Core Area Wastewater Facilities

Environmental Monitoring Program 2020 Report

Cycle 2 – Year 5

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CORE AREA WASTEWATER FACILITIES
ENVIRONMENTAL MONITORING PROGRAM
2020 REPORT

EXECUTIVE SUMMARY

The Capital Regional District (CRD) has discharged fine-screened municipal wastewater through two core area outfalls located at Macaulay Point and Clover Point for over 100 years. In mid-2020, the CRD commissioned a new tertiary treatment plant and outfall at McLoughlin Point. Therefore, 2020 was a transitional year for both sewage treatment in the Core Area and the monitoring program.

Monitoring of wastewater quality, and the surface water and seafloor environments in the vicinity of the outfalls, has occurred on a regular basis since the late 1980s. The CRD is required to monitor wastewater facilities for compliance with the Municipal Wastewater Regulation under the provincial *Environmental Management Act* and the Wastewater Systems Effluent Regulations (WSER) under the federal *Fisheries Act*.

Beyond regulatory compliance, to ensure protection of human health and the environment, the CRD undertakes monitoring, as outlined in the Core Area Liquid Waste Management Plan, and to assess the impacts of the outfalls on the marine environment. This monitoring is done on a five-year cycle.

The 2020 environmental monitoring program represents Year 5 of Cycle 2 and includes:

- wastewater monitoring and analysis for a list of substances, including conventional parameters, metals, and other priority substances (conducted monthly for each outfall)
- reclaimed water monitoring and analysis at McLoughlin (conducted weekly)
- surface water and water column monitoring and analysis of bacteriological indicators of potential for human exposure to wastewater in the marine environment and a list of substances, including conventional parameters, metals, and other priority substances (conducted quarterly at each outfall)
- seafloor monitoring and analysis of sediment chemistry, and mussel tissue and health to assess accumulation of contaminants around the Clover outfall
- continuing and new additional investigations that address specific questions about water column and seafloor monitoring components and that look into emerging scientific issues regarding wastewater discharges and environmental effects
- completing a comprehensive statistical trend assessment of cycles 1 and 2 data (2011-2019) to determine whether there are any significant impact changes over time and space

Flows were gradually diverted from Macaulay and Clover to McLoughlin starting in August. Access limitations during construction meant that proxy sample locations were required for Macaulay and Clover for significant portions of the year. Other logistical challenges led to deviations from established sampling protocols as well. As such, comparisons of 2020 results to previous years must be done with caution.

Overall, risks to human health and the environment were low. Wastewater quality from Macaulay and Clover was similar to previous years with a few exceedances of provincial and federal regulatory limits. McLoughlin effluent quality was also above regulatory limits at times from August to December. This was as expected because neither provincial nor federal wastewater regulations allow for a commissioning period when a new facility comes online and it is not possible for all treatment processes to be instantly and fully effective. While effluent quality steadily improved as the year progressed, it is expected that it could take up to two years for all McLoughlin treatment processes to stabilize. Most of the Macaulay and Clover effluent monitoring efforts will be dropped starting in 2021, with the exception of monitoring wet weather overflows.

Surface water and water column sampling confirmed that the Macaulay and Clover outfalls were operating as predicted from plume dispersion and dilution modelling. These monitoring efforts will shift to the new McLoughlin outfall in 2021, with the exception of monitoring the old outfalls when they are discharging during rain events.

Impacts to the Clover seafloor in 2020 were similar to previous sampling events, with impacts primarily limited to within approximately 200 metres (m) of the outfall. Seafloor monitoring design remains largely unchanged with McLoughlin coming online, with the exception of the addition of new seafloor sampling stations around the new outfall.

Overall, the comprehensive statistical trend assessment of 2011 to 2019 Macaulay and Clover data reaffirmed previous assessments. The weight of evidence analysis of ecosystem impacts indicated that the discharge impacts were most evident within 400 m of the Macaulay outfall and 200 m of the Clover outfall. There was little evidence for far-field effects to water quality, sediment quality, and benthic organisms, and only limited evidence for potential risks to fish health and humans and wildlife on wider scales. Overall, human health and environmental risks are expected to further decline with the installation of tertiary treatment at McLoughlin.

ADDITIONAL INVESTIGATIONS

Additional investigations address specific questions or issues pertaining to the monitoring program, clarify aspects of the program, or provide concurrent data for the assessment of environmental effects. Some additional investigations are also requirements of the Liquid Waste Management Plan approval. Recommended studies are reviewed by the Marine Monitoring Advisory Group (MMAG) on a regular basis.

In April 2020, the CRD was asked to provide weekly wastewater samples from Macaulay, Clover, McLoughlin and the Saanich Peninsula wastewater treatment plants by a consortium of researchers from the University of Victoria (UVIC) and private contractor. The project also included samples from the Regional District of Nanaimo. All samples have been analyzed using similar methodologies to those used elsewhere on the BC Lower Mainland, across Canada and internationally with the goal of using results to inform local health authority COVID-19 response plans. As of mid-2021, this project’s funding was not renewed and the project was cancelled. All data from the project have been analyzed and will be presented to stakeholders in late 2021. The CRD also participated in a related project with the University of British Columbia and Harbour Resource Partners, the consortium that built the McLoughlin treatment plant. This project involves the development of a simple handheld sensor that could be used by operators to detect various pathogens in wastewater (including things like COVID), with the hope that the data would be used to inform local health authorities about changes in pathogen levels over time.

In 2020, the CRD continued to participate in two Ocean Wise Conservation Association initiatives: the Salish Sea Ambient Monitoring Exchange (SSAMEx) and Pollution Tracker. The CRD and Pollution Tracker data from the Salish Sea have been incorporated into a draft scientific journal manuscript that characterized monitoring program biota concentrations of polychlorinated biphenyls (PCBs) and how concentrations change with trophic level and sediment physical and geochemical characteristics. The Ocean Wise Conservation Association has been using CRD samples to develop analytical methodologies for microplastics in environmental samples and to add to the broader Pollution Tracker dataset. Discussions are ongoing regarding opportunities to assess the effectiveness of the McLoughlin treatment plant to reduce microplastic loadings to the environment. It is hoped that the Ocean Wise Conservation Association will have greater capacity in 2022 to accept CRD samples.

The CRD has also provided benthic invertebrate debris samples from Macaulay Point to a University of Chicago researcher as part of a collaborative project with the CRD’s contract benthic taxonomist. The researcher has been comparing the “death assemblages” of molluscs and bivalves contained within the archived debris to the “live” communities that are assessed as part of the routine sediment sampling program. Assessments are ongoing, with results likely to be published in a relevant scientific journal.

The CRD also continued participation in a second collaborative project with the contract benthic taxonomist, the UVIC and Metro Vancouver to develop an inexpensive benthos toxicogenomic tool that could be used in years when seafloor sampling does not take place. It could also be used at historic monitoring stations that have been abandoned. The project has a five-year timeline and the CRD will continue to provide support, including future sampling vessel and sample access.

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Terms & Abbreviations

BOD	Biochemical Oxygen Demand
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
CTD	conductivity-temperature-depth (CTD) instrument
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
OC	Organochlorine pesticides
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-p-dioxins
PDBE	Polybrominated diphenyl ethers
PFOS	perfluorooctane sulfonate
PPCP	Pharmaceuticals and personal care products
Q+	Quarterly Plus
QA/QC	quality assessment/quality control
SCADA	Supervisory Control and Data Acquisition
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
UVIC	University of Victoria
WAD	weak acid dissociable (WAD) cyanide
WMEP	Wastewater Marine Environment Program
WQG	Water Quality Guidelines
WSER	Wastewater Systems Effluent Regulations
WWTP	Wastewater Treatment Plant

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1.0 BACKGROUND

Wastewater has been discharged from the Macaulay Point and Clover Point outfalls for approximately 100 years. The Macaulay outfall has been in use since 1915, with the initial discharge at low tide level. In 1971, to alleviate shoreline pollution, the location of discharge was moved offshore. The outfall is now approximately 1,800 metres (m) long and terminates in a multiport diffuser at a depth of 60 m. The discharge of municipal wastewater at Clover began in 1894. Discharge was to the shoreline until 1981, when construction of an extended outfall was completed. The Clover outfall is now approximately 1,160 m long and discharges through a multiport diffuser at a depth of approximately 65 m.

In August 2020, the CRD commissioned a new treatment plant at McLoughlin Point. This treatment plant receives the majority of Macaulay and Clover flows and treats them to a tertiary standard before discharge through a new 1,925-m long outfall. This new outfall includes a 210-m multiport diffuser that terminates at approximately 60-m depth and is located approximately 200 m east of the existing Macaulay outfall terminus. The Macaulay and Clover outfalls will continue to discharge 6-mm fine-screened wastewater during wet weather events–effectively operating as sanitary sewer overflow points for the upstream conveyance system.

The treated and screened wastewater from these three outfalls is discharged to the fast-moving waters of Juan de Fuca Strait. The non-saline wastewaters are then rapidly diluted, as they mix with surrounding marine waters. As the wastewater plumes mix with the marine waters, they rapidly rise and trap at mean depths of 45-60 m (Macaulay and Clover) and 20-50 m (McLoughlin), with some plume surfacing predicted during periods of slack tide, predominantly during the winter months (Hodgins, 2006; Seaconsult 2019).

In March 2003, the CRD Core Area Liquid Waste Management Plan (CRD, 2000) was approved by the BC Ministry of Environment and Climate Change Strategy (ENV). The plan outlined the CRD's strategy to manage liquid wastes for the next 25 years. Commitments made in this plan were designed to protect public health and the environment from the impacts of liquid waste discharges. On July 21, 2006, the CRD received a letter from the minister of environment requiring an amendment to the plan, detailing a schedule for the provision of sewage treatment. In the letter, the minister also requested that the CRD continue the current monitoring program. The plan amendment #7 (CRD, 2009) was submitted to ministry in December 2009, with follow up amendments #8 in June 2010, #9 in July 2014, #10 in March 2016, #11 in September 2016, and #12 in February 2017. These amendments have all been conditionally approved by ENV and included the CRD’s commitment to building the new plant at McLoughlin Point and a facility at Hartland Landfill to treat the resulting sewage residuals to a Class A biosolids standard, as per the BC Organic Matter Recycling Regulation. Amendment #12, detailing the District of Oak Bay’s plans to eliminate the two combined sewer overflow locations in the Clover system, was also conditionally approved in June 2018.

The outfalls all operate under the long-term direction of the plan (see Section 1.1.1 for more detail). The Macaulay (PE-270) and Clover (PE-1877) outfalls operate under permits on a day-to-day basis that were issued by ENV under the 2004 *BC Environmental Management Act* [formerly the *BC Waste Management Act* (BCMoE, 2004)]. In 2020, the outfalls continued to operate under these permits, as well as transitional authorizations, to discharge deleterious substances under the *Federal Wastewater Systems Effluent Regulation*. These transitional authorizations were valid until December 31, 2020, by which time treatment needed to be in place at McLoughlin to eliminate the discharge of deleterious substances, as defined under this regulation. Once operators have stabilized operation of the new McLoughlin treatment plant and conveyance system, the permits for Macaulay and Clover will be cancelled. The new McLoughlin outfall operates under *BC Municipal Wastewater Regulation* registration RE-108831, which was originally issued in June 2020 and revised in February 2021. The McLoughlin treatment plant achieves all requirements of the *Federal Wastewater Systems Effluent Regulation.*

Monitoring year 2020 represents Cycle 2, Year 5 of the Wastewater and Marine Environment Program (WMEP) and will be the last year where Macaulay and Clover outfalls are the main discharge locations for CRD core area wastewaters. Flow from Clover was largely diverted to McLoughlin by August 2020 and from Macaulay by September 2020. Flows out these two outfalls remained intermittent throughout the remainder of the year, as optimizations were made to conveyance and treatment plant system operation. Site access to Macaulay and Clover was also restricted as these facilities were being upgraded to pump to McLoughlin. As such, upstream pump stations were sampled for as proxy locations for Macaulay and Clover throughout much of 2020. Construction activities at all three wastewater sampling locations also led to deviations from standard sampling protocols that precluded direct comparison to previous years' results. Non-compliance was also expected at McLoughlin. Neither the provincial nor federal wastewater regulations have provisions that allow for effluent quality exceedances during commissioning, even though it is challenging for a commissioning treatment plant to immediately achieve full levels of treatment. The 2021 WMEP (Cycle 3, Year 1) will shift focus to monitoring at the new McLoughlin plant and outfall.

1.1 Environmental Monitoring Program Components

1.1.1 Program History

Monitoring of wastewater discharges, surface waters and the seafloor environment in the vicinity of the Macaulay and Clover outfalls has been conducted as part of the Environmental Monitoring Program (formerly the Wastewater and Marine Environment Program) on a regular basis since the late 1980s. The program has undergone a number of changes over the years. Monitoring of wastewater, marine waters close to the outfalls, and benthic communities were conducted in the 1970s and 1980s in collaboration with UVIC and independent consultants. In addition, special additional investigations were undertaken to more clearly define the effects of the outfalls on the receiving environment. In 1992, a detailed investigation of effects related to the outfalls was conducted by EVS Environment Consultants Ltd. (North Vancouver, BC) (1992). This study included the analysis of wastewater and sediment chemistry, sediment toxicity, and the assessment of the health of biological communities near the outfalls. The 1992 study results were used to design a regular monitoring and assessment program, in collaboration with MMAG (see Section 1.2 for details).

From 1992 until 1999, the program consisted of monthly wastewater analysis for conventional parameters, quarterly wastewater analysis for priority substances, monthly surface water (<1 m depth) sampling for indicator bacteria, yearly sediment chemistry analysis and seafloor organism monitoring on a three-year cycle. Starting in 2000, the program was again revised in consultation with MMAG. The major changes were not in the components of the program, but rather in the increased frequency of monitoring. Special additional investigations continued to supplement the routine monitoring, as necessary.

Toxicity testing also used to be a component of the monitoring program, for both wastewater and sediment. Wastewater toxicity testing invariably failed, primarily due to the high ammonia concentrations in the Macaulay and Clover wastewaters. Because ammonia is not typically a concern in the marine environment, it was agreed, in consultation with MMAG and ENV, that wastewater toxicity testing be dropped from the program. Sediment toxicity testing was also a component of the program and was dropped following the 1992 EVS study (EVS, 1992) due to confounding total organic carbon concentrations. Both sediment and wastewater toxicity testing, using updated methodologies, were reintroduced to the monitoring program in 2011 as part of a revised monitoring program for which more details will be provided below.

The Society of Environmental Toxicology and Chemistry (SETAC) completed a review of the CRD Core Area Liquid Waste Management Plan in 2006 (SETAC, 2006). This review panel commented that the monitoring program was substantial and well designed and that continuing it would be appropriate for assessing the CRD wastewater discharge in the future. However, the panel made a number of recommendations to enhance the monitoring program, including considering more extensive monitoring with better spatial and temporal resolution in the far-field to provide a better understanding of the fate of the surfaced sewage plume. Since the SETAC review, the decision to move to advanced treatment was made.

In 2008, CRD and ENV staff initiated a review of the objectives and design of the monitoring program in light of the SETAC review and plans to install additional treatment for the Macaulay and Clover wastewaters. As a result of this review, a revised monitoring program, based on a five-year cycle, was implemented in 2011. Both MMAG and consultants familiar with monitoring program data reviewed the new program (Golder, 2011a) and provided recommendations, as necessary. There is also a commitment within the five-year monitoring program that CRD and ministry staff will meet on an annual basis to review the results of the previous monitoring year.

The monitoring program design for Cycle 3 and beyond has been revised based on these annual collaborative reviews, comments from the advisory group reviews and other external experts, and the transition to treatment at McLoughlin, which started in 2020. WMEP revisions primarily include shifting most of the wastewater and surface water monitoring effort to McLoughlin and adding new stations to the seafloor monitoring to encompass the predicted impact footprint of the new McLoughlin outfall. Monitoring of the new seafloor locations began in 2019 (and were reported in last year's report), along with some effluent quality monitoring once McLoughlin commissioning began. The overall monitoring shift to McLoughlin will not take place until Cycle 3, which begins in 2021.

1.1.2 Approach and Program Components

The current monitoring program components were developed in conjunction with ENV and MMAG, as part of a new program based on a five-year cycle. The first cycle (Cycle 1) took place from 2011-2015, but one component (the fish survey) was delayed until 2018 due to logistical concerns. Cycle 2 started in 2016 and extended to 2020. The objectives of the monitoring program [as contained in the Core Area Liquid Waste Management Plan (2000) and updated in amendment #7 (2009)] are as follows:

- monitor and assess wastewater quality and quantity
- monitor and assess the potential effects of the wastewater discharges to the marine environment
- monitor and assess the potential effects of the wastewater discharges to human health
- provide information to the CRD's Regional Source Control Program
- provide information to wastewater managers regarding plant and outfall diffuser performance
- provide compliance monitoring results to regulatory agencies
- provide scientific assessment to the general public regarding the use of the marine environment for the disposal of municipal wastewater

A summary of the monitoring components and sampling frequency of the current five-year monitoring program is presented in Table 1.1. The 2020 monitoring program is presented in Table 1.2 and Figure 1.1, and consisted of the following components:

- wastewater monitoring and analysis for a list of substances, including conventional parameters, metals, and other priority substances (conducted monthly at Macaulay and Clover, or upstream proxy locations, and McLoughlin during commissioning)
- reclaimed water monitoring and analysis for a small list of substance, including conventional parameters and bacteria (conducted weekly at McLoughlin during commissioning)
- surface water and water column monitoring and analysis of bacteriological indicators of potential for human exposure to wastewater in the marine environment and a list of substances, including conventional parameters, metals, and other priority substances (conducted quarterly at Macaulay and Clover)
- seafloor monitoring and analysis of sediment chemistry to assess accumulation of contaminants and impacts to marine mussels around the Clover outfall
- continuing additional investigations that address specific questions about water column and seafloor monitoring components and that look into emerging scientific issues regarding wastewater discharges and environmental effects
- completing a comprehensive statistical trend assessment of cycles 1 and 2 data (2011-2019) to determine whether there are any significant impact changes over time and space

An evidence-based approach is used to assess potential environmental effects. Wastewater is analyzed on a regular basis to monitor the substances present in sewage. The potential effects of these substances on organisms in surface waters and the water column are assessed by comparing the concentrations that are predicted in the marine environment to water quality guidelines, based on applying computer model derived receiving environment dilution factors to the wastewater concentrations. Predicted concentrations are then confirmed by surface and water column monitoring around each outfall. Concentrations of substances present in the wastewater discharges are also analyzed in sediments around the outfalls and at reference sites. Sediment chemistry results are compared to various sediment quality guidelines, as a screening tool to predict potential effects on biological organisms in the marine environment. Finally, organisms that live around the outfalls are monitored to assess direct *in situ* outfall effects.

The organisms that have the potential for the most severe effects in the marine environment close to the outfalls are those that are sessile and/or continuously exposed to the wastewater discharges. These include benthic communities off the Macaulay and McLoughlin outfalls and mussel communities off the Clover outfall. Prior to 2011, these organisms were monitored annually. As part of the revised five-year monitoring cycle, their monitoring frequency was reduced to only once (mussel communities) or twice (benthic invertebrate communities) in the five-year cycle. This reduced frequency has allowed for the addition of sediment toxicity and bioaccumulation assessments, along with the finfish health assessment.

In addition to the sediment toxicity and bioaccumulation studies, the health of the seafloor communities is determined by assessing what organisms are present, along with their abundance, growth and reproductive status. These biological indicators provide a direct assessment of environmental effects. Potential effects to higher trophic levels (e.g., fish and marine mammals) are also assessed by measuring concentrations of substances present in wastewater, sediments, benthic invertebrate, mussel, and (eventually) finfish tissues.

The five-year monitoring cycles will continue to be supplemented by additional investigations, as necessary. Additional investigations are important elements of the monitoring program. Some of these investigations are part of the requirements under the Core Area Liquid Waste Management Plan 2003 approval, including the study of the potential effects of pharmaceuticals and personal care products (PPCP) and polybrominated diphenyl ethers (PBDE) (flame retardants) on the marine environment. Current additional investigations are presented in Table 6.1 and are discussed in Section 6.0. Results from these investigations are incorporated in the overall assessment of effects on the marine environment.

1.2 Marine Monitoring Advisory Group

The CRD formed MMAG in 1987 to advise on and provide an independent assessment of CRD marine monitoring programs. MMAG consisted of university and government scientists with expertise in the fields of marine science, oceanography, toxicology, chemistry and environmental health. Since 1987, MMAG has worked with the CRD to develop a comprehensive monitoring program for the Macaulay and Clover outfalls and has historically been required to submit an annual review of the program to ENV. In September 2010, ENV waived all formal advisory group reporting requirements. The CRD, however, retained MMAG and broadened the group’s mandate to include the review of the CRD’s Integrated Watershed Management Program marine monitoring activities, as well as expanded the group’s membership to include members of the public with relevant expertise. Because of the transition to a new treatment system to replace the Macaulay and Clover outfalls, the monitoring program has largely been kept unchanged in recent years, with the exception of adding new seafloor stations adjacent to the new McLoughlin outfall. Advice of MMAG has not been solicited since 2015, but there are plans to resurrect the group once the new McLoughlin treatment system is commissioned and operation has stabilized.

1.3 Data Presentation and Analysis

Until 2000, the results of the monitoring program were tabulated in separate reports according to each component (wastewater monitoring results, etc.). Each of these reports presented a snapshot into the effects of the outfalls on the receiving environment. A comprehensive summary of the results was provided by compiling the data from the different components on a regular basis (once every three to five years). As the frequency of the seafloor components was increased from every three years to annually in 2000, and as additional elements were incorporated into the program, it became evident that the program would benefit from the production of an annual report. Annual reporting began with the 2000-2001 report, which was completed in 2002 (CRD, 2002) and continued up to and including the 2010 monitoring year (CRD, 2011).

However, following the review and redesign of the monitoring program, the need for annual comprehensive reporting was reassessed. Summary data reports are now provided following each of the first four years of a five-year cycle, and this started with the 2011 monitoring year. These data reports will include any completed statistical assessments of the data and the results will be used to confirm the suitability of the upcoming year's monitoring design. A more comprehensive interpretive report (similar to the annual reports prepared for the 2000-2010 monitoring results) will be prepared at the end of each five-year cycle (after year five), and will include detailed statistical and environmental risk assessments of all data collected within the five-year cycle. The comprehensive report for Cycle 1 was expanded to include 2016-2019 Cycle 2 data. The final report was received in the fall of 2020 (Hatfield, 2020) a summary of the findings are presented herein.

This report presents only a relatively brief summary of the results of the 2020 Macaulay and Clover environmental monitoring program (Cycle 2, Year 5), commissioning effluent quality monitoring at McLoughlin, data and analyses of results from previous years that have not yet already been presented, and brief summaries of the comprehensive 2011-2019 assessment. Limited statistical analyses have been performed on the 2020 data; a more detailed and comprehensive statistical assessment of the 2020 results will be undertaken as part of a future 2020 plus Cycle 3 (2021-2025) review that will be initiated in 2024/25.

Table 1.1 Monitoring Components of the Five-Year Macaulay, Clover and McLoughlin Environmental Monitoring Program (Cycle 2)

Monitoring Component	Sub-component	Year 1 (2016)		Year 2 (2017)		Year 3 (2018)		Year 4 (2019)		Year 5 (2020)		
		Mac[1]	Clo[1]	Mac	Clo	Mac	Clo	Mac	Clo	Mac[4]	Clo[4]	McL
WASTEWATER												
Wastewater	weekly, monthly and quarterly chemistry	√	√	√	√	√	√	√	√	√	√	√
	quarterly high resolution chemistry	√	√	√	√	√	√	√	√	√	√	√
	quarterly toxicity testing	√	√	√	√	√	√	√	√	√	√	
	monthly toxicity testing											√
Reclaimed Water	weekly chemistry											√
SEAFLOOR												
Sediment	sediment chemistry			√	√			√*			√	
	pore-water chemistry			√	√			√*				
	sediment toxicity			√	√			√*				
	sediment/benthic invertebrate bioaccumulation			√				√*				
Benthic Invertebrates	community structure			√				√*				
Mussels	community indices and health										√	
	tissue chemistry										√	
Fish	health indices					√[2]	√[2]			√[3]	√[3]	
	whole fish and fillet tissue chemistry					√[2]	√[2]			√[3]	√[3]	
SURFACE WATER AND WATER COLUMN												
Surface Water	bacteria	√	√	√	√	√	√	√	√	√	√	
Water Column	bacteria, conventionals, metals	√	√	√	√	√	√	√	√	√	√	
REPORTING AND ADDITIONAL INVESTIGATIONS												
Additional Investigations	dependent upon emerging environmental issues and recommendations by the advisory group and others	√	√	√	√	√	√	√	√	√	√	
Reporting	annual data summary report	√	√	√	√	√	√	√	√			
	five-year comprehensive report									√	√	

Notes:

[1] Mac-Macaulay, Clo-Clover, McL-McLoughlin [2]Delayed from Cycle 1, [3] Timing of this study to be determined as the Cycle 1 fish survey didn't take place until Cycle 2, [4]Or upstream proxy locations once access was restricted due to construction

Table 1.2 Monitoring Components of the 2020 Macaulay, Clover and McLoughlin Environmental Monitoring Program

Macaulay Outfall	Parameter	Monitoring Frequency
Wastewater[3]	Flow	Daily
	Compliance monitoring	Federal – Weekly Provincial – Monthly
	Conventional parameters[1] and priority substances[1]	Monthly
	Priority substances[1]	Quarterly (January, April, July and October)
	Toxicity – acute	Quarterly
	Toxicity – chronic	Discontinued in 2020 due to loss of access
Surface Water & Water Column	Indicator bacteria (fecal coliform and *Enterococci*) and CTD (dissolved oxygen, salinity, temperature) Conventional parameters[1] and metals[1]	Quarterly with a set of five sampling events in 30 days during each quarter
Clover Outfall	**Parameter**	**Monitoring Frequency**
Wastewater[3]	Flow	Daily
	Compliance monitoring	Federal – Weekly Provincial – Monthly
	Conventional parameters[1] and priority substances[1]	Monthly
	Priority substances[1]	Quarterly (January, April, July and October)
	Toxicity – acute	Quarterly
	Toxicity – chronic	Discontinued in 2020 due to loss of access
Surface Water & Water Column	Indicator bacteria (fecal coliform and *Enterococci*) and CTD (dissolved oxygen, salinity, temperature) Conventional parameters[1] and metals[1]	Quarterly with a set of five sampling events in 30 days during each quarter
Seafloor	Particle size analysis, TOC[2], AVS[2] and sediment chemistry[1], horse mussel tissue chemistry and health	See Table 1.1
McLoughlin Outfall	**Parameter**	**Monitoring Frequency**
Wastewater	Flow	Daily
	Compliance monitoring	Federal – Weekly Provincial – Various frequencies
	Conventional parameters[1] and priority substances[1]	Monthly
	Priority substances[1]	Quarterly (October)
	Toxicity – acute	Monthly
	Toxicity – chronic	Annually
Reclaimed Water	Compliance monitoring	Weekly

Notes:
[1]Analyte lists can be found in Appendices B1 (wastewater); C1 (water column), D1 (sediment and mussel tissue)
[2]TOC—total organic carbon, AVS—acid volatile sulphide
[3]Monitoring shifted to proxy locations once access was restricted due to construction

Figure 1.1 Elements of the 2020 Macaulay, Clover and McLoughlin Environmental Monitoring Program

MACAULAY, CLOVER AND MCLOUGHLIN ENVIRONMENTAL MONITORING PROGRAM 2020

MONITORING COMPONENTS
(Core program)

Regular analyses conducted monthly, quarterly and once or twice in the five-year cycle

WASTEWATER

- Contaminant chemistry
- Toxicity
- Reclaimed water

SURFACE WATER & WATER COLUMN

- Microbiological indicators
- Contaminant chemistry

SEAFLOOR (Clover)

- Sediment chemistry
- Horse mussel tissue chemistry and health assessments

ADDITIONAL INVESTIGATIONS

Studies to address specific questions related to the monitoring program

Investigations Completed in 2020 and early 2021

- None

Investigations Continuing/Starting in 2020 to 2021

- Continued participation in the Ocean Wise Conservation Association's SSAMEx and Pollution Tracker programs
- Continuation of a collaborative project with the Ocean Wise Conservation Association and Vancouver Island University to develop methods for microplastic analyses in wastewater and environmental samples
- Continuation of a collaborative project with Biologica Environmental Services Ltd. (Victoria, BC) and the University of Chicago to assess live versus dead benthos assemblages around the Macaulay outfall
- Continuation of a collaborative project with Biologica Environmental Services Ltd., the UVIC, and Metro Vancouver to develop benthic invertebrate toxicogenomic monitoring tools
- Initiation of a collaborative assessment of the uptake and trophic changes in PCB in the benthic marine food chain around the Macaulay outfall
- Participation in a UVIC and Pani Energy Ltd. collaborative project to assess COVID-19 presence in regional wastewaters
- Participation in a University of British Columbia and Harbour Resource Partners collaborative project to develop an handheld microorganism detection device

2.0 WASTEWATER MONITORING

2.1 Introduction

Wastewater monitoring is conducted regularly at both the Macaulay and Clover wastewater outfalls to assess compliance with ENV permits for flow, carbonaceous biochemical oxygen demand (CBOD) and total suspended solids (TSS), federal wastewater regulations for CBOD, unionized ammonia and TSS, and to profile the chemical and physical constituents of wastewater before it is released to the marine receiving environment. Assessment of wastewater provides information on the concentrations and loadings of wastewater constituents to the marine environment, ultimately providing an indication of which substances may be of environmental concern (priority pollutant monitoring). The results are then used to direct the efforts of the monitoring program and the CRD's Regional Source Control Program. Table 2.2 and Table 2.3 present a summary of federal and provincial compliance limits.

The implementation of the Core Area wastewater treatment project and conveyance system has resulted in changes to both wastewater compliance and monitoring requirements.

In 2020, it was not feasible for the wastewater sampling program to meet all compliance monitoring requirements or priority pollutant monitoring commitments. Significant upgrades took place at the Macaulay and Clover pump stations to redirect flows to the new McLoughlin Point Wastewater Treatment Plant (WWTP). Construction activities and COVID-19 concerns led to loss of access to Macaulay and Clover sampling points, so proxy pump station locations upstream in the Core Area conveyance system were added to the sampling program. Compliance requirements for Macaulay and Clover (and their proxy stations) were required to be met for all of 2020.

Compliance of the McLoughlin treatment plant with a new provincial registration and the federal Wastewater Systems Effluent Regulations (WSER) was technically required as soon as commissioning began in August 2020. However, highly variable and potentially non-compliant effluent quality was expected during commissioning as the various treatment processes were brought online and tested in a staggered manner. Non-compliance was expected as neither the provincial nor the federal wastewater regulations have provisions that allow for effluent quality exceedances during commissioning, even though it is challenging for a commissioning treatment plant to immediately achieve full levels of treatment. In addition, not all regulatory and priority pollutant sampling protocols could be met, as site safety, access and availability of suitable sampling equipment was limited during construction and commissioning.

Because of the sampling location and protocol deviations, all 2020 Macaulay and Clover wastewater results are not directly comparable to previous years and should be interpreted with caution. The staggered commissioning activities at the McLoughlin treatment plant must also be considered when evaluating the relevance of any non-compliant results.

The 2020 reconfiguration of Clover and Macaulay to become pump stations to send flows to McLoughlin, as well as becoming future sanitary sewer overflow locations, presented an opportunity to conduct detailed statistical trend analyses of wastewater concentrations and loadings to date. Usually this assessment is conducted every three to five years to quantitatively assess temporal trends in concentrations and loadings of wastewater parameters. In 2020, Hatfield Consultants (Hatfield, 2020) conducted an integrated analysis of data from 2011-2019 updating previous trend assessments conducted by Golder Associates (Golder, 2009 and Golder, 2017a).

2.2 Methods

Effluent monitoring was conducted at Macaulay and Clover pump stations until access was lost due to the facility upgrades. Clover sampling was moved to Trent pump station in early April, and then to Currie pump station in late April, following an electrical fire. The Macaulay sampling location was moved to Craigflower pump station in late July. Both these proxy sampling locations were utilized for the remainder of 2020. Compliance sampling began at McLoughlin in August by the WWTP construction contractor, Harbour Resource Partners. McLoughlin Point WWTP influent and effluent priority pollutant sampling began in August and was conducted by CRD staff, concurrent with monitoring at Macaulay and Clover proxy sampling locations. Figure 2.1 presents a map of the conveyance system, which shows the proxy pump stations in relation to the new treatment plant and to the Clover and Macaulay Point pump stations.

Macaulay and Clover (or their proxies) screened effluent, and McLoughlin final effluent, were measured once a week (at Macaulay and Clover) or several times a week (at McLoughlin) to assess compliance with WSER and provincial permit or registration compliance limits. Samples from all three locations were analyzed monthly or quarterly for over 20 conventional parameters, such as TSS and nutrients, and a comprehensive list of up to 500 priority substances (Table 2.1, Appendix B1). Acute toxicity tests were also run on a quarterly basis (January, April, July and October) at Clover and Macaulay, and monthly at McLoughlin starting in August (Appendix B1). Finally, chronic toxicity tests were conducted in October with McLoughlin Point WWTP effluent only.

The list of priority substances was originally adapted from the US Environmental Protection Agency (US EPA) National Recommended Water Quality Criteria; Priority Toxic Pollutants list (US EPA, 2002). The CRD's list is reviewed on a periodic basis to determine the need to remove or add substances depending on new developments in terms of analytical techniques, potential presence in wastewaters, and potential effects on the receiving environment. The list was most recently revised to align with the Ocean Wise's Pollution Tracker Program (Section 6.1.1).

Wastewater samples from Macaulay and Clover (or their proxies) pump stations were taken as 24-hour time-based composites (400 mL wastewater collected every 30 minutes for 24 hours and combined into one sample). Grab samples were also collected for a few substances, including those that have very short hold times (e.g., fecal coliforms), those that are volatile (e.g., sulphide and volatile organic substances) and those that cannot be sampled accurately by composite sampling (e.g., oil and grease). From August to December, McLoughlin Point WWTP influent and effluent were sampled on a monthly basis as grab samples.

After collection, samples were immediately dispatched to qualified laboratories to conduct chemical analyses. Conventional and priority substance parameters were analyzed by Bureau Veritas Laboratories (BV Labs, Burnaby, BC), and high-resolution analyses were conducted at SGS AXYS Analytical Services (Sidney, BC). Substances were analyzed using methods capable of achieving method detection limits suitable for comparison to applicable water quality guidelines.

Wastewater flow volumes were measured continuously (every few minutes) by a SCADA system at the Macaulay and Clover outfalls (Appendices B2 and B3) and the new McLoughlin WWTP (Appendix B4). Flow measurements were compared to maximum daily and annual mean flow limits specified in the permits for these facilities. These flow values were also used for the calculation of loadings of conventional and priority substances by multiplying daily flows against daily concentrations then extrapolating out to annual loadings to the marine receiving environment. Macaulay and Clover flow data were used regardless of whether sample results were from the Macaulay and Clover pump stations or their upstream proxy stations.

Acute (Appendix B8) and chronic (Appendix B9) wastewater toxicity testing was conducted by Nautilus Environmental (Burnaby, BC), using standardized and Environment Canada approved protocols.

Table 2.1 Frequency of Wastewater Sampling by Analytical Group

(Appendix B1 provides a listing of individual analytes within each analytical group)

Parameter Group	Wastewater Priority Substances		
	Monthly	Quarterly	Annual
Conventionals	√	√	
Metals, total	√	√	
Metals, speciated (MeHg and TBT)		√	
Metals, dissolved	√	√	
Aldehydes	√	√	
Phenolic compounds	√	√	
Chlorinated phenolics	√	√	
Non-chlorinated phenolics	√	√	
Polycyclic aromatic hydrocarbons	√	√	
Semi-volatile organics	√	√	
Miscellaneous semi-volatile organics	√	√	
Volatile organics	√	√	
Terpenes	√	√	
Acute Toxicity			
Rainbow Trout 96-hr LC50	√[1]	√[2]	
Daphnia magna 48-hr LC50	√[1]	√[2]	
Chronic Toxicity			
Ceriodaphnia seven-day (survival and reproduction)			√
Rainbow trout alevin and embryo (EA) 30-day (survival and growth)			√
Top smelt seven-day (survival and growth)			√
Echinoderm fertilization (reproduction)			√
High-Resolution Analyses			
Nonylphenols (NP)		√	
Organochlorine pesticides (OC Pest)		√	
Pharmaceuticals and Personal Care Products (PPCPs)		√	
Polychlorinated biphenyls (PCBs)		√	
Polycyclic aromatic hydrocarbons (PAH)		√	
Polybrominated diphenyl ethers (PBDE)		√	
Per- and poly-fluoroalkyl substances (PFAS)		√	

[1]Monthly at McLoughlin
[2]Quarterly at Clover and Macaulay (or their proxy sampling locations)

DATA QUALITY ASSESSMENT

A rigorous quality assurance/quality control (QA/QC) assessment procedure was followed for both field sampling procedures and laboratory analyses for the routine wastewater monitoring component. From each analytical batch (12 monthly batches in 2020), one sample was randomly chosen for laboratory triplicate analysis every quarter (January, April, July and October) and one sample was randomly chosen for field triplicate analysis annually. In addition, one sample each month was analyzed as a matrix spike and trip and field blanks were tested once in 2020. The analytical laboratories also conducted internal QA/QC analyses, including method analyte spikes, method blanks and standard reference materials. Appendix A presents “A Guidance Manual for the Assessment of WMEP Analytical Data” (Golder, 2017b).

Any data that exhibited failures of QA/QC criteria was not included in any statistical analysis.

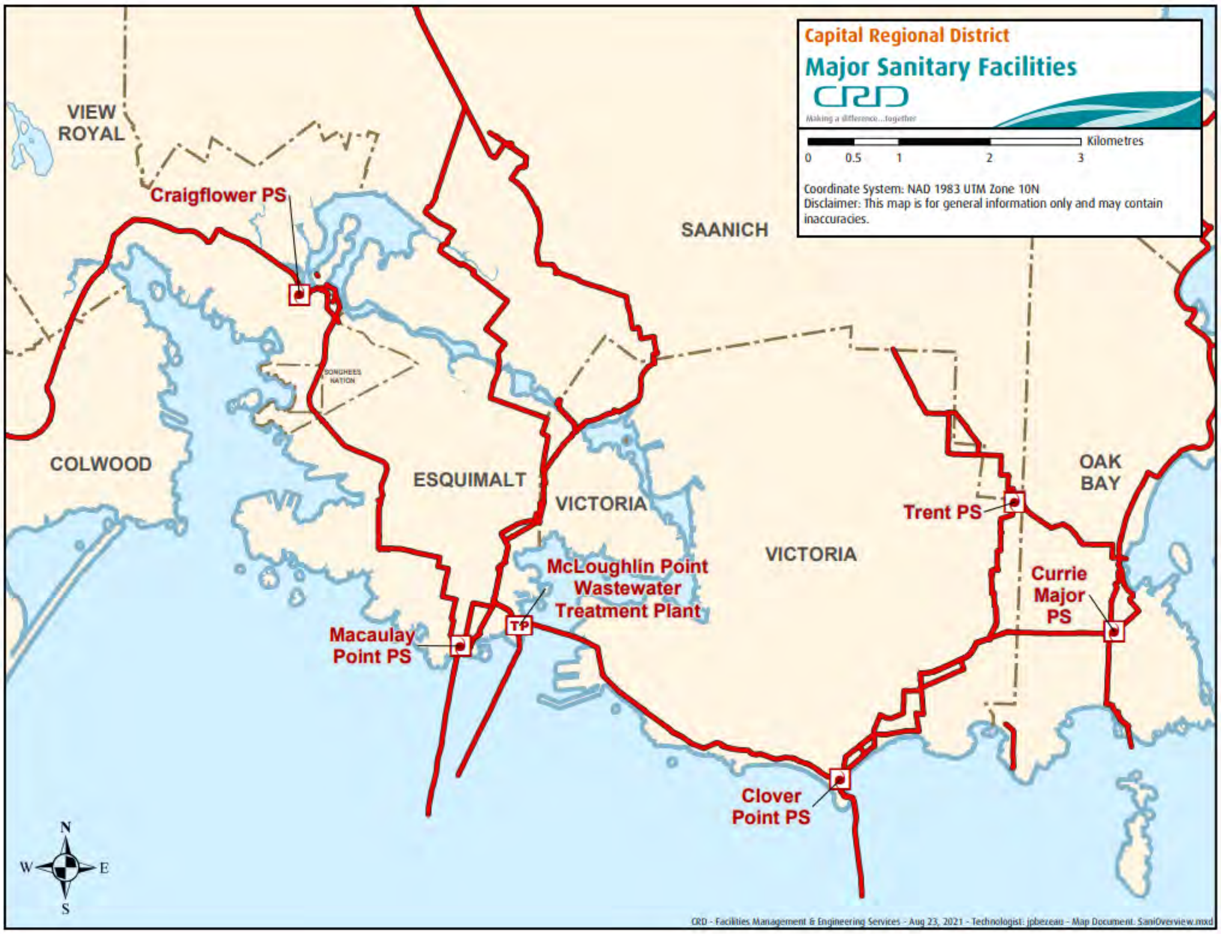


Figure 2.1 Core Area Conveyance System

2.3 Results and Discussion

CRD staff conducted the following wastewater monitoring and reporting in 2020:

- Wastewater was sampled on a weekly basis at both the Clover and Macaulay outfalls (and their proxies) to ensure compliance with federal WSER, and on a monthly basis to ensure compliance with permits issued by the ENV under the *Environmental Management Act*.
- Final effluent was monitored three times per week at McLoughlin starting in August to ensure compliance with federal WSER, and at variable frequencies to ensure compliance with the facility registration issued by ENV under the *Municipal Wastewater Regulation.*
- Compliance results were reported to Environment and Climate Change Canada on a quarterly basis through the online Effluent Regulatory Reporting Information System and on a monthly basis to ENV by email.
- Flows are presented in Figure 2.2 (Macaulay), Figure 2.3 (Clover) and Figure 2.4 (McLoughlin WWTP).

2.3.1 Federal Compliance Monitoring

The required frequency of sampling, to satisfy WSER requirements, is based on the average daily flows from the previous calendar year (2019 flows); as a result, weekly monitoring was required in 2020 at Clover Point and Macaulay Point outfalls (or their proxies) and three times per week at McLoughlin WWTP. WSER stipulate monthly average effluent quality limits for TSS and CBOD, and a maximum individual weekly limit for unionized ammonia that is equivalent to secondary treatment. Table 2.2 and Table 2.3 present these limits.

As the Macaulay and Clover outfalls discharge only screened effluent, the federal government granted transitional authorizations for these facilities that allow for effluent quality limits to be exceeded temporarily until new treatment can be installed. These transitional authorizations came into effect January 1, 2015 and require treatment equivalent to secondary (or better) to be in place by December 31, 2020. Table 2.4 and Table 2.5 present results from the weekly sampling, as well as the monthly averages for TSS and CBOD. Clover (Currie proxy) had compliance result failures in April and August, while Macaulay (Craigflower proxy) had compliance result failures in August and October. Proxy station exceedances are expected as these waste flows are raw un-screened sewage, whereas Macaulay and Clover are screened to 6 mm.

Table 2.6 presents results from the McLoughlin Point WWTP compliance sampling. As expected, results indicate that the plant was not compliant with WSER from August to December for TSS and CBOD, while toxicity and unionized ammonia were in compliance. Various treatment processes were brought online during commissioning and as a result, TSS and CBOD results were highly variable as treatment processes were stabilized.

2.3.2 Provincial Compliance Monitoring

Monthly wastewater monitoring is undertaken to ensure compliance with the provincial permits issued for the Macaulay and Clover outfalls. Among other day-to-day operation requirements, the permits stipulate maximum operating levels for flow and expectations for the wastewater concentrations of TSS and CBOD (Table 2.4 and Table 2.5). ENV requires the Clover and Macaulay wastewaters to be within the expected ranges for fine-screened wastewater (Metcalf and Eddy, 2013). Variable frequency monitoring is undertaken to ensure compliance with the provincial registration issued for McLoughlin; effluent quality limits vary depending on whether the facility is discharging solely tertiary effluent when flows are less than 216,000 m^3/day, or blended (primary + tertiary) effluent when flows are greater than 216,000 m^3/day. Table 2.6 and Table 2.7 present these limits.

Flow information for 2020 is presented in Figure 2.2 and Appendix B2 (Macaulay), Figure 2.3 and Appendix B3 (Clover) and Figure 2.4 and Appendix B4 (McLoughlin). Flows did not exceed the allowable daily maximum for Macaulay (maximum 150,000 m^3), Clover (maximum 185,000 m^3) or McLoughlin WWTP (maximum 432,000 m^3) in 2020. Flows were diverted from Macaulay to McLoughlin in October and from Clover to McLoughlin in September, therefore, flow for these facilities were low or intermittent after these diversions.

