Saanich Peninsula Treatment Plant

Wastewater and Marine Environment Program 2020 Report

Capital Regional District | Parks & Environmental Services, Environmental Protection

Prepared by:
Marine Programs

Capital Regional District
625 Fisgard Street, Victoria, BC V8W 2S6
T: 250.360.3000 F: 250.360.3079
www.crd.bc.ca

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SAANICH PENINSULA TREATMENT PLANT
WASTEWATER AND MARINE ENVIRONMENT PROGRAM
2020 REPORT

EXECUTIVE SUMMARY

The Capital Regional District (CRD) has been operating the Saanich Peninsula Treatment Plant (SPTP) since February 2000. The treatment plant serves North Saanich, Central Saanich and the Town of Sidney, as well as the Victoria International Airport, the Institute of Ocean Sciences and the Tseycum and Pauquachin First Nations communities. It is a conventional secondary level wastewater treatment plant, which has periodically produced Class A biosolids. The treatment plant discharges un-disinfected secondary effluent into the marine receiving environment (Bazan Bay) through an outfall located approximately 1,580 metres (m) from the shoreline at a depth of 30 m. Residual solids left over from the treatment process are currently disposed of at the Hartland Landfill. The CRD undertakes monitoring to meet provincial and federal regulatory requirements, as well as to assess the impacts of the outfall on the marine environment and human health. Information is often used to inform the CRD's Regional Source Control Program (RSCP) and treatment plant operations. This monitoring is stipulated by the BC Ministry of Environment and Climate Change Strategy (ENV) through the Municipal Wastewater Regulation under the *Environmental Management Act* and the federal Wastewater Systems Effluent Regulations under the *Fisheries Act*.

As part of the Saanich Peninsula Liquid Waste Management Plan (LWMP), the CRD committed to develop a long-term monitoring program. CRD staff reviewed the pre-discharge monitoring data (1998-2000), in conjunction with the post-discharge monitoring results (2000-2003), and developed the long-term monitoring program, in consultation with the Marine Monitoring Advisory Group. This program has been in place since 2004. In 2011 and 2012, in collaboration with ENV, the CRD conducted a more recent review of the program, to determine whether revisions were necessary to satisfy changing regulatory monitoring expectations. Some minor changes were made and implemented in January 2013.

The 2020 Wastewater and Marine Environment Program consisted of the following components:

- daily, weekly and monthly analysis of wastewater for federal and provincial compliance monitoring and treatment plant performance parameters, and quarterly analysis for priority substances
- quarterly wastewater toxicity testing
- monthly analysis of biosolids for fecal coliforms and metals
- a biannual surface monitoring program, consisting of five sampling days within a 30-day period, once each in summer and winter
- sediment chemistry testing
- benthic invertebrate enumeration

WASTEWATER MONITORING

Compliance Monitoring and Treatment Plant Performance

The CRD conducted wastewater monitoring on a regular basis to profile the chemical and physical constituents of influent and effluent, determine concentrations relative to provincial and federal regulatory limits, and assess treatment plant performance. Parameters monitored for regulatory compliance were below the applicable effluent regulatory limits. Influent and effluent quality was within expected ranges and met all treatment plant operating objectives.

Priority Substances

In addition to the compliance and treatment plant performance monitoring, over 500 substances were analyzed in the SPTP influent and effluent on a quarterly basis. These substances were monitored to more comprehensively assess potential risks of the wastewater discharge to organisms living in the marine environment around the outfall.

Approximately 45% of substances were detected in 50% or more of the samples, and included most of the conventional variables, metals (both total and dissolved), some organics, and high resolution parameters. Most frequently detected substances were below BC and Canadian Water Quality Guidelines (WQG), even in undiluted effluent. Only bacterial indicators, nitrogen, weak acid dissociable cyanide, cadmium, copper, zinc, and high-resolution total polychlorinated biphenyls exceeded guidelines in undiluted effluent, prior to discharge to the marine receiving environment.

Water quality guidelines must be met outside of the initial dilution zone (IDZ) (i.e., an area with a radius of approximately 100 m around the outfall), so in order to predict levels at the edge of the IDZ, estimated minimum initial dilution factors were applied to all substance concentrations. All substances were predicted to be below WQG after the application of this dilution factor, including those substances that were above guidelines in undiluted effluent, with the exception of bacterial indicators. As such, impacts of these discharged substances to aquatic life are likely minimal. Surface water monitoring was undertaken to assess the human health and shellfish impacts of the effluent bacteriological exceedances (see Surface Water Monitoring section below).

Toxicity Testing

In 2020, all toxicity tests passed with no mortality. There was a small impact on Rainbow trout embryo survival and viability. There were no other survival or reproductive impairments observed during the chronic toxicity testing conducted using SPTP effluent.

BIOSOLIDS MONITORING

No biosolids were produced at the SPTP in 2020. All sludge generated at the facility was disposed of at the Hartland Landfill. The CRD monitored the sludge in 2020 to inform the CRD's RSCP, and all regulated parameters were below Class A biosolids limits.

SURFACE WATER MONITORING

Bacteriology

Surface water (1 m depth) fecal coliform and enterococci concentrations were low at all stations, with geometric means of 2 CFU/100 mL or less. IDZ stations also had low bacteriology concentrations, with geometric means of 11 CFU/100 mL or less, below BC and Health Canada recreational and shellfish guidelines. There were no elevated geometric mean fecal coliform or enterococci concentrations observed at any station, on any sampling date, and no samples that exceeded the Health Canada enterococci single sample guideline of 70 CFU/100 mL.

Overall, results indicate that adverse health effects from recreational primary contact activities and shellfish harvesting are not expected. However, an area of approximately 17.65 km^2 around the outfall is closed for shellfish harvesting, as standard Fisheries and Oceans Canada procedure near industrial and sanitary wastewater outfalls. Shellfish closures have a minimum radius around an outfall of 300 m, but closure areas are usually larger near bigger urban centres, such as for the SPTP outfall, where there are other potential sources of bacterial contamination (e.g., stormwater discharges, marinas, septic systems, sewage pumps), in addition to the wastewater outfall.

An assessment has been undertaken to evaluate the need for disinfection at the SPTP. Based on the results of this review, disinfection is not recommended at this time.

Extended Monitoring

WQG exceedances were observed for boron in the water column surrounding the SPTP outfall, at all stations and sampling events, including at the reference station. These exceedances are expected, as boron is naturally occurring in the environment at higher levels. The CRD will continue to monitor metals in waters around the outfall and the reference station, to assess environmental significance.

Nutrients

There were some seasonal patterns in the nutrient results, which were consistent between the reference and the IDZ stations. Results were within the ranges measured in previous years and those of the pre- and post-discharge assessment programs. As was observed in previous monitoring years, high variability, both spatially and temporally, was evident in the data. Fluctuations in nutrient concentrations are attributed to natural variation in the monitoring areas. Overall, there was no evidence of an effect on nutrient concentrations in the receiving environment from the SPTP discharge.

SEAFLOOR

Seafloor monitoring (i.e., benthic community structure and sediment chemistry) was conducted in 2020. This component is conducted every four years, since before the plant commenced discharging in 2000. The next sampling event is planned for 2024. Overall, seafloor monitoring indicated no adverse impacts are expected as a result of the wastewater discharge.

OVERALL ASSESSMENT

Based on tests used to monitor effluent quality and surface water in 2020, no significant adverse effects from the SPTP discharge on the receiving environment are expected. Results were similar to previous years. Influent and effluent quality was within expected ranges and met all regulatory limits and operating certificate compliance requirements on all sampling dates. All substances, with the exception of bacterial indicators, for which there are BC or Canadian WQG, met these guidelines when the estimated minimum initial environmental dilution of the effluent was factored in, indicating that the predicted levels of substances in the environment were not likely to be at concentrations of concern to aquatic life. Surface water fecal coliform and enterococci data indicated that adverse health effects on recreational activities or shellfish consumers were low or not expected. As expected, boron exceeded WQG at every station and sampling depth, including at the reference station, as the natural concentrations of boron are above WQG in the Salish Sea. ENV is working on updating the boron guideline. Surface water nutrient concentrations were within ranges measured in previous monitoring programs and showed no detectable effect from the discharge. Seafloor monitoring indicated no adverse impacts are expected as a result of the wastewater discharge.

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Terms & Abbreviations

ALK	alkalinity
AVS	Acid Volatile Sulphide
BC OMRR	Organic Matter Recycling Regulations
BOD	Biochemical Oxygen Demand
CALA	Canadian Association for Laboratory Accreditation
CBOD	Carbonaceous Biochemical Oxygen Demand
CCME	Canadian Council of Ministers of the Environment
CFU	colony-forming unit
Cl	Chloride
COD	Chemical Oxygen Demand
COND	Conductivity
CSSP	Canadian Shellfish Sanitation Program
ENT	Enterococci
ENV	BC Ministry of Environment and Climate Change Strategy
FC	Fecal Coliform
IDZ	Initial Dilution Zone
LWMP	Liquid Waste Management Program
MMAG	Marine Monitoring Advisory Group
NH_3	Ammonia
NO_2	nitrite
NO_3	nitrate
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PDBE	Polybrominated diphenyl ethers
PPCP	Pharmaceuticals and personal care products
Q+	Quarterly Plus
QA/QC	quality assessment/quality control
RSCP	Regional Source Control Program
SCADA	Supervisory Control and Data Acquisition
SPTP	Saanich Peninsula Treatment Plant
SQG	sediment quality guidelines
TDP	total dissolved phosphorus
TKN	total Kjeldahl nitrogen
TOC	total organic carbon
TP	total phosphorus
TSS	Total Suspended Solids
TWQRP	Technical Water Quality Review Panel
US EPA	US Environmental Protection Agency
WAD	weak acid dissociable (WAD) cyanide
WMEP	Wastewater Marine Environment Program
WQG	Water Quality Guidelines
WSER	Wastewater Systems Effluent Regulations

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1.0 BACKGROUND

The Saanich Peninsula Treatment Plant (SPTP) started operations in February 2000. This Capital Regional District (CRD) treatment plant serves North Saanich, Central Saanich and the Town of Sidney, as well as the Victoria International Airport, the Institute of Ocean Sciences and Tseycum and Pauquachin First Nations communities. It is a conventional secondary level wastewater treatment plant, which has periodically produced Class A biosolids. The treatment facility discharges undisinfected secondary-treated effluent into the marine receiving environment (Bazan Bay) through an outfall located approximately 1,580 m from the shoreline at a depth of 30 m. Residual sludge from the treatment process is currently disposed of at the Hartland Landfill. The Wastewater and Marine Environment Program (WMEP) includes regular monitoring, as stipulated by the BC Ministry of Environment and Climate Change Strategy (ENV), through the Municipal Wastewater Regulation under the *Environmental Management Act* and the federal Wastewater Systems Effluent Regulations (WSER) under the *Fisheries Act*. The facility operates under a Provincial Operational Certificate (#ME-15445), and the Saanich Peninsula Liquid Waste Management Plan (LWMP) (CRD, 2009a).

The Saanich Peninsula LWMP committed the CRD to carry out a pre- and post-discharge assessment program and to develop a long-term monitoring program. The pre-discharge program was conducted from October 1998 to January 2000. The post-discharge program was initiated in February 2000 (when treatment plant operation began) and completed in February 2001. The results presented in Aquametrix Research Ltd. (2000, 2001a and 2001b) guided the development of the long-term monitoring program in consultation with the Marine Monitoring Advisory Group (MMAG). The MMAG consists of university and government scientists with expertise in the fields of marine biology, chemistry, toxicology, oceanography and public health. This independent group reviews CRD marine monitoring and assessment programs and makes appropriate recommendations.

Upon MMAG review of the post-discharge assessment program, the group determined that additional data were needed before a long-term program could be defined. Therefore, an interim WMEP was developed by CRD staff working with the MMAG. This interim program was conducted from 2001-2003 (CRD, 2002, 2003 and 2004) and included additional receiving environment nutrient monitoring for a two-year period (2002-2003). It was also during this time that a Technical Water Quality Review Panel (TWQRP) determined that a disinfection step during the treatment process was unnecessary to meet human health recreation guidelines.

After a review of the 2002 and 2003 nutrient data, the MMAG recommended that the extensive nutrient monitoring be discontinued. Instead, the MMAG proposed that monthly monitoring of nutrients at one station directly above the outfall terminus, and one reference station be incorporated into the regular program. The group also recommended the addition of a plan with two conditions that could precipitate the re-evaluation of the need for a comprehensive nutrient monitoring program (detailed in Section 5.1). CRD staff incorporated these two conditions into the long-term monitoring program, which was finalized and first included in the 2003 annual report. The long-term SPTP WMEP was implemented in 2004, following submission to ENV, as required under the LWMP. Monitoring is also undertaken to satisfy requirements of the federal WSER, which came into effect in 2013.

A review of the SPTP WMEP was conducted in 2011-2012 in partnership with ENV. As a result of this review, new aspects of the SPTP WMEP include annual wastewater toxicity testing, and changes to the surface water sampling program intended to align the program more closely with the water quality guidelines (WQG) requiring the collection of five samples in 30 days, plus initial dilution zone (IDZ) (i.e., an area with a radius of approximately 100 m around the outfall) stations in an attempt to capture the wastewater plume. This revised program was implemented in January 2013 and is summarized in Table 2.1.

In addition, the initial TWQRP suggested a number of conditions that would prompt a reevaluation of the need for disinfection at the SPTP, one of which was 10 years of plant operation. This reevaluation was initiated in 2011 with the MMAG receiving formal delegation to undertake the review. In 2015, the MMAG confirmed that disinfection continues to be unnecessary to meet recreational water quality guidelines around the outfall, and requested that the CRD continue to assess the potential benefits of disinfection to nearby shellfish resources in consultation with First Nation and other shellfish stakeholders. In January 2020, staff advised the Saanich Peninsula Wastewater Commission that installation of disinfection at the SPTP does not appear to present any significant benefit to nearby shellfish resources, as the ongoing surface water bacteriological monitoring indicates that levels around the outfall are well below thresholds to protect shellfish harvesting. Staff therefore recommend that disinfection not be installed at this time. Staff continue to meet with W̱SÁNEĆ First Nations and other shellfish stakeholders to assess potential future disinfection need, as well as to identify other areas on the Saanich Peninsula where shellfish harvesting could be restored but are outside the influence of the SPTP.

2.0 INTRODUCTION

The objectives of the SPTP WMEP are to:

- Comply with federal and provincial regulations.
- Assess the effects of the wastewater discharge on the marine environment and the potential for human health risks (related to the presence of bacteria in surface water).
- Determine waste loads to the marine receiving environment.
- Monitor influent, effluent and biosolids quality (both as part of regulatory requirements and to optimize treatment plant performance).
- Supply information to the CRD's Regional Source Control Program (RSCP) and treatment plant operators.
- Provide scientific guidance to wastewater managers regarding the use of the marine environment for the disposal of municipal wastewater.

This report presents the results of the 2020 SPTP WMEP in one integrated report. The components of the current WMEP are presented in Table 2.1. These components, the parameters that are measured for each, and the sampling frequency were determined based on regulatory requirements (i.e., for compliance monitoring), a review of the pre- and post-discharge assessment programs, similar monitoring and assessment programs, and recommendations of the MMAG. The following sections present summaries of the methods used for sample collection and processing, and for data analysis of each component of the 2020 WMEP. Detailed information can be found in any technical reports and independent consultant reports referred to in the individual sections. Methods were selected for each of these components, based on internationally recognized standards, and sampling and analytical protocols.

Outfall and reference stations for the sea surface and seafloor components of the WMEP were chosen by the MMAG, following recommendations by the consultant (Aquametrix) that conducted the pre- and post-discharge monitoring program. The reference station was chosen because oceanographic computer modelling indicated it would be far enough away from the plume effects, while being at a similar depth to the outfall stations.

Table 2.1 SPTP Wastewater and Marine Environment Program Components, Parameters, Frequency and Stations

Component	Parameter	Frequency and Stations
Wastewater Monitoring	compliance monitoring (CBOD, FC, flow, unionized NH_3, pH, pH @ 15°C, TSS)[1]	daily to twice per month at the influent and final effluent sampling points[2] federal – every two weeks provincial – monthly
	treatment plant performance (ALK, CBOD, COD, COND, Cl, NH_3, NO_2, NO_3, BOD, TDP, TKN, TP, TSS)[1]	twice per week to monthly[3] at the influent and final effluent sampling points
	influent and effluent priority substances[4]	quarterly[5] at the influent and effluent sampling points
	chronic toxicity testing	annually at the effluent sampling point (*Ceriodaphnia dubia* survival and reproduction, Rainbow trout embryo-alevin survival and development, echinoderm (*Strongylocentrotus)* fertilization, seven-day Pacific topsmelt survival and growth)
	acute toxicity testing	quarterly at the effluent sampling point (Rainbow trout 96-hour LC50, *Daphnia magna* 48-hour LC50)
Biosolids/Sludge Monitoring	metals, moisture, FC[1]	monthly (when biosolids were produced) from the biosolids conveyor belt (i.e., before dropping into shipping bin). Currently dewatered sludge is monitored monthly for informational purposes.
Surface Water Monitoring	indicator bacteria (FC, ENT)[1]	10 times a year (5-in-30 samples collected in the winter and in the summer) at 19 stations (14 outfall stations, four IDZ stations and one reference station)
	nutrients (NH_3, NO_2, NO_3, TDP, TKN, TP), COND, salinity, pH, temperature and TOC[1]	10 times a year (5-in-30 samples collected in the winter and in the summer) at five stations (four IDZ stations and one reference station)
	metals	twice yearly (winter and summer) at five stations (four IDZ stations and one reference station)
Seafloor	particle size analysis, TOC[1], AVS[1] and sediment chemistry[4]	every four years at two stations[6] (one outfall terminus station and one reference station)
	benthic community structure (including TA, TR, SDI)[7]	

Notes:

[1] ALK - alkalinity, AVS - acid volatile sulphide, CBOD - carbonaceous biochemical oxygen demand, COD - chemical oxygen demand, COND - conductivity, Cl - chloride, FC - fecal coliforms, ENT - enterococci, NH3 - ammonia, NO_3- nitrate, NO_2 -nitrite, BOD - biochemical oxygen demand, TDP - total dissolved phosphorus, TKN - total Kjeldahl nitrogen, TOC - total organic carbon, TP - total phosphorus, TSS - total suspended solids

[2] Frequency is listed in Appendix A

[3] Frequency depends on the operation of the facility and what the operators need to optimize treatment plant performance

[4] All parameters are listed in Appendix A

[5] January, April, July and October and additional Q+ sampling conducted one day before and one day after a quarterly sampling event

[6] Conducted in 2020. Next time will be 2024, 2028, etc.

[7] TA - total abundance, TR - taxa richness, SDI - Swartz Dominance index

3.0 WASTEWATER MONITORING

3.1 Introduction

The CRD conducts wastewater monitoring on a regular basis at the SPTP to assess compliance with the operational certificate under the LWMP and the federal WSER, to assess treatment plant performance and to profile the physical and chemical constituents of treated wastewater before it is released to the marine receiving environment. These data provide an indication of which components may be of concern in the receiving environment and can be used to direct the efforts of the WMEP and the RSCP.

Wastewater monitoring at the SPTP consists of quarterly composite analyses for all priority substances, supplemented by additional "quarterly plus" (Q+) composite sampling occurring one day before and one day after the quarterly sampling events. The Q+ monitoring program is intended to increase the precision of the quarterly sampling events for key substances of interest (Appendix A) and eliminate the difficulties associated with statistically comparing grab to composite results. In 2020, Q+ samples were collected in January and July.

The list of parameters was adapted from the US Environmental Protection Agency (US EPA) National Recommended Water Quality Criteria; Priority Toxic Pollutants list (US EPA, 2002). The CRD reviews its list on a periodic basis to determine the need to delete or add substances depending on new developments in terms of analytical techniques, potential presence in wastewaters and potential effects on human health and the receiving environment, alignment with the Vancouver Aquarium's Pollution Tracker parameters, and upon ENV review. Influent is analyzed for the same comprehensive list of substances.

Detailed statistical trend analyses are undertaken every three-five years to quantitatively assess temporal trends in concentrations and loadings of wastewater parameters. In 2012, Golder Associates (Golder, 2013) updated the previous trend assessment to include the 2009-2011 results, expanding the total SPTP dataset from 2000-2011. Results of this assessment were presented in the 2011 annual report (CRD, 2012). The most recent trend assessment was completed in 2017 (Golder, 2019) and included the next three years of wastewater data (2012-2015). Results were included in the 2016 annual report (CRD, 2017).

3.2 Methods

Information on wastewater sampling and analytical methods is presented below and in any independent consultants' reports referenced in the individual sections. Sampling and analytical methods used for each of these components were based on recognized standards and protocols (APHA, 1992; BC MWLAP, 2003). Samples were either collected as composites (i.e., over a 24-hour period) or individual grabs (i.e., discrete one-time) depending on the parameters that were being analyzed.

3.2.1 Compliance Monitoring and Treatment Plant Performance

The CRD operators and sampling technicians regularly monitor effluent quality and flow, as required by the ENV operational certificate under the SPTP LWMP and federal regulations. Table 3.1 presents parameters, effluent regulatory limits, frequency and sampling methods used to assess compliance.

Influent and effluent samples were also collected periodically to assess the efficiency of the treatment plant processes (see Table 2.1 for a list of parameters and monitoring frequency). Flow was measured continuously with a Supervisory Control and Data Acquisition (SCADA) system.

Operators and technicians collected composite influent and effluent samples using on-site automated ISCO™ samplers (http://www.isco.com). Influent samples were collected from a sampling point situated where the wastewater had entered the treatment plant and been screened, but prior to transfer to the settling tanks (i.e., before primary treatment). Effluent samples were collected from a sampling port situated where the final effluent is discharged to the marine receiving environment. Sub-samples (consisting of 400 mL) were collected every 30 minutes and composited into one sample representing the 24-hour period. Grab samples (i.e., one-time discrete samples) were collected for the analysis of parameters not suited to composite sampling, such as fecal coliforms, pH, oil and grease, and volatile organic compounds.

Parameters required by federal regulations were analyzed at Canadian Association for Laboratory Accreditation certified labs. Laboratory analyses were conducted at Bureau Veritas Laboratories Inc. (Burnaby, BC) and SGS AXYS Analytical Services (Sidney, BC).

Table 3.1 SPTP Effluent Compliance Monitoring Parameters, Regulatory Limits, Frequency and Sampling Methods

Parameter	Effluent Regulatory Limit	Required Frequency of Monitoring[4]	Sampling Method
CBOD	provincial – 45 mg/L maximum federal – 25 mg/L average	provincial – 2x per week federal – 2x per month	24-hr composite
TSS[1]	provincial – 45 mg/L maximum federal – 25 mg/L average	provincial – 2x per week federal – 2x per month	24-hr composite
flow[1]	23,448 m^3/day (average daily)[2] 56,000 m^3/day (maximum daily)	continuously	SCADA[3]
pH[1]	6-9	2x per week	grab
ammonia[1], pH @ 15°C	provincial – required, but no limit federal – unionized 1.25 mg/L maximum	provincial – monthly federal – 2x per month	24-hr composite
fecal coliforms	required, but no limit	provincial – monthly	grab
total residual chlorine	federal – 0.02 mg/L average	only when used as part of the treatment process[5]	grab

Notes:
1 parameters which are also analyzed in influent
2 limit determined on an annual basis = (12,200 m^3/d * (1.0316 $^{\text{calendar year—1999}}$))
3 SCADA system
4 as described in the operating certificate or the federal WSER
5 chlorine was not used as part of the SPTP treatment process in 2020. As such, total residual chlorine was not monitored.

CBOD = carbonaceous biochemical oxygen demand; TSS = total suspended solids; FC = fecal coliforms

3.2.2 Priority Substances

CRD technicians collected influent and effluent samples, as done with compliance parameters, with the following adaptations:

- Sampling equipment (i.e., hoses, sieves and carboys) was cleaned thoroughly prior to use by an external private laboratory (SGS AXYS Analytical Services), following trace cleaning procedures, including triple rinses with solvents, acids and distilled water.
- The CRD WMEP automated ISCO™ samplers (different from the on-site SPTP automated ISCO™ samplers used by the operators for the compliance and treatment plant performance monitoring) were used to collect influent and effluent composite samples. Two different samplers were used: one for influent and one for effluent. Sub-samples (consisting of 400 mL) were collected every 30 minutes and composited into one sample representing the 24-hour period.

- Composite samples were collected into a fluorinated, pre-cleaned 20-L carboy and continuously and thoroughly mixed before and during sample splitting to ensure sample homogeneity.
- Grab samples were collected using the ISCO™ sampler manual pumping setting (i.e., at the end of each composite sample interval) and transferred into appropriate sample bottles on site.

The sampling technician immediately dispatched the samples to qualified laboratories (i.e., Canadian Association for Laboratory Accreditation proficient and certified) to conduct chemical analyses. The SPTP laboratory conducted analyses for most conventional parameters (e.g., BOD, CBOD, fecal coliforms, chloride, sulphate, nitrate, nitrite, conductivity, TKN, TSS, COD, ammonia, pH and alkalinity); Bureau Veritas (Burnaby, BC) conducted analyses for the federally-regulated parameters (i.e., pH @ 15°C, unionized ammonia, TSS, CBOD) and priority substances; and SGS AXYS Analytical Services conducted analyses for high-resolution parameters. Laboratory and CRD staff chose analytical methods to ensure that method detection limits were low enough for comparisons to ENV approved (BCMoE&CCS, 2019) and working (BCMoE&CCS, 2017) WQG and the Canadian Council of Ministers of the Environment (CCME 2003) *Canadian Water Quality Guidelines for the Protection of Aquatic Life*.

Wastewater was analyzed for a comprehensive list of priority substances that included conventional variables (included for the assessment of potential effects on the marine receiving environment and for comparison to the compliance treatment plant performance results), metals, halogenated compounds, polycyclic aromatic hydrocarbons, polybrominated diphenyl ethers, polychlorinated biphenyls, pesticides, pharmaceuticals and personal care products, nonylphenols and fluorinated compounds (Appendix A).

DATA QUALITY ASSESSMENT

The CRD and laboratory staff followed a rigorous quality assessment/quality control (QA/QC) procedure for both field sampling procedures and laboratory analyses. Within each analytical batch that was analyzed quarterly [i.e., four batches in 2020 that included samples from other CRD wastewater treatment plants (e.g., Clover and Macaulay points outfalls)], one sample was randomly chosen for laboratory triplicate analysis, one sample was randomly chosen for field triplicate analysis, and one sample for a matrix spike. Both Bureau Veritas and SGS AXYS Analytical also conducted internal QA/QC analysis, including method analyte spikes, method blanks and standard reference materials.

DATA ANALYSIS

Percent frequencies of detection were determined for each substance by adding the number of times the compound was detected, dividing it by the total number of samples collected in the year and multiplying it by 100. A frequency of greater than 50% was selected as a percentage above which meaningful statistical analyses could be conducted. For non-detectable results (i.e., less than the method detection limits), a value of half the method detection limit was used for calculating the substance mean concentrations. For those substances detected greater than 50% of the time in the effluent, predictions of substance concentrations in the receiving environment were made by dividing maximum substance concentrations in effluent by the estimated minimum initial dilution factor of 153:1 (Hayco, 2005). The estimated minimum initial dilution factor was determined by a receiving environment dye study undertaken December 7-9, 2004, and was determined to occur within approximately 50 m south of the outfall at a depth of 24.4 m at slack tide (Hayco 2005). Predicted environmental concentrations, as well as the original sample concentrations (i.e., without the initial dilution factor), were compared to:

- ENV approved (BCMoE&CCS, 2019) and working (BCMoE&CCS, 2017) WQG,
- CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Lif*e (CCME, 2003), and
- Health Canada guidelines for the protection of human health (Health Canada, 2012).

These comparisons give an indication of the potential for receiving environment effects.

Annual loadings were determined by first calculating the quarterly loadings (January, April, July and October), averaging these values and multiplying by the number of days in a year (366 in 2020 due to the leap year). Quarterly loadings were calculated by averaging the total flow over the two sampling days and multiplying the average flow by the concentration of each substance measured that quarter. Loadings were calculated only for substances detected in >50% of sampling events.

Substances for which minimum initial dilution and loading calculations were not appropriate were noted as n/a (not applicable). For example, pH, conductivity and hardness do not lend themselves to loading calculations (e.g., pH is a discrete measurement and calculating a loading over time is not appropriate).

3.2.3 Toxicity Testing

Acute toxicity testing refers to the assessment of adverse effects of a substance resulting from either a single exposure or from multiple exposures to a substance in a short period of time (usually less than 24 hours). Acute toxicity testing was conducted by Nautilus Environmental (Burnaby, BC) on a quarterly basis using effluent collected from the SPTP in January, April, July and October of 2020. Tests consisted of a 96-hour rainbow trout LC50 and a 48-hour *Daphnia magna* LC50. The LC50 test measures the lethal concentration that kills 50% of organisms over the test period. Anything less than 100% survival is a fail.

Chronic toxicity testing refers to the assessment of adverse health effects from repeated exposures, often at lower levels, to a substance over a longer period of time (weeks or years). Chronic toxicity results are reported as either the LC50, which is the concentration at which 50% of the test organisms die during the test period, or as the EC50 or EC25, which are the concentrations at which a negative impact is observed on 50% or 25%, respectively, of the organisms in the specified test period (e.g., decreased fertilization or growth). Chronic toxicity testing was conducted by Nautilus using effluent collected from the SPTP in November and December of 2020. Tests consisted of a seven-day *Oncorhynchus mykiss* (Rainbow trout) embryo-alevin, a seven-day *Atherinops affinis* (Topsmelt) survival and growth, a six-day *Ceriodaphnia* survival and reproduction, and an echinoid fertilization test.

3.3 Results and Discussion

3.3.1 Compliance Monitoring and Treatment Plant Performance

Flow data are presented in Appendix B1. Flow measurements indicate that the mean daily flow in 2020 was similar to that in 2019 (9,993 m^3/d in 2020 versus 9,143 m^3/d in 2019). There were no exceedances of the permitted average or maximum daily allowable flow in 2020. Figure 3.1 presents the SPTP flows from 2011-2020 indicating that flows are not increasing significantly over time. Provincial wastewater compliance monitoring and treatment plant performance monitoring results are summarized in Table 3.2. Federal wastewater compliance parameters are summarized in Table 3.3. The complete raw data sets are presented in Appendices B2 (influent) and B3 (effluent).

All effluent results were below provincial and federal regulatory limits in 2020.

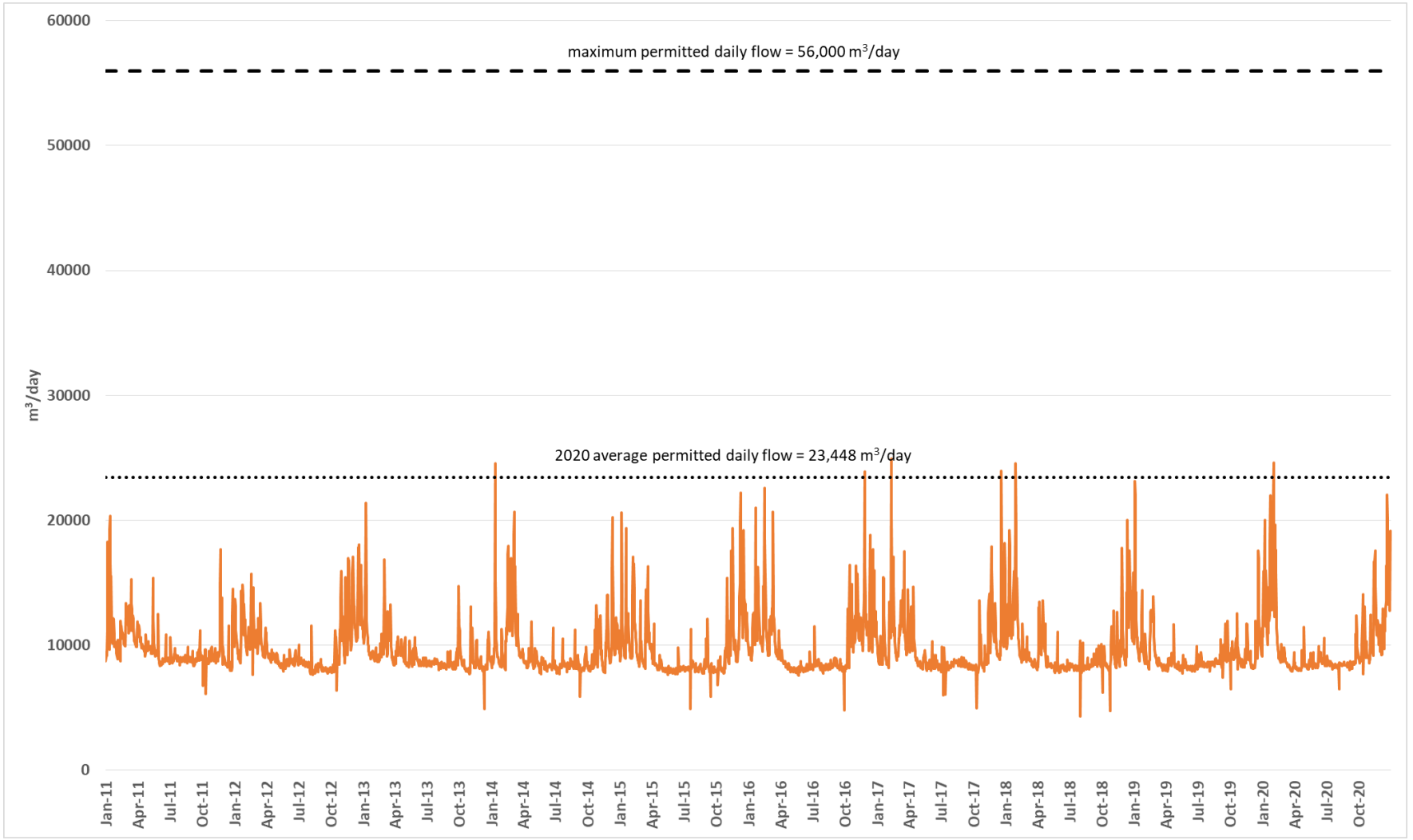

Figure 3.1 SPWTP Effluent flows from 2011-2020

Table 3.2 SPTP 2020 Provincial Compliance Monitoring and Treatment Plant Performance Results

Parameter and Unit	Effluent Regulatory Limit	Influent				Effluent			
		n	Mean	Min	Max	n	Mean	Min	Max
CBOD (mg/L)	45 maximum	6	141	4.2	270	126	6	1	28
TSS (mg/L)	45 maximum	5	149	17	250	27	8	4	19
flow (m^3/d)	23,448 average daily 56,000 maximum daily	---	---	---	---	366	9,993	6,452	24,585
pH (pH units)	6-9	43	7.25	6.3	8	43	7.08	5.7	7.7
NH_3 (mg/L N)	Required, but no limit	32	33.6	0.033	49	32	4	0.0075	35
fecal coliform (CFU/100 mL)	Required, but no limit	8	4,481,838	2	10,000,000	40	267,085	1,100	8,300,000
alkalinity (mg/L)	*	15	208	87.3	310	15	44	20.8	70
chloride (mg/L)	*	16	83	47	200	16	76	57	120
COD (mg/L)	*	56	542	256	823	56	44	25	72
BOD (mg/L)	*	53	191	6.5	310	104	14	3	150
conductivity (µS/cm)	*	38	718	432	1,300	38	517	412	680
nitrate (mg/L N)	*	6	2.21	0.037	10.9	27	12.24	5.89	16.4
nitrite (mg/L N)	*	8	0.42	0.0152	0.942	31	1.05	0.0034	5.58
TKN (mg/L N)	*	28	41.4	10.8	66.2	28	4.3	0.1	45.2
TDP (mg/L P)	*	16	3	1.6	4.9	16	3.71	1.50	1.70
TP (mg/L P)	*	20	5.33	1.18	7.79	20	4	0.9	6.1

Notes:

CBOD = carbonaceous biochemical oxygen demand, COD = chemical oxygen demand, FC = fecal coliforms, NH_3 = ammonia, BOD = biochemical oxygen demand, TDP = total dissolved phosphorus, TKN = total Kjeldahl nitrogen, TP = total phosphorus, TSS = total suspended solids

Average daily flows [limit determined on an annual basis = (12,200 m^3/d * ($1.0316^{\text{calendar year -1999}}$)]

* measured to assess treatment plant performance

Table 3.3 Saanich Peninsula Treatment Plant Federal Wastewater Compliance Results 2020

Saanich Peninsula Treatment Plant Secondary Effluent				
	CBOD (mg/L)	Unionized ammonia (mg/L N)	pH @ 15°C	TSS (mg/L)
Federal Limit	25 average	1.25 max	---	25 average
	n=126	N=27	N=27	N=27
January	4.0	<0.0005	6.5	8.1
February	2.8	<0.0005	6.6	12
March	4.0	<0.0005	6.5	9.0
April	17	0.005	6.5	10
May	6.4	0.005	6.7	8.8
June	6.6	0.0101	6.9	8.4
July	5.2	0.004	6.8	6.4
August	4.3	0.002	6.7	9.8
September	4.5	0.02	6.9	9.0
October	7.4	0.005	6.9	6.7
November	5.0	<0.0005	6.5	6.2
December	3.6	<0.0005	6.7	5.4

3.3.2 Priority Substances

Over 500 priority substances were analyzed in the SPTP influent and effluent, including high-resolution substances on a quarterly basis. Approximately 49% of these were detected in effluent in at least 50% of the samples, and are listed in Table 3.4. These include most of the conventional variables (TSS, BOD, CBOD, nutrients, etc.), metals (total and dissolved), some organics and high-resolution parameters.

Influent and effluent concentrations for all priority substances detected are presented in Appendix B4. Table 3.4 presents annual mean, minimum and maximum effluent concentrations, and loadings of the substances detected in 50% or more of sampling events. The 1:153 estimated minimum initial dilution factor (Hayco, 2005) was applied to the maximum concentrations and the resulting concentrations were then compared to the ENV approved (BCMoE&CCS, 2019) and working (BCMoE&CCS, 2017) WQG, the CCME *Water Quality Guidelines for the Protection of Aquatic Life* (CCME, 2003), and the Health Canada *Guidelines for Canadian Recreational Water Quality* (Health Canada, 2012) to assess predicted environmental concentrations. It should be noted that not all substances (e.g., alkalinity, conductivity, hardness and pH) discharged to the marine receiving environment could be assessed by extrapolating effluent concentrations using predicted minimum initial dilution. These parameters are not suitable for effluent dilution calculations (e.g., pH of 7.0 cannot be divided by estimated minimum initial dilution of 1:153).

Note that in June 2020, BC ENV rescinded the 1988 approved microbiological indicator WQG (WGQ of 200 CFU/100mL) for fecal coliforms for primary contact recreation. Comparisons to the rescinded WQG have been retained for informational purposes only.

The maximum concentrations of most parameters were below guidelines in undiluted effluent (i.e., prior to discharge). Parameters not meeting WQG in undiluted effluent (maximum concentrations) included: enterococci, fecal coliforms, nitrogen, weak acid dissociable (WAD) cyanide, cadmium, copper, zinc and high resolution total polychlorinated biphenyls (Table 3.4); these exceedances have also been observed in previous years. All results were below WQG after application of the estimated minimum initial dilution factor (i.e., the maximum predicted concentration in the environment), with the exception of enterococci and fecal coliforms. Effluent concentrations have consistently been below WQG from 2000-2020, after estimated minimum initial dilution has been applied (CRD, 2002-2020). However, in some previous years, estimated environmental concentrations were predicted using mean effluent concentrations, rather than maximum concentrations, as has been done since 2010. CRD staff will continue to monitor effluent to determine whether exceedances of BC WQG are changing in frequency over time.

3.3.3 Toxicity Testing

Table 3.5 presents the results from the 2020 acute toxicity testing. There was no mortality observed for either acute toxicity test (Rainbow trout or *Daphnia*) in any of the samples (January, April, July and October). Table 3.6 presents the results from the 2020 chronic toxicity testing indicating a small impact on the EC25/LC25 Rainbow trout embryo viability and survival, and no impact on all other chronic tests when exposed to 100% effluent.

3.4 Overall Assessment

Overall, the 2020 wastewater monitoring results were generally consistent with previous years. The SPTP effluent met all flow, TSS, CBOD and unionized ammonia requirements stipulated under the provincial operational certificate and federal WSER, indicating that wastewaters, from an operational perspective, were as expected. In addition, because all priority substances met applicable WQG in the marine receiving environment (following the application of estimated minimum initial dilution factors), with the exception of bacteriological indicators, it is not likely that significant effects on aquatic life will occur as a result of the substances being discharged. The use of an estimated minimum initial dilution factor allows for a conservative (i.e., protective) estimate of potential effects because the predicted average initial factors are actually much higher in the marine receiving environments around the outfall (Hayco, 2005). Direct risk to human health and shellfish harvesting, as a result of the bacteriological indicator exceedances in effluent, was assessed via surface water and water column monitoring in the receiving environment (see Section 5.0).

