

Baseline Surface Water Quality Monitoring Plan

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Introduction

Remediation and construction activities associated with the Port Lands Flood Protection and Enabling Infrastructure (PLFP) Project have the potential to impact the adjacent surface water body. Erosion and sediment controls, stormwater management measures, and water treatment will be used to prevent the remediation and construction activities from impacting the surrounding water environment.

This Baseline Surface Water Quality Monitoring Plan (BSWQMP) has been developed to determine the baseline water quality conditions during dry and wet weather for the PLFP area. The purpose of the BSWQMP is to establish baseline conditions to verify that activities associated with the PLFP Project are not adversely affecting surface water quality. This BSWQMP expands the compendium of work completed by the Toronto and Region Conservation Authority (TRCA) on the surface water quality in Keating Channel and the Inner Harbour.

Baseline sampling will extend into the construction phase until the start of significant near-water works, after which compliance sampling will begin. CH2M anticipates compliance monitoring during construction will include the same stations and analytes as the baseline monitoring phase. Baseline samples will be collected by TRCA until the start of the first stage of construction in late June 2018. Baseline samples should continue to be collected by EllisDon (or their subcontractor) until the start of construction of significant near-water works in 2020.

CH2M has assessed soil and groundwater studies over the last 20 years from within the PLFP to determine the contaminants of concern (COCs) exceeding regulatory guidelines, which include:

- Petroleum hydrocarbons (PHCs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Metals
- Polychlorinated biphenyls (PCBs)
- Volatile organic compounds (VOCs)

Since the nature of the activities being undertaken (such as the excavation of contaminated materials and the use of construction equipment) requires disturbing the soils and exposing the groundwater, there is the potential for the COCs to affect the surface water quality.

The objectives of the BSWQMP are to:

- Establish a clear approach to determining dry and wet weather baseline conditions in the surface waters near the PLFP Project site
- Outline the framework for data collection and analyte measurement

Regulatory Framework and Criteria

The following documents were researched for water quality sampling requirements that might be associated with construction activities:

- Canadian Council of Ministers of the Environment (CCME). 2003. *Canadian Environmental Quality Guidelines*.
- *Government of Canada Fisheries Act*, Sections 35 and 36.
- Ontario Ministry of the Environment and Climate Change (MOECC). 1990. *Ontario Water Resources Act*, Sections 29, 33, and 53.
- Ontario Ministry of the Environment and Climate Change (MOECC). 1994. *Water Management: Policies, Guidelines, Provincial Water Quality Objectives of the Ministry of the Environment*.
- Ontario Ministry of the Environment and Climate Change (MOECC). 1995a. *Erosion and Sediment Control Practices Study Technical Report*.
- Ontario Ministry of the Environment and Climate Change (MOECC). 1995b. *Guidelines for Evaluating Construction Activities Impacting on Water Resource*.
- City of Toronto. 2007. *The Toronto Green Development Standard*.
- City of Toronto. 2010. *Municipal Code Part II, Environmental Management Plan Chapter 681 (By-law 457-2000)*.
- The following TRCA onsite erosion and sediment control guidelines:
 - *Erosion and Sediment Control Guideline for Urban Construction (2006)*
 - *(Abbreviated) Erosion and Sediment Control Design and Submission Requirements (2007)*
 - *Preserving and Restoring Healthy Soil: Best Practices for Urban Construction (2012)*
 - *Post-construction Restoration Guidelines (2014)*
- Toronto and Region Conservation Authority (TRCA). 2014. *Don Mouth Naturalization and Port Lands Flood Protection Project, Amended Environmental Assessment Report*.
- Waterfront Toronto (WT). 2013. *Waterfront Toronto Environmental Management Plan for Project-Related Activities*.

The MOECC Provincial Water Quality Objectives (PWQO) contain criteria for surface water quality. In addition, the CCME identifies thresholds of protection for aquatic life from constituents listed in Section 36 of the *Fisheries Act* as deleterious substances when placed in the water. CCME guidelines and criteria are applicable where any PWQO criteria are not available or they directly influence the guidelines set out by the TRCA.