The average daily flow from McLoughlin WWTP was 88,404 m^3/day in 2020, based on flows recorded from August to December. The McLoughlin Point WWTP is designed to tertiary treat 216,000 m^3/day. Any additional flow volume coming into the plant is primary treated and then blended with the tertiary-treated flow. The plant is authorized to blend these flows for 70 days per year. In 2020, there were four days when flows were greater than 216,000 m^3 and blending occurred (three days in November and one day in December).

Results indicate that the quality of the wastewaters from Macaulay and Clover outfalls in 2020 were generally similar to the previous year's results. Macaulay (Craigflower proxy) had one biochemical oxygen demand (BOD) result outside the expected range for fine-screened wastewater in August (Table 2.4) and Clover (Trent proxy) was outside expected ranges for TSS once in April (Table 2.5). As expected, toxicity testing indicated that the wastewater at Clover and Macaulay (or their proxies) was acutely toxic to rainbow trout on each testing date. With the exception of these exceedances, the remainder of the results met provincial regulatory expectations.

McLoughlin WWTP final effluent was not compliant with provincial registration requirements from August to early October during commissioning, which was expected due to the staggered implementation of treatment processes. November and December results were mostly in compliance, including toxicity results (Table 2.6), with the exception of monthly TSS and CBOD averages and two days of daily maximums exceeding in late December. Blended effluent was discharged on four days in 2020; CBOD exceeded blended effluent limits three times and TSS once during these events (Table 2.7).

Table 2.2 Clover and Macaulay Provincial and Federal Compliance Limits

Parameter	Unit	Provincial Limit Registration		Federal Transitional Authorization Limit	
		Clover	Macaulay	Clover	Macaulay
CBOD	mg/L	---	---	327 (monthly average)	334 (monthly average)
BOD	mg/L	350 (max)	350 (max)		
Rainbow Trout Toxicity	pass/fail	pass	pass	---	---
TSS	mg/L	400 (max)	400 (max)	396 (monthly average)	342 (monthly average)
Unionized NH_3 @ 15°C	mg/L	---	---	1.25 (max)	1.25 (maximum)

Table 2.3 McLoughlin Point WWTP Provincial and Federal Compliance Limits

Parameter	Unit	Provincial Limit Registration		Federal Limit WSER
		McLoughlin WWTP <216,000 m^3	McLoughlin WWTP >216,000 m^3	McLoughlin WWTP <216,000 m^3
CBOD	mg/L	25 (maximum) 10 (monthly average	130 (maximum)	25 (monthly average)
Rainbow Trout Toxicity	pass/Fail	pass	---	pass
TSS	mg/L	25 (maximum) 10 (monthly average)	130 (maximum)	25 (monthly average)
Unionized NH_3 @ 15°C	mg/L	---	---	1.25 (maximum)

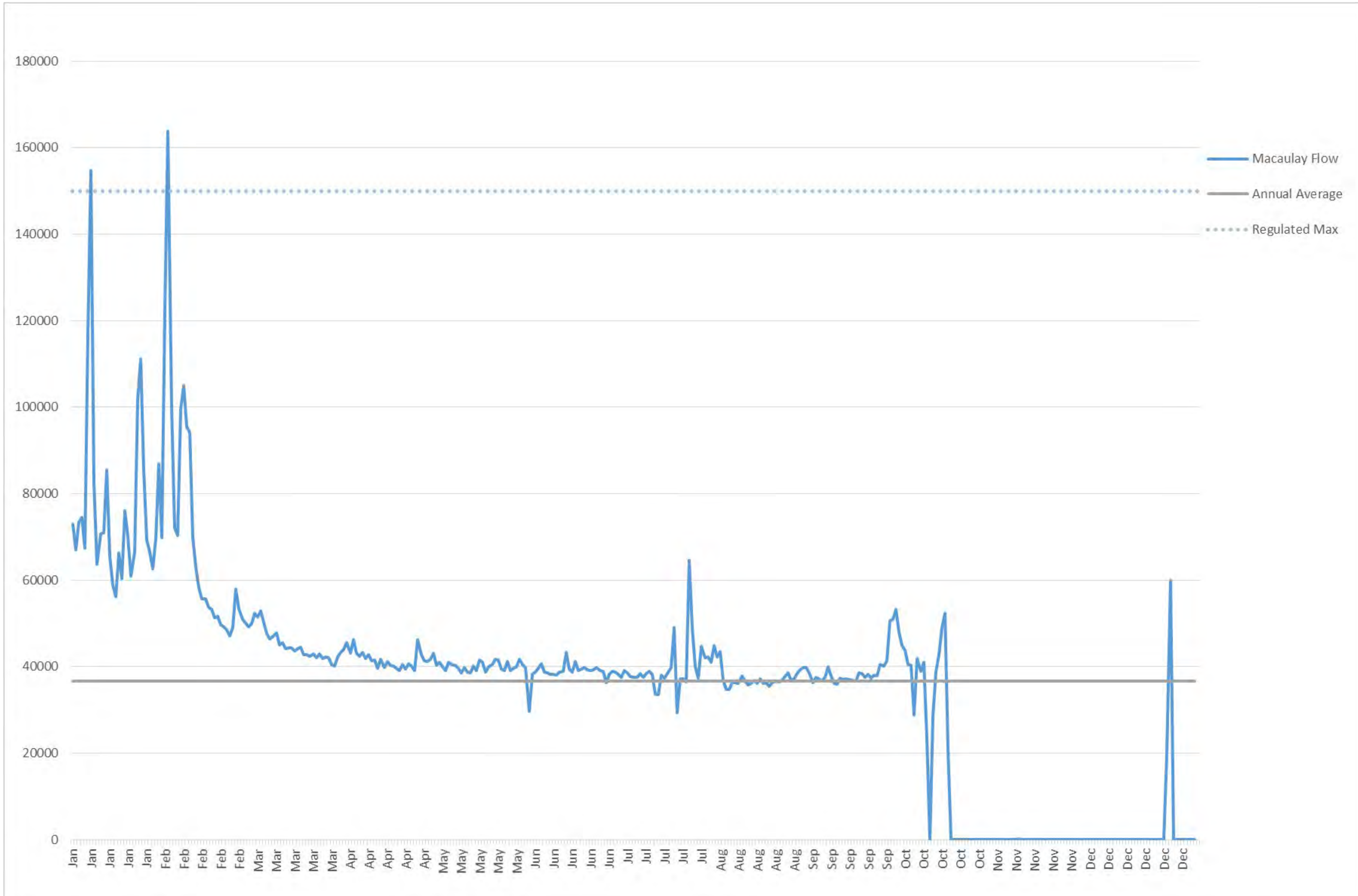


Figure 2.2 Macaulay Flows in 2020

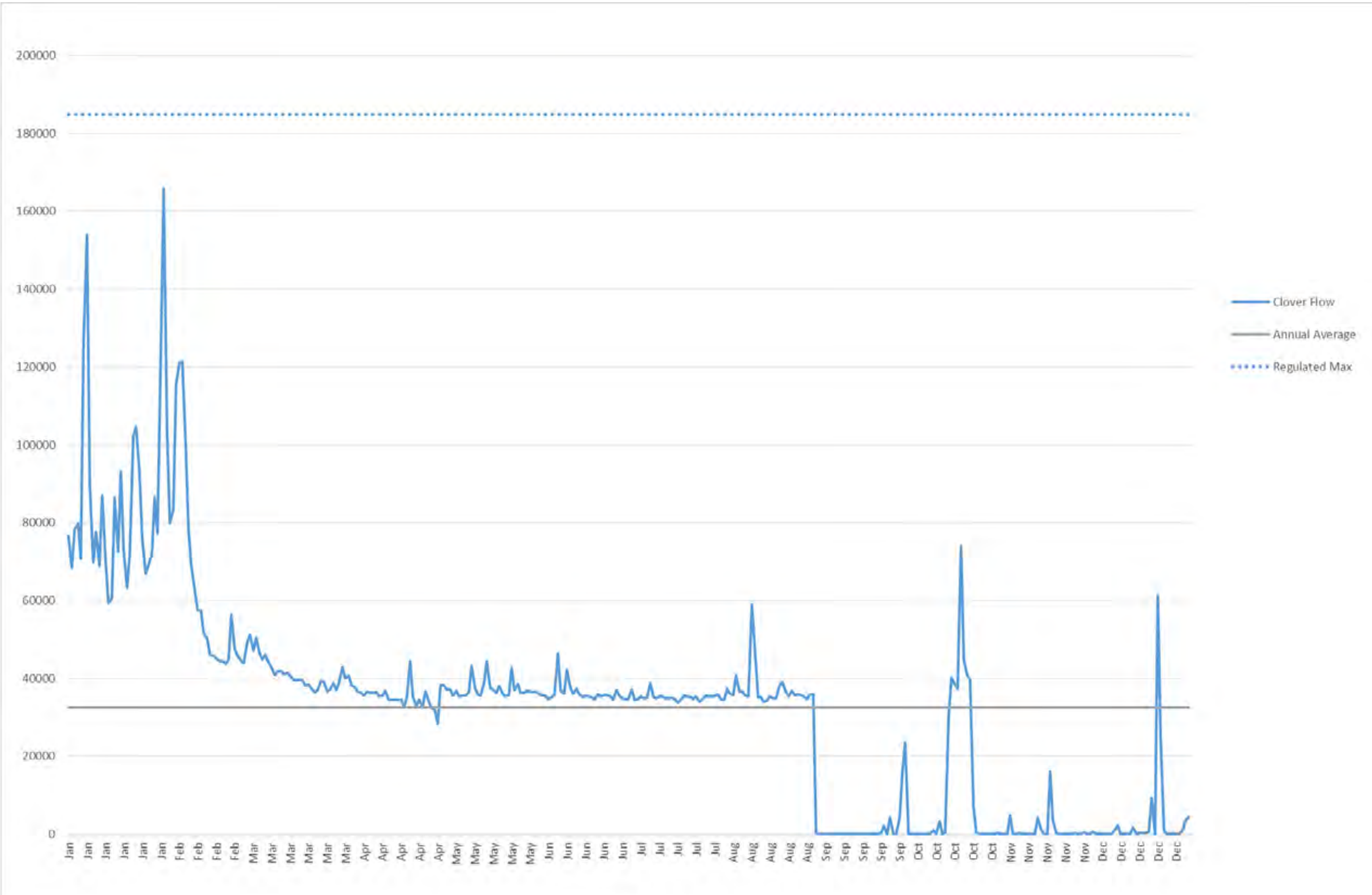


Figure 2.3 Clover Flows in 2020

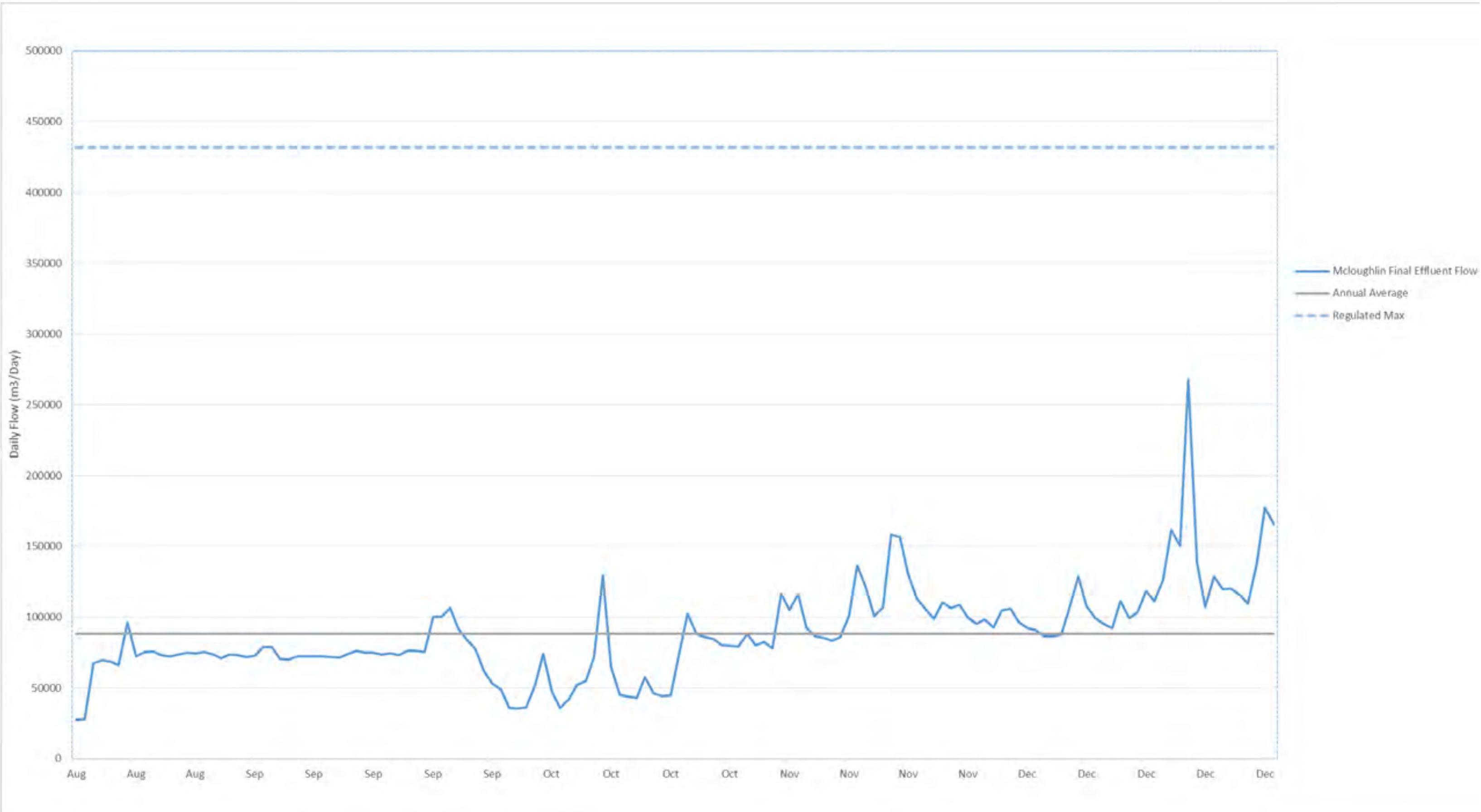


Figure 2.4 McLoughlin WWTP Final Effluent Flows in 2020

Table 2.4 Macaulay (or proxy) Federal and Provincial Wastewater Compliance Results for 2020

	Macaulay Point Effluent					
		CBOD	BOD	Rainbow Trout Toxicity	TSS	Unionized NH_3 @ 15°C
		mg/L	mg/L		mg/L	mg/L
	Provincial Limit Registration		350 (maximum)*	pass/fail	400 (maximum)*	
Proxy	Federal Transitional Authorization Limit	334 (monthly average)			342 (monthly average)	1.25 (maximum)
	02/01/2020	190	---		170	0.037
	08/01/2020	360	---		170	0.054
	14/01/2020	190	200	fail	180	0.071
	22/01/2020	160	---		190	0.051
	29/01/2020	95	---		120	0.069
	January Average	**199**	---		**166**	
	05/02/2020	140	---		110	0.040
	11/02/2020	210	190		130	0.060
	18/02/2020	210	---		240	0.083
	26/02/2020	270	---		270	0.100
	February Average	**206**	---		**183**	
	03/03/2020	200	---		180	0.110
	10/03/2020	310	170		230	0.069
	18/03/2020	370	---		230	0.065
	25/03/2020	290	---		260	0.073
	March Average	**293**	---		**225**	
	01/04/2020	310	---		260	0.130
	08/04/2020	230	---		190	0.022
	15/04/2020	330	---		340	0.063
	21/04/2020	120	180	fail	250	0.040
	29/04/2020	150	---		170	0.091
	April Average	**228**	---		**242**	
	06/05/2020	230	---		270	0.008
	13/05/2020	360	350		350	0.041
	20/05/2020	220	---		250	0.072
	27/05/2020	270	---		270	0.065
	May Average	**270**	---		**285**	

Table 2.4, cont'd

	Macaulay Point Effluent					
		CBOD	BOD	Rainbow Trout Toxicity	TSS	Unionized NH_3 @ 15°C
		mg/L	mg/L		mg/L	mg/L
	Provincial Limit Registration		350 (maximum)*	pass/fail	400 (maximum)*	
Proxy	Federal Transitional Authorization Limit	334 (monthly average)			342 (monthly average)	1.25 (maximum)
	04/06/2020	340	---		280	0.070
	10/06/2020	330	330		290	0.063
	17/06/2020	290	---		190	0.069
	24/06/2020	350	---		300	0.044
	June Average	**328**	---		**265**	
	02/07/2020	5	---		250	0.040
	09/07/2020	320	---		210	0.029
	14/07/2020	290	250	fail	200	0.047
Craigflower	23/07/2020	480	---		300	0.380
Craigflower	29/07/2020	380	---		170	0.140
	July Average	**295**	---		**226**	
Craigflower	05/08/2020	270	---		190	0.098
Craigflower	12/08/2020	320	370		320	0.080
Craigflower	19/08/2020	520	---		260	0.270
Craigflower	26/08/2020	410	---		94	0.140
	August Average	**380**	---		**216**	
Craigflower	02/09/2020	290	---		190	0.120
Craigflower	08/09/2020	300	---		88	0.098
Craigflower	16/09/2020	380	---		260	0.120
Craigflower	23/09/2020	320	330		200	0.120
Craigflower	30/09/2020	350	---		190	0.140
	September Average	**328**	---		**186**	
Craigflower	07/10/2020	590	---		70	0.160
Craigflower	14/10/2020	320	---		190	0.110
Craigflower	21/10/2020	220	220	fail	49	0.090
Craigflower	28/10/2020	340	---		38	0.086
	October Average	**368**	---		**87**	

Table 2.4, cont'd

	Macaulay Point Effluent					
		CBOD	BOD	Rainbow Trout Toxicity	TSS	Unionized NH_3 @ 15°C
		mg/L	mg/L		mg/L	mg/L
	Provincial Limit Registration		350 (maximum)*	pass/fail	400 (maximum)*	
Proxy	Federal Transitional Authorization Limit	334 (monthly average)			342 (monthly average)	1.25 (maximum)
Craigflower	04/11/2020	96	---		130	0.064
Craigflower	12/11/2020	290	---		130	0.051
Craigflower	18/11/2020	220	260		190	0.038
Craigflower	25/11/2020	420	---		290	0.054
	November Average	**257**	---		**185**	
Craigflower	02/12/2020	260	---		180	0.067
Craigflower	10/12/2020	330	330		120	0.045
Craigflower	21/12/2020	110	---		110	0.012
Craigflower	29/12/2020	300	---		170	0.033
	December Average	**250**	---		**145**	

Notes:
* Equivalent to or better than screened municipal wastewater. Metcalf and Eddy (2013)
Shaded results indicate exceedance

Table 2.5 Clover (or proxy) Federal and Provincial Wastewater Compliance Results for 2020

	Clover Point Effluent					
		CBOD	BOD	TSS	Rainbow Trout Toxicity	Unionized NH_3 @ 15°C
		mg/L	mg/L	mg/L		mg/L
	Provincial Limit Registration		350 (maximum)*	400 (maximum)*	pass/fail	
Proxy	Federal Transitional Authorization Limit	327 (monthly average)		396 (monthly average)		1.25 (maximum)
	02/01/2020	160	---	160		0.001
	08/01/2020	210	---	110		0.003
	14/01/2020	380	210	160	fail	0.025
	22/01/2020	95	---	120		0.034
	29/01/2020	88	---	110		0.024
	January Average	**187**	---	**132**		
	05/02/2020	87	---	84		0.017
	11/02/2020	330	220	350		0.034
	18/02/2020	210	---	190		0.032
	26/02/2020	230	---	240		0.041
	February Average	**209**	---	**199**		
	03/03/2020	170	---	170		0.044
	10/03/2020	240	160	230		0.031
	18/03/2020	260	---	220		0.041
	25/03/2020	380	---	290		0.057
	March Average	**263**	---	**228**		
Trent	01/04/2020	1,600	---	1,700		0.010
Trent	08/04/2020	190	---	120		0.039
Trent	15/04/2020	240	---	280		0.069
Currie	21/04/2020	140	170	130	fail	0.084
Currie	29/04/2020	150	---	280		7.200
	April Average	**464**	---	**502**		
Currie	06/05/2020	280	---	220		0.088
Currie	13/05/2020	200	170	140		0.039
Currie	20/05/2020	160	---	100		0.094
Currie	27/05/2020	190	---	120		0.093
	May Average	**208**	---	**145**		

Table 2.5, cont'd

	Clover Point Effluent					
		CBOD	BOD	TSS	Rainbow Trout Toxicity	Unionized NH_3 @ 15°C
		mg/L	mg/L	mg/L		mg/L
	Provincial Limit Registration		350 (maximum)*	400 (maximum)*	pass/fail	
Proxy	Federal Transitional Authorization Limit	327 (monthly average)		396 (monthly average)		1.25 (maximum)
Currie	04/06/2020	200	---	240		0.044
Currie	10/06/2020	180	200	63		0.072
Currie	17/06/2020	160	---	210		0.075
Currie	24/06/2020	210	---	200		0.069
	June Average	**188**	---	**178**		
Currie	02/07/2020	350	---	240		0.067
Currie	09/07/2020	150	---	110		0.061
Currie	14/07/2020	190	180	210	fail	0.044
Currie	23/07/2020	210	---	180		0.150
Currie	29/07/2020	190	---	130		0.100
	July Average	**218**	---	**174**		
Currie	05/08/2020	220	---	240		0.062
Currie	12/08/2020	190	120	110		0.170
Currie	19/08/2020	210	---	120		0.140
Currie	26/08/2020	200	---	33		0.140
	August Average	**205**	---	**126**		
Currie	02/09/2020	200	---	72		0.063
Currie	08/09/2020	210	---	94		0.065
Currie	16/09/2020	270	---	240		0.120
Currie	23/09/2020	150	140	120		0.067
Currie	30/09/2020	190	---	48		0.130
	September Average	**204**	---	**115**		
Currie	07/10/2020	200	---	130		0.130
Currie	14/10/2020	200	---	180		0.140
Currie	21/10/2020	150	150	170	fail	0.110
Currie	28/10/2020	210	---	240		0.230
	October Average	**190**	---	**180**		

Table 2.5, cont'd

	Clover Point Effluent					
		CBOD	BOD	TSS	Rainbow Trout Toxicity	Unionized NH_3 @ 15°C
		mg/L	mg/L	mg/L		mg/L
	Provincial Limit Registration		350 (maximum)*	400 (maximum)*	pass/fail	
Proxy	Federal Transitional Authorization Limit	327 (monthly average)		396 (monthly average)		1.25 (maximum)
Currie	04/11/2020	220	---	140		0.080
Currie	12/11/2020	110	---	150		0.037
Currie	18/11/2020	110	140	100		0.047
Currie	25/11/2020	140	---	150		0.043
	November Average	**145**	---	**135**		
Currie	02/12/2020	80	---	190		0.071
Currie	10/12/2020	190	110	150		0.040
Currie	21/12/2020	12	---	37		0.002
Currie	29/12/2020	95	---	89		0.013
	December Average	**94**	---	**117**		

Notes:
* Equivalent to or better than screened municipal wastewater. Metcalf and Eddy (2013)
Monthly averages are bolded and shaded results indicate exceedance

Table 2.6 McLoughlin Federal and Provincial Wastewater Compliance Results for 2020 (<2x ADWF*)

			McLoughlin WWTP Final Effluent							
	Total Daily Flow (<2ADWF)	Rainbow Trout Toxicity	CBOD	TSS	Unionized NH_3 @ 15°C	NH_3-N	Total Phosphate	Orthophosphate	Fecal Coliforms	Enterococci
	m^3/day	pass/fail	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	CFU/100 mL
Provincial Limit Registration	<216,000		25 (maximum) 10 (monthly average)	25 (maximum) 10 (monthly average)	---	---	---	---	---	---
Wastewater Systems Effluent Regulations		pass	25 (monthly average)	25 (monthly average)	1.25 (maximum)	---	---	---	---	---
12/08/2020	27,500		98	41						
13/08/2020	27,700		153	73						
14/08/2020	67,200		110	35						
15/08/2020	69,800		122	61						
16/08/2020	68,700									
17/08/2020	65,900		171	92						
18/08/2020	96,000		106	72		38.8				
19/08/2020	72,100		73	52					2,420,000	60,000
20/08/2020	75,500		156	108						
21/08/2020	75,600									
22/08/2020	73,100		121	33						
23/08/2020	72,300		145	71			5.7			
24/08/2020	73,400		160	51					2,420,000	60,000
25/08/2020	74,900		168	56						
26/08/2020	74,600		161	60		45.1	6.3	3.8		
27/08/2020	75,500									
28/08/2020	74,000									
29/08/2020	71,000		107	41						
30/08/2020	73,600		341	66						
31/08/2020	73,100	Fail	132	69						
August Average			**145**	**61**		**42.0**	**6.0**	**3.8**	**2,420,000**	**60,000**
01/09/2020	72,000		137	93		35.3		3.5		
02/09/2020	72,500								9,800,000	3,200,000
03/09/2020	79,100									
04/09/2020	78,900									

Table 2.6 cont'd

			McLoughlin WWTP Final Effluent							
	Total Daily Flow (<2ADWF)	Rainbow Trout Toxicity	CBOD	TSS	Unionized NH_3 @ 15°C	NH_3-N	Total Phosphate	Orthophosphate	Fecal Coliforms	Enterococci
	m^3/day	pass/fail	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	CFU/100 mL
Provincial Limit Registration	<216,000		25 (maximum) 10 (monthly average)	25 (maximum) 10 (monthly average)	---	---	---	---	---	---
Wastewater Systems Effluent Regulations		pass	25 (monthly average)	25 (monthly average)	1.25 (maximum)	---	---	---	---	---
05/09/2020	70,300		102	55						
06/09/2020	70,100		152	57.6						
07/09/2020	72,400									
08/09/2020	72,200		154	24						
09/09/2020	72,200		154	36					8,660,000	1,460,000
10/09/2020	72,200									
11/09/2020	71,800		148	67						
12/09/2020	71,300		115	45						
13/09/2020	74,100		114	94						
14/09/2020	76,400		120	94						
15/09/2020	75,000		100	80		37.5	9.0	4.0		
16/09/2020	75,000								2,420,000	600
17/09/2020	73,400									
18/09/2020	74,500		112	70						
19/09/2020	73,300		126	68						
20/09/2020	76,400									
21/09/2020	76,300		120	64		41.1	5.6		3,870,000	2,700,000
22/09/2020	75,400		98	31						
23/09/2020	100,200		112	74						
24/09/2020	100,400									
25/09/2020	106,200		68	24						
26/09/2020	91,800		91	54						
27/09/2020	83,700	Fail								
28/09/2020	77,500		122	37						
29/09/2020	61,800		84	63					539,000	2,800,000
30/09/2020	53,200									
September Average			**117**	**60**		**38.0**	**7.3**	**3.8**	**5,057,800**	**2,032,120**

Table 2.6 cont'd

			McLoughlin WWTP Final Effluent							
	Total Daily Flow (<2ADWF)	Rainbow Trout Toxicity	CBOD	TSS	Unionized NH_3 @ 15°C	NH_3-N	Total Phosphate	Orthophosphate	Fecal Coliforms	Enterococci
	m^3/day	pass/fail	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	CFU/100 mL
Provincial Limit Registration	<216,000		25 (maximum) 10 (monthly average)	25 (maximum) 10 (monthly average)	---	---	---	---	---	---
Wastewater Systems Effluent Regulations		pass	25 (monthly average)	25 (monthly average)	1.25 (maximum)	---	---	---	---	---
01/10/2020	48,900									
02/10/2020	35,900									
03/10/2020	35,400		37	42						
04/10/2020	36,100		102	100						
05/10/2020	52,000									
06/10/2020	74,100		93	56						
07/10/2020	47,600		132	70						
08/10/2020	35,700		74	59		26.0	5.3	4.1	228,000	540,000
09/10/2020	42,000									
10/10/2020	52,300									
11/10/2020	55,100		54	85						
12/10/2020	72,000		53	61						
13/10/2020	129,300		38	81						
14/10/2020	64,900		38	81						
15/10/2020	45,200		69	60						
16/10/2020	43,700		74	55						
17/10/2020	42,800									
18/10/2020	57,600		90	64						
19/10/2020	46,000	Fail	95	98						
20/10/2020	44,200		84	50					4,100	10,000
21/10/2020	44,800		54	86	0.037	15.0	1720.0	1.5	15,000	520
22/10/2020	75,300		169	204		37.4	5.3	3.2	19,900,000	5,600,000
23/10/2020	102,600									
24/10/2020	88,300									
25/10/2020	85,900		142	182						
26/10/2020	84,800		182	183						
27/10/2020	80,300		131	107						

Table 2.6 cont'd

			McLoughlin WWTP Final Effluent								
	Total Daily Flow (<2ADWF)	Rainbow Trout Toxicity	CBOD	TSS	Unionized NH_3 @ 15°C	NH_3-N	Total Phosphate	Orthophosphate	Fecal Coliforms	Enterococci
	m³/day	pass/fail	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	CFU/100 mL
Provincial Limit Registration	**<216,000**		**25 (maximum) 10 (monthly average)**	**25 (maximum) 10 (monthly average)**	**---**	**---**	**---**	**---**	**---**	**---**
Wastewater Systems Effluent Regulations		**pass**	**25 (monthly average)**	**25 (monthly average)**	**1.25 (maximum)**	**---**	**---**	**---**	**---**	**---**
28/10/2020	79,700		211	179					4,350,000	10,700,000
29/10/2020	79,200		166	85						
30/10/2020	88,300									
31/10/2020	80,300									
October Average			**100**	**95**	**0.037**	**26.1**	**576.9**	**2.9**	**4,899,420**	**3,370,104**
01/11/2020	82,300		117	42						
02/11/2020	77,900		235	121						
03/11/2020	116,600		189	166						
04/11/2020	105,100		84	75						
05/11/2020	116,000		75	76		23.8	3.5	1.5	2,420,000	1,600,000
06/11/2020	92,600		8.1	9.7		17.5				
07/11/2020	86,500		7.1	4.9		19.7				
08/11/2020	85,400		7.1	4.9		21.3	2.3	1.6	121,000	30,000
09/11/2020	83,300									
10/11/2020	86,000		12.1	3		26.2				
11/11/2020	101,000		15.3	7.8		27.2				
12/11/2020	136,700									
13/11/2020	120,500		9.1	11		17.9				
14/11/2020	100,600		8.2	3.1		22.4				
15/11/2020	106,700		12	5.3		23.9	2.5	1.8	20,000	10,000
16/11/2020	158,300		10	7.7		18.3				
17/11/2020	156,500		10	3.0		16.0				
18/11/2020	130,200	Pass	6.1	5.7		16.8				
19/11/2020	113,100		10	7.7	0.036	19.9	2250	1.7	230,000	14,000
20/11/2020	105,800		8.5	8.4		24.1				
21/11/2020	98,700		8.2	10		22.7				
22/11/2020	110,300		10	13		24.7	2.9	2.5	135,000	77,000

Table 2.6 cont'd

			McLoughlin WWTP Final Effluent								
	Total Daily Flow (<2ADWF)	Rainbow Trout Toxicity	CBOD	TSS	Unionized NH_3 @ 15°C	NH_3-N	Total Phosphate	Orthophosphate	Fecal Coliforms	Enterococci
	m³/day	pass/fail	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	CFU/100 mL
Provincial Limit Registration	**<216,000**		**25 (maximum) 10 (monthly average)**	**25 (maximum) 10 (monthly average)**	**---**	**---**	**---**	**---**	**---**	**---**
Wastewater Systems Effluent Regulations		**pass**	**25 (monthly average)**	**25 (monthly average)**	**1.25 (maximum)**	**---**	**---**	**---**	**---**	**---**
23/11/2020	106,600		7.5	13		24.9				
24/11/2020	108,800									
25/11/2020	99,600		8.9	8.5		21.7				
26/11/2020	95,400		13	7.7		25.1				
27/11/2020	98,300		7.6	13		24.6				
28/11/2020	92,600		8.1	10		24.9				
29/11/2020	104,700		10	9.3		24.2	3.3	2.6	299,000	68,000
30/11/2020	105,800		6.4	6.7		18.4				
November Average			**33**	**24**	**0.036**	**22.0**	**377**	**1.9**	**537,500**	**299,833**
01/12/2020	96,580		6.8	6.3		23.3				
02/12/2020	92,320	Pass	7.2	4.7		18.6				
03/12/2020	90,900		8.3	10		25.3				
04/12/2020	86,390		5.6	7.7		26.1				
05/12/2020	86,300		6.6	3.00		27.5				
06/12/2020	87,690		7.1	5.9		24.6	3.6	3.1		
07/12/2020	106,840		7.6	7.8		30.0			17,300	13,700
08/12/2020	128,600		8.2	7.2		17.2				
09/12/2020	107,800		12	11		25.8				
10/12/2020	99,320		11	10	0.023	20.6	2570	2.2	19,000	2,800
11/12/2020	95,515		9.3	5.9		27.6				
12/12/2020	92,100		9.3	8.2		28.9				
13/12/2020	111,300		6.4	9.0		23.7				
14/12/2020	99,500		10	15		26.9	2.1	1.9	44,800	23,000
15/12/2020	103,200		9.3	9.8		30.7				
16/12/2020	118,500		8.9	11		33.2				
17/12/2020	111,300		9.1	9.2		30.2				
18/12/2020	126,200		7.1	11		17.3				

Table 2.6 cont'd

			McLoughlin WWTP Final Effluent								
	Total Daily Flow (<2ADWF)	Rainbow Trout Toxicity	CBOD	TSS	Unionized NH_3 @ 15°C	NH_3-N	Total Phosphate	Orthophosphate	Fecal Coliforms	Enterococci
	m^3/day	pass/fail	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	CFU/100 mL
Provincial Limit Registration	<216,000		25 (maximum) 10 (monthly average)	25 (maximum) 10 (monthly average)	---	---	---	---	---	---
Wastewater Systems Effluent Regulations		pass	25 (monthly average)	25 (monthly average)	1.25 (maximum)	---	---	---	---	---
19/12/2020	161,250		6.9	9.1		17.8				
20/12/2020	150,360		7.3	5.5		17.3				
21/12/2020	267,920		7.4	8.5		7.5	2.0	0.7	145,000	39,000
22/12/2020	138,480		92	111		6.6				
23/12/2020	107,260		26	37		1.5				
24/12/2020	128,780									
25/12/2020	119,560									
26/12/2020	120,170		4.9	7.2		15.1				
27/12/2020	115,940		10	11		18.6				
28/12/2020	109,660		3.3	5.7		17.6				
29/12/2020	137,640		5.1	4.1		15.9			63,800	66,000
30/12/2020	177,460									
31/12/2020	165,830									
December Average			**12**	**13**	**0.023**	**21.3**	**644.4**	**2.0**	**57,980**	**28,900**

Notes:
Blue shading indicates that single values exceed the maximum limit; orange shading indicates that average values exceed the average limit, *ADWF – Average Dry Weather Flow

Table 2.7 McLoughlin Provincial Wastewater Compliance Results for 2020 (>2x ADWF Blended Effluent Days)

McLoughlin WWTP Final Effluent			
	Flow (>2ADWF*)**	CBOD	TSS
	m^3/day	mg/L	mg/L
Provincial Limit Registration	>216,000	130 (maximum)	130 (maximum)
01/11/2020	1,030	117	42
02/11/2020	530	235	121
03/11/2020	240	189	166
21/12/2020	40,790	7	9

Notes:
*ADWF – Average Dry Weather Flow
**Represents the amount of flow over and above the tertiary capacity of 216,000 m^3/day

2.3.3 Priority Substances

Wastewater samples were analyzed for the priority substances listed in Table 2.1 and Appendix B1. There were more than 170 routine resolution substances analyzed and more than half of these were not detected in 2020 (at routine detection limits chosen for comparison to the applicable water quality guidelines). The routine resolution substances frequently detected in Clover and Macaulay (or their proxies) wastewaters (greater than 50% of the time) were similar to previous years. The high-resolution analyses resulted in higher frequency of detection relative to the routine resolution analysis for the same parameters due to the lower detection limits of the high-resolution methods. Frequency of detections were slightly less in treated wastewater at McLoughlin Point WWTP than Clover and Macaulay (or their proxies) screened discharges, as a result of the higher levels of treatment. The frequencies of detection of all substances analyzed in wastewater are included in Appendix B5 (Macaulay), Appendix B6 (Clover) and Appendix B7 (McLoughlin).

Both concentrations and loadings at Clover and Macaulay (or their proxies) in 2020 were qualitatively similar to previous years and the observed variation was typical of municipal wastewater discharges. McLoughlin Point WWTP effluent had slightly lower loadings than Clover and Macaulay (or their proxies) in 2020. Caution should be observed in these observations, as loadings and average calculations were based on one to three grab samples only, and extrapolated to represent annual loadings. The concentrations of substances that were frequently detected (greater than 50% of sampling events) in Macaulay and Clover (or their proxies) wastewaters are presented in Table 2.4 (Macaulay), Table 2.5 (Clover) and Table 2.6 (McLoughlin). Annual loadings to the marine environment are presented in appendices B5, B6 and B7.

To determine the potential for effects of the wastewater discharges on the receiving environment, average and maximum wastewater concentrations of frequently detected substances (Tables 2.8 to 2.10) were compared to the BC (BC MoE&CCS 2017 and 2019), Warrington (1988) and Canadian Council of Ministers of the Environment (CCME) water quality guidelines (CCME, 2003) developed to protect aquatic life and human health, and to the Health Canada guidelines for human health protection (Health Canada, 2012). Conservative estimates of the minimum initial dilution of the wastewaters in receiving waters off the outfalls (245:1 for Macaulay, 175:1 for Clover (Hodgins, 2006), and 113:1 for McLoughlin (Seaconsult, 2019)) were applied to maximum wastewater substance concentrations from both discharges to predict maximum potential concentrations in the marine environment. These minimum initial dilution factors are predicted to occur at the edge of the initial dilution zone (IDZ) of each outfall. 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.

Before application of minimum dilution factors, there were several substances that exceeded applicable guidelines in undiluted wastewater (Clover, Macaulay, sampling proxies and McLoughlin) prior to discharge (Table 2.8 to Table 2.10). These substances included bacterial indicators, weak acid dissociable cyanide, copper, zinc and total PCBs. In addition, cadmium, lead and benzo(a)pyrene at Macaulay and Clover (or their proxies), bisphenol A and nonylphenols at Macaulay and naphthalene at McLoughlin exceeded guidelines. These exceedances were similar in frequency and magnitude to those observed in previous years (CRD, 2018; CRD, 2019).

After application of minimum dilution factors at all facilities (Clover, Macaulay, sampling proxies and McLoughlin), there were no substances exceeding applicable guidelines in wastewater, except for bacteriological indicators, indicating that receiving environment concentrations were unlikely to exceed guidelines beyond the IDZ (area that extends 100 m around the outfall diffusers), and the potential for effects on aquatic life were likely limited to within the outfall IDZ.