Table 3.4 Annual Concentrations and Loadings of Frequently Detected Substances (≥50% of the time) in SPTP Effluent, 2020

Parameter Name	State Code	Unit Code	Detection Limit	% Freq	Average Concentration	Max	Min	Max Diluted (1:153)	Average Eff Load (kg/year)	Average Eff Load (tonne/year)	WQG
Conventionals											
Alkalinity - Bicarbonate	TOT	mg/L	1	100%	52	68	30	0.44	165	0.2	
Alkalinity - Total - Ph 4.5	TOT	mg/L	1	100%	42.67	56	25	0.37	n/a	n/a	
Biochemical Oxygen Demand	TOT	mg/L	2	100%	14.73	28	8.4	0.18	n/a	n/a	
Carbonaceous Biochemical Oxygen Demand	TOT	mg/L	2	100%	9.23	23	3.6	0.15	n/a	n/a	
Chemical Oxygen Demand	TOT	mg/L	10	100%	51.3	59	46	0.4	n/a	n/a	
Chloride	TOT	mg/L	1	100%	70	78	65	0.51	251	0.25	
Enterococci	TOT	CFU/100 mL	1	100%	167,800	1,300,000	1,200	8,497	532	1	35d, 70d
Fecal Coliforms	TOT	CFU/100 mL	1	100%	1,245,000	8,300,000	13,000	54,250	5,071	5	200[+]
Hardness (as CaCO3)	DIS	mg/L	0.5	100%	82	91	74.1	0.595	n/a	n/a	
Hardness (as CaCO3)	TOT	mg/L	0.5	100%	82	88	77.3	0.577	n/a	n/a	
Kjeldahl Nitrogen	TOT	mg/L	0.4	75%	2.24	5.95	0.2	0.039	7	0.01	
N - Nh3 (As N)	TOT	mg/L	0.3	75%	5.64	34	0.015	0.222	19	0.02	
N - No2 (As N)	TOT	mg/L	0.01	100%	0.86	3.37	0.0034	0.022	4	0.004	
N - No3 (As N)	TOT	mg/L	0.2	100%	12.9	15.9	9.98	0.104	47	0.05	
N - No3 + No2 (As N)	TOT	mg/L	0.2	100%	14.3	16.1	13.2	0.105	54	0	
Nitrogen as N	TOT	mg/L	0.4	100%	16.2	19.3	13.1	0.126	57	0.1	3.7a
P - Po4 - Ortho (As P)	TOT	mg/L	0.03	100%	2.6	3.5	1.5	0.0229	9	0.01	
P - Po4 - Total (As P)	TOT	µg/L	5	100%	2,881	4,620	900	30.2	10	0.01	
pH	TOT	pH	0	100%	7.18	n/a	n/a	n/a	25	0.03	7.0-8.7b.c
pH @ 15°C	TOT	pH	0	100%	6.56	n/a	n/a	n/a	24	0.02	
SAD Cyanide	TOT	mg/L	0.0005	100%	0.0019	0.0034	0.0011	0.00002	0.01	0.00001	
Specific Conductivity - 25°C	TOT	µS/cm	2	100%	488	520	450	3.4	1741	2	
Sulfide	TOT	mg/L	0.0018	88%	0.095	0.39	0.0018	0.0026	0.30	0.0003	
Sulphate	TOT	mg/L	1	100%	28	30	26	0.2	91	0.09	
Total Organic Carbon	TOT	mg/L	0.5	100%	16.5	22	12	0.144	58	0.06	
Total Suspended Solids	TOT	mg/L	1	100%	6.1	8.4	4	0.05	22	0.02	
WAD Cyanide	TOT	mg/L	0.0005	100%	0.001	0.002	0.001	0.00001	0.004	0.000004	0.001a
Metals Total											
Aluminum	TOT	µg/L	3	100%	41.6	184	16.5	1.2	0.14	0.0001	
Antimony	TOT	µg/L	0.02	100%	0.21	0.26	0.17	0.002	0.001	0.000001	
Arsenic	TOT	µg/L	0.02	100%	0.26	0.37	0.21	0.002	0.001	0.000001	12.5a,c
Barium	TOT	µg/L	0.05	100%	8.37	11.6	6.91	0.076	0.03	0.00003	
Cadmium	TOT	µg/L	0.005	100%	0.044	0.131	0.018	0.0009	0.0002	0.0000002	0.12b,c
Calcium	TOT	mg/L	0.25	100%	21.0	22.1	19.8	0.144	75	0.08	
Chromium	TOT	µg/L	0.1	100%	0.63	1.01	0.38	0.007	0.00	0.000002	56b,c
Cobalt	TOT	µg/L	0.01	100%	0.243	0.339	0.209	0.002	0.001	0.000001	

Table 3.4, continued

Parameter Name	State Code	Unit Code	Detection Limit	% Freq	Average Concentration	Max	Min	Max Diluted (1:153)	Average Eff Load (kg/year)	Average Eff Load (tonne/year)	WQG
Copper	TOT	µg/L	0.1	100%	26.7	80.1	14.4	0.524	0.10	0.0001	<2(lt), 3(st)a
Iron	TOT	µg/L	5	100%	109	322	39	2.1	0.39	0.0004	
Lead	TOT	µg/L	0.02	100%	0.61	1.38	0.314	0.009	0.002	0.000002	<2(lt),140(st)a
Magnesium	TOT	mg/L	0.25	100%	7.31	9.19	6.14	0.06	26	0.03	
Manganese	TOT	µg/L	0.1	100%	31.3	36.1	25	0.236	0.1	0.0001	100b
Methyl Mercury	TOT	ng/L	0.023	75%	0.047	0.068	0.032	0.0004	0.0000002	0.0000000002	
Molybdenum	TOT	µg/L	0.05	100%	1.13	1.38	0.785	0.009	0.004	0.000004	
Nickel	TOT	µg/L	0.1	100%	1.85	2.34	1.36	0.015	0.007	0.00001	8.3b
Potassium	TOT	mg/L	0.25	100%	13.9	16.6	9.78	0.108	50	0.05	
Selenium	TOT	µg/L	0.04	100%	0.187	0.371	0.113	0.002	0.001	0.000001	2a
Silver	TOT	µg/L	0.01	88%	0.023	0.082	0.01	0.0005	0.0001	0.0000001	1.5(lt), 3(st)a
Tin	TOT	µg/L	0.2	100%	0.468	1.22	0.24	0.008	0.002	0.000002	
Zinc	TOT	µg/L	1	100%	41.4	73.1	32.7	0.48	0.1	0.0001	10(lt), 55(st)a
Metals Dissolved											
Aluminum	DIS	µg/L	0.5	100%	13.7	28.2	10.5	0.184	0.05	0.00005	
Antimony	DIS	µg/L	0.02	100%	0.201	0.219	0.185	0.001	0.001	0.000001	
Arsenic	DIS	µg/L	0.02	100%	0.252	0.331	0.155	0.002	0.001	0.000001	
Barium	DIS	µg/L	0.02	100%	7.314	8.41	6.16	0.055	0.03	0.00003	
Cadmium	DIS	µg/L	0.005	100%	0.025	0.040	0.0103	0.00026	0.0001	0.0000001	
Calcium	DIS	mg/L	0.05	100%	20.8	22.2	18.2	0.1451	74	0.07	
Chromium	DIS	µg/L	0.1	100%	0.531	1	0.33	0.007	0.00	0.000002	
Cobalt	DIS	µg/L	0.005	100%	0.223	0.24	0.199	0.0016	0.001	0.000001	
Copper	DIS	µg/L	0.05	100%	18.3	49.5	10.5	0.324	0.07	0.0001	
Iron	DIS	µg/L	1	100%	66.6	114	30.2	0.75	0.25	0.0003	
Lead	DIS	µg/L	0.005	100%	0.425	0.606	0.222	0.004	0.002	0.000002	
Magnesium	DIS	mg/L	0.05	100%	7.28	8.86	6.2	0.058	26	0.03	
Manganese	DIS	µg/L	0.05	100%	24.5	30.6	18.8	0.2	0.1	0.0001	
Molybdenum	DIS	µg/L	0.05	100%	1.10	1.39	0.769	0.009	0.004	0.000004	
Nickel	DIS	µg/L	0.02	100%	1.74	2.13	1.3	0.014	0.006	0.00001	
Phosphorus	DIS	µg/L	2	100%	2,520	4,010	673	26.2	9	0.01	
Potassium	DIS	mg/L	0.05	100%	14.0	16.7	10.4	0.109	50	0.05	
Selenium	DIS	µg/L	0.04	100%	0.175	0.242	0.11	0.002	0.001	0.000001	
Tin	DIS	µg/L	0.2	100%	0.431	0.69	0.25	0.005	0.001	0.000001	
Zinc	DIS	µg/L	0.1	100%	34.4	39.9	31.3	0.261	0.1	0.0001	
Monobutyltin	TOT	µg/L	0.001	75%	0.009	0.015	0.001	0.0001	0.00003	0.00000003	
Monobutyltin Trichloride	TOT	µg/L	0.001	75%	0.015	0.024	0.001	0.0002	0.0001	0.0000001	

Table 3.4, continued

Parameter Name	State Code	Unit Code	Detection Limit	% Freq	Average Concentration	Max	Min	Max Diluted (1:153)	Average Eff Load (kg/year)	Average Eff Load (tonne/year)	WQG
PAH											
1,4-dioxane	TOT	µg/L	0.1	75%	0.38	0.45	0.33	0.003	0.001	0.000001	
Naphthalene	TOT	µg/L	0.01	75%	0.029	0.072	0.01	0.0005	0.0001	0.0000001	
Phenanthrene	TOT	µg/L	0.01	100%	0.019	0.025	0.014	0.0002	0.0001	0.0000001	
Total Lmw-PAHs	TOT	µg/L	0.01	75%	0.055	0.092	0.035	0.0006	0.0002	0.0000002	
Total PAH	TOT	µg/L	0.02	100%	0.063	0.092	0.042	0.0006	0.0002	0.0000002	
Trichloromethane	TOT	µg/L	1	100%	1.2	1.3	1.1	0.01	0.004	0.000004	
High Resolution Parameters											
PAH											
1-Methylphenanthrene	TOT	ng/L	0.228	100%	1.17	1.44	0.77	0.009	0.000004	0.000000004	
2-Methylnaphthalene	TOT	ng/L	0.496	100%	2.72	3.75	1.59	0.025	0.000009	0.000000009	
Acenaphthene	TOT	ng/L	0.464	100%	10.00	14.8	4.25	0.097	0.00003	0.00000003	6,000a
Acenaphthylene	TOT	ng/L	0.439	100%	0.519	0.747	0.301	0.005	0.000002	0.000000002	
Anthracene	TOT	ng/L	1.48	75%	0.24	0.33	0.13	0	0.000001	0.000000001	
Benzo(A)Anthracene	TOT	ng/L	0.144	100%	0.546	0.968	0.245	0.006	0.000002	0.000000002	
Benzo(A)Pyrene	TOT	ng/L	0.344	67%	0.474	1.11	0.142	0.007	0.000002	0.000000002	10a
Benzo(B)Fluoranthene	TOT	ng/L	0.241	100%	0.462	0.936	0.14	0.006	0.000001	0.000000001	
Benzo(E)Pyrene	TOT	ng/L	0.327	100%	0.406	0.742	0.19	0.005	0.000001	0.000000001	
Benzo(G,H,I)Perylene	TOT	ng/L	0.42	100%	0.507	0.931	0.288	0.006	0.000002	0.000000002	
Benzo[J,K]Fluoranthenes	TOT	ng/L	0.245	75%	0.328	0.857	0.117	0.006	0.000001	0.000000001	
Chrysene	TOT	ng/L	0.143	100%	0.935	1.5	0.569	0.01	0.000003	0.000000003	100a
Dibenzothiophene	TOT	ng/L	0.235	100%	1.82	2.34	0.681	0.015	0.000006	0.00000001	
Fluoranthene	TOT	ng/L	0.387	100%	7.96	10.9	4.56	0.071	0.00003	0.00000003	
Fluorene	TOT	ng/L	0.263	100%	4.64	6.45	1.81	0.042	0.00002	0.00000002	12,000a
Indeno(1,2,3-C,D)Pyrene	TOT	ng/L	0.45	67%	0.553	1.09	0.195	0.007	0.000002	0.000000002	
Naphthalene	TOT	ng/L	0.587	100%	28.3	90.1	3.96	0.589	0.00009	0.00000009	1,000a
Phenanthrene	TOT	ng/L	1.47	100%	16.5	22.8	7.63	0.15	0.00006	0.00000006	
Pyrene	TOT	ng/L	0.376	100%	4.72	6.21	3.05	0.041	0.00002	0.00000002	
PBDE											
PBDE 15	TOT	pg/L	1.43	75%	2.13	2.87	1.36	0.02	0.00000001	0.0000000000	
PBDE 17/25	TOT	pg/L	1.43	100%	21.6	27.4	15.1	0.18	0.0000001	0.0000000001	
PBDE 28/33	TOT	pg/L	1.43	100%	46.7	65.2	32.1	0.43	0.0000002	0.0000000002	
PBDE 37	TOT	pg/L	1.43	100%	6.44	11.6	2.03	0.08	0.00000002	0.0000000000	
PBDE 47	TOT	pg/L	1.43	100%	2,283	3,730	1,490	24.38	0.000008	0.000000008	
PBDE 49	TOT	pg/L	1.43	100%	52.6	86.8	34.5	0.57	0.0000002	0.0000000002	
PBDE 51	TOT	pg/L	1.43	100%	6.43	10.5	3.89	0.07	0.00000002	0.00000000002	
PBDE 66	TOT	pg/L	1.43	100%	39.1	59.1	27.3	0.39	0.0000001	0.0000000001	
PBDE 71	TOT	pg/L	1.43	100%	7.26	9.36	5.36	0.06	0.00000003	0.00000000003	

Table 3.4, continued

Parameter Name	State Code	Unit Code	Detection Limit	% Freq	Average Concentration	Max	Min	Max Diluted (1:153)	Average Eff Load (kg/year)	Average Eff Load (tonne/year)	WQG
PBDE 75	TOT	pg/L	1.43	100%	3.06	4.44	2.28	0.03	0.00000001	0.00000000001	
PBDE 79	TOT	pg/L	1.43	100%	44.4	58.3	31.7	0.38	0.0000002	0.0000000002	
PBDE 85	TOT	pg/L	9.95	100%	92.7	173	55.1	1.13	0.0000003	0.0000000003	
PBDE 99	TOT	pg/L	6.21	100%	2,323	4,420	1,190	28.9	0.000008	0.000000008	
PBDE 100	TOT	pg/L	5.73	100%	479	908	251	5.93	0.000002	0.000000002	
PBDE 119/120	TOT	pg/L	10.3	100%	8	13.8	3	0.1	0.00000003	0.00000000003	
PBDE 138/166	TOT	pg/L	3.2	100%	21.13	41.5	13.6	0.27	0.0000001	0.0000000001	
PBDE 140	TOT	pg/L	2.45	100%	6.7	13.1	4.25	0.09	0.00000002	0.00000000002	
PBDE 153	TOT	pg/L	2.56	100%	196	392	102	2.56	0.000001	0.000000001	
PBDE 154	TOT	pg/L	2.61	100%	150	298	79	1.95	0.000001	0.000000001	
PBDE 183	TOT	pg/L	3.95	100%	25.9	51.5	14.7	0.34	0.0000001	0.0000000001	
PBDE 203	TOT	pg/L	25.1	100%	32.4	90.7	9.6	0.6	0.0000001	0.0000000001	
PBDE 206	TOT	pg/L	1.43	100%	249	712	74.8	4.65	0.000001	0.000000001	
PBDE 207	TOT	pg/L	1.43	100%	382	1,160	95.8	7.58	0.000001	0.000000001	
PBDE 208	TOT	pg/L	1.43	100%	242	706	61.8	4.61	0.000001	0.000000001	
PBDE 209	TOT	pg/L	31.5	100%	2,861	7,850	961	51.3	0.000009	0.000000009	
PBDE 155	TOT	pg/L	1.86	100%	11.8	24.4	5.34	0.16	0.00000004	0.00000000004	
PCB											
PCB 1	TOT	pg/L	0.717	100%	3.44	4.49	2.44	0.029	0.00000001	0.00000000001	
PCB 2	TOT	pg/L	0.717	100%	1.62	1.77	1.44	0.012	0.00000001	0.00000000001	
PCB 3	TOT	pg/L	0.717	100%	3.44	4	2.79	0.026	0.00000001	0.00000000001	
PCB 4	TOT	pg/L	1.22	100%	5.37	6.35	4.94	0.04	0.00000002	0.00000000002	
PCB 6	TOT	pg/L	0.717	100%	3.14	3.39	2.74	0.022	0.00000001	0.00000000001	
PCB 7	TOT	pg/L	0.72	100%	9.28	26.1	1.03	0.171	0.00000004	0.00000000004	
PCB 8	TOT	pg/L	0.717	100%	7.33	7.99	6.24	0.052	0.00000003	0.00000000003	
PCB 9	TOT	pg/L	0.717	75%	1.19	1.63	0.877	0.011	0.000000004	0.000000000004	
PCB 11	TOT	pg/L	0.782	100%	65.9	101	45.8	0.66	0.0000002	0.0000000002	
PCB 12/13	TOT	pg/L	0.784	75%	2.27	2.87	1.85	0.019	0.00000001	0.00000000001	
PCB 15	TOT	pg/L	0.723	100%	6.23	8.06	4.84	0.053	0.00000002	0.00000000002	
PCB 16	TOT	pg/L	0.717	100%	6.1	7.6	3.86	0.05	0.00000002	0.00000000002	
PCB 17	TOT	pg/L	0.717	100%	5.59	6.2	5.06	0.041	0.00000002	0.00000000002	
PCB 18/30	TOT	pg/L	0.717	100%	12.43	14.3	10.5	0.093	0.00000004	0.00000000004	
PCB 19	TOT	pg/L	0.717	100%	1.67	2.63	0.958	0.017	0.00000001	0.00000000001	
PCB 20/28	TOT	pg/L	0.717	100%	14.58	16.7	12.2	0.109	0.00000005	0.00000000005	
PCB 21/33	TOT	pg/L	0.717	100%	6.70	7.99	5.22	0.052	0.00000002	0.00000000002	
PCB 22	TOT	pg/L	0.717	100%	6.16	6.94	5.42	0.045	0.00000002	0.00000000002	
PCB 25	TOT	pg/L	0.717	100%	1.06	1.3	0.772	0.008	0.000000004	0.00000000000	
PCB 26/29	TOT	pg/L	0.717	100%	2.59	2.64	2.48	0.017	0.00000001	0.00000000001	

Table 3.4, continued

Parameter Name	State Code	Unit Code	Detection Limit	% Freq	Average Concentration	Max	Min	Max Diluted (1:153)	Average Eff Load (kg/year)	Average Eff Load (tonne/year)	WQG
PCB 31	TOT	pg/L	0.717	100%	13.63	14.9	12.3	0.097	0.00000005	0.00000000005	
PCB 32	TOT	pg/L	0.717	100%	3.50	4.08	2.74	0.027	0.00000001	0.00000000001	
PCB 35	TOT	pg/L	0.717	100%	1.61	2.86	1.07	0.019	0.00000001	0.00000000001	
PCB 37	TOT	pg/L	0.717	100%	3.85	4.54	2.8	0.03	0.00000001	0.00000000001	
PCB 40/41/71	TOT	pg/L	0.717	100%	7.30	9.59	5.23	0.063	0.00000003	0.00000000003	
PCB 42	TOT	pg/L	0.717	100%	3.2	4.11	2.07	0.027	0.00000001	0.00000000001	
PCB 44/47/65	TOT	pg/L	0.717	100%	31.5	39.8	17.1	0.26	0.0000001	0.0000000001	
PCB 45/51	TOT	pg/L	0.717	100%	5.50	8.53	3.63	0.056	0.00000002	0.00000000002	
PCB 46	TOT	pg/L	0.717	75%	0.991	1.13	0.732	0.007	0.000000004	0.00000000000	
PCB 48	TOT	pg/L	0.717	100%	3.10	3.75	2.48	0.025	0.00000001	0.00000000001	
PCB 49/69	TOT	pg/L	0.717	100%	8.44	10.2	6.39	0.067	0.00000003	0.00000000003	
PCB 50/53	TOT	pg/L	0.717	100%	2.06	2.5	1.42	0.016	0.00000001	0.00000000001	
PCB 52	TOT	pg/L	0.717	100%	22.9	27.5	18.3	0.18	0.00000008	0.0000000001	
PCB 56	TOT	pg/L	1.18	100%	4.3	6.2	3.09	0.04	0.00000001	0.00000000001	
PCB 59/62/75	TOT	pg/L	0.717	75%	1.09	1.65	0.67	0.011	0.000000004	0.000000000004	
PCB 60	TOT	pg/L	1.15	100%	2.48	3.56	1.91	0.02	0.000000009	0.00000000001	
PCB 61/70/74/76	TOT	pg/L	1.09	100%	21.7	29.7	16.9	0.19	0.00000008	0.0000000001	
PCB 64	TOT	pg/L	0.717	100%	5.98	7.68	4.49	0.05	0.00000002	0.00000000002	
PCB 66	TOT	pg/L	1.07	100%	8.02	10.9	6.4	0.07	0.00000003	0.00000000003	
PCB 68	TOT	pg/L	1.06	100%	2.17	2.84	1.24	0.02	0.000000007	0.00000000001	
PCB 83/99	TOT	pg/L	1.38	100%	9.75	16.1	6.64	0.11	0.00000003	0.00000000003	
PCB 84	TOT	pg/L	1.46	100%	5.31	8.25	3.67	0.05	0.00000002	0.00000000002	
PCB 85/116/117	TOT	pg/L	1.11	100%	3.08	4	2.26	0.03	0.00000001	0.00000000001	
PCB 86/87/97/108/119/125	TOT	pg/L	1.14	100%	13.93	19	11.4	0.12	0.00000005	0.00000000005	
PCB 88/91	TOT	pg/L	1.32	100%	2.43	3.6	1.5	0.02	0.000000009	0.00000000001	
PCB 90/101/113	TOT	pg/L	1.16	100%	20	29.9	16.1	0.2	0.00000007	0.0000000001	
PCB 92	TOT	pg/L	1.32	100%	3.36	4.89	2.38	0.03	0.00000001	0.00000000001	
PCB 93/95/98/100/102	TOT	pg/L	1.28	100%	18.3	27.5	13.8	0.18	0.00000006	0.0000000001	
PCB 105	TOT	pg/L	0.717	100%	5.12	6.38	4.11	0.042	0.00000002	0.00000000002	900a
PCB 109	TOT	pg/L	0.717	75%	0.74	0.83	0.67	0.005	0.000000003	0.000000000003	
PCB 110/115	TOT	pg/L	0.989	100%	17.7	25.1	13.8	0.164	0.0000001	0.0000000001	
PCB 118	TOT	pg/L	0.717	100%	13.1	16.4	11.5	0.107	0.00000005	0.00000000005	
PCB 123	TOT	pg/L	0.717	75%	0.73	0.8	0.69	0.005	0.000000003	0.000000000003	
PCB 128/166	TOT	pg/L	0.717	100%	1.71	1.95	1.13	0.013	0.000000006	0.00000000001	
PCB 129/138/160/163	TOT	pg/L	0.717	100%	14.5	20.4	12.2	0.133	0.00000005	0.00000000005	
PCB 130	TOT	pg/L	0.717	75%	0.84	1.03	0.67	0.007	0.000000003	0.000000000003	
PCB 132	TOT	pg/L	0.717	100%	4.29	5.7	3.19	0.037	0.00000001	0.00000000001	
PCB 135/151/154	TOT	pg/L	0.717	100%	5.35	9.44	3.54	0.062	0.00000002	0.00000000002	

Table 3.4, continued

Parameter Name	State Code	Unit Code	Detection Limit	% Freq	Average Concentration	Max	Min	Max Diluted (1:153)	Average Eff Load (kg/year)	Average Eff Load (tonne/year)	WQG
PCB 136	TOT	pg/L	0.717	100%	2.16	3.71	1.41	0.024	0.000000007	0.00000000001	
PCB 137	TOT	pg/L	0.717	75%	0.90	1.37	0.68	0.009	0.000000003	0.000000000003	
PCB 141	TOT	pg/L	0.717	100%	2.43	3.62	1.93	0.024	0.000000009	0.00000000001	
PCB 144	TOT	pg/L	0.717	75%	1.03	1.57	0.67	0.01	0.000000004	0.000000000004	
PCB 146	TOT	pg/L	0.717	100%	2.27	3.56	1.77	0.023	0.000000008	0.00000000001	
PCB 147/149	TOT	pg/L	0.717	100%	11.33	19.2	8.11	0.125	0.00000004	0.00000000004	
PCB 153/168	TOT	pg/L	0.717	100%	14.83	21.3	12.1	0.139	0.00000005	0.00000000005	
PCB 155	TOT	pg/L	0.717	100%	1.91	2.85	1.3	0.019	0.000000007	0.00000000001	
PCB 156/157	TOT	pg/L	0.717	100%	2.38	3.12	1.76	0.02	0.000000008	0.00000000001	
PCB 158	TOT	pg/L	0.717	100%	1.38	1.67	1.21	0.011	0.000000005	0.000000000005	
PCB 164	TOT	pg/L	0.717	75%	0.87	1.27	0.68	0.008	0.000000003	0.000000000003	
PCB 170	TOT	pg/L	0.717	100%	3.23	5.78	1.92	0.038	0.00000001	0.00000000001	
PCB 171/173	TOT	pg/L	0.717	75%	1.13	1.44	0.67	0.009	0.000000004	0.000000000004	
PCB 174	TOT	pg/L	0.717	100%	3.06	4.13	2.15	0.027	0.00000001	0.00000000001	
PCB 177	TOT	pg/L	0.717	100%	1.81	2.98	0.97	0.019	0.00000001	0.00000000001	
PCB 179	TOT	pg/L	0.717	100%	1.56	2.83	0.83	0.018	0.00000001	0.00000000001	
PCB 180/193	TOT	pg/L	0.717	100%	10.6	16.4	7.37	0.107	0.00000004	0.00000000004	
PCB 183/185	TOT	pg/L	0.717	100%	2.14	3.22	0.80	0.021	0.00000001	0.00000000001	
PCB 184	TOT	pg/L	0.717	100%	4.02	5.84	2.1	0.038	0.00000001	0.00000000001	
PCB 187	TOT	pg/L	0.717	100%	5.51	7.83	3.12	0.051	0.00000002	0.00000000002	
PCB 194	TOT	pg/L	0.717	100%	2.06	3.29	1.35	0.022	0.00000001	0.00000000001	
PCB 196	TOT	pg/L	0.717	100%	0.97	1.51	0.689	0.01	0.000000003	0.000000000003	
PCB 198/199	TOT	pg/L	0.717	100%	2.81	5.32	1.29	0.035	0.00000001	0.00000000001	
PCB 202	TOT	pg/L	0.717	100%	0.86	1.03	0.759	0.007	0.000000003	0.000000000003	
PCB 203	TOT	pg/L	0.717	75%	1.81	3.79	0.68	0.025	0.00000001	0.00000000001	
PCB 209	TOT	pg/L	0.717	100%	2.8	4.59	1.67	0.03	0.00000001	0.00000000001	
PCB TEQ 3	TOT	pg/L	1	100%	0.003	0.004	0.002	0.00003	0.00000000001	0.00000000000001	
PCB TEQ 4	TOT	pg/L	1	100%	0.04	0.04	0.04	0.0003	0.0000000001	0.0000000000001	
PCBs Total	TOT	pg/L	1	100%	500	683	406	4.46	0.0000018	0.000000002	100a
Total Dichloro Biphenyls	TOT	pg/L	1	100%	99.2	126	82.8	0.82	0.0000004	0.0000000004	
Total Heptachloro Biphenyls	TOT	pg/L	1	100%	22.1	42.5	7.45	0.28	0.0000001	0.0000000001	
Total Hexachloro Biphenyls	TOT	pg/L	1	100%	62.9	97.7	46	0.64	0.0000002	0.0000000002	
Total Monochloro Biphenyls	TOT	pg/L	1	100%	6.5	9.15	4.1	0.06	0.00000002	0.00000000002	
Total Nonachloro Biphenyls	TOT	pg/L	1	100%	4.24	4.24	4.24	0.03	0.00000001	0.00000000001	
Total Octachloro Biphenyls	TOT	pg/L	1	100%	3.98	6.32	1.35	0.04	0.00000002	0.00000000002	
Total Pentachloro Biphenyls	TOT	pg/L	1	100%	106	158	74.4	1.03	0.0000004	0.0000000004	
Total Tetrachloro Biphenyls	TOT	pg/L	1	100%	123	154	82.3	1.01	0.0000004	0.0000000004	
Total Trichloro Biphenyls	TOT	pg/L	1	100%	75.4	84.6	65.7	0.55	0.0000003	0.0000000003	

Table 3.4, continued

Parameter Name	State Code	Unit Code	Detection Limit	% Freq	Average Concentration	Max	Min	Max Diluted (1:153)	Average Eff Load (kg/year)	Average Eff Load (tonne/year)	WQG
Nonylphenols											
4-Nonylphenol Diethoxylates	TOT	ng/L	36.2	75%	196	441	15.2	2.9	0.0007	0.000001	700b
4-Nonylphenol Monoethoxylates	TOT	ng/L	25.2	100%	380	462	212	3	0.001	0.000001	700b
Np	TOT	ng/L	20.5	100%	142	194	77.1	1.3	0.0005	0.000001	700b
Pesticides											
1,2-dichlorobenzene	TOT	ng/L	1	100%	0.83	1.49	0.35	0.01	0.000003	0.000000003	42,000b,c
1,3-dichlorobenzene	TOT	ng/L	1	100%	3.4	6.25	0.3	0.04	0.00001	0.00000001	
1,4-dichlorobenzene	TOT	ng/L	1	100%	63.4	122	13.8	0.8	0.0002	0.0000002	
2,3,5-trimethylnaphthalene	TOT	ng/L	0.551	100%	2.2	2.99	1.26	0.02	0.000007	0.00000001	
2,4-DDD	TOT	ng/L	0.0456	75%	0.150	0.256	0.049	0.0017	0.0000005	0.000000001	
2,6-dimethylnaphthalene	TOT	ng/L	0.933	100%	1.10	1.59	0.636	0.01	0.000004	0.000000004	
4,4-DDE	TOT	ng/L	0.0456	75%	0.123	0.235	0.063	0.0015	0.0000005	0.0000000005	
Beta-Endosulfan	TOT	ng/L	0.114	75%	0.299	0.571	0.106	0.004	0.000001	0.000000001	1.6b
Dieldrin	TOT	ng/L	0.114	100%	0.173	0.232	0.121	0.002	0.000001	0.000000001	
Hexachlorobenzene	TOT	ng/L	0.0228	100%	0.076	0.138	0.039	0.0009	0.0000003	0.0000000003	
Hexachlorobutadiene	TOT	ng/L	1	100%	0.31	0.55	0.19	0.004	0.000001	0.000000001	
Pentachlorobenzene	TOT	ng/L	1	100%	0.06	0.09	0.03	0.001	0.0000002	0.0000000002	
PFBA	TOT	ng/L	1.55	75%	278	1,080	3.05	7.06	0.0008	0.000001	
PFBS	TOT	ng/L	0.388	100%	3.27	4.74	1.7	0.031	0.00001	0.00000001	
PFDA	TOT	ng/L	0.388	100%	1.20	1.62	0.788	0.011	0.000004	0.000000004	
PFHpA	TOT	ng/L	0.388	100%	17.4	48.1	2.28	0.314	0.00005	0.0000001	
PFHxA	TOT	ng/L	0.388	100%	50.6	167	7.76	1.092	0.0002	0.0000002	
PFHxS	TOT	ng/L	0.388	100%	4.31	5	3.4	0.033	0.00002	0.00000002	
PFNA	TOT	ng/L	0.388	75%	1.50	3.22	0.762	0.021	0.000005	0.00000001	
PFOA	TOT	ng/L	0.388	100%	8.57	15.4	5.47	0.101	0.000030	0.00000003	
PFOS	TOT	ng/L	0.388	100%	3.94	5.44	2.16	0.036	0.00001	0.00000001	
PFPeA	TOT	ng/L	0.776	100%	132	459	12.5	3	0.0004	0.0000004	
PPCP											
2-Hydroxy-Ibuprofen	TOT	ng/L	19.9	100%	1,899	5,590	94.6	36.5	0.006	0.00001	
Bisphenol A	TOT	ng/L	29.9	100%	69.5	103	41.7	0.7	0.0002	0.0000002	900b
Furosemide	TOT	ng/L	19.9	100%	1,793	2,260	1,210	14.8	0.006	0.00001	
Gemfibrozil	TOT	ng/L	3.98	100%	55.5	103	16.9	0.67	0.0002	0.0000002	
Glyburide	TOT	ng/L	3.98	100%	3.17	4.24	1.76	0.03	0.00001	0.00000001	
Hydrochlorothiazide	TOT	ng/L	43.8	100%	2,588	2,970	2,000	19.4	0.009	0.00001	
Ibuprofen	TOT	ng/L	19.9	100%	739	2610	5	17.1	0.002	0.000002	
Naproxen	TOT	ng/L	9.95	100%	1,022	2,920	115	19.08	0.003	0.000003	

Table 3.4, continued

Parameter Name	State Code	Unit Code	Detection Limit	% Freq	Average Concentration	Max	Min	Max Diluted (1:153)	Average Eff Load (kg/year)	Average Eff Load (tonne/year)	WQG
Triclocarban	TOT	ng/L	1.99	100%	1.5	2.82	0.81	0.02	0.00001	0.00000001	
Triclosan	TOT	ng/L	29.9	100%	44.3	55.5	31.4	0.4	0.0002	0.0000002	
Warfarin	TOT	ng/L	1.99	100%	8.63	10.1	8.04	0.07	0.00003	0.00000003	

Notes:

[1] As determined by Hayco (2005); n/a=not applicable; ND=not detected; --- parameter does not lend itself to calculating loading, e.g. pH

a=BC Approved Water Quality Guideline; b=BC Working Water Quality Guideline; c=CCME Water Quality Guideline for the protection of Aquatic Life; d=Health Canada Guidelines for Recreational Water Quality

Shaded cells indicate an exceedance of one or more of the guidelines

*concentrations are incorporated into compliance monitoring mean values presented in Table 3.2 and Table 3.3. ^loadings for NH_3 and TSS were calculated using available daily/weekly data rather than quarterly data only, in order to increase accuracy

+In June 2020, BC ENV rescinded the 1988 approved microbiological indicator WQG for fecal coliforms for primary contact recreation. Comparisons to the rescinded WQG have been retained for informational purposes only

Shaded cells indicate an exceedance of one or more WQG. Note that this table does not include the results of the compliance and treatment plant performance monitoring, as discussed in Section 3.3.1 and presented in Table 3.2.

Table 3.5 2020 Acute Toxicity Results

Wastewater Concentration	Rainbow trout LC50 96-hour (Onchorhynchus mykiss)				Daphnia magna LC50 48-hour			
%vol/vol	mortality # (96-hr)				mortality # (48-hr)			
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct
0	0	0	0	0	0	0	0	0
6.25	0	0	0	0	0	0	0	0
12.5	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0

Table 3.6 2020 Chronic Toxicity Results

Test	Endpoint (%v/v)	
	EC50 or IC50	EC25/LC25
Rainbow Trout (*Onchorhynchus mykiss*) Embryo/Alevin Test		
• embryo survival	>100	78.1
• embryo viability	>100	70.3
7-day Topsmelt (*Atherinops affinis*) survival and growth test		
• survival	>100	---
• growth	>100	>100
6-day *Ceriodaphnia* test		
• survival	>100	---
• reproduction	>100	>100
Echinoid fertilization (*Strongylocentrotus purpuratus*)	>100	>100

Notes:
*EC50 = observable effect in 50% of the test organisms, EC25 = observable effect in 25% of the test organisms, LC50= lethal effect in 50% of the test organisms
-- not tested

4.0 BIOSOLIDS MONITORING

4.1 Introduction

In the SPTP LWMP, the CRD and its partner municipalities on the Saanich Peninsula made a commitment to implement a biosolids management plan, based on the following specific commitments:

- Pursue an effective and diversified program for the beneficial use of Class A biosolids that incorporates an economically viable and long-term solution.
- Mitigate nuisances associated with the production and application of biosolids, including odour, noise, truck traffic and dust.
- Manage biosolids to ensure that detrimental effects to public health and the environment are avoided.

The SPTP can produce Class A biosolids, in accordance with the pathogen reduction and vector attraction reduction processes in the ENV (BC MoE, 2002) *Organic Matter Recycling Regulations* (BC OMRR). These regulations define process and quality criteria for biosolids production and establish land application and distribution requirements. The regulations are set to protect human and environmental health.

In 2008, the CRD developed the PenGrow program to produce a soil enhancer product from the Class A biosolids. Biosolids were an end product of the sewage treatment process and were produced when solids (i.e., sludge) were treated. The product was cured and stored at the CRD's Hartland Landfill and the PenGrow program was intermittently in production until early 2011.

In July 2011, the PenGrow program was put on hold following CRD Board motions that "[ended] the production, storage and distribution of biosolids for land application at all CRD facilities and parks", including Hartland Landfill, and indicated the region "does not support the application of biosolids on farmland in the CRD under any circumstances." CRD staff are currently investigating a number of longer-term beneficial use options for the biosolids and sludge. Until alternative non-land application markets for the biosolids can be developed and implemented, no more PenGrow will be produced and all sludge will be disposed of as controlled waste at the Hartland Landfill. The SPTP generated 3,720 tonnes of dewatered sludge in 2020.

Detailed statistical trend analyses are undertaken every three to five years to quantitatively assess temporal trends in concentrations and loadings of wastewater parameters. In 2012, Golder Associates (Golder, 2013) updated the previous trend assessment to include the 2009-2011 results, expanding the total SPTP dataset from 2000-2011. Results of this assessment were presented in the 2011 annual report (CRD, 2012). The most recent trend assessment was completed in 2017 (Golder, 2019) and included the next three years of biosolids data (2012-2015). Results were included in the 2016 report (CRD, 2017).

Starting in 2013, the CRD commenced monitoring the sludge in order to help inform the RSCP on the partitioning behaviour of some wastewater contaminants between the solid and liquid phases of the treatment processes. Metals were of primary interest, as they fall under the RSCP's regulatory regime.

4.2 Methods

Sludge was produced at the SPTP and analyzed for similar parameters as previous years (Table 4.1). In 2020, sludge was collected monthly, with replicate samples collected in February and September.

4.3 Results and Discussion

In 2020, 40 parameters were monitored in the SPTP sludge. For those parameters that are BC OMRR regulated, all results were far below the Class A biosolids limit (Table 4.1), similar to previous years.

4.4 Overall Assessment

No biosolids were produced at the SPTP in 2020. It is unknown if or when production will recommence. However, the sludge monitoring data collected to inform the RSCP showed that all OMRR regulated parameters continue to be far below Class A biosolids limits. The sludge will continue to be disposed of as controlled waste at the Hartland Landfill until their long term use is determined.

Table 4.1 SPTP Sludge Monitoring, 2020

Parameter	Units	Class A Biosolids Limit (mg/kg)	Jan	Feb FR1	Feb FR2	Mar	Apr	May	Jun	Jul	Aug	Sep FR1	Sep FR2	Oct	Nov	Dec	Average
Regulated Parameters																	
Arsenic	mg/kg dry	75	1.02	1.44	1.49	0.84	0.58	0.6	0.69	0.8	1.03	0.55	0.55	0.52	0.64	1.02	0.84
Cadmium	mg/kg dry	20	0.79	0.916	1.02	0.858	0.82	0.916	0.995	0.797	0.729	0.701	0.688	0.606	0.985	0.734	0.83
Chromium	mg/kg dry	1,060	8	11.7	12.2	6	5.8	5	7.2	8.1	7.1	5	5	4.3	5.7	7	7.01
Cobalt	mg/kg dry	151	1.16	1.5	1.52	0.98	0.68	0.78	0.73	0.8	0.97	0.66	0.62	0.64	0.92	1.03	0.93
Copper	mg/kg dry	757	289	328	329	312	360	301	347	426	530	318	305	288	321	334	342
Lead	mg/kg dry	505	8.05	14.4	14.5	7.72	7.73	9.74	8.11	10.1	11.8	10	8.72	6.45	7.58	9.7	9.61
Mercury	mg/kg dry	5	0.253	0.321	0.38	0.315	0.197	0.163	0.237	0.24	0.233	0.344	0.261	0.211	0.194	0.194	0.25
Molybdenum	mg/kg dry	20	3.43	3.99	4.18	3.21	2.73	2.58	3.27	3.82	4.87	3.73	3.46	2.81	3.76	3.97	3.56
Nickel	mg/kg dry	181	9.72	8.78	9.41	5.24	5.25	4.65	5.59	5.79	6.33	4.87	11.3	3.79	5.08	6.69	6.61
Selenium	mg/kg dry	14	1.77	1.79	1.86	1.66	1.54	1.45	1.71	1.92	2.13	1.41	1.34	1.22	1.43	1.88	1.65
Thallium	mg/kg dry	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	mg/kg dry	656	5.2	8.3	8.5	3.4	2.7	2	2.2	2.4	1.7	1	1.1	1.4	2.5	5.6	3.43
Zinc	mg/kg dry	1,868	243	250	246	201	266	273	351	347	421	323	312	246	274	233	285
Unregulated Parameters																	
Total dry weight	% wet	n/a	22.3	21.4	20.6	23	37.6	26	28.2	23.7	19.9	34.4	35.7	21.9	28.4	22.6	26.1
pH	pH	n/a	5.72	5.73	6.14	5.62	6.34	5.57	5.47	5.65	5.43	5.39	5.31	5.64	5.78	5.66	5.68
WAD Cyanide	mg/kg dry	n/a	2.24	2.34	2.43	21.8	1.33	1.93	1.78	2.11	2.52	1.46	1.4	2.28	1.76	2.21	3.40
Aluminum	mg/kg dry	n/a	2,030	2,920	3,100	1,350	910	752	951	977	987	691	660	766	1,190	1,970	1,375.29
Antimony	mg/kg dry	n/a	0.6	0.71	0.75	0.65	0.53	1.17	0.65	0.69	1.66	0.58	0.58	0.46	0.54	0.67	0.73
Barium	mg/kg dry	n/a	41.1	48.3	50.7	43.4	25.3	39.8	44	45.1	48.4	40.2	40.2	28.6	45.6	47.6	42.02
Beryllium	mg/kg dry	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	mg/kg dry	n/a	14.4	12.3	14.7	13	11.5	11.8	13.6	15.2	19.4	12	11.7	11.5	12.4	12.8	13.3
Boron	mg/kg dry	n/a	12.2	11.3	11.6	10.6	8.1	6.7	5.3	9.4	25.1	10.1	9.7	12.1	30.1	49	15.1
Calcium	mg/kg dry	n/a	6,320	7,010	7,110	5,760	5,390	5,710	5,720	5,540	6,360	5,090	4,740	4,430	5,270	5,340	5,699
Iron	mg/kg dry	n/a	2,870	4,230	4,470	2,200	1,650	1,300	1,630	1,930	2,140	1,410	1,350	1,600	2,470	2,700	2,282
Lithium	mg/kg dry	n/a	1.03	1.68	1.74	0.78	0.42	0.37	0.4	0.41	0.35	0.25	0.27	0.39	0.66	1.16	0.71
Magnesium	mg/kg dry	n/a	3,170	3,070	3,130	2,060	1,490	1,520	1,720	3,370	4,250	2,910	2,140	2,780	2,300	2,660	2,612
Manganese	mg/kg dry	n/a	66.5	86.3	93.8	58.4	37	43.8	40.4	46	47.1	33.7	31.9	37.6	60.8	59.8	53.1
Phosphorus	mg/kg dry	n/a	13,600	12,700	13,100	9,410	7,560	8,040	8,640	14,300	17,300	10,300	9,570	10,100	10,100	11,100	11,130
Potassium	mg/kg dry	n/a	4,060	3,850	4,170	2,570	2,630	2,250	2,520	4,190	4,700	3,270	2,920	3,100	2,580	3,200	3,286
Silver	mg/kg dry	n/a	1.07	0.92	1.04	0.86	0.9	1.03	1.06	1.01	1.03	0.84	0.78	0.67	0.99	0.85	0.93

Table 4.1, continued

Parameter	Units	Class A Biosolids Limit (mg/kg)	Jan	Feb FR1	Feb FR2	Mar	Apr	May	Jun	Jul	Aug	Sep FR1	Sep FR2	Oct	Nov	Dec	Average
Sodium	mg/kg dry	n/a	245	274	295	266	241	279	279	324	429	253	237	211	262	264	276
Strontium	mg/kg dry	n/a	20.9	26.4	27.1	19	13.3	25.7	27.5	26.9	32.5	17.7	17.1	17.3	16.9	17.4	21.8
Sulfur	mg/kg dry	n/a	4,490	4,910	5,010	4,570	4,150	3,710	3,510	4,660	5,040	3,680	3,420	3,140	3,860	4,590	4,196
Tellurium	mg/kg dry	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thorium	mg/kg dry	n/a	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg dry	n/a	7.34	7.3	8.5	8.26	7.5	7.45	7.99	8.63	9.5	6.35	6.33	5.55	6.77	8.25	7.55
Titanium	mg/kg dry	n/a	29.3	41.1	41.5	19	35.5	21.2	18.8	31.6	14.6	23.8	19.4	27.9	23	54.2	28.6
Tungsten	mg/kg dry	n/a	0.31	0.35	0.38	0.32	0.41	0.33	0.54	0.41	0.44	0.25	0.25	0.24	0.24	0.29	0.34
Uranium	mg/kg dry	n/a	0.48	0.6	0.645	0.406	0.281	0.266	0.272	0.303	0.337	0.183	0.18	0.203	0.284	0.498	0.35
Zirconium	mg/kg dry	n/a	2.3	1	1	1	2.4	1	1	2.3	1	2.2	2.3	1	3.9	4.3	1.91

Notes:
*From Organic Matter Recycling Regulation (B.C. Reg. 18/2002, Schedule 4 Section 3, February 28, 2019), which references Trade Memorandum T-4-93 'Safety Guidelines for Fertilizers and Supplements' (Sept 1997) and contains maximum acceptable metal concentrations based on annual application rates (mg metal/kg product) 4,400 kg/ha –yr.
FR1 and FR2 indicate two samples (field replicates) collected that month as part of QA/QC protocols

5.0 RECEIVING ENVIRONMENT MONITORING

Receiving environment monitoring is undertaken to assess human health and environmental impacts of the SPTP outfall. In addition, the results are used to verify the environmental concentrations of parameters that are predicted using wastewater concentration data and the 1:153 minimum initial dilution factor determined during the 2004 dye study (Hayco, 2005) (discussed in Section 3.0).