Given the importance of the nearshore waters to public water supply, aquatic habitat, and recreational uses, water quality sampling is to be performed throughout the following project phases:

- Preconstruction to establish baseline conditions
- During construction to assess compliance
- Postconstruction to monitor for project outcomes

CH2M anticipates Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), MOECC, Aquatic Habitat Toronto, and TRCA will be the main regulatory and review bodies that oversee this plan. The BSWQMP and Surface Water Quality Compliance Monitoring Plan (SWQCMP), which address the preconstruction and construction phases, respectively, will support application for a DFO Offsetting Plan and Fisheries Authorization by describing the planned water quality sampling specific to monitoring potential erosion and sedimentation.

Background

From 2009 to 2016, TRCA conducted baseline sampling in Keating Channel, and collected continuous measurements of the following parameters:

- Turbidity
- Water temperature
- pH
- Conductivity
- Salinity
- Dissolved oxygen (DO)

From 2009 to 2011, TRCA performed depth profiling at Jarvis and Parliament Slips, and collected continuous measurements of the following parameters (TRCA, 2018):

- Water temperature
- pH
- Conductivity
- Total dissolved solids (TDS)
- DO

LimnoTech completed one dry weather sampling event at five stations along the Lower Don River in December 2017, and collected data on PHCs, PAHs, VOCs, and metals (LimnoTech, 2018).

Baseline turbidity samples are currently being collected near the Cherry Street Lake Filling (CSLF) project site in accordance with the CSLF Fisheries Act Authorization Permit (DFO, 2017). Guidelines for turbidity sampling during construction are detailed in the *Cherry Street Stormwater and Lake Filling Fisheries Act Offsetting Plan* (WSP, 2017).

CH2M has considered these data while designing the BSWQMP for the PLFP Project so that only value-added stations and analytes are recommended for further sampling.

It is also recognized that in the 1990s, the City of Toronto Wet Weather Flow Management Plan (WWFMP) collected extensive dry and wet weather water quality data in the Don River watershed on the following parameters (D'Andrea et al., 2004):

- Nutrients
- Copper
- Lead
- Zinc
- Dieldrin
- Escherichia coli (E.coli)

However, given the passage of 20-25 years since that data was collected, the BSWQMP proposes one sampling station in the Don River (Table 1), which will serve to provide updated 2018 baseline data and a comparison of how water quality conditions may have changed in that river reach since the WWFMP study.

Sampling Approach

Baseline surface water quality sampling is to be completed to help determine whether excavation works during construction are impacting the nearshore surface waters. In case of an anomalous observation, established baseline conditions can support the evaluation of a potential connection to the PLFP construction and help guide the implementation of required mitigation procedures.

Sampling Locations

Selected sampling locations will be georeferenced. Baseline sampling locations are recommended in the general areas listed in Table 1 and shown on Figure 1. Table 1 also summarizes existing data and recommended further baseline sampling.

Table 1. Proposed Baseline Surface Water Quality Sampling Locations

Station ID	Location	Existing Data	Recommended Sampling in BSWQMP
1	Lower Don River (at surface water station WT17-5, sampled by LimnoTech in December 2017)	Grab sampling of one dry weather event performed by LimnoTech in December 2017. WWFMP dry weather and wet weather data from 1990s on nutrients, copper, lead, zinc, dieldrin, and E.coli.	Daily turbidity baseline samples. Three dry and four wet weather sampling events at this location with expanded analyte list (Attachment 1, Table 1-3).
2	Keating Channel (at the existing TRCA monitoring location)	TRCA has several years (2009-2016) of sonde and turbidity sensor data. These are sufficient to characterize baseline conditions for those parameters at this location.	Four dry and four wet weather sampling events at this location with expanded analyte list (Attachment 1, Table 1-3).
3	Polson Slip (along the northern wall just east of the Inner Harbour)	CSLF baseline turbidity data can be used for this station.	Four dry and four wet weather sampling events at this location with expanded analyte list (Attachment 1, Table 1-3).
4	Eastern Channel (parking area at southwestern corner of the Port Lands)	No surface water quality sampling performed to date at this location.	Daily turbidity baseline samples. Four dry and four wet weather sampling events at this location with expanded analyte list (Attachment 1, Table 1-3).
5	Shipping Channel (northern wall near the boundary of the spillway and soil management facility)	No surface water quality sampling performed to date at this location.	Daily turbidity baseline samples. Four dry and four wet weather sampling events at this location with expanded analyte list (Attachment 1, Table 1-3).