Table 2.8 Concentrations of Frequently Detected Substances (>50% of the time) in Macaulay (or proxy) Wastewater 2020

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
CONVENTIONALS										
Enterococci	TOT	CFU/100 mL	100%	991,900	16	2,200,000	170,000	8,980	35 (geomean) /70(max)	35 (geomean) /70(max)
Fecal Coliforms**	TOT	CFU/100 mL	100%	6,471,000	14	10,000,000	2,100,000	40,820		
Alkalinity - Total	TOT	mg/L	100%	213.3	15	250	180	n/a		
Chloride	TOT	mg/L	100%	76.56	16	200	43	0.82		
Chemical Oxygen demand	TOT	mg/L	100%	658.9	16	857	475	3.5		
Hardness (as CaCO3)	DIS	mg/L	100%	70.82	16	127	48.7	n/a		
Hardness (as CaCO3)	TOT	mg/L	100%	79.68	16	135	58.2	n/a		
pH	TOT	pH	100%	7.29	16	7.96	6.91	n/a	7.0-8.7a	7.0-8.7
Sulfide	TOT	mg/L	100%	0.2769	16	0.67	0.047	0.00273		
Sulfur	TOT	mg/L	100%	8.97	12	10.8	7.4	0.04		
Sulphate	TOT	mg/L	100%	24.71	7	29	18	0.12		
Total Organic Carbon	TOT	mg/L	100%	61.5	16	94	41	0.384		
SAD Cyanide	TOT	mg/L	80%	0.002536	10	0.0044	0.00166	0.000018		
WAD Cyanide	TOT	mg/L	81%	0.001433	16	0.0037	0.00059	0.000015	0.001b	
Oil & Grease, total	TOT	mg/L	100%	14.49	16	30	5.2	0.12		
Specific Conductivity - 25°C.	TOT	µS/cm	100%	781.3	16	1200	610	n/a		
NUTRIENTS										
N - Kjeldahl Nitrogen	TOT	mg/L	100%	45.63	16	57.8	5.49	0.236		
Nitrogen as N	TOT	mg/L	100%	45.65	16	57.8	5.49	0.236		
N - Nh3 (As N)	TOT	mg/L	100%	42.69	16	47	31	0.192	70c	
P - PO4 - Ortho (As P)	TOT	mg/L	100%	3.594	16	5.4]	2	0.022		
P - PO4 - Total (As P)	TOT	µg/L	100%	5963	16	8120	3770	33.14		
ORGANICS										
Trichloromethane	TOT	µg/L	100%	3.65	11	7.9	2.7	0.03		
Dimethyl Ketone	TOT	µg/L	100%	112.8	16	320	41	1.3		
BTEX										
Toluene	TOT	µg/L	88%	1.157	16	2	0.4	0.008		
METALS-TOTAL										
Aluminum	TOT	µg/L	100%	189.1	16	255	93.9	1.04		
Antimony	TOT	µg/L	100%	0.2869	16	0.413	0.222	0.0017		
Arsenic	TOT	µg/L	100%	0.5391	16	1.15	0.275	0.0047	12.5b	12.5
Barium	TOT	µg/L	100%	17.69	16	23.3	10.3	0.0951		
Cadmium	TOT	µg/L	100%	0.1311	16	0.204	0.0607	0.00083	0.12a	0.12
Calcium	TOT	mg/L	100%	19.67	16	28.2	15.7	0.115		
Chromium	TOT	µg/L	100%	1.482	16	3.35	0.55	0.014		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
Chromium III	TOT	mg/L	53%	0.002014	15	0.0099	0.00099	0.00004	0.056a	0.056
Cobalt	TOT	µg/L	100%	0.6378	16	1.19	0.353	0.0049		
Copper	TOT	µg/L	100%	92.36	16	111	66	0.453	2 (mean) / 3 (max)b	
Iron	TOT	µg/L	100%	442.1	16	608	222	2.48		
Lead	TOT	µg/L	100%	2.483	16	4.76	1.19	0.0194	2 (mean) / 140 (max)b	
Magnesium	TOT	mg/L	100%	7.431	16	15.7	4.63	0.064		
Manganese	TOT	µg/L	100%	53.04	16	78.8	30.9	0.322	100a	
Mercury	TOT	µg/L	75%	0.01318	16	0.04	0.0043	0.00016		0.016
Molybdenum	TOT	µg/L	100%	1.14	16	4.63	0.605	0.0189		
Nickel	TOT	µg/L	100%	3.218	16	4.68	2.1	0.019	8.3a	
Potassium	TOT	mg/L	100%	17.03	16	20.7	9.43	0.084		
Selenium	TOT	µg/L	100%	0.2978	16	0.342	0.26	0.0014	2b	
Silver	TOT	µg/L	100%	0.1559	16	1.84	0.023	0.0075	1.5 (mean) / 3 (max)b	
Sodium	TOT	mg/L	100%	50.37	12	74.5	31.8	0.304		
Thallium	TOT	µg/L	94%	0.00503	16	0.0086	0.002	0.00004		
Tin	TOT	µg/L	100%	1.08	16	1.97	0.5	0.008		
Zinc	TOT	µg/L	100%	106.6	16	132	65.1	0.54	10 (mean) / 55(max)b	
METALS-DISSOLVED										
Aluminum	DIS	µg/L	100%	26.26	16	42.3	11.7	0.173		
Antimony	DIS	µg/L	100%	0.2535	16	0.379	0.19	0.0015		
Arsenic	DIS	µg/L	100%	0.4511	16	1.09	0.215	0.0044		
Barium	DIS	µg/L	100%	8.014	16	11.7	5.96	0.0478		
Cadmium	DIS	µg/L	100%	0.02504	16	0.0688	0.0082	0.00028		
Calcium	DIS	mg/L	100%	16.75	16	26.4	12.2	0.1078		
Chromium	DIS	µg/L	100%	1.059	16	2.57	0.35	0.01		
Cobalt	DIS	µg/L	100%	0.4429	16	0.925	0.203	0.00378		
Copper	DIS	µg/L	100%	48.09	16	67.5	26.1	0.2755		
Iron	DIS	µg/L	100%	219.2	16	351	101	1.43		
Lead	DIS	µg/L	100%	0.637	16	0.939	0.303	0.00383		
Magnesium	DIS	mg/L	100%	7.038	16	14.8	4.24	0.0604		
Manganese	DIS	µg/L	100%	35.74	16	55.8	24.8	0.2278		
Molybdenum	DIS	µg/L	100%	1.025	16	3.01	0.363	0.0123		
Nickel	DIS	µg/L	100%	2.463	16	3.94	1.54	0.0161		
Phosphorus	DIS	µg/L	100%	4,198	16	6,120	2,100	24.98		
Potassium	DIS	mg/L	100%	16.15	16	20.4	9.25	0.0833		
Selenium	DIS	µg/L	100%	0.2062	16	0.272	0.156	0.0011		
Silver	DIS	µg/L	100%	0.1061	16	1.07	0.015	0.00437		
Sodium	DIS	mg/L	100%	49.87	12	76	33.1	0.3102		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
Tin	DIS	µg/L	100%	0.792	16	1.15	0.4	0.005		
Zinc	DIS	µg/L	100%	29.31	16	37.9	13.7	0.155		
METALS-SPECIATED										
Methyl Mercury	TOT	ng/L	100%	0.4623	4	0.872	0.272	0.0036		
ORGANICS										
Chloroform	TOT	µg/L	100%	3.02	5	3.7	1.7	0.02		
Alpha-Terpineol	TOT	µg/L	100%	6.73	16	11.2	5.4	0.05		
PAHs										
2-Methylnaphthalene	TOT	µg/L	100%	0.0709	16	0.15	0.015	0.0006		
Acenaphthene	TOT	µg/L	94%	0.0844	16	0.28	0.01	0.0011	6b	
Acenaphthylene	TOT	µg/L	69%	0.1024	16	0.32	0.01	0.0013		
Anthracene	TOT	µg/L	75%	0.0245	16	0.083	0.01	0.0003		
Benzo(a)anthracene	TOT	µg/L	69%	0.0251	16	0.14	0.01	0.0006		
Benzo(a)pyrene	TOT	µg/L	69%	0.03039	16	0.22	0.005	0.0009	0.01b	
Chrysene	TOT	µg/L	69%	0.0535	16	0.15	0.01	0.0006	0.1b	
Fluoranthene	TOT	µg/L	94%	0.0541	16	0.24	0.01	0.001		
Fluorene	TOT	µg/L	94%	0.072	16	0.29	0.01	0.0012	12b	
Naphthalene	TOT	µg/L	100%	0.1133	16	0.55	0.025	0.0022	1b	1.4
Phenanthrene	TOT	µg/L	94%	0.1054	16	0.25	0.031	0.001		
Pyrene	TOT	µg/L	88%	0.0769	16	0.61	0.01	0.0025		
Total Hmw-PAHs	TOT	µg/L	88%	0.3084	16	1.1	0.02	0.0045		
Total Lmw-PAHs	TOT	µg/L	100%	0.5769	16	1.4	0.12	0.0057		
Total Pahs	TOT	µg/L	100%	0.8825	16	1.6	0.13	0.0065		
PHENOLICS										
Phenol	TOT	µg/L	100%	17.36	16	47.2	5.6	0.193		
Total Phenols	TOT	mg/L	100%	0.07819	16	0.12	0.045	0.00049		
PHTHALATES										
Bis(2-Ethylhexyl)Phthalate	TOT	µg/L	63%	6.09	16	9.5	5	0.04		
Diethyl Phthalate	TOT	µg/L	94%	1.519	16	2.41	0.25	0.0098		
HIGH RESOLUTION										
PAHS										
1-Methylphenanthrene	TOT	ng/L	100%	8.948	4	11.7	5.57	0.048		
2-Methylnaphthalene	TOT	ng/L	100%	81.05	4	218	30.6	0.89		
Acenaphthene	TOT	ng/L	100%	116.5	4	338	25.1	1.38	6000b	
Acenaphthylene	TOT	ng/L	100%	3.848	4	6.22	2.22	0.025		
Anthracene	TOT	ng/L	100%	20.36	4	37.7	6.82	0.15		
Benzo(a)anthracene	TOT	ng/L	100%	14.5	3	22.5	3.19	0.092		
Benzo(b)fluoranthene	TOT	ng/L	100%	12.82	3	18.8	2.65	0.077		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
Benzo(e)pyrene	TOT	ng/L	100%	11.9	3	19	2.09	0.078		
Benzo(g,h,i)perylene	TOT	ng/L	100%	13.66	3	21.7	2.99	0.089		
Benzo[a]pyrene	TOT	ng/L	100%	44.2	1	44.2	44.2	0.18	10b	
Benzo[j,k]fluoranthenes	TOT	ng/L	100%	19.97	4	39.6	1.99	0.162		
Chrysene	TOT	ng/L	100%	24.74	4	47.5	5.36	0.194	100b	
Dibenzo(a,h)anthracene	TOT	ng/L	100%	3.846	3	8.06	0.357	0.033		
Dibenzothiophene	TOT	ng/L	100%	20.95	4	28.4	13.8	0.116		
Fluoranthene	TOT	ng/L	100%	83.33	4	153	32.4	0.624		
Fluorene	TOT	ng/L	100%	59.6	4	160	17.1	0.653	12000b	
Indeno[1,2,3-cd]pyrene	TOT	ng/L	100%	17.64	4	31.8	1.87	0.13		
Naphthalene	TOT	ng/L	100%	142.5	4	371	16.2	1.514	1000b	
Perylene	TOT	ng/L	100%	5.484	4	11.9	0.52	0.049		
Phenanthrene	TOT	ng/L	100%	153.8	4	203	100	0.83		
Pyrene	TOT	ng/L	100%	63.48	4	110	24.8	0.449		
PBDE										
Pbde 100	TOT	pg/L	100%	3595	4	4960	2810	20.24		
Pbde 119/120	TOT	pg/L	75%	52.7	4	63.6	43.8	0.3		
Pbde 12/13	TOT	pg/L	100%	6.82	4	16.2	3.19	0.07		
Pbde 138/166	TOT	pg/L	100%	157	4	237	87	0.97		
Pbde 140	TOT	pg/L	100%	53.5	4	73.7	39.6	0.3		
Pbde 15	TOT	pg/L	100%	27.08	4	52.9	13	0.22		
Pbde 153	TOT	pg/L	100%	1630	4	1980	1190	8.08		
Pbde 154	TOT	pg/L	100%	1227	4	1610	858	6.57		
Pbde 155	TOT	pg/L	100%	108.1	4	132	87.6	0.54		
Pbde 17/25	TOT	pg/L	100%	143	4	174	115	0.71		
Pbde 183	TOT	pg/L	100%	362	4	490	240	2		
Pbde 190	TOT	pg/L	75%	32.55	4	42.6	21.7	0.17		
Pbde 203	TOT	pg/L	100%	264.8	4	311	143	1.3		
Pbde 206	TOT	pg/L	100%	2,688	4	5,520	1,180	22.53		
Pbde 207	TOT	pg/L	100%	3,403	4	6760	1760	27.59		
Pbde 208	TOT	pg/L	100%	1,953	4	4,230	1,010	17.27		
Pbde 209	TOT	pg/L	100%	56,080	4	80,300	31,900	327.8		
Pbde 28/33	TOT	pg/L	100%	344	4	461	261	1.88		
Pbde 35	TOT	pg/L	100%	5.16	4	6.25	3.84	0.03		
Pbde 37	TOT	pg/L	100%	8.94	4	14.6	4.3	0.06		
Pbde 47	TOT	pg/L	100%	17,980	4	27,200	13,400	111		
Pbde 49	TOT	pg/L	100%	530.8	4	777	360	3.17		
Pbde 51	TOT	pg/L	100%	57.03	4	77.7	44.4	0.32		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
Pbde 66	TOT	pg/L	100%	304.5	4	515	170	2.1		
Pbde 7	TOT	pg/L	75%	7.46	4	19.1	2.87	0.08		
Pbde 71	TOT	pg/L	100%	49.33	4	65.1	37.3	0.27		
Pbde 75	TOT	pg/L	100%	24.23	4	40.8	16.1	0.17		
Pbde 79	TOT	pg/L	100%	69.6	4	118	44	0.48		
Pbde 8/11	TOT	pg/L	100%	6.49	4	12.6	2.93	0.05		
Pbde 85	TOT	pg/L	100%	740.3	4	1040	526	4.24		
Pbde 99	TOT	pg/L	100%	17,380	4	24,200	13,600	98.78		
Pcb 1	TOT	pg/L	100%	29.18	4	64.1	11.1	0.262		
Pcb 10	TOT	pg/L	75%	3.079	4	10.1	0.68	0.041		
Pcb 103	TOT	pg/L	100%	2.94	4	5.38	1.41	0.02		
Pcb 104	TOT	pg/L	100%	1.25	4	1.35	1.2	0.006		
Pcb 105	TOT	pg/L	100%	60.58	4	77.7	40.9	0.317	90b	
Pcb 107/124	TOT	pg/L	100%	7.73	4	9.94	5.38	0.041		
Pcb 109	TOT	pg/L	100%	9.99	4	13.1	7.9	0.053		
Pcb 11	TOT	pg/L	100%	334.5	4	393	248	1.604		
Pcb 110/115	TOT	pg/L	100%	238	4	264	200	1.078		
Pcb 114	TOT	pg/L	100%	4.89	4	7.06	2.98	0.029		
Pcb 118	TOT	pg/L	100%	177.8	4	218	148	0.89		
Pcb 12/13	TOT	pg/L	100%	11.48	4	14.8	7.81	0.06		
Pcb 121	TOT	pg/L	75%	1.932	4	2.58	0.686	0.011		
Pcb 122	TOT	pg/L	100%	1.89	4	2.58	1.32	0.011		
Pcb 123	TOT	pg/L	100%	7.433	4	9.99	6.02	0.041		
Pcb 128/166	TOT	pg/L	100%	35.35	4	49.4	22.4	0.202		
Pcb 129/138/160/163	TOT	pg/L	100%	243.5	4	303	172	1.237		
Pcb 130	TOT	pg/L	100%	15.08	4	21.2	10.6	0.087		
Pcb 131	TOT	pg/L	100%	3.53	4	4.1	3	0.017		
Pcb 132	TOT	pg/L	100%	83.83	4	106	64.3	0.433		
Pcb 133	TOT	pg/L	100%	3.81	4	4.63	2.96	0.019		
Pcb 134/143	TOT	pg/L	100%	13.67	4	17.1	9.49	0.07		
Pcb 135/151/154	TOT	pg/L	100%	75.08	4	88.2	62	0.36		
Pcb 136	TOT	pg/L	100%	31.8	4	33.7	28.7	0.138		
Pcb 137	TOT	pg/L	100%	13.38	4	17.8	9.82	0.073		
Pcb 139/140	TOT	pg/L	100%	6.408	4	7.43	5.39	0.03		
Pcb 141	TOT	pg/L	100%	39.25	4	47	30.7	0.192		
Pcb 144	TOT	pg/L	100%	12.65	4	14.9	11.6	0.061		
Pcb 146	TOT	pg/L	100%	26.55	4	35.4	19.3	0.144		
Pcb 147/149	TOT	pg/L	100%	179.3	4	210	145	0.857		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
Pcb 148	TOT	pg/L	100%	1.633	4	2.06	1.44	0.008		
Pcb 15	TOT	pg/L	100%	35.28	4	59.1	15.5	0.241		
Pcb 150	TOT	pg/L	100%	1.464	4	1.84	0.914	0.008		
Pcb 153/168	TOT	pg/L	100%	213.3	4	247	160	1.008		
Pcb 155	TOT	pg/L	100%	17.9	4	22.7	13.8	0.093		
Pcb 156157	TOT	pg/L	100%	34.55	4	40.1	27.4	0.164		
Pcb 158	TOT	pg/L	100%	22.25	4	27.1	16	0.111		
Pcb 159	TOT	pg/L	75%	2.412	4	5.1	0.686	0.021		
Pcb 16	TOT	pg/L	100%	39.45	4	65.4	15.8	0.267		
Pcb 164	TOT	pg/L	100%	14.42	4	20	9.36	0.082		
Pcb 167	TOT	pg/L	100%	10.34	4	14.4	7.08	0.059		
Pcb 17	TOT	pg/L	100%	44.78	4	97	14.8	0.396		
Pcb 170	TOT	pg/L	100%	71.15	4	155	40.9	0.633		
Pcb 171/173	TOT	pg/L	100%	15.95	4	28.6	10.7	0.117		
Pcb 172	TOT	pg/L	100%	10.54	4	21.2	6.04	0.087		
Pcb 174	TOT	pg/L	100%	55.28	4	112	31	0.457		
Pcb 175	TOT	pg/L	100%	3.533	4	7.53	1.15	0.031		
Pcb 176	TOT	pg/L	75%	4.944	4	8.55	0.656	0.035		
Pcb 177	TOT	pg/L	100%	29.95	4	58.2	17.8	0.238		
Pcb 178	TOT	pg/L	100%	13.27	4	21.3	8.88	0.087		
Pcb 179	TOT	pg/L	100%	25.1	4	34	14.7	0.139		
Pcb 18/30	TOT	pg/L	100%	82	4	159	31.7	0.649		
Pcb 180/193	TOT	pg/L	100%	193.3	4	413	105	1.686		
Pcb 181	TOT	pg/L	75%	1.335	4	2.55	0.658	0.01		
Pcb 183/185	TOT	pg/L	100%	45.65	4	67.5	26.1	0.276		
Pcb 184	TOT	pg/L	100%	38.83	4	62.8	27.5	0.256		
Pcb 187	TOT	pg/L	100%	71.18	4	114	45.8	0.465		
Pcb 189	TOT	pg/L	75%	4.54	4	9.15	1.31	0.04		
Pcb 19	TOT	pg/L	100%	22.63	4	67.7	5.1	0.276		
Pcb 190	TOT	pg/L	75%	12.99	4	34.8	0.66	0.142		
Pcb 191	TOT	pg/L	75%	2.467	4	5.65	0.656	0.023		
Pcb 194	TOT	pg/L	100%	74.73	4	236	14.6	0.963		
Pcb 195	TOT	pg/L	100%	23.44	4	77.7	4.66	0.317		
Pcb 196	TOT	pg/L	100%	30.38	4	90.4	7.53	0.369		
Pcb 197/200	TOT	pg/L	100%	6.553	4	14.4	3.31	0.059		
Pcb 198/199	TOT	pg/L	100%	73.35	4	199	22.2	0.812		
Pcb 2	TOT	pg/L	100%	5.298	4	6.76	3.63	0.028		
Pcb 20/28	TOT	pg/L	100%	107.6	4	145	59.4	0.592		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
Pcb 201	TOT	pg/L	100%	5.418	4	11.9	2.49	0.049		
Pcb 202	TOT	pg/L	100%	11.85	4	22.6	5.93	0.092		
Pcb 203	TOT	pg/L	100%	46.33	4	132	14.1	0.539		
Pcb 204	TOT	pg/L	100%	1.633	4	2.39	1.19	0.01		
Pcb 205	TOT	pg/L	75%	4.524	4	14.4	0.69	0.059		
Pcb 206	TOT	pg/L	100%	41.55	4	90.2	10.8	0.37		
Pcb 207	TOT	pg/L	75%	6.54	4	11.2	1.71	0.05		
Pcb 208	TOT	pg/L	100%	10.28	4	15.8	3.82	0.06		
Pcb 209	TOT	pg/L	100%	23.19	4	37.1	9.24	0.151		
Pcb 21/33	TOT	pg/L	100%	62.6	4	79.8	35.2	0.326		
Pcb 22	TOT	pg/L	100%	44.55	4	58.9	23.5	0.24		
Pcb 24	TOT	pg/L	75%	1.285	4	2.29	0.686	0.009		
Pcb 25	TOT	pg/L	100%	21.54	4	65.2	4.13	0.266		
Pcb 26/29	TOT	pg/L	100%	32.2	4	82	8.98	0.335		
Pcb 27	TOT	pg/L	100%	25.77	4	87.4	2.27	0.357		
Pcb 3	TOT	pg/L	100%	14.25	4	19.3	9.38	0.079		
Pcb 31	TOT	pg/L	100%	98.9	4	144	53.5	0.588		
Pcb 32	TOT	pg/L	100%	30.48	4	66.7	11.5	0.272		
Pcb 35	TOT	pg/L	100%	12.94	4	14.8	9.67	0.06		
Pcb 36	TOT	pg/L	100%	2.638	4	3.42	1.58	0.014		
Pcb 37	TOT	pg/L	100%	28.7	4	36.3	16.1	0.148		
Pcb 39	TOT	pg/L	100%	1.156	4	1.45	0.972	0.006		
Pcb 4	TOT	pg/L	100%	89.05	4	299	10.6	1.22		
Pcb 40/41/71	TOT	pg/L	100%	67.78	4	107	29.2	0.437		
Pcb 42	TOT	pg/L	100%	35.3	4	66.8	12.3	0.273		
Pcb 43	TOT	pg/L	100%	5.43	4	10.1	1.44	0.041		
Pcb 44/47/65	TOT	pg/L	100%	245.5	4	322	166	1.314		
Pcb 45/51	TOT	pg/L	100%	50.4	4	87.9	25.7	0.359		
Pcb 46	TOT	pg/L	100%	12.61	4	32.5	2.6	0.133		
Pcb 48	TOT	pg/L	100%	23.9	4	31.1	11.2	0.127		
Pcb 49/69	TOT	pg/L	100%	110.9	4	253	33.9	1.033		
Pcb 5	TOT	pg/L	100%	1.865	4	2.55	1.17	0.01		
Pcb 50/53	TOT	pg/L	100%	41.35	4	125	7.1	0.51		
Pcb 52	TOT	pg/L	100%	227.5	4	343	120	1.4		
Pcb 56	TOT	pg/L	100%	37.83	4	45.4	23.4	0.19		
Pcb 59/62/75	TOT	pg/L	100%	11.31	4	20	4.25	0.082		
Pcb 6	TOT	pg/L	100%	22.73	4	46.6	11.1	0.19		
Pcb 60	TOT	pg/L	100%	21.18	4	26.5	13.6	0.11		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
Pcb 61/70/74/76	TOT	pg/L	100%	187.8	4	221	115	0.9		
Pcb 63	TOT	pg/L	100%	3.91	4	6.72	2.04	0.03		
Pcb 64	TOT	pg/L	100%	48.85	4	64.5	22.5	0.263		
Pcb 66	TOT	pg/L	100%	77.1	4	102	46.4	0.42		
Pcb 67	TOT	pg/L	100%	3.203	4	5.64	1.54	0.023		
Pcb 68	TOT	pg/L	100%	19.38	4	22.4	18.2	0.09		
Pcb 7	TOT	pg/L	100%	5.425	4	8.52	2.39	0.035		
Pcb 77	TOT	pg/L	100%	7.97	4	9.95	4.98	0.04	40b	
Pcb 79	TOT	pg/L	100%	2.388	4	3	1.75	0.012		
Pcb 8	TOT	pg/L	100%	62.6	4	133	27.5	0.543		
Pcb 82	TOT	pg/L	100%	22.35	4	25.9	19	0.11		
Pcb 83/99	TOT	pg/L	100%	137.5	4	174	114	0.71		
Pcb 84	TOT	pg/L	100%	66.33	4	82.8	49.7	0.34		
Pcb 85/116/117	TOT	pg/L	100%	35.93	4	41.3	31.4	0.17		
Pcb 86/87/97/108/119/125	TOT	pg/L	100%	150.8	4	175	129	0.71		
Pcb 88/91	TOT	pg/L	100%	35.65	4	50	26.9	0.2		
Pcb 89	TOT	pg/L	100%	2.36	4	2.84	1.91	0.01		
Pcb 9	TOT	pg/L	100%	4.29	4	8.38	2.34	0.034		
Pcb 90/101/113	TOT	pg/L	100%	243.8	4	272	206	1.11		
Pcb 92	TOT	pg/L	75%	36.4	4	60.9	0.98	0.25		
Pcb 93/95/98/100/102	TOT	pg/L	100%	221	4	265	180	1.08		
Pcb 94	TOT	pg/L	100%	2.2	4	4.84	0.91	0.02		
Pcb 96	TOT	pg/L	100%	2.031	4	3.53	0.924	0.014		
Pcb Teq 3	TOT	pg/L	100%	0.04	3	0.05	0.04	0.0002		
Pcb Teq 4	TOT	pg/L	100%	0.1	3	0.14	0.08	0.001		
PCBs Total	TOT	pg/L	100%	5,945	4	8,780	4,460	35.84	100b	
Total Decachloro Biphenyl	TOT	pg/L	100%	23.19	4	37.1	9.24	0.15		
Total Dichloro Biphenyls	TOT	pg/L	100%	569	4	830	429	3.39		
Total Heptachloro Biphenyls	TOT	pg/L	100%	547.3	4	1,110	347	4.53		
Total Hexachloro Biphenyls	TOT	pg/L	100%	1,085	4	1,290	840	5.27		
Total Monochloro Biphenyls	TOT	pg/L	100%	48.75	4	90.2	30.9	0.37		
Total Nonachloro Biphenyls	TOT	pg/L	100%	53.28	4	117	14.6	0.48		
Total Octachloro Biphenyls	TOT	pg/L	100%	260.5	4	798	49.9	3.26		
Total Pentachloro Biphenyls	TOT	pg/L	100%	1,455	4	1,680	1,240	6.86		
Total Tetrachloro Biphenyls	TOT	pg/L	100%	1,245	4	1,910	659	7.8		
Total Trichloro Biphenyls	TOT	pg/L	100%	655	4	1,160	298	4.73		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
PESTICIDES										
1,2-dichlorobenzene	TOT	ng/L	100%	2.09	4	3.89	0.95	0.02	42000a	42000
1,3-dichlorobenzene	TOT	ng/L	75%	8.54	4	15.2	0.21	0.06		
1,4-dichlorobenzene	TOT	ng/L	100%	161.8	4	218	81.1	0.89		
2,3,5-trimethylnaphthalene	TOT	ng/L	100%	13.24	4	24.3	8.84	0.099		
2,6-dimethylnaphthalene	TOT	ng/L	100%	24.35	4	51.9	10.9	0.212		
2,4-DDD	TOT	ng/L	100%	27.07	4	77.5	1.58	0.3163		
4,4-DDE	TOT	ng/L	100%	0.6785	4	0.869	0.463	0.0035		
Alpha Chlordane	TOT	ng/L	100%	0.1598	4	0.24	0.097	0.001		
Alpha-Endosulfan	TOT	ng/L	100%	0.263	4	0.283	0.245	0.001		
Beta-Endosulfan	TOT	ng/L	100%	0.555	4	0.779	0.416	0.003		
Beta-Hch Or Beta-Bhc	TOT	ng/L	75%	0.2543	4	0.338	0.118	0.0014		
Dieldrin	TOT	ng/L	100%	0.645	4	0.777	0.548	0.003		
Hch, Gamma	TOT	ng/L	75%	0.2218	4	0.307	0.151	0.0013		
Hexachlorobenzene	TOT	ng/L	100%	0.2058	4	0.288	0.157	0.0012		
Hexachlorobutadiene	TOT	ng/L	100%	0.32	4	0.62	0.14	0.0025		
Oxy-Chlordane	TOT	ng/L	100%	0.1175	4	0.208	0.054	0.0008		
Pentachlorobenzene	TOT	ng/L	100%	0.1	4	0.14	0.06	0.0006		
Trans-Chlordane	TOT	ng/L	100%	0.218	4	0.333	0.129	0.0014		
Trans-Nonachlor	TOT	ng/L	100%	0.149	4	0.201	0.096	0.0008		
PFOS										
PFBA	TOT	ng/L	100%	295	4	816	20.2	3.33		
PFBS	TOT	ng/L	75%	9.148	4	28.7	1.12	0.117		
PFDA	TOT	ng/L	75%	1.954	4	4.35	0.554	0.018		
PFHpA	TOT	ng/L	75%	15.83	4	42.4	1.12	0.173		
PFHxA	TOT	ng/L	100%	60.84	4	177	5.5	0.722		
PFHxS	TOT	ng/L	100%	10.02	4	29.5	1.92	0.12		
PFNA	TOT	ng/L	100%	2.456	4	4.71	0.585	0.019		
PFOA	TOT	ng/L	100%	17.59	4	53.6	2.54	0.219		
PFOS	TOT	ng/L	100%	10.36	4	20.2	2.57	0.082		
PFPeA	TOT	ng/L	100%	130	4	362	9.1	1.478		
PPCPS										
2-Hydroxy-Ibuprofen	TOT	ng/L	100%	29,750	4	36,400	18,500	148.6		
Bisphenol A	TOT	ng/L	100%	7,846	4	30,600	130	124.9	900a	
Furosemide	TOT	ng/L	100%	1,254	4	1,860	822	7.6		
Gemfibrozil	TOT	ng/L	100%	146	4	163	113	0.67		
Glyburide	TOT	ng/L	75%	8.09	4	20.4	2.33	0.08		
Hydrochlorothiazide	TOT	ng/L	100%	1,820	4	2,440	1,160	10		

Table 2.8, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:245 Dilution	BC WQG	CCME WQG
Ibuprofen	TOT	ng/L	100%	18,800	4	29,000	12,700	118.4		
Naproxen	TOT	ng/L	100%	11,230	4	16,100	6,840	65.71		
Triclocarban	TOT	ng/L	100%	8.77	4	13.9	5.76	0.06		
Triclosan	TOT	ng/L	100%	213	4	286	152	1.2		
Warfarin	TOT	ng/L	100%	6.88	4	10.1	5.37	0.04		
NONYLPHENOLS										
NP	TOT	ng/L	100%	716	4	887	540	3.6	700a	700
4-Nonylphenol Diethoxylates	TOT	ng/L	100%	673	4	1,810	67	7.4		
4-Nonylphenol Monoethoxylates	TOT	ng/L	100%	2,281	4	3,980	464	16		

Notes:
*dilution calculated from maximum concentration,
BC WQG = British Columbia water quality guidelines, CCME WQG = Canadian Council of Ministers of the Environment water quality guidelines
a. working guideline
b. approved guideline
c. Salinity = 30 g/kg, Temp = 20 degrees C and pH = 7
*all guidelines are max unless otherwise stated.
** BC ENV (2020) Addendum to Overview Report (2001) and Technical Appendix (1988) June 26, 2020 – rescinds the 1988 BC approved microbiological indicator WQG for fecal coliforms

Table 2.9 Concentration of Frequently Detected Substances (>50% of the time) in Clover (or proxy) Wastewater 2020

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Conventionals										
Enterococci	TOT	CFU/100 mL	100%	1,272,000	32	3,000,000	320,000	17,140	35 (geomean) / 70 (max)	35 (geomean) / 70 (max)
Fecal Coliforms**	TOT	CFU/100 mL	100%	6,585,000	26	15,000,000	2,200,000	85,710		
Alkalinity - Total	TOT	mg/L	100%	185.5	29	240	130	n/a		
Chloride	TOT	mg/L	100%	49.47	32	88	34	0.5		
Chemical Oxygen demand	TOT	mg/L	100%	411	32	681	224	3.9		
Hardness (as CaCO3)	DIS	mg/L	100%	78.83	32	103	52.1	n/a		
Hardness (as CaCO3)	TOT	mg/L	100%	87.27	32	124	56.7	n/a		
pH	TOT	pH	100%	7.42	32	8.09	7.03	n/a	7.0-8.7a	7.0-8.7
Sulfide	TOT	mg/L	100%	0.1654	32	0.42	0.019	0.0024		
Sulfur	TOT	mg/L	100%	8.11	20	10	5.8	0.06		
Sulphate	TOT	mg/L	100%	21.77	13	24	19	0.14		
Total Organic Carbon	TOT	mg/L	100%	34.5	32	60	19	0.343		
SAD Cyanide	TOT	mg/L	86%	0.0022	22	0.0055	0.00089	0.000031		
WAD Cyanide	TOT	mg/L	63%	0.001291	32	0.0025	0.0005	0.000014	0.001b	
Oil & Grease, total	TOT	mg/L	100%	11.61	32	23	4.2	0.13		
Specific Conductivity - 25°C.	TOT	µS/cm	100%	596.6	32	710	430	n/a		
NUTRIENTS										
N - Kjeldahl Nitrogen	TOT	mg/L	100%	32.44	31	55.4	3.94	0.317		
Nitrogen as N	TOT	mg/L	100%	32.4	32	55.4	3.94	0.317		
N - Nh3 (As N)	TOT	mg/L	100%	30.38	32	49	18	0.28	70b	
P - PO4 - Ortho (As P)	TOT	mg/L	100%	2.944	32	4.8	2	0.0274		
P - PO4 - Total (As P)	TOT	µg/L	100%	4595	32	6720	3130	38.4		
ORGANICS										
Trichloromethane	TOT	µg/L	100%	2.31	25	3.8	1.5	0.02		
BTEX										
Toluene	TOT	µg/L	66%	0.683	32	1.9	0.4	0.011		
METALS-TOTAL										
Aluminum	TOT	µg/L	100%	202.9	32	428	99	2.45		
Antimony	TOT	µg/L	100%	0.2407	32	0.349	0.121	0.002		
Arsenic	TOT	µg/L	100%	0.7512	32	1.29	0.435	0.0074	12.5b	12.5
Barium	TOT	µg/L	100%	19.38	32	38.9	11.1	0.2223		
Cadmium	TOT	µg/L	100%	0.09292	32	0.197	0.0652	0.00113	0.12a	0.12
Calcium	TOT	mg/L	100%	22.21	32	34.1	14.6	0.195		
Chromium	TOT	µg/L	100%	0.764	32	1.46	0.49	0.008		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Cobalt	TOT	µg/L	100%	0.3584	32	0.604	0.275	0.0035		
Copper	TOT	µg/L	100%	104.7	32	151	66	0.863	2 (mean) / 3 (max)b	
Iron	TOT	µg/L	100%	453.5	32	867	291	4.95		
Lead	TOT	µg/L	100%	3.53	32	7.04	1.96	0.0402	2 (mean) / 140 (max)b	
Magnesium	TOT	mg/L	100%	7.722	32	9.84	4.87	0.056		
Manganese	TOT	µg/L	100%	46.93	32	68.4	40.9	0.391	100a	
Mercury	TOT	µg/L	66%	0.01832	32	0.092	0.002	0.00053		0.16
Molybdenum	TOT	µg/L	100%	1.506	32	6.44	0.666	0.0368		
Nickel	TOT	µg/L	100%	2.284	32	3.81	1.92	0.022	8.3a	
Potassium	TOT	mg/L	100%	11.12	32	14	7.97	0.08		
Selenium	TOT	µg/L	100%	0.2834	32	0.382	0.192	0.0022	2b	
Silver	TOT	µg/L	100%	0.0979	32	0.701	0.028	0.004	1.5 (mean) / 3 (max)b	
Sodium	TOT	mg/L	100%	32.48	20	39.1	24.9	0.223		
Thallium	TOT	µg/L	97%	0.0049	32	0.0128	0.002	0.00007		
Tin	TOT	µg/L	100%	0.63	32	1.08	0.36	0.006		
Zinc	TOT	µg/L	100%	81.63	32	139	52.1	0.79	10 (mean) / 55 (max)b	
METALS-DISSOLVED										
Aluminum	DIS	µg/L	100%	25.92	32	108	7	0.617		
Antimony	DIS	µg/L	100%	0.2153	32	0.318	0.12	0.0018		
Arsenic	DIS	µg/L	100%	0.5712	32	0.91	0.317	0.0052		
Barium	DIS	µg/L	100%	8.94	32	11.9	6.07	0.068		
Cadmium	DIS	µg/L	94%	0.01962	32	0.0688	0.005	0.00039		
Calcium	DIS	mg/L	100%	19.62	32	25.1	13.3	0.1434		
Chromium	DIS	µg/L	100%	0.382	32	0.59	0.27	0.003		
Cobalt	DIS	µg/L	100%	0.2172	32	0.299	0.163	0.00171		
Copper	DIS	µg/L	100%	50.13	32	109	19.7	0.6229		
Iron	DIS	µg/L	100%	204	32	324	95.9	1.85		
Lead	DIS	µg/L	100%	0.7488	32	2.22	0.229	0.01269		
Magnesium	DIS	mg/L	100%	7.245	32	9.75	4.61	0.0557		
Manganese	DIS	µg/L	100%	32.34	32	41.6	16.1	0.2377		
Molybdenum	DIS	µg/L	100%	1.418	32	4.35	0.552	0.0249		
Nickel	DIS	µg/L	100%	1.658	32	2.27	1.36	0.013		
Phosphorus	DIS	µg/L	100%	3326	32	5240	2290	29.94		
Potassium	DIS	mg/L	100%	10.82	32	15.4	7.67	0.088		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Selenium	DIS	µg/L	100%	0.225	32	0.332	0.149	0.0019		
Silver	DIS	µg/L	100%	0.03895	32	0.0862	0.0115	0.00049		
Sodium	DIS	mg/L	100%	32.61	20	39.6	24.9	0.2263		
Tin	DIS	µg/L	94%	0.447	32	0.76	0.2	0.004		
Zinc	DIS	µg/L	100%	27.13	32	65.7	6.78	0.375		
METALS-SPECIATED										
Methyl Mercury	TOT	ng/L	100%	0.6757	12	1.04	0.486	0.0059		
ORGANICS										
Chloroform	TOT	µg/L	100%	4.89	7	7.2	3.8	0.04		
PAHS										
2-Methylnaphthalene	TOT	µg/L	91%	0.0344	32	0.12	0.01	0.0007		
Acenaphthene	TOT	µg/L	94%	0.0501	32	0.11	0.01	0.0006	6 b	
Anthracene	TOT	µg/L	75%	0.0323	32	0.2	0.01	0.0011		
Benzo(a)anthracene	TOT	µg/L	66%	0.0537	32	0.75	0.01	0.0043		
Benzo(a)pyrene	TOT	µg/L	78%	0.04494	32	0.58	0.005	0.00331	0.01 b	
Benzo(b)fluoranthene	TOT	µg/L	59%	0.0359	32	0.43	0.01	0.0025		
Benzo(b,j)fluoranthene	TOT	µg/L	63%	0.0545	32	0.68	0.01	0.0039		
Benzo(k)fluoranthene	TOT	µg/L	56%	0.0238	32	0.27	0.01	0.0015		
Chrysene	TOT	µg/L	72%	0.0603	32	0.68	0.01	0.0039	0.1 b	
Fluoranthene	TOT	µg/L	97%	0.1235	32	1.5	0.01	0.0086		
Fluorene	TOT	µg/L	100%	0.0631	32	0.25	0.013	0.0014	12b	
Naphthalene	TOT	µg/L	97%	0.0674	32	0.15	0.026	0.0009	1b	
Phenanthrene	TOT	µg/L	100%	0.1181	32	0.43	0.027	0.0025		
Pyrene	TOT	µg/L	91%	0.1082	32	1.2	0.01	0.0069		
Total Hmw-PAHs	TOT	µg/L	91%	0.4968	32	6.4	0.02	0.0366		
Total Lmw-PAHs	TOT	µg/L	100%	0.5216	32	3.7	0.16	0.0211		
Total Pahs	TOT	µg/L	100%	1.02	32	7.3	0.18	0.0417		
PHENOLICS										
Phenol	TOT	µg/L	94%	5	32	13.5	2.5	0.077		
Total Phenols	TOT	mg/L	100%	0.03841	32	0.071	0.019	0.00041		
PHTHALATES										
Diethyl Phthalate	TOT	µg/L	91%	1.056	32	2.33	0.25	0.0133		
HIGH RESOLUTION										
PAHS										
1-Methylphenanthrene	TOT	ng/L	100%	12.09	12	29.1	4.46	0.166		
2-Methylnaphthalene	TOT	ng/L	100%	39.2	12	62.6	11.4	0.358		
Acenaphthene	TOT	ng/L	100%	97.88	12	190	38	1.086	6000 b	
Acenaphthylene	TOT	ng/L	100%	4.86	12	10.7	2.1	0.061		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Anthracene	TOT	ng/L	100%	33.8	12	112	8.8	0.64		
Benzo(a)anthracene	TOT	ng/L	100%	63.21	9	224	11.5	1.28		
Benzo(a)pyrene	TOT	ng/L	100%	63.13	9	246	8.9	1.406	10 b	
Benzo(b)fluoranthene	TOT	ng/L	100%	47.51	9	173	9.7	0.989		
Benzo(e)pyrene	TOT	ng/L	100%	41.65	9	158	7.3	0.903		
Benzo[g,h,i]perylene	TOT	ng/L	100%	30.93	3	36.1	26.5	0.21		
Benzo[j,k]fluoranthenes	TOT	ng/L	100%	50.2	12	221	8.2	1.263		
Chrysene	TOT	ng/L	100%	49.83	12	185	13	1.057	100b	
Dibenzo(a,h)anthracene	TOT	ng/L	100%	9.334	9	37.4	1.24	0.214		
Dibenzothiophene	TOT	ng/L	100%	26.76	12	47.1	11.9	0.269		
Fluoranthene	TOT	ng/L	100%	145	12	460	45.9	2.629		
Fluorene	TOT	ng/L	100%	50.23	12	89.9	20.6	0.514	12000b	
Indeno[1,2,3-cd]pyrene	TOT	ng/L	100%	42.08	12	175	4.9	1		
Naphthalene	TOT	ng/L	100%	151	12	308	59	1.76	1000b	
Perylene	TOT	ng/L	100%	14.72	12	62	2.3	0.354		
Phenanthrene	TOT	ng/L	100%	211.2	12	435	76.9	2.49		
Pyrene	TOT	ng/L	100%	112.5	12	378	33.4	2.16		
PBDE										
Pbde 100	TOT	pg/L	100%	3109	12	5160	1730	29.49		
Pbde 119/120	TOT	pg/L	75%	49	12	104	21.1	0.6		
Pbde 12/13	TOT	pg/L	75%	2.41	12	3.39	1.38	0.02		
Pbde 126	TOT	pg/L	75%	22.22	12	76.2	5.3	0.44		
Pbde 138/166	TOT	pg/L	100%	147	12	290	50.6	1.66		
Pbde 140	TOT	pg/L	100%	49.31	12	87.2	27.5	0.5		
Pbde 15	TOT	pg/L	100%	13.02	12	17.7	7.48	0.1		
Pbde 153	TOT	pg/L	100%	1572	12	3070	677	17.54		
Pbde 154	TOT	pg/L	100%	1161	12	2360	512	13.49		
Pbde 155	TOT	pg/L	100%	98.14	12	173	61.7	0.99		
Pbde 17/25	TOT	pg/L	100%	92.18	12	126	59.7	0.72		
Pbde 183	TOT	pg/L	100%	154.3	12	271	63.4	1.55		
Pbde 190	TOT	pg/L	58%	13.12	12	30	7.34	0.17		
Pbde 203	TOT	pg/L	100%	102.8	12	182	50.1	1		
Pbde 206	TOT	pg/L	100%	1084	12	1510	463	8.63		
Pbde 207	TOT	pg/L	100%	1280	12	1890	595	10.8		
Pbde 208	TOT	pg/L	100%	773.8	12	1170	309	6.69		
Pbde 209	TOT	pg/L	100%	18,570	12	39,600	5,530	226.3		
Pbde 28/33	TOT	pg/L	100%	248.1	12	299	161	1.71		
Pbde 35	TOT	pg/L	100%	4.32	12	6.44	1.43	0.04		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Pbde 37	TOT	pg/L	100%	8.06	12	14.3	5.45	0.08		
Pbde 47	TOT	pg/L	100%	15,720	12	27,500	8,410	157.1		
Pbde 49	TOT	pg/L	100%	345.8	12	558	202	3.19		
Pbde 51	TOT	pg/L	100%	41.94	12	72.5	22.4	0.41		
Pbde 66	TOT	pg/L	100%	272.2	12	515	98.2	2.94		
Pbde 7	TOT	pg/L	100%	2.59	12	3.4	2.07	0.02		
Pbde 71	TOT	pg/L	100%	36.61	12	66.7	17.5	0.38		
Pbde 75	TOT	pg/L	100%	20.36	12	40.2	9.27	0.23		
Pbde 79	TOT	pg/L	100%	65.51	12	168	34.9	0.96		
Pbde 8/11	TOT	pg/L	100%	3	12	3.99	1.69	0.02		
Pbde 85	TOT	pg/L	100%	627.2	12	1060	314	6.06		
Pbde 99	TOT	pg/L	100%	15,160	12	25,000	8,150	142.9		
PCBs										
Pcb 1	TOT	pg/L	100%	14.09	12	26.8	6.05	0.153		
Pcb 103	TOT	pg/L	83%	1.73	12	2.89	0.69	0.02		
Pcb 105	TOT	pg/L	100%	49.7	12	86.2	22.5	0.493	90b	
Pcb 107/124	TOT	pg/L	100%	5.74	12	10.1	2.33	0.058		
Pcb 109	TOT	pg/L	100%	7.73	12	11.7	3.34	0.067		
Pcb 11	TOT	pg/L	100%	241.4	12	314	116	1.794		
Pcb 110/115	TOT	pg/L	100%	197.3	12	299	87.3	1.709		
Pcb 114	TOT	pg/L	100%	4.423	12	6.55	2.16	0.037		
Pcb 118	TOT	pg/L	100%	139.7	12	208	63.4	1.189		
Pcb 12/13	TOT	pg/L	100%	9.287	12	11.5	4.76	0.066		
Pcb 121	TOT	pg/L	58%	1.249	12	2.01	0.692	0.011		
Pcb 122	TOT	pg/L	67%	1.426	12	2.24	0.692	0.013		
Pcb 123	TOT	pg/L	100%	5.748	12	8.57	2.77	0.049		
Pcb 128/166	TOT	pg/L	100%	19.42	12	33.3	8.01	0.19		
Pcb 129/138/160/163	TOT	pg/L	100%	164.4	12	246	78.3	1.406		
Pcb 130	TOT	pg/L	100%	9.39	12	14.7	4.31	0.084		
Pcb 131	TOT	pg/L	92%	2.729	12	4.2	1.27	0.024		
Pcb 132	TOT	pg/L	100%	57.44	12	88.2	26.7	0.504		
Pcb 133	TOT	pg/L	100%	2.891	12	4.09	1.71	0.023		
Pcb 134/143	TOT	pg/L	100%	9.8	12	14.8	4.43	0.085		
Pcb 135/151/154	TOT	pg/L	100%	63.61	12	104	33.5	0.594		
Pcb 136	TOT	pg/L	92%	23.28	12	38	0.66	0.217		
Pcb 137	TOT	pg/L	100%	9.273	12	13.1	4.45	0.075		
Pcb 139/140	TOT	pg/L	100%	4.245	12	6.31	1.59	0.036		
Pcb 141	TOT	pg/L	100%	28.57	12	45.4	12.8	0.259		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Pcb 144	TOT	pg/L	100%	10.32	12	16	5.34	0.091		
Pcb 146	TOT	pg/L	100%	19.03	12	33.6	10.9	0.192		
Pcb 147/149	TOT	pg/L	100%	140	12	222	70.7	1.269		
Pcb 15	TOT	pg/L	100%	24.33	12	34.1	10.1	0.195		
Pcb 150	TOT	pg/L	75%	1.027	12	1.48	0.692	0.008		
Pcb 153/168	TOT	pg/L	100%	160.8	12	231	84.9	1.32		
Pcb 155	TOT	pg/L	100%	10.5	12	15.6	3.51	0.089		
Pcb 156157	TOT	pg/L	100%	22.28	12	33.6	12.4	0.192		
Pcb 158	TOT	pg/L	100%	14.18	12	22.4	5.71	0.128		
Pcb 159	TOT	pg/L	67%	1.382	12	2.21	0.692	0.013		
Pcb 16	TOT	pg/L	100%	29.98	12	46.6	11.6	0.266		
Pcb 164	TOT	pg/L	100%	8.66	12	14.2	3.59	0.081		
Pcb 167	TOT	pg/L	100%	6.241	12	10.2	2.77	0.058		
Pcb 17	TOT	pg/L	100%	26.06	12	37.3	10.4	0.213		
Pcb 170	TOT	pg/L	100%	32.8	12	47.4	21.3	0.271		
Pcb 171/173	TOT	pg/L	100%	10.72	12	19.8	4.7	0.113		
Pcb 172	TOT	pg/L	100%	6.047	12	9.67	2.94	0.055		
Pcb 174	TOT	pg/L	100%	34.2	12	61.5	14.4	0.351		
Pcb 175	TOT	pg/L	92%	1.941	12	4.92	0.694	0.028		
Pcb 176	TOT	pg/L	100%	6.113	12	10.5	2.76	0.06		
Pcb 177	TOT	pg/L	100%	18.83	12	35	8.42	0.2		
Pcb 178	TOT	pg/L	100%	11.58	12	20.8	5.86	0.119		
Pcb 179	TOT	pg/L	100%	22.54	12	44.8	11	0.256		
Pcb 18/30	TOT	pg/L	100%	52.69	12	77.3	22.9	0.442		
Pcb 180/193	TOT	pg/L	92%	85.14	12	139	0.6	0.794		
Pcb 183/185	TOT	pg/L	100%	29.13	12	57.9	12.8	0.331		
Pcb 184	TOT	pg/L	100%	22.18	12	39.3	7.07	0.225		
Pcb 187	TOT	pg/L	100%	57.33	12	104	29.3	0.594		
Pcb 189	TOT	pg/L	92%	1.89	12	4.33	0.84	0.02		
Pcb 19	TOT	pg/L	100%	5.634	12	8.24	2.24	0.047		
Pcb 190	TOT	pg/L	100%	6.751	12	10.5	3.73	0.06		
Pcb 191	TOT	pg/L	92%	1.606	12	2.53	0.692	0.014		
Pcb 194	TOT	pg/L	100%	16.02	12	23.5	10.1	0.134		
Pcb 195	TOT	pg/L	100%	4.935	12	8.46	2.92	0.048		
Pcb 196	TOT	pg/L	100%	8.756	12	14.1	5.04	0.081		
Pcb 197/200	TOT	pg/L	100%	3.181	12	5.11	1.78	0.029		
Pcb 198/199	TOT	pg/L	100%	27.38	12	45.6	16.7	0.261		
Pcb 2	TOT	pg/L	100%	4.247	12	7.09	2.58	0.041		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Pcb 20/28	TOT	pg/L	100%	84.18	12	113	40.3	0.646		
Pcb 201	TOT	pg/L	100%	3.509	12	7.1	1.41	0.041		
Pcb 202	TOT	pg/L	100%	9.351	12	17	4.47	0.097		
Pcb 203	TOT	pg/L	100%	15.93	12	25.6	10.1	0.146		
Pcb 204	TOT	pg/L	75%	1.201	12	2.71	0.692	0.015		
Pcb 205	TOT	pg/L	67%	1.004	12	1.52	0.692	0.009		
Pcb 206	TOT	pg/L	100%	15.34	12	30.1	6.55	0.17		
Pcb 207	TOT	pg/L	75%	4.06	12	10.9	0.91	0.06		
Pcb 208	TOT	pg/L	100%	6.27	12	14	2.57	0.08		
Pcb 209	TOT	pg/L	100%	14.23	12	26.2	6.63	0.15		
Pcb 21/33	TOT	pg/L	100%	52.48	12	69.6	24.4	0.398		
Pcb 22	TOT	pg/L	100%	35.27	12	48.3	16.3	0.276		
Pcb 24	TOT	pg/L	58%	0.97	12	1.36	0.692	0.008		
Pcb 25	TOT	pg/L	100%	5.572	12	8.08	2.48	0.046		
Pcb 26/29	TOT	pg/L	100%	13.18	12	18.3	5.82	0.105		
Pcb 27	TOT	pg/L	100%	3.758	12	5.83	1.54	0.033		
Pcb 3	TOT	pg/L	100%	11.01	12	16.7	6.4	0.095		
Pcb 31	TOT	pg/L	100%	77.11	12	101	36.3	0.577		
Pcb 32	TOT	pg/L	100%	15.68	12	24.4	7.46	0.139		
Pcb 35	TOT	pg/L	100%	9.392	12	14.8	3.97	0.085		
Pcb 36	TOT	pg/L	100%	2.06	12	3.04	0.934	0.017		
Pcb 37	TOT	pg/L	100%	24.41	12	36.1	11.3	0.206		
Pcb 39	TOT	pg/L	67%	1.024	12	1.56	0.692	0.009		
Pcb 4	TOT	pg/L	100%	12.44	12	17.7	6.08	0.1		
Pcb 40/41/71	TOT	pg/L	100%	46.97	12	70	22.4	0.4		
Pcb 42	TOT	pg/L	100%	21.53	12	34	10.1	0.194		
Pcb 43	TOT	pg/L	100%	3.479	12	5.56	1.59	0.032		
Pcb 44/47/65	TOT	pg/L	100%	165.3	12	224	76.8	1.28		
Pcb 45/51	TOT	pg/L	100%	25.46	12	36.1	11.9	0.206		
Pcb 46	TOT	pg/L	100%	5.028	12	7.49	2.29	0.043		
Pcb 48	TOT	pg/L	100%	18.89	12	28.1	9.4	0.161		
Pcb 49/69	TOT	pg/L	100%	55.51	12	84	27.2	0.48		
Pcb 5	TOT	pg/L	67%	1.493	12	1.9	0.692	0.011		
Pcb 50/53	TOT	pg/L	100%	10.56	12	17.8	4.97	0.102		
Pcb 52	TOT	pg/L	100%	187.3	12	277	76.6	1.583		
Pcb 55	TOT	pg/L	83%	1.31	12	2.42	0.75	0.01		
Pcb 56	TOT	pg/L	100%	34.91	12	45.8	17.7	0.26		
Pcb 59/62/75	TOT	pg/L	100%	6.742	12	11	2.92	0.063		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Pcb 6	TOT	pg/L	100%	12.22	12	15.7	5.75	0.09		
Pcb 60	TOT	pg/L	100%	20.99	12	27.3	11	0.16		
Pcb 61/70/74/76	TOT	pg/L	100%	178.1	12	235	93.6	1.34		
Pcb 63	TOT	pg/L	100%	3.06	12	4.29	1.67	0.02		
Pcb 64	TOT	pg/L	100%	40.7	12	61.4	19.2	0.351		
Pcb 66	TOT	pg/L	100%	66.89	12	88.4	36.3	0.51		
Pcb 67	TOT	pg/L	100%	1.959	12	2.67	0.894	0.015		
Pcb 68	TOT	pg/L	100%	11.99	12	16.4	5.45	0.09		
Pcb 7	TOT	pg/L	100%	3.661	12	6.38	2.19	0.036		
Pcb 77	TOT	pg/L	100%	6.85	12	10.1	2.86	0.06	40b	
Pcb 79	TOT	pg/L	100%	2.151	12	5.93	0.898	0.034		
Pcb 8	TOT	pg/L	100%	38.78	12	59	17	0.337		
Pcb 82	TOT	pg/L	100%	20.02	12	31.8	8.41	0.18		
Pcb 83/99	TOT	pg/L	100%	106.2	12	157	53.8	0.9		
Pcb 84	TOT	pg/L	100%	53.71	12	77.3	24.9	0.44		
Pcb 85/116/117	TOT	pg/L	100%	30.58	12	46.4	13.2	0.27		
Pcb 86/87/97/108/119/125	TOT	pg/L	100%	129.3	12	197	58.5	1.13		
Pcb 88/91	TOT	pg/L	100%	26.28	12	38.5	12	0.22		
Pcb 89	TOT	pg/L	92%	2.09	12	3.42	0.99	0.02		
Pcb 9	TOT	pg/L	100%	2.804	12	4.44	1.24	0.025		
Pcb 90/101/113	TOT	pg/L	100%	208.1	12	299	96.6	1.71		
Pcb 92	TOT	pg/L	75%	25.44	12	55	0.64	0.31		
Pcb 93/95/98/100/102	TOT	pg/L	100%	183.2	12	277	84.9	1.58		
Pcb 96	TOT	pg/L	75%	1.379	12	2.45	0.692	0.014		
Pcb Teq 3	TOT	pg/L	100%	0.04	9	0.11	0.02	0		
Pcb Teq 4	TOT	pg/L	100%	0.09	9	0.14	0.05	0		
PCBs Total	TOT	pg/L	100%	4,143	12	5,720	2,010	32.69	100b	
Total Decachloro Biphenyl	TOT	pg/L	100%	14.23	12	26.2	6.63	0.15		
Total Dichloro Biphenyls	TOT	pg/L	100%	345	12	460	163	2.63		
Total Heptachloro Biphenyls	TOT	pg/L	100%	335.6	12	582	168	3.33		
Total Hexachloro Biphenyls	TOT	pg/L	100%	772.1	12	1110	381	6.34		
Total Monochloro Biphenyls	TOT	pg/L	100%	27.75	12	39.9	8.74	0.23		
Total Nonachloro Biphenyls	TOT	pg/L	100%	21.05	12	48.1	3.87	0.27		
Total Octachloro Biphenyls	TOT	pg/L	100%	82.12	12	138	48.2	0.79		
Total Pentachloro Biphenyls	TOT	pg/L	100%	1195	12	1800	557	10.29		
Total Tetrachloro Biphenyls	TOT	pg/L	100%	912.7	12	1200	438	6.86		
Total Trichloro Biphenyls	TOT	pg/L	100%	437.2	12	583	197	3.33		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
PESTICIDES										
1,2-dichlorobenzene	TOT	ng/L	100%	1.06	8	1.37	0.77	0.01	4200a	
1,3-dichlorobenzene	TOT	ng/L	88%	2.5	8	4.98	0.22	0.03		
1,4-dichlorobenzene	TOT	ng/L	100%	35.44	8	56.2	22.5	0.32		
2,3,5-trimethylnaphthalene	TOT	ng/L	100%	13.15	12	20.5	3.83	0.117		
2,6-dimethylnaphthalene	TOT	ng/L	100%	24.27	12	68.6	3.76	0.392		
2,4-DDD	TOT	ng/L	100%	1.811	12	5.84	0.314	0.0334		
4,4-DDD	TOT	ng/L	67%	0.1383	12	0.307	0.076	0.0018		
4,4-DDE	TOT	ng/L	100%	0.6993	12	0.887	0.484	0.0051		
4,4-DDT	TOT	ng/L	75%	0.3058	12	0.629	0.109	0.0036		
Alpha Chlordane	TOT	ng/L	100%	0.1742	12	0.227	0.125	0.0013		
Alpha-Endosulfan	TOT	ng/L	91%	0.259	11	0.375	0.11	0.002		
Beta-Endosulfan	TOT	ng/L	100%	0.53	11	0.752	0.339	0.004		
Beta-Hch Or Beta-Bhc	TOT	ng/L	75%	0.1924	12	0.309	0.108	0.0018		
Cis-Nonachlor	TOT	ng/L	83%	0.0798	12	0.181	0.0419	0.001		
Dieldrin	TOT	ng/L	100%	0.848	11	1.56	0.538	0.009		
Hch, Gamma	TOT	ng/L	75%	0.1838	12	0.397	0.077	0.0023		
Hexachlorobenzene	TOT	ng/L	100%	0.1568	12	0.234	0.096	0.0013		
Hexachlorobutadiene	TOT	ng/L	90%	0.28	10	0.5	0.03	0.0028		
Methoxyclor	TOT	ng/L	73%	0.486	11	1.16	0.21	0.007		
Oxy-Chlordane	TOT	ng/L	75%	0.0735	12	0.156	0.0403	0.0009		
Pentachlorobenzene	TOT	ng/L	100%	0.09	10	0.13	0.07	0.0007		
Trans-Chlordane	TOT	ng/L	100%	0.2136	12	0.294	0.135	0.0017		
Trans-Nonachlor	TOT	ng/L	100%	0.176	12	0.271	0.105	0.0015		
PFOS										
PFBA	TOT	ng/L	100%	37.36	12	71.1	9.96	0.41		
PFBS	TOT	ng/L	75%	4.253	12	6.49	0.719	0.037		
PFHpA	TOT	ng/L	100%	3.909	12	8.5	1.77	0.049		
PFHxA	TOT	ng/L	100%	11.25	12	22.7	6.23	0.13		
PFHxS	TOT	ng/L	92%	2.853	12	4.03	1.23	0.023		
PFNA	TOT	ng/L	75%	1.18	12	2.07	0.529	0.012		
PFOA	TOT	ng/L	100%	4.936	12	8.23	2.61	0.047		
PFOS	TOT	ng/L	92%	5.298	12	7.98	1.36	0.046		
PFPeA	TOT	ng/L	100%	16.76	12	32.9	7.06	0.188		
PPCPS										
2-Hydroxy-Ibuprofen	TOT	ng/L	100%	24,230	12	28,300	20,700	161.7		
Bisphenol A	TOT	ng/L	100%	105.9	12	182	48.7	1.04	900a	
Furosemide	TOT	ng/L	100%	1212	12	1430	959	8.2		

