F1: C6-C10

Water (Organic)

Phenols - Water (248)
BBY8SOP-00025; modified from BCMOE LABORATORY MANUAL
GC/MS - EXTRACTION
2-Chlorophenol
2,3-Dichlorophenol
2,3,4-Trichlorophenol
2,3,4,5-Tetrachlorophenol
2,3,4,6-tetrachlorophenol
2,3,5-Trichlorophenol
2,3,5,6-Tetrachlorophenol
2,3,6-Trichlorophenol
2,4 + 2,5-Dichlorophenol
2,4,5-Trichlorophenol
2,4,6-trichlorophenol
2,6-Dichlorophenol
3 + 4-Chlorophenol
3,4-Dichlorophenol
3,4,5-Trichlorophenol
3,5-Dichlorophenol
Pentachlorophenol

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Water (Organic)

Polycyclic Aromatic Hydrocarbons (PAH) - Water (249)

BBY8SOP-00021; modified from EPA 3510C and EPA 8270D

GC/MS - EXTRACTION

1-Methylnaphthalene
2-Chloronaphthalene
2-Methylnaphthalene
3-Methylcholanthrene
4-Nitropyrene
7,12-Dimethylbenz(a)anthracene
9,10-Anthraquinone
Acenaphthene
Acenaphthylene
Acridine
Anthracene
Benzo (a) anthracene
Benzo (a) pyrene
Benzo (b,i) fluoranthene
Benzo(e)pyrene
Benzo (g,h,i) perylene
Benzo (k) fluoranthene
Chrysene
Dibenzo(a,e)pyrene
Dibenzo (a,h) anthracene
Fluoranthene
Fluorene
Indeno (1,2,3 - cd) pyrene
N-Methylaniline
Naphthalene
Perylene
Phenanthrene
Pyrene
Quinoline

Water (Organic)

Total Extractable Hydrocarbons (TEH) - Water (250)

BBY8SOP-00029; modified from BC MOE LABORATORY MANUAL SECTION D

GC/FID - EXTRACTION

Total Extractable Hydrocarbons (TEH)

Water (Organic)

Volatile Hydrocarbons (VH) - Water (251)

BBY8SOP-00011; modified from BC MOE LABORATORY MANUAL SECTION D

GC/FID - HEADSPACE

Volatile Hydrocarbon (VH): C6-C10

Water (Organic)

Volatile Organic Compounds (VOC) - Water (253)

BBY8SOP-00009; modified from EPA 5021A and EPA 5035 and EPA 8260C

GC/MS - HEADSPACE

1,1-Dichloroethane
1,1-dichloroethylene
1,1-Dichloropropene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,2-Trichloro-1,2,2-Trifluoroethane

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1,1,2-Trichloroethane
 1,1,2-Trichloropropane
 1,1,2,2-Tetrachloroethane
 1,2-Dibromo-3-chloropropane (DBCP)
 1,2-Dibromoethane
 1,2-dichlorobenzene
 1,2-dichloroethane
 1,2-Dichloropropane
 1,2,3-Trichlorobenzene
 1,2,3-Trichloropropane
 1,2,3-Trichloropropene
 1,2,3-Trimethylbenzene
 1,2,4-Trichlorobenzene
 1,2,4-Trimethylbenzene
 1,3-Butadiene
 1,3-Dichlorobenzene
 1,3-Dichloropropane
 1,3,5-Trichlorobenzene
 1,3,5-Trimethylbenzene
 1,4-dichlorobenzene
 2-Chloropropane
 2-Chlorotoluene
 4-Chlorotoluene
 Benzene
 Bromobenzene
 Bromodichloromethane
 Bromoform
 Bromomethane
 Carbon Tetrachloride
 Chlorobenzene
 Chlorodibromomethane
 Chloroethane
 Chloroform
 Chloromethane
 cis-1,2-Dichloroethylene
 cis-1,3-Dichloropropene
 cis-1,4-Dichloro-2-butene
 Dibromoethane
 Dibromomethane
 Dichlorodifluoromethane
 Dichloromethane
 Ethylbenzene
 Ethylene Dibromide
 Hexachlorobutadiene
 Hexane
 Isopropylbenzene
 m/p-xylene
 Methyl t-butyl ether
 Methylcyclohexane
 n-Butylbenzene
 n-Decane
 n-Propylbenzene
 Naphthalene

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o-xylene
p-Isopropyltoluene
Pentachloroethane
sec-Butylbenzene
Styrene
tert-Butylbenzene
Tetrabromomethane
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
trans-1,4-Dichloro-2-butene
Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