Notes:

ID = identification

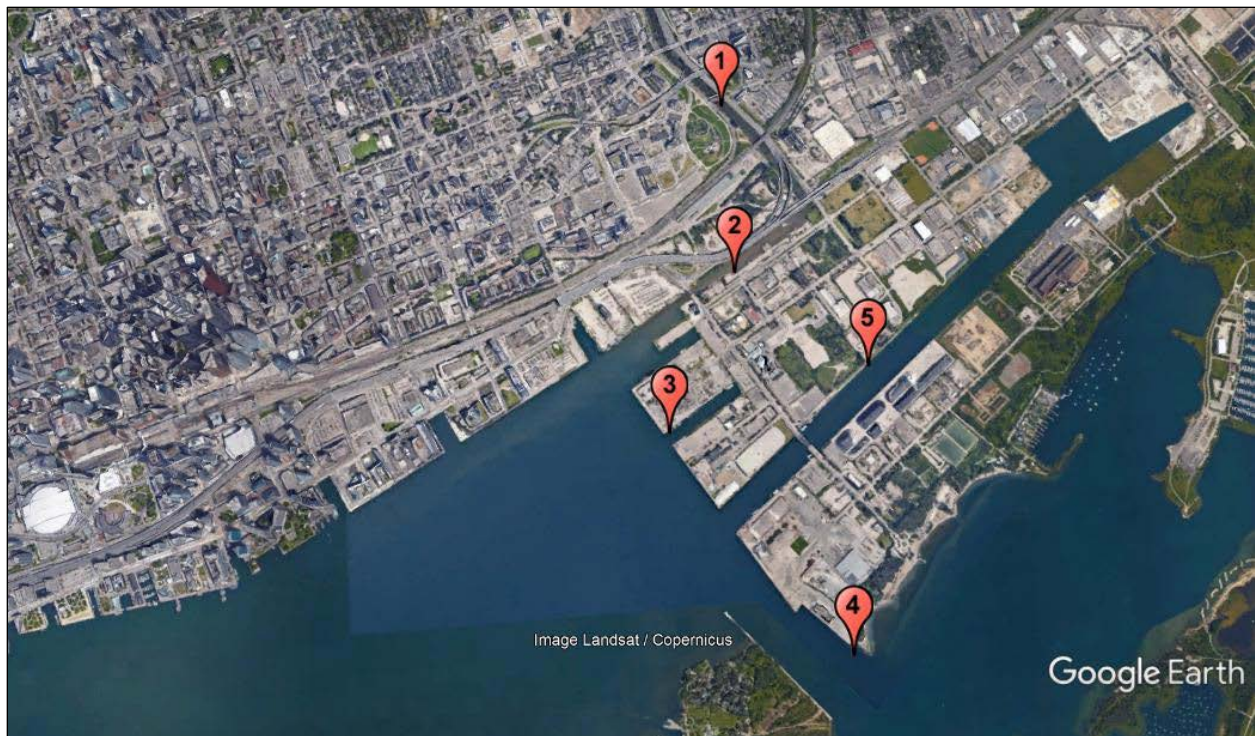


Figure 1. Proposed Sampling Locations

Sample Collection

Grab sampling will be performed at each station from land at the water's edge (such as the shore and dock wall), so vessels will not be required. At Station 1, water is to be sampled from the middle depth of the water column using a Kemmerer sampler, following the LimnoTech sampling procedure (LimnoTech, 2018). At Stations 2 through 5, water is to be sampled from below the surface (0.6 metre [m], in line with the current shoreline sampling programs), using a Kemmerer sampler.