5.1 Introduction

The CRD conducts receiving environment monitoring adjacent to the SPTP wastewater discharge to assess the potential for human health risk for those participating in recreational activities (e.g., swimmers, kayakers) at the surface near the outfall (see Appendix C1 for site coordinates). In addition, monitoring data are used to assess potential risks to shellfish harvesting in the vicinity of the SPTP outfall, although there is no commitment in the LWMP to meet this standard outside of shellfish growing areas. Finally, surface waters are monitored to ensure that the outfall diffuser is functioning as expected and a minimum initial dilution of 153:1 is being achieved.

A review of the SPTP WMEP was conducted in 2011/2012, in partnership with ENV, including the surface water component. As a result of the review, the surface water sampling program was revised. Beginning in 2013, the fecal coliform sampling was switched from monthly to biannual, 5-in-30 sampling (Table 2.1) in order to align more closely with the ENV fecal coliform guideline, based on the geometric mean of five samples collected in 30 days not exceeding 200 CFU/100 mL. In addition, enterococci were analysed along with fecal coliforms, as they are a more persistent tracer of human waste in the marine environment, with a more direct correlation with adverse human health impacts. Metal and conventional parameter concentrations were also added as extended analyses to the surface water monitoring program (Appendix C2) to confirm environmental concentrations that were previously only predicted by using wastewater data (Section 3.0) and applied minimum initial dilution factors.

A Technical Water Quality Review Panel (TWQRP) was formed in 1999 and included representatives from Island Health, Environment Canada and the CRD Environmental Services Department (now known as Parks & Environmental Services Department). The chair of the MMAG (at the time) attended meetings as a technical advisor to the panel. The TWQRP reviewed the pre- and post-discharge assessment fecal coliform results and determined that there was no need to disinfect the effluent to meet the primary contact human recreation guideline (ENV, 2006). The data were consistently below the value of 200 CFU/100 mL and did not show any patterns of exceedances. However, the panel thought that there might be different situations in the future that would warrant a re-evaluation of the need for effluent disinfection, including any of the following scenarios:

1. The SPTP flows reach an average daily flow of 15,000 m^3/d (which represents 82% of the capacity of the plant).
2. The MMAG recommends disinfection based on an effect noted in the on-going monitoring of the receiving environment.
3. There is a significant degradation in effluent quality, as measured by fecal coliform in the discharge relative to June 2000 to June 2001 period (i.e., significant defined as a 10-fold increase in the annual mean over a period of one year).
4. The date is no later than 2011 (i.e., 10 years since the SPTP started operation).

In 2011, the CRD resurrected the TWQRP, following 10 years of operation. The MMAG was delegated as the TWQRP and in 2015, this advisory group confirmed that disinfection continues to be unnecessary to meet recreational water quality guidelines around the outfall. However, they requested that the CRD continue to assess the potential benefits of disinfection to nearby shellfish resources in consultation with First Nation and other shellfish stakeholders. In January 2020, staff advised the Saanich Peninsula Wastewater Commission that installation of disinfection at the SPTP is unlikely to present any significant benefit to nearby shellfish resources, as the ongoing surface water bacteriological monitoring indicates that

levels around the outfall are well below thresholds to protect shellfish harvesting. Staff therefore recommend that disinfection not be installed at this time. Staff continue to meet with W̱SÁNEĆ First Nations and other shellfish stakeholders to assess potential future disinfection need, as well as to identify other areas on the Saanich Peninsula where shellfish harvesting could be restored, but are outside the influence of the SPTP.

5.2 Methods

The CRD sampling technicians sampled surface waters and the water column over two sampling periods in 2020 ("winter", i.e., January/February 2020 and "summer", i.e., June/July 2020) using a 5-m research vessel positioned by global positioning system.

Each sampling period consisted of five individual sampling days occurring over a 30-day period ("5-in-30"). Nineteen stations at different distances from the outfall terminus were sampled. Sampling stations consisted of 14 outfall stations, one reference station located near Sidney Island, and four variable stations located at the edge of the IDZ (Figure 5.1). Station codes describe the distance from the outfall terminus in metres with compass direction (i.e., 100N = 100 m north of the outfall). The variable IDZ stations were selected at the time of sampling based on a computer model prediction (Lorax, 2019) of what depth and direction the effluent plume would most likely be trapped due to tides, current flow and direction. See Appendix C1 for a list of stations and coordinates.

Surface samples were collected at a depth of 1 m using a sampling pole. Sterile wide-mouth bottles were placed in the pole holder with the lid removed, submerged to collection depth, brought to the surface, and then excess water poured off before the lid was screwed on tightly.

IDZ samples and reference station samples were collected at three depths for each station; "top" (1 m below the surface), "middle" (calculated trapping depth from the computer model prediction), and "bottom" (1 m above the seafloor). A vertical Niskin sampling bottle was deployed to the appropriate depth and closed using a weighted messenger. The bottle was then pulled back to the surface, and decanted into the required sample containers. All samples were stored in coolers with ice until delivery to the analytical laboratory.

Surface water samples were analyzed by Bureau Veritas Laboratories Inc. (Burnaby, BC) for various parameters, depending on the sampling site and the sampling day. A larger list of parameters, including metals, was analyzed on a single day of each five-day sampling series and results compared to applicable BC WQG. See Appendix A for the list of surface water parameters and the analytical frequency for each.

Bacteriology results were averaged as geometric means and compared to the provincial and federal enterococci guidelines of 35 CFU/100 mL and a single sample maximum of 70 CFU/100 mL (BCMoE&CCS, 2019, Health Canada, 2012). In addition, results were compared to Canadian Shellfish Sanitation Program (CSSP) guidelines for shellfish harvesting, which require that the geomean of fecal coliform results not exceed 14 CFU/100 mL and not more than 10% of the samples exceed 43 CFU/100 mL (CSSP, 2019).

IDZ samples were analysed for parameters that reflect the suite of nutrients in the SPTP wastewater monitoring program. Both programs monitor ammonia, total Kjeldahl nitrogen (TKN), nitrate, nitrite, total phosphorus, conductivity, pH, salinity and total organic carbon. While some parameters may not be relevant in the marine receiving environment (e.g., ammonia is measured in wastewater, but is primarily found in the ammonium form in marine waters), they are still monitored to allow for direct comparison of the two sets of results. This suite of nutrients has also been monitored since before the SPTP commenced discharging into Bazan Bay, as part of the pre-discharge monitoring program.

Figure 5.1 - Saanich Peninsula Treatment Plant Outfall Sampling and Reference Locations

Sampling Stations (fecal coliform)
Reference Stations (fecal coiform)
Denotes station where seafloor was sampled and sea surface was sampled for nutrients
Outfall Pipe
Diffuser
Municipal Boundaries
Initial dilution zone (100 meters from diffuser)
Area Defined as Bazan Bay for Nitrate Calculations (see Section 5.2.3)

Metres
0 200 400 600 800

Projection: UTM ZONE 10N NAD 83

Sidney
800N
400N
Bazan Bay
800W
400W
400E
See Inset
400S
800S
North Saanich
Central Saanich
Tsawout First Nation
James Island

REF2 E OF SS

Reference Stations
Metres
0 500 1,000 1,500 2,000

Salt Spring Island
Sidney Spit
Sidney
North Saanich
Reference Stations
Sampling Stations
Juan de Fuca EA
Central Saanich
Saanich
Highlands
Kilometres
0 2 4 6 8

200NW 100N 200NE
SP13 SP12 SP02
SP11 SP03
SP10 OUTFALL SP04
SP09 SP05
SP08 SP07 100S SP06
200SW 200SE

Inset
Metres
0 20 40 60 80 100

N
W E
S

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5.3 Results and Discussion

Bacteriology

Results show that all stations had very low concentrations of fecal coliforms and enterococci for both the summer and winter 5-in-30 sampling programs (Figure 5.2, Table 5.1, Table 5.2, Table 5.3 and Table 5.4). Figure 5.2 utilizes the maximum value detected for each sampling depth on each sampling event for the calculated geomeans. No single sample or geomean was over the respective human recreation or shellfish harvesting guidelines, with a maximum geomean of 2 CFU/100 mL recorded for both fecal coliforms and enterococci at the surface water (1 m depth) stations throughout the water column (Table 5.1 and Table 5.2). The IDZ stations had a maximum geomean of 11 CFU/100 mL for fecal coliform and 3 CFU/100 mL for enterococci (Table 5.2, Table 5.3 and Table 5.4).

All surface water fecal coliform concentrations were well below the conservatively predicted environmental concentration of 54,250 CFU/100 mL, after the minimal initial dilution (1:153) (Hayco, 2005) was applied to the maximum effluent fecal coliform concentration of 8,300,000 CFU/100 mL (Table 3.4). Similar observations were made for enterococci, where surface water results were well below the 8,500 CFU/100 mL that was predicted using the maximum effluent enterococci concentration of 1,300,000 CFU/100 mL and the 153:1 dilution factor.

These results are generally consistent with previous years and previous studies (CRD, 2002-2020), including Island Health's summer beach sampling program that involves monitoring the nearshore environment in Bazan Bay, targeting beaches that are most commonly used for recreation.

Overall, the bacteriological sampling results, and previous dye study results (Hayco, 2005), indicate that the plume was predominantly trapped below the surface and that adverse health effects from recreational primary contact activities or the consumption of shellfish are not likely. There were no enterococci or fecal coliform geomean results or single sample results that exceeded the BC or Health Canada guidelines for the protection of human health, or the CSSP guidelines for shellfish harvesting.

As a conservative measure by the federal government, an area of approximately 17.65 km^2 around the outfall is closed for shellfish harvesting, as standard Fisheries and Oceans Canada procedure near industrial and sanitary wastewater outfalls. Shellfish closures have a minimum radius around an outfall of 300 m, but this closure was expanded in December of 2015 due to proximity to an urban centre where there are other potential sources of bacterial contamination (e.g., stormwater outfalls, marinas, septic systems, sewage pumps). This conservative protection area would also ensure shellfish consumer safety in a flood situation where the treatment plant or conveyance system pump stations were overwhelmed.

Metals

The extended suite of parameters was analyzed at the four IDZ sites and a reference site on one day of sampling for each round of 5-in-30 sampling. Results are detailed in Appendix C2. For those parameters that were detected and had relevant BC and CCME WQG, only boron had WQG exceedances. Boron exceeded WQG at every station and every sampling event, including the reference station. This is a common occurrence, as the natural concentrations of boron are above WQG in the Salish Sea. ENV is working on updating the boron guideline.

CRD - Parks & Environmental Services - Facilities Management & Engineering Services - Jun 10, 2020 - Technologist: sruljancich - Map Document: SaanPenWaterColumn2019.mxd

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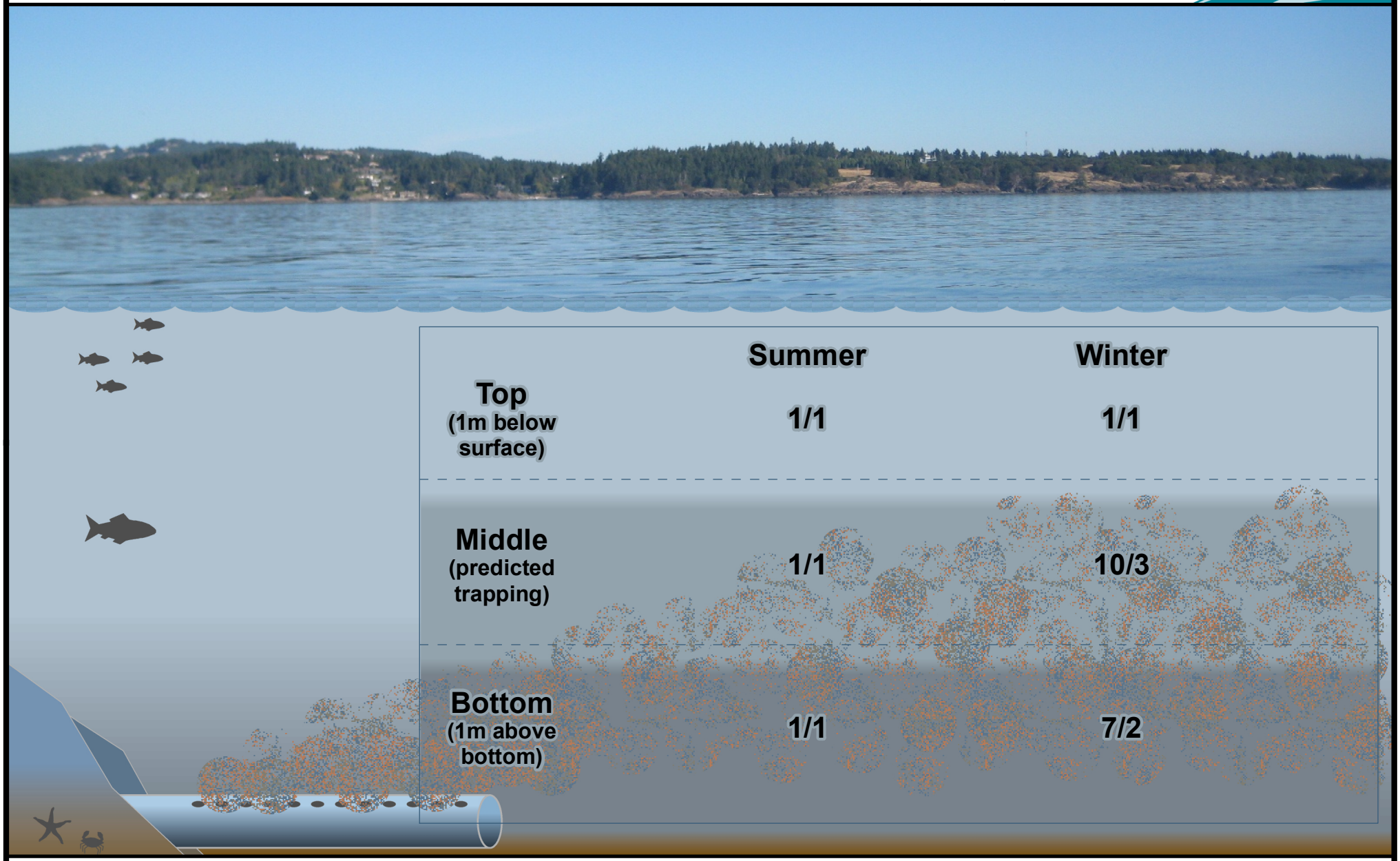
Saanich Peninsula Waste Water Treatment Plant Water Column Sampling

Fecal Coliform and Enterococci Results - 2019 (5 in 30)



Fecal Coliform — **10/41** — Enterococci

Saanich Peninsula Waste Water Treatment Plant IDZ station geometric means of fecal coliform and enterococci counts CFU/100mL (maximum concentrations).

Notes:

Each value is the geometric mean of each maximum value detected at each sampling event (i.e. n=5)
Sampled 5 times in 30 days during each season.

Geometric mean count shown in red if fecal count exceeds 200 CFU/100mL or enterococci count exceeds 20 CFU/100mL.

Table 5.1 SPTP Surface Sites 5 Sampling Events in 30 Days Fecal Coliform 2020

Site	Fecals	Winter						Summer					
		1	2	3	4	5	Geomean	1	2	3	4	5	Geomean
Outfall Sites	Outfall	<1	51	1	2	<1	2	<1	3	<1	1	<1	1
	100N	43	3	<1	2	1	3	<1	<1	1	1	<1	1
	100S	2	34	<1	2	1	2	<1	<1	3	1	<1	1
	200NE	1	6	1	<1	<1	1	<1	<1	2	<1	<1	1
	200NW	2	6	<1	<1	2	1	<1	2	2	<1	<1	1
	200SE	<1	7	3	3	1	2	1	2	2	<1	<1	1
	200SW	1	24	1	3	1	2	1	<1	3	2	<1	1
	400E	2	11	<1	1	<1	1	<1	<1	<1	<1	<1	1
	400N	2	12	<1	1	<1	1	<1	<1	1	<1	<1	1
	400S	2	4	2	6	1	2	3	<1	<1	2	<1	1
	400W	2	6	1	5	1	2	1	2	<1	1	<1	1
	800N	1	5	<1	<1	1	1	<1	<1	1	<1	<1	1
	800S	6	3	<1	<1	1	1	<1	<1	1	<1	<1	1
	800W	<1	3	2	2	1	1	1	<1	2	1	<1	1
Reference Site	Reference 2	1	2	1	2	<1	1	<1	<1	<1	<1	<1	1

Notes:
Shaded cells exceed BC Approved WQG = 200 CFU/100 mL (geometric mean over 5 samples)
<1 replaced with 0.5 for Geomean calculation

Table 5.2 SPTP Surface Sites 5 Sampling Events in 30 Days Enterococci 2020

Site	Enterococci	Winter						Summer					
		1	2	3	4	5	Geomean	1	2	3	4	5	Geomean
Outfall Sites	Outfall	1	10	1	6	<1	2	1	<1	9	<1	<1	1
	100N	5	3	2	1	<1	2	<1	<1	1	<1	<1	1
	100S	1	3	1	2	<1	1	1	<1	1	<1	<1	1
	200NE	<1	4	<1	3	1	1	<1	<1	<1	<1	<1	1
	200NW	1	2	<1	8	1	2	<1	<1	<1	<1	<1	1
	200SE	<1	3	2	1	<1	1	<1	<1	<1	<1	<1	1
	200SW	1	2	1	<1	<1	1	<1	<1	<1	<1	<1	1
	400E	<1	3	3	3	1	2	<1	<1	<1	<1	<1	1
	400N	1	6	<1	1	1	1	1	<1	<1	<1	<1	1
	400S	<1	1	<1	4	1	1	<1	<1	1	<1	<1	1
	400W	1	1	<1	5	1	1	<1	<1	<1	<1	<1	1
	800N	1	3	1	<1	<1	1	<1	<1	<1	<1	<1	1
	800S	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	1
	800W	1	<1	1	3	<1	1	<1	<1	1	<1	<1	1
Reference Site	Reference 2	2	<1	<1	4	<1	1	<1	<1	<1	<1	<1	1

Notes:
Shaded cells exceed BC Approved WQG = 20 CFU/100 mL (geometric mean over 5 samples)
<1 replaced with 0.5 for Geomean calculation

Table 5.3 SPTP IDZ Sites 5 Sampling Events in 30 Days Fecal Coliform 2020

Fecals		Winter						Summer					
CFU/100 mL		Day 1	Day 2	Day 3	Day 4	Day 5	Geomean	Day 1	Day 2	Day 3	Day 4	Day 5	Geomean
Station 1	Top	<1	11	1	1	2*	2	---	<1	<1	3	<1	1
	Middle	1	22	1	3	3	3	---	54*	<1	<1	13	4
	Bottom	6	2	2	3*	<1	2	---	4*	25*	<1	7*	4
Station 2	Top	1	6	2	1	1	2	<1*	<1	<1	1	<1	1
	Middle	1	2	<1	2	<1	1	13*	1	<1	1	1	1
	Bottom	5	4	2	2	4*	3	1*	<1	<1	1	1	1
Station 3	Top	<1	12*	3*	1*	1	2	<1	<1	1*	3*	<1*	1
	Middle	4	8	7*	8	3*	6	<1	<1	1	22*	<1	1
	Bottom	2	110*	79*	2	1	8	<1	<1	<1	1	1	1
Station 4	Top	26*	6	2	1	2	4	<1	<1*	<1	2	<1	1
	Middle	83*	100*	1	9*	2	11	<1	40	1*	<1	23*	3
	Bottom	39*	22	5	<1	4	6	<1	3	<1	3*	1	1
Reference 2	Top	1	2	1	2	<1	1	<1	<1	<1	<1	<1	1
	Middle	1	4	1	<1	1	1	2	<1	<1	<1	<1	1
	Bottom	<1	2	9	<1	<1	1	<1	<1	2	<1	<1	1

Notes:
Shaded cells exceed BC Approved WQG = 200 CFU/100 mL (geometric mean over 5 samples)
<1 replaced with 0.5 for Geomean calculation
--- indicates incomplete sampling due to adverse weather conditions
*value used for geomean calculations for Figure 5.2

Table 5.4 SPTP IDZ Sites 5 Sampling Events in 30 Days Enterococci 2020

Enterococci		Winter						Summer					
CFU/100 mL		Day 1	Day 2	Day 3	Day 4	Day 5	Geomean	Day 1	Day 2	Day 3	Day 4	Day 5	Geomean
Station 1	Top	1	3	2*	<1	<1	1	---	<1	<1	1*	<1	1
	Middle	1	1	1	1	<1	1	---	8*	<1	<1	4*	2
	Bottom	<1	1	1	1	<1	1	---	<1*	2*	<1	1*	1
Station 2	Top	<1	2	<1	<1	1*	1	<1*	<1	<1	<1	<1	1
	Middle	1	<1	1	3*	2*	1	3*	<1	<1	<1	<1	1
	Bottom	2	<1	<1	1	<1	1	1*	<1	<1	<1	<1	1
Station 3	Top	<1	1	<1	3*	<1	1	<1	<1	<1*	<1	<1*	1
	Middle	2	1	4*	2	1	2	<1	<1	<1	3*	<1	1
	Bottom	<1	2	2	2*	1	1	<1	<1	<1	<1	<1	1
Station 4	Top	7*	3*	<1	3	1	2	<1	<1*	<1	<1	<1	1
	Middle	41*	17*	<1	<1	<1	2	<1	4	<1*	<1	3	1
	Bottom	19*	3*	3*	<1	2*	3	<1	<1	<1	<1	<1	1
Reference 2	Top	2	<1	<1	4	<1	1	<1	<1	<1	<1	<1	1
	Middle	<1	<1	<1	1	2	1	<1	<1	1	<1	<1	1
	Bottom	<1	<1	<1	<1	<1	1	<1	<1	<1	<1*	<1	1

Notes:
Shaded cells exceed BC Approved WQG = 20 CFU/100 mL (geometric mean over 5 samples)
<1 replaced with 0.5 for Geomean calculation
--- indicates incomplete sampling due to adverse weather conditions
*value used for geomean calculations for Figure 5.2

Nutrients

The potential effects of the SPTP discharge on nutrient concentrations in the marine receiving environment were assessed by qualitatively comparing the 2020 IDZ and reference station data. Data are presented in Appendix C3.

The 2020 mean concentrations of nutrients, and other measured parameters (i.e., ammonia, TKN, nitrite, nitrate, total phosphorus, dissolved phosphorus), exhibited no consistent (qualitative) differences between outfall and reference stations (Appendix C4). The average concentrations of nutrients in 2020 were also within the ranges measured during the pre- and post-discharge studies (Aquametrix Research Ltd., 2000 and 2001a), and were consistent with recent monitoring years and the concentrations expected in Juan de Fuca Strait. The average surface water result for nitrate was 0.36 mg/L N at the reference station and 0.36 to 0.36 mg/L N at the IDZ stations. For comparison, ambient nitrate concentrations in the Juan de Fuca Strait area are typically on the order of 0.140-0.420 mg/L N (Lewis, 1974 and 1978, as cited in Harrison *et al*., 1994).

Figure 5.3 and Figure 5.4 present 2013-2020 total nitrogen and nitrate results from the reference area and outfall monitoring stations, compared to the Mackas and Harrison (1997) study of background concentrations in the area. The comparison indicates that the monitoring results are well within background concentrations.

Similar to previous years (CRD, 2002-2020), nutrient concentrations in 2020 exhibited high natural spatial and temporal variability, which is typical of the Strait of Georgia and the Juan de Fuca and Haro straits (Mackas and Harrison, 1997). Nutrient concentrations are expected to vary due to seasonal physiochemical and biological cycles in marine waters. From autumn through spring, surface-layer nitrogen concentrations are generally high in the Strait of Georgia and Juan de Fuca and Haro straits because of reduced stratification, sustained tidal and wind mixing and low phytoplankton productivity. In summer, nitrogen concentrations are much lower, coinciding with low salinity and high temperatures influenced by surface water from the Fraser River freshet (Mackas and Harrison, 1997). Ammonia values show a seasonal variation, with total nitrogen and nitrate (Figure 5.3 and Figure 5.4, Appendix C3) lower in the summer and higher in the winter and TKN and nitrite (Appendix C3) higher in the summer and lower in the winter.

Nutrient monitoring results from 2002-2020 have shown no indication of potential for anthropogenic eutrophication. Mackas and Harrison (1997) indicate that the potential for eutrophication of the Strait of Georgia and Juan de Fuca and Haro straits is low for two reasons: first, high ambient nitrate and ammonia concentrations make total primary productivity relatively insensitive to moderate changes; second, the exchange of water by currents is rapid, and water entering the Strait of Georgia and Juan de Fuca Strait carries naturally high nutrient concentrations. Natural nitrogen inputs into the straits from estuarine circulation are estimated to be an order of magnitude higher than all anthropogenic and atmospheric inputs combined (Mackas and Harrison, 1997). SPTP outfall loadings of nitrogen-based nutrients to Bazan Bay were approximately 61 kg N/year in 2020 (Table 3.4; loadings of nitrate+nitrite+TKN, since TKN=organic N+ammonia); whereas, the net natural nitrogen input to the Juan de Fuca Strait/Strait of Georgia/Puget Sound estuarine system totals approximately 400-600 tonnes N/day (i.e., 146,000-219,000 tonnes N/year) (Mackas and Harrison, 1997).

Finally, Bazan Bay naturally contains 15-46 tonnes of nitrate alone, if one uses the typical ambient nitrate concentrations in the Juan de Fuca Strait area (0.140-0.420 mg/L N; Lewis 1974, 1978, as cited in Harrison *et al*., 1994) and an assumed volume of 110,105,000 m^3 (volume calculated for the area enclosed by Sidney to James Island to Cordova Spit; Figure 5.1). Bazan Bay is also well flushed, as is evidenced by the fact that the 2020 surface water nitrate concentrations (Appendix C3) remained within the ambient Juan de Fuca nitrate concentrations, even though the SPTP outfall discharged approximately 47 kg of nitrate in 2020 (Table 3.4). Overall, the 2020 surface water data showed no evidence of any significant effect of the SPTP discharge on nutrients in the Bazan Bay receiving environment.

The conditions that could trigger the re-evaluation of the need for a comprehensive nutrient monitoring program (Section 5.1) were not applied to the 2020 data, as none of the triggers were met. Regardless, the program review with ENV has led to a revised SPTP WMEP, including the surface water monitoring program, which began in 2013. The nutrient component will soon be reviewed by the TWQRP as the review of the need for disinfection has been completed, as per Trigger #4, Section 5.1.

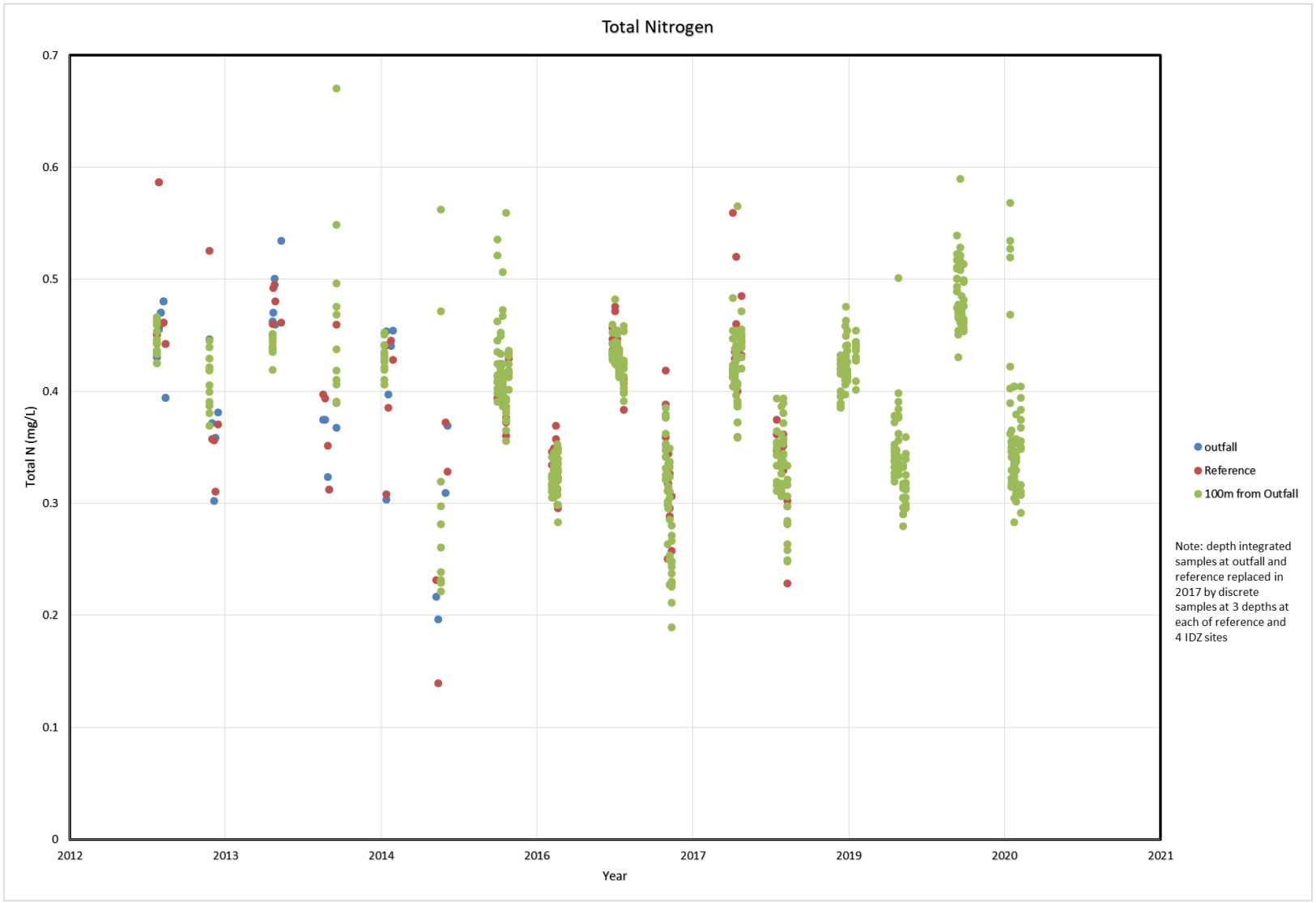


Figure 5.3 SPTP Total Nitrogen Sampling Results 2013-2020

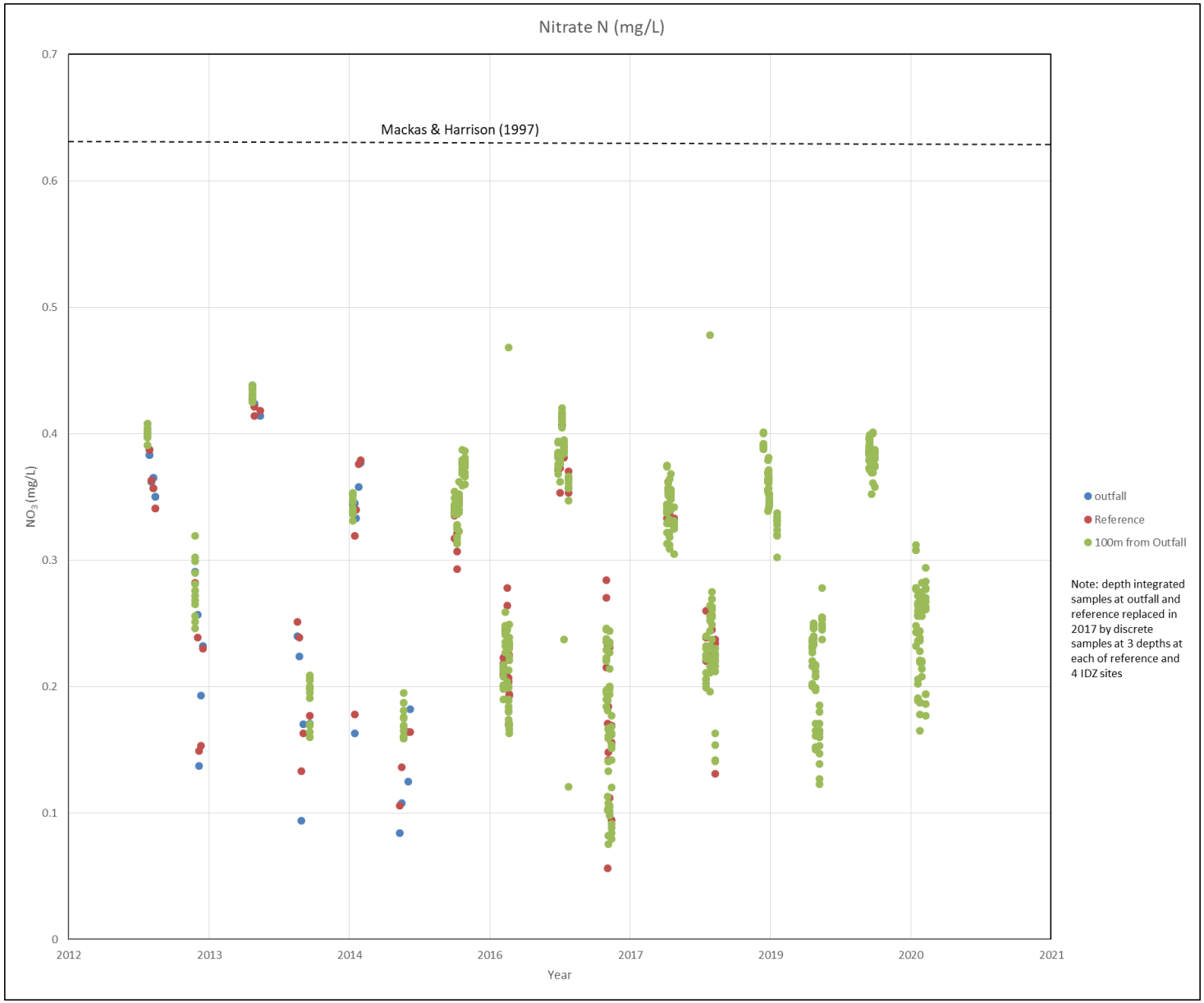


Figure 5.4 SPWTP Nitrate Sampling Results 2013-2020

5.4 Overall Assessment

Overall, the 2020 bacteriology results indicated that the outfall plume was predominantly trapped below the ocean surface and the diffuser was working as expected during the sampling events. In addition, the potential for human exposure to high bacterial concentrations from the wastewater discharge was low around the outfalls, as demonstrated by geometric mean results that were below thresholds used to assess potential human health risks in surface waters. Effects on shellfish consumers was also not expected. Most extended analyses monitoring parameters were either non-detect or well below applicable WQG, with the exception of boron, which exceeded WQG at every station and sampling event, including the reference station. The CRD will continue to monitor metals in waters around the outfall to assess environmental significance.

The 2020 nutrient results were consistent with previous years and there was no evidence of an effect on nutrient concentrations in the receiving environment from the SPTP discharge. There were no qualitative differences between the reference and IDZ stations, and results were within the ranges measured in previous years and ambient measurements throughout Juan de Fuca Strait and the Strait of Georgia.

6.0 SEAFLOOR MONITORING

The WMEP monitors the effects of the SPTP wastewater discharge on the seafloor at the end of the outfall once every four years. Seafloor sampling was conducted in 2020, and will next be conducted in 2024. Seafloor health is monitored in two ways:

1. Sediments at the end of the outfall and at the reference station were collected and analyzed for approximately 575 substances and compared to sediment quality guidelines (SQG), and

2. The health of the benthic invertebrate community at the end of the outfall was compared to the reference station.

6.1 Sediment Monitoring

6.1.1 Introduction

Sediments are collected for analysis of chemical parameters to assess potential effects related to wastewater discharge. Tools used to assess potential effects include the comparison of data to the reference station, pre-discharge concentrations and SQG.

6.1.2 Methods

Sediment sampling generally followed the Puget Sound Ambient Monitoring Program (PSAMP, 2002) protocols and guidelines. Sampling was conducted using the University of Victoria's 16-m science vessel, the MSV John Strickland, using a 0.1 m^2 stainless steel Van Veen grab sampler. Sediment samples were collected on September 9, 2020 from one station off the outfall and from the Reference 2 station, east of Sidney Spit (Figure 5.1).

Sediments were collected by taking three replicate grabs from each of the two sampling stations and compositing into a single sample per station. Sediment is scooped and mixed with trace cleaned bowls and spoons. Target sampling location coordinates can be found in Appendix C1. Samples were analyzed for approximately 575 parameters, including conventional variables, metals, organic substances and high resolution analyses (Appendix A). This suite of substances was selected in collaboration with the MMAG, the ENV program review, and to align with the Vancouver Aquarium Pollution Tracker Program.

Bureau-Veritas (Burnaby, BC) conducted the routine resolution analyses while SGS AXYS Analytical (Victoria, BC) conducted high-resolution analyses.

Ten percent of the sediment samples were randomly chosen for laboratory triplicate analysis (these samples were batched with sediments from other CRD outfall monitoring programs). The analytical laboratory also conducted internal QA/QC analysis, including method analyte spikes, method blanks, and standard reference materials.

Results were compared to multiple SQG, including the Canadian Council of Ministers of the Environment Probably Effects Level (CCME PEL), British Columbia Contaminated Sites Regulation (BC CSR), and the Washington State Department of Ecology (WSDOE) 2nd Lowest Apparent Effects Threshold (AET), to evaluate the potential receiving environment effects. SQG are frequently used to evaluate the potential for adverse biological effects associated with contamination of sediments as part of monitoring, source control, cleanup and dredging programs. There are a variety of SQG in use in North America today, which can vary considerably in the substances that are included, levels derived for the substances, and methods of derivation. In 2007, Avocet Consulting conducted an evaluation of the reliability of certain marine SQG to determine whether selected SQG should be used for monitoring at the Macaulay and Clover Point outfalls (Avocet, 2007). A detailed description of this review is presented in the 2006 Macaulay and Clover Annual Report (CRD, 2007b).

Based on the results of the reliability analysis, the following SQG were determined to be the most relevant and reliable, specifically for the Macaulay and Clover points results and, therefore, were used in the assessment of sediment quality data in this report: the WSDOE non-carbon normalized 2LAET (WSDOE, 1991), the BC SedQCTCS (BCMWLAP, 2003), and the CCME PEL (CCME, 2003). The reliability analysis looked at the incidences of false positive and false negative predictions based on SQG comparisons to historical Macaulay Point benthic data (Avocet, 2007). All of the SQG sets that were assessed had low observed frequencies (≤1%) of false negative predictions.

DATA QUALITY ASSESSMENT

A rigorous QA/QC assessment procedure was followed for both field sampling procedures and laboratory analyses. Within the analytical batch that was analyzed, one sample was randomly chosen for laboratory triplicate analysis and one sample was randomly chosen for field triplicate analysis. The analytical laboratories also conducted internal QA/QC analyses, including method analyte spikes, method blanks, and standard reference materials. Refer to Golder (2017) for detailed descriptions of the QA/QC procedures.

6.1.3 Results and Discussions

In 2020, over 575 substances were analyzed for the composite samples collected at both the outfall and the reference station. Analytical results for all parameters for the 2020 SPTP sediment samples are reported in Appendix D1. As in previous years, in 2020, there were no exceedances of SQG at either the outfall or reference station with parameters being orders of magnitude lower than the chosen criteria (Appendix D1).

6.2 Benthic Invertebrate Community

6.2.1 Introduction

Benthic invertebrate communities consist of a number of different taxa (different kinds of organisms). The types of taxa found at a particular location and the abundance of these organisms partly depend on the physical characteristics of the habitat (e.g., particle size, type of substrate, etc.). Other physical factors that can influence the composition of the community and the number of organisms are temperature, depth, salinity and hydrography. Biological factors that can also influence benthic communities include primary productivity, competition and acclimatization. Benthic communities can change in response to enhanced nutrients, organic matter and contaminants. In marine benthic communities, as the concentration of organic matter in sediment increases, the number of taxa typically decreases while the abundance of organisms increases. Abundance will eventually decline when organic matter begins to overwhelm the community. This pattern is typically observed near wastewater outfalls and involves an increase in abundance and a reduction in the total number of taxa with proximity to the source (Pearson and Rosenberg, 1978).

Measurements of change in benthic communities have been widely used in identifying and monitoring effects from different sources, such as coastal outfalls, chemical contamination of sediments, commercial dredging, oil exploration and introduced species. Potential effects are typically determined through comparisons of exposed stations to reference stations that are outside the exposure area. Community indicators are often used in these assessments. The assessment of the SPTP benthic communities in 2020 included the use of calculated indices, such as the abundance of taxa, the richness of taxa and the community structure of the taxa.

6.2.2 Methods

Benthic sampling generally followed the Puget Sound Ambient Monitoring program (PSAMP, 2002) protocols and guidelines. Sampling was conducted from a 20 m research vessel, the MSV John Strickland, using a 0.1 m^2 stainless steel Van Veen grab sampler, concurrently with the sediment sampling.

Benthic samples were collected in September 2020 from the outfall terminus station and the reference station (Ref 2), east of Sidney Spit (Figure 5.1). These were the same stations used in previous years and the pre-discharge assessment program. Four replicate grabs were taken at each station, sieved in the field to 1.0 mm, preserved in formalin solution and transported to the taxonomic laboratory Biologica Environmental Services, Ltd (Victoria, BC). Benthic invertebrates were sorted, enumerated and identified to the lowest practical taxonomic level using Puget Sound Protocols (PSAMP, 2002). All replicates from each station were analyzed. At least 10% of the submitted samples were re-sorted by another person to ensure that no more than 5% of a given sample was missed by the sorter (i.e., a sample sorting efficiency of 95%). Five percent of all samples were re-identified by a 2nd taxonomist. These quality control measures ensured that all identifications were correct and consistent.

Total abundance and taxa richness were derived and compared to previous years and the pre-discharge data. These indices were used to assess the potential effects of the discharge on benthic organisms. The health of the benthic community at the outfall station relative to the reference station was also assessed by identifying the dominant taxa groups (to phyla or class) at each location.

6.2.3 Results and Discussions

Benthic indices are presented in Figure 6.1 (community structure), Figure 6.2 (taxa richness) and Figure 6.3 (total abundance). The raw benthic results for 2020 are presented in Appendix D2. In 2020, the reference station had a qualitatively higher number of different species (Figure 6.1) and a higher total abundance than the outfall station (Figure 6.23). Taxa richness (Figure 6.32) was equivalent between the two stations.

A typical effect observed near wastewater outfalls involves an increase in abundance of organisms along with a reduction in the total number of taxa due to organic enrichment (Pearson and Rosenberg, 1978). This effect was not observed in 1999, 2004 or 2008, but was qualitatively observed in 2012 (CRD, 2014). In 2020, the community structure at both the outfall and the reference stations were proportionately dominated by the Annelids (marine worms), comprising 39% and 64%, respectively, of the total number of organisms. The next most common group was Mollusca, comprising 35% of the total number of organisms at the outfall, and 17% of the total number of organisms at the reference station.

Considering that total organic carbon has not increased over time, and sediment quality is not exceeding any available SQG, the probability that the highly treated SPTP effluent is causing benthic declines is unlikely. Changes in sorting and taxonomy proficiency has likely been the main contributor to increases in taxa richness and abundance from pre-discharge to present, with a new taxonomist in use since 2012. In 2020, total abundance was higher at the reference station, but taxa richness was the same at both outfall and reference stations.

6.3 Benthic Overall Assessment

Overall, the 2020 results indicate that the wastewater discharge likely does not have a negative impact on the benthic species assemblage. While the total number of animals was less at the outfall than the reference station in 2020, the number of different species was the same for the outfall and the reference stations.