Table 2.9, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Max Concentration 1:175 Dilution	BC WQG	CCME WQG
Gemfibrozil	TOT	ng/L	100%	44.59	12	65.8	25.7	0.38		
Glyburide	TOT	ng/L	67%	2.85	12	3.98	0.82	0.02		
Hydrochlorothiazide	TOT	ng/L	100%	1,435	12	1,680	1160	9.6		
Ibuprofen	TOT	ng/L	100%	14,950	12	18,300	10,400	104.6		
Naproxen	TOT	ng/L	100%	7,746	12	9,690	5,910	55.37		
Triclocarban	TOT	ng/L	100%	7.63	12	11.9	2.88	0.07		
Triclosan	TOT	ng/L	100%	126.9	12	165	91.6	0.9		
Warfarin	TOT	ng/L	100%	6.27	12	7.32	4.99	0.04		
NONYLPHENOLS										
NP	TOT	ng/L	100%	342	12	663	172	3.8	700a	
4-Nonylphenol Diethoxylates	TOT	ng/L	83%	280	12	984	32.2	5.6		
4-Nonylphenol Monoethoxylates	TOT	ng/L	100%	1,384	12	4,100	379	23.4		

Notes:
*dilution calculated from maximum concentration,
BC WQG = British Columbia water quality guidelines, CCME WQG = Canadian Council of Ministers of the Environment water quality guidelines
a. working guideline
b. approved guideline
c. Salinity = 30 g/kg, Temp = 20 degrees C and pH = 7
*all guidelines are max unless otherwise stated.
** BC ENV (2020) Addendum to Overview Report (2001) and Technical Appendix (1988) June 26, 2020 – rescinds the 1988 BC approved microbiological indicator WQG for fecal coliforms

Table 2.10 Concentration of Frequently Detected Substances (>50% of the time) in McLoughlin Wastewater 2020

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
CONVENTIONALS										
Enterococci	TOT	CFU/100 mL	100%	5,773	3	14,000	520	123.9	35 (geomean) / 70 (max)b	35 (geomean) / 70 (max)b
Fecal Coliforms**	TOT	CFU/100 mL	100%	88,000	3	23,0000	15,000	2035		
Alkalinity - Total	TOT	mg/L	100%	126.7	3	160	100	n/a		
Chloride	TOT	mg/L	100%	58.67	3	70	50	0.62		
Chemical Oxygen demand	TOT	mg/L	100%	59.3	3	73	52	0.6		
Hardness (as CaCO3)	DIS	mg/L	100%	89.2	3	110	77.2	n/a		
Hardness (as CaCO3)	TOT	mg/L	100%	90.13	3	113	77.3	n/a		
pH	TOT	pH	100%	6.93	3	6.95	6.92	n/a	7.0-8.7a	7.0-8.7
Sulfide	TOT	mg/L	100%	0.02667	3	0.035	0.011	0.00031		
Sulfur	TOT	mg/L	100%	9.75	2	10.2	9.3	0.09		
Sulphate	TOT	mg/L	100%	28	2	29	27	0.26		
Total Organic Carbon	TOT	mg/L	100%	13.33	3	14	12	0.124		
SAD Cyanide	TOT	mg/L	100%	0.002245	2	0.00268	0.00181	0.000024		
WAD Cyanide	TOT	mg/L	67%	0.00104	3	0.00157	0.0005	0.000014	0.001b	
Specific Conductivity - 25°C.	TOT	µS/cm	100%	576.7	3	610	510	n/a		
NUTRIENTS										
N - Kjeldahl Nitrogen	TOT	mg/L	100%	15.7	3	16.1	15.4	0.142		
Nitrogen as N	TOT	mg/L	100%	23.37	3	27.8	20.8	0.246		
N - Nh3 (As N)	TOT	mg/L	100%	17.67	3	20	15	0.177	70bc	
N - NO2 (As N)	TOT	mg/L	100%	0.5467	3	0.655	0.474	0.0058		
N - NO3 (As N)	TOT	mg/L	100%	6.817	3	11.1	4.54	0.098		
N - NO3 + NO2 (As N)	TOT	mg/L	100%	7.363	3	11.6	5.17	0.103		
P - PO4 - Ortho (As P)	TOT	mg/L	100%	1.8	3	2.2	1.5	0.0195		
P - PO4 - Total (As P)	TOT	µg/L	100%	2180	3	2570	1720	22.74		
ORGANICS										
1,4-dioxane	TOT	µg/L	100%	0.79	1	0.79	0.79	0.007		
Trichloromethane	TOT	µg/L	100%	1.4	3	1.7	1.2	0.02		
METALS-TOTAL										
Aluminum	TOT	µg/L	100%	31.5	3	41.9	22.2	0.37		
Antimony	TOT	µg/L	100%	0.258	3	0.328	0.185	0.0029		
Arsenic	TOT	µg/L	100%	0.8687	3	1.32	0.441	0.0117	12.5b	12.5
Barium	TOT	µg/L	100%	6.907	3	9.98	3.9	0.0883		
Cadmium	TOT	µg/L	100%	0.01633	3	0.0182	0.0137	0.00016	0.12a	0.12
Calcium	TOT	mg/L	100%	23.9	3	30.1	19.4	0.266		

Table 2.10, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
Chromium	TOT	µg/L	100%	0.95	3	1.31	0.39	0.012		
Chromium III	TOT	mg/L	67%	0.001163	3	0.0013	0.00099	0.000012	0.056a	
Cobalt	TOT	µg/L	100%	0.624	3	0.895	0.304	0.0079		
Copper	TOT	µg/L	100%	23.07	3	26.6	16.7	0.235	2 (mean) / 3 (max)b	
Iron	TOT	µg/L	100%	802.3	3	1110	452	9.82		
Lead	TOT	µg/L	100%	0.3767	3	0.387	0.365	0.0034	2 (mean) / 140 (max)b	
Magnesium	TOT	mg/L	100%	7.36	3	9.09	6	0.08		
Manganese	TOT	µg/L	100%	56.17	3	61.2	53.4	0.542	100a	
Mercury	TOT	µg/L	100%	0.00433	3	0.0047	0.004	0.00004		0.16
Molybdenum	TOT	µg/L	100%	0.925	3	1.14	0.688	0.0101		
Nickel	TOT	µg/L	100%	3.86	3	6.29	1.9	0.056	8.3a	
Potassium	TOT	mg/L	100%	12.73	3	16.9	10.4	0.15		
Selenium	TOT	µg/L	100%	0.1403	3	0.16	0.122	0.0014	2b	
Silver	TOT	µg/L	100%	0.0203	3	0.023	0.017	0.0002	1.5 (mean) / 3 (max)b	
Sodium	TOT	mg/L	100%	36.15	2	39.1	33.2	0.346		
Tin	TOT	µg/L	100%	0.307	3	0.33	0.28	0.003		
Zinc	TOT	µg/L	100%	18.97	3	24.2	14.6	0.21	10 (mean) / 55 (max)b	
METALS-DISSOLVED										
Aluminum	DIS	µg/L	100%	11.44	3	14	9.81	0.124		
Antimony	DIS	µg/L	100%	0.257	3	0.321	0.176	0.0028		
Arsenic	DIS	µg/L	100%	0.8637	3	1.34	0.448	0.0119		
Barium	DIS	µg/L	100%	4.513	3	7.81	2.25	0.0691		
Cadmium	DIS	µg/L	100%	0.01163	3	0.0167	0.0089	0.00015		
Calcium	DIS	mg/L	100%	23.57	3	29.2	20.2	0.2584		
Chromium	DIS	µg/L	100%	0.783	3	1.04	0.31	0.009		
Cobalt	DIS	µg/L	100%	0.567	3	0.788	0.269	0.00697		
Copper	DIS	µg/L	100%	17.3	3	21.6	10.4	0.1912		
Iron	DIS	µg/L	100%	381	3	613	236	5.42		
Lead	DIS	µg/L	100%	0.1817	3	0.223	0.118	0.00197		
Magnesium	DIS	mg/L	100%	7.393	3	9.11	5.82	0.0806		
Manganese	DIS	µg/L	100%	41.3	3	54.5	33.9	0.4823		
Mercury	DIS	µg/L	67%	0.00213	3	0.0023	0.0019	0.00002		
Molybdenum	DIS	µg/L	100%	0.905	3	1.08	0.755	0.0096		
Nickel	DIS	µg/L	100%	3.57	3	5.82	1.92	0.0515		
Phosphorus	DIS	µg/L	100%	1977	3	2390	1650	21.15		

Table 2.10, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
Potassium	DIS	mg/L	100%	12.67	3	16.6	10.2	0.1469		
Selenium	DIS	µg/L	100%	0.1297	3	0.146	0.118	0.0013		
Silver	DIS	µg/L	100%	0.00827	3	0.0128	0.005	0.00011		
Sodium	DIS	mg/L	100%	36.55	2	38.5	34.6	0.3407		
Tin	DIS	µg/L	100%	0.233	3	0.28	0.21	0.002		
Zinc	DIS	µg/L	100%	16.5	3	21.9	11.4	0.194		
METALS-SPECIATED										
Methyl Mercury	TOT	ng/L	100%	0.097	1	0.097	0.097	0.0009		
Monobutyltin	TOT	µg/L	100%	0.005	1	0.005	0.005	0.00004		
Monobutyltin Trichloride	TOT	µg/L	100%	0.008	1	0.008	0.008	0.00007		
PAHS										
2-Methylnaphthalene	TOT	µg/L	67%	0.3143	3	0.92	0.01	0.0081		
Acenaphthene	TOT	µg/L	100%	0.2517	3	0.72	0.012	0.0064	6b	
Fluoranthene	TOT	µg/L	67%	0.0617	3	0.16	0.01	0.0014		
Fluorene	TOT	µg/L	100%	0.1367	3	0.35	0.013	0.0031	12b	
Naphthalene	TOT	µg/L	100%	0.451	3	1.3	0.013	0.00115	1b	1.4
Phenanthrene	TOT	µg/L	100%	0.0853	3	0.22	0.017	0.0019		
Pyrene	TOT	µg/L	67%	0.0303	3	0.069	0.01	0.0006		
Total Hmw-PAHs	TOT	µg/L	67%	0.109	3	0.28	0.02	0.0025		
Total Lmw-PAHs	TOT	µg/L	100%	3.751	3	7.7	0.054	0.0681		
Total Pahs	TOT	µg/L	100%	3.851	3	7.7	0.054	0.0681		
PHENOLICS										
Total Phenols	TOT	mg/L	67%	0.0056	3	0.0075	0.0037	0.00007		
PHTHALATES										
Diethyl Phthalate	TOT	µg/L	67%	0.077	3	0.1	0.05	0.0006		
HIGH RESOLUTION										
PAHS										
1-Methylphenanthrene	TOT	ng/L	100%	2.6	1	---	---	0.023		
2-Methylnaphthalene	TOT	ng/L	100%	596	1	---	---	5.274		
Acenaphthene	TOT	ng/L	100%	314	1	---	---	2.779	6000b	
Acenaphthylene	TOT	ng/L	100%	5.31	1	---	---	0.047		
Anthracene	TOT	ng/L	100%	23.7	1	---	---	0.21		
Benzo(a)anthracene	TOT	ng/L	100%	8.12	1	---	---	0.072		
Benzo(a)pyrene	TOT	ng/L	100%	7.8	1	---	---	0.069	10b	
Benzo(b)fluoranthene	TOT	ng/L	100%	5.42	1	---	---	0.048		
Benzo(e)pyrene	TOT	ng/L	100%	4.97	1	---	---	0.044		
Benzo(g,h,i)perylene	TOT	ng/L	100%	5.75	1	---	---	0.051		
Benzo[j,k]fluoranthenes	TOT	ng/L	100%	6.26	1	---	---	0.055		

Table 2.10, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
Chrysene	TOT	ng/L	100%	7.69	1	---	---	0.068	100b	
Dibenzo(a,h)anthracene	TOT	ng/L	100%	0.973	1	---	---	0.009		
Dibenzothiophene	TOT	ng/L	100%	10.2	1	---	---	0.09		
Fluoranthene	TOT	ng/L	100%	29.9	1	---	---	0.265		
Fluorene	TOT	ng/L	100%	94.8	1	---	---	0.839	12000b	
Indeno[1,2,3-cd]pyrene	TOT	ng/L	100%	5.08	1	---	---	0.04		
Naphthalene	TOT	ng/L	100%	748	1	---	---	6.619	1000b	
Perylene	TOT	ng/L	100%	2.1	1	---	---	0.019		
Phenanthrene	TOT	ng/L	100%	83.7	1	---	---	0.74		
Pyrene	TOT	ng/L	100%	26.1	1	---	---	0.231		
PBDE										
Pbde 10	TOT	pg/L	100%	2.88	1	---	---	0.03		
Pbde 100	TOT	pg/L	100%	705	1	---	---	6.24		
Pbde 119/120	TOT	pg/L	100%	13.4	1	---	---	0.1		
Pbde 138/166	TOT	pg/L	100%	29.2	1	---	---	0.26		
Pbde 140	TOT	pg/L	100%	9.79	1	---	---	0.09		
Pbde 15	TOT	pg/L	100%	4.89	1	---	---	0.043		
Pbde 153	TOT	pg/L	100%	301	1	---	---	2.66		
Pbde 154	TOT	pg/L	100%	221	1	---	---	1.96		
Pbde 155	TOT	pg/L	100%	18.4	1	---	---	0.16		
Pbde 17/25	TOT	pg/L	100%	27.1	1	---	---	0.24		
Pbde 183	TOT	pg/L	100%	55.2	1	---	---	0.49		
Pbde 203	TOT	pg/L	100%	45.1	1	---	---	0.4		
Pbde 206	TOT	pg/L	100%	489	1	---	---	4.33		
Pbde 207	TOT	pg/L	100%	679	1	---	---	6.01		
Pbde 208	TOT	pg/L	100%	430	1	---	---	3.81		
Pbde 209	TOT	pg/L	100%	7250	1	---	---	64.2		
Pbde 28/33	TOT	pg/L	100%	70.1	1	---	---	0.62		
Pbde 35	TOT	pg/L	100%	1.4	1	---	---	0.01		
Pbde 37	TOT	pg/L	100%	3.49	1	---	---	0.03		
Pbde 47	TOT	pg/L	100%	3260	1	---	---	28.85		
Pbde 49	TOT	pg/L	100%	99.4	1	---	---	0.88		
Pbde 51	TOT	pg/L	100%	10.9	1	---	---	0.1		
Pbde 66	TOT	pg/L	100%	57.7	1	---	---	0.51		
Pbde 7	TOT	pg/L	100%	2.39	1	---	---	0.02		
Pbde 71	TOT	pg/L	100%	13.9	1	---	---	0.12		
Pbde 75	TOT	pg/L	100%	5.7	1	---	---	0.05		
Pbde 79	TOT	pg/L	100%	38.8	1	---	---	0.34		

Table 2.10, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
Pbde 85	TOT	pg/L	100%	116	1	---	---	1.03		
Pbde 99	TOT	pg/L	100%	3300	1	---	---	29.2		
PCBs										
Pcb 1	TOT	pg/L	100%	12.3	1	---	---	0.109		
Pcb 10	TOT	pg/L	100%	1.59	1	---	---	0.014		
Pcb 105	TOT	pg/L	100%	10.3	1	---	---	0.091	90b	
Pcb 107/124	TOT	pg/L	100%	1.26	1	---	---	0.011		
Pcb 109	TOT	pg/L	100%	1.79	1	---	---	0.016		
Pcb 11	TOT	pg/L	100%	393	1	---	---	3.478		
Pcb 110/115	TOT	pg/L	100%	39.9	1	---	---	0.353		
Pcb 118	TOT	pg/L	100%	28.9	1	---	---	0.256		
Pcb 12/13	TOT	pg/L	100%	4.23	1	---	---	0.037		
Pcb 123	TOT	pg/L	100%	1.34	1	---	---	0.012		
Pcb 128/166	TOT	pg/L	100%	4.83	1	---	---	0.043		
Pcb 129/138/160/163	TOT	pg/L	100%	38.5	1	---	---	0.341		
Pcb 130	TOT	pg/L	100%	2.09	1	---	---	0.018		
Pcb 132	TOT	pg/L	100%	13.6	1	---	---	0.012		
Pcb 134/143	TOT	pg/L	100%	2.69	1	---	---	0.024		
Pcb 135/151/154	TOT	pg/L	100%	11.5	1	---	---	0.102		
Pcb 136	TOT	pg/L	100%	4.67	1	---	---	0.041		
Pcb 137	TOT	pg/L	100%	2.4	1	---	---	0.021		
Pcb 141	TOT	pg/L	100%	5.44	1	---	---	0.048		
Pcb 144	TOT	pg/L	100%	1.79	1	---	---	0.016		
Pcb 146	TOT	pg/L	100%	5.38	1	---	---	0.048		
Pcb 147/149	TOT	pg/L	100%	27.5	1	---	---	0.243		
Pcb 15	TOT	pg/L	100%	9.49	1	---	---	0.084		
Pcb 153/168	TOT	pg/L	100%	33.9	1	---	---	0.3		
Pcb 155	TOT	pg/L	100%	3.33	1	---	---	0.029		
Pcb 156157	TOT	pg/L	100%	5.09	1	---	---	0.045		
Pcb 158	TOT	pg/L	100%	3.41	1	---	---	0.03		
Pcb 16	TOT	pg/L	100%	8.6	1	---	---	0.076		
Pcb 164	TOT	pg/L	100%	1.91	1	---	---	0.017		
Pcb 167	TOT	pg/L	100%	1.47	1	---	---	0.013		
Pcb 17	TOT	pg/L	100%	9.72	1	---	---	0.086		
Pcb 170	TOT	pg/L	100%	6	1	---	---	0.053		
Pcb 171/173	TOT	pg/L	100%	1.35	1	---	---	0.012		
Pcb 172	TOT	pg/L	100%	1.14	1	---	---	0.01		
Pcb 174	TOT	pg/L	100%	6.16	1	---	---	0.055		

Table 2.10, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
Pcb 176	TOT	pg/L	100%	0.982	1	---	---	0.009		
Pcb 177	TOT	pg/L	100%	2.67	1	---	---	0.024		
Pcb 178	TOT	pg/L	100%	1.46	1	---	---	0.013		
Pcb 179	TOT	pg/L	100%	3.41	1	---	---	0.03		
Pcb 18/30	TOT	pg/L	100%	18.8	1	---	---	0.166		
Pcb 180/193	TOT	pg/L	100%	16.2	1	---	---	0.143		
Pcb 183/185	TOT	pg/L	100%	3.32	1	---	---	0.029		
Pcb 184	TOT	pg/L	100%	5.62	1	---	---	0.05		
Pcb 187	TOT	pg/L	100%	9.87	1	---	---	0.087		
Pcb 19	TOT	pg/L	100%	8	1	---	---	0.071		
Pcb 190	TOT	pg/L	100%	1.1	1	---	---	0.01		
Pcb 194	TOT	pg/L	100%	2.91	1	---	---	0.026		
Pcb 195	TOT	pg/L	100%	0.909	1	---	---	0.008		
Pcb 196	TOT	pg/L	100%	1.87	1	---	---	0.017		
Pcb 197/200	TOT	pg/L	100%	0.825	1	---	---	0.007		
Pcb 198/199	TOT	pg/L	100%	3.99	1	---	---	0.035		
Pcb 2	TOT	pg/L	100%	4.42	1	---	---	0.039		
Pcb 20/28	TOT	pg/L	100%	24.4	1	---	---	0.216		
Pcb 202	TOT	pg/L	100%	1.34	1	---	---	0.012		
Pcb 203	TOT	pg/L	100%	2.21	1	---	---	0.02		
Pcb 206	TOT	pg/L	100%	3.21	1	---	---	0.03		
Pcb 209	TOT	pg/L	100%	4.75	1	---	---	0.042		
Pcb 21/33	TOT	pg/L	100%	12.2	1	---	---	0.108		
Pcb 22	TOT	pg/L	100%	10	1	---	---	0.088		
Pcb 25	TOT	pg/L	100%	4.28	1	---	---	0.038		
Pcb 26/29	TOT	pg/L	100%	6.89	1	---	---	0.061		
Pcb 27	TOT	pg/L	100%	4.63	1	---	---	0.041		
Pcb 3	TOT	pg/L	100%	6.31	1	---	---	0.056		
Pcb 31	TOT	pg/L	100%	23.5	1	---	---	0.208		
Pcb 32	TOT	pg/L	100%	7.2	1	---	---	0.064		
Pcb 35	TOT	pg/L	100%	3.05	1	---	---	0.027		
Pcb 36	TOT	pg/L	100%	0.725	1	---	---	0.006		
Pcb 37	TOT	pg/L	100%	6.24	1	---	---	0.055		
Pcb 4	TOT	pg/L	100%	34.9	1	---	---	0.31		
Pcb 40/41/71	TOT	pg/L	100%	12.2	1	---	---	0.108		
Pcb 42	TOT	pg/L	100%	5.7	1	---	---	0.05		
Pcb 43	TOT	pg/L	100%	1.21	1	---	---	0.011		
Pcb 44/47/65	TOT	pg/L	100%	52.4	1	---	---	0.464		

Table 2.10, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
Pcb 45/51	TOT	pg/L	100%	9.82	1	---	---	0.087		
Pcb 46	TOT	pg/L	100%	1.8	1	---	---	0.016		
Pcb 48	TOT	pg/L	100%	6.13	1	---	---	0.054		
Pcb 49/69	TOT	pg/L	100%	17.2	1	---	---	0.152		
Pcb 50/53	TOT	pg/L	100%	6.55	1	---	---	0.058		
Pcb 52	TOT	pg/L	100%	44.7	1	---	---	0.396		
Pcb 56	TOT	pg/L	100%	7.1	1	---	---	0.06		
Pcb 59/62/75	TOT	pg/L	100%	2.22	1	---	---	0.02		
Pcb 6	TOT	pg/L	100%	6.74	1	---	---	0.06		
Pcb 60	TOT	pg/L	100%	4.44	1	---	---	0.04		
Pcb 61/70/74/76	TOT	pg/L	100%	37.6	1	---	---	0.33		
Pcb 63	TOT	pg/L	100%	0.89	1	---	---	0.01		
Pcb 64	TOT	pg/L	100%	9.41	1	---	---	0.083		
Pcb 66	TOT	pg/L	100%	15.8	1	---	---	0.14		
Pcb 68	TOT	pg/L	100%	3.07	1	---	---	0.03		
Pcb 7	TOT	pg/L	100%	1.62	1	---	---	0.014		
Pcb 77	TOT	pg/L	100%	1.3	1	---	---	0.01	40b	
Pcb 8	TOT	pg/L	100%	20	1	---	---	0.177		
Pcb 82	TOT	pg/L	100%	4.19	1	---	---	0.04		
Pcb 83/99	TOT	pg/L	100%	21.2	1	---	---	0.19		
Pcb 84	TOT	pg/L	100%	10.3	1	---	---	0.09		
Pcb 85/116/117	TOT	pg/L	100%	6.19	1	---	---	0.05		
Pcb 86/87/97/108/119/125	TOT	pg/L	100%	27.2	1	---	---	0.24		
Pcb 88/91	TOT	pg/L	100%	5.69	1	---	---	0.05		
Pcb 9	TOT	pg/L	100%	1.62	1	---	---	0.014		
Pcb 90/101/113	TOT	pg/L	100%	46.5	1	---	---	0.41		
Pcb 92	TOT	pg/L	100%	7.27	1	---	---	0.06		
Pcb 93/95/98/100/102	TOT	pg/L	100%	34	1	---	---	0.3		
PCBs Total	TOT	pg/L	100%	1,290	1	---	---	11.42	100b	
Total Decachloro Biphenyl	TOT	pg/L	100%	4.75	1	---	---	0.04		
Total Dichloro Biphenyls	TOT	pg/L	100%	470	1	---	---	4.16		
Total Heptachloro Biphenyls	TOT	pg/L	100%	43.3	1	---	---	0.38		
Total Hexachloro Biphenyls	TOT	pg/L	100%	147	1	---	---	1.3		
Total Monochloro Biphenyls	TOT	pg/L	100%	23	1	---	---	0.2		
Total Nonachloro Biphenyls	TOT	pg/L	100%	3.21	1	---	---	0.03		
Total Octachloro Biphenyls	TOT	pg/L	100%	1.34	1	---	---	0.01		
Total Pentachloro Biphenyls	TOT	pg/L	100%	224	1	---	---	1.98		
Total Tetrachloro Biphenyls	TOT	pg/L	100%	225	1	---	---	1.99		

Table 2.10, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
Total Trichloro Biphenyls	TOT	pg/L	100%	144	1	---	---	1.27		
PESTICIDES										
1,2-dichlorobenzene	TOT	ng/L	100%	0.89	1	---	---	0.01		
1,4-dichlorobenzene	TOT	ng/L	100%	68.6	1	---	---	0.61		
2,3,5-trimethylnaphthalene	TOT	ng/L	100%	5.72	1	---	---	0.051		
2,6-dimethylnaphthalene	TOT	ng/L	100%	21.3	1	---	---	0.188		
2,4-DDD	TOT	ng/L	100%	0.496	1	---	---	0.0044		
4,4-DDE	TOT	ng/L	100%	0.122	1	---	---	0.0011		
4,4-DDT	TOT	ng/L	100%	0.06	1	---	---	0.0005		
Alpha-Endosulfan	TOT	ng/L	100%	0.218	1	---	---	0.002		
Beta-Endosulfan	TOT	ng/L	100%	0.633	1	---	---	0.006		
Beta-Hch Or Beta-Bhc	TOT	ng/L	100%	0.074	1	---	---	0.0007		
Dieldrin	TOT	ng/L	100%	0.229	1	---	---	0.002		
Hch, Gamma	TOT	ng/L	100%	0.134	1	---	---	0.0012		
Hexachlorobenzene	TOT	ng/L	100%	0.053	1	---	---	0.0005		
Hexachlorobutadiene	TOT	ng/L	100%	0.14	1	---	---	0.001		
Pentachlorobenzene	TOT	ng/L	100%	0.04	1	---	---	0.0012		
Trans-Chlordane	TOT	ng/L	100%	0.047	1	---	---	0.0004		
PFOS										
PFBA	TOT	ng/L	100%	27.4	1	---	---	0.24		
PFBS	TOT	ng/L	100%	18.5	1	---	---	0.164		
PFDA	TOT	ng/L	100%	1.36	1	---	---	0.012		
PFHpA	TOT	ng/L	100%	11.2	1	---	---	0.099		
PFHxA	TOT	ng/L	100%	48.8	1	---	---	0.432		
PFHxS	TOT	ng/L	100%	24.7	1	---	---	0.219		
PFNA	TOT	ng/L	100%	1.39	1	---	---	0.012		
PFOA	TOT	ng/L	100%	26.2	1	---	---	0.232		
PFOS	TOT	ng/L	100%	6.57	1	---	---	0.06		
PFPeA	TOT	ng/L	100%	27.6	1	---	---	0.244		
PPCPS										
2-Hydroxy-Ibuprofen	TOT	ng/L	100%	15,400	1	---	---	136.3		
Bisphenol A	TOT	ng/L	100%	9,620	1	---	---	85.1		
Furosemide	TOT	ng/L	100%	1,580	1	---	---	14		
Gemfibrozil	TOT	ng/L	100%	129	1	---	---	1.14		
Hydrochlorothiazide	TOT	ng/L	100%	1,960	1	---	---	17.3		
Ibuprofen	TOT	ng/L	100%	2,600	1	---	---	23		
Naproxen	TOT	ng/L	100%	2,980	1	---	---	26.4		
Triclocarban	TOT	ng/L	100%	4.14	1	---	---	0.04		

Table 2.10, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	n	Max Concentration	Min Concentration	Average Concentration 1:113 Dilution	BC WQG	CCME WQG
Triclosan	TOT	ng/L	100%	53.1	1	---	---	0.5		
Warfarin	TOT	ng/L	100%	6.69	1	---	---	0.06		
NONYLPHENOLS										
NP	TOT	ng/L	100%	96.3	1	---	---	0.9	700b	
4-Nonylphenol Diethoxylates	TOT	ng/L	100%	694	1	---	---	6.1		
4-Nonylphenol Monoethoxylates	TOT	ng/L	100%	431	1	---	---	3.8		

Notes:
*dilution calculated from maximum concentration,
BC WQG = British Columbia water quality guidelines, CCME WQG = Canadian Council of Ministers of the Environment water quality guidelines
a. working guideline
b. approved guideline
*all guidelines are max unless otherwise stated.
--- not calculated as *n*=1
** BC ENV (2020) Addendum to Overview Report (2001) and Technical Appendix (1988) June 26, 2020 – rescinds the 1988 BC approved microbiological indicator WQG for fecal coliforms

2.3.4 Acute Toxicity Testing

Acute toxicity describes the adverse effects of a substance that results either from a single exposure or from multiple exposures in a short period of time (usually less than 24 hours). To be described as acutely toxic, the adverse effects should occur within 14 days of the administration of the test substance. Acute toxicity results for the Clover and Macaulay wastewaters are reported as the LC50, which is the wastewater concentration that will cause mortality in 50% of the organisms within the specified test period. A result that is less than a LC50 of 100% is a failed test. Refer to Appendix B8 for acute toxicity reports.

Table 2.11 presents the results from acute toxicity testing of Clover and Macaulay (or their proxies) screened effluent and McLoughlin WWTP final effluent. Results indicated that undiluted (100%) Clover and Macaulay (or their proxies) wastewater continued to be acutely lethal to rainbow trout (*Oncorhynchus mykiss*), similar to historical results. Undiluted wastewater was also acutely toxic to *Daphnia magna* in January, July and October at Clover and July and October at Macaulay (or their proxies). The severity of toxicity is typically linked to lower flow volumes; the lower the wastewater flow, the lower the concentration of wastewater needed to achieve a toxic effect. This is potentially because wastewater constituents are typically more concentrated when flows are low (usually from late spring to mid-autumn). As expected, McLoughlin WWTP final effluent was acutely toxic (i.e., kills 50% in 96 hours) to trout during the initial phases of commissioning (i.e., September and October) and not acutely toxic in the later stages of commissioning as treatment processes were stabilized (November and December).

Clover (or proxy) wastewater was acutely toxic to trout at concentrations ranging from 30.8% to 70.7% wastewater, and toxic to Daphnia at 56.1% or greater. The estimated minimum initial dilution factor for the Clover outfall is 175:1, resulting in a predicted wastewater concentration of 0.6% at the edge of the IDZ (Hodgins, 2006). The trout LC50 at Clover occurs, therefore, at wastewater concentrations that are two to three orders of magnitude greater than expected to occur at the edge of the IDZ.

Macaulay (or proxy) wastewater was acutely toxic to trout at concentrations ranging from 15.4% to 35.4% wastewater, and to Daphnia at 25.6% or greater. The estimated minimum initial dilution factor for the Macaulay outfall is 245:1, resulting in a predicted wastewater concentration of 0.4% at the edge of the IDZ (Hodgins, 2006). The trout LC50 at Macaulay occurs, therefore, at wastewater concentrations that are two to three orders of magnitude greater than expected to occur at the edge of the IDZ.

McLoughlin WWTP final effluent was acutely lethal to trout at concentrations ranging from 30.8% to 66% during the early stages of commissioning. The estimated minimum initial dilution factor for the McLoughlin WWTP outfall is 113:1, resulting in a predicted wastewater concentration of 0.9% at the edge of the IDZ (Seaconsult, 2019). The trout LC50 at McLoughlin occurs, therefore, at wastewater concentrations that are two to three orders of magnitude greater than expected to occur at the edge of the IDZ.

Estimated minimum dilution factors provide conservative estimates of the concentrations of wastewaters in the receiving waters off the outfalls at the edge of the IDZ. Since the observed LC50 effects concentrations in 2020 were well above predicted concentrations of wastewater at the edge of the IDZ, it is unlikely that marine life is exposed to acute concentrations of effluent unless exposure occurs close to the diffusers within the IDZs.

Table 2.11 Clover, Macaulay (or their proxies) and McLoughlin Acute Toxicity Test Results – 2020

Clover	Predicted Concentration of Effluent at the Edge of the Initial Dilution Zone	Rainbow Trout LC50 (96-hour) (%)	Daphnia magna LC50 (48-hour) (%)
January	0.6%	70.7 (fail)	66.0
April		35.4 (fail)	>100
July		30.8 (fail)	56.1
October		70.7 (fail)	77.1
Macaulay	**Predicted Concentration of Effluent at the Edge of the Initial Dilution Zone**	**Rainbow Trout LC50 (96-hour) (%)**	**Daphnia magna LC50 (48-hour) (%)**
January	0.4%	35.4 (fail)	>100
April		35.4 (fail)	>100
July		30.8 (fail)	25.6
October		15.4 (fail)	37.2
McLoughlin	**Predicted Concentration of Effluent at the Edge of the Initial Dilution Zone**	**Rainbow Trout LC50 (96-hour) (%)**	
August	0.9%	35.4 (fail)	
September		30.8 (fail)	
October*		66.0 (fail) and 100 (pass)	
November		>100 (pass)	
December		>100 (pass)	

Notes:
Test pass = >100%, Results are presented as v/v%, * 2 tests run in October

2.3.5 Chronic Toxicity Testing

Chronic toxicity is described as adverse health effects from repeated or continuous exposures to a substance, often at lower levels over a longer time period (weeks or years). Chronic toxicity results are reported as the LC50, which is the concentration that will result in mortality of 50% of the organisms in the specified test period, or as EC50 or EC25, which are the concentrations that will have a sub-lethal negative effect upon 50% or 25%, respectively, of the organisms in the specified test period (e.g., decreased fertilization or growth). Refer to Appendix B9 for chronic toxicity reports.