Baseline Turbidity Sampling

Existing data will be applied for Stations 2 and 3. At Stations 1, 4, and 5, baseline turbidity samples are to be collected in triplicate and averaged once per day, consistent with the permit requirements for CSLF (WSP, 2017). Following six months of data collection, data variability will be evaluated monthly to determine whether dry and wet weather baseline turbidity concentrations have been established at Stations 1, 4, and 5. Therefore, baseline turbidity sampling will conclude upon the earlier of these two occurrences: the start of significant near-water works; or the establishment of dry and wet weather baseline turbidity concentrations at Stations 1, 4, and 5, following a minimum of six months of data collection.

Turbidity sampling will be performed daily during construction; therefore, baseline turbidity samples are to be collected daily at Stations 1, 4, and 5, regardless of Toronto Port Authority dredging operations in the Keating Channel or seiches in the harbour. The SWQCMP is designed to consider the effects of dredging or seiches on turbidity readings during construction.

Baseline Sampling of Attachment 1 Analytes

A summary of the number of analytes, samples, locations, replicates, and blanks are listed in Attachment 1, Tables 1-1 and 1-2 for dry and wet weather, respectively. Baseline samples for the analytes in Attachment 1, Table 1-3 are to be collected during both dry and wet weather conditions. This will allow separate characterizations of baseline conditions for dry and wet weather.

Given the large size of the Don River watershed, a rapid increase in river stage is considered a more accurate reflection of prevailing weather impacts on the water quality at the sampling locations than local rain gage data near the project site. The Don River at Todmorden TRCA real-time gauge (Hydrometric Station Number [No.] 02HC04) is to be the primary reference for determination of dry and wet weather conditions (<http://trcagauging.ca/dataviewer/GetGraphWithReference.aspx?stn=Don%20at%20Todmorden>).

A review of hydrometric data at the Todmorden station was conducted to determine robust thresholds for dry and wet weather. **Water level thresholds are defined with respect to the Don River at the Todmorden TRCA real-time gauge**, which is the most downstream Don River gauge with publicly available online historical hydrometric data.

Note the following definitions:

- **Dry weather is defined** as having an antecedent period of at least 72 hours without an increase in water level more than 0.1 m.
- **Wet weather is defined** as a storm event that results in an increase in water level of at least 0.2 m in less than or equal to 1 hour.

Wet weather conditions are to be coupled with confirmatory onsite observations from the monitoring team. World Meteorological Organization (WMO) station 71265, located on the Toronto Islands, will also be referenced for confirmation of weather conditions, and collection and recording of weather information more closely related to the project site.

During wet weather, a single first-flush sample will be collected. Typically, the first-flush sample is a grab sample collected during the first 30 minutes of the storm event.

At least four samples, each from distinct, nonconsecutive days, are to be collected for dry weather characterization of the analytes in Attachment 1, Table 1-3. At least four storm events are to be sampled for wet weather first flush characterization of the analytes in Table 1-3. Ideally, at least two of the storm events will each represent 25 millimetres (mm) or more of rainfall, as measured at WMO station 71265.

Toronto Port Authority dredging operations in the Keating Channel may impact water quality at Station 2 and possibly Station 3. Baseline sampling of Attachment 1, Table 1-3 analytes is to be avoided during dredging operations in Keating Channel.

Seiches may affect sampling results during dry and wet weather conditions in the area. Wind patterns associated with seiche and wave action may influence water quality values. To obtain representative baseline samples of COCs associated with stream discharge and potential runoff near the project site, sampling of Attachment 1, Table 1-3 analytes at Stations 2, 3, 4, and 5 is to be conducted following a visual assessment that wind and wave action is not causing the harbour to dominate surface water conditions near the project site. Recorded winds at WMO station 71265 and lake water levels at DFO station 13320 from the day of each sampling event, along with sampling results, are to be reported.

It is understood that one dry weather sampling event has been completed at Station 1. Three additional dry weather events and four wet weather events at Station 1 are to be sampled with the full analyte list in Attachment 1, Table 1-3. Table 1 lists the extent of dry and wet weather sampling to be further performed at each station.