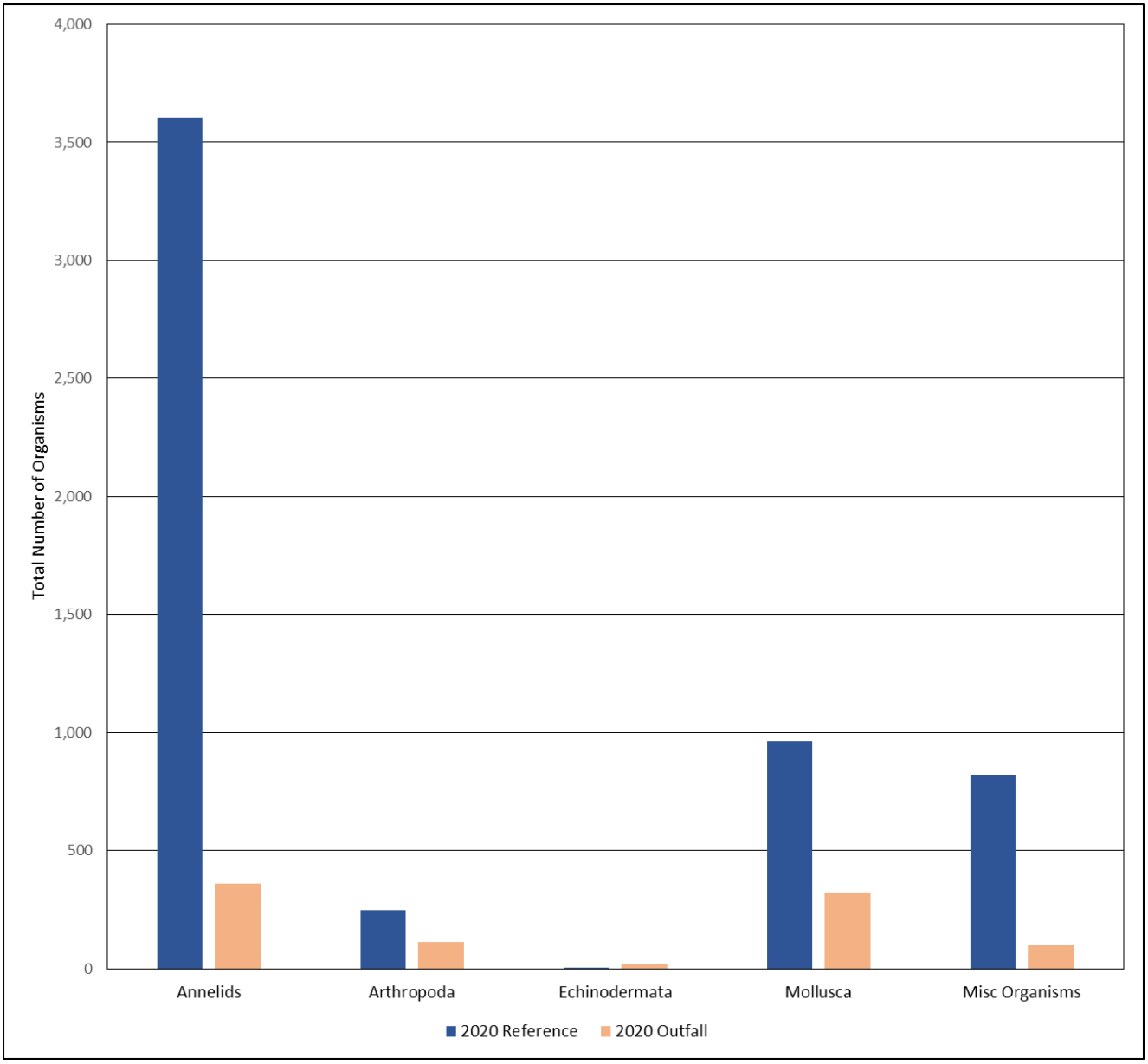


Figure 6.1 2020 SPTP Outfall and Reference Station Benthic Community Structure

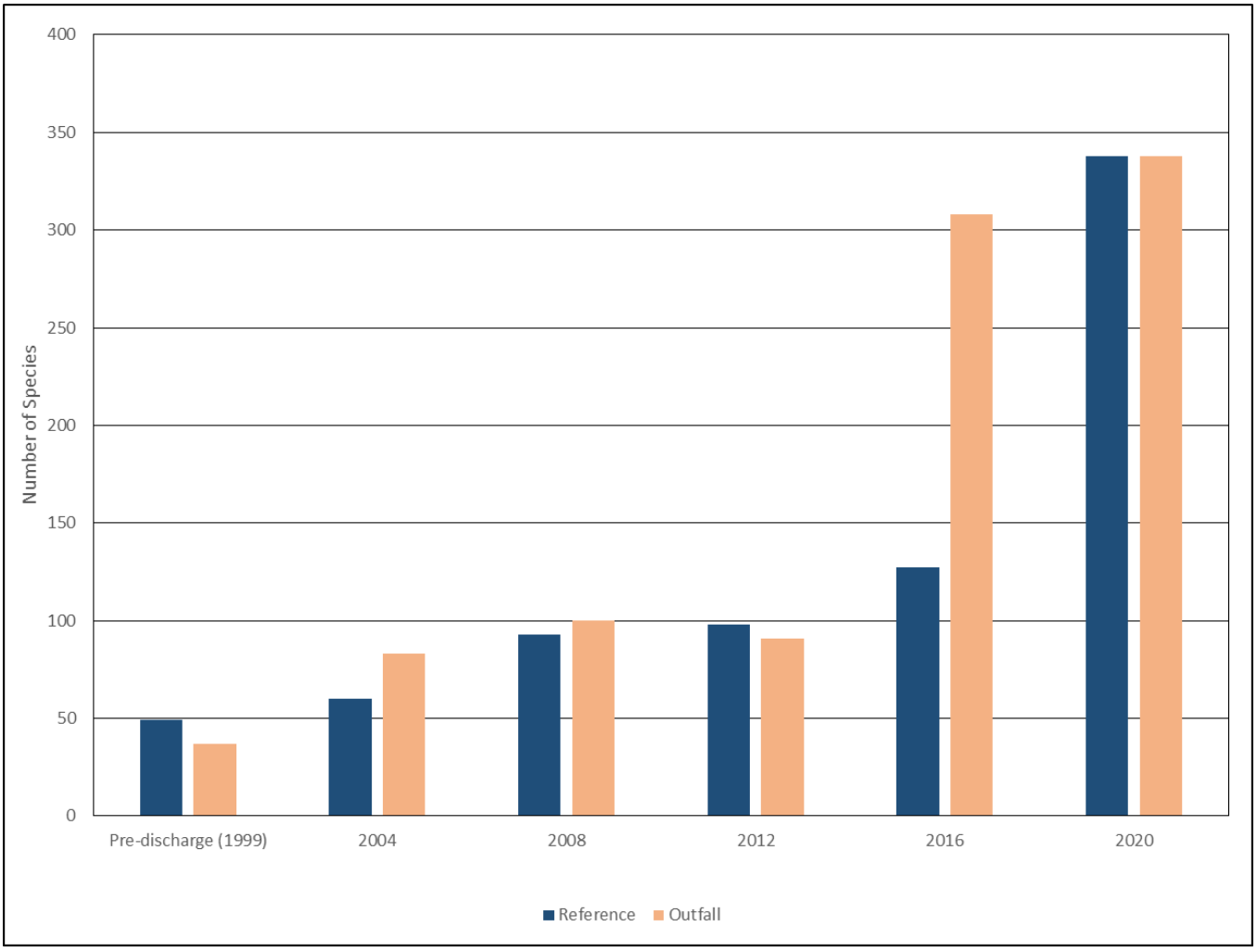


Figure 6.2 SPTP Outfall and Reference Taxa Richness: Pre-Discharge to 2020

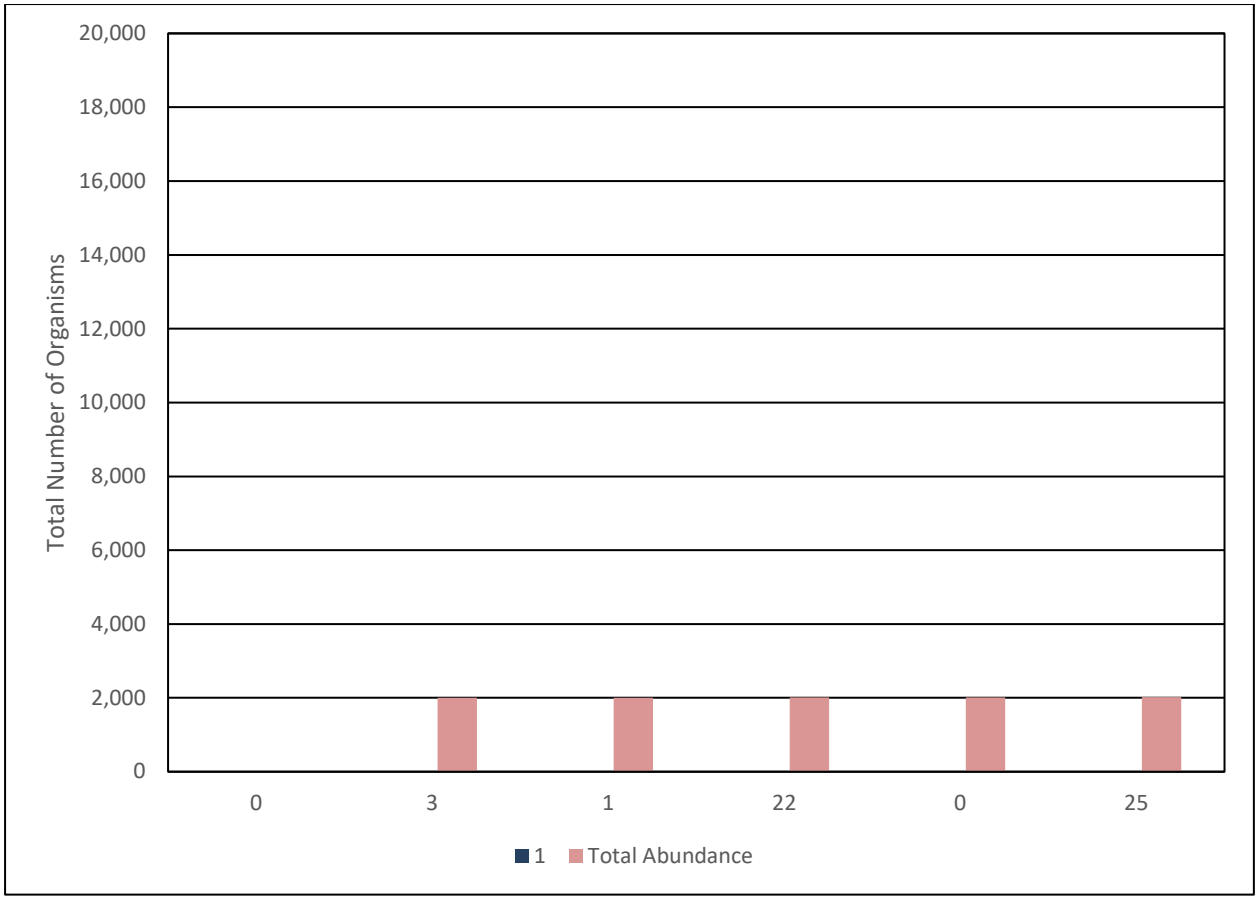


Figure 6.3 SPTP Outfall and Reference Total Abundance: Pre-Discharge to 2020

7.0 OVERALL CONCLUSIONS

Overall, the results of the WMEP monitoring conducted in 2020 did not indicate any significant negative effects from the SPTP discharge on the Bazan Bay receiving environment.

The CRD conducted wastewater monitoring on a regular basis to profile the chemical and physical constituents of influent and effluent. Influent and effluent quality was within expected ranges and met provincial and federal compliance requirements and treatment plant operational objectives. All priority substances for which there are BC and Canadian WQG, met these guidelines after estimated minimum initial dilution of the effluent was factored in, with the exception of bacteriological indicators. This indicates that the substances measured in the effluent were not likely at concentrations high enough to be of concern to aquatic life after discharge to the marine environment.

Effluent toxicity testing resulted in no toxicity, and minimal impairment to survival and reproductive endpoints.

No biosolids were generated in 2020, but monitoring of dewatered sludge was undertaken to inform the RSCP. Monitoring results of the SPTP sludge showed that all BC OMRR regulated parameters were far below Class A biosolids limits.

Surface water monitoring was used to assess the human and environmental effects of the SPTP discharge and to confirm the minimum initial dilution factor of 1:153 determined during the 2004 dye study. Results from 2020 showed that most stations had very low concentrations of fecal coliforms and enterococci, even though environmental concentrations were predicted to be higher, based on effluent bacterial concentrations and the 1:153 dilution factor. Bacterial station geometric means were 11 or less CFU/100 mL for all stations and depths in 2020 indicating adverse health effects from recreational primary contact activities or shellfish consumption were not expected.

Boron exceeded WQG at all IDZ stations, as well as at the reference station, and is naturally found at high levels in Bazan Bay.

There was some seasonality (winter vs. summer sampling events) observed in nutrient concentrations in 2020, but these were consistent between the outfall IDZ stations and the reference station. As was observed in previous monitoring years, high temporal and spatial variation was evident in the data. Monitoring results were within the ranges measured in previous monitoring years and in ambient samples collected throughout the Strait of Juan de Fuca and the Strait of Georgia. Overall, there was no evidence of nutrient enrichment in the receiving environment resulting from the SPTP discharge.

There were no substances exceeding applicable sediment guidelines set to protect marine life in 2020, and results at the outfall were similar to results at the reference site. The data indicate sediment quality is unlikely to have been affected by the outfall.

Benthic community structure and taxa richness were qualitatively higher at the reference station than at the outfall, while total abundance was equivalent between the two stations. Both the outfall and reference stations had benthic invertebrate communities that were representative of those seen elsewhere in the Salish Sea.

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APPENDIX A

Parameter List for the Saanich Peninsula Wastewater and Marine Environment Program 2020

Appendix A Parameter List for the Saanich Peninsula Wastewater and Marine Environment Program 2020

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
CONVENTIONAL VARIABLES				
alkalinity	minimum twice per week to monthly	√		
biochemical oxygen demand	influent - weekly; effluent - 3 times/week	√		
carbonaceous biochemical oxygen demand	minimum 2 times/week	√		
chemical oxygen demand	weekly	√		
chloride	1 time/month	√		
conductivity	4-5 times/month	√		√
cyanide (strong acid dissociable)		√		
cyanide (weak acid dissociable)		√		
fecal coliform	weekly	√	√	√
enterococci			√	√
hardness (as $CaCO_3$)		√		
hardness (as $CaCO_3$), dissolved		√		
ammonia	2-3 times/month	√	√	√
total Kjeldahl nitrogen	2-3 times/month	√	√	√
nitrate	2-3 times/month	√	√	√
nitrite	2-3 times/month	√	√	√
nitrogen, total		√	√	√
oil & grease, mineral		√		
oil & grease, total		√		
organic carbon, total		√	√	√
pH	daily	√	√	√
phosphate, dissolved	1 time/month		√	√
phosphate, total	1 time/month		√	√
salinity		√		√
sulphate		√		√
sulphide		√		√
suspended solids, total	daily	√		√
temperature		√		√

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
METALS TOTAL		√		
aluminum		√	√	
antimony		√	√	
arsenic		√	√	
barium		√	√	
beryllium		√	√	
bismuth			√	
cadmium		√	√	
calcium		√	√	
chromium		√	√	
chromium VI		√	√	
cobalt		√	√	
copper		√	√	
iron		√	√	
lead		√	√	
magnesium		√	√	
manganese		√	√	
mercury		√	√	
molybdenum		√	√	
nickel		√	√	
phosphorus		√	√	
potassium		√	√	
selenium		√	√	
silver		√	√	
sodium			√	
thallium		√	√	
tin		√	√	
zinc		√	√	

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
METALS - OTHER				
dibutyltin		√		
dibutyltin dichloride		√		
monobutyltin		√		
monobutyltin trichloride		√		
tributyltin		√		
tributyltin chloride		√		
methyl mercury		√		
METALS DISSOLVED				
aluminum		√		
antimony		√		
arsenic		√		
barium		√		
beryllium		√		
cadmium		√		
calcium		√		
chromium		√		
cobalt		√		
copper		√		
iron		√		
lead		√		
magnesium		√		
manganese		√		
mercury		√		
molybdenum		√		
nickel		√		
phosphorus		√		
potassium		√		
selenium		√		
silver		√		
thallium		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
tin		√		
zinc		√		
ALDEHYDES				
acrolein		√		
PHENOLIC COMPOUNDS				
total phenols		√		
2-chlorophenol		√		
2,4 & 2,5 -dichlorophenol		√		
2,4,6-trichlorophenol		√		
4-chloro-3-methylphenol		√		
pentachlorophenol		√		
2,4-dimethylphenol		√		
2,4-dinitrophenol		√		
2-methyl-4,6-dinitrophenol		√		
2-nitrophenol		√		
4-nitrophenol		√		
phenol		√		
2,4-DDD		√		
ORGANOCHLORINE PESTICIDES				
2,4-DDE		√		
2,4-DDT		√		
4,4-DDD		√		
4,4-DDE		√		
4,4-DDT		√		
aldrin		√		
alpha-chlordane		√		
alpha-endosulfan		√		
alpha-HCH		√		
beta-endosulfan		√		
beta-HCH		√		
chlordane		√		
delta-HCH		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
dieldrin		√		
endosulfan sulphate		√		
endrin		√		
endrin aldehyde		√		
gamma-chlordane		√		
gamma-HCH		√		
heptachlor		√		
heptachlor epoxide		√		
methoxyclor		√		
mirex		√		
octachlorostyrene		√		
total endosulfan		√		
toxaphene		√		
POLYCYCLIC AROMATIC HYDROCARBONS				
2-chloronaphthalene		√		
2-methylnaphthalene		√		
acenaphthene		√		
acenaphthylene		√		
anthracene		√		
benzo(a)anthracene		√		
benzo(a)pyrene		√		
benzo(b)fluoranthene		√		
benzo(g,h,i)perylene		√		
benzo(k)fluoranthene		√		
chrysene		√		
dibenzo(a,h)anthracene		√		
fluoranthene		√		
fluorene		√		
indeno(1,2,3-c,d)pyrene		√		
naphthalene		√		
phenanthrene		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
pyrene		√		
total high molecular weight – PAH		√		
total low molecular weight – PAH		√		
total PAH		√		
SEMIVOLATILE ORGANICS				
bis(2-ethylhexyl)phthalate		√		
butylbenzyl phthalate		√		
diethyl phthalate		√		
dimethyl phthalate		√		
di-n-butyl phthalate		√		
di-n-octyl phthalate		√		
MISCELLANEOUS SEMIVOLATILE ORGANICS				
1,2,4-trichlorobenzene		√		
1,2-diphenylhydrazine		√		
2,4-dinitrotoluene		√		
2,6-dinitrotoluene		√		
3,3-dichlorobenzidine		√		
4-bromophenyl phenyl ether		√		
4-chlorophenyl phenyl ether		√		
benzidine		√		
bis(2-chloroethoxy)methane		√		
bis(2-chloroethyl)ether		√		
bis(2-chloroisopropyl)ether		√		
hexachlorobenzene		√		
hexachlorobutadiene		√		
hexachlorocyclopentadiene		√		
hexachloroethane		√		
isophorone		√		
nitrobenzene		√		
N-nitrosodimethylamine		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
N-nitrosodi-n-propylamine		√		
N-nitrosodiphenylamine		√		
VOLATILE ORGANICS				
Monocyclic Aromatic Hydrocarbons				
1,2-dichlorobenzene		√		
1,3-dichlorobenzene		√		
1,4-dichlorobenzene		√		
1,2-dibromoethane		√		
1,4-dioxane		√		
4,6-dinitro-2-methylphenol		√		
benzene		√		
carbon tetrachloride		√		
chlorobenzene		√		
dichlorodifluoromethane		√		trichlo
ethylbenzene		√		
styrene		√		
toluene		√		
m & p xylenes		√		
o-xylene		√		
xylenes		√		
Aliphatic				
acrylonitrile		√		
methyl tertiary butyl ether		√		
Chlorinated Aliphatic				
1,1,1,2-tetrachloroethane		√		
1,1,1-trichloroethane		√		
1,1,2,2-tetrachloroethane		√		
1,1,2-trichloroethane		√		
1,1-dichloroethane		√		
1,1-dichloroethene		√		
1,2-dichloroethane		√		
1,2-dichloropropane		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
2-chloroethylvinyl ether		√		
bromomethane		√		
chloroethane		√		
chloroethene		√		
chloromethane		√		
cis-1,2-dichloroethene		√		
cis-1,3-dichloropropene		√		
dibromoethane		√		
dibromomethane		√		
dichloromethane		√		
tetrabromomethane		√		
tetrachloroethene		√		
tetrachloromethane		√		
trans-1,2-dichloroethene		√		
trans-1,3-dichloropropene		√		
trichloroethene		√		
trichlorofluoromethane		√		
Trihalomethanes				
bromodichloromethane		√		
bromoform		√		
chlorodibromomethane		√		
tribromomethane		√		
trichloromethane		√		
vinyl Chloride		√		
Ketones				
4-methyl-2 pentanone		√		
dimethyl ketone		√		
endrin ketone		√		
methyl ethyl ketone		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
TERPENES				
alpha-terpineol		√		
TOXICITY				
acute toxicity	quarterly	√		
chronic toxicity	annually	√		
HIGH RESOLUTION ANALYSES				
Nonylphenols				
4-Nonylphenols		√		
4-Nonylphenol monoethoxylates		√		
4-Nonylphenol diethoxylates		√		
Octylphenol		√		
PAHs				
Naphthalene		√		
Acenaphthylene		√		
Acenaphthene		√		
Fluorene		√		
Phenanthrene		√		
Anthracene		√		
Fluoranthene		√		
Pyrene		√		
Benz[a]anthracene		√		
Chrysene		√		
Benzo[b]fluoranthene		√		
Benzo[j,k]fluoranthenes		√		
Benzo[e]pyrene		√		
Benzo[a]pyrene		√		
Perylene		√		
Dibenz[a,h]anthracene		√		
Indeno[1,2,3-cd]pyrene		√		
Benzo[ghi]perylene		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
2-Methylnaphthalene		√		
2,6-Dimethylnaphthalene		√		
2,3,5-Trimethylnaphthalene		√		
1-Methylphenanthrene		√		
Dibenzothiophene		√		
PBDEs		√		
PCBs		√		
Pesticides				
1,3-Dichlorobenzene		√		
1,4-Dichlorobenzene		√		
1,2-Dichlorobenzene		√		
1,3,5-Trichlorobenzene		√		
1,2,4-Trichlorobenzene		√		
1,2,3-Trichlorobenzene		√		
1,2,4,5-/1,2,3,5-Tetrachlorobenzene		√		
1,2,3,4-Tetrachlorobenzene		√		
Pentachlorobenzene		√		
Hexachlorobutadiene		√		
Hexachlorobenzene		√		
HCH, alpha		√		
HCH, beta		√		
HCH, gamma		√		
Heptachlor		√		
Aldrin		√		
Octachlorostyrene		√		
Chlordane, oxy-		√		
Chlordane, gamma (trans)		√		
Chlordane, alpha (cis)		√		
Nonachlor, trans-		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
Nonachlor, cis-		√		
2,4'-DDD		√		
4,4'-DDD		√		
2,4'-DDE		√		
4,4'-DDE		√		
2,4'-DDT		√		
4,4'-DDT		√		
Mirex		√		
HCH, delta		√		
Heptachlor Epoxide		√		
alpha-Endosulphan		√		
Dieldrin		√		
Endrin		√		
beta-Endosulphan		√		
Endosulphan Sulphate		√		
Endrin Aldehyde		√		
Endrin Ketone		√		
Methoxychlor		√		
PPCPs				
Bisphenol A		√		
Furosemide		√		
Gemfibrozil		√		
Glipizide		√		
Glyburide		√		
hydrochlorothiazide		√		
2-Hydroxy-ibuprofen		√		
Ibuprofen		√		
Naproxen		√		
Triclocarban		√		

Appendix A, continued

Parameter	Compliance Monitoring and Treatment Plant Performance	Wastewater Priority Substances	Receiving Environment	
	Influent and Effluent - Sampling frequency	Sampled quarterly (one day before and one day after quarterly)*	5 samples in 30 days (summer and winter) 1st day	5 samples in 30 days (summer and winter) 2nd-5th day
Triclosan		√		
Warfarin		√		
Fluorinated Compounds				
PFBA		√		
PFBS		√		
PFDA		√		
PFDoA		√		
PFHpA		√		
PFHxA		√		
PFHxS		√		
PFNA		√		
PFOA		√		
PFOS		√		
PFOSA		√		
PFPeA		√		
PFUnA		√		

APPENDIX B

Wastewater Monitoring

Appendix B1 Saanich Peninsula Treatment Plant Effluent Flow (m^3) in 2020

Appendix B2 Compliance and Treatment Plant Performance Influent Results 2020

Appendix B3 Compliance and Treatment Plant Performance Effluent Results 2020

Appendix B4 Influent and Effluent Priority Substance Concentrations 2020

Appendix B1 Saanich Peninsula Treatment Plant Effluent Flow (m^3) in 2020

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	11,405	21,146	9,673	8,605	8,418	8,518	8,383	8,159	8,488	8,891	9,124	9,461
2	10,655	24,585	9,373	8,606	8,299	8,432	8,303	8,108	8,472	8,900	8,835	11,462
3	12,371	15,114	9,804	8,395	8,321	8,275	9,127	8,450	8,383	8,555	12,421	9,408
4	15,915	12,258	9,285	8,205	8,448	8,272	8,645	8,398	8,391	8,745	11,291	9,691
5	14,748	13,632	9,026	8,087	8,424	8,219	8,711	8,251	8,027	9,011	11,012	9,175
6	13,429	19,608	8,903	8,163	8,325	8,184	8,745	6,452	8,064	8,774	9,977	9,259
7	15,195	17,352	8,632	8,275	8,253	8,323	8,491	8,608	8,684	8,739	9,483	10,028
8	20,010	17,618	8,619	8,063	8,128	8,422	8,457	8,405	8,552	8,722	9,410	12,901
9	13,704	15,687	8,627	8,005	8,101	9,899	8,735	8,454	8,385	9,555	9,444	11,605
10	11,513	12,730	8,603	7,979	8,067	8,928	8,576	8,552	8,437	9,981	9,396	10,589
11	15,973	11,314	8,490	7,980	8,074	8,637	8,319	8,493	8,219	11,669	9,147	10,089
12	14,618	10,616	8,513	7,928	8,357	9,469	8,496	8,376	8,104	11,215	11,121	9,705
13	14,750	10,207	8,277	8,006	8,837	8,896	8,704	8,378	8,477	14,073	16,689	11,206
14	12,583	9,812	8,323	8,149	8,524	8,909	8,551	8,496	8,574	7,697	11,656	11,122
15	10,935	9,664	8,225	8,068	8,329	9,410	8,502	8,350	8,680	9,787	11,832	12,227
16	10,048	9,371	8,386	8,020	8,251	9,050	8,530	8,422	8,646	9,417	16,805	12,331
17	11,711	8,954	8,432	8,051	8,467	8,851	8,464	8,514	8,410	9,131	17,538	12,955
18	10,945	9,235	8,248	7,992	9,355	8,777	8,055	8,400	8,526	13,089	14,600	13,536
19	14,624	8,895	8,204	7,965	8,850	8,695	8,283	8,365	8,424	10,479	12,794	16,343
20	13,077	9,008	8,187	7,964	8,410	8,503	8,413	8,601	8,694	9,632	11,829	15,185
21	11,938	8,739	8,060	8,108	8,536	8,568	8,411	8,650	8,699	9,291	10,801	22,040
22	12,399	8,621	7,950	8,145	8,329	8,740	8,387	8,374	8,528	8,977	10,824	20,012
23	17,925	8,617	8,041	9,584	8,098	8,529	8,326	8,378	10,882	10,304	11,628	14,849
24	21,996	10,049	8,121	8,571	8,155	8,536	8,346	8,388	10,273	9,685	11,981	13,235
25	16,032	9,167	7,916	8,256	9,428	10,590	8,155	8,409	12,346	9,163	11,718	13,516
26	13,944	8,803	7,864	8,392	8,734	8,755	8,200	8,391	10,998	9,205	10,754	16,077
27	12,817	8,758	8,143	8,447	8,448	8,325	8,479	8,386	9,879	9,101	10,465	14,666
28	13,089	8,653	8,287	11,421	8,288	8,618	8,408	8,348	9,453	8,957	10,019	13,425
29	15,916	9,039	8,299	9,004	8,568	8,655	8,370	8,203	9,141	8,908	10,100	12,759
30	16,118	---	8,316	8,517	8,144	8,330	8,379	8,577	8,906	9,137	11,607	19,158
31	13,716	---	9,398	---	8,303	---	8,394	8,564	---	8,570	---	18,560
TOTAL Flow (m3/day)	434,099	347,252	264,225	250,951	261,269	262,315	262,345	258,900	267,742	297,360	344,301	406,575
Average	14,003	11,974	8,523	8,365	8,428	8,744	8,463	8,352	8,925	9,592	11,477	13,115
Maximum	21,996	24,585	9,804	11,421	9,428	10,590	9,127	8,650	12,346	14,073	17,538	22,040
Minimum	10,048	8,617	7,864	7,928	8,067	8,184	8,055	6,452	8,027	7,697	8,835	9,175
n	31	29	31	30	31	30	31	31	30	31	30	31
											Annual Average	**9,993**

Appendix B2 Compliance and Treatment Plant Performance Influent Results 2020

Date 2020	ALK	BOD	CBOD	CL	COD	FC	NH^3	UNION NH_3	NO_2	NO_3	TKN	PO_4	pH	pH@15	TRC	TSS
units	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
3-Jan	---	190	---	---	409	---	---	---	---	---	---	---	---	---	---	---
7-Jan	---	---	---	---	---	---	20	---	0.44	2.08	24	3	7	---	---	---
10-Jan	---	---	---	---	409	---	---	---	---	---	---	---	---	---	---	---
14-Jan	---	---	---	---	---	4,700	0.03	---	0.02	---	---	1	7	---	---	---
15-Jan	---	180	170	70	439	---	28	0.04	<0.005	<0.02	35	4	7	7	---	140
15-Jan	179	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
16-Jan	---	---	---	---	---	7,200,000	26	---	<0.002	---	---	4	7	---	---	---
17-Jan	---	160	---	---	418	---	---	---	---	---	---	---	---	---	---	---
21-Jan	---	---	---	94	---	---	25	---	0.45	0.09	35	---	7	---	---	---
24-Jan	---	71	---	---	256	---	---	---	---	---	---	---	---	---	---	---
31-Jan	---	130	---	---	267	---	---	---	---	---	---	---	---	---	---	---
4-Feb	---	---	---	---	---	---	24	---	0.15	0.04	34	4	7	---	---	---
7-Feb	---	95	---	---	327	---	---	---	---	---	---	---	---	---	---	---
12-Feb	177	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
14-Feb	---	33	---	---	470	---	---	---	---	---	---	---	---	---	---	---
18-Feb	---	---	---	65	---	---	31	---	<0.005	<0.02	41	---	7	---	---	---
21-Feb	---	180	---	---	560	---	---	---	---	---	---	---	---	---	---	---
28-Feb	---	210	---	---	577	---	---	---	---	---	---	---	---	---	---	---
3-Mar	---	---	---	---	---	---	32	---	<0.005	<0.02	41	5	7	---	---	---
6-Mar	---	210	---	---	448	---	---	---	---	---	---	---	---	---	---	---
11-Mar	206	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
13-Mar	---	66	---	---	637	---	---	---	---	---	---	---	---	---	---	---
17-Mar	---	---	---	68	---	---	38	---	0.44	0.06	42	---	8	---	---	---
20-Mar	---	---	---	---	636	---	---	---	---	---	---	---	---	---	---	---
27-Mar	---	210	---	---	687	---	---	---	---	---	---	---	---	---	---	---
3-Apr	---	200	---	---	559	---	---	---	---	---	---	---	---	---	---	---
7-Apr	---	---	13	---	---	2	12	0.02	0.77	10.90	11	4	8	7	---	17
10-Apr	---	100	---	---	707	---	---	---	---	---	---	---	---	---	---	---
14-Apr	230	---	---	63	---	---	40	---	<0.005	<0.02	45	---	8	---	---	---
17-Apr	---	270	---	---	597	---	---	---	---	---	---	---	---	---	---	---
22-Apr	250	150	130	59	584	2,300,000	40	0.05	<0.005	<0.02	39	5	6	7	---	210
24-Apr	---	240	---	---	595	---	---	---	---	---	---	---	---	---	---	---
1-May	---	220	---	---	332	---	---	---	---	---	---	---	---	---	---	---
5-May	---	---	---	---	---	---	41	---	<0.005	<0.02	41	6	7	---	---	---
8-May	---	240	---	---	638	---	---	---	---	---	---	---	---	---	---	---
13-May	219	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
15-May	---	250	---	---	567	---	---	---	---	---	---	---	---	---	---	---

Appendix B2, continued

Date 2020	ALK	BOD	CBOD	CL	COD	FC	NH^3	UNION NH_3	NO_2	NO_3	TKN	PO_4	pH	pH@15	TRC	TSS
units	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
19-May	---	---	---	73	---	---	32	---	<0.005	<0.02	41	---	8	---	---	---
22-May	---	120	---	---	657	---	---	---	---	---	---	---	---	---	---	---
29-May	---	230	---	---	589	---	---	---	---	---	---	---	---	---	---	---
2-Jun	---	---	---	---	---	---	39	---	<0.005	<0.02	44	6	7	---	---	---
5-Jun	---	200	---	---	543	---	---	---	---	---	---	---	---	---	---	---
10-Jun	207	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
12-Jun	---	230	---	---	520	---	---	---	---	---	---	---	---	---	---	---
16-Jun	---	---	---	87	---	---	34	---	<0.005	<0.02	50	---	7	---	---	---
19-Jun	---	260	---	---	594	---	---	---	---	---	---	---	---	---	---	---
26-Jun	---	260	---	---	580	---	---	---	---	---	---	---	---	---	---	---
3-Jul	---	240	---	---	666	---	---	---	---	---	---	---	---	---	---	---
7-Jul	---	---	---	---	---	---	39	---	<0.005	<0.02	45	6	7	---	---	---
10-Jul	---	260	---	---	624	---	---	---	---	---	---	---	---	---	---	---
14-Jul	---	---	---	---	---	7,400,000	42	---	<0.002	---	---	8	8	---	---	---
15-Jul	310	210	260	200	823	750,000	49	0.09	<0.005	<0.02	66	8	8	7	---	250
15-Jul	204	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
16-Jul	---	---	---	---	---	8,200,000	41	---	0.94	---	---	7	7	---	---	---
17-Jul	---	310	---	---	710	---	---	---	---	---	---	---	---	---	---	---
21-Jul	---	---	---	97	---	---	41	---	<0.005	<0.02	50	---	7	---	---	---
24-Jul	---	250	---	---	613	---	---	---	---	---	---	---	---	---	---	---
31-Jul	---	220	---	---	700	---	---	---	---	---	---	---	---	---	---	---
4-Aug	---	---	---	---	---	---	44	---	<0.005	<0.02	55	7	7	---	---	---
7-Aug	---	190	---	---	632	---	---	---	---	---	---	---	---	---	---	---
12-Aug	226	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
14-Aug	---	220	---	---	617	---	---	---	---	---	---	---	---	---	---	---
18-Aug	---	---	---	98	---	---	38	---	<0.005	<0.02	48	---	7	---	---	---
21-Aug	---	---	---	---	555	---	---	---	---	---	---	---	---	---	---	---
28-Aug	---	230	---	---	585	---	---	---	---	---	---	---	---	---	---	---
4-Sep	---	230	---	---	655	---	---	---	---	---	---	---	---	---	---	---
8-Sep	---	---	---	---	---	---	40	---	<0.005	<0.02	48	6	7	---	---	---
11-Sep	---	170	---	---	649	---	---	---	---	---	---	---	---	---	---	---
16-Sep	216	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
18-Sep	---	300	---	---	631	---	---	---	---	---	---	---	---	---	---	---
22-Sep	---	---	---	93	---	---	45	---	<0.005	<0.02	47	---	7	---	---	---
25-Sep	---	180	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Oct	---	---	---	---	652	---	---	---	---	---	---	---	---	---	---	---
2-Oct	---	260	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Oct	---	---	---	---	---	---	44	---	<0.005	<0.02	48	7	7	---	---	---

Appendix B2, continued

Date 2020	ALK	BOD	CBOD	CL	COD	FC	NH^3	UNION NH_3	NO_2	NO_3	TKN	PO_4	pH	pH@15	TRC	TSS
units	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
9-Oct	---	270	---	---	598	---	---	---	---	---	---	---	---	---	---	---
13-Oct	---	---	---	58	---	---	30	---	<0.005	<0.02	32	---	7	---	---	---
16-Oct	---	170	---	---	626	---	---	---	---	---	---	---	---	---	---	---
21-Oct	200	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
22-Oct	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Oct	260	280	270	99	646	10,000,000	40	0.08	<0.005	<0.02	38	6	7	7	---	130
23-Oct	---	150	---	---	449	---	---	---	---	---	---	---	---	---	---	---
30-Oct	---	230	---	---	696	---	---	---	---	---	---	---	---	---	---	---
3-Nov	---	---	---	---	---	---	34	---	<0.005	<0.02	53	4	8	---	---	---
6-Nov	---	200	---	---	516	---	---	---	---	---	---	---	---	---	---	---
13-Nov	---	130	---	---	293	---	---	---	---	---	---	---	---	---	---	---
17-Nov	147	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
20-Nov	---	170	---	---	323	---	---	---	---	---	---	---	---	---	---	---
24-Nov	---	---	---	47	---	---	28	---	0.12	0.07	41	---	7	---	---	---
27-Nov	---	120	---	---	450	---	---	---	---	---	---	---	---	---	---	---
1-Dec	---	---	---	---	---	---	29	---	<0.005	<0.02	35	5	7	---	---	---
3-Dec	---	170	---	---	391	---	---	---	---	---	---	---	---	---	---	---
9-Dec	87	---	---	---	---	---	---	---	---	---	---	---	7	---	---	---
10-Dec	---	190	---	---	482	---	---	---	---	---	---	---	---	---	---	---
14-Dec	---	---	---	57	---	---	28	---	<0.005	<0.02	31	---	7	---	---	---
18-Dec	---	---	---	---	404	---	---	---	---	---	---	---	---	---	---	---
23-Dec	---	86	---	---	287	---	---	---	---	---	---	---	---	---	---	---
30-Dec	---	7	4	---	456	---	---	---	---	---	---	---	---	---	---	---
Mean	208	191	141	83	542	4,481,838	39	0.06	0.11	0.48	41	5.3	7.3	6.8	---	149
Min	87	7	4	47	256	2	22.8	0.02	<0.002	<0.02	11	1.2	6.3	6.7	---	17
Max	310	310	270	200	823	10,000,000	49	0.09	0.94	10.90	66	7.8	8.0	6.9	---	250
n	2	49	3	10	52	7	27	3	28	20	23	3	76	3	---	51

Notes: ALK-alkalinity, BOD-total biochemical oxygen demand, COD-chemical oxygen demand, CL-chloride, COND-conductivity, NH3-ammonia, UNION NH3-unionized ammonia
NO3-nitrate, NO2-nitrite, TDP-total dissolved phosphorus, TP-total phosphorous, TKN-total Kjeldahl nitrogen, CBOD- carbonaceous biochemical oxygen demand, TRC-total residual chlorine, TSS-total suspended solids

Appendix B3 Compliance and Treatment Plant Performance Effluent Results 2020

Date 2020	ALK	BOD	CBOD	CL	COD	FC	NH_3	UNION NH_3	NO_2	NO_3	TKN	PO_4	PH	PH@15	TRC	TSS
units	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2-Jan	---	8	5	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Jan	---	9	5	---	48	---	---	---	---	---	---	---	---	---	---	---
7-Jan	---	---	3.0	---	---	54,000	0.10	<0.0005	0.017	14	<0.2	3	7.2	6.4	---	9.6
10-Jan	---	---	---	---	40	---	---	---	---	---	---	---	---	---	---	---
14-Jan	---	---	---	---	---	13,000	<0.015	---	0.02	---	---	3	6.6	---	---	---
15-Jan	---	8.4	3.6	67	46	---	<0.015	<0.0005	0.01	13	<0.2	1	6.8	6.4	---	6.0
15-Jan	40	---	---	---	---	---	---	---	---	---	---	---	7.3	---	---	---
16-Jan	---	---	---	---	---	8,300,000	34	---	0.003	---	---	4.6	6.9	---	---	---
16-Jan	---	8.5	4.4	---	---	---	---	---	---	---	---	---	---	---	---	---
17-Jan	---	7.8	3.3	---	40	---	---	---	---	---	---	---	---	---	---	---
21-Jan	---	---	4.1	100	---	250,000	0.10	<0.0005	0.02	13.0	1.1	---	7.1	6.5	0.01	8.8
23-Jan	---	7.5	4.6	---	---	---	---	---	---	---	---	---	---	---	---	---
24-Jan	---	5.7	2.6	---	48	---	---	---	---	---	---	---	---	---	---	---
30-Jan	---	5.9	5.2	---	---	---	---	---	---	---	---	---	---	---	---	---
31-Jan	---	6	3	---	32	---	---	---	---	---	---	---	---	---	---	---
4-Feb	---	---	3	---	---	1,100	0.055	<0.0005	0.012	12.4	<0.2	2.7	7.1	6.7	0.04	5.2
6-Feb	---	6.2	3	---	---	---	---	---	---	---	---	---	---	---	---	---
7-Feb	---	5.9	3	---	29	---	---	---	---	---	---	---	---	---	---	---
12-Feb	33	---	---	---	---	8,200	---	---	---	---	---	---	7.2	---	---	---
13-Feb	---	6.7	3	---	---	---	---	---	---	---	---	---	---	---	---	---
14-Feb	---	4.7	3.4	---	35	---	---	---	---	---	---	---	---	---	---	---
18-Feb	---	---	2.8	68	---	28,000	0.063	<0.0005	0.026	16.3	<0.2	---	7.1	6.5	0.10	19.0
20-Feb	---	7.8	2.3	---	---	---	---	---	---	---	---	---	---	---	---	---
21-Feb	---	4.8	2.5	---	41	---	---	---	---	---	---	---	---	---	---	---
27-Feb	---	7.0	3.2	---	---	---	---	---	---	---	---	---	---	---	---	---
28-Feb	---	6.8	2.9	---	50	---	---	---	---	---	---	---	---	---	---	---
3-Mar	---	---	3.3	---	---	7,800	0.11	<0.0005	0.02	16.4	1.2	3.8	6.9	6.4	---	6.0
5-Mar	---	7.5	4.5	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Mar	---	7.7	6.8	---	44	---	---	---	---	---	---	---	---	---	---	---
11-Mar	21	---	---	---	---	3,400	---	---	---	---	---	---	6.8	---	---	---
12-Mar	---	8.8	<2	---	---	---	---	---	---	---	---	---	---	---	---	---
13-Mar	---	8.0	3.8	---	46	---	---	---	---	---	---	---	---	---	---	---
17-Mar	---	---	5.5	68	---	94,000	0.08	<0.0005	0.03	15.4	0.5	---	7.1	6.5	---	12.0
19-Mar	---	9.3	3.4	---	---	---	---	---	---	---	---	---	---	---	---	---
20-Mar	---	8.3	4.0	---	35	---	---	---	---	---	---	---	---	---	---	---
26-Mar	---	9.6	3.8	---	---	---	---	---	---	---	---	---	---	---	---	---
27-Mar	---	12.0	4.4	---	48	---	---	---	---	---	---	---	---	---	---	---