Chronic toxicity testing was conducted using McLoughlin Point WWTP final effluent in October 2020. Several species were tested, including Topsmelt (*Atherinops affinis*), *Ceriodaphnia,* Echinoids and a 30-day Rainbow Trout embryo/alevin viability test. The Rainbow Trout embryo/alevin viability test is based on assessing non-viable alevins or the failure to reach the alevin stage with timely and expected development due to deterioration at any previous stage, including failure of egg fertilization, mortality of embryo or alevin, failure to hatch by test end, or abnormal development. One or both of the following two endpoints are obtained for the same effect: (1) effective concentration for failure of 25% of individuals to develop normally to the alevin stage (EC25); and (2) median effective concentration for failure of 50% of individuals to develop normally to the alevin stage (EC50).

Table 2.12 presents the results from chronic toxicity testing of McLoughlin Point WWTP effluent. Chronic lethal toxicity (survival) ranged from 33.7% to 37.8% wastewater (LC50), with sub-lethal effects, such as growth, reproduction and fertilization impairment occurring at wastewater concentrations ranging from 2.6% to 31.8% (EC50 and lC50) and 2.2% to 23.1% (EC25 and lC25).

Similar to the acute toxicity test results, the wastewater concentrations at which most chronic effects were observed were substantially higher than the predicted wastewater concentrations in the marine receiving environment at the edge of the IDZ (0.9% at McLoughlin) (Seaconsult, 2019). Marine life is unlikely to be exposed to the chronically toxic wastewater concentrations unless exposure occurs close to the outfall diffusers within the IDZ and the organisms spend a prolonged time exposed to the sewage plume.

Table 2.12 McLoughlin Chronic Toxicity Test Results – 2020

Chronic Toxicity Test	%v/v
Six-day Topsmelt	
Survival -LC50	>100
Dry Biomass - IC25	53.8
Dry Biomass - IC50	>100
Dry Weight - IC25	62.9
Dry Weight - IC50	>100
Seven-day Ceriodaphnia	
Survival -LC50	>100
Reproduction-IC25	>100
Reproduction-IC50	>100
Echinoid Fertilization-IC25	57.4
Echinoid Fertilization-IC50	68.9
Rainbow Trout Embryo-Alevin	
Embryo Survival-EC25	57.3
Embryo Survival-EC50	71.3
Embryo Viability-EC25	56.3
Embryo Viability-EC50	70.2

Notes:
Cl = 95% confidence limits

2.3.6 Trend Assessment Results

Results of the Hatfield (2020) comprehensive review indicate that, of the 500 chemical constituents analyzed in Macaulay Point and Clover Point effluents, 75% of these constituents were detected in over 50% of samples from 2011 to 2019. The effluent monitoring program found the outfalls met the provincial permits and federal WSER standards with only a few exceptions: TSS and CBOD exceeded their respective limits on some occasions, as a result of high flow and rainy conditions. The concentrations of most of the wastewater contaminants have been decreasing over time at both outfalls. This decreasing trend is associated with a range of factors, such as source control, public awareness and education on water conservation, improved waste disposal practice, and improved low-flow plumbing fixtures. However, TSS, CBOD, total ammonia, and fecal coliforms increased during cycles 1 and 2. Similarly, loadings of most chemical constituents decreased over monitoring years, but TSS, CBOD, total inorganic nitrogen, total ammonia, and total high molecular weight polycyclic aromatic hydrocarbons increased in recent years (i.e., Cycle 2).

Statistically significant increasing trends were indicated for ammonia at both Clover and Macaulay, and for zinc and fecals at Clover only. Statistically significant decreasing trends were indicated for enterococci, cadmium, total PCBs at both Clover and Macaulay outfalls, for copper and PCB 105 at Macaulay only, and for WAD cyanide at Clover only.

Concentrations of several effluent constituents exceeded relevant water quality guidelines in undiluted effluents, including:

- fecal coliforms
- enterococci
- weak-acid dissociable cyanide
- ammonia
- sulphide
- cadmium
- copper
- iron
- manganese
- zinc
- trichloromethane
- 1,2-dichlorobenzene
- polychlorinated biphenyl (PCB) congener 105, 126, 194 and total PCBs
- nonylphenols

Undiluted wastewater effluents from both outfalls were regularly acutely toxic to fish and sometimes to invertebrates, and chronically toxic to both fish and invertebrates. However, effluent concentrations associated with toxic effects in both acute and chronic tests were above predicted wastewater concentrations in the marine receiving environment at the edge of the IDZ. Therefore, direct toxic effects on organisms in the receiving environment are unlikely.

2.3.7 Overall Assessment

The 2020 Clover and Macaulay (or their proxies) wastewater monitoring results were generally consistent with previous years, indicating that from an operational and regulatory compliance perspective, wastewater quality was as expected. Most flow, BOD and TSS requirements stipulated under Macaulay and Clover provincial permits were met, except for one BOD maximum measurement at Macaulay and one TSS maximum measurement at Clover that exceeded effluent quality expectations for fine-screened effluent. In addition, Clover and Macaulay (or their proxies) wastewater was acutely toxic to rainbow trout. Federal transitional authorization wastewater regulation limits were exceeded for TSS and CBOD two times at Clover and two times at Macaulay. These transitional authorizations stipulated a December 31, 2020 deadline for the installation of treatment equivalent to secondary or better.

Some substances in the Macaulay and Clover (or their proxies) wastewaters exceeded water quality guidelines in undiluted wastewater, but all parameters except bacterial indicators were predicted to meet guidelines in the marine receiving environment following the application of estimated minimum initial dilution factors. The 2020 wastewaters from both outfalls were acutely lethal and chronically toxic to aquatic life. However, the observed effects concentrations in the laboratory were, for the most part, well above the predicted environmental wastewater concentrations in the marine receiving environment at the edge of the IDZ.

As expected, the 2020 McLoughlin Point WWTP final tertiary effluent results were not compliant with federal and provincial regulations during commissioning. Unfortunately, neither set of regulations allows for the variability of effluent that is expected as new treatment plant processes are brought online and stabilized. It is anticipated that the McLoughlin treatment processes could take up to two years to fully stabilize, with occasional non-compliance events throughout this time period. More stable treatment processes later in the year resulted in more consistently compliant effluent quality.

The use of estimated minimum initial dilution factors allows for a conservative (i.e., highly protective) estimation of potential effects because the predicted average (mean) initial dilution factors are actually much higher in the marine receiving environments around each outfall (647:1 and 894:1 for the Macaulay and Clover outfalls, respectively; Hodgins, 2006) and (median) 711:1 for McLoughlin Point WWTP (Seaconsult, 2019). However, it should be noted that the above dilution factors assume fully functioning outfall diffusers. An outfall inspection was conducted in 2017 (Clover and Macaulay) and found no deficiencies in the diffusers that could cause water quality issues in the receiving environment. The overall operation of the outfall diffusers is assessed via the surface water and water column monitoring described in Section 4.0.

The Clover and Macaulay (or their proxies) wastewaters were acutely and chronically toxic to rainbow trout and *Daphnia magna*. During early commissioning stages, McLoughlin effluent was also acutely toxic.

The bacteriological indicator guideline exceedances will continue even after the installation of treatment, as disinfection has not been installed as part of the new McLoughlin treatment process and is not feasible at Macaulay or Clover during rain events. However, with the additional treatment at McLoughlin, even without disinfection, the magnitude of these exceedances will be much reduced.

Hatfield's comprehensive 2011-2019 review concluded that direct toxic effects of wastewater on organisms in the receiving environment off Clover and Macaulay Point outfalls was predicted to be unlikely. Future assessments of McLoughlin Point WWTP effluent predicts similar and improved results.

3.0 RECLAIMED WATER

The McLoughlin Point wastewater treatment plant registration #108831 includes the use of reclaimed water for operations use (i.e., wash down treatment works). The registration designates the use as “moderate exposure-frequent use”, which stipulates criteria for reclaimed water quality to protect the environment and human health. Table 3.1 presents the results of testing conducted during the commissioning of the McLoughlin WWTP

Table 3.1 Municipal Wastewater Regulations – Moderate Exposure Category

Date	pH	Total Residual Chlorine mg/L	CBOD mg/L	Fecal Coliforms CFU/100 mL or MPN	TSS mg/L
MWR Limit	6.5-9 Single Sample		25 mg/L Single Sample	median < 1 CFU/100 mL or < 2.2 MPN; Maximum 14 CFU/100 mL	25 mg/L Single Sample
09/11/2020	7	<2	---	---	---
12/11/2020	---	---	20	<10,000	12.5
16/11/2020	7.1	>2	2	<10,000	5.1
23/11/2020	7.2	4.1		<1	46
30/11/2020	7.1	4.6	2	1	4.9
07/12/2020	6.8	>6	2	1	3
14/12/2020	7.1	>6	---	1	3

Notes:
Shading represents values above MWR limit.

Harbour Resource Partners, the consortium that built the treatment plant, conducted analysis during commissioning (September to December) using unknown laboratories. These results should be interpreted with caution, as there is no knowledge of sample handling or analytical protocols used. Fecal coliform possibly exceeded criteria in November, but it is unknown due to laboratory uncertainty, but results were well below criteria in December. TSS was above criteria once in late November.

Staff at the CRD operated McLoughlin WWTP will be sampling monthly in 2021 using accredited laboratories.

4.0 SURFACE WATER MONITORING

4.1 Introduction

CRD staff have been monitoring receiving waters around the Macaulay and Clover outfalls for fecal coliform indicator bacteria concentrations since the early 1980s. This indicator is used as a surrogate to assess the potential for human health impacts from exposure to wastewaters in the marine environment. Observed impacts at the shoreline have been attributed to stormwater discharges, which are currently monitored by the CRD's Stormwater Quality Program.

As part of the five-year monitoring cycle design initiated in 2011, CRD and ENV staff substantially revised the surface water monitoring component of the program. Most notably, revisions included the replacement of the monthly sampling with quarterly (January, April, July, October) surface water sampling that consists of five bacteriology samples in a 30-day period ("5-in-30") for each quarter and the addition of enterococci. Water column sampling for stations around the IDZ of each outfall was also added. The water column sampling (at depth) includes automated instrument measurements and water sampling for the analysis of various nutrients, conventional parameters, metals, oil and grease, and the two bacteriological indicators. The objective of the water column sampling is to determine whether provincial regulatory requirements are being met, specifically that applicable provincial and federal water quality guidelines are not exceeded at the edge of the IDZ throughout the water column, and that the outfall diffusers are operating as expected.

Finally, in 2015, staff added a reference station at Constance Bank, 12 km from the Clover outfall, to provide background concentrations for comparison to any guideline exceedances observed adjacent to the two outfalls.

The implementation of the Core Area Wastewater Treatment Project will also result in changes to surface water monitoring commitments. The McLoughlin Point WWTP commissioning commenced in August 2020. Because operation of the McLoughlin plant was not consistent throughout 2020, and discharge through the Macaulay and Clover outfalls was still intermittent, the surface water monitoring program for all of 2020 continued to focus on the Macaulay and Clover outfalls. Because of the proximity of the Macaulay sampling stations to the McLoughlin outfall, some McLoughlin plume signal was likely captured during the Macaulay sampling in the fall.

The transition of routine surface water monitoring from Macaulay and Clover to the McLoughlin outfall will take place in January 2021. Since the Clover and Macaulay outfalls will continue to be wet weather and emergency overflow points for the McLoughlin conveyance system, surface water sampling will also be required around the Clover and Macaulay Point outfalls during and after large storms or emergency bypasses, conditional upon vessel availability and weather conditions.

4.2 Methods

Staff collected "5 in 30" surface and IDZ water column samples each quarter of 2020 in the vicinity of both outfalls (Figure 4.1). Due to COVID-19 uncertainties and the inability to socially distance on the larger contract sampling vessel, the IDZ water column sampling was cancelled for the spring (April) sampling period. Surface water sampling did still take place for this quarter, as staff were able to use the smaller CRD sampling vessel, limiting the number of staff needed onboard.

For January, July and October, sampling was undertaken using UVIC's 16-m science vessel, the MSV John Strickland. The Strickland is equipped with a hydraulic winch and an electric slip ring winch, an A-frame, bow thrusters and a differential global positioning system. Surface samples were collected at the surface of the water column at a depth of 1 m using a sampling pole, and the IDZ water column stations were sampled with a Seabird conductivity-temperature-depth (CTD) instrument and automated rosette sampler. The CTD instrument was also equipped with a dissolved oxygen sensor. Water column instrument profiles were taken at each IDZ station and water samples were taken at the top (at a depth of 5 m), middle (middle of predicted plume trapping depth; see below for how middle depths were determined) and bottom (5 m above the seafloor). Surface and IDZ sampling parameters are presented in Appendix C1.

A surface drift drogue was released at the beginning of each surface water sampling event and retrieved at the end of the sampling event. Position and time were recorded at the beginning and the end of the release in order to track potential directional flow of the sewage plume, should it surface.

For April, surface sampling was undertaken using a smaller vessel that was able to be used with minimal staff. The vessel was incapable of sampling at depth, as it does not have the capability of running a winch and CTD. This change in vessel was implemented to protect workers from COVID.

In the fall, the majority of effluent was being discharged out of the McLoughlin outfall. The Macaulay outfall was only concurrently discharging on the first day (October 6) of sampling. As such, any detectable results around the Macaulay outfall on the subsequent four sampling days would be attributable solely to the McLoughlin outfall plume.

Surface sampling stations are presented in Figure 4.1 and Appendix C2. The surface sampling grid, consisting of a total of 13 stations per outfall, was used to ensure that there was good spatial coverage of the receiving environment, where plume surfacing is most likely to occur (including some overlap with future McLoughlin outfall surface sampling locations). In addition, samples were collected at the location at which the drift drogue was retrieved. Surface samples were collected in sterile, wide-mouth bottles by rapidly submerging open, upright bottles to a depth of 1 m using a sampling pole.

IDZ stations (surrounding the IDZ) are also presented in Figure 4.1. Station selection varied from day to day with four stations sampled each day. For each sampling day, the predicted current direction and plume trapping depth were determined using the CRD's hydrodynamic C3 model. The model incorporates local conditions (historic instrument data and current and tide tables) to estimate current direction and effluent trapping depth (Hodgins, 2006). The model is also updated on an annual basis to incorporate the previous year's data. The four stations and the "middle" sampling depth were then selected to ensure that they fell within the plume's model-predicted direction of travel and trapping depth for that day and time. Samples were collected with the automated rosette sampler at three depths: the "top", which was 5 m from the surface, the "middle" plume trapping depth predicted by the model, and the "bottom", which was 5 m from the seafloor. All samples were decanted into sample bottles and preserved for analysis of metals, various conventional parameters and nutrients (Appendix C1). Bacteriological indicators, ammonia, hardness, TSS and pH samples were collected for each of the "5-in-30" sampling days, while the analysis of metals, oil and grease, phosphorus, sulfide, total organic carbon and nutrients were conducted on samples collected from only one day per quarter (usually the first of the "5-in-30" sampling days).

The surface and IDZ water column samples were analyzed for two bacteriological indicators (fecal coliforms and enterococci) by BV Labs (Victoria, BC). Fecal coliforms were enumerated using 0.45 µm membrane filters on mFC medium at 44.5°C for 24 hours and enterococci were enumerated using 0.45 µm nitrocellulose membranes on mEI medium at 41°C for 22-26 hours.

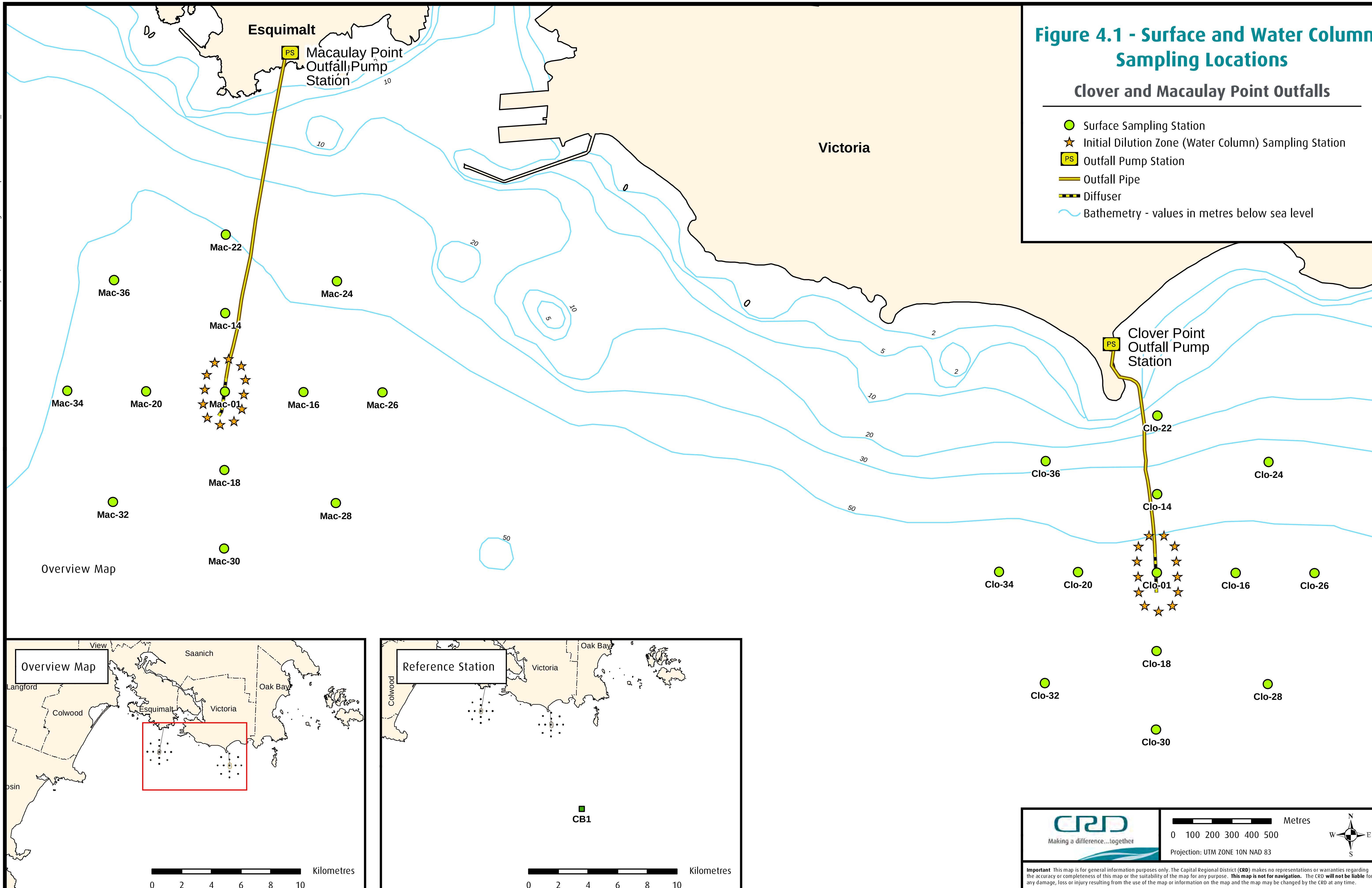
Bacteriological results were evaluated against human health guidelines developed by Warrington (1988) and ENV (BCMoE&CCS 2017; 2019) for recreational primary contact and to Health Canada (2012) guidelines for recreational water quality. These guidelines are:

- Health Canada enterococci guidelines based on the geometric mean of five samples taken approximately weekly, not exceeding 35 CFU/100 mL
- Health Canada single enterococci values not exceeding 70 CFU/100 mL

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

All other IDZ water column results were evaluated against available CCME (2002) and Approved *BC Water Quality Guidelines for the Protection of Aquatic Life* (BCMoE&CCS 2017; 2019) using the maximum concentration from each of the pooled sampling depths (of the four sample stations) from each of the sampling days within the season. It should be noted that metals results were compared to guidelines that stipulate a “5-in-30” sampling protocol. However, metals were only sampled once during a “5-in-30” sampling period. Because of this reduced sampling frequency and the use of pooled maximum concentrations, any guideline exceedances would be worst-case indicators of potential environmental risk and should be interpreted with caution.

Detailed statistical trend analyses are undertaken every three to five years to quantitatively assess temporal and spatial trends. In 2020, Hatfield Consultants (Hatfield, 2020) conducted an integrated analysis of cycles 1 and 2 data from 2011 to 2019. This assessment updated a previous surface water data assessment, also conducted by Hatfield (2012).



CRD Environmental Sustainability - May 18, 2016 - Technologist: SR - Map Document: MacClov_SurfaceAndWaterColumnStations.mxd

4.3 Results and Discussion

4.3.1 Macaulay

As noted above, the majority of effluent during the fall sampling period was being discharged solely out of the McLoughlin outfall. The Macaulay outfall was only concurrently discharging on the first day of fall sampling (October 6). As such, any detectable results around the Macaulay outfall on the subsequent four fall sampling days are attributable solely to the McLoughlin outfall plume.

<u>Surface Water Stations</u>

CRD staff collected 280 surface water samples at the Macaulay outfall receiving environment in 2020. Because of the proximity to the McLoughlin outfall and the fact that the Macaulay outfall discharge volume was substantively reduced starting in August, any results in the fall sampling event around Macaulay are predominantly a result of the McLoughlin plume. Of the five fall sampling days, Macaulay was only actually discharging on the first day (October 6). Reference station results from Constance Bank, are presented along with Clover results in Section 4.3.2.

Fecal coliform results for each sampling event at Macaulay (including seasonal geometric means) are presented in Appendix C3. Station seasonal geometric means were one or two orders of magnitude below the former provincial guideline of 200 CFU/100 mL (Table 4.1; Figure 4.2). Seven individual fecal coliform measurements out of 280 were above the value of 200 CFU/100 mL (Appendix C3). The maximum fecal coliform concentration measured in 2020 was 3,200 CFU/100 mL on day one in the winter at the drogue station. This date represented the sole sampling day when both Macaulay and McLoughlin outfalls were discharging.

Enterococci results for each sampling event at Macaulay (including seasonal station geometric means) are presented in Appendix C3. All seasonal geometric means were below the federal guideline of 35 CFU/100 mL (Table 4.1; Figure 4.2). Eight individual enterococci measurements out of 280 (representing 2.8% of the surface water samples) were above the federal single value guideline of 70 CFU/100 mL (Appendix C3), mostly occurring in the winter on day one. The maximum enterococci concentration measured in 2020 was 700 CFU/100 mL occurring on day one in the winter at the drogue station. As above, these highest values were detected on the sole sampling day when both Macaulay and McLoughlin outfalls were discharging.

There were no human health guideline exceedances for fecals (former guideline) in any quarter and no exceedances for enterococci in the spring or summer. The frequency and location of exceedances are similar to previous years indicating that the diffuser performance is consistent over time. The Macaulay outfall was inspected by a remotely operated vehicle in 2017, which found no deficiencies in the diffuser that could cause water quality issues in the receiving environment.

Elevated bacterial results in winter suggest that diluted effluent was surfacing during these sampling events and some risks to human health were present for anyone recreating at the ocean's surface during this time of year. Overall, however, results were within the concentrations predicted by hydrodynamic modelling (Hodgins, 2006). The model predicts a less than 5% chance that Macaulay effluent would reach the surface during slack tide in winter and an even lower probability at other times of the year. Although the plume is predicted to be highly diluted by the time it reaches the surface on these occasions (average dilution of 1580:1), elevated fecal coliform and enterococci concentrations are predicted to occur (Hodgins, 2006). Summer plume surfacing events are also predicted at both outfalls, associated with the morning flush in the wastewater system, weak water column stratification and slack tide (Lorax, 2009). These summer events are predicted to be less frequent than in winter. During summer, the core of the plume is predicted to be trapped at depth, but the diluted edge of the plume is predicted to occasionally surface.

Overall, the data indicate that the Macaulay effluent plume was predominantly trapped below the surface, as predicted by the model, and that the outfall diffuser was achieving adequate dilution. Had the effluent plume not been predominantly trapped, more frequent high fecal coliform and enterococci concentrations would have been observed, particularly at stations approximately 100 m from the outfall, where the model predicts the plume is most likely to surface (Hodgins, 2006). If more regular plume surfacing was occurring, we would expect to see fecal coliform concentrations of approximately 4,095 CFU/100 mL at the surface, based on applying the average dilution factor of 1,580:1 to the 2020 mean wastewater fecal coliform concentration of 6,471,428 CFU/100 mL (Table 2.8) As mentioned above, the maximum fecal coliform concentration was 3,200 CFU/100 mL at sample stations adjacent to the outfall and were low at the Constance Bank reference site. In addition, the McLoughlin plume signal was detected at the Macaulay stations in the fall when one or both of the outfalls were discharging.

Table 4.1 Macaulay Surface Water (1 m depth) Fecal Coliform and Enterococci Seasonal Geometric Means

Fecals	Winter	Spring	Summer	Autumn
Mac-01	55	5	2	4
Mac-14	27	6	3	2
Mac-16	49	7	3	3
Mac-18	76	7	1	6
Mac-20	30	4	2	3
Mac-22	18	15	4	3
Mac-24	23	11	6	5
Mac-26	29	4	3	5
Mac-28	43	3	1	3
Mac-30	46	4	1	3
Mac-32	36	4	2	4
Mac-34	16	3	2	2
Mac-36	25	3	2	3
Mac-D1	71	---	2	7
CB-Reference	9	---	3	3
Enterococci	**Winter**	**Spring**	**Summer**	**Autumn**
Mac-01	22	2	1	2
Mac-14	8	2	2	1
Mac-16	14	3	1	1
Mac-18	19	2	1	1
Mac-20	8	2	2	1
Mac-22	3	4	2	1
Mac-24	6	4	1	1
Mac-26	7	2	1	1
Mac-28	9	2	2	1
Mac-30	17	2	1	1
Mac-32	12	2	1	2
Mac-34	5	2	1	1
Mac-36	10	1	1	1
Mac-D1	19	---	2	3
CB-Reference	3	---	1	2

Notes:

Results exceeding the rescinded BC water quality guideline (geometric mean of 200 CFU/100 mL for fecal coliforms) and Health Canada's (geometric mean of 35 CFU/100 mL for enterococci) are highlighted. Results are presented in geometric means of "5-in-30" day sampling (CFU/100 mL).

--- denotes sampling did not occur due to adverse weather or drogue loss.

*not a complete set of five sampling events due to weather

Figure 4.2 - Macaulay Point Surface Water Stations

Fecal Coliform and Enterococci Results - 2020 (5 in 30)

- Macaulay Point Surface Sampling Stations
  Geo mean fecal count / Geo mean enterococci count
- Initial Dilution Zone
  (100 metres from diffuser)
- Outfall Pipe
- Diffuser

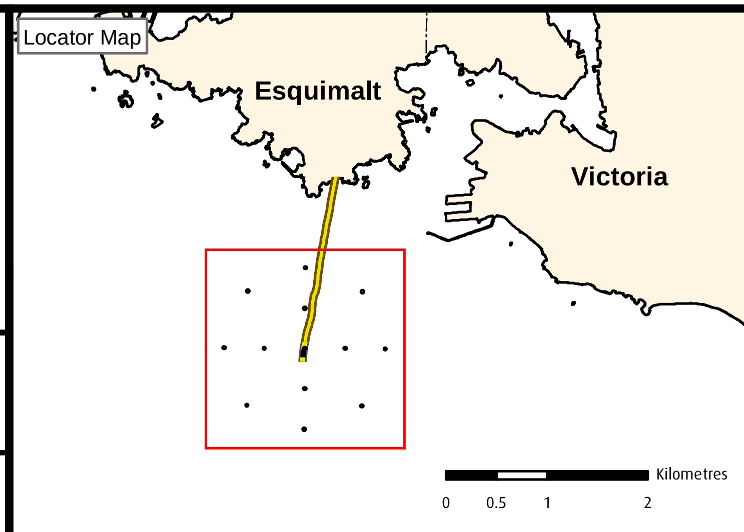
Note: Geo mean count shown in red if fecal count exceeds 200 CFU/100mL or enterococci count exceeds 20 CFU/100mL.

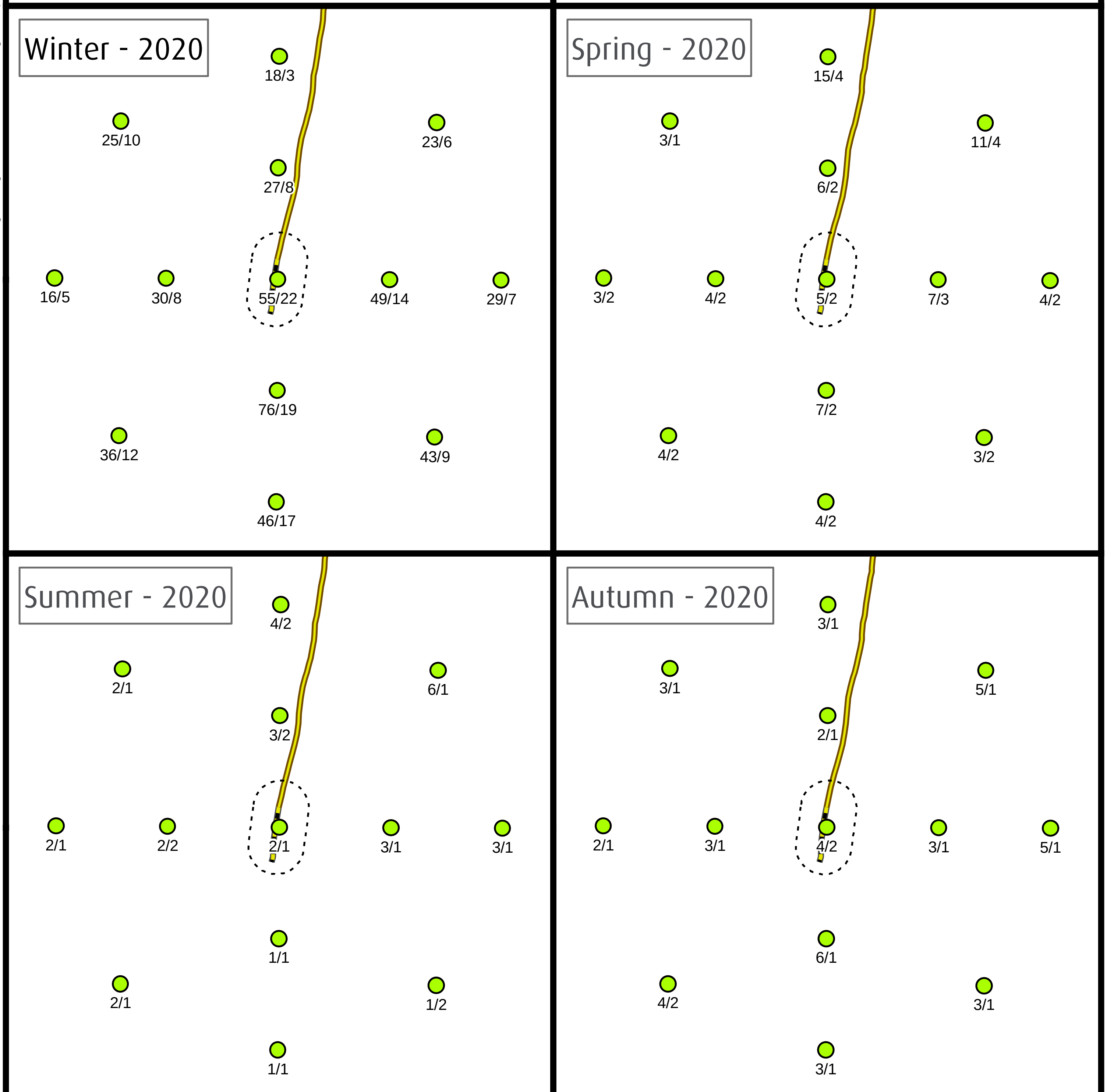
Making a difference...together

0 100 200 300 400 500 Metres

Projection: UTM ZONE 10N NAD 83

N W E S





CRD - Parks & Environmental Services - Environmental Engineering - Feb 12, 2021 - Technologist: srujancich - Map Document: SurfaceSamplesMac2021FieldMapSeasonsReport.mxd

Initial Dilution Zone Water Column - Macaulay

Analytical results for each IDZ water column sampling event at Macaulay are presented in Appendix C4. CTD and dissolved oxygen plots for each sampling day are presented in Appendix C7. As noted previously, no IDZ sampling took place in April due to COVID concerns. In addition, the Macaulay outfall was only actually discharging on Day 1 of the fall sampling event; for the remaining four fall sampling dates, flow was solely being discharged out of the McLoughlin outfall. Reference station results from Constance Bank are presented along with Clover results in Section 4.3.2.

Only samples for which results were above detection limits, and have either BC approved or CCME water quality guidelines, are presented (Appendix C4) (arsenic, boron, cadmium, copper, enterococci, fecal coliforms, lead, manganese, nickel, silver and zinc). All other results are available upon request.

Figure 4.3 presents the geometric means of maximum (i.e., worst case from each day in the "5-in-30" round) enterococci and fecal coliforms concentrations for each of the seasons' samples (winter, summer and autumn). The cumulative impacts of McLoughlin and Macaulay discharging simultaneously on October 6 were detectable, as evidenced by higher values on this day relative to the other four fall sampling days when only the McLoughlin outfall was discharging. Detectable results on these four sampling days confirm the McLoughlin plume influence around the Macaulay outfall even though the predominant current and tide influence is in the opposite direction to the southeast.

The geometric means of the "5-in-30" fecal coliform water column results exceeded 200 CFU/100 mL former guidelines the majority of the time, with exceedances at the middle and bottom sampling depths at each season (within the plume's predicted trapping depth). Exceedances also occurred at the surface in the winter (Appendix C4).

The geometric means of the "5-in-30" enterococci water column results also exceeded 70 CFU/100 mL guidelines with most exceedances at the middle or bottom sampling depths for each season (within the plume's predicted trapping depth). Exceedances occurred at the surface in the winter and summer (Appendix C4). Single value exceedances of the federal enterococci guideline of 70 CFU/100 mL occurred 18% of the time (Appendix C4), with fewer exceedances in autumn than summer and winter.

There were no exceedances of provincial or federal guidelines for any of the metals that were analyzed in the water column IDZ samples, except for boron. Concentrations of total boron exceeded the provincial guideline of 1.2 mg/L in all samples, with values ranging from 3.25-3.71 mg/L and 3.14-3.45 mg/L at the reference station. However, ambient boron concentrations, as confirmed at the reference station (Section 4.3.2), are approximately 4.0 mg/L in southern Vancouver Island marine waters (BCMoE, 2006). Therefore, it is inevitable that guidelines are exceeded around the outfalls.

Water column profiles of temperature, salinity, dissolved oxygen and transmissivity (Appendix C7) generally followed expected seasonal patterns for the Salish Sea (well mixed in winter and stratified in summer). It appears that the plume was only occasionally detected by the sensors, based on observations of reduced oxygen and transmissivity levels when compared to elevated levels of the bacteriological indicators (fecal coliforms and enterococci). A master's thesis (Krogh *et al*., 2018) examining vertical profiles of dissolved oxygen between 2011 and 2016 confirmed that of the approximately 850 CTD casts conducted, only six profiles showed any evidence of a sewage plume layer, using reduced dissolved oxygen as a primary indicator.

CTD profiling will continue as part of the routine environmental monitoring program. This data is also used to populate the oceanographic database that underlies the dispersion model used to forecast plume depth and direction.

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	Winter	Spring	Summer	Autumn
Top (5m below surface)	1,041/296	---/---	115/60	191/23
Middle (predicted trapping)	2,982/242	---/---	3,240/445	268/37
Bottom (5m above bottom)	2,590/191	---/---	2,769/712	1,141/184

Fecal Coliform — **34/7**
Enterococci

Macaulay Point IDZ station geometric means of fecal coliform and enterococci counts CFU/100mL (maximum concentrations).

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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 35 CFU/100mL.

4.3.2 Clover

Surface Water Stations

CRD staff collected 280 surface water samples at the Clover outfall receiving environment and 15 samples at an associated reference station, Constance Bank in 2020. This reference station is also suitable for comparison to the Macaulay results.

Fecal coliform results for each sampling event at Clover (including seasonal geometric means) are presented in Appendix C5. All station fecal coliform geometric means were one or two orders of magnitude below the former 200 CFU/100 mL guideline (Table 4.2; Figure 4.4). All individual stations had geometric means of 98 CFU/100 mL or less. Five measurements out of 280 surface water samples were above the value of 200 CFU/100 mL (Appendix C5). The maximum fecal coliform concentration measured in 2020 was 3,400 CFU/100 mL on day one in winter. The reference station at Constance Bank had very low fecal coliforms detected with results ranging from a max of 59 to a minimum of one.

Enterococci results for each sampling event at Clover (including seasonal geometric means) are presented in Appendix C5. No enterococci geometric means were above the federal guideline of 35 CFU/100 mL (Table 4.2; Figure 4.4). Five individual measurements out of 280 (representing 1.8% of the surface water samples) were above the federal single value guideline of 70 CFU/100 mL, (Appendix C5) in winter and spring. The maximum enterococci concentration measured in 2020 was 920 CFU/100 mL on day one in winter, concurrent with the highest fecal coliform concentration noted above. The reference station at Constance Bank had very low enterococci results with results ranging from a max of 27 to a minimum of one.

In 2020, there were no human health guideline exceedances for fecals and enterococci. The Clover outfall was inspected by remotely operated vehicle in 2017, which found no deficiencies in the diffuser that could cause water quality issues in the receiving environment.

Relatively elevated bacterial results in winter suggest that diluted effluent was surfacing during these sampling events and some risk to human health was present for anyone recreating at the ocean's surface during these times of year. Overall, however, results were within the expected concentrations predicted by hydrodynamic modelling (Hodgins, 2006). The C3 model predicts a less than 2% chance that the Clover effluent would reach the surface during slack tide in winter and an even lower chance during other times of the year (Hodgins, 2006). Although the plume is highly diluted by the time it reaches the surface (average dilution of 1500:1), fecal coliform and enterococci concentrations above 200 and 35 CFU/100 mL, respectively, are predicted to occur. Summer plume surfacing events are also predicted at both outfalls, associated with the morning flush in the wastewater system, weak water column stratification and slack tide (Lorax, 2009). These events are predicted to be less frequent than in winter. During summer, the core of the plume is predicted to be trapped at depth, but the diluted edge of the plume is predicted to occasionally surface. The modelling assumes a fully functioning outfall diffuser.

Overall, the data indicate that the Clover effluent plume was predominantly trapped below the surface, as predicted by the model, and that the outfall diffuser was achieving adequate dilution. Had the effluent plume not been predominantly trapped, more frequent high fecal coliform and enterococci concentrations would have been observed, particularly at stations approximately 100 m from the outfall, where the model predicts the plume is most likely to surface (Hodgins, 2006). If more regular plume surfacing was occurring, we would expect to see fecal coliform concentrations of approximately 4,390 CFU/100 mL, based on applying the average dilution factor of 1,500:1 to the 2020 mean wastewater fecal coliform concentration of 6,585,000 CFU/100 mL (Table 2.9) As mentioned above, the maximum fecal coliform concentration was 4,900 CFU/100 mL at sample stations adjacent to the outfall and were low at the Constance Bank reference site.

Table 4.2 Clover Surface Water (1 m depth) Fecal Coliform and Enterococci Seasonal Geometric Means

Fecals	Winter	Spring	Summer	Autumn
Clo-01	65	20	3	7
Clo-14	38	25	3	19
Clo-16	29	14	2	8
Clo-18	23	10	3	4
Clo-20	51	15	4	4
Clo-22	46	27	7	12
Clo-24	36	98	6	19
Clo-26	38	22	4	9
Clo-28	23	10	4	6
Clo-30	27	7	2	4
Clo-32	23	9	3	5
Clo-34	36	14	3	6
Clo-36	33	21	5	16
Clo-D1	33	---	2	4
CB-Reference	9	---	3	3
Enterococci	**Winter**	**Spring**	**Summer**	**Autumn**
Clo-01	10	4	1	2
Clo-14	14	5	1	3
Clo-16	9	3	1	2
Clo-18	6	2	1	2
Clo-20	13	2	1	2
Clo-22	12	5	1	4
Clo-24	9	12	2	3
Clo-26	9	6	1	2
Clo-28	8	2	2	1
Clo-30	6	2	1	1
Clo-32	4	2	1	1
Clo-34	8	4	1	2
Clo-36	9	9	2	4
Clo-D1	16	---	3	1
CB-Reference	3	---	1	2

Notes:

Results exceeding the rescinded BC water quality guidelines (geometric mean of 200 CFU/100 mL for fecal coliforms) and Health Canada's (geometric mean of 35 CFU/100 mL for enterococci) are highlighted. Results are presented in geometric means of "5-in-30" day sampling (CFU/100 mL).

--- denotes sampling did not occur due to adverse weather or drogue loss.

* not a complete set of five sampling events due to weather

Figure 4.4 - Clover Point Surface Water Stations

Fecal Coliform and Enterococci Results - 2020 (5 in 30)

- Clover Point Surface Sampling Stations
  Geo mean fecal count / Geo mean enterococci count
- Initial Dilution Zone
  (100 metres from diffuser)
- Outfall Pipe
- Diffuser

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

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Metres 0 100 200 300 400 500

Projection: UTM ZONE 10N NAD 83

N W E S

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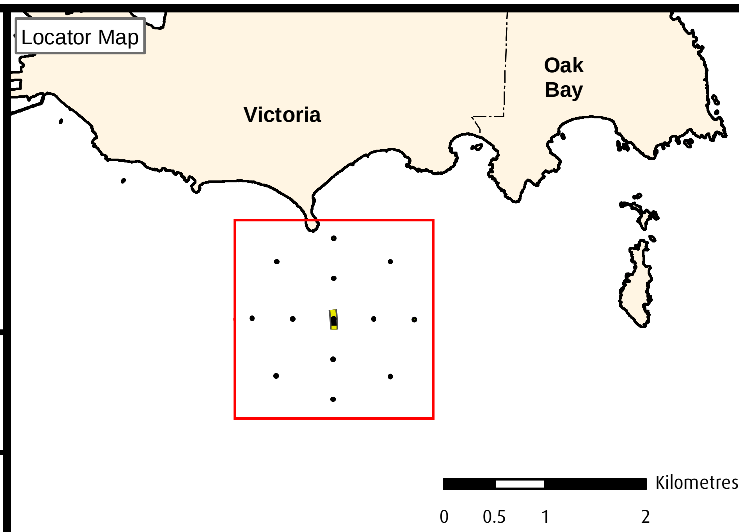
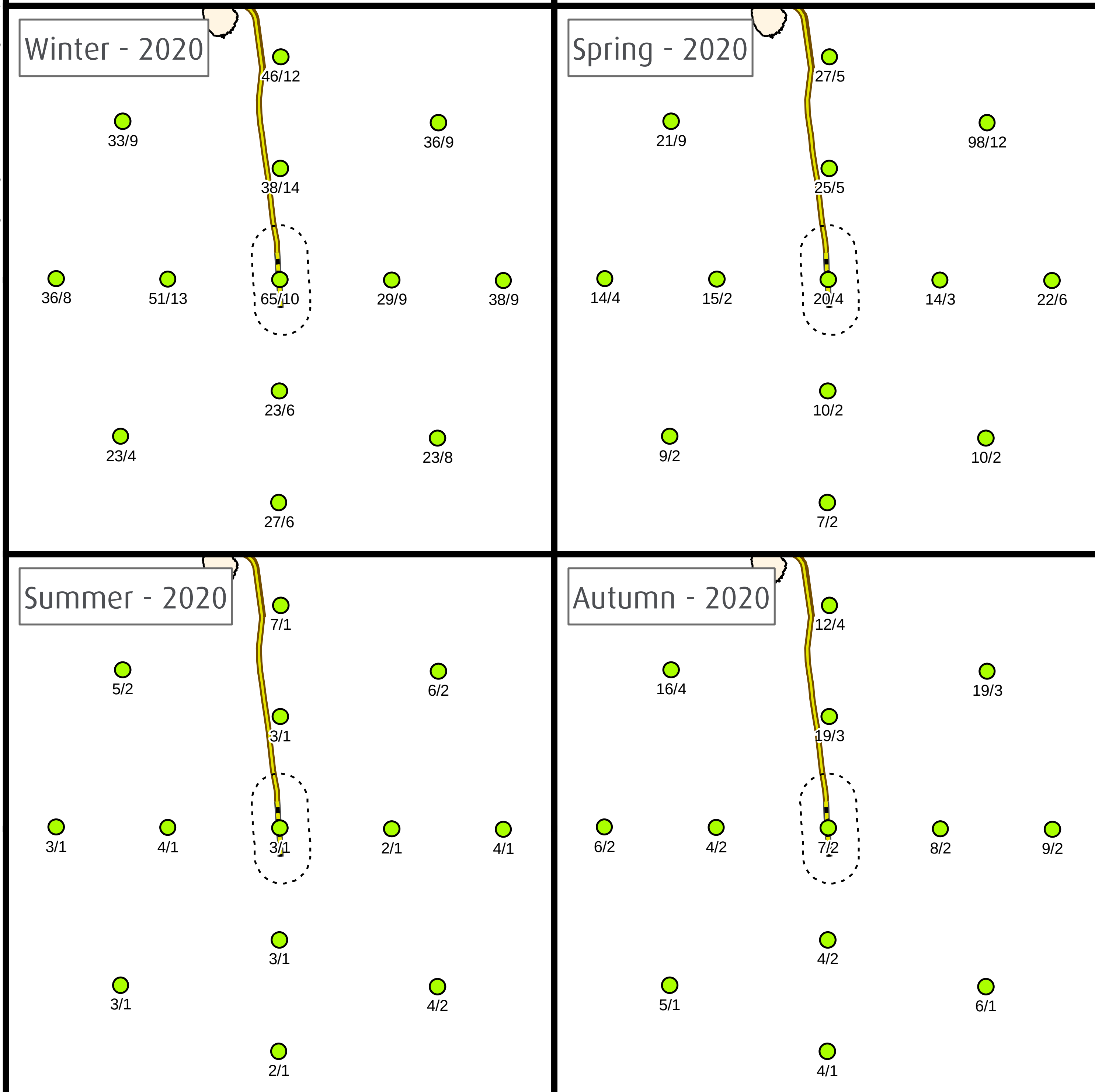




CRD - Parks & Environmental Services - Environmental Engineering - Feb 12, 2021 - Technologist: sruljancich - Map Document: SurfaceSamplesClov2021FieldMapSeasonsReport.mxd

Initial Dilution Zone Water Column - Clover

Analytical results for each IDZ water column sampling event at Clover are presented in Appendix C6. CTD, dissolved oxygen plots for each sampling day are presented in Appendix C7. As noted previously, no IDZ sampling took place in April due to COVID concerns.