Seasonality

At present, construction of significant near-water works is anticipated to begin in 2020, and baseline monitoring is expected to begin in April 2018. The first stage of construction will begin in late June 2018. Dry and wet weather baseline samples are to be collected by TRCA during the spring and summer seasons before the start of the first stage of construction. Dry and wet weather baseline samples should continue to be collected by EllisDon (or their subcontractor) in each season before the start of construction of significant near-water works.

Sample Analytes

Attachment 1 contains a table of all analytes that have been detected exceeding regulatory standards in the soil or groundwater in the future Waterlot excavation area, as of January 19, 2018. Once construction begins, these analytes have the potential to enter the nearshore waters, and should be measured during each dry and wet weather baseline sampling event, and at each location.

Samples are to be analyzed at a laboratory that is accredited with respect to International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC) Standard 17025:2017, *General Requirements for the Competence of Testing and Calibration Laboratories* (for example, Canadian Association for Laboratory Accreditation, Standards Council of Canada). Sample collection protocols, such as sampling volumes, bottles, storage, preservatives, holding times, and delivery, are to be coordinated with the laboratory before each sampling event, and should meet applicable regulatory requirements, such as those described by MOECC in *Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater*, Sections 3.2, 3.3, and 3.4 (1999). Samples are to be reported by the laboratory to the lowest achievable detection limit.

Establish Representative Baseline Conditions

Procedures for establishing representative baseline conditions will be applied to both existing and new data collected in the BSWQMP. This will include statistical techniques, such as box plots and cumulative distribution plots; and the calculation of mean, median, standard deviation, and discrete quantiles (for example, 1, 10, 25, 50, 75, 95, and 99) on dry and wet weather data.

At Stations 2 and 3, the CSLF turbidity threshold values will be used, as these have been approved by the DFO.

Health and Safety

A comprehensive health and safety plan will be developed for sampling collection. Notable risks include:

- Sampling during storm events
- Working near water
- Handling samples that may contain COCs

Quality Assurance and Quality Control Procedures

Standard quality assurance (QA) and quality control (QC) procedures are to be followed for all aspects of sampling and data reporting. QA/QC procedures will include, at a minimum, the following:

- Using dedicated sampling equipment or appropriate equipment cleaning procedures
- Using new disposable gloves at each sampling location
- Sampling in triplicate for turbidity
- Submitting replicate samples at a frequency of 10 percent for analytes in Attachment 1, Table 1-3
- Submitting one suite of laboratory-prepared trip blanks and an equipment blank if nondedicated sampling equipment is used per dry and wet weather sampling event

In Attachment 1, Tables 1-1 and 1-2, note that more replicates are needed for wet weather events due to the greater number of samples per event; and two blanks are recommended for metals analysis to account for total and dissolved samples.

Samples of Attachment 1, Table 1-3 analytes will be placed in laboratory-prepared sample containers and placed in coolers at the appropriate storage temperature under chain-of-custody (CoC) forms for transportation to the laboratory. A hand-held device will be used to take in-field measurements of pH and temperature for provision to the lab as part of the CoC.

Field records of sampling events are to be collected and maintained over the course of the program and will include, at a minimum:

- Sample date
- Sample time
- Name of field staff
- Samples collected
- Onsite weather conditions at time of sampling
- Other site observations relevant to the sampling procedures

A photographic record of sample locations should also be maintained to confirm site conditions.

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Canadian Council of Ministers of the Environment (CCME). 2003. *Canadian Environmental Quality Guidelines*.

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WSP. 2017. *Cherry Street Stormwater and Lakefilling Fisheries Offsetting Plan*.