Appendix B3, continued

Date 2020	ALK	BOD	CBOD	CL	COD	FC	NH_3	UNION NH_3	NO_2	NO_3	TKN	PO_4	PH	PH@15	TRC	TSS
units	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2-Apr	---	29.0	7.6	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Apr	---	45.0	9.2	---	72	---	---	---	---	---	---	---	---	---	---	---
7-Apr	---	---	---	---	---	---	35	---	<0.0005	<0.02	45.2	5.7	7.6	---	---	---
9-Apr	---	40.0	14.0	---	---	---	---	---	---	---	---	---	---	---	---	---
10-Apr	---	30.0	9.5	---	49	---	---	---	---	---	---	---	---	---	---	---
14-Apr	39	---	15	68	---	6,400	4.2	0.004	0.9	14.3	2.6	---	7.3	6.5	---	12.0
16-Apr	---	25.0	25	---	---	---	---	---	---	---	---	---	---	---	---	---
17-Apr	---	37.0	28.0	---	61	---	---	---	---	---	---	---	---	---	---	---
22-Apr	68	28.0	23.0	65	59	13,000	6.1	0.01	3.4	10.0	6.0	3.8	5.7	6.5	---	8.4
23-Apr	---	37.0	25.0	---	---	---	---	---	---	---	---	---	---	---	---	---
24-Apr	---	23.0	19.0	---	62	---	---	---	---	---	---	---	---	---	---	---
30-Apr	---	20.0	16.0	---	---	---	---	---	---	---	---	---	---	---	---	---
1-May	---	18.0	14.0	---	38	---	---	---	---	---	---	---	---	---	---	---
5-May	---	---	9.3	---	---	46,000	4.5	0.005	2.5	11.3	6.1	4.8	7.0	6.7	---	9.6
7-May	---	19.0	6.0	---	---	---	---	---	---	---	---	---	---	---	---	---
8-May	---	20.0	6.8	---	42	---	---	---	---	---	---	---	---	---	---	---
13-May	62	---	---	---	---	44,000	---	---	---	---	---	---	7.4	---	---	---
14-May	---	25.0	6.0	---	---	---	---	---	---	---	---	---	---	---	---	---
15-May	---	22.0	6.4	---	44	---	---	---	---	---	---	---	---	---	---	---
19-May	---	---	5.4	76	---	12,000	3.3	0.006	5.2	6.9	2.7	---	7.5	6.8	0.02	8.0
21-May	---	15.0	4.2	---	---	---	---	---	---	---	---	---	---	---	---	---
22-May	---	16.0	3.7	---	41	---	---	---	---	---	---	---	---	---	---	---
28-May	---	13.0	5.5	---	---	---	---	---	---	---	---	---	---	---	---	---
29-May	---	12.0	3.2	---	44	---	---	---	---	---	---	---	---	---	---	---
2-Jun	---	---	4.1	---	---	23,000	5.0	0.012	5.6	5.9	4.0	3.1	7.4	7.0	0.08	7.2
4-Jun	---	16.0	6.5	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Jun	---	16.0	4.9	---	41	---	---	---	---	---	---	---	---	---	---	---
10-Jun	70	---	---	---	---	240,000	---	---	---	---	---	---	7.7	---	---	---
11-Jun	---	22.0	8.1	---	---	---	---	---	---	---	---	---	---	---	---	---
12-Jun	---	25.0	8.4	---	50	---	---	---	---	---	---	---	---	---	---	---
16-Jun	---	---	8.6	92	---	125,000	4.4	0.008	4.7	6.8	5.0	---	7.3	6.8	0.01	9.6
18-Jun	---	17.0	6.0	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Jun	---	16.0	6.3	---	42	---	---	---	---	---	---	---	---	---	---	---
25-Jun	---	19.0	5.9	---	---	---	---	---	---	---	---	---	---	---	---	---
26-Jun	---	19.0	7.3	---	41	---	---	---	---	---	---	---	---	---	---	---
2-Jul	---	12.0	6.1	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Jul	---	13.0	3.8	---	49	---	---	---	---	---	---	---	---	---	---	---
7-Jul	---	---	4.1	---	---	5,800	1.5	0.002	0.8	11.8	3.2	2.4	7.2	6.6	0.03	7.6

Appendix B3, continued

Date 2020	ALK	BOD	CBOD	CL	COD	FC	NH_3	UNION NH_3	NO_2	NO_3	TKN	PO_4	PH	PH@15	TRC	TSS
units	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
9-Jul	---	15.0	4.8	---	---	---	---	---	---	---	---	---	---	---	---	---
10-Jul	---	16.0	5.4	---	56	---	---	---	---	---	---	---	---	---	---	---
14-Jul	---	---	---	---	---	53,000	3.1	---	1.2	---	---	4.3	6.9	---	---	---
15-Jul	58	14.0	6.7	78	50	280,000	0.7	0.001	1.1	12.5	1.3	3.8	6.9	6.6	---	6.0
15-Jul	43	---	---	---	---	67,000	---	---	---	---	---	---	7.2	---	---	---
16-Jul	---	---	---	---	---	14,000	1.2	---	0.912	---	---	0.9	7.4	---	---	---
16-Jul	---	16.0	<15	---	---	---	---	---	---	---	---	---	---	---	---	---
17-Jul	---	15.0	<15	---	43	---	---	---	---	---	---	---	---	---	---	---
21-Jul	---	---	5.4	89	---	9,700	2.4	0.01	0.41	12.6	3.6	---	7.2	7.1	1.3	5.6
23-Jul	---	14.0	4.2	---	---	---	---	---	---	---	---	---	---	---	---	---
24-Jul	---	13.0	3.0	---	53	---	---	---	---	---	---	---	---	---	---	---
30-Jul	---	12.0	4.3	---	---	---	---	---	---	---	---	---	---	---	---	---
31-Jul	---	10.0	4.5	---	41	---	---	---	---	---	---	---	---	---	---	---
4-Aug	---	---	3.8	---	---	21,000	1.3	0.001	0.45	14.1	2.0	5.7	7.1	6.6	---	12.0
6-Aug	---	8.4	3.6	---	---	---	---	---	---	---	---	---	---	---	---	---
7-Aug	---	6.9	2.1	---	38	---	---	---	---	---	---	---	---	---	---	---
12-Aug	53	---	---	---	---	66,000	---	---	---	---	---	---	7.3	---	---	---
13-Aug	---	24.0	6.1	---	---	---	---	---	---	---	---	---	---	---	---	---
14-Aug	---	14.0	4.6	---	43	---	---	---	---	---	---	---	---	---	---	---
18-Aug	---	---	4.4	120	---	41,000	1.7	0.003	0.5	13.0	2.1	---	7.1	6.8	---	7.6
21-Aug	---	---	---	---	39	---	---	---	---	---	---	---	---	---	---	---
27-Aug	---	13.0	4.8	---	---	---	---	---	---	---	---	---	---	---	---	---
28-Aug	---	13.0	5.1	---	42	---	---	---	---	---	---	---	---	---	---	---
3-Sep	---	11.0	4.0	---	---	---	---	---	---	---	---	---	---	---	---	---
4-Sep	---	11.0	3.2	---	35	---	---	---	---	---	---	---	---	---	---	---
8-Sep	---	---	9.4	---	---	520,000	12	0.026	1.3	7.0	10.3	5.8	7.3	6.9	0.02	8.8
10-Sep	---	16.0	5.2	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Sep	---	12.0	3.5	---	49	---	---	---	---	---	---	---	---	---	---	---
16-Sep	39	---	---	---	---	2,100	---	---	---	---	---	---	7.2	---	---	---
17-Sep	---	8.4	2.8	---	---	---	---	---	---	---	---	---	---	---	---	---
18-Sep	---	7.8	2.8	---	45	---	---	---	---	---	---	---	---	---	---	---
22-Sep	---	---	3.7	81	---	39,000	2.2	0.005	1.2	11.8	3.1	---	7.3	6.9	0.02	9.2
24-Sep	---	17.0	5.2	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Sep	---	8.8	4.8	---	---	---	---	---	---	---	---	---	---	---	---	---
1-Oct	---	20.0	9.0	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Oct	---	---	---	---	42	---	---	---	---	---	---	---	---	---	---	---
2-Oct	---	8.0	3.7	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Oct	---	---	8.1	---	---	15,000	2.7	0.004	0.9	12.6	7.0	3.9	6.9	6.8	0.02	8.0

Appendix B3, continued

Date 2020	ALK	BOD	CBOD	CL	COD	FC	NH_3	UNION NH_3	NO_2	NO_3	TKN	PO_4	PH	PH@15	TRC	TSS
units	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
8-Oct	---	10.0	20.0	---	---	---	---	---	---	---	---	---	---	---	---	---
9-Oct	---	9.0	17.0	---	56	---	---	---	---	---	---	---	---	---	---	---
13-Oct	---	---	6.9	60	---	35,000	3.40	0.012	0.88	10.2	3.9	---	7.2	7.1	0.01	8.0
15-Oct	---	13.0	5.6	---	---	---	---	---	---	---	---	---	---	---	---	---
16-Oct	---	5.3	4.6	---	44	---	---	---	---	---	---	---	---	---	---	---
21-Oct	31	---	---	---	---	55,000	---	---	---	---	---	---	7.0	---	---	---
22-Oct	---	5.5	4.3	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Oct	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Oct	30	8.5	3.6	70	50	44,000	0.02	<0.0005	0.16	15.9	1.5	2.1	6.4	6.7	---	4.0
23-Oct	---	5.2	3.7	---	54	---	---	---	---	---	---	---	---	---	---	---
29-Oct	---	9.5	4.7	---	---	---	---	---	---	---	---	---	---	---	---	---
30-Oct	---	9.9	4.6	---	40	---	---	---	---	---	---	---	---	---	---	---
3-Nov	---	---	4.2	---	---	31,000	0.11	<0.0005	0.10	16.3	<0.2	6.1	6.9	6.5	0.02	6.0
5-Nov	---	5.6	3.2	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Nov	---	13.0	14.0	---	56	---	---	---	---	---	---	---	---	---	---	---
12-Nov	---	9.7	4.2	---	---	---	---	---	---	---	---	---	---	---	---	---
13-Nov	---	7.4	3.3	---	37	---	---	---	---	---	---	---	---	---	---	---
17-Nov	40	---	---	---	---	23,000	---	---	---	---	---	---	7.2	---	---	---
19-Nov	---	6.1	3.0	---	---	---	---	---	---	---	---	---	---	---	---	---
20-Nov	---	3.0	3.9	---	42	---	---	---	---	---	---	---	---	---	---	---
24-Nov	---	---	7.7	57	---	22,000	0.04	<0.0005	0.21	14.6	1.2	---	7.0	6.6	0.02	6.4
26-Nov	---	8.2	4.6	---	---	---	---	---	---	---	---	---	---	---	---	---
27-Nov	---	5.6	2.2	---	39	---	---	---	---	---	---	---	---	---	---	---
1-Dec	---	---	2.6	---	---	3,900	0.05	<0.0005	0.02	14.5	2.1	4.2	6.9	6.6	0.02	6.4
3-Dec	---	5.5	3.2	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Dec	---	7.8	4.9	---	32	---	---	---	---	---	---	---	---	---	---	---
9-Dec	26	---	---	---	---	2,000	---	---	---	---	---	---	7.0	---	---	---
10-Dec	---	5.7	4.0	---	---	---	---	---	---	---	---	---	---	---	---	---
10-Dec	---	5.1	2.9	---	25	---	---	---	---	---	---	---	---	---	---	---
14-Dec	---	---	3.1	57	---	65,000	0.04	<0.0005	0.02	8.2	5.4	---	7.0	6.8	---	4.4
18-Dec	---	---	---	---	43	---	---	---	---	---	---	---	---	---	---	---
22-Dec	---	11.0	2.6	---	---	---	---	---	---	---	---	---	---	---	---	---
23-Dec	---	13.0	5.4	---	34	---	---	---	---	---	---	---	---	---	---	---
29-Dec	---	9.6	3.9	---	---	---	---	---	---	---	---	---	---	---	---	---
30-Dec	---	150.0	---	---	38	---	---	---	---	---	---	---	---	---	---	---

Appendix B3, continued

Date 2020	ALK	BOD	CBOD	CL	COD	FC	NH_3	UNION NH_3	NO_2	NO_3	TKN	PO_4	PH	PH@15	TRC	TSS
units	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Mean	44	14.5	6.1	76.0	44.3	267,085	4.0	0.0039	1.0	11.8	4.3	3.7	7.1	6.7	0.1	8.2
Min	21	3.0	<2	57.0	25.0	1100.0	<0.015	<0.0005	<0.005	<0.02	<0.2	0.9	5.7	6.4	0.0	4.0
Max	70	150	28.0	120	72.0	8,300,000	35.0	0.0260	5.6	16.4	45.2	6.1	8	7.1	1.3	19.0
n	2	103	125	10	55	41	29	26	29	27	6	17	79	26	15	74

Notes: ALK-alkalinity, BOD-total biochemical oxygen demand, COD-chemical oxygen demand, CL-chloride, COND-conductivity, NH3-ammonia, union NH3-unionized ammonia, NO3-nitrate, NO2-nitrite, TDP-total dissolved phosphorus, TP-total phosphorous, TKN-total Kjeldahl nitrogen, CBOD- carbonaceous biochemical oxygen demand, UN NH3-unionized ammonia, TRC-total residual chlorine, TSS-total suspended solids

Appendix B4 Influent and Effluent Priority Substance Concentrations 2020

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
Alkalinity - Bicarbonate	TOT	mg/L	---	---	---	---	---	---	250	68	---	---	310	58	---	---	260	30
Alkalinity - Carbonate	TOT	mg/L	---	---	---	---	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Alkalinity - Hydroxide	TOT	mg/L	---	---	---	---	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Alkalinity - Phenolphthalein - Ph 8.3	TOT	mg/L	---	---	---	---	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Alkalinity - Total - Ph 4.5	TOT	mg/L	---	---	---	---	---	---	210	56	---	---	260	47	---	---	210	25
Biochemical Oxygen Demand	TOT	mg/L	---	---	180	8.4	---	---	150	28	---	---	210	14	---	---	280	8.5
Carbonaceous Biochemical Oxygen Demand	TOT	mg/L	---	---	170	3.6	---	---	130	23	---	---	260	6.7	---	---	270	3.6
Chemical Oxygen Demand	TOT	mg/L	---	---	439	46	---	---	584	59	---	---	823	50	---	---	646	50
Chloride	TOT	mg/L	---	---	70	67	---	---	59	65	---	---	200	78	---	---	99	70
Hardness (as CaCO3)	DIS	mg/L	84.4	91.1	84.3	82.7	85.1	82	82.8	83.1	73.5	82	118	81.5	77.1	79.2	76.6	74.1
Hardness (as CaCO3)	TOT	mg/L	82.8	86.6	86.8	82	87.3	88.3	88.4	82.5	86.1	79.3	137	83.4	88.7	79.7	86.6	77.3
Oil & Grease, Total	TOT	mg/L	<1	<1	14	<1	20	9.2	14	<1	13	<1	15	<1	20	<1	8.4	<1
Oil & Grease, Mineral	TOT	mg/L	<2	<2	2.1	<2	3	<2	<2	<2	<2	<2	4.1	<2	<2	<2	<2	<2
pH	TOT	pH	7.31	7.33	7.84	7.45	7.58	7.44	7.07	6.83	7.52	7.41	7.33	6.97	7.45	7.36	7.08	6.64
pH @ 15°C	TOT	pH	---	---	6.71	6.42	---	---	6.67	6.51	---	---	6.83	6.57	---	---	6.87	6.74
SAD Cyanide	TOT	mg/L	0.001	0.001	0.002	0.001	0.001	0.002	<0.0025	0.002	0.003	0.002	0.003	0.003	0.003	0.001	<0.0025	0.002
Specific Conductivity - 25°C	TOT	µS/cm	---	---	660	450	---	---	680	500	---	---	1300	520	---	---	840	480
Sulfide	TOT	mg/L	0.02	0.26	0.17	0.02	0.01	0.39	0.30	<0.0018	0.55	0.01	2.80	0.04	1.60	0.01	1.70	0.02
Sulfur	TOT	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sulphate	TOT	mg/L	---	---	---	---	---	---	22	26	---	---	42	28	---	---	28	30
Temperature	TOT	°C	6.1	8.6	9.2	10	10	10.9	14.5	15.8	19.3	20.8	19.4	21.3	---	---	17.9	17.2
Total Organic Carbon	TOT	mg/L	---	---	27	12	---	---	37	18	---	---	45	14	---	---	53	22
Total Suspended Solids	TOT	mg/L	---	---	140	6	---	---	210	8.4	---	---	250	6	---	---	130	4
WAD Cyanide	TOT	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	<0.0025	0.001	0.001	0.001	0.003	0.002	0.002	0.002	<0.0025	0.001
Kjeldahl Nitrogen	TOT	mg/L	---	---	35.1	<0.2	---	---	39.4	5.95	---	---	66.2	1.31	---	---	37.8	1.48
N - Nh3 (As N)	TOT	mg/L	0.033	<0.015	28	<0.015	26	34	40	6.1	42	3.1	49	0.7	41	1.2	40	0.019
N - Nh3 (As N)- Unionized	TOT	mg/L	---	---	0.039	<0.0005	---	---	0.051	0.0055	---	---	0.088	0.00071	---	---	0.081	<0.0005
N - No2 (As N)	TOT	mg/L	0.015	0.020	<0.005	0.012	<0.002	0.003	<0.005	3.370	<0.002	1.230	<0.005	1.140	0.942	0.912	<0.005	0.157
N - No3 (As N)	TOT	mg/L	---	---	<0.02	13.2	---	---	<0.02	9.98	---	---	<0.02	12.5	---	---	<0.02	15.9
N - No3 + No2 (As N)	TOT	mg/L	---	---	<0.02	13.2	---	---	---	---	---	---	<0.02	13.6	---	---	<0.02	16.1
Nitrogen as N	TOT	mg/L	---	---	35.1	13.1	---	---	39.4	19.3	---	---	66.2	14.9	---	---	37.8	17.6
P - Po4 - Ortho (As P)	TOT	mg/L	---	---	2	2.1	---	---	3.4	3.5	---	---	4.9	3.3	---	---	3.9	1.5
P - Po4 - Total (As P)	TOT	µg/L	1,180	2,550	4,120	900	4,030	4,620	5,410	3,840	7,650	4,300	7,790	3,840	7,170	914	6,250	2,080
Enterococci	TOT	CFU/100 mL	2,900	5,100	170,000	1,200	1,800,000	1,300,000	890,000	5,600	1,200,000	7,200	880,000	17,000	970,000	1,600	1,800,000	4,700
Fecal Coliforms	TOT	CFU/100 mL	4,700	13,000	---	---	7,200,000	8,300,000	2,300,000	13,000	7,400,000	53,000	750,000	280,000	8,200,000	14,000	10,000,000	44,000
Aluminum	DIS	µg/L	10.1	12.4	29.2	12.2	34.2	28.2	27	10.9	28.2	11.5	19.1	11.9	24.1	10.5	27.2	12
Antimony	DIS	µg/L	0.17	0.19	0.22	0.19	0.20	0.19	0.15	0.20	0.20	0.22	0.14	0.22	0.22	0.21	0.19	0.19
Arsenic	DIS	µg/L	0.22	0.29	0.31	0.23	0.35	0.33	0.30	0.21	0.37	0.27	0.39	0.29	0.35	0.24	0.27	0.16
Barium	DIS	µg/L	6.71	6.76	6.98	6.81	7.28	6.16	10.20	8.41	8.14	7.74	7.81	7.60	8.26	8.05	8.19	6.98
Beryllium	DIS	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	DIS	µg/L	0.039	0.040	0.038	0.036	0.037	0.025	0.028	0.010	0.033	0.023	0.019	0.019	0.038	0.019	0.023	0.032
Calcium	DIS	mg/L	20.5	22	19.9	20.4	20.4	18.2	21.5	22.2	18.9	21.5	23.7	21.6	19.5	21.5	17.4	19.1
Chromium	DIS	µg/L	0.31	0.33	0.5	0.41	0.55	0.38	0.57	0.53	0.72	0.54	0.4	1	0.87	0.69	0.45	0.37
Cobalt	DIS	µg/L	0.201	0.21	0.23	0.20	0.24	0.24	0.24	0.24	0.22	0.23	0.20	0.23	0.23	0.23	0.22	0.21
Copper	DIS	µg/L	11.7	10.5	46.5	11.1	44.4	49.5	41.5	16.6	64.4	14.2	49.6	13.4	65	13.2	56.3	17.9
Iron	DIS	µg/L	31.7	30.2	112	31.1	105	114	267	109	222	61.3	215	64.7	184	65.9	221	56.2
Lead	DIS	µg/L	0.228	0.22	0.53	0.22	0.59	0.61	0.66	0.50	0.93	0.50	0.63	0.49	0.94	0.46	0.84	0.41
Magnesium	DIS	mg/L	8.06	8.8	8.37	7.71	8.32	8.86	7.08	6.71	6.38	6.88	14.4	6.7	6.87	6.2	8.06	6.41
Manganese	DIS	µg/L	24.2	25.7	26.1	22.2	25.1	24.3	31.2	30.6	28.4	26.1	29.4	23	28.9	25.4	32.7	18.8
Mercury	DIS	µg/L	0.002	0.003	<0.002	<0.002	0.002	0.003	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	0.002	<0.0019

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
Molybdenum	DIS	µg/L	0.948	1.13	1.49	1.06	1.38	1.09	0.89	1.39	0.87	1.03	0.63	0.77	1.92	1.04	1.00	1.25
Nickel	DIS	µg/L	1.38	1.30	1.70	1.39	1.62	1.47	1.86	1.67	2.07	1.91	1.68	1.97	2.14	2.05	2.29	2.13
Phosphorus	DIS	µg/L	960	2,600	3,210	839	2,860	3,000	4,700	3,690	4,570	4,010	5,220	3,620	4,180	673	5,200	1,730
Potassium	DIS	mg/L	11.4	10.4	11.8	10.7	11.1	13	15.4	15.9	16.7	16.7	18.8	16.2	16.8	16	15.5	12.8
Selenium	DIS	µg/L	0.126	0.11	0.202	0.118	0.208	0.224	0.147	0.169	0.412	0.214	0.207	0.175	1.22	0.242	0.163	0.145
Silver	DIS	µg/L	<0.005	<0.005	0.0213	<0.005	0.023	0.0266	0.0242	0.0088	0.0378	<0.005	0.041	0.0096	0.0487	0.0051	0.028	<0.005
Sodium	DIS	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Thallium	DIS	µg/L	<0.002	<0.002	<0.002	<0.002	0.003	0.002	<0.002	<0.002	0.007	<0.002	<0.002	<0.002	0.006	0.002	<0.002	<0.002
Tin	DIS	µg/L	0.27	0.25	0.61	0.3	0.54	0.69	0.4	0.36	0.82	0.49	0.7	0.54	0.88	0.45	0.96	0.37
Zinc	DIS	µg/L	32.1	33	30.8	31.8	29.7	32.4	12.2	31.3	27.5	37.6	20.5	34.6	29.2	34.4	13.2	39.9
Aluminum	TOT	µg/L	27.5	31.6	152	19.9	284	184	241	20.6	348	20.8	260	18	266	16.5	255	21.5
Antimony	TOT	µg/L	0.179	0.206	0.232	0.172	0.261	0.261	0.183	0.21	0.541	0.228	0.156	0.214	0.388	0.235	0.23	0.186
Arsenic	TOT	µg/L	0.234	0.298	0.313	0.212	0.407	0.371	0.435	0.216	0.559	0.244	0.473	0.266	0.49	0.244	0.353	0.212
Barium	TOT	µg/L	7.03	7.02	12.6	6.91	17	11.6	16	8.56	24.5	8.19	25.2	8.25	23.7	8.78	17.7	7.65
Beryllium	TOT	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Cadmium	TOT	µg/L	0.045	0.050	0.201	0.043	0.233	0.131	0.162	0.020	0.216	0.024	0.163	0.023	0.205	0.018	0.163	0.041
Calcium	TOT	mg/L	20.2	21.1	21.1	20.2	21.6	20.2	23.6	21.9	23.2	20.5	29.1	22.1	23.6	21.8	21	19.8
Chromium	TOT	µg/L	0.4	0.41	0.86	0.38	1.33	0.86	1.07	0.55	4.68	0.67	1.13	1.01	1.73	0.74	1.08	0.42
Chromium Iii	TOT	mg/L	<0.00099	<0.00099	<0.00099	<0.00099	0.0013	<0.00099	---	---	---	---	---	---	---	---	---	---
Chromium Vi	TOT	mg/L	<0.00099	<0.00099	<0.00099	<0.00099	<0.00099	<0.00099	0.0022	<0.00099	<0.00099	<0.00099	<0.00099	<0.00099	<0.0099	<0.00099	<0.00099	<0.00099
Cobalt	TOT	µg/L	0.21	0.217	0.291	0.209	0.366	0.339	0.39	0.232	0.532	0.228	0.414	0.233	0.424	0.236	0.44	0.252
Copper	TOT	µg/L	15.7	14.7	68	14.4	74.2	80.1	93.8	22.7	159	20.4	84.2	19.9	142	17.4	112	23.8
Iron	TOT	µg/L	61.9	61.5	239	39	433	322	403	122	769	81.4	793	80.1	585	96.6	468	72.6
Lead	TOT	µg/L	0.313	0.314	1.49	0.324	1.47	1.38	2.34	0.545	3.9	0.609	4.88	0.607	2.91	0.561	2.64	0.505
Magnesium	TOT	mg/L	7.84	8.26	8.27	7.66	8.07	9.19	7.14	6.77	6.85	6.81	15.5	6.88	7.22	6.14	8.31	6.75
Manganese	TOT	µg/L	26.5	26.2	34.4	25	33.8	34.4	38.8	32	46	34.2	48.1	35	45.9	36.1	45.5	27.5
Mercury	TOT	µg/L	<0.002	0.0048	<0.04	<0.002	0.0098	<0.02	<0.038	<0.038	<0.019	<0.0019	0.0075	0.0025	<0.019	0.0023	0.0092	0.0032
Methyl Mercury	TOT	ng/L	---	---	0.302	<0.032	---	---	0.525	0.068	---	---	0.83	0.056	---	---	0.543	0.032
Molybdenum	TOT	µg/L	0.965	1.12	1.38	0.998	1.68	1.36	1.16	1.38	2.41	1.06	0.816	0.785	2.96	1.06	1.39	1.29
Nickel	TOT	µg/L	1.36	1.36	2.99	1.44	2.18	1.9	2.48	1.74	4.61	1.85	3.5	2.06	3.02	2.13	3	2.34
Potassium	TOT	mg/L	11	9.78	11.9	10.7	10.9	13	15	15.5	17.7	16.3	20.1	16.6	17.4	16.3	15.6	13.3
Selenium	TOT	µg/L	0.142	0.13	0.26	0.113	0.347	0.371	0.274	0.168	0.574	0.179	0.375	0.196	0.444	0.182	0.321	0.16
Silver	TOT	µg/L	<0.01	0.012	0.019	<0.01	0.085	0.082	0.025	0.023	0.629	0.018	0.028	0.011	0.199	0.013	0.028	0.012
Sodium	TOT	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Thallium	TOT	µg/L	<0.002	<0.002	0.002	<0.002	0.005	0.004	0.005	<0.002	0.014	0.006	0.009	<0.002	0.009	0.004	0.006	<0.002
Tin	TOT	µg/L	0.31	0.24	0.7	0.26	0.84	1.22	0.91	0.31	1.23	0.51	1.07	0.43	1.19	0.4	1.06	0.37
Total Chromium III	TOT	mg/L	---	---	---	---	---	---	<0.00099	<0.00099	0.005	<0.00099	0.001	0.001	<0.0099	<0.00099	0.001	<0.00099
Zinc	TOT	µg/L	34.3	33.9	68.6	33	71.5	73.1	104	32.7	182	40.3	144	37.7	134	36.5	130	44
Dibutyltin	TOT	µg/L	---	---	0.004	<0.001	---	---	0.003	<0.001	---	---	<0.001	<0.001	---	---	0.002	<0.001
Dibutyltin Dichloride	TOT	µg/L	---	---	0.005	<0.001	---	---	0.004	<0.001	---	---	<0.001	<0.001	---	---	0.002	<0.001
Monobutyltin	TOT	µg/L	---	---	0.011	0.008	---	---	0.006	0.015	---	---	<0.001	<0.001	---	---	0.005	0.013
Monobutyltin Trichloride	TOT	µg/L	---	---	0.017	0.013	---	---	0.01	0.024	---	---	<0.001	<0.001	---	---	0.008	0.021
Tributyltin	TOT	µg/L	---	---	<0.001	<0.001	---	---	<0.001	<0.001	---	---	<0.001	<0.001	---	---	<0.001	<0.001
Tributyltin Chloride	TOT	µg/L	---	---	<0.001	<0.001	---	---	<0.001	<0.001	---	---	<0.001	<0.001	---	---	<0.001	<0.001
Acrolein	TOT	µg/L	---	---	<2.8	<2.8	---	---	<2.8	<2.8	---	---	<2.8	<2.8	---	---	<2.8	<2.8
2-Methyl-4,6-Dinitrophenol	TOT	µg/L	---	---	---	---	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<2.5	<2.5
2-Nitrophenol	TOT	µg/L	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<2.5	<2.5
4-Nitrophenol	TOT	µg/L	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<4	<2.5	---	---	<2.5	<2.5
4-n-Octylphenol	TOT	ng/L	---	---	<2.92	<2.71	---	---	---	---	---	---	---	---	---	---	---	---
4-Nonylphenol Diethoxylates	TOT	ng/L	---	---	753	289	---	---	424	441	---	---	1,420	<15.2	---	---	1,180	40
4-Nonylphenol Monoethoxylates	TOT	ng/L	---	---	2,460	389	---	---	5,610	458	---	---	8,980	462	---	---	5,860	212
Np	TOT	ng/L	---	---	676	194	---	---	1,840	77	---	---	2,620	155	---	---	2,790	142

Appendix B4, cont'd

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
Octylphenol	TOT	ng/L	---	---	---	---	---	---	<4.72	<3.86	---	---	<6.04	<2.86	---	---	<5.66	<3.2
Phenol	TOT	µg/L	---	---	10	<2.5	---	---	10.3	<2.5	---	---	13.6	<2.5	---	---	9	<2.5
Total Phenols			TOT	mg/L	---	---	0.042	<0.0075	---	---	0.053	0.004	---	---	0.051	<0.0075	---	---
Pentachlorophenol	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
Bis(2-Ethylhexyl)Phthalate	TOT	µg/L	---	---	<5	<5	---	---	<5	<5	---	---	7.6	<5	---	---	6.7	<5
Butylbenzyl Phthalate	TOT	µg/L	---	---	---	---	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<2.5	<2.5
Diethyl Phthalate	TOT	µg/L	---	---	1.7	<0.25	---	---	1.48	0.34	---	---	0.91	<0.25	---	---	<0.25	<0.25
Dimethyl Phthalate	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	---	---	---	---	<0.25	<0.25
Di-N-Butyl Phthalate	TOT	µg/L	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<2.5	<2.5
Di-N-Octyl Phthalate	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
N-Butylbenzyl Phthalate	TOT	µg/L	---	---	<2.5	<2.5	---	---	---	---	---	---	---	---	---	---	---	---
Acrylonitrile	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Alpha-Terpineol	TOT	µg/L	---	---	5.4	<5	---	---	6.4	<5	---	---	6.7	<5	---	---	7.3	<5
1,1,1,2-Tetrachloroethane	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,1,1-trichloroethane	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,1,2,2-tetrachloroethane	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,1,2-trichloroethane	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,1-dichloroethane	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,1-dichloroethene	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,2,4-trichlorobenzene	TOT	µg/L	---	---	<0.2	<0.2	---	---	<0.2	<0.2	---	---	<0.2	<0.2	---	---	<0.2	<0.2
1,2-dibromoethane	TOT	µg/L	---	---	<0.2	<0.2	---	---	<0.2	<0.2	---	---	<0.2	<0.2	---	---	<0.2	<0.2
1,2-dichlorobenzene	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,2-dichloroethane	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,2-dichloropropane	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,2-diphenylhydrazine	TOT	µg/L	---	---	<0.05	<0.05	---	---	<0.05	<0.05	---	---	<0.05	<0.05	---	---	<0.05	<0.05
1,3-dichlorobenzene	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,4-dichlorobenzene	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
1,4-dioxane	TOT	µg/L	---	---	<0.1	0.45	---	---	<0.16	<0.33	---	---	0.17	0.41	---	---	0.31	0.33
2,4 + 2,5 Dichlorophenol	TOT	µg/L	---	---	---	---	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
2,4 + 2,5-Dichlorophenol	TOT	µg/L	---	---	<0.5	<0.5	---	---	---	---	---	---	---	---	---	---	---	---
2,4,6-trichlorophenol	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
2,4-dimethylphenol	TOT	µg/L	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<2.5	<2.5	---	---	<2.5	<2.5
2,4-dinitrophenol	TOT	µg/L	---	---	<6.5	<6.5	---	---	<6.5	<6.5	---	---	<6.5	<6.5	---	---	<6.5	<6.5
2,4-dinitrotoluene	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
2,6-dinitrotoluene	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
3,3-dichlorobenzidine	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
4,6-dinitro-2-methylphenol	TOT	µg/L	---	---	<2.5	<2.5	---	---	---	---	---	---	---	---	---	---	---	---
cis-1,3-dichloropropene	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Dichlorodifluoromethane	TOT	µg/L	---	---	<2	<2	---	---	<2	<2	---	---	<2	<2	---	---	<2	<2
Methyl Tertiary Butyl Ether	TOT	µg/L	---	---	<4	<4	---	---	<4	<4	---	---	<4	<4	---	---	<4	<4
Nitrobenzene	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
N-Nitrosodimethylamine	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
N-Nitrosodi-N-Propylamine	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
N-Nitrosodiphenylamine	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
trans-1,3-dichloropropene	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Benzene	TOT	µg/L	---	---	<0.4	<0.4	---	---	<0.4	<0.4	---	---	<0.4	<0.4	---	---	<0.4	<0.4
Ethylbenzene	TOT	µg/L	---	---	<0.4	<0.4	---	---	<0.4	<0.4	---	---	<0.4	<0.4	---	---	<0.4	<0.4
M & P Xylenes	TOT	µg/L	---	---	<0.4	<0.4	---	---	0.71	<0.4	---	---	<0.4	<0.4	---	---	<0.4	<0.4
O-Xylene	TOT	µg/L	---	---	<0.4	<0.4	---	---	0.44	<0.4	---	---	<0.4	<0.4	---	---	<0.4	<0.4
Styrene	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
Toluene	TOT	µg/L	---	---	0.51	<0.4	---	---	1.6	<0.6	---	---	2	<0.4	---	---	1.9	<0.4
Xylenes	TOT	µg/L	---	---	<0.4	<0.4	---	---	1.2	<0.4	---	---	<0.4	<0.4	---	---	<0.4	<0.4

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
2-Chloronaphthalene	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
4-Bromophenyl Phenyl Ether	TOT	µg/L	---	---	<0.05	<0.05	---	---	<0.05	<0.05	---	---	<0.05	<0.05	---	---	<0.05	<0.05
4-Chlorophenyl Phenyl Ether	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
Bis(2-Chloroethoxy)Methane	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
Bis(2-Chloroethyl)Ether	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
Bis(2-Chloroisopropyl)Ether	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
Bromodichloromethane	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Bromomethane	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Chlorobenzene	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
Chlorodibromomethane	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Chloroethane	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Chloroethene	TOT	µg/L	---	---	---	---	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
Chloromethane	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Cis-1,2-Dichloroethene	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Dibromomethane	TOT	µg/L	---	---	<0.9	<0.9	---	---	<2	<2	---	---	9.6	<2	---	---	<2	<2
Dichloromethane	TOT	µg/L	---	---	4.3	<2	---	---	---	---	---	---	---	---	---	---	---	---
Hexachlorobutadiene	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
Hexachlorocyclopentadiene	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
Hexachloroethane	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
Tetrabromomethane	TOT	µg/L	---	---	<50	<50	---	---	<50	<50	---	---	<50	<50	---	---	<50	<50
Tetrachloroethene	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
Tetrachloromethane	TOT	µg/L	---	---	---	---	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
Trans-1,2-Dichloroethene	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Tribromomethane	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
Trichloroethene	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	2.9	<0.5
Trichlorofluoromethane	TOT	µg/L	---	---	<4	<4	---	---	<4	<4	---	---	<4	<4	---	---	<4	<4
Trichloromethane	TOT	µg/L	---	---	---	---	---	---	3.5	1.2	---	---	2.8	1.1	---	---	3.5	1.3
Vinyl Chloride	TOT	µg/L	---	---	<0.5	<0.5	---	---	---	---	---	---	---	---	---	---	---	---
2-Chlorophenol	TOT	µg/L	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5	---	---	<0.5	<0.5
4-Chloro-3-Methylphenol	TOT	µg/L	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1	---	---	<1	<1
4-Methyl-2-Pentanone	TOT	µg/L	---	---	<10	<10	---	---	<10	<10	---	---	<10	<10	---	---	<10	<10
Dimethyl Ketone	TOT	µg/L	---	---	73	<15	---	---	100	21	---	---	52	<15	---	---	77	<15
Isophorone	TOT	µg/L	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25	---	---	<0.25	<0.25
Methyl Ethyl Ketone	TOT	µg/L	---	---	<50	<50	---	---	<50	<50	---	---	<50	<50	---	---	<50	<50
Carbon Tetrachloride	TOT	µg/L	---	---	<0.5	<0.5	---	---	---	---	---	---	---	---	---	---	---	---
Chloroform	TOT	µg/L	---	---	2.2	<1	---	---	---	---	---	---	---	---	---	---	---	---
1-Methylphenanthrene	TOT	ng/L	---	---	5.45	0.77	---	---	9.02	1.44	---	---	16	1.21	---	---	14.4	1.25
2-Methylnaphthalene	TOT	µg/L	---	---	0.031	<0.01	---	---	0.14	<0.01	---	---	0.031	<0.01	---	---	0.15	<0.01
2-Methylnaphthalene	TOT	ng/L	---	---	19.7	1.59	---	---	35	2.25	---	---	52.6	3.75	---	---	54.4	3.27
Acenaphthene	TOT	µg/L	---	---	0.032	<0.01	---	---	<0.01	<0.01	---	---	0.047	<0.01	---	---	0.073	<0.01
Acenaphthene	TOT	ng/L	---	---	30.2	4.25	---	---	29	11.8	---	---	72.8	9.13	---	---	117	14.8
Acenaphthylene	TOT	µg/L	---	---	0.25	<0.01	---	---	0.15	<0.01	---	---	<0.01	<0.01	---	---	<0.01	<0.01
Acenaphthylene	TOT	ng/L	---	---	0.991	0.301	---	---	1.05	0.59	---	---	3.22	0.436	---	---	1.46	0.747
Anthracene	TOT	µg/L	---	---	<0.01	0.012	---	---	<0.01	<0.01	---	---	0.031	0.013	---	---	<0.01	<0.01
Anthracene	TOT	ng/L	---	---	4.54	<0.13	---	---	6.39	0.232	---	---	14	0.248	---	---	12.6	0.333
Benz[a]anthracene	TOT	ng/L	---	---	2.98	0.223	---	---	---	---	---	---	---	---	---	---	---	---
Benzo(A)Anthracene	TOT	µg/L	---	---	<0.01	<0.01	---	---	<0.01	<0.01	---	---	0.015	<0.01	---	---	0.08	<0.01
Benzo(A)Anthracene	TOT	ng/L	---	---	---	---	---	---	22.3	0.425	---	---	29.4	0.968	---	---	9.94	0.245
Benzo(A)Pyrene	TOT	µg/L	---	---	<0.005	0.006	---	---	<0.005	<0.005	---	---	0.009	<0.005	---	---	0.007	<0.005
Benzo(A)Pyrene	TOT	ng/L	---	---	---	---	---	---	21.5	0.142	---	---	28.1	1.11	---	---	6.4	<0.171
Benzo(B)Fluoranthene	TOT	µg/L	---	---	0.013	<0.01	---	---	<0.01	<0.01	---	---	0.014	<0.01	---	---	<0.01	<0.01
Benzo(B)Fluoranthene	TOT	ng/L	---	---	---	---	---	---	20.6	0.31	---	---	25.9	0.936	---	---	7.01	0.14