Only samples for which results were above detection limits, and have either BC Approved Water Quality or CCME guidelines, are presented (Appendix C6) (ammonia, arsenic, boron, cadmium, copper, enterococci, fecals, lead, nickel, silver and zinc). All other results are available upon request.

Figure 4.5 presents the geometric means of maximum (i.e., worst case from each day in the “5-in-30” round) enterococci and fecal coliforms concentrations for each of the seasons’ samples (winter, summer and autumn).

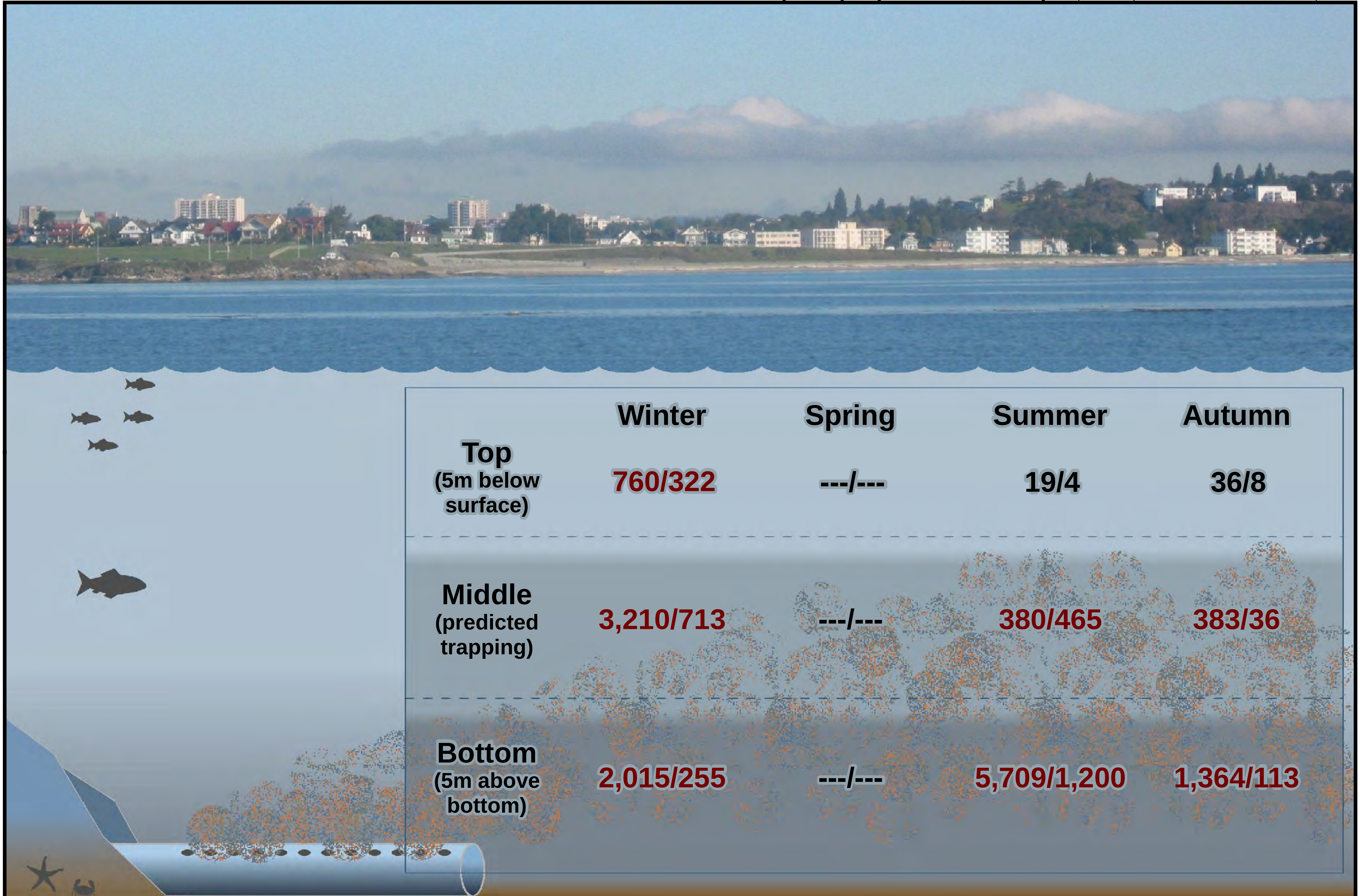
The geometric means of the “5-in-30” fecal coliform water column results exceeded the 200 CFU/100 mL guidelines consistently at the middle or bottom (within the plume’s predicted trapping depth) sampling depths with the winter season exceeding at the top depth (Appendix C6) aligning with surface water sampling results. Constance Bank IDZ samples did not exceed WQG in any season and were consistently lower than outfall sampling sites.

The geometric means of the “5-in-30” enterococci water column results exceeded the 70 CFU/100 mL guidelines at the middle or bottom depths. Enterococci exceeded guidelines at the surface (top of the water column) in the winter with a geomean of 322 CFU/100 mL. Single value exceedances to the federal enterococci guideline of 70 CFU/100 mL occurred 20% of the time (Appendix C6), with slightly fewer exceedances in summer than winter and autumn Constance Bank IDZ samples did not exceed WQG in any season and were consistently lower than outfall sampling sites.

There were no exceedances of provincial or federal guidelines for any of the metals that were analyzed in the water column IDZ samples or at the Constance Bank reference, except for boron in all samples. Concentrations of total boron almost invariably exceeded the provincial guideline of 1.2 mg/L, with values ranging from 3.13-3.65 mg/L and 3.14-3.50 mg/L at the reference station. However, ambient boron concentrations, as confirmed by results from the reference station, are approximately 4.0 mg/L in southern Vancouver Island marine waters (BCMoE, 2006). Therefore, it is inevitable that guidelines are exceeded, but not as a result of the outfall.

Water column profiles of temperature, salinity and dissolved oxygen (Appendix C7) generally followed expected seasonal patterns for the Salish Sea (well mixed in winter and stratified in summer). It appears that the plume was only occasionally detected by the sensors, based on observations of reduced oxygen levels and transmissivity when compared to concurrent elevated levels of the bacteriological indicators (fecal coliforms and enterococci). A master’s thesis (Krogh *et al*., 2018), examined vertical profiles of dissolved oxygen between 2011 and 2016, confirming that of the approximately 850 CTD casts conducted, only six profiles showed any evidence of a sewage plume layer, using reduced dissolved oxygen as an indicator.

CTD profiling will continue as part of the routine environmental monitoring program. This data is also used to populate the oceanographic database that underlies the dispersion model used to forecast plume depth and direction.



	Winter	Spring	Summer	Autumn
Top (5m below surface)	760/322	---/---	19/4	36/8
Middle (predicted trapping)	3,210/713	---/---	380/465	383/36
Bottom (5m above bottom)	2,015/255	---/---	5,709/1,200	1,364/113

Fecal Coliform — **51/13** — Enterococci

Clover Point IDZ station geometric means of fecal coliform and enterococci counts CFU/100mL (maximum concentrations).

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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 35 CFU/100mL.

4.3.3 Trend Assessment Results

Hatfield's comprehensive assessment of 2011-2019 data (Hatfield 2020) found that fecal coliform concentrations at sites around Macaulay Point were lower than those around Clover Point in all seasons in surface waters, but were similar at the effluent-trapping depth. Fecal coliform concentrations at all depths decreased with distance from the outfall regardless of the direction while considering the inter-annual and seasonal variations at each site. Enterococcus, ammonia, manganese, potassium, and sodium showed increasing trends, whereas calcium, silicon, and zinc showed decreasing trends in most seasons at both outfalls. Water quality samples from the middle and bottom depths at the IDZ generally showed frequent guideline exceedances, whereas exceedances were not observed in water samples collected from surface at both outfalls. Fecal coliforms, *Enterococcus spp.*, and boron frequently exceeded relevant water quality guidelines at both outfalls. Cadmium, chromium, copper, selenium, zinc exceeded their respective guidelines on a few occasions, which may have been also related to background conditions because enterococci, boron, and zinc exceeded guidelines at the background site.

4.3.4 Overall Assessment

Overall, the 2020 surface fecal coliform and enterococci results indicate that the outfall plumes were predominantly trapped below the ocean surface and the diffusers were working as expected for most of the year. There did appear to be some surfacing predominantly in the winter around both outfalls. The potential for human exposure to high fecal coliform and enterococci concentrations from the wastewater was moderate around the outfalls, as surface water "5-in-30" geometric mean results were all below thresholds used to assess risk to human health, with the exception of twice at the surface of the IDZ. No surface water quality guideline exceedances were observed greater than 100 m from the outfall, but there were a number of single value enterococci results that exceeded the single sample criteria. These exceedances occurred in the winter sampling periods, when plume surfacing events are more likely to occur. The seasonality of the high bacterial counts can be attributed to higher effluent flows in winter, coupled with the oceanography of this particular area during the winter months (relative lack of water column stratification due to wind and cooler surface waters).

The IDZ water column sampling, however, indicated that many fecal and enterococci results were above guidelines at depth, with the highest magnitude bacteriological guideline exceedances observed at the middle and bottom depths, generally below 40 m. Boron exceeded guidelines in all samples, even those at the reference station.

Results from the fall sampling round confirmed that the cumulative signal when both Macaulay and McLoughlin are simultaneously discharging is detectable around the Macaulay outfall. Even when the McLoughlin outfall is the sole discharge location, its plume is detectable at the Macaulay sampling stations even though the predominant current and tide influence is in the opposite direction towards the southeast. The 2021 sampling program will shift to stations around the McLoughlin outfall to assess the IDZ and surface impacts of the new outfall. Future IDZ and surface sampling around the Macaulay and Clover outfalls will only take place if they are concurrently discharging with McLoughlin and sampling schedules align.

Similar to wastewater observations, the bacteriological guideline exceedances are expected to continue even once the majority of Core Area flows are diverted through the new McLoughlin wastewater treatment plant. This is because disinfection has not been installed at the new McLoughlin plant, and there will continue to be occasional wet weather and emergency overflows out the Macaulay and Clover outfalls. However, the magnitude and frequency of the exceedances will be greatly reduced overall as the McLoughlin treatment processes are expected to reduce wastewater bacterial concentrations by approximately 1-2 orders of magnitude.

5.0 SEDIMENT AND MUSSEL TISSUE CHEMISTRY

5.1 Introduction

The effects of the wastewater discharges on the seafloor adjacent to the Macaulay and Clover points outfalls have been measured in a variety of ways since the WMEP monitoring began. The most recent changes to the seafloor monitoring component of the WMEP were made based on the recent WMEP review by CRD and ENV staff and the implementation of a revised five-year monitoring cycle beginning in 2011 (Table 1.1). These changes included a reduction in both the number of seafloor stations, as well as the sampling frequency for sediment chemistry and biological communities (i.e., mussels at Clover and benthic invertebrates at Macaulay). These reductions were made to allow for the addition of comprehensive sediment toxicity and bioaccumulation testing, and a finfish survey. Changes to program design we also made in 2019 to add sampling stations around the new McLoughlin outfall, where benthic invertebrate assessments will be undertaken concurrently with the Macaulay sampling.

2020 was year five of the five-year monitoring cycle (Table 1.1). The 2020 seafloor sampling program consisted of a sediment chemistry monitoring program around the Clover Point outfall, along with assessments of mussel tissue chemistry and organism health.

The use of bivalves as indicators of potential environmental effects is extensive. Previous surveys have involved assessing native populations, installed populations (i.e., caged or transplanted) or laboratory-based assessments. The most widely used bivalve genus in monitoring and research programs has been *Mytilus sp*., and more specifically, *Mytilus edulis*. Resident populations of *Modiolus sp*. mussels have been used less frequently in monitoring and research programs primarily due to their lack of commercial use, but also due to their infrequent occurrence at monitoring sites.

In general, organisms, such as mussels, divide their energy between biological functions, such as growth, reproduction, and survival. The amount of energy available for these functions is usually limited, and when organisms are under stress from natural or anthropogenic sources, they generally respond by concentrating their energy into the most important function (i.e., survival). Therefore, a stressed community will show reduced growth and reproduction. For mussels, these potential effects can be assessed by measuring the length, width and weight of individuals, the age structure, and the reproductive status (i.e., gonadal index, timing index, and comparison between sexes) of the community. The main objective of this mussel program was to determine how biological parameters and tissue concentrations vary with distance from the outfall and to monitor changes over time.

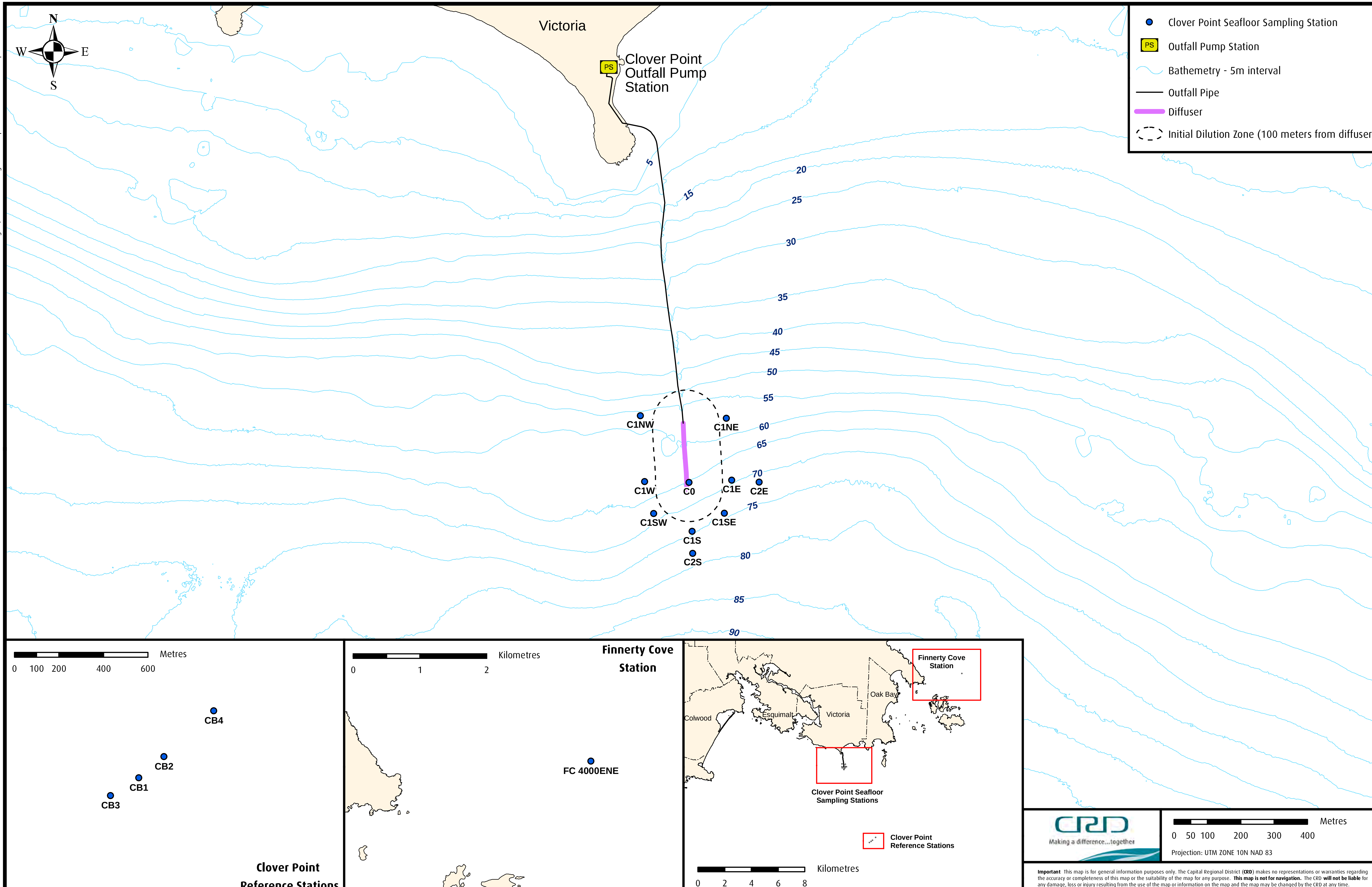
Detailed spatial and temporal statistical analyses of the mussel data are conducted on a regular basis, typically every three to five years. These analyses help in the determination of the potential effects related to the outfall, what factors (such as specific contaminants, natural variability, etc.) may be causing any effects, and if the effects are ecologically significant now or could be in the future. A detailed assessment was undertaken by Hatfield Consultants on the 2011-2019 dataset, the results of which are presented in this report (Appendix D7).

5.2 Methods

The Clover Point seafloor sampling followed established protocols and guidelines that have been developed to standardize marine sampling techniques and help to reduce variability between sampling events (PSAMP, 2002). In addition, sampling methodologies were harmonized in 2014 with protocols, methodologies and target analytes of the Ocean Wise Conservation Association's Pollution Tracker Program and SSAMEx programs (Section 6.0). Sampling was conducted off the research vessel MV Strickland, using a 0.1 m^2 Van Veen grab sampler (Picture 5.1).

Sediment and samples of the local mussel species, Northern Horse mussel (*Modiolus modiolus*), were collected from 10 stations (Appendix D2) located in the near-, mid- and far-fields of the Clover Point outfall in September 2020 (Figure 5.1) from UVIC's MV Strickland, a 15-m research vessel. Samples were also collected from three associated reference stations at Constance Bank, and from one station at Finnerty Cove. The area 100 m around the diffuser section of the outfall is defined as the IDZ. Stations are designated as follows:

- C (for Clover)
- 0 (for the station located immediately above the outfall terminus), 1 (for stations at or just outside the IDZ) or 2 (for stations situated approximately 200 m from the outfall terminus)
- E, N, etc. (for the compass direction from the outfall terminus)
- CB1 through CB3 for Constance Bank reference stations
- FC for Finnerty Cove



CRD - Parks & Environmental Services - Aug 17, 2016 - Technologist: SR - Map Document: SeafloorSamplesClov2016.mxd

Picture 5.1 Seafloor Sampling Van Veen Grab

Sediment Sampling

Three replicate grabs were collected and composited into one sample representing each station using methods consistent with previous monitoring years (i.e., collecting sediments only from the top 2 cm of each grab).

The sediment chemistry parameter list is found in Appendix D1. Sediments were analyzed for over 550 routine and high-resolution analytes. Ten percent of the sediment samples were randomly chosen for additional laboratory and field triplicate analyses. The analytical laboratory, BV Laboratories (Burnaby, BC), also conducted internal QA/QC analyses, including method analyte spikes, method blanks and standard reference materials.

Sediment quality guidelines (SQGs) 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 multiple SQGs in use in North America today, varying 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 select marine SQGs to determine which ones were most applicable for monitoring at the Macaulay and Clover points outfalls (Avocet, 2007). Based on these results, the following SQGs were determined to be the most relevant and reliable, specifically for the Macaulay Point results, and were, therefore, used in the assessment of sediment quality data in this report: the WSDOE 2LAET (WSDOE, 1991); the BC SedQCtcs (BCMWLAP, 2003), and the CCME PEL (CCME, 2002).

Mussel Sampling

At each sampling site, 25 mussels were randomly selected. CRD staff measured physical parameters, including length, width, and tissue weight. Mussel shells were also cleaned for aging by Biologica Environmental Services Ltd. (Victoria, BC). After weighing the mussel tissue, 10 mussels were randomly selected and one tissue cross section from each was preserved in Davidson's solution. The tissue cross sections were submitted to BC Animal Health (Abbotsford, BC), where they were processed using routine histological techniques.

Tissue from 15 mussels from each station were homogenized and analyzed for various inorganic and organic chemicals, including total metals, chlorinated hydrocarbons, semi-volatile organics, base-neutral extractables, chlorinated phenolics, PAHs, polychlorinated dibenzo-p-dioxins (PCDDs) and phthalates (Appendix D1). SGS AXYS analyzed the tissue for high-resolution analysis and the remaining tissue was subsampled and sent to BV Labs (Burnaby BC) for the remaining priority substances analyses at routine detection limits. Ten percent of all tissue samples were subjected to laboratory and field QA/QC protocols that included the analysis of field triplicates, laboratory triplicates, a method blank and a spiked reference material (SRM) analysis. A detailed description of analytical methods and all QA/QC procedures are presented in CRD, 2011.

4.3 Results and Discussion

Comparison to Sediment Quality Guidelines

The 2020 routine resolution sediment chemistry data (Appendix D4) indicated that effects of the outfalls on the seafloor were still spatially limited. However, the 2020 sediment chemistry had fewer SQG exceedances relative to the previous 2015 sampling. In 2015,there were 24 values (representing approximately 0.63% of results above detection limits) exceeding at least one SQG (CRD, 2016), compared to only nine exceedances in 2020 (1,2,4-trichlorobenzene, copper, lead, mercury and total PCBs). Table 5.1 presents these results and shows that exceedances were seen at all distance groupings (outfall, near-field, far-field and reference).

Hatfield's comprehensive assessment (Appendix D7) found that sediments close to the outfall had increased concentrations of arsenic, cadmium, copper, molybdenum, and zinc, most PCB congeners, PBDE congeners, pesticides, and dioxins/furans, relative to mid-field, far-field, and background site groups. Sediment concentrations greater than guidelines were observed for copper, lead, mercury, zinc, some PAH compounds, PBDE 99, total pentaPBDE, pesticides, butylbenzyl phthalate, bis[2-ethylhexyl]phthalate, total PCBs, and total phenols. However, 2-methylnaphthalene (PAH), total hexachlorocyclohexane (pesticide), and total phenols were also elevated in sediments from the background site group, which suggested other sources in addition to the outfall. When temporal trends are evaluated for Clover Point, nine PCB congeners showed decreasing trend and three PCB congeners, two PBDE congeners, and three pesticides showed increasing trend over the monitoring years. All these constituents measured in wastewater effluents demonstrated decreasing trend, further indicating other sources of these organics around the Clover Point outfall. However, many of these analytes also had similar temporal trends at background/reference site group (Hatfield, 2021).

Mussel Community Indicators and Health

A summary of the 2020 mussel biological parameters (shell age, length, width and tissue wet weight) are presented in Figures 5.3-5.5. Measurements for all 2020 mussels are in Appendix D5. Average shell length and shell width were generally largest at the outfall stations decreasing with distance away from the outfall (Figure 5.4). A similar pattern was observed for tissue wet weight (Figure 5.5). These patterns are qualitatively similar to mussels sampled previously around Clover Point, including the most recent year, 2015. The presumed cause is the availability of an enhanced organic food source (discharged from the outfall) that diminishes with distance from the outfall. Additional research would be necessary to confirm this cause-and-effect relationship.

A total of 140 mussel samples were examined for Gonadal Index (Figure 5.2) and histology (Yu Xin, 2021, Appendix D6). Of the 140 mussels (Table 5.2), 72 were males, 65 were females and two were immature with unidentified sex. Among the 140 samples, the gonads of 50 (36%) of the mussels were at the developing stage, 43 (31%) were fully ripe, 40 (29%) were at spawning condition, and two (~1%) mussels were spent.

The histological examination (Table 5.3, Appendix D6) revealed few diseases or parasites of concern in mussel tissue outside of what is seen in an unimpacted population. In all the cases, there was no evidence of pathology associated with these mussels.

Results from Hatfield's assessment of 2011-2019 found that mussel shell length, width, and weight, tissue weight, and growth (both length and weight) were larger at the near-field site group relative to far-field and background site groups in most monitoring years. Decreasing trends in growth and tissue weight and increasing trends in age, shell length, shell weight, and shell width were found in mussels at the near-field site group. Opposite trends in these growth metrics were observed at the background site group. In the near-field group, standardized effect sizes for shell length, shell width, and shell weight increased from 2008 to 2015, indicating the difference between near-field and other exposure groups has increased for these metrics over the study period (Hatfield, 2021).

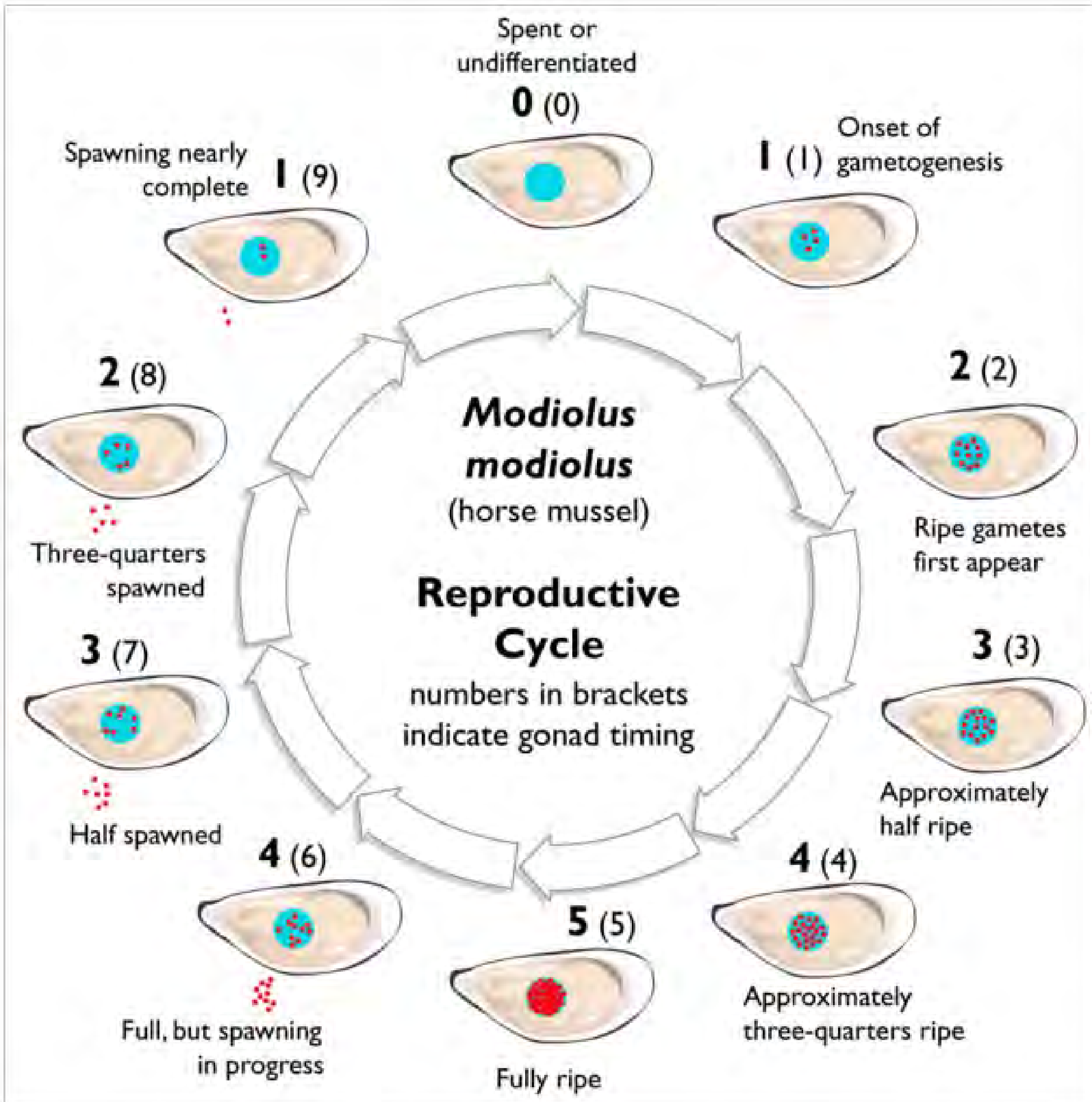


Figure 5.2 Gonadal Index – Reproductive Cycle

Mussel Tissue Chemistry

Appendix D3 presents tissue chemistry results. Of the approximately 550 analytes measured in 2020, 59% were detected at both routine and high-resolution detection limits, including metals, some volatile organic compounds, benzene, some Organochlorine pesticides (OC), PAHs, PBDEs, PCBs, some PCDDs, some PPCPs and perfluorooctane sulfonate (PFOS).

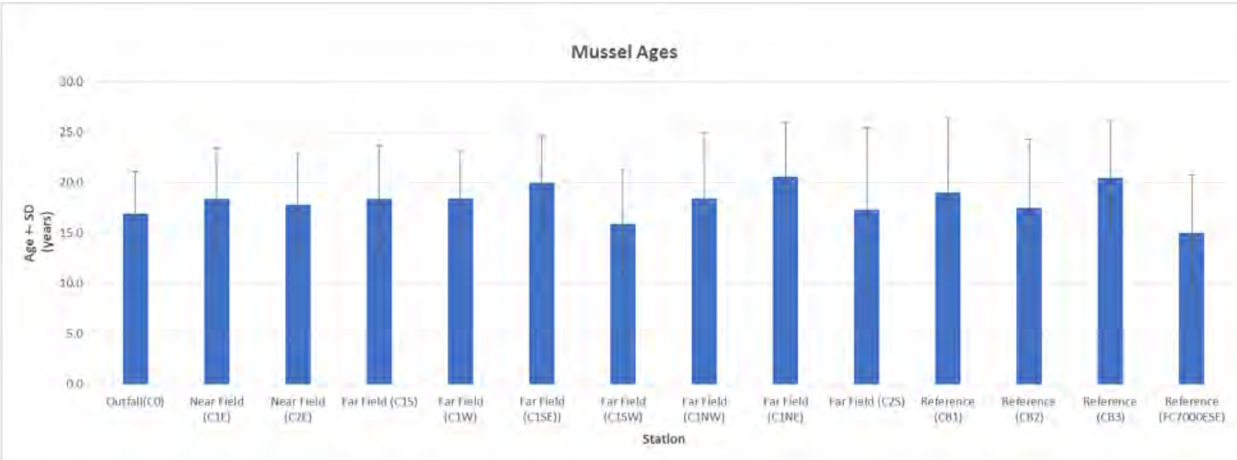
Results from Hatfield's assessment of 2011-2019 found evidence of enrichment effects in mussels near the outfall. Concentrations of several PAHs, PBDEs and PCBs were significantly higher in the tissue of mussels collected at the near-field site group than at the background site group. However, no such spatial differences were observed for most metals, phenolics, volatile/semivolatile organics, pesticides, and phthalates. Overall, tissue chemistry indicates an effect at the near-field site group, relative to the far-field and background site groups, likely associated with the Clover Point outfall. The overall trends of tissue chemistry indicate an effect at near-field site group, relative to far-field and background site groups, associated with the Clover Point outfall.

Table 5.1 Sediment Quality Guideline Exceedances Summary, 2020

						Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	CONSTANCE Bank #3	CONSTANCE Bank #2	Constance Bank #1	Finnerty Cove
	Unit	DL	CCME-PEL[1]	BC-CSR-TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Outfall	Near Field		Far Field									Reference			
ORGANICS																					
1,2,4-Trichlorobenzene	ng/g dry	0.0193			0.031	---	---	---	---	---	---	0.316	0.275	---	---	0.415	---	---	---	---	0.413
METALS																					
Copper	mg/kg dry	0.5	108	130	390	202	15.8	15.4	17.9	11.5	11.7	12.5	13.1	12.7	12.5	12.5	11.1	14.8	13	13.1	15.8
Lead	mg/kg dry	0.1	112	130	450	329	4.72	8.88	6.95	6.24	5.23	5.86	5.92	7.94	5.06	4.98	11.3	6.4	6.35	6.16	6.69
Mercury	mg/kg dry	0.05	0.7	0.84	0.41	0.256	4.16	0.084	0.081	<0.05	5.66	<0.05	<0.05	<0.05	0.052	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCBS																					
PCBs Total	pg/g dry	---	189,000		120,000	1,770	1440	831	919,000	525	522	706	1,110	1,900	729	679	885	788	787	537	795

Notes:
[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), Highlighting indicates that concentration exceeds at least one of the sediment criteria, --- data not quantifiable.

Figure 5.3 Mussel Ages

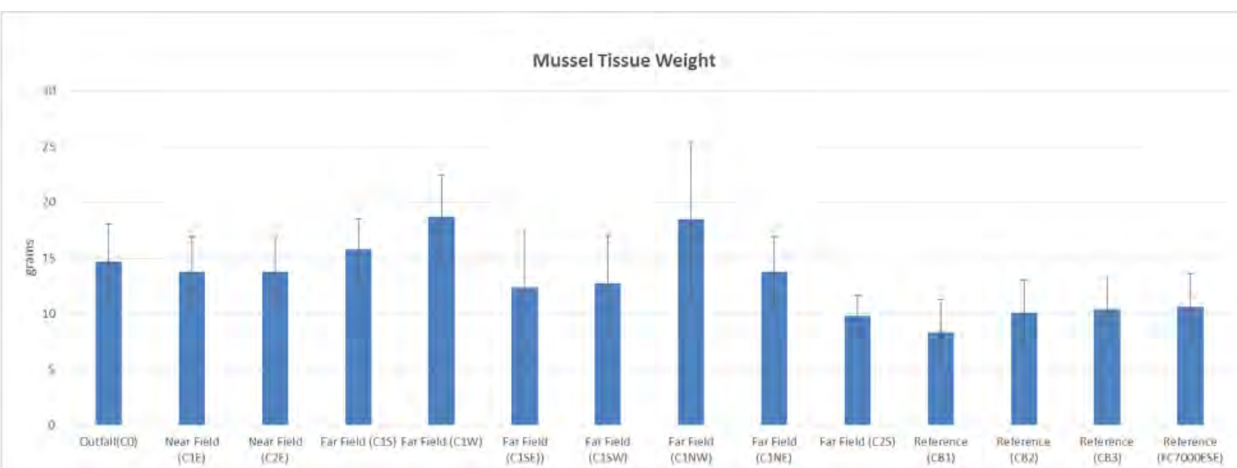


*Error bars represent standard deviation

Figure 5.4 Mussel Shell Width and Length

*Error bars represent standard deviation

Figure 5.5 Mussel Tissue Wet Weight



*Error bars represent standard deviation

Table 5.2 Summary of Mussel Reproductive Stages, 2020

Location	Number of mussels examined				Number of mussels in each reproductive stage										Gonadal index average
					Developing				Ripe	Spawning				Spent	
	M	F	I	H	onset of gametogenesis	1st ripe gametes	≈1/2 ripe	≈3/4 ripe		spawning in progress	≈1/2 spawned	≈3/4 spawned	nearly complete		
CO	4	6	0	0	0	0	1	0	4	3	2	0	0	0	4.1
C1NE	4	5	0	0	1	0	1	1	2	3	0	1	0	0	3.4
C1W	4	6	0	0	0	0	1	6	0	3	0	0	0	0	3.9
C1NW	7	2	0	0	0	0	0	2	3	4	0	0	0	0	4.3
C1S	8	2	0	0	0	0	0	1	9	0	0	0	0	0	4.9
C1SE	5	4	0	0	0	0	2	1	3	3	0	0	0	0	4.1
C1SW	5	5	0	0	0	0	1	2	2	5	0	0	0	0	4.1
C1E	5	4	0	0	0	0	1	1	6	1	0	0	0	0	4.6
C2S	4	6	0	0	0	0	0	1	6	2	1	0	0	0	4.5
C2E	1	8	0	1	0	0	1	2	4	2	0	0	0	0	4.3
CB1	3	6	1	0	0	0	6	3	0	0	0	0	0	1	3
CB2	6	3	1	0	0	0	0	2	0	7	0	0	0	1	3.6
CB3	6	4	0	0	0	2	4	2	0	2	0	0	0	0	3.2
FC7SE	7	3	0	0	0	0	3	1	4	0	2	0	0	0	3.9
Total	72	65	2	1	1	2	21	26	43	34	5	1	0	2	

M=male, F=female, I=indeterminate sex, H=hermaphrodite

Table 5.3 Mussel Histology Exam Results

		Pathology												OIE and Other Diseases of Concern							Other Diseases, Parasites and Symbionts																
Location	Specimen number	P.M. or Degenerative Change	Diffuse Hemocyte Infiltration	Focalized Hemocyte Infiltration	Diapedesis	Metaplasia	Neoplasia	Ceroid Bodies	Gonad Resorption	VGH	Kidney Concretion	Hemocyte with yellow granule deposits	Basophilic stained depositions	*Bonamia spp.*	*Mikrocytos mackini*	*Marteilia refringins*	*Marteilia sydneyi*	*Marteiloides chungmuensis*	*Perkinsus spp.*	*Haplosporidium spp.*	RLP (gill, mantle or palp epithelium)	RLP (DGT or gut epithelium)	Vibriosis	Nocardiosis	Other Bacteria (* specify)	APX (Nematopsis-like sporess)	QPX (Labyrinthuloides sp.)	Kidney Coccidia	Trichodina –like Ciliates	Rhynchodida or Sphenophyra-like Ciliates	*Stegotricha enterikos (DGT lumen)*	Intracellular Ciliates (Mussel DGT)	*Mytilicola spp.*	Encysted Trematode metacercaria	*Prosornychus sp.*	External Protozoa with no pathology assoc.	External Metazoa with no pathology assoc.
CB1	10	0	0	3	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	3	1
CB2	10	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	1	0	0	0	0	0	5	1
CB3	10	0	1	1	1	2	0	0	0	0	1	3	2	0	0	0	0	0	0	0	0	1	0	0	0	10	0	0	0	0	0	0	0	0	0	4	0
C1NE	10	0	1	1	1	1	1	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	2	1
C1W	10	0	0	2	1	1	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	3	0	0	0	10	0	0	0	2	0	0	0	0	0	5	0
C1NW	10	0	0	0	1	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	1	0	0	0	0	0	4	0
C1SE	10	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	10	0	1	0	0	0	0	0	0	0	1	0
C1S	10	0	0	1	1	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	2	0
C1SW	10	0	0	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	1	0	0	0	0	0	0	0	3	2
C1E	10	0	0	2	0	0	1	0	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	10	0	2	0	0	0	0	0	0	0	2	1
C2S	10	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	0	0	0	10	0	0	0	0	0	0	0	0	0	1	3
C2E	10	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	10	0	2	0	0	0	0	0	0	0	5	2
FC7SE	10	0	2	0	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	4	2
CO	10	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	1	0	0	0	7	0	2	0	3	0	0	0	0	0	4	2
TOTAL	140	0	4	15	8	6	4	0	0	0	5	15	18	0	0	0	0	0	0	0	2	8	0	0	0	134	0	8	0	7	0	0	0	0	0	45	15

5.3 Overall Assessment

The 2020 Clover Point sediment chemistry results were generally consistent with previous years and recent reviews (Golder, 2007; Golder, 2011b; SETAC, 2006, Hatfield, 2020). Although there were demonstrable impacts of the outfall on sediment chemistry, as evidenced by SQG exceedances, the number of exceedances was reduced from 2015. Routine and high-resolution sediment chemistry parameter levels around the outfall did not appear to be increasing over time.

The next year (2021) of the monitoring cycle will be Year 1 of Cycle 3, and there is no seafloor monitoring component scheduled (Table 1.1). The next round of seafloor monitoring will take place in Year 2 of Cycle 3 (2022), and will consist of Macaulay and McLoughlin points sediment chemistry, pore-water chemistry and sediment toxicity. In addition, sediment/benthic invertebrate bioaccumulation and benthic community structure will be conducted at McLoughlin/Macaulay Point.

Hatfield's (2020) review of 2011-2019 monitoring data concluded that weight of evidence assessment of CRD monitoring program results indicated that overall risks of ecological impact on regional water bodies (the straits of Juan de Fuca and Georgia) were low. There were moderate effects associated with the outfalls for sediment chemistry in the near-field and mid-field site groups, but far-field site group effects were weak. The weight of evidence analyses suggested the largest effects of CRD discharges on the benthos of the Strait may be associated with long-term reductions in sediment oxidative state due to organic enrichment of sediments near the outfall. Because sediment guideline exceedances were primarily limited to within 400 m from the Macaulay Point outfall and 200 m from the Clover Point outfall, the overall ecological impact of the CRD discharges on the seafloor between 2011 and 2019 was found to be low. It is expected that conditions will improve around the Clover and Macaulay outfalls as the majority of discharge is now tertiary treated and through the new McLoughlin Point outfall.

6.0 ADDITIONAL INVESTIGATIONS

Additional investigations are important elements of the monitoring program and are conducted to address focussed or emerging issues, clarify aspects of the program and provide concurrent data for the assessment of environmental effects. The SETAC review of the program agreed that one-time investigations are appropriate to fill in information gaps, as needed (SETAC, 2006). Studies undertaken as part of the additional investigations component of the monitoring program are usually recommended and reviewed by the advisory group. The advisory group periodically reviews the list of additional investigations based on program results, current scientific issues, and the need to supplement the existing knowledge on environmental effects of the Macaulay and Clover wastewater discharges. Other additional investigations are identified opportunistically through contacts in the local academic and scientific communities.

In 2005, the advisory group initiated a comprehensive review of the list of additional investigations. This review was completed in 2006 and Table 6.1 presents the studies that were recommended based on a risk assessment framework: contaminant source, pathways (ways in which contaminants can reach receptors), and receptors (e.g., fish, invertebrates and human health, etc.). For each of these categories, studies were ranked as high, medium or low priority.

Subsequently, in 2006, the CRD received a letter from the BC Minister of Environment requesting that an amendment to the Core Area Liquid Waste Management Plan detailing a schedule for the provision of wastewater treatment be provided by June 30, 2007. The additional investigations presented were evaluated by the advisory group before this decision to move to advanced treatment was made. As such, all additional investigations that had already been implemented by the receipt date of this letter were continued. Implementation of other investigations was put on hold because their priority was likely to change once higher levels of treatment were put in place at McLoughlin Point. Following a meeting in early 2013, the advisory group was tasked with reviewing and reprioritizing the list, as well as adding any additional potential new studies. This review is ongoing.

Investigations that deal with new emerging scientific issues are best undertaken under collaborative research programs. For example, the potential for environmental effects of PPCP has been identified as a potential environmental concern in the scientific community and was identified as high priority by the advisory group. There was also a requirement under the Core Area Liquid Waste Management Plan approval letter of March 26, 2003, to undertake some collaborative studies on PPCPs. However, when this emerging issue was identified, routine laboratory analytical techniques for quantifying these substances had only recently been developed and there were no commercial laboratories in Canada that could analyze for these compounds. As such, these substances were best assessed in research programs where collaborative resources from academia and government could be used. Since then, commercial laboratories have developed standardized methods and PPCP analyses are now a routine part of the WMEP.

Studies that were underway in 2006 have since been completed or are continuing, but new investigations from Table 6.1 have not been initiated. However, a number of opportunistic collaborative opportunities have come up in recent years. Section 6.1 summarizes additional investigations that were ongoing, completed or initiated in 2019 to mid-2021.