Water (Organic)

Volatile Organic Compounds (VOC) - Water (314)

BBY8SOP-00040; BC MOE LABORATORY MANUAL SECTION D
GC/MS - HEADSPACE

1-Chlorobutane
1,4-Dioxane
2-Butanone (MEK)
2-Chloroethanol
2-Hexanone
4-Methyl-2-pentanone (MIBK)
Acetone
Acrolein
Acrylonitrile
Allyl chloride
Alpha-Diisobutylene
Beta-Diisobutylene
Butylated hydroxytoluene
Carbon disulfide
Chloroprene
Cyclohexanone
Cyclohexene
Dicyclopentadiene
Ethyl Acrylate
Ethyl ether
Hexachloroethane
Isobutanol
Isopropanol
Methyl methacrylate
Methylacrylonitrile
n-Butanol
Tetrahydrofuran
trans-Crotonaldehyde
Vinyl Acetate

Water (Toxicology)

Bivalve Larval Survival and Development - Water (309)

BBY2SOP-00029; EPA 600/R-95/136 (1995)
GROWTH AND SURVIVAL

Bivalves (48hr)

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Water (Toxicology)

Ceriodaphnia dubia - Water (139)
BBY2SOP-00001; EPS 1/RM/21
SURVIVAL AND REPRODUCTION
Ceriodaphnia dubia (7d)

Water (Toxicology)

Daphnia magna - Water (141)
BBY2SOP-00007; EPS 1/RM/11 and EPS 1/RM/14
LETHALITY
Daphnia LC50 (48 h)
Single Concentration (48h)

Water (Toxicology)

Echinoid Fertilization - Water (143)
BBY2SOP-00009; EPS 1/RM/27
FERTILIZATION SUCCESS
Echinoderm Fertilization (20 min)

Water (Toxicology)

Fathead Minnow - Water (147)
BBY2SOP-00002; EPS 1/RM/22
GROWTH AND SURVIVAL
Fathead Minnow (7d)

Water (Toxicology)

Lemna minor - Water (289)
BBY2SOP-00053; EPS 1/RM/37
GROWTH INHIBITION
Lemna minor (7d)

Water (Toxicology)

Microtox - Water (144)
BBY2SOP-00013; EPS 1/RM/24
BIOLUMINESCENCE
Microtox IC50 (15 min)

Water (Toxicology)

Pseudokirchneriella subcapitata - Water (146)
BBY2SOP-00006; EPS 1/RM/25
GROWTH INHIBITION
Pseudokirchneriella subcapitata (72h)

Water (Toxicology)

Rainbow Trout - Water (140)
BBY2SOP-00004; EPS 1/RM/13 and EPS 1/RM/9
LETHALITY
Single Concentration (96h)
Trout LC50 (96 h)

Water (Toxicology)

Rainbow Trout [pH Stabilization] - Water (294)
BBY2SOP-00061; EPS 1/RM/50
ACUTE LETHALITY (SURVIVAL)
Single Concentration (96h) - pH Stabilization
Trout LC50 (96h) - pH Stabilization

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Water (Toxicology)

Topsmelt - Water (291)

BBY2SOP-00050; EPA 821-02-012

ACUTE LETHALITY

Topsmelt (96h)

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Appendix B4 Nautilus Environmental Inc.



Membership Number: 3525
Laboratory Name: Nautilus Environmental Inc.
Parent Institution:
Address: 8664 Commerce Court Burnaby BC V5A 4N7
Contact: Ms. Julianna Kalocai
Phone: (604) 420-8773; (778) 829-6359
Fax: (604) 357-1361
Email: julianna@nautilusenvironmental.ca

Standard: Conforms with requirements of ISO/IEC 17025
Clients Served: All Interested Parties
Revised On: June 1, 2018
Valid To: February 26, 2020

Scope of Accreditation

Sediment (Toxicology)

Chironomus dilutus - Sediment (011)
401-1; EPS 1/RM/32
SURVIVAL AND GROWTH INHIBITION
Survival and Growth (10d)

Sediment (Toxicology)

Hyalella azteca - Sediment (012)
400-1; EPS 1/RM/33
SURVIVAL AND GROWTH INHIBITION
Survival and Growth (14d)

Water (Toxicology)

Ceriodaphnia dubia - Water (003)
209; EPS 1/RM/21
SURVIVAL AND REPRODUCTION
Ceriodaphnia dubia (7d)

Water (Toxicology)