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
Benzo(B)Fluoranthene + Benzo(J)Fluoranthene	TOT	µg/L	---	---	0.013	<0.01	---	---	<0.01	<0.01	---	---	0.03	<0.01	---	---	<0.01	<0.01
Benzo(E)Pyrene	TOT	ng/L	---	---	---	---	---	---	15.3	0.285	---	---	22.7	0.742	---	---	5.61	0.19
Benzo(G,H,I)Perylene			TOT	µg/L	---	---	<0.02	<0.02	---	---	<0.02	<0.02	---	---	<0.02	<0.02	---	---
Benzo(G,H,I)Perylene	TOT	ng/L	---	---	---	---	---	---	16.3	0.302	---	---	22.8	0.931	---	---	5.61	0.288
Benzo(K)Fluoranthene	TOT	µg/L	---	---	<0.01	<0.01	---	---	<0.01	<0.01	---	---	0.011	<0.01	---	---	<0.01	<0.01
Benzo[a]pyrene	TOT	ng/L	---	---	2.26	0.163	---	---	---	---	---	---	---	---	---	---	---	---
Benzo[b]fluoranthene	TOT	ng/L	---	---	2.52	0.222	---	---	---	---	---	---	---	---	---	---	---	---
Benzo[e]pyrene	TOT	ng/L	---	---	2.87	0.22	---	---	---	---	---	---	---	---	---	---	---	---
Benzo[ghi]perylene	TOT	ng/L	---	---	2.35	0.218	---	---	---	---	---	---	---	---	---	---	---	---
Benzo[J,K]Fluoranthenes	TOT	ng/L	---	---	2.32	0.145	---	---	21.2	0.192	---	---	25.6	0.857	---	---	6.3	<0.117
Chrysene	TOT	µg/L	---	---	0.034	<0.01	---	---	<0.01	<0.01	---	---	0.028	<0.01	---	---	0.021	<0.01
Chrysene	TOT	ng/L	---	---	5.19	0.569	---	---	27.7	0.942	---	---	28	1.5	---	---	15.1	0.727
Dibenz[a,h]anthracene	TOT	ng/L	---	---	3.45	<0.167	---	---	---	---	---	---	---	---	---	---	---	---
Dibenzo(A,H)Anthracene	TOT	µg/L	---	---	<0.02	<0.02	---	---	<0.02	<0.02	---	---	<0.02	<0.02	---	---	<0.02	<0.02
Dibenzo(A,H)Anthracene	TOT	ng/L	---	---	---	---	---	---	3.8	<0.218	---	---	5.77	0.289	---	---	0.901	<0.206
Dibenzothiophene	TOT	ng/L	---	---	10.9	0.681	---	---	12	2.21	---	---	26	2.04	---	---	36.2	2.34
Fluoranthene	TOT	µg/L	---	---	0.018	0.011	---	---	0.021	<0.01	---	---	0.069	<0.01	---	---	0.079	0.029
Fluoranthene	TOT	ng/L	---	---	30.1	4.56	---	---	60.8	7.35	---	---	98.8	10.9	---	---	90.8	9.04
Fluorene	TOT	µg/L	---	---	0.058	<0.01	---	---	0.037	<0.01	---	---	0.082	<0.01	---	---	0.061	<0.01
Fluorene	TOT	ng/L	---	---	20.2	1.81	---	---	20.9	5.98	---	---	36.7	6.45	---	---	55.2	4.32
Indeno(1,2,3-C,D)Pyrene	TOT	µg/L	---	---	<0.02	<0.02	---	---	<0.02	<0.02	---	---	<0.02	<0.02	---	---	<0.02	<0.02
Indeno(1,2,3-C,D)Pyrene	TOT	ng/L	---	---	---	---	---	---	17.9	0.374	---	---	25.6	1.09	---	---	4.41	<0.195
Indeno[1,2,3-cd]pyrene	TOT	ng/L	---	---	3.64	<0.227	---	---	---	---	---	---	---	---	---	---	---	---
Naphthalene	TOT	µg/L	---	---	0.04	<0.01	---	---	0.18	0.07	---	---	0.09	0.01	---	---	0.09	0.02
Naphthalene	TOT	ng/L	---	---	65.8	3.96	---	---	369	90.1	---	---	171	8.37	---	---	235	10.6
Perylene	TOT	ng/L	---	---	1.74	<0.135	---	---	5.73	<0.125	---	---	6.46	0.244	---	---	1.83	<0.165
Phenanthrene	TOT	µg/L	---	---	0.06	0.03	---	---	0.05	0.02	---	---	0.15	0.02	---	---	0.18	0.01
Phenanthrene	TOT	ng/L	---	---	99.2	7.63	---	---	111	22.8	---	---	208	16.9	---	---	294	18.8
Pyrene	TOT	µg/L	---	---	0.01	<0.01	---	---	0.02	<0.01	---	---	0.03	<0.01	---	---	0.06	<0.01
Pyrene	TOT	ng/L	---	---	19.3	3.05	---	---	48.5	4.92	---	---	76.5	6.21	---	---	51.1	4.69
Total Hmw-Pah'S	TOT	µg/L	---	---	0.08	<0.02	---	---	0.04	<0.02	---	---	0.19	<0.02	---	---	0.25	0.03
Total Lmw-Pah'S	TOT	µg/L	---	---	0.50	<0.05	---	---	0.56	0.09	---	---	0.43	0.04	---	---	0.55	0.04
Total Pahs	TOT	µg/L	---	---	0.57	0.05	---	---	0.60	0.09	---	---	0.62	0.04	---	---	0.80	0.06
Pbde 10	TOT	pg/L	---	---	---	<1.36	---	---	---	<1.34	---	---	---	<1.36	---	---	---	<1.33
Pbde 100	TOT	pg/L	---	---	---	251	---	---	---	908	---	---	---	402	---	---	---	354
Pbde 105	TOT	pg/L	---	---	---	<3.63	---	---	---	<6.65	---	---	---	<4.01	---	---	---	<2.37
Pbde 116	TOT	pg/L	---	---	---	<4.09	---	---	---	<9.01	---	---	---	<5.05	---	---	---	<3.03
Pbde 119/120	TOT	pg/L	---	---	---	2.99	---	---	---	13.8	---	---	---	8.68	---	---	---	6.4
Pbde 12/13	TOT	pg/L	---	---	---	<1.36	---	---	---	<1.34	---	---	---	<1.36	---	---	---	<1.33
Pbde 126	TOT	pg/L	---	---	---	<1.65	---	---	---	4.62	---	---	---	3.11	---	---	---	<1.33
Pbde 128	TOT	pg/L	---	---	---	<6.74	---	---	---	<10.8	---	---	---	2.87	---	---	---	<1.33
Pbde 138/166	TOT	pg/L	---	---	---	13.6	---	---	---	41.5	---	---	---	15	---	---	---	14.4
Pbde 140	TOT	pg/L	---	---	---	4.25	---	---	---	13.1	---	---	---	5.09	---	---	---	4.36
Pbde 15	TOT	pg/L	---	---	---	<1.36	---	---	---	2.87	---	---	---	2.52	---	---	---	1.78
Pbde 153	TOT	pg/L	---	---	---	102	---	---	---	392	---	---	---	156	---	---	---	134
Pbde 154	TOT	pg/L	---	---	---	79	---	---	---	298	---	---	---	117	---	---	---	105
Pbde 155	TOT	pg/L	---	---	---	5.34	---	---	---	24.4	---	---	---	8.68	---	---	---	8.58
Pbde 17/25	TOT	pg/L	---	---	---	15.1	---	---	---	27.4	---	---	---	23.2	---	---	---	20.5
Pbde 181	TOT	pg/L	---	---	---	<1.36	---	---	---	<2.43	---	---	---	<1.36	---	---	---	<1.33
Pbde 183	TOT	pg/L	---	---	---	14.7	---	---	---	51.5	---	---	---	19.2	---	---	---	18.3
Pbde 190	TOT	pg/L	---	---	---	<1.36	---	---	---	5.11	---	---	---	3.37	---	---	---	<1.33
Pbde 203	TOT	pg/L	---	---	---	9.61	---	---	---	90.7	---	---	---	13.2	---	---	---	16.2

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
Pbde 206	TOT	pg/L	---	---	---	114	---	---	---	712	---	---	---	95.4	---	---	---	74.8
Pbde 207	TOT	pg/L	---	---	---	117	---	---	---	1160	---	---	---	153	---	---	---	95.8
Pbde 208	TOT	pg/L	---	---	---	93	---	---	---	706	---	---	---	106	---	---	---	61.8
Pbde 209	TOT	pg/L	---	---	---	961	---	---	---	7850	---	---	---	1660	---	---	---	971
Pbde 28/33	TOT	pg/L	---	---	---	32.1	---	---	---	65.2	---	---	---	46.6	---	---	---	43
Pbde 30	TOT	pg/L	---	---	---	<1.36	---	---	---	<1.34	---	---	---	<1.36	---	---	---	<1.33
Pbde 32	TOT	pg/L	---	---	---	<1.36	---	---	---	<1.34	---	---	---	<1.36	---	---	---	<1.33
Pbde 35	TOT	pg/L	---	---	---	<1.36	---	---	---	<1.34	---	---	---	<1.36	---	---	---	<1.33
Pbde 37	TOT	pg/L	---	---	---	2.03	---	---	---	11.6	---	---	---	6.74	---	---	---	5.39
Pbde 47	TOT	pg/L	---	---	---	1490	---	---	---	3730	---	---	---	2210	---	---	---	1700
Pbde 49	TOT	pg/L	---	---	---	34.5	---	---	---	86.8	---	---	---	46.4	---	---	---	42.7
Pbde 51	TOT	pg/L	---	---	---	3.89	---	---	---	10.5	---	---	---	6.51	---	---	---	4.83
Pbde 66	TOT	pg/L	---	---	---	27.4	---	---	---	59.1	---	---	---	42.6	---	---	---	27.3
Pbde 7	TOT	pg/L	---	---	---	<1.36	---	---	---	<1.34	---	---	---	<1.36	---	---	---	<1.33
Pbde 71	TOT	pg/L	---	---	---	5.36	---	---	---	9.36	---	---	---	7.34	---	---	---	6.99
Pbde 75	TOT	pg/L	---	---	---	2.28	---	---	---	4.44	---	---	---	2.91	---	---	---	2.6
Pbde 77	TOT	pg/L	---	---	---	<1.36	---	---	---	<1.34	---	---	---	<1.36	---	---	---	<1.33
Pbde 79	TOT	pg/L	---	---	---	31.7	---	---	---	45.4	---	---	---	58.3	---	---	---	42
Pbde 8/11	TOT	pg/L	---	---	---	<1.36	---	---	---	<1.34	---	---	---	<1.36	---	---	---	<1.33
Pbde 85	TOT	pg/L	---	---	---	55.1	---	---	---	173	---	---	---	79.8	---	---	---	62.7
Pbde 99				TOT	pg/L	---	---	---	1,190	---	---	---	4,420	---	---	---	1,990	---
Decachloro Biphenyl	TOT	pg/L	---	---	---	<---	---	---	---	4.59	---	---	---	<---	---	---	---	2.73
Pcb 1	TOT	pg/L	---	---	---	2.44	---	---	---	4.49	---	---	---	3.96	---	---	---	2.85
Pcb 10	TOT	pg/L	---	---	---	<1.14	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.64
Pcb 103	TOT	pg/L	---	---	---	<1.42	---	---	---	<2.33	---	---	---	<1.2	---	---	---	<0.952
Pcb 104	TOT	pg/L	---	---	---	2.24	---	---	---	<0.668	---	---	---	<0.68	---	---	---	0.935
Pcb 105	TOT	pg/L	---	---	---	4.17	---	---	---	6.38	---	---	---	4.11	---	---	---	5.8
Pcb 106	TOT	pg/L	---	---	---	0.82	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 107/124	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	0.853
Pcb 109	TOT	pg/L	---	---	---	0.703	---	---	---	0.829	---	---	---	0.779	---	---	---	<0.666
Pcb 11	TOT	pg/L	---	---	---	45.8	---	---	---	101	---	---	---	62.6	---	---	---	54.2
Pcb 110/115	TOT	pg/L	---	---	---	13.8	---	---	---	25.1	---	---	---	15.2	---	---	---	16.8
Pcb 111		TOT	pg/L	---	---	---	<1.18	---	---	---	<2.06	---	---	---	<1.05	---	---	---
Pcb 112	TOT	pg/L	---	---	---	<1.18	---	---	---	<1.87	---	---	---	<1.03	---	---	---	<0.725
Pcb 114	TOT	pg/L	---	---	---	<0.679	---	---	---	1.29	---	---	---	<0.68	---	---	---	0.921
Pcb 118	TOT	pg/L	---	---	---	11.5	---	---	---	16.4	---	---	---	11.8	---	---	---	12.5
Pcb 12/13	TOT	pg/L	---	---	---	2.29	---	---	---	2.87	---	---	---	2.08	---	---	---	<1.85
Pcb 120	TOT	pg/L	---	---	---	<1.08	---	---	---	<1.94	---	---	---	<1.01	---	---	---	<0.72
Pcb 121	TOT	pg/L	---	---	---	1.75	---	---	---	<2.09	---	---	---	<1.04	---	---	---	<0.803
Pcb 122	TOT	pg/L	---	---	---	<0.69	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.679
Pcb 123	TOT	pg/L	---	---	---	<0.7	---	---	---	0.748	---	---	---	0.8	---	---	---	0.686
Pcb 126	TOT	pg/L	---	---	---	<0.687	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 127	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 128/166	TOT	pg/L	---	---	---	1.13	---	---	---	1.94	---	---	---	1.95	---	---	---	1.8
Pcb 129/138/160/163	TOT	pg/L	---	---	---	12.2	---	---	---	20.4	---	---	---	12.6	---	---	---	12.6
Pcb 130	TOT	pg/L	---	---	---	0.705	---	---	---	1.03	---	---	---	0.945	---	---	---	<0.666
Pcb 131	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 132	TOT	pg/L	---	---	---	3.19	---	---	---	5.7	---	---	---	4.31	---	---	---	3.97
Pcb 133	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 134/143	TOT	pg/L	---	---	---	<0.679	---	---	---	1.55	---	---	---	0.728	---	---	---	<0.666
Pcb 135/151/154	TOT	pg/L	---	---	---	4.5	---	---	---	9.44	---	---	---	3.92	---	---	---	3.54
Pcb 136	TOT	pg/L	---	---	---	1.65	---	---	---	3.71	---	---	---	1.86	---	---	---	1.41

Appendix B4, cont'd

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
Pcb 137	TOT	pg/L	---	---	---	<0.679	---	---	---	1.37	---	---	---	0.756	---	---	---	0.78
Pcb 139/140	TOT	pg/L	---	---	---	<0.679	---	---	---	0.732	---	---	---	<0.68	---	---	---	<0.666
Pcb 14	TOT	pg/L	---	---	---	<1.12	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.7
Pcb 141	TOT	pg/L	---	---	---	2.04	---	---	---	3.62	---	---	---	2.13	---	---	---	1.93
Pcb 142	TOT	pg/L	---	---	---	7.88	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 144	TOT	pg/L	---	---	---	0.892	---	---	---	1.57	---	---	---	0.971	---	---	---	<0.666
Pcb 145	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 146	TOT	pg/L	---	---	---	1.91	---	---	---	3.56	---	---	---	1.77	---	---	---	1.84
Pcb 147/149	TOT	pg/L	---	---	---	8.26	---	---	---	19.2	---	---	---	9.75	---	---	---	8.11
Pcb 148	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 15	TOT	pg/L	---	---	---	5.81	---	---	---	4.84	---	---	---	8.06	---	---	---	6.21
Pcb 150	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 152	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 153/168	TOT	pg/L	---	---	---	13.1	---	---	---	21.3	---	---	---	12.8	---	---	---	12.1
Pcb 155	TOT	pg/L	---	---	---	1.78	---	---	---	2.85	---	---	---	1.3	---	---	---	1.7
Pcb 156157	TOT	pg/L	---	---	---	1.91	---	---	---	3.12	---	---	---	1.76	---	---	---	2.72
Pcb 158	TOT	pg/L	---	---	---	1.42	---	---	---	1.67	---	---	---	1.21	---	---	---	1.22
Pcb 159	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 16	TOT	pg/L	---	---	---	6.39	---	---	---	6.55	---	---	---	7.6	---	---	---	3.86
Pcb 161	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 162	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 164		TOT	pg/L	---	---	---	<0.679	---	---	---	1.27	---	---	---	0.865	---	---	---
Pcb 165	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 167	TOT	pg/L	---	---	---	<0.679	---	---	---	1.13	---	---	---	<0.68	---	---	---	0.864
Pcb 169	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 17	TOT	pg/L	---	---	---	5.59	---	---	---	5.49	---	---	---	6.2	---	---	---	5.06
Pcb 170	TOT	pg/L	---	---	---	1.92	---	---	---	5.78	---	---	---	2.68	---	---	---	2.54
Pcb 171/173	TOT	pg/L	---	---	---	1.28	---	---	---	1.15	---	---	---	1.44	---	---	---	<0.666
Pcb 172	TOT	pg/L	---	---	---	<0.679	---	---	---	1.1	---	---	---	1.28	---	---	---	<0.666
Pcb 174	TOT	pg/L	---	---	---	2.15	---	---	---	4.13	---	---	---	3.74	---	---	---	2.23
Pcb 175	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 176	TOT	pg/L	---	---	---	<0.679	---	---	---	0.708	---	---	---	0.751	---	---	---	<0.666
Pcb 177	TOT	pg/L	---	---	---	1.06	---	---	---	2.23	---	---	---	2.98	---	---	---	0.969
Pcb 178	TOT	pg/L	---	---	---	<0.679	---	---	---	1.65	---	---	---	1.34	---	---	---	<0.666
Pcb 179	TOT	pg/L	---	---	---	1.11	---	---	---	2.83	---	---	---	1.46	---	---	---	0.826
Pcb 18/30	TOT	pg/L	---	---	---	12.2	---	---	---	12.7	---	---	---	14.3	---	---	---	10.5
Pcb 180/193	TOT	pg/L	---	---	---	7.37	---	---	---	16.4	---	---	---	10.1	---	---	---	8.65
Pcb 181	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 182	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 183/185	TOT	pg/L	---	---	---	0.799	---	---	---	3.16	---	---	---	3.22	---	---	---	1.39
Pcb 184	TOT	pg/L	---	---	---	4.52	---	---	---	5.84	---	---	---	3.62	---	---	---	2.1
Pcb 186	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 187	TOT	pg/L	---	---	---	3.35	---	---	---	7.74	---	---	---	7.83	---	---	---	3.12
Pcb 188	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 189	TOT	pg/L	---	---	---	0.856	---	---	---	<1.26	---	---	---	<2.29	---	---	---	<0.666
Pcb 19	TOT	pg/L	---	---	---	0.958	---	---	---	1.28	---	---	---	1.82	---	---	---	2.63
Pcb 190	TOT	pg/L	---	---	---	<0.679	---	---	---	1.03	---	---	---	<0.68	---	---	---	<0.666
Pcb 191	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 192	TOT	pg/L	---	---	---	1.91	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 194	TOT	pg/L	---	---	---	1.48	---	---	---	3.29	---	---	---	2.13	---	---	---	1.35
Pcb 195	TOT	pg/L	---	---	---	<0.679	---	---	---	0.89	---	---	---	<0.68	---	---	---	<0.666
Pcb 196	TOT	pg/L	---	---	---	0.689	---	---	---	1.51	---	---	---	0.739	---	---	---	0.955

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
Pcb 197/200	TOT	pg/L	---	---	---	<0.679	---	---	---	0.922	---	---	---	<0.68	---	---	---	<0.666
Pcb 198/199	TOT	pg/L	---	---	---	1.61	---	---	---	5.32	---	---	---	3.01	---	---	---	1.29
Pcb 2	TOT	pg/L	---	---	---	1.66	---	---	---	1.77	---	---	---	1.6	---	---	---	1.44
Pcb 20/28	TOT	pg/L	---	---	---	13.8	---	---	---	15.6	---	---	---	16.7	---	---	---	12.2
Pcb 201	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 202	TOT	pg/L	---	---	---	0.847	---	---	---	1.03	---	---	---	0.799	---	---	---	0.759
Pcb 203	TOT	pg/L	---	---	---	1.59	---	---	---	3.79	---	---	---	<0.68	---	---	---	1.16
Pcb 204	TOT	pg/L	---	---	---	4.04	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 205	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 206	TOT	pg/L	---	---	---	<0.807	---	---	---	3.09	---	---	---	<1.96	---	---	---	<2.43
Pcb 207	TOT	pg/L	---	---	---	<0.679	---	---	---	0.993	---	---	---	<1.63	---	---	---	<1.66
Pcb 208	TOT	pg/L	---	---	---	<0.679	---	---	---	1.15	---	---	---	<2.12	---	---	---	<1.84
Pcb 209	TOT	pg/L	---	---	---	1.67	---	---	---	4.59	---	---	---	2.01	---	---	---	2.73
Pcb 21/33	TOT	pg/L	---	---	---	5.22	---	---	---	7.99	---	---	---	7.46	---	---	---	6.11
Pcb 22	TOT	pg/L	---	---	---	5.64	---	---	---	6.63	---	---	---	6.94	---	---	---	5.42
Pcb 23	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 24	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 25	TOT	pg/L	---	---	---	1.21	---	---	---	0.948	---	---	---	1.3	---	---	---	0.772
Pcb 26/29	TOT	pg/L	---	---	---	2.48	---	---	---	2.6	---	---	---	2.62	---	---	---	2.64
Pcb 27	TOT	pg/L	---	---	---	1.17	---	---	---	<0.668	---	---	---	0.853	---	---	---	<0.666
Pcb 3	TOT	pg/L	---	---	---	4	---	---	---	3.36	---	---	---	3.59	---	---	---	2.79
Pcb 31	TOT	pg/L	---	---	---	12.4	---	---	---	14.9	---	---	---	14.9	---	---	---	12.3
Pcb 32	TOT	pg/L	---	---	---	3.47	---	---	---	4.08	---	---	---	3.69	---	---	---	2.74
Pcb 34	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 35	TOT	pg/L	---	---	---	1.12	---	---	---	2.86	---	---	---	1.38	---	---	---	1.07
Pcb 36	TOT	pg/L	---	---	---	1.52	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 37	TOT	pg/L	---	---	---	2.8	---	---	---	3.93	---	---	---	4.54	---	---	---	4.13
Pcb 38	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 39	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	1.3
Pcb 4	TOT	pg/L	---	---	---	5.13	---	---	---	5.07	---	---	---	6.35	---	---	---	4.94
Pcb 40/41/71	TOT	pg/L	---	---	---	5.23	---	---	---	8.97	---	---	---	9.59	---	---	---	5.4
Pcb 42	TOT	pg/L	---	---	---	2.07	---	---	---	4.11	---	---	---	3.83	---	---	---	2.79
Pcb 43	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	1.14
Pcb 44/47/65	TOT	pg/L	---	---	---	17.1	---	---	---	29.7	---	---	---	39.5	---	---	---	39.8
Pcb 45/51	TOT	pg/L	---	---	---	3.63	---	---	---	5.07	---	---	---	8.53	---	---	---	4.75
Pcb 46	TOT	pg/L	---	---	---	1.02	---	---	---	1.13	---	---	---	1.08	---	---	---	<0.732
Pcb 48	TOT	pg/L	---	---	---	2.62	---	---	---	3.75	---	---	---	3.53	---	---	---	2.48
Pcb 49/69	TOT	pg/L	---	---	---	7.17	---	---	---	9.98	---	---	---	10.2	---	---	---	6.39
Pcb 5	TOT	pg/L	---	---	---	<1.25	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.84
Pcb 50/53	TOT	pg/L	---	---	---	1.97	---	---	---	2.34	---	---	---	2.5	---	---	---	1.42
Pcb 52	TOT	pg/L	---	---	---	19.2	---	---	---	27.5	---	---	---	26.7	---	---	---	18.3
Pcb 54	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	0.862
Pcb 55	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.24
Pcb 56	TOT	pg/L	---	---	---	3.09	---	---	---	6.2	---	---	---	4.01	---	---	---	3.89
Pcb 57	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.11
Pcb 58	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.18
Pcb 59/62/75	TOT	pg/L	---	---	---	0.966	---	---	---	1.09	---	---	---	1.65	---	---	---	<0.666
Pcb 6	TOT	pg/L	---	---	---	3.33	---	---	---	3.09	---	---	---	3.39	---	---	---	2.74
Pcb 60	TOT	pg/L	---	---	---	1.91	---	---	---	3.56	---	---	---	2.19	---	---	---	2.25
Pcb 61/70/74/76	TOT	pg/L	---	---	---	16.9	---	---	---	29.7	---	---	---	20.1	---	---	---	20
Pcb 63	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.12
Pcb 64	TOT	pg/L	---	---	---	4.52	---	---	---	7.21	---	---	---	7.68	---	---	---	4.49

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
Pcb 66	TOT	pg/L	---	---	---	6.4	---	---	---	10.9	---	---	---	6.44	---	---	---	8.34
Pcb 67	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.98
Pcb 68	TOT	pg/L	---	---	---	1.24	---	---	---	2.84	---	---	---	2.09	---	---	---	2.51
Pcb 7	TOT	pg/L	---	---	---	26.1	---	---	---	1.48	---	---	---	1.03	---	---	---	8.5
Pcb 72	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	18.2	---	---	---	<1.12
Pcb 73	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb 77	TOT	pg/L	---	---	---	<0.679	---	---	---	1.18	---	---	---	0.724	---	---	---	<1.14
Pcb 78	TOT	pg/L	---	---	---	1.57	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.17
Pcb 79	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.966
Pcb 8	TOT	pg/L	---	---	---	7.66	---	---	---	7.43	---	---	---	7.99	---	---	---	6.24
Pcb 80	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.07
Pcb 81	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<1.17
Pcb 82	TOT	pg/L	---	---	---	<1.69	---	---	---	<2.96	---	---	---	<1.58	---	---	---	1.29
Pcb 83/99	TOT	pg/L	---	---	---	7.27	---	---	---	16.1	---	---	---	8.97	---	---	---	6.64
Pcb 84	TOT	pg/L	---	---	---	4.61	---	---	---	8.25	---	---	---	4.72	---	---	---	3.67
Pcb 85/116/117	TOT	pg/L	---	---	---	3.18	---	---	---	4	---	---	---	2.26	---	---	---	2.87
Pcb 86/87/97/108/119/125	TOT	pg/L	---	---	---	11.4	---	---	---	19	---	---	---	12	---	---	---	13.3
Pcb 88/91	TOT	pg/L	---	---	---	2.13	---	---	---	3.6	---	---	---	2.47	---	---	---	1.5
Pcb 89	TOT	pg/L	---	---	---	<1.66	---	---	---	<2.79	---	---	---	<1.46	---	---	---	<1.12
Pcb 9	TOT	pg/L	---	---	---	1.27	---	---	---	0.985	---	---	---	0.877	---	---	---	<1.63
Pcb 90/101/113	TOT	pg/L	---	---	---	16.2	---	---	---	29.9	---	---	---	17.8	---	---	---	16.1
Pcb 92	TOT	pg/L	---	---	---	2.38	---	---	---	4.89	---	---	---	3.43	---	---	---	2.74
Pcb 93/95/98/100/102	TOT	pg/L	---	---	---	15	---	---	---	27.5	---	---	---	17	---	---	---	13.8
Pcb 94	TOT	pg/L	---	---	---	<1.74	---	---	---	<2.85	---	---	---	<1.51	---	---	---	<1.17
Pcb 96	TOT	pg/L	---	---	---	<0.679	---	---	---	<0.668	---	---	---	<0.68	---	---	---	<0.666
Pcb Teq 3	TOT	pg/L	---	---	---	---	---	---	---	0.004	---	---	---	0.002	---	---	---	0.003
Pcb Teq 4	TOT	pg/L	---	---	---	---	---	---	---	0.041	---	---	---	0.040	---	---	---	0.040
PCBs Total	TOT	pg/L	---	---	---	406	---	---	---	683	---	---	---	496	---	---	---	415
Total Dichloro Biphenyls	TOT	pg/L	---	---	---	97.4	---	---	---	126	---	---	---	90.5	---	---	---	82.8
Total Heptachloro Biphenyls	TOT	pg/L	---	---	---	19.4	---	---	---	42.5	---	---	---	19.2	---	---	---	7.45
Total Hexachloro Biphenyls	TOT	pg/L	---	---	---	53.4	---	---	---	97.7	---	---	---	54.5	---	---	---	46
Total Monochloro Biphenyls	TOT	pg/L	---	---	---	4.1	---	---	---	6.26	---	---	---	9.15	---	---	---	---
Total Nonachloro Biphenyls	TOT	pg/L	---	---	---	---	---	---	---	4.24	---	---	---	---	---	---	---	---
Total Octachloro Biphenyls	TOT	pg/L	---	---	---	6.32	---	---	---	5.24	---	---	---	3.01	---	---	---	1.35
Total Pentachloro Biphenyls	TOT	pg/L	---	---	---	74.4	---	---	---	158	---	---	---	92.8	---	---	---	97
Total Tetrachloro Biphenyls	TOT	pg/L	---	---	---	82.3	---	---	---	154	---	---	---	144	---	---	---	112
Total Trichloro Biphenyls	TOT	pg/L	---	---	---	68.4	---	---	---	84.6	---	---	---	82.7	---	---	---	65.7
1,2,3,4-Tetrachlorobenzene	TOT	ng/L	---	---	---	<0.213	---	---	---	<0.213	---	---	---	<0.212	---	---	---	<0.213
1,2,3-Trichlorobenzene	TOT	ng/L	---	---	---	<0.213	---	---	---	<0.213	---	---	---	<0.241	---	---	---	<0.213
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	TOT	ng/L	---	---	---	<0.213	---	---	---	<0.213	---	---	---	<0.212	---	---	---	<0.213
1,2,4-trichlorobenzene	TOT	ng/L	---	---	---	<0.213	---	---	---	0.247	---	---	---	0.544	---	---	---	<0.213
1,2-dichlorobenzene	TOT	ng/L	---	---	---	0.658	---	---	---	1.49	---	---	---	---	---	---	---	0.353
1,3,5-Trichlorobenzene	TOT	ng/L	---	---	---	<0.213	---	---	---	<0.213	---	---	---	<0.219	---	---	---	<0.213
1,3-dichlorobenzene	TOT	ng/L	---	---	---	3.64	---	---	---	6.25	---	---	---	---	---	---	---	0.297
1,4-dichlorobenzene	TOT	ng/L	---	---	---	54.5	---	---	---	122	---	---	---	---	---	---	---	13.8
2,3,5-trimethylnaphthalene	TOT	ng/L	---	---	11.2	1.26	---	---	11.9	2.88	---	---	35.3	2.99	---	---	18.5	1.62
2,4-DDD	TOT	ng/L	---	---	---	0.146	---	---	---	0.15	---	---	---	<0.256	---	---	---	0.049
2,4-DDE	TOT	ng/L	---	---	---	<0.0427	---	---	---	<0.0456	---	---	---	<0.0815	---	---	---	<0.0426
2,4-DDT	TOT	ng/L	---	---	---	<0.197	---	---	---	<0.16	---	---	---	<0.453	---	---	---	<0.0426
2,6-dimethylnaphthalene	TOT	ng/L	---	---	9.47	0.636	---	---	12.4	1.59	---	---	109	1.12	---	---	16.5	1.06
4,4-DDE	TOT	ng/L	---	---	---	0.235	---	---	---	0.097	---	---	---	<0.0966	---	---	---	0.063
4,4-DDT	TOT	ng/L	---	---	---	<0.211	---	---	---	<0.203	---	---	---	<0.547	---	---	---	<0.0426

Appendix B4, cont'd

Parameter			Jan. 13 2020		Jan. 14 2020		Jan. 15 2020		Apr. 21 2020		Jul. 13 2020		Jul. 14 2020		Jul. 15 2020		Oct. 21 2020	
			Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly	Influent Q+	Effluent Q+	Influent Quarterly	Effluent Quarterly
44DDD	TOT	ng/L	---	---	---	<0.124	---	---	---	<0.0929	---	---	---	<0.344	---	---	---	<0.0426
Aldrin	TOT	ng/L	---	---	---	<0.0427	---	---	---	<0.0425	---	---	---	0.089	---	---	---	<0.0426
Alpha Chlordane	TOT	ng/L	---	---	---	<0.0427	---	---	---	<0.0425	---	---	---	<0.0424	---	---	---	<0.0426
Alpha-Endosulfan	TOT	ng/L	---	---	---	0.259	---	---	---	<0.106	---	---	---	<0.106	---	---	---	0.214
Alpha-Hch Or Alpha-Bhc	TOT	ng/L	---	---	---	<0.229	---	---	---	<0.0425	---	---	---	<0.157	---	---	---	<0.0426
Beta-Endosulfan	TOT	ng/L	---	---	---	0.322	---	---	---	0.197	---	---	---	<0.106	---	---	---	0.571
Beta-Hch Or Beta-Bhc	TOT	ng/L	---	---	---	<0.282	---	---	---	0.066	---	---	---	<0.269	---	---	---	0.061
Cis-Nonachlor	TOT	ng/L	---	---	---	<0.0427	---	---	---	0.055	---	---	---	<0.0424	---	---	---	<0.0426
Delta-Hch Or Delta-Bhc	TOT	ng/L	---	---	---	<0.107	---	---	---	<0.214	---	---	---	<0.219	---	---	---	<0.106
Dieldrin	TOT	ng/L	---	---	---	0.166	---	---	---	0.121	---	---	---	0.232	---	---	---	0.173
Endosulfan Sulfate	TOT	ng/L	---	---	---	<0.107	---	---	---	<0.106	---	---	---	0.146	---	---	---	<0.106
Endrin	TOT	ng/L	---	---	---	<0.107	---	---	---	<0.106	---	---	---	<0.106	---	---	---	<0.106
Endrin Aldehyde	TOT	ng/L	---	---	---	<0.107	---	---	---	<0.468	---	---	---	<0.913	---	---	---	<0.106
Endrin Ketone	TOT	ng/L	---	---	---	<0.107	---	---	---	<0.13	---	---	---	<0.125	---	---	---	<0.106
Hch, Gamma	TOT	ng/L	---	---	---	<0.289	---	---	---	0.152	---	---	---	<0.176	---	---	---	0.088
Heptachlor	TOT	ng/L	---	---	---	<0.0427	---	---	---	<0.0425	---	---	---	<0.0424	---	---	---	<0.0426
Heptachlor Epoxide	TOT	ng/L	---	---	---	<0.107	---	---	---	<0.106	---	---	---	<0.106	---	---	---	<0.106
Hexachlorobenzene	TOT	ng/L	---	---	---	0.052	---	---	---	0.074	---	---	---	0.138	---	---	---	0.039
Hexachlorobutadiene	TOT	ng/L	---	---	---	0.292	---	---	---	0.551	---	---	---	0.209	---	---	---	0.185
Methoxyclor	TOT	ng/L	---	---	---	<0.213	---	---	---	<0.213	---	---	---	<0.212	---	---	---	<0.212
Mirex	TOT	ng/L	---	---	---	<0.0427	---	---	---	<0.0425	---	---	---	<0.0424	---	---	---	<0.0426
Octachlorostyrene	TOT	ng/L	---	---	---	<0.0427	---	---	---	<0.0036	---	---	---	<0.0066	---	---	---	<0.0426
Oxy-Chlordane	TOT	ng/L	---	---	---	0.064	---	---	---	<0.0425	---	---	---	<0.0424	---	---	---	<0.0426
Pentachlorobenzene	TOT	ng/L	---	---	---	0.049	---	---	---	0.075	---	---	---	0.085	---	---	---	0.03
Trans-Chlordane	TOT	ng/L	---	---	---	<0.0427	---	---	---	0.054	---	---	---	<0.0424	---	---	---	<0.0426
Trans-Nonachlor	TOT	ng/L	---	---	---	<0.0427	---	---	---	0.053	---	---	---	<0.0424	---	---	---	<0.0426
PFBA	TOT	ng/L	---	---	<3.14	<3.05	---	---	349	1080	---	---	4.24	8.44	---	---	15.8	22.3
PFBS	TOT	ng/L	---	---	5.13	4.74	---	---	3.38	2.9	---	---	<0.801	1.7	---	---	4.24	3.72
PFDA	TOT	ng/L	---	---	<0.784	0.788	---	---	1.57	1.62	---	---	<0.801	1.32	---	---	0.71	1.08
PFDoA	TOT	ng/L	---	---	<0.784	<0.762	---	---	<0.749	<0.769	---	---	<0.801	<0.792	---	---	<0.388	<0.386
PFHpA	TOT	ng/L	---	---	1.28	2.28	---	---	26.1	48.1	---	---	<0.801	11.2	---	---	0.722	7.86
PFHxA	TOT	ng/L	---	---	4.66	7.76	---	---	74	167	---	---	2.86	16.5	---	---	4.64	11.2
PFHxS	TOT	ng/L	---	---	5.55	4.75	---	---	5.1	4.08	---	---	1.97	3.4	---	---	4.17	5
PFNA	TOT	ng/L	---	---	<0.784	<0.762	---	---	3.32	3.22	---	---	1.44	0.983	---	---	0.849	1.03
PFOA	TOT	ng/L	---	---	3.43	6.72	---	---	11.3	15.4	---	---	1.79	5.47	---	---	2.8	6.68
PFOS	TOT	ng/L	---	---	5.57	5.44	---	---	5.15	2.16	---	---	<0.801	3.11	---	---	9.61	5.04
PFOSA	TOT	ng/L	---	---	<0.784	<0.762	---	---	<0.749	<0.769	---	---	<0.801	<0.792	---	---	<0.388	<0.386
PFPeA	TOT	ng/L	---	---	4.07	12.5	---	---	166	459	---	---	3.2	21.2	---	---	5.32	34.1
PFUnA	TOT	ng/L	---	---	<0.784	<0.762	---	---	<0.749	<0.769	---	---	<0.801	<0.792	---	---	<0.388	<0.386
2-Hydroxy-Ibuprofen	TOT	ng/L	---	---	29,400	94.6	---	---	28,900	5,590	---	---	41,800	1,330	---	---	35,700	581
Bisphenol A	TOT	ng/L	---	---	118	42	---	---	191	91.2	---	---	133	103	---	---	105	41.7
Furosemide	TOT	ng/L	---	---	1,400	1,210	---	---	1,340	1,570	---	---	2,150	2,130	---	---	2,560	2,260
Gemfibrozil	TOT	ng/L	---	---	57.3	16.9	---	---	144	103	---	---	40	76.8	---	---	36.9	25.4
Glipizide	TOT	ng/L	---	---	<2.41	<0.775	---	---	<0.793	<0.812	---	---	<3.1	<1.53	---	---	<3.94	<0.8
Glyburide	TOT	ng/L	---	---	<2.41	1.76	---	---	3.75	4.24	---	---	4.49	3.21	---	---	5.68	3.47
Hydrochlorothiazide	TOT	ng/L	---	---	2,040	2,000	---	---	2,260	2,590	---	---	2920	2790	---	---	3170	2970
Ibuprofen	TOT	ng/L	---	---	13,100	5.01	---	---	14,000	2,610	---	---	21,700	276	---	---	23,300	63.5
Naproxen	TOT	ng/L	---	---	7,630	115	---	---	9,690	2,920	---	---	11,900	332	---	---	14,000	719
Triclocarban	TOT	ng/L	---	---	8.29	1.31	---	---	10.9	2.82	---	---	6.31	1.05	---	---	5.9	0.809
Triclosan	TOT	ng/L	---	---	145	55.5	---	---	175	41.9	---	---	127	48.4	---	---	124	31.4
Warfarin	TOT	ng/L	---	---	8.86	8.04	---	---	7.03	8.32	---	---	9.95	8.04	---	---	10.7	10.1

--- data not available

APPENDIX C

Surface Water / IDZ Monitoring

Appendix C1 SPTP Surface Water Stations

Appendix C2 SPTP IDZ Sites Extended Sampling Results 2020 (1st day of sampling)

Appendix C3 Surface Water IDZ Nutrient Monitoring Results 2020

Appendix C1 SPTP Surface Water Stations

		Latitude	Longitude
Surface Water Stations	Outfall	48°37.3978	-123°23.1511'
	100N	48°37.4302	-123°23.1511'
	100S	48°37.3654	-123°23.1506'
	200NE	48°37.4440	-123°23.8221'
	200NW	48°37.4433	-123°23.2202'
	200SE	48°37.3522	-123°23.8160'
	200SW	48°37.3522	-123°23.2195'
	400E	48°37.3983	-123°22.5556'
	400N	48°37.5274	-123°23.1518'
	400S	48°37.2682	-123°23.1500'
	400W	48°37.3972	-123°23.3462'
	800N	48°38.5701	-123°23.1529'
	800S	48°37.1391	-123°23.1488'
	800W	48°37.3965	-123°23.5417'
	Reference 2	48°38.5496	-123°19.1139'
IDZ Stations	SP02	48°37.7179	-123°23.1816'
	SP03	48°37.6930	-123°23.1431'
	SP04	48°37.6576	-123°23.1365'
	SP05	48°37.6272	-123°23.1647'
	SP06	48°37.6137	-123°23.2149'
	SP07	48°37.6052	-123°23.2682'
	SP08	48°37.6088	-123°23.3218'
	SP09	48°37.6337	-123°23.3602'
	SP10	48°37.6691	-123°23.3668'
	SP11	48°37.6995	-123°23.3386'
	SP12	48°37.7130	-123°23.2884'
	SP13	48°37.7215	-123°23.2351'

Appendix C2 SPTP IDZ Sites Extended Sampling Results (one sampling day each season) 2020

		Aluminum (mg/L)		Antimony (mg/L)		Arsenic (mg/L)		Barium (mg/L)		Beryllium (mg/L)		Boron (mg/L)		Cadmium (mg/L)		Chromium (mg/L)		Cobalt (mg/L)		Copper (mg/L)		Iron (mg/L)		Lead (mg/L)		Magnesium (mg/L)	
		Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
WQ Guidelines						0.0125 mg/L *+#						1.2 mg/L		0.00012 mg/L (max) *						0.002 mg/L (mean of 5 samples) or 0.14 mg/L (max) *							
Station 1	Top	0.026	---	<0.001	---	0.0016	---	0.0089	---	<0.0005	---	3.26	---	0.000084	---	<0.0005	---	<0.00005		<0.0005	---	0.030	---	<0.00005	---	1,040	---
	Middle	0.034	---	<0.001	---	0.0016	---	0.0092	---	<0.0005	---	3.29	---	0.000079	---	<0.0005	---	<0.00005		<0.0005	---	0.041	---	<0.00005	---	1,010	---
	Bottom	0.038	---	<0.001	---	0.0017	---	0.0090	---	<0.0005	---	3.29	---	0.000073	---	<0.0005	---	<0.00005		<0.0005	---	0.049	---	<0.00005	---	1,020	---
Station 2	Top	0.025	0.021	<0.001	<0.001	0.0016	0.0017	0.0084	0.0082	<0.0005	<0.0005	3.22	3.22	0.000060	0.000064	<0.0005	<0.005	<0.00005	<0.00005	<0.0005	<0.0005	0.034	0.028	<0.00005	<0.00005	1,000	1,260
	Middle	0.033	0.073	<0.001	<0.001	0.0017	0.0017	0.0090	0.0088	<0.0005	<0.0005	3.24	3.42	0.000071	0.000067	<0.0005	<0.005	<0.00005	0.000067	<0.0005	<0.0005	0.040	0.102	0.00007	0.00011	997	1,350
	Bottom	0.034	0.095	<0.001	<0.001	0.0017	0.0019	0.0086	0.0082	<0.0005	<0.0005	3.19	3.25	0.000068	0.000076	<0.0005	<0.005	<0.00005	0.000068	<0.0005	<0.0005	0.044	0.116	0.00006	0.00006	976	1,340
Station 3	Top	0.026	0.022	<0.001	<0.001	0.0017	0.0017	0.0087	0.0080	<0.0005	<0.0005	3.42	3.14	0.000069	0.000070	<0.0005	<0.005	<0.00005	<0.00005	<0.0005	<0.0005	0.032	0.027	<0.00005	0.00010	1,040	1,310
	Middle	0.033	0.057	<0.001	<0.001	0.0016	0.0017	0.0088	0.0085	<0.0005	<0.0005	3.34	3.28	0.000057	0.000074	<0.0005	<0.005	<0.00005	0.000053	<0.0005	<0.0005	0.041	0.072	0.00007	<0.00005	1,040	1,330
	Bottom	0.039	0.162	<0.001	<0.001	0.0016	0.0017	0.0089	0.0085	<0.0005	<0.0005	3.32	3.34	0.000077	0.000069	<0.0005	<0.005	<0.00005	0.000087	<0.0005	<0.0005	0.045	0.218	<0.00005	0.00009	1,030	1,370
Station 4	Top	0.033	0.018	<0.001	<0.001	0.0017	0.0016	0.0091	0.0080	<0.0005	<0.0005	3.29	3.2	0.000080	0.000093	<0.0005	<0.005	<0.00005	<0.00005	<0.0005	<0.0005	0.033	0.022	<0.00005	0.00031	1,020	1,290
	Middle	0.061	0.057	<0.001	<0.001	0.0016	0.0017	0.0087	0.0087	<0.0005	<0.0005	3.43	3.21	0.000069	0.000082	<0.0005	<0.005	<0.00005	<0.00005	<0.0005	<0.0005	0.043	0.075	<0.00005	0.00005	1,010	1,210
	Bottom	0.039	0.078	<0.001	<0.001	0.0016	0.0017	0.0088	0.0084	<0.0005	<0.0005	3.31	3.27	0.000066	0.000077	<0.0005	<0.005	<0.00005	0.000054	<0.0005	<0.0005	0.049	0.101	<0.00005	0.00008	1,020	1,300
Reference 2	Top	0.026	0.016	<0.001	<0.001	0.0017	0.0016	0.0089	0.0078	<0.0005	<0.0005	3.25	3.21	0.000085	0.000075	<0.0005	<0.005	<0.00005	<0.00005	<0.0005	<0.0005	0.032	0.021	0.00028	<0.00005	994	1,280
	Middle	0.038	0.031	<0.001	<0.001	0.0016	0.0017	0.0087	0.0079	<0.0005	<0.0005	3.43	3.25	0.000070	0.000085	<0.0005	<0.005	<0.00005	<0.00005	<0.0005	<0.0005	0.045	0.041	0.00007	<0.00005	1,040	1,310
	Bottom	0.039	0.050	<0.001	<0.001	0.0018	0.0017	0.0092	0.0085	<0.0005	<0.0005	3.34	3.33	0.000078	0.000082	<0.0005	<0.005	<0.00005	0.00005	<0.0005	<0.0005	0.050	0.066	0.00019	0.00007	1,100	1,370
Average IDZ Stations	Top	0.027	0.010	<0.001	<0.001	0.0016	0.0017	0.0088	0.0081	<0.0005	<0.0005	3.30	3.19	0.000073	0.000076	<0.0005	<0.005	<0.00005	0.00003	<0.0005	<0.0005	0.032	0.026	<0.00005	0.00014	1,025	1,287
	Middle	0.040	0.062	<0.001	<0.001	0.0016	0.0017	0.0089	0.0087	<0.0005	<0.0005	3.33	3.30	0.000069	0.000074	<0.0005	<0.005	<0.00005	0.00006	<0.0005	<0.0005	0.041	0.083	0.00007	0.00006	1,014	1,297
	Bottom	0.038	0.112	<0.001	<0.001	0.0017	0.0018	0.0088	0.0084	<0.0005	<0.0005	3.28	3.29	0.000071	0.000074	<0.0005	<0.005	<0.00005	0.00007	<0.0005	<0.0005	0.047	0.145	0.00006	0.00008	1,012	1,337