Table 6.1 Macaulay and Clover Additional Investigations Prioritization (2006)

Category	Investigation	Description and Characteristics	2006 Rating	Status/ Anticipated Initiation Date	Anticipated Completion Date
Contaminant Source	Study to address the presence of endocrine disrupting compounds and PPCP in wastewater and the potential effects on the receiving environment	The first part of an overall phased-approach to study these substances will be to measure the concentrations of a group of substances in wastewater. This is an area of emerging concern related to human health and potential environmental effects (from the chemical, biological and toxicological aspects).	High	Initiated in 2004	Completed in 2010
	Assessment of contaminants associated with oil and grease	Determination of contaminants associated with oil and grease originating from the outfalls. Relates to the potential human health and environmental effects issues (e.g., windsurfers, seagulls, etc.). The first phase of this investigation will be to undertake a literature review	Medium	No dates (study will be re-evaluated in the advisory group additional investigation review)	
	Identification of pathogens in wastewater and the presence of these in surface waters around the outfalls	Analysis of wastewater for different types of pathogens that have the potential to affect human health and determine if these pathogens are present in the receiving environment around the outfalls (related to die-offs, etc., in marine waters).	Low	Enterococci were added to the bacteriological target analyte list in 2011. Consideration of additional pathogens will be re-evaluated in the advisory group additional investigation review.	
	Bacteria source identification	Determine the different sources of fecal coliform to differentiate between various mammals, such as cows, dogs and humans.	Low	Planning on undertaking far field characterisation work off the new treatment plant to validate plume modelling.	
Pathways	Sediment transport/deposition/ re-suspension	The first step in this investigation would include a determination of the different particle size fractions in wastewater (this could be conducted through a literature review and/or through laboratory experiments). The second phase would include the determination of the settling of particles from the discharge onto sediments. Results from these analyses would be used in the overall assessment of sediment particle deposition and the subsequent movement of sediments around the outfalls.	High	Initiated in 2005 (study is on hold – will be re-evaluated as part of the advisory group additional investigation review)	

Table 6.1, cont'd

Category	Investigation	Description and Characteristics	2006 Rating	Status/ Anticipated Initiation Date	Anticipated Completion Date
Pathways, *cont'd*	Conduct a sediment core sampling program	Determination of sedimentation and mixing rates and the fluxes of contaminants near the outfalls and at reference sites. A mass balance approach could be used where rates of contaminant accumulation in sediments are compared with the rate of contaminant discharge from the outfalls in an attempt to determine the proportion of each contaminant captured by and stored in the sediments. A sediment trap study could be added to study contaminant transport in the near bottom nepheloid layer.	Medium	Initiated in 2006 in conjunction with Institute of Ocean Sciences.	Completed in 2011
Receptors and Potential Effects	Effects of endocrine disrupting compounds and PPCP on the receiving environment	As part of a phased-approach to study effects of endocrine disrupting compounds, laboratory exposures, bioassay and/or caged studies (or an organism found around the outfall) could be conducted to assess the potential effects of these substances on the receiving environment around the outfalls.	High	Collaborative study with UVic on toxicogenomic effects to benthic invertebrates was initiated in 2007.	Funding not secured and project was shelved
	Assessment of chemical concentrations in tissue of different trophic level organisms (including higher trophic levels)	Measurement of contaminants in crab, finfish or other organisms near the outfalls would provide a basis for a food-ingestion human health risk assessment. This information could also be used to model bioconcentration and biomagnification of contaminants to higher trophic levels near the outfalls.	High	A finfish sampling program was added to the five-year monitoring cycle.	Delayed Cycle 1 survey completed in 2018, with final report received in 2019 Results were presented in the 2019 annual report
	Identification of biological resources	Identification of the harvestable organisms around the outfalls.	Low	No dates (study will be re-evaluated in the advisory group additional investigation review)	
	Clover mussel population biology	Conduct some additional studies on the mussel population around the Clover outfall (e.g., reproductive cycle, health, etc.). Additional data relates to the current monitoring and to potential studies on emerging chemicals.	Low	No dates (study will be re-evaluated in the advisory group additional investigation review)	
	Levels of pathogens in biota (e.g., epibenthic, etc.)	Assess the presence and concentration of pathogens in biota near the outfalls.	Low	No dates (study will be re-evaluated in the advisory group additional investigation review)	
	Assess potential risks associated with pathogens/antibacterial resistance	A literature review, risk assessment or a pilot study could be conducted to study antibiotic bacteria and the relevance as a potential emerging concern to human health, wildlife and domestic animals.	Low	No dates (study will be re-evaluated in the advisory group additional investigation review)	
	Investigate the structure of algal plankton communities	Assess the potential effects of the wastewater discharges on algal communities (planktonic and benthic).	Low	No dates (study will be re-evaluated in the advisory group additional investigation review)	

6.1 Investigations Completed or Underway from 2019 to mid-2021

The WMEP participated in the following additional investigations:

- continued participation in the Ocean Wise Conservation Association's SSAMEx and Pollution Tracker programs;
- continuation of a collaborative project with the Ocean Wise Conservation Association and Vancouver Island University to develop methods for microplastic analyses in wastewater and environmental samples;
- continuation of a collaborative project with Biologica Environmental Services Ltd. (Victoria, BC) and the University of Chicago to assess live versus dead benthos assemblages around the Macaulay outfall;
- continuation of a collaborative project with Biologica Environmental Services Ltd., UVIC, and Metro Vancouver to develop benthic invertebrate toxicogenomic monitoring tools;
- continuation of a collaborative assessment of the uptake and trophic changes in PCBs in the benthic marine food chain around the Macaulay outfall;
- participation in a UVIC and industry collaborative project to assess COVID-19 presence in regional wastewaters; and
- participation in a University of British Columbia and industry collaborative project to develop a handheld device to monitor and detect microorganisms in wastewater.

6.1.1 Ocean Wise Conservation Association's SSAMEx and Pollution Tracker Programs

The Ocean Wise Conservation Association's SSAMEx program is a trans-boundary initiative with the aim to build on current monitoring initiatives, enable data sharing to fill gaps in existing coverage for the Salish Sea, and provide a platform for discussion and dialogue among partners. The primary objective of SSAMEx is to facilitate the generation of a cross-jurisdictional trans-boundary dataset that focuses on ambient background conditions in the Salish Sea, such that other monitoring activities (e.g., municipal wastewater outfall monitoring) have a greater ability to determine whether observed shifts in results are associated with natural factors (e.g., climate related) or anthropogenic influences (e.g., wastewater outfalls). One of the main ways that SSAMEx achieves its objective is by developing harmonized sampling methodologies that can be adapted by the various organizations undertaking monitoring throughout the Salish Sea.

The objective of the Ocean Wise Conservation Association's Pollution Tracker program is to assess contaminant levels and profiles along the BC coast, via the collection of surface sediments and shellfish, both near and far from pollution sources. The program meets its objective by supporting new and existing sampling efforts and through coordinating laboratory analyses. The data generated is used to produce "state of the coastal environment" reports for partners and the general public, produce scientific publications, and populate the SSAMEx with data from background sample locations.

In 2020, the CRD continued to analyze an expanded contaminant list in Core Area wastewaters that aligns with the Pollution Tracker target analyte list. The 2020 seafloor sampling was also harmonized with SSAMEx methodologies. In 2020, staff and external researchers also used monitoring program and Pollution Tracker data to start to characterize and assess behaviour of PCB contaminants throughout the Salish Sea; additional details about these assessments can be found in Section 6.1.5.

6.1.2 Microplastic Analytical Methodology Development

The Ocean Wise Conservation Association is working to assess microplastics in the ocean waters and sea life of the Salish Sea. The Vancouver Island University was also undertaking similar work, though their program has since stopped. The CRD provided 2015 Clover mussel samples to Vancouver Island University to help them develop methods that will be used to determine if plastics are accumulating in sea life tissues. It is doubtful that any results will be received due to the program shutting down. In addition, the CRD provided the Ocean Wise Conservation Association with 2016 wastewater and 2017 sediment samples from Clover and Macaulay and, in conjunction with the Regional Source Control Program, samples from a residential wastewater catchment area upstream in the sewage system. The Ocean Wise

Conservation Association has been using these samples to develop analytical methodologies that determine both quantity and type of plastics in wastewater and environmental samples.

The CRD has recently reached out to the Ocean Wise Conservation Association to determine whether their lab has capacity to receive more CRD samples, specifically from McLoughlin to determine the plant's efficiency at reducing microplastic loadings to the environment. It is hoped that the lab will be able to start receiving samples in 2022.

6.1.3 Benthos Death Assemblages

In early 2016, the monitoring program was approached by the CRD contract taxonomist (Biologica Environmental Services Ltd.) and a University of Chicago researcher to gauge willingness to provide archived Macaulay benthic sample debris for further assessment. The researcher was interested in comparing the "death assemblages" of molluscs and bivalves contained within the archived debris to the "live" communities that are assessed by Biologica in routine environmental monitoring program sediment samples. Such live-dead comparisons have been used elsewhere to assess anthropogenic stressors over time.

The monitoring program provided 2010, 2014 and 2017 debris to the University of Chicago. The 2005-2017 "live" Macaulay community data were pooled to establish average bivalve species composition per site and the 2014 and 2017 debris samples were picked for "dead" individuals.

The live-dead comparisons generally matched the spatial patterns observed in the other monitoring program seafloor monitoring components (sediment chemistry, etc.) and were indicative of the already known outfall nutrification impacts. Pollution and organic enrichment-tolerant bivalves were found in higher abundance in the debris samples collected close to the outfall, and decreased with distance from the outfall. There were also differences in live-dead taxa abundances that varied with proximity to the outfall. Overall, the results suggest a nutrient footprint that extends greater than 1 km away from the Macaulay diffuser, slightly farther than what the routine environmental monitoring program stations would capture. The results are being further assessed.

The preliminary findings were presented at the Geological Society of America Annual Meeting in Seattle in October 2017, and more complete findings were presented at the 2020 Salish Sea Ecosystem Conference in Vancouver. Findings will also eventually be published in a relevant scientific journal.

6.1.4 Benthos Toxicogenomic Tool Development

Benthic taxonomy is a useful tool for the assessment of anthropogenic stressors and has proven invaluable in determining the impacts of the Macaulay outfall. Taxonomic assessments, however, are labour- and time-intensive, and can be costly. In addition, the revised monitoring program five-year monitoring cycle has a reduced frequency of benthos assessments in comparison to the annual programs that took place pre-2011. This has resulted in a loss of temporal and spatial resolution for the program.

In 2016, the program was approached by our contract taxonomist (Biologica Environmental Services Ltd.) and a UVIC researcher regarding interest in supporting the development of a benthos toxicogenomic tool that would be inexpensive relative to a full taxonomic assessment. This tool could be used in years when seafloor sampling does not take place and at historic monitoring stations that have been abandoned. The CRD collaborated on developing similar toxicogenomic tools for the Clover Point horse mussels (Veldhoen et al., 2009; Veldhoen et al., 2011; CRD, 2011); development of these tools was put on hold following the provincial order to install further treatment, which resulted in the long-term fate of the Clover outfall becoming unknown.

Biologica is the financial driver of this industrial research and development project, with the same UVIC researcher, that historically developed some Clover mussel eDNA tools, providing the scientific and technical lead. To date, the monitoring program has provided benthos samples collected during seafloor sampling in 2017 and 2019, as well as access to the archived Macaulay taxonomic reference collection.

These were used to identify taxa to prioritize for further toxicogenomic work-up and by various UVIC co-op student for preliminary method development.

In 2018, Biologica and UVIC submitted a grant application to fully implement the project. The application was a success and a five-year project was initiated in April 2019. The CRD and Metro Vancouver were both financial supporters of the project and will continue to provide sampling vessel and sample access throughout the project's duration. Results, as they come available, will be presented in relevant scientific journals.

6.1.5 Uptake and Trophic Changes of Polychlorinated Biphenyls

Following completion of last year's assessment of PBDE flame retardant contaminants (Burd *et al*., 2019), a similar assessment was initiated for PCBs, another group of contaminants that are persistent, bioaccumulative, and toxic. Because of these properties, their production has been banned and they are no longer in active use, but legacy sources to the environment exist. Understanding their environmental behaviour is important for determining why environmental concentrations are not decreasing in some locations, as expected. In 2019 and early 2020, staff worked with external researchers to compile monitoring program and Ocean Wise Conservation Association Pollution Tracker data to assess uptake and trophic changes in PCBs in the benthic marine food chain in the Salish Sea relative to sediment physical and geochemical characteristics. Tissue data from the Cycle 1 Macaulay and Clover fish survey was also included. A manuscript was written and submitted to a scientific journal in early 2021; it is still under review.

6.1.6 COVID-19 in Wastewater

Throughout the world, researchers have been investigating ways to predict timing of COVID-19 outbreaks to inform health care planning. One promising technique is wastewater epidemiology, which has been used elsewhere in the world to detect COVD-19 in wastewater systems, sometimes as much as a week or two before patients started presenting with widespread symptoms in health care facilities.

The COVID-19 pandemic arrived in British Columbia early in 2020. In April 2020, the CRD was asked to provide weekly wastewater samples from Macaulay, Clover and the Saanich Peninsula wastewater treatment plant by a consortium of researchers from UVIC and Pani Energy Inc. (Victoria, BC). McLoughlin samples were also provided once the new plant was commissioned in early 2021. The Regional District of Nanaimo also provided samples to the project. All samples have been analyzed using similar methodologies to those used elsewhere on the BC Lower Mainland, across Canada and internationally with the goal of using results to inform local health authority COVID-19 response plans. As of mid-2021, this project's funding was not renewed and the project was cancelled. All data from the project have been analyzed and will be presented to stakeholders in late 2021.

6.1.7 Handheld Microorganism Detection Device

A researcher at the University of British Columbia and Harbour Resource Partners, the consortium that built the McLoughlin Point treatment plant, began a project to develop a novel handheld DNA sequencing device to monitor and detect microorganisms in wastewater. The aim is to provide utility operators with an easy-to-use screening tool that can provide a qualitative assessment of pathogen presence in wastewaters. Results could then be used to inform health agencies of any changes in pathogen presence over time. The contractor began providing McLoughlin wastewater and sludge samples during commissioning and the CRD continued to provide samples after taking over plant operation in January 2021.

6.1.8 Investigations Planned for 2022

No new additional investigations or studies are planned for 2021/22, unless novel opportunities arise.

7.0 CONCLUSIONS

2020 was a transitional year for sewage treatment in the Core Area and the WMEP. The new McLoughlin Point WWTP began commissioning in August 2020, with flows gradually being diverted from Macaulay and Clover to the new facility. Regardless of discharge location, the different routine monitoring components of the program, and the additional investigations, were effective tools to assess the effects of the Macaulay, Clover and McLoughlin discharges on the marine receiving environment.

Wastewater monitoring took place at all three locations, but access limitations during construction meant that proxy sample locations were required for Macaulay and Clover for significant portions of the year. Other logistical challenges led to deviations from established wastewater sampling protocols as well. As such, comparisons to previous years' monitoring results must be done with caution. In addition, neither provincial nor federal wastewater regulations allow for a commissioning period when a new facility comes online. Full compliance with McLoughlin regulatory limits was, therefore, not expected during commissioning, as it was not possible for all treatment processes to be instantly and fully effective. In 2021, the majority of wastewater monitoring will be dropped at Macaulay and Clover, with the exception of wet weather effluent quality monitoring. Influent and effluent sampling at McLoughlin will become the focus, both to assess regulatory compliance and to determine contaminant removal efficiency of the tertiary treatment processes.

Receiving environment surface and water column monitoring continued to focus on the Clover and Macaulay outfalls in 2020 even though flow was transitioning to McLoughlin. The focus of this monitoring component will switch to McLoughlin in 2021, with only wet weather flow monitoring required for Macaulay and Clover if these events are coincident with routine McLoughlin sampling.

Seafloor monitoring design remained largely unchanged with the commissioning of McLoughlin, with the exception of new seafloor stations around the McLoughlin outfall that were added to the east of the Macaulay stations in 2019. Macaulay/McLoughlin seafloor sampling is only required twice per monitoring cycle, with the next sampling event in 2022. Clover seafloor sampling took place in 2020.

Various additional investigations were ongoing in 2020. These investigations continue to address gaps in the routine monitoring program or emerging environmental and human health concerns related to the discharge of wastewater to the marine environment.

A comprehensive statistical assessment was completed in 2020 that included 2011 to 2019 cycles 1 and 2 data. Results from this assessment generally confirmed the stability of effects to the environment of the Macaulay and Clover discharges and set the stage for assessing improvements resulting from the installation of tertiary treatment at McLoughlin. Details about individual monitoring program components can be found in preceding sections of this report; the results of the overall weight of assessment are provided below.

There are not yet historical results to compare McLoughlin results to; it is expected that it will take up to two years for treatment processes to fully stabilize and a further two to three years before enough data will have been collected to make definitive statements about the efficacy of treatment and resulting reductions of effects in the marine environment. The installation of tertiary treatment is expected to substantively reduce overall contaminant loading to the environment and reduce the footprint of impact. The CRD is committed to continue the WMEP to assess these improvements over time and space.

7.1 Wastewater

Wastewater compliance monitoring results indicated that the quality of the wastewaters from Macaulay and Clover outfalls in 2020 was similar to previous years. Concentrations of all conventional parameters were generally within the expected ranges for fine-screened wastewater, with the exception of one BOD result at Macaulay and one TSS result at Clover. Federal WSER limits for TSS and CBOD were not met at Macaulay and Clover, but the CRD has received transitional authorizations to discharge non-compliant effluent until December 31, 2020, by which time all flows must be diverted to McLoughlin for treatment. These transitional authorizations contain interim unionized ammonia, TSS and CBOD limits, which were mostly met in 2020, with the exception of a few exceedances in April, August and October. However, it should be noted that these exceedances were at the upstream proxy sampling locations where the wastewaters were un-screened and expected to be higher in concentration than historical screened effluent results directly from Macaulay and Clover.

As noted above, McLoughlin effluent quality was not expected to be compliant at times during commissioning. All provincial regulatory limits were exceeded from August to early October, but as treatment processes stabilized, the frequency of non-compliance events decreased. Both TSS and CBOD concentrations exceeded federal limits from August to December. It is expected that non-compliance frequency will be reduced in 2021, but treatment processes can take up to two years to fully stabilize.

With the exception of bacteriological indicators, the estimated receiving environment concentrations (based on applying predicted minimum initial dilution factors to routine resolution wastewater concentrations) did not exceed applicable provincial and federal water quality guidelines for the protection of human health and aquatic life. Wastewater priority substance monitoring results were also similar to previous years and those substances with applicable guidelines showed receiving environment concentrations (based on the predicted minimum initial dilution) below guidelines, with most below guidelines in wastewater even before discharge to the marine environment. In general, McLoughlin effluent concentrations and loadings of most contaminants were substantively lower than historical Macaulay and Clover results. More detailed concentration and loading assessments will be undertaken in 2021.

Wastewaters, when discharged from the Macaulay and Clover outfalls, were regularly acutely lethal to fish and sometimes to invertebrates, and chronic toxicity was observed for both fish and invertebrates. However, the effects concentrations observed in the acute and chronic tests were generally well above the predicted wastewater concentrations at the edge of the IDZ of both outfalls. Since measured wastewater parameters were not predicted to exceed guidelines in the receiving environment, and toxicity effects levels were above the wastewater concentrations predicted in the marine environment, there was likely low potential for adverse effects to organisms in the environment around the Macaulay and Clover outfalls, as a result of the wastewater discharge. McLoughlin final effluent was also acutely lethal to fish during early stages of commissioning, but by November, toxicity impacts had ceased. Chronic toxicity will be added to the McLoughlin sampling program in 2021.

There are many newer and emerging substances that the CRD may or may not yet monitor and for which guidelines have yet to be developed. The potential influence of these chemicals on the environment is relatively unknown. The CRD attempts to assess risk of these newer chemicals through additional investigations. Such investigations are currently being identified or, for those in Table 6.1, will be reprioritized by the advisory group.

The bacteriological guideline exceedances will continue even once all flows are treated at McLoughlin, as disinfection was not included as part of the treatment processes. However, the magnitude and duration of the exceedances will decrease substantially overall as bacterial levels in McLoughlin final effluent will be an order of magnitude lower, and unscreened flows out Macaulay and Clover will only occur during heavy rain events. Future consideration of the need to disinfect effluent will be subject to ongoing monitoring of the impact of the treated McLoughlin effluent and wet weather overflows. Reduction of wet weather discharges will be advanced through the ongoing implementation of CRD and municipal inflow and infiltration reduction programs.

7.2 Reclaimed Water

Reclaimed water was used at the new McLoughlin Point treatment plant starting in November to wash down various pieces of treatment equipment. This reclaimed water was effectively final tertiary effluent that was disinfected to reduce bacteriological loading. Because there was potential for operators to be exposed to the reclaimed water, monitoring was required to assess compliance with regulatory limits for protection of human health. The reclaimed water did not meet regulatory limits for fecal coliforms or TSS during commissioning of the equipment in November, but was compliant in December. Compliance is expected to improve as operation stabilizes.

7.3 Surface Water

Because operation of the McLoughlin plant was not consistent throughout 2020, and discharge through the Macaulay and Clover outfalls was still intermittent, the surface water monitoring program for all of 2020 continued to focus on the Macaulay and Clover outfalls. Because of the proximity of the Macaulay sampling stations to the McLoughlin outfall, some McLoughlin plume signal was likely captured during the Macaulay sampling in the fall.

Overall, the 2020 surface fecal coliform and enterococci results around the Macaulay and Clover outfalls indicated that the outfall plumes were predominantly trapped below the ocean surface. The potential for human exposure to high fecal coliform and enterococci concentrations around the outfalls was moderate, as fecal coliform and enterococci surface water geometric mean results were above thresholds used to assess risk to human health. These exceedances occurred mostly during the winter sampling periods when surfacing events were more likely to occur.

The 2020 water column monitoring (at depths of 5 m or greater) confirmed that bacteriological indicators regularly exceeded both provincial and federal guidelines at the edge of the IDZ around each outfall. However, these results were expected, based on the wastewater concentrations of the bacteriological indicators (in the millions of bacteria per 100 mL) and the intended design of the outfall diffusers. The diffusers were designed specifically to ensure that the wastewater plumes were predominantly trapped below the surface. Results from the fall sampling round confirmed that the cumulative signal when both Macaulay and McLoughlin were simultaneously discharging was detectable around the Macaulay outfall. Even when the McLoughlin outfall was the sole discharge location, its plume was detectable at the Macaulay sampling stations, even though the predominant current and tide influence is in the opposite direction towards the southeast.

Overall, the fecal coliform and enterococci results were within the concentrations predicted by hydrodynamic modelling. The seasonality of the high bacterial counts can be attributed to higher wastewater flows in winter, coupled with the oceanography of this particular area during the winter months (relative lack of water column stratification due to wind and relatively cool surface waters). Summer plume surfacing events are also predicted to occur occasionally at both outfalls, associated with the morning flush in the wastewater system, weak water column stratification and slack tide. Events are predicted to be less frequent in summer than in winter.

As noted above, the bacteriological guideline exceedances are expected to continue around the McLoughlin outfall even with tertiary treatment. However, exceedances will be much reduced in magnitude and duration overall, as treated McLoughlin effluent bacterial levels are an order of magnitude lower than current Macaulay and Clover concentrations. There will also be continued exceedances around the Macaulay and Clover outfalls, as they will be transitioned to wet weather overflow points when McLoughlin treatment capacity is reached. Disinfection is not feasible for Macaulay and Clover, though they are only predicted to overflow infrequently until fulsome implementation of CRD and municipal inflow and infiltration reduction programs.

Boron routinely exceeded guidelines in water column samples, but at both the outfall and reference stations. These exceedances cannot be attributed to the outfalls, as natural background concentrations of boron in the Salish Sea are routinely higher than guidelines.

While the plumes were predominantly trapped below the surface, and only moderate risk to human health, there is higher potential risk to organisms that live in the water column. The 2020 water column monitoring results for metals were all low or at background levels (e.g., boron) indicating that risk to organisms was also likely low. However, the monitoring program is relatively lacking of assessments of organisms living in the water column, with the exception of the finfish monitoring component of the program. Water column living organisms potentially move in and out of the plume and, therefore, potential effects cannot be easily attributed to the outfalls themselves.

Overall, the bacteriological monitoring results indicated that the surface water effects of the outfalls were limited. The cores of the plumes were predominantly trapped at depth for most of the year, and substantially diluted wastewater only occasionally reached the surface. Similar patterns, though reduced in magnitude and frequency, are expected around the new McLoughlin outfall once monitoring begins there in 2021.

7.4 Seafloor Monitoring

Seafloor monitoring is required every two to three years around the Macaulay/McLoughlin outfalls and every five years around the Clover outfall. In 2020, seafloor monitoring was required for Clover Point, and included sediment and resident horse mussel tissue chemistry, and mussel size and health metrics.

Overall, the 2020 Clover sediment chemistry results indicated that only nine of the detected results exceeded at least one sediment quality guideline, which is lower than what was observed during the previous 2015 Clover sediment survey when 24 results exceeded guidelines. The 2020 exceedances were observed for 1,2,4-trichlorobenzene, copper, lead, mercury and total PCBs.

Mussel health and size metrics showed similar patterns to previous assessments. The mussels were generally bigger closer to the outfall, likely due to the outfall providing an enhanced food source that diminishes as one gets further away. No diseases or parasites of concern were observed in the mussel tissues. Tissue chemistry results were qualitatively similar to 2015 and previous assessments. Of the approximately 550 analytes measured in 2020, 59% were detected at both routine and high-resolution detection limits, including metals, some volatile organic compounds, benzene, some OC pesticides, PAHs, PBDEs, PCBs, some PCDDs, some PPCPs and PFOS. Tissue concentrations were typically higher in mussels near the outfall, as expected.

The 2020 sediment and mussel results have not yet been fulsomely analyzed and interpreted. They will be included in the Cycle 2/3 2020-2025 comprehensive statistical assessment.

7.5 Additional Investigations

Additional investigations are important elements of the program that address specific questions or issues pertaining to the monitoring program, clarify aspects of the program and provide concurrent data for the assessment of environmental effects.

The CRD’s ongoing participation in the two Ocean Wise Conservation Association initiatives included ensuring the monitoring program’s samples were collected using harmonized methodologies, thereby benefiting both the CRD when assessing monitoring results, as well as others doing similar monitoring elsewhere in the Salish Sea. In addition, participation in these initiatives provided access to other Salish Sea datasets for comparison to monitoring program results. Access to such datasets was integral during the preparation of the *in-review* journal manuscript that characterizes trophic changes of PCBs in CRD biota samples. By providing various types of samples to the Ocean Wise Conservation Association, the monitoring program has helped facilitate the development of new analytical methodologies for microplastics in wastewater and environmental samples. The death assemblage assessments are ongoing and it is hoped that the development of the benthos toxicogenomic tools will provide the CRD and Metro Vancouver with a useful and inexpensive monitoring tool for filling in spatial and temporal gaps in the routine benthos programs. By providing wastewater samples to UVIC for COVID analyses, it is hoped that local health authorities will receive advanced notice of local COVID outbreaks prior to widespread increases in patient hospitalization. Similarly, CRD provision of McLoughlin wastewater samples to UBC will hopefully result in an easy-to-use, handheld device that will allow operators to detect microorganisms in wastewater and ultimately inform health authorities.

7.6 Trend Assessment Weight of Evidence

Overall, the comprehensive statistical trend assessment of 2011 to 2019 data reaffirmed previous assessments. The weight of evidence analysis of ecosystem impacts indicated that the discharge impacts were most evident within 400 m of the Macaulay outfall and 200 m of the Clover outfall. There was little evidence for far-field effects to water quality, sediment quality, and benthic organisms, and only limited evidence for effects to fish health and risks to humans and wildlife on wider scales. As noted above, effects are expected to improve with the installation of tertiary treatment at McLoughlin.

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APPENDIX A
GUIDANCE MANUAL FOR
ASSESSMENT AND ANALYSIS OF WMEP DATA

Available upon request.

Contact: CRD’s Environmental Monitoring Program, 250.360.3296

APPENDIX B
2020 WASTEWATER MONITORING

Appendix B1	Priority Substance List and Sampling Frequency
Appendix B2	Macaulay Point Effluent Flow
Appendix B3	Clover Point Effluent Flow
Appendix B4	McLoughlin Wastewater Treatment Plant Tertiary Effluent Flow
Appendix B5	Frequency of Detection and Loadings of Substances in Macaulay Point Wastewaters
Appendix B6	Frequency of Detection and Loadings of Substances in Clover Point Wastewaters
Appendix B7	Frequency of Detection and Loadings of Substances in McLoughlin Point Wastewaters
Appendix B8	Acute Toxicity Test Result Bench Sheets (available up on request)
Appendix B9	Chronic Toxicity Test Result Bench Sheets (available up on request)

Appendix B1   Priority Substance List and Sampling Frequency

Substance	Macaulay and Clover Points Outfalls and McLoughlin Point WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
CONVENTIONALS		
alkalinity	√	√
biochemical oxygen demand (BOD)	√	√
carbonaceous biochemical oxygen demand (CBOD)	√	√
chemical oxygen demand (COD)	√	√
chloride	√	√
conductivity	√	√
cyanide-SAD	√	√
cyanide-WAD	√	√
enterococci	√	√
fecal coliforms	√	√
hardness, total	√	√
nitrogen, ammonia	√	√
nitrogen, nitrate	√	√
nitrogen, nitrite	√	√
nitrogen, total Kjeldahl	√	√
oil and grease, mineral	√	√
oil and grease, total	√	√
organic carbon, total	√	√
pH	√	√
sulphate	√	√
sulphide	√	√
suspended solids, total	√	√
METALS		
Total Metals		
aluminum	√	√
antimony	√	√
arsenic	√	√
barium	√	√
beryllium	√	√
cadmium	√	√
calcium	√	√
chromium	√	√
chromium VI	√	√
cobalt	√	√
copper	√	√
iron	√	√
lead	√	√
magnesium	√	√
manganese	√	√
mercury	√	√
molybdenum	√	√
nickel	√	√
phosphorus	√	√
potassium	√	√

Appendix B1, cont'd

Substance	Macaulay and Clover Points Outfalls and McLoughlin Point WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
selenium	√	√
silver	√	√
thallium	√	√
tin	√	√
zinc	√	√
Dissolved Metals		
aluminum	√	√
antimony	√	√
arsenic	√	√
barium	√	√
beryllium	√	√
cadmium	√	√
calcium	√	√
chromium	√	√
cobalt	√	√
copper	√	√
iron	√	√
lead	√	√
magnesium	√	√
manganese	√	√
mercury	√	√
molybdenum	√	√
nickel	√	√
phosphorus	√	√
potassium	√	√
selenium	√	√
silver	√	√
thallium	√	√
tin	√	√
zinc	√	√
Speciated Metals		
dibutyltin	√	
dibutyltin dichloride	√	
methyl mercury	√	
monobutyltin	√	
monobutyltin trichloride	√	
tributyltin	√	
tributyltin dichloride	√	
ALDEHYDES		
acrolein	√	√
PHENOLIC COMPOUNDS		
total phenols	√	√
CHLORINATED PHENOLICS		
2,4,6-trichlorophenol	√	√
2,4/2,5-dichlorophenol	√	√

Appendix B1, cont'd

Substance	Macaulay and Clover Points Outfalls and McLoughlin Point WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
2-chlorophenol	√	√
4-chloro-3-methylphenol	√	√
pentachlorophenol	√	√
NON-CHLORINATED PHENOLICS		
2,4-dimethylphenol	√	√
2,4-dinitrophenol	√	√
2-methyl-4,6-dinitrophenol	√	√
2-nitrophenol	√	√
4-nitrophenol	√	√
phenol	√	√
ORGANOCHLORINE PESTICIDES		
2,4-DDD	√*	
2,4-DDE	√*	
2,4-DDT	√*	
4,4-DDD	√*	
4,4-DDE	√*	
4,4-DDT	√*	
aldrin	√*	
alpha chlordane	√*	
alpha-endosulfan	√*	
alpha-BHC	√*	
beta-endosulfan	√*	
beta-BHC	√*	
chlordane	√*	
delta-BHC	√*	
dieldrin	√*	
endosulfan sulfate	√*	
endrin	√*	
endrin aldehyde	√*	
gamma chlordane	√*	
heptachlor	√*	
heptachlor epoxide	√*	
gamma BHC	√*	
methoxyclor	√*	
mirex	√*	
octachlorostyrene	√*	
toxaphene	√*	
POLYCHLORINATED BIPHENYLS		
PCB-1	√*	
PCB-3	√*	
PCB-4/10	√*	
PCB-5/8	√*	
PCB-15	√*	
PCB-18	√*	
PCB-19	√*	
PCB-23/34	√*	
PCB-28	√*	

Appendix B1, cont'd

Substance	Macaulay and Clover Points Outfalls and McLoughlin Point WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
PCB-31	√*	
PCB-37	√*	
PCB-40	√*	
PCB-44	√*	
PCB-43/49	√*	
PCB-52/73	√*	
PCB-54	√*	
PCB-56/60	√*	
PCB-66/80	√*	
PCB-77	√*	
PCB-81	√*	
PCB-87/115/116	√*	
PCB-89/90/101	√*	
PCB-93/95	√*	
PCB-99	√*	
PCB-104	√*	
PCB-105/127	√*	
POLYCYCLIC AROMATIC HYDROCARBONS		
dibenzo(a,h)anthracene	√*	√
fluoranthene	√*	√
fluorene	√*	√
indeno(1,2,3-c,d)pyrene	√*	√
naphthalene	√*	√
phenanthrene	√*	√
pyrene	√*	√
total high molecular weight - PAH	√*	√
total low molecular weight - PAH	√*	√
total PAH	√*	√
SEMIVOLATILE ORGANICS		
Phthalates		
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	√	

Appendix B1, cont'd

Substance	Macaulay and Clover Points Outfalls and McLoughlin Point WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
bis(2-chloroisopropyl)ether	√	
hexachlorobenzene	√	
hexachlorobutadiene	√	
hexachlorocyclopentadiene	√	
hexachloroethane	√	
isophorone	√	√
nitrobenzene	√	√
N-nitrosodimethylamine	√	√
N-nitrosodi-n-propylamine	√	√
N-nitrosodiphenylamine	√	√
VOLATILE ORGANICS		
Monocyclic Aromatic Hydrocarbons		
benzene	√	√
chlorobenzene	√	√
1,2-dichlorobenzene	√	√
1,3-dichlorobenzene	√	√
1,4-dichlorobenzene	√	√
ethylbenzene	√	√
m & p xylenes	√	√
o-xylene	√	√
styrene	√	√
toluene	√	√
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	√	√
bromomethane	√	√
chloroethane	√	√
chloroethene	√	√
chloromethane	√	√
cis-1,2-dichloroethene	√	√
cis-1,3-dichloropropene	√	√
dibromoethane	√	√
dibromomethane	√	√
dichloromethane	√	√
tetrabromomethane	√	√
tetrachloroethene	√	√
tetrachloromethane	√	√

Appendix B1, cont'd

Substance	Macaulay and Clover Points Outfalls and McLoughlin Point WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
trans-1,2-dichloroethene	√	√
trans-1,3-dichloropropene	√	√
trichloroethene	√	√
trichlorofluoromethane	√	√
Trihalomethanes		
bromodichloromethane	√	√
chlorodibromomethane	√	√
tribromomethane	√	√
trichloromethane	√	√
Ketones		
dimethyl ketone	√	√
methyl ethyl ketone	√	√
methyl isobutyl ketone	√	√
alpha-terpineol	√	√
High resolution Analysis		
Nonylphenols	√	
Polybrominated Diphenyl Ethers (PBDE)	√	
Polycyclic Aromatic Hydrocarbons (PAH)	√	
Per and Polyfluoroalkyl Substances (PFOS)	√	
Pharmaceuticals and Personal Care Products (PPCP)	√	
Dioxins and Furans (PCDD)	√	
Polychlorinated Biphenyls (PCBS)	√	
TOXICITY-ACUTE		
96-hr Rainbow Trout	√	
48-hr Daphnia magna	√	
TOXICITY-CHRONIC (Annual)		
Rainbow Trout Avelin and Egg Test (EA)	√***	
Ceriodaphnia 7-day	√***	
Top smelt 7-day	√***	
Echinoderm fertilization	√***	

Notes:
√* Analyses were conducted at a higher resolution (i.e., at SGS AXYS Analytics), ** monthly, ***annually

Appendix B2 Macaulay Point Effluent Flow

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	73,020	163,780	51,440	46,180	39,020	40,620	37,580	34,735	37,482	41,825	-	-
2	67,080	99,640	52,880	43,060	40,940	38,780	37,560	36,278	39,929	38,995	-	-
3	73,520	72,060	50,220	42,420	40,460	38,660	38,340	36,321	37,805	41,057	164	-
4	74,580	70,300	47,600	43,360	40,260	38,260	37,580	36,078	36,080	23,417	-	-
5	67,360	99,380	46,500	41,900	39,700	38,320	38,460	37,951	36,031	-	-	-
6	117,060	105,120	46,900	42,780	38,660	38,040	38,980	36,597	37,346	28,399	-	-
7	154,760	95,420	47,800	41,440	39,800	38,820	38,190	35,724	37,058	38,873	-	-
8	82,600	94,160	45,000	41,500	38,840	39,000	33,670	36,073	37,215	42,711	-	-
9	63,720	69,940	45,590	39,560	38,580	43,240	33,530	36,837	36,978	49,076	13	-
10	70,620	62,940	44,120	41,640	40,140	39,460	38,000	36,136	36,766	52,440	-	-
11	70,960	58,360	44,300	39,800	39,180	38,840	37,400	37,108	36,668	21,033	-	-
12	85,560	55,620	44,320	41,180	41,480	41,280	38,360	36,171	38,555	-	-	-
13	65,660	55,700	43,580	40,280	41,020	39,170	39,765	36,233	38,388	-	-	-
14	58,800	53,760	44,080	40,180	38,840	39,510	49,057	35,509	37,532	-	-	-
15	56,200	53,240	44,480	39,600	39,960	39,780	29,374	36,269	38,240	-	11	-
16	66,320	51,240	42,780	39,020	40,520	39,320	37,200	36,739	37,381	-	-	-
17	60,420	51,620	42,740	40,440	41,680	39,180	37,140	36,415	38,129	-	-	-
18	76,160	49,760	42,480	39,440	41,500	39,280	36,420	36,793	37,818	-	-	-
19	69,980	49,160	42,940	40,640	39,400	39,740	64,571	37,759	40,500	-	-	-
20	60,860	48,440	42,100	40,140	39,020	39,140	48,930	38,587	40,205	-	-	-
21	66,480	47,160	42,980	39,140	41,180	38,880	39,899	36,771	41,301	-	-	19,735
22	101,860	49,000	41,860	46,220	39,140	36,340	37,364	37,184	50,700	-	-	60,046
23	111,100	57,860	42,240	42,760	39,680	38,180	44,600	38,416	50,950	-	-	-
24	85,520	53,400	42,100	41,340	39,920	38,860	42,018	39,246	53,159	-	-	-
25	69,260	51,000	40,580	41,200	41,640	38,780	42,249	39,783	47,942	-	-	-
26	66,420	50,120	40,220	41,760	40,580	38,320	41,016	39,822	44,850	-	-	-
27	62,620	49,180	42,280	43,040	39,760	37,620	44,814	38,601	43,852	-	-	-
28	69,600	49,920	43,320	40,260	29,720	39,060	42,171	36,358	40,527	-	-	-
29	86,900	52,320	43,920	41,080	38,320	38,660	43,521	37,606	40,317	-	6	-
30	69,720		45,620	39,900	38,760	37,740	36,784	37,205	28,738	-	-	-
31	122,340		43,080		39,680		34,830	36,699		-		
TOTAL (m3/day)	2,427,060	1,919,600	1,380,050	1,241,260	1,227,380	1,170,880	1,239,373	1,148,004	1,198,442	377,838	194	79,781
Average	78,292	66,193	44,518	41,375	39,593	39,029	39,980	37,032	39,948	12,188	6	2,659
Maximum	154,760	163,780	52,880	46,220	41,680	43,240	64,571	39,822	53,159	52,441	164	60,046
Minimum	56,200	47,160	40,220	39,020	29,720	36,340	29,374	34,735	28,738	-	-	-
n	31	29	31	30	31	30	31	31	30	11	4	2
										Annual Average		**36,739**

Notes: Shaded cells indicate exceedance to maximum daily flow = 150,000 m^3/day and/or annual mean daily flow = 50,000 m^3/day

Appendix B3 Clover Point Effluent Flow

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	76,536	165,898	47,117	40,682	38,304	36,704	34,661	34,558	15	25	15	14
2	68,396	103,005	50,513	38,296	38,181	36,011	37,164	37,367	15	24	4,897	15
3	78,169	79,977	46,361	37,679	37,100	35,533	34,464	36,053	25	24	72	12
4	79,803	83,406	45,045	36,566	37,135	35,561	34,737	35,807	20	25	12	18
5	70,791	115,650	46,044	36,267	35,550	34,741	35,459	40,654	20	20	279	20
6	126,526	121,348	44,018	35,585	36,838	35,227	34,866	36,589	23	17	14	1,098
7	154,013	121,547	42,848	36,648	35,372	35,823	35,006	36,603	28	22	15	2,212
8	89,708	99,724	40,981	36,367	35,641	46,422	38,809	35,660	35	976	17	11
9	69,785	78,180	41,789	36,319	35,531	36,801	35,367	35,315	25	87	19	9
10	77,587	68,857	41,944	36,443	36,474	36,057	34,785	58,960	25	3,323	22	12
11	68,960	62,738	41,146	35,313	43,143	42,159	35,349	48,409	34	20	4,242	13
12	87,057	57,502	41,505	35,564	37,478	37,650	35,369	35,159	34	369	1,192	1,600
13	69,757	57,355	40,789	36,873	35,972	36,158	34,848	35,159	42	30,080	12	12
14	59,361	51,479	39,626	34,573	35,615	37,391	34,818	34,037	35	40,245	73	179
15	60,609	50,317	39,412	34,573	38,853	35,924	34,968	34,334	28	38,394	15,977	179
16	86,328	46,064	39,704	34,573	44,438	35,307	34,678	35,438	41	37,277	3,533	197
17	72,411	45,953	39,431	34,573	37,474	35,660	33,744	34,863	30	74,047	175	619
18	93,075	45,213	38,184	34,573	37,098	35,355	34,568	34,872	34	44,826	15	9,283
19	72,952	44,535	38,421	32,718	36,326	35,272	35,532	38,018	37	40,726	10	116
20	63,346	44,512	37,314	34,891	38,114	34,532	35,316	39,176	24	39,750	15	61,530
21	72,471	43,721	36,416	44,415	36,173	35,919	35,156	36,574	179	7,163	17	24,689
22	102,165	44,816	36,978	35,242	35,447	35,381	34,764	35,464	2,068	497	19	797
23	104,609	56,382	39,237	32,863	35,739	35,687	35,436	36,905	31	19	328	75
24	92,799	47,546	39,171	34,543	42,736	35,740	34,042	35,831	4,148	80	14	63
25	75,782	45,819	36,602	32,601	36,913	35,452	34,537	36,006	124	80	14	131
26	66,896	44,647	37,262	36,627	38,526	34,438	35,656	35,758	38	18	420	157
27	69,091	43,832	38,825	34,098	36,310	36,920	35,379	35,406	4,143	75	15	60
28	72,115	49,297	36,991	32,400	36,318	35,584	35,416	34,643	15,935	21	13	903
29	86,460	51,223	38,932	31,917	36,763	34,882	35,477	35,983	23,461	251	555	3,380
30	77,058		42,794	28,240	36,634	34,739	35,881	36,009	25	68	66	4,426
31	124,700		40,004		36,398		34,635	346		10		42,121
TOTAL (m^3/day)	2,569,316	1,970,543	1,265,404	1,062,022	1,158,594	1,089,030	1,090,887	1,115,956	50,703	358,563	32,065	153,948
Average	82,881	67,950	40,819	35,401	37,374	36,301	35,190	35,999	1,690	11,567	1,069	4,966
Maximum	154,013	165,898	50,513	44,415	44,438	46,422	38,809	58,960	23,461	74,047	15,977	61,530
Minimum	59,361	43,721	36,416	28,240	35,372	34,438	33,744	346	-	10	10	9
n	31	29	31	30	31	30	31	31	30	31	30	31
											Annual Average	**32,560**

Notes: Shaded cells indicate exceedance to maximum daily flow = 185,000 m^3/day and/or annual mean daily flow = 82,000 m^3/day

Appendix B4 McLoughlin Wastewater Treatment Plant Tertiary Effluent Flow

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	---	---	---	---	---	---	---	---	72,000	48,900	82,300	96,580
2	---	---	---	---	---	---	---	---	72,500	35,900	77,900	92,320
3	---	---	---	---	---	---	---	---	79,100	35,400	116,600	90,900
4	---	---	---	---	---	---	---	---	78,900	36,100	105,100	86,390
5	---	---	---	---	---	---	---	---	70,300	52,000	116,000	86,300
6	---	---	---	---	---	---	---	---	70,100	74,100	92,600	87,690
7	---	---	---	---	---	---	---	---	72,400	47,600	86,500	106,840
8	---	---	---	---	---	---	---	---	72,200	35,700	85,400	128,600
9	---	---	---	---	---	---	---	---	72,200	42,000	83,300	107,800
10	---	---	---	---	---	---	---	---	72,200	52,300	86,000	99,320
11	---	---	---	---	---	---	---	---	71,800	55,100	101,000 (1,030)	95,515
12	---	---	---	---	---	---	---	27,500	71,300	72,000	136,700 (530)	92,100
13	---	---	---	---	---	---	---	27,700	74,100	129,300	120,500 (240)	111,300
14	---	---	---	---	---	---	---	67,200	76,400	64,900	100,600	99,500
15	---	---	---	---	---	---	---	69,800	75,000	45,200	106,700	103,200
16	---	---	---	---	---	---	---	68,700	75,000	43,700	158,300	118,500
17	---	---	---	---	---	---	---	65,900	73,400	42,800	156,500	111,300
18	---	---	---	---	---	---	---	96,000	74,500	57,600	130,200	126,200
19	---	---	---	---	---	---	---	72,100	73,300	46,000	113,100	161,250
20	---	---	---	---	---	---	---	75,500	76,400	44,200	105,800	150,360
21	---	---	---	---	---	---	---	75,600	76,300	44,800	98,700	267,920 (40,790)
22	---	---	---	---	---	---	---	73,100	75,400	75,300	110,300	138,480
23	---	---	---	---	---	---	---	72,300	100,200	102,600	106,600	107,260
24	---	---	---	---	---	---	---	73,400	100,400	88,300	108,800	128,780
25	---	---	---	---	---	---	---	74,900	106,200	85,900	99,600	119,560
26	---	---	---	---	---	---	---	74,600	91,800	84,800	95,400	120,170
27	---	---	---	---	---	---	---	75,500	83,700	80,300	98,300	115,940
28	---	---	---	---	---	---	---	74,000	77,500	79,700	92,600	109,660
29	---	---	---	---	---	---	---	71,000	61,800	79,200	104,700	137,640
30	---	---	---	---	---	---	---	73,600	53,200	88,300	105,800	177,460
31	---	---	---	---	---	---	---	73,100	---	80,300	---	165,830
TOTAL (m^3/day)	-	-	-	-	-	-	-	1,381,500	2,299,600	1,950,300	3,181,900	3,740,665
Average	-	-	-	-	-	-	-	69,075	76,653	62,913	106,063	120,667
Maximum	-	-	-	-	-	-	-	96,000	106,200	129,300	158,300	267,920
Minimum	-	-	-	-	-	-	-	27,500	53,200	35,400	77,900	86,300
n	-	-	-	-	-	-	-	20	30	31	30	31
											Annual Average	**88,408**

Notes: Shaded cells indicate exceedance to maximum daily flow = 432,000 m^3/day (comprising 216,000 m^3/day tertiary treated and 216,000 m^3/day primary treatment during wet weather)
Bracketed value indicates amount of final effluent that is primary screened flow.