Attachment 1
Water Quality Analytes to Sample

Table 1-1. Dry Weather Event Sample Summary

Analyte Type	Analytes (No.)	Samples per Location (No.)	Locations (No.)	Replicates (No.)	Blanks (No.)
Chemistry	17	1	5	1	1
Metal	50	1	5	1	2
PAH	21	1	5	1	1
PCB	1	1	5	1	1
PHC	8	1	5	1	1
VOC	26	1	5	1	1

Notes:

No. = number

PAH = polycyclic aromatic hydrocarbon

PCB= polychlorinated biphenyl

PHC = petroleum hydrocarbon

VOC = volatile organic compound

Table 1-2. Wet Weather Event Sample Event Summary

Analyte Type	Analytes (No.)	Samples per Location (No.)	Locations (No.)	Replicates (No.)	Blanks (No.)
Chemistry	17	1	5	1	1
Metal	50	1	5	1	2
PAH	21	1	5	1	1
PCB	1	1	5	1	1
PHC	8	1	5	1	1
VOC	26	1	5	1	1

Notes:

No. = number

PAH = polycyclic aromatic hydrocarbon

PCB= polychlorinated biphenyl

PHC = petroleum hydrocarbon

VOC = volatile organic compound

Table 1-3. Water Quality Analytes to Sample

Analyte Type	Chemical Abstracts Service Registry No. or Acronym	Analyte Name
CHEMISTRY	ALK	Alkalinity (as CaCO ₃)
CHEMISTRY	7664-41-7	Ammonia
CHEMISTRY	BOD	Biochemical Oxygen Demand
CHEMISTRY	16887-00-6	Chloride (Cl)
CHEMISTRY	57-12-5	Cyanide
CHEMISTRY	DO	Dissolved Oxygen
CHEMISTRY	16984-48-8	Fluoride
CHEMISTRY	14797-55-8	Nitrate (as N)
CHEMISTRY	NO ₂ NO ₃	Nitrate-Nitrite (as N)
CHEMISTRY	14797-65-0	Nitrite (as N)
CHEMISTRY	PH	pH
CHEMISTRY	14808-79-8	Sulphate
CHEMISTRY	TEMP	Temperature
CHEMISTRY	KN	Total Kjeldahl Nitrogen
CHEMISTRY		Total Hardness (as CaCO ₃)
CHEMISTRY	TSS	Total Suspended Solids
CHEMISTRY	TURB	Turbidity
INORGANIC	SC	Specific Conductivity
METAL	7429-90-5	Aluminum
METAL	7440-36-0	Antimony
METAL	7440-36-0_D	Antimony (Sb), dissolved
METAL	7440-38-2	Arsenic
METAL	7440-38-2_D	Arsenic (As), dissolved
METAL	7440-39-3	Barium
METAL	7440-39-3_D	Barium (Ba), dissolved
METAL	7440-41-7	Beryllium
METAL	7440-42-8	Boron
METAL	7440-42-8_D	Boron (B), dissolved
METAL	7440-43-9	Cadmium
METAL	7440-43-9_D	Cadmium (Cd), dissolved
METAL	7440-70-2	Calcium
METAL	7440-47-3	Chromium
METAL	7440-47-3_D	Chromium (Cr), dissolved

Table 1-3. Water Quality Analytes to Sample

Analyte Type	Chemical Abstracts Service Registry No. or Acronym	Analyte Name
METAL	18540-29-9	Chromium, Hexavalent (Cr6+)
METAL	7440-48-4	Cobalt
METAL	7440-48-4_D	Cobalt (Co), dissolved
METAL	7440-50-8	Copper
METAL	7440-50-8_D	Copper (Cu), dissolved
METAL	7439-89-6	Iron
METAL	7439-92-1	Lead
METAL	7439-92-1_D	Lead (Pb), dissolved
METAL	7439-95-4	Magnesium
METAL	7439-96-5	Manganese
METAL	7439-97-6	Mercury
METAL	7439-97-6_D	Mercury, dissolved
METAL	7439-98-7	Molybdenum
METAL	7439-98-7_D	Molybdenum (Mo), dissolved
METAL	7440-02-0	Nickel
METAL	7440-02-0_D	Nickel (Ni), dissolved
METAL	7723-14-0	Phosphorus
METAL	9/7/7440	Potassium
METAL	7782-49-2	Selenium
METAL	7782-49-2_D	Selenium (Se), dissolved
METAL	7440-22-4	Silver
METAL	7440-22-4_D	Silver (Ag), dissolved
METAL	7440-23-5	Sodium
METAL	7440-23-5_D	Sodium (Na), dissolved
METAL	7440-24-6	Strontium
METAL	7440-28-0	Thallium
METAL	7440-28-0_D	Thallium (Tl), dissolved
METAL	7440-32-6	Titanium
METAL	7440-61-1	Uranium (U)
METAL	7440-61-1_D	Uranium (U), dissolved
METAL	7440-62-2	Vanadium
METAL	7440-62-2_D	Vanadium (V), dissolved
METAL	7440-66-6	Zinc