Notes:
Shaded cells indicate exceedance to BC WQG (see Appendix C2)
* = BC Approved Water Quality Guideline
+ = BC Working Water Quality Guideline
# = CCME Water Quality Guideline for the Protection of Aquatic Life
--- indicates result not available due to truncated sampling day or missed analysis

Appendix C2, continued

		Manganese (mg/L)		Mercury (mg/L)		Molybdenum (mg/L)		Nickel (mg/L)		Potassium (mg/L)		Selenium (mg/L)		Silver (mg/L)		Strontium (mg/L)		Tin (mg/L)		Titanium (mg/L)		Uranium (mg/L)		Zinc (mg/L)	
		Winter	summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
WQ Guidelines								0.0071 mg/L *				0.002 mg/L *		0.0015 mg/L (mean of 5 samples) or 0.003 mg/L (max) *										0.01 mg/L (mean of 5 samples) *	
Station 1	Top	0.0026	0.0026	<0.002	---	0.0099	---	<0.0005	---	396	---	<0.0005	---	<0.0001	---	---	---	<0.001	---	---	---	0.0025	---	<0.003	---
	Middle	0.0026	0.0026	<0.002	---	0.0099	---	<0.0005	---	412	---	<0.0005	---	<0.0001	---	---	---	<0.001	---	---	---	0.0025	---	<0.003	---
	Bottom	0.0026	0.0026	<0.002	---	0.0100	---	<0.0005	---	401	---	<0.0005	---	<0.0001	---	---	---	<0.001	---	---	---	0.0025	---	<0.003	---
Station 2	Top	0.0025	0.0025	<0.002	<0.0019	0.0104	0.0094	<0.0005	<0.0005	401	375	<0.0005	<0.0005	<0.0001	<0.0001	---	6.28	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Middle	0.0026	0.0026	<0.002	<0.0019	0.0099	0.0094	<0.0005	0.00051	399	405	<0.0005	<0.0005	<0.0001	<0.0001	---	6.39	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Bottom	0.0025	0.0025	<0.002	<0.0019	0.0102	0.0097	<0.0005	0.00053	396	394	<0.0005	<0.0005	<0.0001	<0.0001	---	6.42	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
Station 3	Top	0.0025	0.0025	<0.002	<0.0019	0.0098	0.0096	<0.0005	<0.0005	392	391	<0.0005	<0.0005	<0.0001	<0.0001	---	6.62	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Middle	0.0025	0.0025	<0.002	<0.0019	0.0097	0.0094	<0.0005	<0.0005	404	403	<0.0005	<0.0005	<0.0001	<0.0001	---	6.46	<0.001	<0.001	---	<0.005	0.0024	---	<0.003	<0.003
	Bottom	0.0026	0.0026	<0.002	<0.0019	0.0095	0.0098	<0.0005	0.00063	397	418	<0.0005	<0.0005	<0.0001	<0.0001	---	6.7	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
Station 4	Top	0.0026	0.0026	<0.002	<0.0019	0.0097	0.0097	<0.0005	<0.0005	402	391	<0.0005	<0.0005	<0.0001	<0.0001	---	6.5	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Middle	0.0025	0.0025	<0.002	<0.0019	0.0096	0.0096	<0.0005	0.0005	398	384	<0.0005	<0.0005	<0.0001	<0.0001	---	6.43	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Bottom	0.0026	0.0026	<0.002	<0.0019	0.0099	0.0097	<0.0005	0.00052	402	390	<0.0005	<0.0005	<0.0001	<0.0001	---	6.63	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
Reference 2	Top	0.0025	0.0025	<0.002	<0.0019	0.0100	0.0091	<0.0005	<0.0005	401	389	<0.0005	<0.0005	<0.0001	<0.0001	---	6.33	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Middle	0.0025	0.0025	<0.002	<0.0019	0.0099	0.0095	<0.0005	<0.0005	386	391	<0.0005	<0.0005	<0.0001	<0.0001	---	6.55	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Bottom	0.0026	0.0026	<0.002	<0.0019	0.0100	0.0091	<0.0005	<0.0005	407	397	<0.0005	<0.0005	<0.0001	<0.0001	---	6.4	<0.001	<0.001	---	<0.005	0.0025	---	0.0041	0.0089
Average IDZ Stations	Top	0.0025	0.0025	<0.002	<0.0019	0.0099	0.0095	<0.0005	<0.0005	398	386	<0.0005	<0.0005	<0.0001	<0.0001	---	6.47	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Middle	0.0026	0.0026	<0.002	<0.0019	0.0098	0.0095	<0.0005	0.00042	403	397	<0.0005	<0.0005	<0.0001	<0.0001	---	6.43	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003
	Bottom	0.0026	0.0026	<0.002	<0.0019	0.0099	0.0097	<0.0005	0.00056	399	401	<0.0005	<0.0005	<0.0001	<0.0001	---	6.58	<0.001	<0.001	---	<0.005	0.0025	---	<0.003	<0.003

Notes:
Shaded cells indicate exceedance to BC WQG (see Appendix C2)
* = BC Approved Water Quality Guideline
+ = BC Working Water Quality Guideline
# = CCME Water Quality Guideline for the Protection of Aquatic Life
--- indicates result not available due to truncated sampling day or missed analysis

Appendix C3 SPTP IDZ Sites Nutrient Monitoring Results (1st to 5th day of sampling) 2020

NH3 mg/L – 2020							
	BC Approved WQG = 23-33 mg/L N (average over 5 samples) or 3.4-5.0 mg/L N (maximum)						
		Winter					Average
Reference	Top	0.220	0.060	<0.025	0.130	<0.025	0.110
	Middle	0.120	0.110	<0.025	0.130	0.063	0.072
	Bottom	0.160	0.110	0.080	0.160	0.110	0.112
Station 1	Top	0.080	0.120	0.030	0.230	0.078	0.201
	Middle	0.080	0.065	<0.025	0.210	0.150	0.110
	Bottom	0.065	0.090	<0.05	0.140	0.065	0.110
Station 2	Top	0.084	0.150	0.210	0.140	0.058	0.106
	Middle	0.120	0.045	<0.025	0.190	0.079	0.106
	Bottom	0.075	0.110	<0.05	0.160	0.078	0.117
Station 3	Top	0.077	0.130	<0.05	0.170	0.099	0.116
	Middle	0.110	0.078	<0.025	0.190	0.075	0.096
	Bottom	0.068	0.100	<0.025	0.100	<0.025	0.127
Station 4	Top	0.100	0.077	<0.05	0.150	0.038	0.107
	Middle	0.200	0.130	<0.05	0.490	0.037	0.109
	Bottom	0.062	0.062	<0.025	0.110	0.030	0.136
		Summer					Average
Reference	Top	0.100	0.040	0.097	0.038	0.050	0.140
	Middle	0.120	0.081	0.092	0.100	0.110	0.127
	Bottom	0.058	0.083	0.082	0.110	0.061	0.129
Station 1	Top	---	0.150	0.048	0.064	0.110	0.103
	Middle	---	0.066	0.063	<0.025	0.091	0.105
	Bottom	---	0.080	0.077	0.069	0.120	0.107
Station 2	Top	0.160	0.120	0.061	0.025	0.061	0.087
	Middle	0.100	0.060	0.027	0.078	0.064	0.077
	Bottom	0.072	0.048	<0.025	0.078	0.070	0.146
Station 3	Top	0.092	0.074	0.064	0.080	0.093	0.139
	Middle	0.036	0.077	0.032	0.130	0.120	0.171
	Bottom	0.110	0.026	<0.025	0.092	0.100	0.158
Station 4	Top	0.077	0.081	0.056	0.063	0.067	0.086
	Middle	0.049	0.045	0.110	0.032	0.110	0.122
	Bottom	0.047	0.150	0.075	0.089	0.091	0.072

Notes:

WQG calculated from BC Approved Water Quality Guidelines Summary Report, Table 26E (long-term/average) and Table 26F (short-term acute/maximum). Values used for calculations are 30ppt salinity, 10°C, and pH of 8

--- sample result not available due to truncated sample day

Appendix C3, continued

PO_4 Phosphate Total mg/L – 2020							
		Winter					Average
Reference	Top	0.075	0.059	0.064	0.058	0.065	0.056
	Middle	0.080	0.057	0.065	0.066	0.066	0.053
	Bottom	0.080	0.056	0.064	0.065	0.063	0.055
Station 1	Top	0.079	0.058	0.066	0.063	0.065	0.053
	Middle	0.076	0.270	0.065	0.068	0.066	0.052
	Bottom	0.074	0.056	0.064	0.064	0.062	0.050
Station 2	Top	0.074	0.068	0.064	0.067	0.066	0.054
	Middle	0.083	0.056	0.065	0.065	0.066	0.051
	Bottom	0.077	0.057	0.064	0.065	0.066	0.051
Station 3	Top	0.066	0.056	0.065	0.063	0.062	0.052
	Middle	0.074	0.056	0.062	0.070	0.066	0.049
	Bottom	0.074	0.054	0.068	0.065	0.060	0.050
Station 4	Top	0.079	0.058	0.063	0.064	0.062	0.053
	Middle	0.076	0.054	0.064	0.067	0.067	0.053
	Bottom	0.075	0.056	0.066	0.066	0.063	0.055
		Summer					Average
Reference	Top	0.050	0.061	0.042	0.029	0.026	0.033
	Middle	0.052	0.056	0.050	0.044	0.042	0.038
	Bottom	0.055	0.067	0.058	0.048	0.045	0.036
Station 1	Top	---	0.050	0.038	0.031	0.036	0.036
	Middle	---	0.049	0.047	0.044	0.047	0.038
	Bottom	---	0.051	0.052	0.049	0.039	0.035
Station 2	Top	0.046	0.044	0.041	0.044	0.029	0.035
	Middle	0.054	0.048	0.048	0.034	0.041	0.036
	Bottom	0.057	0.052	0.051	0.036	0.041	0.033
Station 3	Top	0.048	0.047	0.039	0.046	0.030	0.035
	Middle	0.055	0.054	0.048	0.050	0.042	0.036
	Bottom	0.080	0.051	0.051	0.049	0.043	0.032
Station 4	Top	0.048	0.047	0.039	0.035	0.038	0.037
	Middle	0.053	0.065	0.046	0.046	0.044	0.035
	Bottom	0.055	0.061	0.039	0.039	0.045	0.037

--- sample result not available due to truncated sample day

Appendix C3, continued

TSS mg/L – 2020							
		Winter					Average
Reference	Top	21.0	14.0	3.2	17.0	35.0	2.40
	Middle	28.0	15.0	12.0	15.0	8.8	3.40
	Bottom	19.0	23.0	6.8	12.0	14.0	4.40
Station 1	Top	16.0	23.0	8.4	11.0	20.0	5.00
	Middle	15.0	14.0	4.0	12.0	10.0	4.60
	Bottom	13.0	18.0	6.8	26.0	23.0	3.40
Station 2	Top	11.0	12.0	8.8	24.0	29.0	2.20
	Middle	11.0	20.0	4.0	20.0	34.0	3.80
	Bottom	6.8	34.0	9.2	12.0	18.0	4.20
Station 3	Top	11.0	7.6	15.0	22.0	17.0	3.40
	Middle	16.0	25.0	17.0	15.0	18.0	3.80
	Bottom	22.0	20.0	18.0	8.8	20.0	4.00
Station 4	Top	13.0	28.0	8.4	13.0	11.0	3.20
	Middle	14.0	24.0	7.2	18.0	8.8	3.00
	Bottom	18.0	23.0	11.0	4.0	12.0	4.20
		Summer					Average
Reference	Top	6.4	28.0	6.8	12.0	41.0	6.80
	Middle	34.0	8.8	19.0	21.0	12.0	5.60
	Bottom	9.2	12.0	13.0	16.0	7.6	5.80
Station 1	Top	---	24.0	11.0	4.4	12.0	6.60
	Middle	---	33.0	7.2	12.0	10.0	6.40
	Bottom	---	24.0	8.4	15.0	8.4	8.40
Station 2	Top	25.0	45.0	11.0	11.0	10.0	9.00
	Middle	32.0	30.0	7.2	8.0	10.0	6.80
	Bottom	17.0	33.0	7.6	8.8	24.0	7.40
Station 3	Top	24.0	9.6	7.6	9.6	8.4	7.00
	Middle	42.0	9.2	8.0	8.0	14.0	5.80
	Bottom	53.0	9.6	11.0	9.2	32.0	8.60
Station 4	Top	42.0	14.0	6.8	6.0	13.0	7.20
	Middle	37.0	7.6	13.0	22.0	14.0	7.60
	Bottom	36.0	19.0	9.6	12.0	8.8	5.00

--- sample result not available due to truncated sample day

Appendix C3, continued

TKN mg/L – 2020							
		Winter					Average
Reference	Top	0.117	0.026	0.112	0.169	0.096	0.062
	Middle	0.087	0.069	0.191	0.082	0.104	0.073
	Bottom	0.095	0.072	0.141	0.086	0.150	0.072
Station 1	Top	0.126	0.055	0.135	0.106	0.076	0.059
	Middle	0.107	0.072	0.061	0.114	0.139	0.061
	Bottom	0.137	0.039	0.140	0.086	0.080	0.058
Station 2	Top	0.105	0.071	0.146	0.083	0.077	0.063
	Middle	0.527	0.078	0.163	0.079	0.068	0.073
	Bottom	0.104	0.087	0.125	0.079	0.091	0.069
Station 3	Top	0.088	0.085	0.142	0.081	0.096	0.078
	Middle	0.116	0.098	0.205	0.113	0.111	0.064
	Bottom	0.142	0.087	0.135	0.068	0.141	0.061
Station 4	Top	0.152	0.079	0.126	0.097	0.071	0.069
	Middle	0.104	0.079	0.084	0.110	0.075	0.078
	Bottom	0.127	0.060	0.091	0.091	0.096	0.057
		Summer					Average
Reference	Top	0.239	0.161	0.129	0.125	0.139	0.129
	Middle	0.210	0.104	0.092	0.070	0.095	0.108
	Bottom	0.139	0.082	0.098	0.101	0.095	0.102
Station 1	Top	---	0.126	0.157	0.079	0.110	0.119
	Middle	---	0.078	0.103	0.065	0.086	0.113
	Bottom	---	0.072	0.136	0.071	0.106	0.142
Station 2	Top	0.287	0.134	0.115	0.094	0.124	0.115
	Middle	0.084	0.076	0.084	0.078	0.080	0.118
	Bottom	0.216	0.087	0.158	0.087	0.075	0.159
Station 3	Top	0.146	0.106	0.173	0.102	0.114	0.116
	Middle	0.145	0.085	0.097	0.108	0.096	0.104
	Bottom	0.259	0.105	0.093	0.085	0.085	0.117
Station 4	Top	0.286	0.118	0.114	0.092	0.112	0.111
	Middle	0.124	0.088	0.096	0.072	0.106	0.113
	Bottom	0.160	0.094	0.117	0.062	0.124	0.132

--- sample result not available due to truncated sample day

Appendix C3, continued

Sulphate mg/L – 2020							
		Winter					Average
Reference	Top	2,300	2,500	2,700	2,800	2,300	2,144
	Middle	2,400	2,500	2,600	2,200	2,700	1,894
	Bottom	2,200	2,300	2,700	2,200	2,700	2,256
Station 1	Top	2,400	2,200	2,500	2,800	2,000	2,120
	Middle	2,400	2,400	2,700	2,000	2,200	2,256
	Bottom	2,600	2,200	2,500	2,200	2,200	2,190
Station 2	Top	2,500	2,300	2,300	2,800	2,500	2,294
	Middle	2,600	2,300	2,600	2,200	2,700	2,026
	Bottom	2,600	2,500	2,300	2,400	2,300	2,030
Station 3	Top	2,500	2,000	2,600	2,300	2,000	2,002
	Middle	2,200	2,400	2,600	2,300	2,500	2,198
	Bottom	2,400	2,500	2,600	2,300	2,000	2,172
Station 4	Top	2,400	2,400	2,500	2,100	2,500	2,070
	Middle	2,300	2,300	2,400	2,300	2,100	2,092
	Bottom	2,500	2,300	2,300	2,300	2,200	2,196
		Summer					Average
Reference	Top	2,100	1,900	2,200	1,500	2,000	2,152
	Middle	800	2,200	1,800	2,000	2,200	2,134
	Bottom	1,900	2,200	1,900	1,800	2,000	2,108
Station 1	Top	---	2,100	1,900	1,900	2,200	2,250
	Middle	---	2,100	2,300	1,700	1,900	2,248
	Bottom	---	2,100	2,400	2,100	2,100	2,122
Station 2	Top	1,500	1,800	2,100	1,900	2,000	2,198
	Middle	1,900	2,100	2,300	2,100	2,400	2,228
	Bottom	1,700	2,200	2,100	1,400	1,800	2,148
Station 3	Top	2,100	2,000	2,000	1,900	1,800	2,296
	Middle	2,000	2,200	1,800	2,900	2,200	2,206
	Bottom	1,900	2,100	2,300	1,800	1,900	2,222
Station 4	Top	2,000	2,000	2,000	1,800	1,800	2,288
	Middle	1,900	2,200	2,400	2,100	2,100	2,260
	Bottom	1,800	2,200	2,400	2,200	2,300	2,320

--- sample result not available due to truncated sample day

Appendix C3, continued

Nitrate Nitrogen mg/L – 2020							
	BC Approved WQG = 3.7 mg/L (average over 5 samples)						
		Winter					Average
Reference	Top	0.384	0.398	0.382	0.351	0.373	0.360
	Middle	0.386	0.397	0.388	0.389	0.384	0.358
	Bottom	0.384	0.393	0.380	0.385	0.368	0.358
Station 1	Top	0.383	0.399	0.376	0.380	0.375	0.361
	Middle	0.386	0.397	0.378	0.400	0.374	0.363
	Bottom	0.373	0.392	0.373	0.383	0.381	0.361
Station 2	Top	0.384	0.397	0.382	0.376	0.387	0.359
	Middle	0.386	0.394	0.352	0.386	0.386	0.352
	Bottom	0.385	0.391	0.382	0.385	0.385	0.354
Station 3	Top	0.386	0.387	0.369	0.378	0.385	0.355
	Middle	0.384	0.371	0.384	0.401	0.384	0.356
	Bottom	0.379	0.378	0.386	0.387	0.358	0.358
Station 4	Top	0.387	0.396	0.383	0.369	0.386	0.355
	Middle	0.396	0.394	0.385	0.361	0.386	0.362
	Bottom	0.390	0.390	0.376	0.382	0.380	0.360
		Summer					Average
Reference	Top	0.238	0.203	0.205	0.216	0.133	0.216
	Middle	0.257	0.260	0.251	0.279	0.300	0.229
	Bottom	0.317	0.267	0.253	0.276	0.305	0.235
Station 1	Top	---	0.189	0.187	0.219	0.194	0.210
	Middle	---	0.272	0.228	0.260	0.294	0.217
	Bottom	---	0.266	0.264	0.282	0.261	0.213
Station 2	Top	0.232	0.191	0.165	0.220	0.186	0.208
	Middle	0.278	0.236	0.237	0.256	0.267	0.219
	Bottom	0.312	0.256	0.244	0.256	0.270	0.204
Station 3	Top	0.243	0.206	0.178	0.208	0.177	0.205
	Middle	0.277	0.260	0.236	0.268	0.278	0.216
	Bottom	0.308	0.257	0.239	0.270	0.263	0.212
Station 4	Top	0.248	0.202	0.188	0.214	0.194	0.209
	Middle	0.278	0.264	0.221	0.265	0.283	0.225
	Bottom	0.308	0.256	0.219	0.275	0.277	0.202

--- sample result not available due to truncated sample day

Appendix C3, continued

Nitrite Nitrogen mg/L – 2020							
	BC Approved WQG = 3.7 mg/L (average over 5 samples)						
		Winter					Average
Reference	Top	<0.002	<0.002	<0.002	0.002	<0.002	0.001
	Middle	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Bottom	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Station 1	Top	<0.002	<0.002	<0.002	<0.002	0.002	0.001
	Middle	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Bottom	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Station 2	Top	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Middle	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Bottom	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Station 3	Top	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Middle	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Bottom	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Station 4	Top	<0.002	<0.002	<0.002	0.002	<0.002	0.001
	Middle	<0.002	<0.002	<0.002	0.002	<0.002	0.001
	Bottom	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
		Summer					Average
Reference	Top	<0.002	0.004	<0.002	0.003	<0.002	0.002
	Middle	<0.002	0.003	0.003	0.002	0.008	0.003
	Bottom	<0.002	<0.002	0.004	<0.002	0.004	0.003
Station 1	Top	---	0.003	0.003	0.003	0.004	0.002
	Middle	---	<0.002	0.003	0.004	0.003	0.003
	Bottom	---	0.003	0.004	0.003	0.002	0.003
Station 2	Top	<0.002	0.004	0.003	0.003	0.006	0.002
	Middle	<0.002	0.003	0.003	0.003	0.002	0.004
	Bottom	<0.002	0.003	0.003	0.003	0.005	0.003
Station 3	Top	<0.002	0.002	0.003	0.002	<0.002	0.002
	Middle	<0.002	0.003	0.003	0.003	<0.002	0.003
	Bottom	<0.002	0.003	0.003	0.002	0.007	0.002
Station 4	Top	<0.002	0.003	0.002	0.003	0.004	0.002
	Middle	<0.002	0.003	0.004	0.003	0.005	0.004
	Bottom	<0.002	0.004	0.002	0.003	0.003	0.002

--- sample result not available due to truncated sample day

Appendix C3, continued

Salinity – 2020							
		Winter					Average
Reference	Top	31.0	31.0	32.0	27.7	30.5	30.4
	Middle	31.4	31.2	32.2	30.5	30.6	30.6
	Bottom	31.4	31.3	32.6	30.9	30.6	30.6
Station 1	Top	30.9	30.9	31.6	29.3	31.0	30.5
	Middle	31.2	31.1	32.2	30.3	30.9	30.5
	Bottom	31.2	31.2	32.2	30.7	30.3	30.5
Station 2	Top	31.0	31.1	31.5	29.3	30.5	30.3
	Middle	31.1	31.2	32.1	30.2	30.9	30.7
	Bottom	31.4	31.2	32.3	30.9	31.1	30.7
Station 3	Top	31.2	30.9	31.9	29.4	30.6	30.4
	Middle	31.2	31.2	32.0	30.7	30.9	30.5
	Bottom	31.3	31.2	32.1	30.6	31.0	30.6
Station 4	Top	31.4	30.8	32.0	29.6	30.5	30.4
	Middle	31.2	31.2	32.3	30.3	30.6	30.5
	Bottom	31.4	31.2	32.1	30.9	30.9	30.6
		Summer					Average
Reference	Top	29.9	30.2	27.4	29.0	25.1	30.4
	Middle	30.5	30.7	28.5	30.0	29.6	30.5
	Bottom	30.9	31.0	28.8	30.1	29.7	30.7
Station 1	Top	---	30.4	26.8	29.1	27.7	30.6
	Middle	---	30.8	28.5	29.6	29.2	30.6
	Bottom	---	30.7	28.6	30.0	29.1	30.7
Station 2	Top	30.1	30.3	27.0	29.1	27.1	30.5
	Middle	30.4	30.6	28.7	29.6	29.3	30.6
	Bottom	30.7	30.8	28.9	29.6	29.3	30.6
Station 3	Top	29.9	30.5	26.7	29.2	26.9	30.5
	Middle	30.5	30.7	28.7	29.6	29.2	30.7
	Bottom	30.8	30.7	28.9	29.9	29.2	30.6
Station 4	Top	30.0	30.2	27.1	29.0	27.6	30.6
	Middle	30.5	30.8	28.4	29.7	29.3	30.6
	Bottom	30.6	30.5	28.7	29.8	29.4	30.5

--- sample result not available due to truncated sample day

Appendix C3, continued

N Nitrogen Total mg/L – 2020							
		Winter					Average
Reference	Top	0.501	0.424	0.494	0.522	0.469	0.424
	Middle	0.473	0.466	0.579	0.470	0.488	0.432
	Bottom	0.479	0.465	0.520	0.471	0.518	0.430
Station 1	Top	0.509	0.454	0.511	0.485	0.454	0.420
	Middle	0.493	0.469	0.461	0.514	0.513	0.424
	Bottom	0.510	0.430	0.513	0.469	0.461	0.419
Station 2	Top	0.489	0.468	0.528	0.460	0.464	0.421
	Middle	0.913	0.472	0.516	0.465	0.453	0.426
	Bottom	0.489	0.477	0.508	0.464	0.476	0.422
Station 3	Top	0.474	0.472	0.511	0.459	0.481	0.434
	Middle	0.500	0.469	0.589	0.513	0.497	0.421
	Bottom	0.522	0.465	0.521	0.455	0.499	0.419
Station 4	Top	0.539	0.475	0.509	0.468	0.457	0.423
	Middle	0.500	0.473	0.470	0.474	0.461	0.439
	Bottom	0.517	0.450	0.467	0.473	0.476	0.415
		Summer					Average
Reference	Top	0.477	0.368	0.334	0.343	0.272	0.346
	Middle	0.467	0.367	0.346	0.351	0.403	0.338
	Bottom	0.462	0.349	0.354	0.377	0.404	0.342
Station 1	Top	---	0.318	0.346	0.301	0.307	0.331
	Middle	---	0.350	0.333	0.329	0.383	0.335
	Bottom	---	0.341	0.404	0.355	0.367	0.357
Station 2	Top	0.519	0.329	0.283	0.317	0.316	0.326
	Middle	0.362	0.315	0.324	0.337	0.348	0.340
	Bottom	0.527	0.346	0.404	0.346	0.350	0.366
Station 3	Top	0.389	0.314	0.353	0.313	0.291	0.323
	Middle	0.422	0.347	0.335	0.379	0.374	0.323
	Bottom	0.568	0.365	0.334	0.357	0.355	0.331
Station 4	Top	0.534	0.322	0.304	0.309	0.310	0.322
	Middle	0.402	0.355	0.320	0.340	0.394	0.343
	Bottom	0.468	0.354	0.338	0.341	0.404	0.336

--- sample result not available due to truncated sample day

Appendix C3, continued

Sulfide mg/L – 2020							
		Winter					Average
Reference	Top	<0.0018	<0.0018	<0.0018	<0.0018	0.003	0.013
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Station 1	Top	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Station 2	Top	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Station 3	Top	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Station 4	Top	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
		Summer					Average
Reference	Top	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	0.054	0.0009
Station 1	Top	---	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	---	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	---	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Station 2	Top	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Station 3	Top	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
Station 4	Top	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Middle	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018
	Bottom	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018

--- sample result not available due to truncated sample day

Appendix C3, continued

Total Organic Carbon mg/L – 2020							
		Winter					Average
Reference	Top	96	91	94	99	140	82
	Middle	84	83	110	94	140	84
	Bottom	88	90	110	110	140	110
Station 1	Top	99	83	110	99	140	102
	Middle	97	90	100	110	150	100
	Bottom	94	75	90	100	130	109
Station 2	Top	91	86	110	100	150	104
	Middle	95	87	82	100	140	113
	Bottom	100	85	100	99	150	112
Station 3	Top	94	79	96	99	150	72
	Middle	99	85	98	110	140	73
	Bottom	89	90	100	100	140	110
Station 4	Top	93	88	110	100	140	115
	Middle	97	79	100	120	140	85
	Bottom	89	89	110	110	130	85
		Summer					Average
Reference	Top	<50	<40	35	110	87	76
	Middle	<50	<40	120	100	140	77
	Bottom	<50	<40	59	94	130	80
Station 1	Top	---	<40	36	110	120	64
	Middle	---	<40	<13	92	130	81
	Bottom	---	31	130	130	110	79
Station 2	Top	<50	<40	130	83	110	83
	Middle	<50	<40	140	100	110	86
	Bottom	<50	<40	55	110	110	61
Station 3	Top	<50	<40	130	98	110	75
	Middle	<50	31	130	88	120	71
	Bottom	<50	<40	140	110	110	79
Station 4	Top	<50	26	130	100	120	79
	Middle	<50	<40	130	86	120	77
	Bottom	<50	<40	130	100	120	83

--- sample result not available due to truncated sample day

APPENDIX D

Seafloor Monitoring

Appendix D1 SPTP Sediment Chemistry Results 2020

Appendix D2 SPTP Benthic Invertebrate Results 2020

Appendix D1 SPTP Sediment Chemistry Results 2020

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
C:N	No Units	0	0.526	---			
Carbon	%	0.05	0.29	0.07			
Particle Size, gravel	%	2	<2	<2			
Particle Size, sand	%	2	86	90			
Particle Size, silt	%	2	8.8	4.9			
Particle Size, clay	%	2	5.4	4.9			
Total Nitrogen	pg/g dry	---	10.1	8.32			
Total Organic Carbon	pg/g dry	---	1.99	17			
Sulfur	%	0.06	0.2	0.16			
Moisture	%	0.3	33	25			
Hardness (as CaCO3)	mg/L	0.019	1.2	<0.01			
pH	pH	0	8.28	7.89			
Total Cyanide	mg/kg	1	<1	<0.2			
Salinity	g/L	0.01	31.2	30.2			
AVS	µmol/g dry	0.2	<0.2	2.26			
Cadmium (SEM)	µmol/g dry	0.005	<0.005	<0.0089			
Copper (SEM)	µmol/g dry	0.01	0.027	0.043			
Lead (SEM)	µmol/g dry	0.02	<0.02	<0.028			
Mercury (SEM)	µmol/g dry	0.00005	<0.00005	<0.00005			
Nickel (SEM)	µmol/g dry	0.05	<0.05	<0.05			
Zinc (SEM)	µmol/g dry	0.005	0.06	0.168			
Aluminum	mg/kg	100	7,860	7,300			
Antimony	mg/kg	0.1	0.13	0.12			200
Arsenic	mg/kg	0.2	2.28	2.03	41.6	50	93
Barium	mg/kg	0.1	17.5	15.3			
Beryllium	mg/kg	0.2	<0.2	<0.2			
Bismuth	mg/kg	0.1	<0.1	<0.1			
Boron	mg/kg	1	10.4	7.8			
Cadmium	mg/kg	0.05	0.129	<0.05	4.21	5	6.7
Calcium	mg/kg	100	4,420	4,340			
Chromium	mg/kg	0.5	16.8	15.4	160	190	270
Cobalt	mg/kg	0.1	4.2	3.76			
Copper	mg/kg	0.5	7.74	7.89	108	130	390
Iron	mg/kg	100	13,000	11,600			
Lead	mg/kg	0.1	3.04	2.57	112	130	530

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Lithium	mg/kg	0.5	9.89	6.57			
Magnesium	mg/kg	100	4,280	3,840			
Manganese	mg/kg	0.2	143	146			
Mercury	mg/kg	0.05	<0.05	<0.05	0.696	0.84	0.59
Molybdenum	mg/kg	0.1	0.35	0.15			
Nickel	mg/kg	0.5	12.8	11	42.8		
Potassium	mg/kg	100	1,080	840			
Selenium	mg/kg	0.5	<0.5	<0.5			
Silver	mg/kg	0.05	<0.05	<0.05	1.77		6.1
Sodium	mg/kg	100	3,420	3,200			
Strontium	mg/kg	0.1	27.3	23.4			
Thallium	mg/kg	0.05	0.165	0.074			
Tin	mg/kg	0.1	0.28	0.29			
Titanium	mg/kg	1	623	713			
Tungsten	mg/kg	0.5	<0.5	<0.5			
Uranium	mg/kg	0.05	0.453	0.29			
Vanadium	mg/kg	1	30.1	32.3			
Zinc	mg/kg	1	29.5	22.9	271	330	960
Zirconium	mg/kg	0.5	2.56	2.09			
1,1,1,2-Tetrachloroethane	mg/kg	0.02		<0.02			
Benzene	mg/kg	0.005		<0.005			
Ethylbenzene	mg/kg	0.01		<0.01			
M & P Xylenes	mg/kg	0.04		<0.04			
Methyl Tertiary Butyl Ether	mg/kg	0.1		<0.1			
Nitrobenzene	µg/g	0.1	<0.1	<0.2			
O-Xylene	mg/kg	0.04		<0.04			
Styrene	mg/kg	0.03		<0.03			
Toluene	mg/kg	0.05		<0.05			
Xylenes	mg/kg	0.04		<0.04			
4-Bromophenyl Phenyl Ether	µg/g	0.1	<0.1	<0.2			
4-Chlorophenyl Phenyl Ether	µg/g	0.1	<0.1	<0.2			
Bis(2-Chloroethoxy)Methane	µg/g	0.1	<0.1	<0.2			
Bis(2-Chloroethyl)Ether	µg/g	0.2	<0.2	<0.4			
Bis(2-Chloroisopropyl)Ether	µg/g	0.1	<0.1	<0.2			
Endrin Ketone	ng/g dry	0.0106	<0.0106	<0.013			
Hexachlorobenzene	ng/g dry	0.002	0.013	0.02			70
Hexachlorocyclopentadiene	µg/g	0.5	<0.5	<1			
Hexachloroethane	µg/g	0.1	<0.1	<0.2			

Appendix D1, continued

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
2-Chlorophenol	µg/g	0.1	<0.1	<0.2			
4-Chloro-3-Methylphenol	µg/g	0.1	<0.1	<0.2			
Isophorone	µg/g	0.1	<0.1	<0.2			
2,5-Dichlorophenol	µg/g	0.1	<0.1	<0.2			
2-Methyl-4,6-Dinitrophenol	µg/g	0.5	<0.5	<1			
2-Nitrophenol	µg/g	0.5	<0.5	<1			0.063
4-Nitrophenol	µg/g	0.5	<0.5	<1			
Np	ng/g dry	0.245	8.44	5.79			
4-Nonylphenol Diethoxylates	ng/g dry	2.43	<2.43	<2.63			
4-Nonylphenol Monoethoxylates	ng/g dry	0.778	<0.778	<0.854			
Octylphenol	ng/g dry	0.141	<0.141	<0.118			
2,4,6-trichlorophenol	µg/g	0.1	<0.1	<0.2			0.029
2,4-dichlorophenol	µg/g	0.1	<0.1	<0.2			
2,4-dimethylphenol	µg/g	0.1	<0.1	<0.2			
2,4-dinitrophenol	µg/g	1	<1	<2			
Pentachlorophenol	µg/g	0.2	<0.2	<0.4			
Bromobenzene	mg/kg	0.2		<0.2			
Bromodichloromethane	mg/kg	0.05		<0.05			
Bromomethane	mg/kg	0.3		<0.3			
Chlorobenzene	mg/kg	0.02		<0.02			
Chlorodibromomethane	mg/kg	0.05		<0.05			
Chloroethane	mg/kg	0.1		<0.1			
Chloroethene	mg/kg	0.04		<0.04			
Chloromethane	mg/kg	0.05		<0.05			
Cis-1,2-Dichloroethene	mg/kg	0.03		<0.03			
Dibromomethane	mg/kg	0.08		<0.08			
Hexachlorobutadiene	ng/g dry	0.0025	0.034	0.03			
Tetrachloroethene	mg/kg	0.01		<0.01			
Tetrachloromethane	mg/kg	0.02		<0.02			
Trans-1,2-Dichloroethene	mg/kg	0.03		<0.03			
Tribromomethane	mg/kg	0.05		<0.05			
Trichloroethene	mg/kg	0.009		<0.009			
Trichlorofluoromethane	mg/kg	0.2		<0.2			
Trichloromethane	mg/kg	0.02		<0.02			
Aldrin	ng/g dry	0.0039	<0.0039	<0.0038			
Alpha Chlordane	ng/g dry	0.0039	<0.0039	<0.0038	4.79	5.7	
Alpha-Endosulfan	ng/g dry	0.0098	<0.0098	<0.0095			
Alpha-Hch Or Alpha-Bhc	ng/g dry	0.0039	0.004	0.009			

Appendix D1, continued

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Beta-Endosulfan	ng/g dry	0.0118	0.037	0.036			
Beta-Hch Or Beta-Bhc	ng/g dry	0.0039	0.005	0.008			
Cis-Nonachlor	ng/g dry	0.0039	<0.0039	<0.0038			
Delta-Hch Or Delta-Bhc	ng/g dry	0.0098	<0.0098	<0.0095			
Dieldrin	ng/g dry	0.0098	<0.0098	<0.0095	4.3	5.2	
Endosulfan Sulfate	ng/g dry	0.0098	<0.0098	<0.0105			
Endrin	ng/g dry	0.0098	<0.0098	<0.0095	62.4	75	
Endrin Aldehyde	ng/g dry	0.0371	<0.0371	<0.0578			
Endrin Ketone	ng/g dry	0.0106	<0.0106	<0.013			
Hch, Gamma	ng/g dry	0.0039	<0.0039	<0.0038		1.2	
Heptachlor	ng/g dry	0.0039	<0.0039	<0.0038		3.3	
Heptachlor Epoxide	ng/g dry	0.0098	<0.0098	<0.0095	2.74	3.3	
Hexachlorobenzene	ng/g dry	0.002	0.013	0.02			0.07
Hexachlorobutadiene	ng/g dry	0.0025	0.034	0.03			0.12
Methoxyclor	ng/g dry	0.025	<0.025	<0.019			
Octachlorostyrene	ng/g dry	0.0039	<0.0039	<0.0038			
Oxy-Chlordane	ng/g dry	0.0039	<0.0039	0.014			
Pentachlorobenzene	ng/g dry	0.002	0.008	0.014			
Trans-Chlordane	ng/g dry	0.0039	<0.0039	<0.0038	4.79	5.7	
Trans-Nonachlor	ng/g dry	0.0039	<0.0039	<0.0038			
N-Nitrosodi-N-Propylamine	µg/g	0.1	<0.1	<0.2			
1-Methylphenanthrene	ng/g dry	0.0675	1.56	5.22			
2-Methylnaphthalene	ng/g dry	0.139	3.69	10.3			
Acenaphthene	ng/g dry	0.0926	0.178	0.356	128	150	500
Acenaphthylene	ng/g dry	0.0339	0.113	0.234	245	290	1,300
Anthracene	ng/g dry	0.0359	0.329	0.602	88.9	110	1000
Benzo(a)Anthracene	ng/g dry	0.0395	0.662	1.29	693	830	1,600
Benzo(a)Pyrene	ng/g dry	0.0468	0.623	1.2	763	920	1,600
Benzo(b)Fluoranthene	ng/g dry	0.0334	0.94	2.05			
Benzo(e)Pyrene	ng/g dry	0.0445	0.772	1.59			720
Benzo(g,h,i)Perylene	ng/g dry	0.0555	0.847	1.72			
Benzo[j,k]Fluoranthenes	ng/g dry	0.0359	0.544	1.18			
Chrysene	ng/g dry	0.0398	1.31	2.75	846	1,000	2,800
Dibenzo(a,h)Anthracene	ng/g dry	0.0564	0.176	0.323	135	16	230
Dibenzothiophene	ng/g dry	0.0273	0.34	0.784			
Fluoranthene	ng/g dry	0.0359	1.88	3.89	1,494	1,800	2,500
Fluorene	ng/g dry	0.0349	0.585	1.27	144	170	540
Indeno(1,2,3-c,d)Pyrene	ng/g dry	0.0563	0.642	1.28			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Naphthalene	ng/g dry	0.199	2.13	6.22	391	470	2,100
Perylene	ng/g dry	0.0495	3.33	6.72			
Phenanthrene	ng/g dry	0.0356	3.78	9.78	544	650	1,500
Pyrene	ng/g dry	0.0349	1.87	3.64	1,398	1,700	3,300
Pbde 7	pg/g dry	0.123	<0.123	0.318			
Pbde 8/11	pg/g dry	0.123	0.302	0.789			
Pbde 10	pg/g dry	0.123	<0.123	<0.119			
Pbde 12/13	pg/g dry	0.123	0.487	0.568			
Pbde 15	pg/g dry	0.123	0.317	0.409			
Pbde 17/25	pg/g dry	0.123	0.801	1.57			
Pbde 28/33	pg/g dry	0.123	0.666	1.11			
Pbde 30	pg/g dry	0.123	<0.123	<0.119			
Pbde 32	pg/g dry	0.123	<0.123	<0.119			
Pbde 35	pg/g dry	0.123	<0.123	<0.119			
Pbde 37	pg/g dry	0.123	0.153	0.169			
Pbde 47	pg/g dry	0.123	9.52	10.4			
Pbde 49	pg/g dry	0.123	1.46	1.77			
Pbde 51	pg/g dry	0.123	0.184	0.269			
Pbde 66	pg/g dry	0.123	0.435	0.462			
Pbde 71	pg/g dry	0.123	<0.123	<0.119			
Pbde 75	pg/g dry	0.123	<0.123	<0.119			
Pbde 77	pg/g dry	0.123	<0.123	<0.119			
Pbde 79	pg/g dry	0.123	1.24	1.33			
Pbde 85	pg/g dry	0.123	<0.123	<0.119			
Pbde 99	pg/g dry	0.123	<0.123	<0.119			
Pbde 100	pg/g dry	0.123	1.73	1.58			
Pbde 105	pg/g dry	0.123	<0.123	<0.119			
Pbde 116	pg/g dry	0.123	<0.123	<0.119			
Pbde 119/120	pg/g dry	0.123	<0.123	<0.119			
Pbde 126	pg/g dry	0.123	<0.123	<0.119			
Pbde 128	pg/g dry	0.587	<0.587	<0.568			
Pbde 138/166	pg/g dry	0.133	<0.133	<0.119			
Pbde 140	pg/g dry	0.123	<0.123	<0.119			
Pbde 153	pg/g dry	0.123	0.631	0.506			
Pbde 154	pg/g dry	0.123	0.642	0.653			
Pbde 155	pg/g dry	0.123	0.185	0.351			
Pbde 181	pg/g dry	0.123	<0.123	<0.119			
Pbde 183	pg/g dry	0.123	0.532	0.271			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Pbde 190	pg/g dry	0.123	<0.123	<0.119			
Pbde 203	pg/g dry	0.123	0.537	0.606			
Pbde 206	pg/g dry	0.123	4.68	4.31			
Pbde 207	pg/g dry	0.123	1.96	1.82			
Pbde 208	pg/g dry	0.123	4.51	3.32			
Pbde 209	pg/g dry	3.11	33.3	34.7			
Pcb 1	pg/g dry	0.493	0.826	1.66			
Pcb 2	pg/g dry	0.456	7.59	6.66			
Pcb 3	pg/g dry	0.304	1.64	2.04			
Pcb 4	pg/g dry	1.72	<1.72	<1.98			
Pcb 5	pg/g dry	1.44	<1.44	<1.55			
Pcb 6	pg/g dry	1.28	<1.28	<1.38			
Pcb 7	pg/g dry	1.32	<1.32	<1.42			
Pcb 8	pg/g dry	1.19	2.57	5.82			
Pcb 9	pg/g dry	1.27	<1.27	<1.36			
Pcb 10	pg/g dry	1.35	<1.35	<1.46			
Pcb 11	pg/g dry	1.49	5.62	7.66			
Pcb 12/13	pg/g dry	1.46	<1.46	<1.57			
Pcb 14	pg/g dry	1.33	<1.33	<1.43			
Pcb 15	pg/g dry	1.25	2.34	5.64			
Pcb 16	pg/g dry	0.254	0.734	1.25			
Pcb 147/149	pg/g dry	0.247	5.79	16			
Pcb 17	pg/g dry	0.228	0.893	1.91			
Pcb 18/30	pg/g dry	0.186	1.83	4.48			
Pcb 19	pg/g dry	0.27	0.34	0.603			
Pcb 20/28	pg/g dry	0.228	6.67	17.6			
Pcb 21/33	pg/g dry	0.221	2.16	5.79			
Pcb 22	pg/g dry	0.252	1.72	4.41			
Pcb 23	pg/g dry	0.245	<0.245	<0.307			
Pcb 24	pg/g dry	0.17	<0.17	<0.151			
Pcb 25	pg/g dry	0.193	0.302	1.03			
Pcb 26/29	pg/g dry	0.235	0.895	1.7			
Pcb 27	pg/g dry	0.156	0.187	0.286			
Pcb 31	pg/g dry	0.218	5.68	10.6			
Pcb 32	pg/g dry	0.227	0.712	2.13			
Pcb 34	pg/g dry	0.244	<0.244	<0.307			
Pcb 35	pg/g dry	0.246	0.292	0.627			
Pcb 36	pg/g dry	0.226	<0.226	<0.284			