Daphnia magna - Water (002)
205; EPS 1/RM/11 and EPS 1/RM/14
ACUTE LETHALITY (SURVIVAL)
Daphnia LC50 (48 h)

Water (Toxicology)

Fathead minnow - Water (010)
220-4; EPS 1/RM/22
SURVIVAL AND GROWTH INHIBITION
Survival and Growth (7d)

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Water (Toxicology)

Hyalella azteca - Water (013)

400-1; EPS 1/RM/33

SURVIVAL AND GROWTH INHIBITION

Survival and Growth (14d)

Water (Toxicology)

Lemna minor - Water (005)

215; EPS 1/RM/37

GROWTH INHIBITION

Lemna minor (7d)

Water (Toxicology)

Pseudokirchneriella subcapitata - Water (008)

213; EPS 1/RM/25

GROWTH INHIBITION

Pseudokirchneriella subcapitata (72h)

Water (Toxicology)

Rainbow Trout - Water (001)

201; EPS 1/RM/13 and EPS 1/RM/9

ACUTE LETHALITY (SURVIVAL)

Trout LC50 (96 h)

Water (Toxicology)

Rainbow Trout [pH Stabilization] - Water (009)

204-1; EPS 1/RM/50

pH STABILIZATION

Survival

Water (Toxicology)

Salmonid - Water (004)

203; EPS 1/RM/28

EARLY LIFE STAGE

Salmonid Embryo (7d)

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Appendix B5 Flett Research Ltd.



CALA

Canadian Association for
Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 3306

Laboratory Name: Flett Research Ltd.

Parent Institution:

Address: 440 DeSalaberry Ave. Winnipeg MB R2L 0Y7

Contact: Dr. Robert J. Flett

Phone: (204) 667-2505

Fax: (204) 667-2505

Email: flett@flettresearch.ca

Standard: Conforms with requirements of ISO/IEC 17025

Clients Served: All Interested Parties

Revised On: June 5, 2018

Valid To: June 4, 2020

Scope of Accreditation

Solids (Inorganic)

Mercury - Solids [Soil] (002)

T00130; modified from ANALYTICA CHIMICA ACTA 281: 135-152 and EPA 1631E

CVAFS - DIGESTION

Mercury

Solids (Inorganic)

Mercury - Solids [Soil] (011)

T00210; modified from EPA 7473

MERCURY ANALYZER

Mercury

Solids (Inorganic)

Methyl Mercury - Solids [Soil] (015)

M10240; modified from ANALYTICA CHIMICA ACTA: 135-152 and EPA 1630

CVAFS - DISTILLATION (AUTOMATED)

Methylmercury

Solids (Radiochemistry)

Lead-210 - Solids [Soil] (017)

N20110; modified from EAKINS & MORRISON. JOURNAL OF APPLIED RADIATION & ISOTOPES 29, 531-536

DIGESTION/DISTILLATION-ALPHA SPECTROSCOPY

Lead-210

Solids (Radiochemistry)

Radionuclides - Solids [Soil] (018)

N30120; modified from EML HASL-300 METHOD GA-01-R

GAMMA SPECTROMETRY (HPGe)

Actinium-228

Americium-241

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Bismuth-214
Cesium-134
Cesium-137
Cobalt-60
Lead-212
Lead-214
Potassium-40
Thorium-234

Solids (Radiochemistry)

Radium-226 - Solids [Soil] (019)
N40110; modified from MATHIEU BISCAYE, LUPTON & HAMMOND. HEALTH PHYSICS 55, 989-992
DIGESTION-RN-222 EMANATION-ALPHA SPECTROMETRY
Radium-226 (Rn-222)

Tissue (Inorganic)

Mercury - Tissue [Biological] (003)
T00110; modified from ANALYTICAL CHEMISTRY 48: 926-928 and EPA 1631E
CVAFS - DIGESTION
Mercury

Tissue (Inorganic)

Mercury - Tissue [Biological] (010)
T00210; modified from EPA 7473
MERCURY ANALYZER
Mercury

Tissue (Inorganic)

Methyl Mercury - Tissue [Biological] (012)
M 10220; modified from CAN. J. FISH. AQUAT. SCI. 49:1010-1017 and EPA 1630
CVAFS - DIGESTION
Methylmercury

Water (Inorganic)

Mercury - Water (001)
T00120; modified from EPA 1631E
CVAFS - OXIDATION
Mercury

Water (Inorganic)

Methyl Mercury - Water (016)
M10210, M10211; modified from EPA 1630
CVAFS - DISTILLATION
Methylmercury

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