Table 1-3. Water Quality Analytes to Sample

Analyte Type	Chemical Abstracts Service Registry No. or Acronym	Analyte Name
METAL	7440-66-6_D	Zinc (Zn), dissolved
METAL	7440-67-7	Zirconium
PAH	MTNPH2-1	1+2-Methylnaphthalenes
PAH	90-12-0	1-Methylnaphthalene
PAH	91-57-6	2-Methylnaphthalene
PAH	83-32-9	Acenaphthene
PAH	208-96-8	Acenaphthylene
PAH	120-12-7	Anthracene
PAH	56-55-3	Benzo[a]anthracene
PAH	50-32-8	Benzo[a]pyrene
PAH	BZBJF	Benzo[b&j]fluoranthene
PAH	205-99-2	Benzo[b]fluoranthene
PAH	191-24-2	Benzo[g,h,i]perylene
PAH	207-08-9	Benzo[k]fluoranthene
PAH	205-82-3	Benzo[j]fluoranthene
PAH	218-01-9	Chrysene
PAH	53-70-3	Dibenzo[a,h]anthracene
PAH	206-44-0	Fluoranthene
PAH	86-73-7	Fluorene
PAH	193-39-5	Indeno[1,2,3-Cd]pyrene
PAH	91-20-3	Naphthalene
PAH	85-01-8	Phenanthrene
PAH	129-00-0	Pyrene
PCB	PCB	Total PCBs
PHC	PHCC6C10	F1 (C6-C10)
PHC	PHCC6C10BTEX	F1-BTEX
PHC	PHCC10C16	F2 (C10-C16)
PHC	PHCC10C16N	F2-Naphthalene
PHC	C16C34	F3 (C16-C34)
PHC	PHCC16C34P	F3-PAH
PHC	C34C50	F4 (C34-C50)
PHC	E-14695	F4G-SG
VOC	75-34-3	1,1-Dichloroethane

Table 1-3. Water Quality Analytes to Sample

Analyte Type	Chemical Abstracts Service Registry No. or Acronym	Analyte Name
VOC	95-50-1	1,2-Dichlorobenzene
VOC	107-06-2	1,2-Dichloroethane
VOC	540-59-0	1,2-Dichloroethene (Total)
VOC	78-87-5	1,2-Dichloropropane
VOC	542-75-6	1,3-Dichloropropene
VOC	67-64-1	Acetone
VOC	71-43-2	Benzene
VOC	108-90-7	Chlorobenzene
VOC	156-59-2	cis-1,2-Dichloroethene
VOC	10061-01-5	cis-1,3-Dichloropropene
VOC	75-09-2	Dichloromethane
VOC	100-41-4	Ethylbenzene
VOC	78-93-3	Methyl Ethyl Ketone (2-Butanone)
VOC	108-10-1	Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)
VOC	1634-04-4	Methyl tert-butyl ether (MTBE)
VOC	110-54-3	n-Hexane
VOC	100-42-5	Styrene
VOC	127-18-4	Tetrachloroethene
VOC	108-88-3	Toluene
VOC	156-60-5	trans-1,2-Dichloroethene
VOC	79-01-6	Trichloroethylene
VOC	75-01-4	Vinyl Chloride
VOC	95-47-6	Xylene, o
VOC	179601-23-1	Xylenes, m & p
VOC	1330-20-7	Xylenes, Total

Notes:

BTEX = benzene, toluene, ethylbenzene, and xylenes

CaCO₃ = calcium carbonate

F = fraction

F4G = F4 gravimetric

N = nitrogen

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

PHC = petroleum hydrocarbon

TSS = total suspended solids

VOC = volatile organic compound