Appendix D1, continued

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Pcb 37	pg/g dry	0.221	1.91	5.08			
Pcb 38	pg/g dry	0.215	<0.215	<0.27			
Pcb 39	pg/g dry	0.225	<0.225	<0.283			
Pcb 40/41/71	pg/g dry	0.262	2.19	7.38			
Pcb 42	pg/g dry	0.274	1.55	3.67			
Pcb 43	pg/g dry	0.312	<0.312	<0.329			
Pcb 44/47/65	pg/g dry	0.233	3.9	11.2			
Pcb 45/51	pg/g dry	0.273	0.478	1.17			
Pcb 46	pg/g dry	0.31	<0.31	0.633			
Pcb 48	pg/g dry	0.269	0.782	2.03			
Pcb 49/69	pg/g dry	0.226	3	7.86			
Pcb 50/53	pg/g dry	0.257	0.313	0.99			
Pcb 52	pg/g dry	0.256	3.97	12.4			
Pcb 54	pg/g dry	0.227	<0.227	<0.247			
Pcb 55	pg/g dry	0.355	<0.355	0.606			
Pcb 56	pg/g dry	0.353	3.17	8.47			
Pcb 57	pg/g dry	0.314	<0.314	<0.416			
Pcb 58	pg/g dry	0.331	<0.331	<0.439			
Pcb 59/62/75	pg/g dry	0.189	0.564	1.19			
Pcb 60	pg/g dry	0.34	2.14	4.94			
Pcb 61/70/74/76	pg/g dry	0.309	9.87	28.6			
Pcb 63	pg/g dry	0.322	<0.322	0.85			
Pcb 64	pg/g dry	0.191	1.65	4.78			
Pcb 66	pg/g dry	0.338	6.46	17.8			
Pcb 67	pg/g dry	0.259	<0.259	0.449			
Pcb 68	pg/g dry	0.309	<0.309	<0.409			
Pcb 72	pg/g dry	0.315	<0.315	<0.417			
Pcb 73	pg/g dry	0.202	<0.202	<0.213			
Pcb 77	pg/g dry	0.273	0.866	2.18			
Pcb 78	pg/g dry	0.305	<0.305	<0.404			
Pcb 79	pg/g dry	0.249	<0.249	0.423			
Pcb 80	pg/g dry	0.288	<0.288	<0.382			
Pcb 81	pg/g dry	0.27	<0.27	<0.361			
Pcb 82	pg/g dry	0.199	1.03	2.18			
Pcb 83/99	pg/g dry	0.194	5.06	13			
Pcb 84	pg/g dry	0.222	1.12	3.35			
Pcb 85/116/117	pg/g dry	0.152	1.47	3.94			
Pcb 86/87/97/108/119/125	pg/g dry	0.16	4.31	11.2			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Pcb 88/91	pg/g dry	0.193	0.693	1.97			
Pcb 89	pg/g dry	0.212	<0.212	<0.316			
Pcb 90/101/113	pg/g dry	0.164	7.04	17.6			
Pcb 92	pg/g dry	0.198	1.01	2.82			
Pcb 93/95/98/100/102	pg/g dry	0.187	3.75	10.1			
Pcb 94	pg/g dry	0.216	<0.216	<0.321			
Pcb 96	pg/g dry	0.158	<0.158	0.141			
Pcb 103	pg/g dry	0.179	<0.179	0.386			
Pcb 104	pg/g dry	0.181	<0.181	<0.151			
Pcb 105	pg/g dry	0.241	3.54	8.67			
Pcb 106	pg/g dry	0.23	<0.23	<0.271			
Pcb 107/124	pg/g dry	0.238	<0.238	0.623			
Pcb 109	pg/g dry	0.235	0.856	1.91			
Pcb 110/115	pg/g dry	0.134	7.43	16.4			
Pcb 111	pg/g dry	0.133	<0.133	<0.198			
Pcb 112	pg/g dry	0.128	<0.128	<0.19			
Pcb 114	pg/g dry	0.232	<0.232	0.334			
Pcb 118	pg/g dry	0.214	7.46	19.6			
Pcb 120	pg/g dry	0.128	<0.128	0.205			
Pcb 121	pg/g dry	0.151	<0.151	<0.224			
Pcb 122	pg/g dry	0.252	<0.252	<0.298			
Pcb 123	pg/g dry	0.22	0.243	0.564			
Pcb 126	pg/g dry	0.293	<0.293	<0.314			
Pcb 127	pg/g dry	0.227	<0.227	<0.269			
Pcb 128/166	pg/g dry	0.214	1.16	3.11			
Pcb 129/138/160/163	pg/g dry	0.221	8.5	22.9			
Pcb 130	pg/g dry	0.284	0.476	1.3			
Pcb 131	pg/g dry	0.272	<0.272	<0.386			
Pcb 132	pg/g dry	0.29	2.33	5.54			
Pcb 133	pg/g dry	0.271	<0.271	0.441			
Pcb 134/143	pg/g dry	0.288	<0.288	0.702			
Pcb 135/151/154	pg/g dry	0.185	2.7	7.2			
Pcb 136	pg/g dry	0.146	0.856	1.68			
Pcb 137	pg/g dry	0.272	0.288	0.523			
Pcb 139/140	pg/g dry	0.25	<0.25	0.411			
Pcb 141	pg/g dry	0.246	0.951	1.93			
Pcb 142	pg/g dry	0.286	<0.286	<0.406			
Pcb 144	pg/g dry	0.194	0.31	0.946			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Pcb 145	pg/g dry	0.156	<0.156	<0.177			
Pcb 146	pg/g dry	0.244	1.39	5.43			
Pcb 148	pg/g dry	0.188	0.191	0.348			
Pcb 150	pg/g dry	0.149	<0.149	<0.169			
Pcb 152	pg/g dry	0.146	<0.146	<0.166			
Pcb 153/168	pg/g dry	0.203	7.44	21.6			
Pcb 155	pg/g dry	0.121	<0.121	<0.147			
Pcb 156/157	pg/g dry	0.242	1.09	2.47			
Pcb 158	pg/g dry	0.167	0.527	1.41			
Pcb 159	pg/g dry	0.185	<0.185	<0.263			
Pcb 161	pg/g dry	0.179	<0.179	<0.254			
Pcb 162	pg/g dry	0.192	<0.192	<0.273			
Pcb 164	pg/g dry	0.18	0.475	1.33			
Pcb 165	pg/g dry	0.223	<0.223	<0.317			
Pcb 167	pg/g dry	0.188	0.444	0.988			
Pcb 169	pg/g dry	0.225	<0.225	<0.311			
Pcb 170	pg/g dry	0.219	1.35	4.36			
Pcb 171/173	pg/g dry	0.213	0.44	1.46			
Pcb 172	pg/g dry	0.222	0.341	0.901			
Pcb 174	pg/g dry	0.204	1.47	3.96			
Pcb 175	pg/g dry	0.196	<0.196	0.391			
Pcb 176	pg/g dry	0.15	0.161	0.529			
Pcb 177	pg/g dry	0.2	1.36	3.67			
Pcb 178	pg/g dry	0.206	0.535	1.52			
Pcb 179	pg/g dry	0.157	0.586	2.79			
Pcb 180/193	pg/g dry	0.2	2.97	11.3			
Pcb 181	pg/g dry	0.208	<0.208	<0.195			
Pcb 182	pg/g dry	0.187	<0.187	0.18			
Pcb 183/185	pg/g dry	0.192	1.03	4.21			
Pcb 184	pg/g dry	0.149	<0.149	<0.139			
Pcb 186	pg/g dry	0.164	<0.164	<0.153			
Pcb 187	pg/g dry	0.185	2.84	10.1			
Pcb 188	pg/g dry	0.144	<0.144	<0.135			
Pcb 189	pg/g dry	0.165	<0.165	<0.17			
Pcb 190	pg/g dry	0.153	0.236	0.939			
Pcb 191	pg/g dry	0.158	<0.158	<0.148			
Pcb 192	pg/g dry	0.18	<0.18	<0.168			
Pcb 194	pg/g dry	0.137	0.676	3.71			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Pcb 195	pg/g dry	0.145	0.301	1.07			
Pcb 196	pg/g dry	0.185	0.392	1.98			
Pcb 197/200	pg/g dry	0.144	0.246	0.892			
Pcb 198/199	pg/g dry	0.194	1.44	5.52			
Pcb 201	pg/g dry	0.148	<0.148	0.706			
Pcb 202	pg/g dry	0.136	0.389	1.46			
Pcb 203	pg/g dry	0.177	0.612	3.18			
Pcb 204	pg/g dry	0.146	<0.146	<0.141			
Pcb 205	pg/g dry	0.126	<0.126	0.252			
Pcb 206	pg/g dry	0.675	1	4.23			
Pcb 207	pg/g dry	0.471	<0.471	0.69			
Pcb 208	pg/g dry	0.545	<0.545	1.27			
Pcb 209	pg/g dry	0.18	0.888	3.77			
Pcb Teq 3	pg/g dry	---	0.0841	0.308			
Pcb Teq 4	pg/g dry	---	0.178	0.375			
PCBs Total	pg/g dry	---	157	467	189,000	230,000	1,000,000,000
Total Decachloro Biphenyl	mg/kg	1	<1	<0.2			
Total Heptachloro Biphenyls	pg/g dry	---	8.78	43.2			
Total Hexachloro Biphenyls	pg/g dry	---	30.1	93.4			
Total Monochloro Biphenyls	pg/g dry	---	10.1	8.32			
Total Nonachloro Biphenyls	pg/g dry	---	<'---	4.92			
Total Octachloro Biphenyls	pg/g dry	---	1.99	17			
Total Pentachloro Biphenyls	pg/g dry	---	34.2	113			
Total Tetrachloro Biphenyls	pg/g dry	---	38	115			
Total Trichloro Biphenyls	pg/g dry	---	23.4	48.3			
1,2,3,4,6,7,8-HPCDD	pg/g dry	0.0614	1.5	3.78			
1,2,3,4,6,7,8-HPCDF	pg/g dry	0.0614	0.361	1.04			
1,2,3,4,7,8,9-HPCDF	pg/g dry	0.0614	<0.0614	0.065			
1,2,3,4,7,8-HXCDD	pg/g dry	0.0614	<0.0614	0.102			
1,2,3,4,7,8-HXCDF	pg/g dry	0.0614	<0.0614	0.118			
1,2,3,6,7,8-HXCDD	pg/g dry	0.0614	0.369	1.03			
1,2,3,6,7,8-HXCDF	pg/g dry	0.0614	<0.0614	0.095			
1,2,3,7,8,9-HXCDD	pg/g dry	0.0614	0.328	0.805			
1,2,3,7,8,9-HXCDF	pg/g dry	0.0614	0.066	0.075			
1,2,3,7,8-PECDD	pg/g dry	0.0614	0.075	0.188			
1,2,3,7,8-PECDF	pg/g dry	0.0614	<0.0614	0.105			
2,3,4,6,7,8-HXCDF	pg/g dry	0.0614	<0.0614	0.082			
2,3,4,7,8-PECDF	pg/g dry	0.0614	<0.0614	0.115			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
2,3,7,8-TCDD	pg/g dry	0.0614	<0.0614	0.079			
2,3,7,8-TCDF	pg/g dry	0.0614	0.212	0.565			
OCDD	pg/g dry	0.0614	7.19	19.3			
OCDF	pg/g dry	0.0614	0.418	1.06			
TOTAL HEPTA-DIOXINS	pg/g dry	---	3.31	8.79			
TOTAL HEPTA-FURANS	pg/g dry	---	0.737	2.31			
TOTAL HEXA-DIOXINS	pg/g dry	---	2.94	8.18			
TOTAL HEXA-FURANS	pg/g dry	---	0.404	0.862			
TOTAL PENTA-DIOXINS	pg/g dry	---	0.25	1.4			
TOTAL PENTA-FURANS	pg/g dry	---	0.154	1.04			
TOTAL TETRA-DIOXINS	pg/g dry	---	<0.0614	0.6			
TOTAL TETRA-FURANS	pg/g dry	---	0.493	2.51			
PFBA	ng/g dry	0.0495	3.33	6.72			
PFBS	ng/g dry	0.0495	3.33	6.72			
PFDA	ng/g dry	0.0495	3.33	6.72			
PFDoA	ng/g dry	0.0495	3.33	6.72			
PFHpA	ng/g dry	0.0495	3.33	6.72			
PFHxA	ng/g dry	0.0495	3.33	6.72			
PFHxS	ng/g dry	0.0495	3.33	6.72			
PFNA	ng/g dry	0.0495	3.33	6.72			
PFOA	ng/g dry	0.0495	3.33	6.72			
PFOS	ng/g dry	0.0495	3.33	6.72			
PFOSA	ng/g dry	0.0495	3.33	6.72			
PFPeA	ng/g dry	0.0495	3.33	6.72			
PFUnA	ng/g dry	0.0495	3.33	6.72			
2-Hydroxy-Ibuprofen	ng/g dry	3.86	<3.86	<4.01			
Acetaminophen	ng/g dry	14.5	<14.5	<15.1			
Albuterol	ng/g dry	0.3	<0.3	<0.29			
Alprazolam	ng/g dry	0.289	<0.289	<0.301			
Amitriptyline	ng/g dry	2.38	<2.38	<1.23			
Amlodipine	ng/g dry	---	---	---			
Amphetamine	ng/g dry	0.3	0.312	0.47			
Amsacrine	ng/g dry	---	---	---			
Atenolol	ng/g dry	0.3	<0.3	<0.29			
Atorvastatin	ng/g dry	---	---	---			
Azathioprine	ng/g dry	1.93	<1.93	<2.01			
Azithromycin	ng/g dry	---	---	---			
Benzoylecgonine	ng/g dry	0.289	<0.289	<0.301			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Benztropine	ng/g dry	---	---	---			
Betamethasone	ng/g dry	---	---	---			
Bisphenol A	ng/g dry	5.78	<5.78	<6.02			
Busulfan	ng/g dry	3.86	<3.86	<4.01			
Caffeine	ng/g dry	14.5	<14.5	<15.1			
Carbadox	ng/g dry	---	---	---			
Carbamazepine	ng/g dry	1.45	<1.45	<1.51			
Cefotaxime	ng/g dry	---	---	---			
Cimetidine	ng/g dry	0.599	<0.599	---			
Ciprofloxacin	ng/g dry	---	---	---			
Citalopram	ng/g dry	---	---	---			
Clarithromycin	ng/g dry	1.45	<1.45	<1.51			
Clinafloxacin	ng/g dry	---	---	---			
Clonidine	ng/g dry	1.2	<1.2	<1.16			
Clotrimazole	ng/g dry	0.386	<0.386	<0.401			
Cloxacillin	ng/g dry	---	---	---			
Cocaine	ng/g dry	1.52	<1.52	<2.68			
Codeine	ng/g dry	1.2	<1.2	<1.16			
Colchicine	ng/g dry	---	---	---			
Cotinine	ng/g dry	0.3	<0.3	<0.29			
Cyclophosphamide	ng/g dry	0.771	<0.771	<0.803			
Daunorubicin	ng/g dry	7.71	<7.71	<8.03			
Deet	ng/g dry	0.578	2.52	1.51			
Dehydronifedipine	ng/g dry	---	---	---			
Desmethyldiltiazem	ng/g dry	1.4	<1.4	---			
Diatrizoic acid	ng/g dry	23.1	<23.1	<24.1			
Diazepam	ng/g dry	0.289	<0.289	<0.301			
Digoxigenin	ng/g dry	---	---	---			
Digoxin	ng/g dry	---	---	---			
Diltiazem	ng/g dry	---	---	---			
Diphenhydramine	ng/g dry	---	---	---			
Doxorubicin	ng/g dry	---	---	---			
Drospirenone	ng/g dry	7.71	<7.71	<8.03			
Enalapril	ng/g dry	0.3	<0.3	<0.29			
Enrofloxacin	ng/g dry	---	---	---			
Erythromycin-H2O	ng/g dry	2.22	2.25	<2.31			
Etoposide	ng/g dry	1.93	<1.93	<2.01			
Flumequine	ng/g dry	---	---	---			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Fluocinonide	ng/g dry	5.78	<5.78	<6.02			
Fluoxetine	ng/g dry	2.18	<2.18	<6.68			
Fluticasone Propionate	ng/g dry	---	---	---			
Furosemide	ng/g dry	3.86	<3.86	<4.01			
Gemfibrozil	ng/g dry	0.771	<0.771	<0.803			
Glipizide	ng/g dry	0.771	<0.771	<0.803			
Glyburide	ng/g dry	0.771	<0.771	<0.803			
Hydrochlorothiazide	ng/g dry	8.48	<8.48	<8.83			
Hydrocodone	ng/g dry	1.2	<1.2	<1.16			
Hydrocortisone	ng/g dry	57.8	<57.8	<60.2			
Ibuprofen	ng/g dry	3.86	<3.86	<4.01			
Iopamidol	ng/g dry	77.1	315	747			
Lincomycin	ng/g dry	---	---	---			
Lomefloxacin	ng/g dry	---	---	---			
Medroxyprogesterone Acetate	ng/g dry	3.86	<3.86	<4.01			
Melphalan	ng/g dry	23.1	<23.1	---			
Meprobamate	ng/g dry	---	---	---			
Metformin	ng/g dry	0.3	<0.3	0.498			
Methylprednisolone	ng/g dry	3.86	<3.86	<4.02			
Metoprolol	ng/g dry	16.2	<16.2	---			
Metronidazole	ng/g dry	3.86	<3.86	<4.01			
Miconazole	ng/g dry	---	---	---			
Moxifloxacin	ng/g dry	---	---	---			
Naproxen	ng/g dry	1.93	<1.93	<2.01			
Norfloxacin	ng/g dry	---	---	---			
Norfluoxetine	ng/g dry	1.45	<1.45	<1.51			
Norgestimate	ng/g dry	---	---	---			
Norverapamil	ng/g dry	0.147	<0.147	---			
Ofloxacin	ng/g dry	---	---	---			
Ormetoprim	ng/g dry	---	---	---			
Oxacillin	ng/g dry	---	---	---			
Oxazepam	ng/g dry	3.86	<3.86	<4.01			
Oxolinic Acid	ng/g dry	---	---	---			
Oxycodone	ng/g dry	0.599	<0.599	<0.58			
Paroxetine	ng/g dry	3.86	<3.86	<5.53			
Penicillin G	ng/g dry	---	---	---			
Penicillin V	ng/g dry	---	---	---			
Prednisolone	ng/g dry	5.78	<5.78	---			

Appendix D1, continued

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Prednisone	ng/g dry	64.3	<64.3	---			
Promethazine	ng/g dry	6.17	<6.17	---			
Propoxyphene	ng/g dry	0.452	<0.452	<0.877			
Propranolol	ng/g dry	1.93	<1.93	---			
Ranitidine	ng/g dry	0.599	<0.599	---			
Rosuvastatin	ng/g dry	3.86	<3.86	<4.01			
Roxithromycin	ng/g dry	0.289	<0.289	<0.301			
Sarafloxacin	ng/g dry	---	---	---			
Sertraline	ng/g dry	0.386	<0.386	---			
Simvastatin	ng/g dry	---	---	---			
Sulfachloropyridazine	ng/g dry	1.45	<1.45	<1.51			
Sulfadiazine	ng/g dry	1.45	<1.45	<1.51			
Sulfadimethoxine	ng/g dry	0.289	<0.289	<0.383			
Sulfamerazine	ng/g dry	0.578	<0.578	<0.61			
Sulfamethazine	ng/g dry	0.578	<0.578	<0.602			
Sulfamethizole	ng/g dry	0.592	<0.592	<1.39			
Sulfamethoxazole	ng/g dry	1.11	<1.11	<0.911			
Sulfanilamide	ng/g dry	14.5	<14.5	<15.1			
Sulfathiazole	ng/g dry	1.45	<1.45	<1.51			
Tamoxifen	ng/g dry	0.386	<0.386	<0.401			
Teniposide	ng/g dry	3.86	<3.86	<4.01			
Theophylline	ng/g dry	57.8	<57.8	<60.2			
Thiabendazole	ng/g dry	1.45	<1.45	---			
Trenbolone	ng/g dry	3.86	<3.86	<4.02			
Trenbolone Acetate	ng/g dry	0.289	<0.289	<0.301			
Triamterene	ng/g dry	0.3	<0.3	<0.29			
Triclocarban	ng/g dry	0.386	<0.386	<0.401			
Triclosan	ng/g dry	5.78	<5.78	<6.02			
Trimethoprim	ng/g dry	1.45	<1.45	<1.51			
Tylosin	ng/g dry	5.78	<5.78	<6.02			
Valsartan	ng/g dry	---	---	---			
Venlafaxine	ng/g dry	---	---	---			
Verapamil	ng/g dry	---	---	---			
Virginiamycin	ng/g dry	---	---	---			
Warfarin	ng/g dry	0.386	<0.386	<0.401			
10-Hydroxy-Amitriptyline	ng/g dry	0.153	<0.153	---			
Zidovudine	ng/g dry	23.1	<23.1	<24.1			
M,P-Cresol	µg/g	0.2	<0.2	<0.4			

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
Phenol	µg/g	0.2	<0.2	<0.4			
Bis(2-Ethylhexyl)Phthalate	µg/g	0.5	<0.5	<1			
Butylbenzyl Phthalate	µg/g	0.2	<0.2	<0.4			
Di-N-Butyl Phthalate	µg/g	0.2	<0.2	<0.4			
Di-N-Octyl Phthalate	µg/g	0.5	<0.5	<1			
Diethyl Phthalate	µg/g	0.2	<0.2	<0.4			
Dimethyl Phthalate	µg/g	0.2	<0.2	<0.4			
2,4-dinitrotoluene	µg/g	0.1	<0.1	<0.2			
2,6-dinitrotoluene	µg/g	0.1	<0.1	<0.2			
3,3-dichlorobenzidine	µg/g	0.5	<0.5	<1			
Nitrosodiphenylamine/Diphenylamine	µg/g	0.2	<0.2	<0.4			
1,1,1-trichloroethane	mg/kg	0.02		<0.02			
1,1,2,2-tetrachloroethane	mg/kg	0.02		<0.02			
1,1,2-trichloroethane	mg/kg	0.02		<0.02			
1,1-dichloroethane	mg/kg	0.025		<0.025			
1,1-dichloroethene	mg/kg	0.025		<0.025			
1,2,3-Trichlorobenzene mg	mg/kg	0.03		<0.03			
1,2,4-trichlorobenzene mg	mg/kg	0.03		<0.03			
1,2-dibromoethane	mg/kg	0.03		<0.03			
1,2-dichlorobenzene mg	mg/kg	0.02		<0.02			0.05
1,2-dichloroethane	mg/kg	0.02		<0.02			
1,2-dichloropropane mg	mg/kg	0.02		<0.02			
1,3-dichlorobenzene mg	mg/kg	0.02		<0.02			
1,4-dichlorobenzene mg	mg/kg	0.02		<0.02			0.11
cis-1,3-dichloropropene	mg/kg	0.02		<0.02			
Isopropylbenzene	mg/kg	0.2		<0.2			
trans-1,3-dichloropropene	mg/kg	0.02		<0.02			
VPH	mg/kg	10		<10			
1,2,3,4-Tetrachlorobenzene	ng/g dry	0.0195	<0.0195	<0.019			
1,2,3-Trichlorobenzene	ng/g dry	0.0195	<0.0195	0.079			
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	ng/g dry	0.0195	<0.0195	<0.019			
1,2,4-Trichlorobenzene	ng/g dry	0.0195	0.067	0.12			
1,2-dichlorobenzene	ng/g dry	---	---	---			
1,3,5-Trichlorobenzene	ng/g dry	0.0195	<0.0195	<0.019			
1,3,5-trimethylbenzene	ng/g dry	0.0195	<0.0195	<0.019			
1,3-dichlorobenzene	ng/g dry	---	---	---			
1,4-dichlorobenzene	ng/g dry	---	---	---			
1,7-Dimethylxanthine	ng/g dry	57.8	<57.8	<60.2			

Appendix D1, continued

Parameter	Units	DL	SPWWTP Outfall	Reference 2	Sediment Screening Criteria		
					CCME PEL[1]	BC CSR Typical[2]	WSDOE 2nd Lowest AET[3]
2,3,5-trimethylnaphthalene	ng/g dry	0.0933	3.87	9.65			
2,4-DDD	ng/g dry	0.0039	<0.0039	0.006	7.81		
2,4-DDE	ng/g dry	0.0039	<0.0039	<0.0038	374		
2,4-DDT	ng/g dry	0.0059	<0.0059	<0.0069	4.77		
2,6-dimethylnaphthalene	ng/g dry	0.134	3.6	8.82			
4,4-DDE	ng/g dry	0.0039	0.012	0.033	374	450	
4,4-DDT	ng/g dry	0.0039	0.012	0.033	4.77	5.7	
4,4-DDD	ng/g dry	0.0039	0.012	0.033	7.81	9.4	
Mirex	ng/g dry	0.0039	<0.0039	<0.0038			

Notes:
Shaded cells indicate exceedance to one of more SQG
1 - Canadian Council of Ministers of the Environment Probable Effects Level (PEL) (CCME, 2002)
2 - BC Contaminated Sites Regulation Typical Contaminated Site Criteria (BCMWLAP, 2003)
3 - Washington State Department of Ecology, 2nd lowest AET (WSDOE, 1991)
Multiple units are presented for analytes, which were reported using several units by the laboratory

Appendix D2 SPTP Benthic Invertebrate Results 2020

TAXON	Reference																Outfall													
	Rep 1				Rep 2				Rep 3				Rep 4				Rep 1				Rep 2				Rep 3				Rep 4			
	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J
ANNELIDA																																
Ampharete sp.																1																
Ampharete sp. nr. acutifrons						2																								1		
Ampharetinae indet.								5								2																3
Amphiglena sp.						1																										
Anobothrus gracilis		1				3	12			1	3	2			5	1																
Aphelochaeta glandaria complex		1				1																										
Aphelochaeta sp.		3					1																									
Aphelochaeta sp. N6 (Ruff)										2																						
Aphrodita parva							1																									
Aphrodita sp.												1																				
Apistobranchus tullbergi										1																						
Arcteobia sp.																																1
Aricidea (Acmira) lopezi		2	1			1																										
Aricidea (Strelzovia) sp A SCAMIT			1				1																									
Aricidea wassi															2				1								2					
Armandia brevis																																5
Asabellides lineata						1									1																	
Asabellides sp.				3			1	6																								1
Autolytinae indet.			1											3		1														4	2	
Barantolla sp. nr. americana			3	4																												
Boccardia pugettensis		2								1																						
Capitella capitata complex											1																					
Capitellidae indet.				9		1								1																		
Caulleriella pacifica				1											1	1						1									1	2
Chaetozone acuta																														3		
Chaetozone careyi										1								1														
Chaetozone pugettensis						1																										
Chaetozone sp.		3																												2	1	1
Chone duneri						1																										
Chone magna			3											2																		
Chone sp.							5	6						2		1																
Circeis armoricana										1																						
Cistenides granulata				1				1																								1
Decamastus sp. nr. gracilis		54	23	24		57	25	14		95	16			61	29	15							2									
Diopatra hupferiana monroi								1																								
Diopatra ornata		3		1		3	3			3				3																2	1	
Dipolydora bidentata																														1		
Dipolydora cardalia						2				1				3																1	2	
Dipolydora socialis		2				19	34	15						3	7	8																
Dipolydora sp.		2									6	10			1																21	20
Drilonereis longa																1																
Eranno sp.						1																										
Erinaceusyllis erinaceus																														2		
Eteone sp.						1	1																									1
Euchone incolor						2																										
Euclymene sp. nr. zonalis		12	6	13		1	3	50		5	7	16		1	6	40																

Appendix D2, continued

TAXON	Reference																Outfall													
	Rep 1				Rep 2				Rep 3				Rep 4				Rep 1				Rep 2				Rep 3				Rep 4			
	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J
Euclymeninae indet.								6				13			2	4				1												1
Eudistylia sp.															1																
Eulalia quadrioculata							3																								
Eulalia sp.																3															
Eumida sp.						7	4	2			2	3		4	1	2															
Eusyllis blomstrandi						1	2			1					1														1		
Eusyllis habei														2																6	
Exogone dwisula			1	1			1			1				5	1	4															
Exogone lourei			1			7	8	1		3				6	6	3													16	31	8
Exogone sp.						1		1								1															1
Galathowenia oculata		61	65	40		209	150	16		222	43	3		138	62	10													15	2	1
Glycera americana	1	1	1				1			1	3					2															
Glycera nana				2			2	1																							
Glycinde picta							3	2								1														2	
Goniada brunnea						1																									
Goniadidae indet.																															1
Grania incerta						1																							1		
Harmothoe imbricata							1	1							1														1	2	
Hermundura ocularis		4				5				1				5															1		
Lanassa gracilis								1																							
Lanassa sp.								1																							
Lanassa venusta venusta																															1
Laonice cirrata															1																
Laonice sp.																				1											
Leitoscoloplos pugettensis		16	17	1		7	5	6		15	13			13	6	2															
Lepidasthenia longicirrata						1																									
Levinsenia gracilis										1	1																				
Levinsenia sp.																				1											
Limnodriloides victoriensis										1																					
Lumbrineridae indet.			1	6				8								15															
Lumbrineris californiensis		5	1			3	3	3		3		1		6	1	1													1		
Lumbrineris cruzensis			1				2	3																							
Lumbrineris sp.		5	4			10	1	2			1			3	3	2													2		
Magelona hobsonae																			1				2								
Magelona longicornis		27		1		39	17	1		44	8			46	5			7	2			1	1						2		
Mediomastus ambiseta			12			1	1			5	1				4																
Mediomastus californiensis		8	9			16	6	1		10	1			4	13			1											17	1	
Mediomastus sp.				1		5	5	1							3	1															
Melinna elisabethae		1				3	1			1				1	2	1															
Mesochaetopterus taylori		1												1															1		
Microphthalmus sp.		1																													
Myxicola sp.								1																							
Naididae indet.		3												2																	
Naineris cf. grubei																1															
Neosabellaria cementarium						4	4	2											1												1
Nephtys assignis							1																								
Nephtys caeca		1					3											1												1	
Nephtys caecoides																							1								
Nephtys ferruginea							2	2		2					1			1				2							2	3	

Appendix D2, continued

TAXON	Reference																Outfall													
	Rep 1				Rep 2				Rep 3				Rep 4				Rep 1				Rep 2				Rep 3				Rep 4			
	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J
Nephtys sp.				5								1		1	1																	1
Nereididae indet.						1												1														2
Nereis procera		2	1			2					2	1			1								1								1	
Nicolea zostericola															1																	
Notomastus hemipodus		4	7	1			7			10					3																	
Notomastus lineatus															1																	
Notomastus sp.																		1												6	3	
Notophyllum sp.						1																										
Odontosyllis phosphorea														1																1		
Onuphidae indet.				7				5								11																1
Onuphis elegans							1								1																1	
Onuphis iridescens										1																						
Onuphis sp.											1																					
Ophelia limacina																		3	3	1								1				
Opheliidae indet.														1																		1
Ophelina acuminata		1	1			1				1																						
Opisthodonta uraga										1																						
Owenia johnsoni										5	3	2			1																	
Owenia sp.			4	3			4	4							3	3															1	3
Oweniidae indet.																			2	1				2								
Oxydromus pugettensis																															1	
Paleanotus bellis							1							1																	1	
Paradialychone bimaculata										7	3																					
Paraprionospio alata		3		1		2				1				1								1								1		
Pectinaria californiensis								1																								
Pholoe glabra										2																						
Pholoe sp.							1	1																								
Pholoe sp. N-1 (Ruff)															1																	
Pholoides asperus							1									1																
Phyllochaetopterus prolifica		1				217				3				18				1												4		
Phyllodoce sp.				2			1									2																
Phyllodocidae indet.																1																1
Phylo felix						1		1																								
Pilargis berkeleyae		2	1					1																								
Pista elongata							1			1	1			1	1																	
Pista sp.				1				3								1																
Platynereis bicanaliculata				1				1			1					1																1	
Podarkeopsis perkinsi		3																														
Podarkeopsis sp.											1																					
Polycirrus californicus complex										1					1					2											1	
Polycirrus sp. B (Byers)								1																								
Polycirrus sp. complex		1	1	1			1	2							1																1	1	
Polycirrus sp. III (Banse)																						1									1	
Polycirrus sp. IV (Banse)																															1	
Polydora limicola		1				8									3																	
Polydora sp.																															1	
Polynoidae indet.								2								1															1	1
Praxillella gracilis						1																										
Prionospio (Minuspio) lighti		5	2			3	2			3				1	4	2														2		

Appendix D2, continued

TAXON	Reference																Outfall													
	Rep 1				Rep 2				Rep 3				Rep 4				Rep 1				Rep 2				Rep 3				Rep 4			
	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J
Prionospio (Minuspio) multibranchiata																						2										
Prionospio (Prionospio) steenstrupi		3	4			2	4			5				5	2			1												8	6	
Prionospio sp.				1			2	1			1	1			1	2						3										
Proceraea sp.						3	3			2				10																		
Protodorvillea gracilis																			1												2	
Pseudochitinopoma occidentalis								2																							1	1
Pseudopotamilla intermedia															1																	
Sabellidae indet.																																3
Sabellinae indet.																2																
Scalibregma californicum										1																					1	
Scoletoma tetraura complex		5	10	4		12	8	7		15	8			3	13	3																
Scoloplos acmeceps				1												1																
Scoloplos armiger																				1												
Sphaerodoropsis sphaerulifer		1				3				1																						
Sphaerosyllis californiensis		1				1	1								2																	
Spio cirrifera		6				13	1			10				1	6																	
Spiochaetopterus costarum complex		5	2			59	12			6	1			6	4			1												4	1	
Spionidae indet.							1	1								1											1	1				
Spionidae indet. (Polydorid group)			1	1		1	4	4																1								
Spiophanes berkeleyorum			3	42		13	5	70		4	11	30			3	5				1				2								3
Spirorbis sp.		1				30	14							1								1								2		
Sternaspis affinis		2				2		3		1	1	1																				
Syllides mikeli																															1	1
Syllis caeca		18	2			2				8				1		1							1								2	2
Syllis cornuta						1								1																1		
Syllis hyalina																1																
Syllis sp.																1																
Tenonia priops																															1	
Terebellidae indet.								1								3																8
Terebellides sp.							1																									
ARTHROPODA																																
Achelia sp.																														1		
Americhelidium shoemakeri																		1														
Ampelisca pugetica						1	3																									
Ampelisca sp.								1						1	3																1	
Amphipoda indet.				1				1								1								1								1
Aoroides columbiae						2	1																									
Aoroides inermis																														2		
Aoroides sp.												1																			2	
Balanomorpha indet.			1				20	10							1								1	2							3	
Byblis millsi															1																	
Byblis sp.							2																									
Cancridae indet.				1				1																								
Caprella sp.						4																										
Chondrochelia dubia complex		2								1					3															1	2	
Corophiidae indet.			1												1																	
Crangon alaskensis											1																					
Deflexilodes similis																		1				2				1						
Desdimelita desdichada																							1							3	2	

Appendix D2, continued

TAXON	Reference																Outfall													
	Rep 1				Rep 2				Rep 3				Rep 4				Rep 1				Rep 2				Rep 3				Rep 4			
	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J
Diastylis abboti						1								1								3								4		
Ericthonius rubricornis																														5	1	
Euphilomedes carcharodonta		9				7				11				2				5				3				1				1	1	
Euphilomedes producta		1																														
Gammaropsis sp.																															1	
Gammaropsis thompsoni						1								1																		
Grandifoxus longirostris																		5	11			2	3			3	1			1	5	
Halacaridae indet.						5																										
Haliophasma geminata														1																		
Heterophoxus conlanae		1												1																		
Heterophoxus ellisi						3								1																		
Ischyrocerus anguipes						1																										
Ischyrocerus sp.										1																						
Joeropsis sp.						1																										
Laticorophium baconi						6	1			6	1			12	6															1	1	
Majoidea indet.								3								5																2
Majoxiphalus major																		2														
Microjassa sp.																						1										
Munnogonium sp.							1			2																						
Nebalia pugettensis complex																						1										
Photis brevipes														5																		
Photis sp.											1			3																		
Pinnixa occidentalis complex		4	4								1																					
Pinnotheridae indet.																2								3								3
Podoceropsis sp.										1																						
Prachynella lodo						1					4																					
Protomedeia grandimana		6																														
Protomedeia prudens						1				1				14	1															4		
Protomedeia sp.						6																1										
Rhepoxynius boreovariatus		3				11	2			6	4			6								5				4				1		
Thoridae indet.																1																
Wecomedon sp.																			1													
Westwoodilla tone														1																		
BRYOZOA																																
Alderina sp.										11				5				1												1		
Amathia gracilis						3								2				1				1				1				1		
Bryozoa indet.		1				4																										
Caberea ellisi						1																										
Caulibugula sp.										1																						
Celleporella hyalina		6				400				47				16				1				6				3				8		
Celleporina sp.						73								7								1										
Lagenicella sp.										8																						
Microporella sp.						4												1				1								6		
Pomocellaria sp.						1																										
Reginella sp.																						1										
Tricellaria sp.						1																										
Tubulipora sp.						3								1																		

Appendix D2, continued

TAXON	Reference																Outfall													
	Rep 1				Rep 2				Rep 3				Rep 4				Rep 1				Rep 2				Rep 3				Rep 4			
	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J
CHORDATA																																
Ascidia sp.								1																								2
Boltenia villosa							1																								1	
Molgula sp.																3																
Stolidobranchia indet.								1																								
Styela sp.								3																								1
CNIDARIA																																
Abietinaria sp.		1				1								1								1										
Actiniaria indet.																1																
Aglaophenia sp.										1																						
Amphinema dinema		1																														
Bougainvillea sp.						5								4																		
Bougainvilliidae indet.										1				1																		
Calycella syringa						6				2																1				1		
Campanularia sp.		2				47				6				7				10				10				11				11		
Clytia sp.		1				5								1																		
Edwardsiidae indet.		2				2						1				3														1		
Halecium sp.						3																										
Hydrallmania sp.						1				1																						
Leptothecata indet.																										3						
Obelia sp.										1																						
Plumularia sp.						2				1				2																		
Selaginopsis sp.						2																										
Sertularella sp.		1				1				1				2																1		
Stylatula sp.				1								1																				
Thuiaria sp.		1				2				1																						
ECHINODERMATA																																
Amphiodia urtica																		2	3	3		1		1		2				1		
Amphioplus sp.																														1		
Amphioplus strongyloplax																										1						
Amphipholis sp.								1								3																
Amphiuridae indet.																																2
Dendrasteridae indet.																								1				1				
Pentamera lissoplaca																1																
ENTOPROCTA																																
Barentsia hildegardae						2				2																						
Barentsia parva						4																										
Barentsia sp.						2								1								1										
MOLLUSCA																																
Acila castrensis				1								2							1	1				2						3	2	
Alia tuberosa						1																										
Alvania compacta		3				36				5				26								1								15		
Amphissa columbiana							3																									
Amphissa sp.							1																									
Astyris gausapata		9	2			20				11	1			13				3	1			5				2	2					
Axinopsida serricata		29	18			44	87			57	49			39	44			1	1			1								1		
Bivalvia indet.																												4				
Calliostoma ligatum							2																									
Clinocardiinae indet.								1				1				1								1								

Appendix D2, continued

TAXON	Reference																Outfall													
	Rep 1				Rep 2				Rep 3				Rep 4				Rep 1				Rep 2				Rep 3				Rep 4			
	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J
Clinocardium nuttallii																																4
Compsomyax subdiaphana								1																								
Crepipatella lingulata							1																									
Cryptonatica affinis																			1													
Cyclocardia ventricosa																															1	
Doto sp.												1			2																	
Gastropoda indet.		1	1									1																				
Kurtiella tumida		4	1			4				1	1			6	1			78				12				8				29		
Kurtziella plumbea														1																		
Lucinoma annulatum				2				4				1				2																
Lyonsia californica																				1												
Macoma elimata							1	2				1				1																
Macoma golikovi			1																1				1	2						2	2
Macoma nasuta				1				1				1																				
Macoma sp.				2																												
Macoma yoldiformis			3			1	12	4		3	9			1	2															2	1	
Mactridae indet.																												1				
Margarites pupillus						1								1																	2	
Modiolus sp.														1		1																
Mya sp.								2																								1
Mytilidae indet.								3																1								4
Nassarius mendicus		1																				1								1		
Nutricola sp.			3			2	1			1				3	2			4	14				17							44		
Odostomia sp.							3				1																			1		
Olivella strigata																		1								1						
Pandora bilirata										1																						
Parvilucina tenuisculpta		14	52			6	84	1		19	47			22	59								1									
Pectinidae indet.												1																				
Solamen columbianum							1																									
Solen sicarius		1										1	1											1				1			1	
Tellina modesta			8				5			1	7				4						2	1			1					2	
Tellina nuculoides																		3	17	1		1	2									
Trichotropis cancellata																1																
Trochidae indet.																								1								
Turbonilla sp.			1												1							1										
Veneridae indet.								2																								2
Vitreolina columbiana														1																		
Yoldia seminuda				1				2		1	1	2		2																		
NEMERTEA																																
Amphiporus sp.												1																				1
Carinoma mutabilis			2																													
Cerebratulus californiensis			3	1			2	1			5	2			1	1															3	
Hoplonemertea indet.															4	1															1	
Lineidae indet.			3				9								2	1							1									
Lineus sp.														3	2	1																
Quasitetrastemma nigrifrons															2																	
Tetrastemmatidae indet.																1																
Tubulanus sp.			1	1		3	2	2				2		2		3																1
Zygeupolia rubens										1								1														

Appendix D2, continued

TAXON	Reference																Outfall													
	Rep 1				Rep 2				Rep 3				Rep 4				Rep 1				Rep 2				Rep 3				Rep 4			
	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J	M	A	I	J
PHORONIDA																																
Phoronis psammophila																														1		
Phoronopsis harmeri																		1												1		
PORIFERA																																
Demospongiae indet.						2																								1		
SIPUNCULA																																
Thysanocardia nigra		2	2			6				1				1	1																	
Total Number of Organisms by Stage	**1**	**390**	**297**	**191**		**1,550**	**634**	**319**		**726**	**273**	**105**	**1**	**589**	**364**	**201**		**141**	**62**	**15**		**77**	**36**	**21**		**44**	**7**	**8**		**258**	**143**	**106**
Total Number of Organisms				**879**				**2,503**				**1,104**				**1,155**				**218**				**134**				**59**				**507**
Organisms per m^2				**8,790**				**25,030**				**11,040**				**11,550**				**2,180**				**1,340**				**590**				**5,070**
Total Number of Taxa				**95**				**153**				**106**				**126**				**46**				**53**				**21**				**109**

Notes:
M = Mega, A = Adult, I = Intermediate, J = Juvenile