Appendix B5 Frequency of Detection and Loadings of Substances in Macaulay Point Wastewaters

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
CONVENTIONALS						
Enterococci	TOT	CFU/100 mL	991,900	16	100%	---
Fecal Coliforms	TOT	CFU/100 mL	6,471,000	14	100%	---
Alkalinity - Total	TOT	mg/L	213	15	100%	---
Biochemical Oxygen Demand	TOT	mg/L	264	16	100%	3,051,770
Chloride	TOT	mg/L	77	16	100%	1,160,821
Chemical Oxygen demand	TOT	mg/L	659	16	100%	7,933,035
Hardness (as CaCO3)	DIS	mg/L	71	16	100%	---
Hardness (as CaCO3)	TOT	mg/L	80	16	100%	---
pH	TOT	pH	7.3	16	100%	---
pH @ 15°C	TOT	pH	6.7	16	100%	---
Sulfide	TOT	mg/L	0.28	16	100%	3,276
Sulfur	TOT	mg/L	9.0	12	100%	98,241
Sulphate	TOT	mg/L	25	7	100%	236,604
Temperature	TOT	°C	16	12	100%	---
Total Organic Carbon	TOT	mg/L	62	16	100%	701,715
SAD Cyanide	TOT	mg/L	0.0025	10	80%	38
WAD Cyanide	TOT	mg/L	0.0014	16	81%	21
Carbonaceous Biochemical Oxygen Demand	TOT	mg/L	278	16	100%	3,104,187
Oil & Grease, total	TOT	mg/L	14	16	100%	148,533
Oil & Grease, Mineral	TOT	mg/L	ND>50%	16	50%	---
Total Suspended Solids	TOT	mg/L	223	16	100%	2,653,568
Specific Conductivity - 25°C.	TOT	µS/cm	781	16	100%	---
NUTRIENTS						
N - Kjeldahl Nitrogen	TOT	mg/L	46	16	100%	550,765
Nitrogen as N	TOT	mg/L	46	16	100%	551,493
N - Nh3 (As N)	TOT	mg/L	43	16	100%	530,980
N - Nh3 (As N)- Unionized	TOT	mg/L	0.064	16	100%	821
N - NO2 (As N)	TOT	mg/L	ND>50%	16	0%	---
N - NO3 (As N)	TOT	mg/L	ND>50%	16	6%	---
N - NO3 + NO2 (As N)	TOT	mg/L	ND>50%	16	6%	---
P - PO4 - Ortho (As P)	TOT	mg/L	3.6	16	100%	40,313
P - PO4 - Total (As P)	TOT	µg/L	5963	16	100%	70,276

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
ORGANICS						
1,1,1,2-Tetrachloroethane	TOT	µg/L	ND>50%	16	0%	---
1,1,1-trichloroethane	TOT	µg/L	ND>50%	16	0%	---
1,1,2,2-tetrachloroethane	TOT	µg/L	ND>50%	16	0%	---
1,1,2-trichloroethane	TOT	µg/L	ND>50%	16	0%	---
1,1-dichloroethane	TOT	µg/L	ND>50%	16	0%	---
1,1-dichloroethene	TOT	µg/L	ND>50%	16	0%	---
1,2,4-trichlorobenzene	TOT	µg/L	ND>50%	16	0%	---
1,2-dibromoethane	TOT	µg/L	ND>50%	16	0%	---
1,2-dichlorobenzene	TOT	µg/L	ND>50%	16	0%	---
1,2-dichloroethane	TOT	µg/L	ND>50%	16	0%	---
1,2-dichloropropane	TOT	µg/L	ND>50%	16	0%	---
1,2-diphenylhydrazine	TOT	µg/L	ND>50%	16	0%	---
1,3-dichlorobenzene	TOT	µg/L	ND>50%	16	0%	---
1,4-dichlorobenzene	TOT	µg/L	ND>50%	16	0%	---
1,4-dioxane	TOT	µg/L	ND>50%	4	50%	---
2,4 + 2,5-Dichlorophenol	TOT	µg/L	ND>50%	16	0%	---
2,4,6-trichlorophenol	TOT	µg/L	ND>50%	16	0%	---
2,4-dimethylphenol	TOT	µg/L	ND>50%	16	0%	---
2,4-dinitrophenol	TOT	µg/L	ND>50%	16	0%	---
2,4-dinitrotoluene	TOT	µg/L	ND>50%	16	0%	---
2,6-dinitrotoluene	TOT	µg/L	ND>50%	16	0%	---
3,3-dichlorobenzidine	TOT	µg/L	ND>50%	16	0%	---
4,6-dinitro-2-methylphenol	TOT	µg/L	ND>50%	5	0%	---
cis-1,3-dichloropropene	TOT	µg/L	ND>50%	16	0%	---
Dichlorodifluoromethane	TOT	µg/L	ND>50%	16	0%	---
Methyl Tertiary Butyl Ether	TOT	µg/L	ND>50%	16	0%	---
Nitrobenzene	TOT	µg/L	ND>50%	16	0%	---
trans-1,3-dichloropropene	TOT	µg/L	ND>50%	16	0%	---
2-Chloronaphthalene	TOT	µg/L	ND>50%	16	0%	---
4-Bromophenyl Phenyl Ether	TOT	µg/L	ND>50%	16	0%	---
4-Chlorophenyl Phenyl Ether	TOT	µg/L	ND>50%	16	0%	---
Bis(2-Chloroethoxy)Methane	TOT	µg/L	ND>50%	16	0%	---
Bis(2-Chloroethyl)Ether	TOT	µg/L	ND>50%	16	0%	---
Bis(2-Chloroisopropyl)Ether	TOT	µg/L	ND>50%	16	0%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Bromodichloromethane	TOT	µg/L	ND>50%	16	0%	---
Bromomethane	TOT	µg/L	ND>50%	16	0%	---
Chlorobenzene	TOT	µg/L	ND>50%	16	0%	---
Chlorodibromomethane	TOT	µg/L	ND>50%	16	0%	---
Chloroethane	TOT	µg/L	ND>50%	16	0%	---
Chloroethene	TOT	µg/L	ND>50%	11	0%	---
Chloromethane	TOT	µg/L	ND>50%	16	0%	---
Cis-1,2-Dichloroethene	TOT	µg/L	ND>50%	16	0%	---
Dibromomethane	TOT	µg/L	ND>50%	16	0%	---
Dichloromethane	TOT	µg/L	ND>50%	5	0%	---
Hexachlorobutadiene	TOT	µg/L	ND>50%	16	0%	---
Hexachlorocyclopentadiene	TOT	µg/L	ND>50%	16	0%	---
Hexachloroethane	TOT	µg/L	ND>50%	16	0%	---
Tetrabromomethane	TOT	µg/L	ND>50%	16	0%	---
Tetrachloroethene	TOT	µg/L	ND>50%	16	0%	---
Tetrachloromethane	TOT	µg/L	ND>50%	11	0%	---
Trans-1,2-Dichloroethene	TOT	µg/L	ND>50%	16	0%	---
Tribromomethane	TOT	µg/L	ND>50%	16	0%	---
Trichloroethene	TOT	µg/L	ND>50%	16	0%	---
Trichlorofluoromethane	TOT	µg/L	ND>50%	16	0%	---
Trichloromethane	TOT	µg/L	3.65	11	100%	27
Vinyl Chloride	TOT	µg/L	ND>50%	5	0%	---
2-Chlorophenol	TOT	µg/L	ND>50%	16	0%	---
4-Chloro-3-Methylphenol	TOT	µg/L	ND>50%	16	0%	---
4-Methyl-2-Pentanone	TOT	µg/L	ND>50%	16	0%	---
Dimethyl Ketone	TOT	µg/L	113	16	100%	1,536
Isophorone	TOT	µg/L	ND>50%	16	6%	---
Methyl Ethyl Ketone	TOT	µg/L	ND>50%	16	13%	---
BTEX						
Benzene	TOT	µg/L	ND>50%	16	0%	---
Ethylbenzene	TOT	µg/L	ND>50%	16	0%	---
M & P Xylenes	TOT	µg/L	ND>50%	16	0%	---
O-Xylene	TOT	µg/L	ND>50%	16	0%	---
Styrene	TOT	µg/L	ND>50%	16	0%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Toluene	TOT	µg/L	1.2	16	88%	12.96
Xylenes	TOT	µg/L	ND>50%	16	0%	---
METALS - TOTAL						
Aluminum	TOT	µg/L	189	16	100%	2,461
Antimony	TOT	µg/L	0.29	16	100%	4
Arsenic	TOT	µg/L	0.54	16	100%	8
Barium	TOT	µg/L	18	16	100%	238
Beryllium	TOT	µg/L	ND>50%	16	0%	---
Cadmium	TOT	µg/L	0.13	16	100%	1.8
Calcium	TOT	mg/L	20	16	100%	267,454
Chromium	TOT	µg/L	1.5	16	100%	24
Chromium III	TOT	mg/L	0.0020	15	53%	21
Chromium Vi	TOT	mg/L	ND>50%	16	0%	---
Cobalt	TOT	µg/L	0.64	16	100%	10
Copper	TOT	µg/L	92	16	100%	1,113
Iron	TOT	µg/L	442	16	100%	5,585
Lead	TOT	µg/L	2.5	16	100%	31
Magnesium	TOT	mg/L	7.4	16	100%	106,705
Manganese	TOT	µg/L	53	16	100%	731
Mercury	TOT	µg/L	0.013	16	75%	0.3
Molybdenum	TOT	µg/L	1.1	16	100%	16
Nickel	TOT	µg/L	3.2	16	100%	43
Potassium	TOT	mg/L	17	16	100%	218,961
Selenium	TOT	µg/L	0.30	16	100%	4
Silver	TOT	µg/L	0.16	16	100%	4
Sodium	TOT	mg/L	50	12	100%	572,030
Thallium	TOT	µg/L	0.0050	16	94%	0.06
Tin	TOT	µg/L	1.1	16	100%	13
Zinc	TOT	µg/L	107	16	100%	1,283
METALS - DISSOLVED						
Aluminum	DIS	µg/L	26	16	100%	325
Antimony	DIS	µg/L	0.25	16	100%	3
Arsenic	DIS	µg/L	0.45	16	100%	7
Barium	DIS	µg/L	8.0	16	100%	107
Beryllium	DIS	µg/L	ND>50%	16	0%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Cadmium	DIS	µg/L	0.025	16	100%	0.42
Calcium	DIS	mg/L	16.8	16	100%	222,985
Chromium	DIS	µg/L	1.1	16	100%	18
Cobalt	DIS	µg/L	0.44	16	100%	7
Copper	DIS	µg/L	48	16	100%	552
Iron	DIS	µg/L	219	16	100%	2,815
Lead	DIS	µg/L	0.64	16	100%	7.55
Magnesium	DIS	mg/L	7.0	16	100%	98,488
Manganese	DIS	µg/L	36	16	100%	474
Mercury	DIS	µg/L	ND>50%	16	13%	---
Molybdenum	DIS	µg/L	1.0	16	100%	15
Nickel	DIS	µg/L	2.5	16	100%	35
Phosphorus	DIS	µg/L	4198	16	100%	48,271
Potassium	DIS	mg/L	16	16	100%	210,455
Selenium	DIS	µg/L	0.21	16	100%	2.6
Silver	DIS	µg/L	0.11	16	100%	2.6
Sodium	DIS	mg/L	50	12	100%	568,194
Thallium	DIS	µg/L	ND>50%	16	6%	---
Tin	DIS	µg/L	0.79	16	100%	10.7
Zinc	DIS	µg/L	29	16	100%	342
METALS - SPECIATED						
Methyl Mercury	TOT	ng/L	0.46	4	100%	0.01
Dibutyltin	TOT	µg/L	ND>50%	4	25%	---
Dibutyltin Dichloride	TOT	µg/L	ND>50%	4	50%	---
Monobutyltin	TOT	µg/L	ND>50%	4	50%	---
Monobutyltin Trichloride	TOT	µg/L	ND>50%	4	50%	---
Tributyltin	TOT	µg/L	ND>50%	4	0%	---
Tributyltin Chloride	TOT	µg/L	ND>50%	4	0%	---
ORGANICS						
Carbon Tetrachloride	TOT	µg/L	ND>50%	5	0%	---
Chloroform	TOT	µg/L	3.0	5	100%	64.7
Acrolein	TOT	µg/L	ND>50%	16	0%	---
Acrylonitrile	TOT	µg/L	ND>50%	16	0%	---
Alpha-Terpineol	TOT	µg/L	6.7	16	100%	82.8
N-Nitrosodi-N-Propylamine	TOT	µg/L	ND>50%	16	0%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
N-Nitrosodimethylamine	TOT	µg/L	ND>50%	16	0%	---
N-Nitrosodiphenylamine	TOT	µg/L	ND>50%	16	0%	---
PAHS						
2-Methylnaphthalene	TOT	µg/L	0.07	16	100%	1.1
Acenaphthene	TOT	µg/L	0.08	16	94%	1.6
Acenaphthylene	TOT	µg/L	0.10	16	69%	1.7
Anthracene	TOT	µg/L	0.025	16	75%	0.4
Benzo(a)anthracene	TOT	µg/L	0.025	16	69%	0.4
Benzo(a)pyrene	TOT	µg/L	0.030	16	69%	0.3
Benzo(b)fluoranthene	TOT	µg/L	ND>50%	16	50%	---
Benzo(b)fluoranthene + Benzo(j)fluoranthene	TOT	µg/L	ND>50%	16	50%	---
Benzo(g,h,i)perylene	TOT	µg/L	ND>50%	16	13%	---
Benzo(k)fluoranthene	TOT	µg/L	ND>50%	16	38%	---
Chrysene	TOT	µg/L	0.054	16	69%	0.6
Dibenzo(a,h)anthracene	TOT	µg/L	ND>50%	16	13%	---
Fluoranthene	TOT	µg/L	0.054	16	94%	0.9
Fluorene	TOT	µg/L	0.072	16	94%	1.4
Indeno(1,2,3-c,d)pyrene	TOT	µg/L	ND>50%	16	13%	---
Naphthalene	TOT	µg/L	0.11	16	100%	2
Phenanthrene	TOT	µg/L	0.11	16	94%	1.6
Pyrene	TOT	µg/L	0.077	16	88%	1.3
Total Hmw-PAHs	TOT	µg/L	0.31	16	88%	3.9
Total Lmw-PAHs	TOT	µg/L	0.58	16	100%	10
Total PAHs	TOT	µg/L	0.88	16	100%	14
PHENOLICS						
2-Methyl-4,6-Dinitrophenol	TOT	µg/L	ND>50%	11	0%	---
2-Nitrophenol	TOT	µg/L	ND>50%	16	0%	---
4-Nitrophenol	TOT	µg/L	ND>50%	16	19%	---
Phenol	TOT	µg/L	17	16	100%	187
Total Phenols	TOT	mg/L	0.08	16	100%	936
Pentachlorophenol	TOT	µg/L	ND>50%	16	0%	---
PHTHALATES						
N-Butylbenzyl Phthalate	TOT	µg/L	ND>50%	5	0%	---
Bis(2-Ethylhexyl)Phthalate	TOT	µg/L	6.1	16	63%	76
Butylbenzyl Phthalate	TOT	µg/L	ND>50%	11	0%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Di-N-Butyl Phthalate	TOT	µg/L	ND>50%	16	0%	---
Di-N-Octyl Phthalate	TOT	µg/L	ND>50%	16	0%	---
Diethyl Phthalate	TOT	µg/L	1.5	16	94%	21
Dimethyl Phthalate	TOT	µg/L	ND>50%	14	0%	---
HIGH RESOLUTION						
PAHs						
1-Methylphenanthrene	TOT	ng/L	8.9	4	100%	0.2
2-Methylnaphthalene	TOT	ng/L	81	4	100%	1
Acenaphthene	TOT	ng/L	117	4	100%	2.9
Acenaphthylene	TOT	ng/L	3.8	4	100%	0.1
Anthracene	TOT	ng/L	20	4	100%	0.4
Benz[a]anthracene	TOT	ng/L	52	4	100%	1.5
Benzo[a]pyrene	TOT	ng/L	44	4	100%	1.3
Benzo[b]fluoranthene	TOT	ng/L	38	4	100%	1.1
Benzo[e]pyrene	TOT	ng/L	32	4	100%	0.9
Benzo[ghi]perylene	TOT	ng/L	27	4	100%	0.8
Benzo[j,k]fluoranthenes	TOT	ng/L	20	4	100%	0.4
Chrysene	TOT	ng/L	25	4	100%	0.5
Dibenzo(a,h)anthracene	TOT	ng/L	3.8	4	100%	0.05
Dibenzothiophene	TOT	ng/L	21	4	100%	0.4
Fluoranthene	TOT	ng/L	83	4	100%	1.7
Fluorene	TOT	ng/L	60	4	100%	1.4
Indeno[1,2,3-cd]pyrene	TOT	ng/L	18	4	100%	0.4
Naphthalene	TOT	ng/L	143	4	100%	1.8
Perylene	TOT	ng/L	5.5	4	100%	0.1
Phenanthrene	TOT	ng/L	154	4	100%	2.7
Pyrene	TOT	ng/L	63	4	100%	1.3
PBDE						
Pbde 10	TOT	pg/L	ND>50%	4	0%	---
Pbde 100	TOT	pg/L	3,595	4	100%	0.06
Pbde 105	TOT	pg/L	ND>50%	4	0%	---
Pbde 116	TOT	pg/L	ND>50%	4	0%	---
Pbde 119/120	TOT	pg/L	53	4	75%	0.0008
Pbde 12/13	TOT	pg/L	7	4	100%	0.0002
Pbde 126	TOT	pg/L	ND>50%	4	50%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pbde 128	TOT	pg/L	ND>50%	4	0%	---
Pbde 138/166	TOT	pg/L	157	4	100%	0.003
Pbde 140	TOT	pg/L	54	4	100%	0.0009
Pbde 15	TOT	pg/L	27	4	100%	0.0006
Pbde 153	TOT	pg/L	1,630	4	100%	0.03
Pbde 154	TOT	pg/L	1,227	4	100%	0.02
Pbde 155	TOT	pg/L	108	4	100%	0.002
Pbde 17/25	TOT	pg/L	143	4	100%	0.002
Pbde 181	TOT	pg/L	ND>50%	4	25%	---
Pbde 183	TOT	pg/L	362	4	100%	0.005
Pbde 190	TOT	pg/L	33	4	75%	0.0005
Pbde 203	TOT	pg/L	265	4	100%	0.004
Pbde 206	TOT	pg/L	2,688	4	100%	0.04
Pbde 207	TOT	pg/L	3,403	4	100%	0.05
Pbde 208	TOT	pg/L	1,953	4	100%	0.03
Pbde 209	TOT	pg/L	56,080	4	100%	0.8
Pbde 28/33	TOT	pg/L	344	4	100%	0.005
Pbde 30	TOT	pg/L	ND>50%	4	0%	---
Pbde 32	TOT	pg/L	ND>50%	4	25%	---
Pbde 35	TOT	pg/L	5.2	4	100%	0.00007
Pbde 37	TOT	pg/L	8.9	4	100%	0.0001
Pbde 47	TOT	pg/L	17,980	4	100%	0.3
Pbde 49	TOT	pg/L	531	4	100%	0.01
Pbde 51	TOT	pg/L	57	4	100%	0.0009
Pbde 66	TOT	pg/L	305	4	100%	0.005
Pbde 7	TOT	pg/L	7.5	4	75%	0.0002
Pbde 71	TOT	pg/L	49	4	100%	0.0007
Pbde 75	TOT	pg/L	24	4	100%	0.0004
Pbde 77	TOT	pg/L	ND>50%	4	50%	---
Pbde 79	TOT	pg/L	70	4	100%	0.001
Pbde 8/11	TOT	pg/L	6.5	4	100%	0.0001
Pbde 85	TOT	pg/L	740	4	100%	0.01
Pbde 99	TOT	pg/L	17380	4	100%	0.3
PCBs						
Pcb 1	TOT	pg/L	29	4	100%	0.0006
Pcb 10	TOT	pg/L	3.1	4	75%	0.00008

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 103	TOT	pg/L	2.9	4	100%	0.00006
Pcb 104	TOT	pg/L	1.3	4	100%	0.00002
Pcb 105	TOT	pg/L	61	4	100%	0.001
Pcb 106	TOT	pg/L	ND>50%	4	0%	---
Pcb 107/124	TOT	pg/L	7.7	4	100%	0.0001
Pcb 109	TOT	pg/L	10.0	4	100%	0.0002
Pcb 11	TOT	pg/L	335	4	100%	0.005
Pcb 110/115	TOT	pg/L	238	4	100%	0.004
Pcb 111	TOT	pg/L	ND>50%	4	0%	---
Pcb 112	TOT	pg/L	ND>50%	4	0%	---
Pcb 114	TOT	pg/L	4.9	4	100%	0.00008
Pcb 118	TOT	pg/L	178	4	100%	0.003
Pcb 12/13	TOT	pg/L	11	4	100%	0.0002
Pcb 120	TOT	pg/L	ND>50%	4	0%	---
Pcb 121	TOT	pg/L	1.9	4	75%	0.00003
Pcb 122	TOT	pg/L	1.9	4	100%	0.00003
Pcb 123	TOT	pg/L	7.4	4	100%	0.0001
Pcb 126	TOT	pg/L	ND>50%	4	0%	---
Pcb 127	TOT	pg/L	ND>50%	4	0%	---
Pcb 128/166	TOT	pg/L	35	4	100%	0.0005
Pcb 129/138/160/163	TOT	pg/L	244	4	100%	0.004
Pcb 130	TOT	pg/L	15	4	100%	0.0002
Pcb 131	TOT	pg/L	3.5	4	100%	0.00005
Pcb 132	TOT	pg/L	84	4	100%	0.001
Pcb 133	TOT	pg/L	3.8	4	100%	0.00006
Pcb 134/143	TOT	pg/L	14	4	100%	0.0002
Pcb 135/151/154	TOT	pg/L	75	4	100%	0.001
Pcb 136	TOT	pg/L	32	4	100%	0.0005
Pcb 137	TOT	pg/L	13	4	100%	0.0002
Pcb 139/140	TOT	pg/L	6.4	4	100%	0.0001
Pcb 14	TOT	pg/L	ND>50%	4	0%	---
Pcb 141	TOT	pg/L	39	4	100%	0.0006
Pcb 142	TOT	pg/L	ND>50%	4	0%	---
Pcb 144	TOT	pg/L	13	4	100%	0.0002
Pcb 145	TOT	pg/L	ND>50%	4	0%	---
Pcb 146	TOT	pg/L	27	4	100%	0.0004

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 147/149	TOT	pg/L	179	4	100%	0.003
Pcb 148	TOT	pg/L	1.6	4	100%	0.00003
Pcb 15	TOT	pg/L	35	4	100%	0.0007
Pcb 150	TOT	pg/L	1.5	4	100%	0.00002
Pcb 152	TOT	pg/L	ND>50%	4	0%	---
Pcb 153/168	TOT	pg/L	213	4	100%	0.003
Pcb 155	TOT	pg/L	18	4	100%	0.0003
Pcb 156157	TOT	pg/L	35	4	100%	0.0005
Pcb 158	TOT	pg/L	22	4	100%	0.0003
Pcb 159	TOT	pg/L	2.4	4	75%	0.00005
Pcb 16	TOT	pg/L	39	4	100%	0.0008
Pcb 161	TOT	pg/L	ND>50%	4	0%	---
Pcb 162	TOT	pg/L	ND>50%	4	50%	---
Pcb 164	TOT	pg/L	14	4	100%	0.0002
Pcb 165	TOT	pg/L	ND>50%	4	0%	---
Pcb 167	TOT	pg/L	10	4	100%	0.0001
Pcb 169	TOT	pg/L	ND>50%	4	0%	---
Pcb 17	TOT	pg/L	45	4	100%	0.001
Pcb 170	TOT	pg/L	71	4	100%	0.001
Pcb 171/173	TOT	pg/L	16	4	100%	0.0003
Pcb 172	TOT	pg/L	11	4	100%	0.0002
Pcb 174	TOT	pg/L	55	4	100%	0.001
Pcb 175	TOT	pg/L	3.5	4	100%	0.00006
Pcb 176	TOT	pg/L	4.9	4	75%	0.00009
Pcb 177	TOT	pg/L	30	4	100%	0.0006
Pcb 178	TOT	pg/L	13	4	100%	0.0002
Pcb 179	TOT	pg/L	25	4	100%	0.0005
Pcb 18/30	TOT	pg/L	82	4	100%	0.002
Pcb 180/193	TOT	pg/L	193	4	100%	0.004
Pcb 181	TOT	pg/L	1.3	4	75%	0.00002
Pcb 182	TOT	pg/L	ND>50%	4	25%	---
Pcb 183/185	TOT	pg/L	46	4	100%	0.0008
Pcb 184	TOT	pg/L	39	4	100%	0.0006
Pcb 186	TOT	pg/L	ND>50%	4	0%	---
Pcb 187	TOT	pg/L	71	4	100%	0.001
Pcb 188	TOT	pg/L	ND>50%	4	25%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 189	TOT	pg/L	4.5	4	75%	0.00008
Pcb 19	TOT	pg/L	23	4	100%	0.0006
Pcb 190	TOT	pg/L	13	4	75%	0.0003
Pcb 191	TOT	pg/L	2.5	4	75%	0.00005
Pcb 192	TOT	pg/L	ND>50%	4	25%	---
Pcb 194	TOT	pg/L	75	4	100%	0.002
Pcb 195	TOT	pg/L	23	4	100%	0.0006
Pcb 196	TOT	pg/L	30	4	100%	0.0008
Pcb 197/200	TOT	pg/L	6.6	4	100%	0.0001
Pcb 198/199	TOT	pg/L	73	4	100%	0.002
Pcb 2	TOT	pg/L	5.3	4	100%	0.0001
Pcb 20/28	TOT	pg/L	108	4	100%	0.002
Pcb 201	TOT	pg/L	5.4	4	100%	0.0001
Pcb 202	TOT	pg/L	12	4	100%	0.0002
Pcb 203	TOT	pg/L	46	4	100%	0.001
Pcb 204	TOT	pg/L	1.6	4	100%	0.00003
Pcb 205	TOT	pg/L	4.5	4	75%	0.0001
Pcb 206	TOT	pg/L	42	4	100%	0.0009
Pcb 207	TOT	pg/L	6.5	4	75%	0.0001
Pcb 208	TOT	pg/L	10	4	100%	0.0002
Pcb 209	TOT	pg/L	23	4	100%	0.0004
Pcb 21/33	TOT	pg/L	63	4	100%	0.001
Pcb 22	TOT	pg/L	45	4	100%	0.0008
Pcb 23	TOT	pg/L	ND>50%	4	0%	---
Pcb 24	TOT	pg/L	1.3	4	75%	0.00003
Pcb 25	TOT	pg/L	22	4	100%	0.0005
Pcb 26/29	TOT	pg/L	32	4	100%	0.0007
Pcb 27	TOT	pg/L	26	4	100%	0.0007
Pcb 3	TOT	pg/L	14	4	100%	0.0003
Pcb 31	TOT	pg/L	99	4	100%	0.002
Pcb 32	TOT	pg/L	30	4	100%	0.0007
Pcb 34	TOT	pg/L	ND>50%	4	25%	---
Pcb 35	TOT	pg/L	13	4	100%	0.0002
Pcb 36	TOT	pg/L	2.6	4	100%	0.00004
Pcb 37	TOT	pg/L	29	4	100%	0.0005
Pcb 38	TOT	pg/L	ND>50%	4	0%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 39	TOT	pg/L	1.2	4	100%	0.00002
Pcb 4	TOT	pg/L	89	4	100%	0.002
Pcb 40/41/71	TOT	pg/L	68	4	100%	0.001
Pcb 42	TOT	pg/L	35	4	100%	0.0007
Pcb 43	TOT	pg/L	5.4	4	100%	0.0001
Pcb 44/47/65	TOT	pg/L	246	4	100%	0.004
Pcb 45/51	TOT	pg/L	50	4	100%	0.001
Pcb 46	TOT	pg/L	13	4	100%	0.0003
Pcb 48	TOT	pg/L	24	4	100%	0.0004
Pcb 49/69	TOT	pg/L	111	4	100%	0.002
Pcb 5	TOT	pg/L	1.9	4	100%	0.00003
Pcb 50/53	TOT	pg/L	41	4	100%	0.001
Pcb 52	TOT	pg/L	228	4	100%	0.004
Pcb 54	TOT	pg/L	ND>50%	4	25%	---
Pcb 55	TOT	pg/L	ND>50%	4	50%	---
Pcb 56	TOT	pg/L	38	4	100%	0.0006
Pcb 57	TOT	pg/L	ND>50%	4	25%	---
Pcb 58	TOT	pg/L	ND>50%	4	0%	---
Pcb 59/62/75	TOT	pg/L	11	4	100%	0.0002
Pcb 6	TOT	pg/L	23	4	100%	0.0005
Pcb 60	TOT	pg/L	21	4	100%	0.0003
Pcb 61/70/74/76	TOT	pg/L	188	4	100%	0.003
Pcb 63	TOT	pg/L	3.9	4	100%	0.00008
Pcb 64	TOT	pg/L	49	4	100%	0.0009
Pcb 66	TOT	pg/L	77	4	100%	0.001
Pcb 67	TOT	pg/L	3.2	4	100%	0.00006
Pcb 68	TOT	pg/L	19	4	100%	0.0003
Pcb 7	TOT	pg/L	5.4	4	100%	0.0001
Pcb 72	TOT	pg/L	ND>50%	4	50%	---
Pcb 73	TOT	pg/L	ND>50%	4	25%	---
Pcb 77	TOT	pg/L	8.0	4	100%	0.0001
Pcb 78	TOT	pg/L	ND>50%	4	0%	---
Pcb 79	TOT	pg/L	2.4	4	100%	0.00004
Pcb 8	TOT	pg/L	63	4	100%	0.001
Pcb 80	TOT	pg/L	ND>50%	4	0%	---
Pcb 81	TOT	pg/L	ND>50%	4	0%	---

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 82	TOT	pg/L	22.4	4	100%	0.0004
Pcb 83/99	TOT	pg/L	138	4	100%	0.002
Pcb 84	TOT	pg/L	66	4	100%	0.001
Pcb 85/116/117	TOT	pg/L	36	4	100%	0.0006
Pcb 86/87/97/108/119/125	TOT	pg/L	151	4	100%	0.002
Pcb 88/91	TOT	pg/L	36	4	100%	0.0006
Pcb 89	TOT	pg/L	2.4	4	100%	0.00004
Pcb 9	TOT	pg/L	4.3	4	100%	0.00009
Pcb 90/101/113	TOT	pg/L	244	4	100%	0.004
Pcb 92	TOT	pg/L	36	4	75%	0.0006
Pcb 93/95/98/100/102	TOT	pg/L	221	4	100%	0.004
Pcb 94	TOT	pg/L	2.2	4	100%	0.00005
Pcb 96	TOT	pg/L	2.0	4	100%	0.00004
Pcb Teq 3	TOT	pg/L	0.04	3	100%	0.0000005
Pcb Teq 4	TOT	pg/L	0.1	3	100%	0.000001
PCBs Total	TOT	pg/L	5,945	4	100%	0.1
Total Decachloro Biphenyl	TOT	pg/L	23.2	4	100%	0.0004
Total Dichloro Biphenyls	TOT	pg/L	569	4	100%	0.01
Total Heptachloro Biphenyls	TOT	pg/L	547	4	100%	0.011
Total Hexachloro Biphenyls	TOT	pg/L	1,085	4	100%	0.02
Total Monochloro Biphenyls	TOT	pg/L	49	4	100%	0.001
Total Nonachloro Biphenyls	TOT	pg/L	53	4	100%	0.001
Total Octachloro Biphenyls	TOT	pg/L	261	4	100%	0.007
Total Pentachloro Biphenyls	TOT	pg/L	1,455	4	100%	0.02
Total Tetrachloro Biphenyls	TOT	pg/L	1,245	4	100%	0.02
Total Trichloro Biphenyls	TOT	pg/L	656	4	100%	0.01
PESTICIDES						
1,2,3,4-Tetrachlorobenzene	TOT	ng/L	ND>50%	4	0%	---
1,2,3-Trichlorobenzene	TOT	ng/L	ND>50%	4	0%	---
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	TOT	ng/L	ND>50%	4	0%	---
1,2,4-trichlorobenzene	TOT	ng/L	ND>50%	4	50%	---
1,2-dichlorobenzene	TOT	ng/L	2.1	4	100%	0.04
1,3,5-Trichlorobenzene	TOT	ng/L	ND>50%	4	0%	---
1,3-dichlorobenzene	TOT	ng/L	8.5	4	75%	0.2
1,4-dichlorobenzene	TOT	ng/L	162	4	100%	3.0

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
2,3,5-trimethylnaphthalene	TOT	ng/L	13	4	100%	0.2
2,6-dimethylnaphthalene	TOT	ng/L	24	4	100%	0.4
2,4-DDD	TOT	ng/L	27	4	100%	0.4
2,4-DDE	TOT	ng/L	ND>50%	4	50%	---
2,4-DDT	TOT	ng/L	ND>50%	4	25%	---
4,4-DDD	TOT	ng/L	ND>50%	4	50%	---
4,4-DDE	TOT	ng/L	0.68	4	100%	0.01
4,4-DDT	TOT	ng/L	ND>50%	4	50%	---
Mirex	TOT	ng/L	ND>50%	4	0%	---
Aldrin	TOT	ng/L	ND>50%	4	0%	---
Alpha Chlordane	TOT	ng/L	0.16	4	100%	0.003
Alpha-Endosulfan	TOT	ng/L	0.26	4	100%	0.004
Alpha-Hch Or Alpha-Bhc	TOT	ng/L	ND>50%	4	50%	---
Beta-Endosulfan	TOT	ng/L	0.56	4	100%	0.01
Beta-Hch Or Beta-Bhc	TOT	ng/L	0.25	4	75%	0.004
Cis-Nonachlor	TOT	ng/L	ND>50%	4	50%	---
Delta-Hch Or Delta-Bhc	TOT	ng/L	ND>50%	4	0%	---
Dieldrin	TOT	ng/L	0.65	4	100%	0.01
Endosulfan Sulfate	TOT	ng/L	ND>50%	4	25%	---
Endrin	TOT	ng/L	ND>50%	4	0%	---
Endrin Aldehyde	TOT	ng/L	ND>50%	4	0%	---
Endrin Ketone	TOT	ng/L	ND>50%	4	0%	---
Hch, Gamma	TOT	ng/L	0.22	4	75%	0.004
Heptachlor	TOT	ng/L	ND>50%	4	25%	---
Heptachlor Epoxide	TOT	ng/L	ND>50%	4	50%	---
Hexachlorobenzene	TOT	ng/L	0.21	4	100%	0.003
Hexachlorobutadiene	TOT	ng/L	0.32	4	100%	0.005
Methoxyclor	TOT	ng/L	ND>50%	4	50%	---
Octachlorostyrene	TOT	ng/L	ND>50%	4	0%	---
Oxy-Chlordane	TOT	ng/L	0.12	4	100%	0.002
Pentachlorobenzene	TOT	ng/L	0.10	4	100%	0.002
Trans-Chlordane	TOT	ng/L	0.22	4	100%	0.004
Trans-Nonachlor	TOT	ng/L	0.15	4	100%	0.002
PFOs						
PFBA	TOT	ng/L	296	4	100%	7.2

Appendix B5, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
PFBS	TOT	ng/L	9.1	4	75%	0.2
PFDA	TOT	ng/L	2.0	4	75%	0.04
PFDoA	TOT	ng/L	ND>50%	4	25%	---
PFHpA	TOT	ng/L	16	4	75%	0.4
PFHxA	TOT	ng/L	61	4	100%	1.5
PFHxS	TOT	ng/L	10	4	100%	0.2
PFNA	TOT	ng/L	2.5	4	100%	0.05
PFOA	TOT	ng/L	18	4	100%	0.4
PFOS	TOT	ng/L	10	4	100%	0.2
PFOSA	TOT	ng/L	ND>50%	4	25%	---
PFPeA	TOT	ng/L	130	4	100%	3.2
PFUnA	TOT	ng/L	ND>50%	4	0%	---
PPCPs						
2-Hydroxy-Ibuprofen	TOT	ng/L	29,750	4	100%	410
Bisphenol A	TOT	ng/L	7,846	4	100%	225
Furosemide	TOT	ng/L	1,254	4	100%	16
Gemfibrozil	TOT	ng/L	146	4	100%	2.2
Glipizide	TOT	ng/L	ND>50%	4	0%	---
Glyburide	TOT	ng/L	8.1	4	75%	0.1
Hydrochlorothiazide	TOT	ng/L	1820	4	100%	25
Ibuprofen	TOT	ng/L	18,800	4	100%	247
Naproxen	TOT	ng/L	11,230	4	100%	148
Triclocarban	TOT	ng/L	8.8	4	100%	0.1
Triclosan	TOT	ng/L	214	4	100%	2.9
Warfarin	TOT	ng/L	6.9	4	100%	0.1
NONYLPHENOLS						
4-n-Octylphenol	TOT	ng/L	ND>50%	1	0%	---
NP	TOT	ng/L	716	4	100%	12
4-Nonylphenol Diethoxylates	TOT	ng/L	673	4	100%	11
4-Nonylphenol Monoethoxylates	TOT	ng/L	2,281	4	100%	31
Octylphenol	TOT	ng/L	ND>50%	3	33%	---

Appendix B6 Frequency of Detection and Loadings of Substances in Clover Point Wastewaters

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
CONVENTIONALS						
Enterococci	TOT	CFU/100 mL	1,272,000	32	100%	---
Fecal Coliforms	TOT	CFU/100 mL	6,585,000	26	100%	---
Alkalinity - Total	TOT	mg/L	186	29	100%	---
Biochemical Oxygen Demand	TOT	mg/L	161	32	100%	2,105,254
Chloride	TOT	mg/L	49	32	100%	704,498
Chemical Oxygen demand	TOT	mg/L	411	32	100%	5,719,953
Hardness (as CaCO3)	DIS	mg/L	79	32	100%	---
Hardness (as CaCO3)	TOT	mg/L	87	32	100%	---
pH	TOT	pH	7.4	32	100%	---
pH @ 15°C	TOT	pH	6.8	32	100%	---
Sulfide	TOT	mg/L	0.165	32	100%	1,689
Sulfur	TOT	mg/L	8.1	20	100%	87,828
Sulphate	TOT	mg/L	22	13	100%	198,088
Temperature	TOT	°C	17	12	100%	---
Total Organic Carbon	TOT	mg/L	35	32	100%	464,181
SAD Cyanide	TOT	mg/L	0.0022	22	86%	35
WAD Cyanide	TOT	mg/L	0.0013	32	63%	15
Carbonaceous Biochemical Oxygen Demand	TOT	mg/L	193	32	100%	2,793,112
Oil & Grease, total	TOT	mg/L	11.6	32	100%	163,812
Oil & Grease, Mineral	TOT	mg/L	ND>50%	32	47%	---
Total Suspended Solids	TOT	mg/L	161	32	100%	2,334,037
Specific Conductivity - 25°C.	TOT	µS/cm	597	32	100%	---
NUTRIENTS						
N - Kjeldahl Nitrogen	TOT	mg/L	32.4	31	100%	384,800
Nitrogen as N	TOT	mg/L	32.4	32	100%	383,039
N - Nh3 (As N)	TOT	mg/L	30.4	32	100%	380,212
N - Nh3 (As N)- Unionized	TOT	mg/L	0.0667	32	100%	660
N - NO2 (As N)	TOT	mg/L	ND>50%	32	38%	---
N - NO3 (As N)	TOT	mg/L	ND>50%	32	19%	---
N - NO3 + NO2 (As N)	TOT	mg/L	ND>50%	32	38%	---
P - PO4 - Ortho (As P)	TOT	mg/L	2.9	32	100%	37,503
P - PO4 - Total (As P)	TOT	µg/L	4595	32	100%	59,382

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
ORGANICS						
1,1,1,2-Tetrachloroethane	TOT	µg/L	ND>50%	32	0%	---
1,1,1-trichloroethane	TOT	µg/L	ND>50%	32	0%	---
1,1,2,2-tetrachloroethane	TOT	µg/L	ND>50%	32	0%	---
1,1,2-trichloroethane	TOT	µg/L	ND>50%	32	0%	---
1,1-dichloroethane	TOT	µg/L	ND>50%	32	0%	---
1,1-dichloroethene	TOT	µg/L	ND>50%	32	0%	---
1,2,4-trichlorobenzene	TOT	µg/L	ND>50%	32	0%	---
1,2-dibromoethane	TOT	µg/L	ND>50%	32	0%	---
1,2-dichlorobenzene	TOT	µg/L	ND>50%	32	0%	---
1,2-dichloroethane	TOT	µg/L	ND>50%	32	6%	---
1,2-dichloropropane	TOT	µg/L	ND>50%	32	0%	---
1,2-diphenylhydrazine	TOT	µg/L	ND>50%	32	0%	---
1,3-dichlorobenzene	TOT	µg/L	ND>50%	32	0%	---
1,4-dichlorobenzene	TOT	µg/L	ND>50%	32	0%	---
1,4-dioxane	TOT	µg/L	ND>50%	12	42%	---
2,4 + 2,5-Dichlorophenol	TOT	µg/L	ND>50%	32	0%	---
2,4,6-trichlorophenol	TOT	µg/L	ND>50%	32	0%	---
2,4-dimethylphenol	TOT	µg/L	ND>50%	32	0%	---
2,4-dinitrophenol	TOT	µg/L	ND>50%	32	0%	---
2,4-dinitrotoluene	TOT	µg/L	ND>50%	32	0%	---
2,6-dinitrotoluene	TOT	µg/L	ND>50%	32	0%	---
3,3-dichlorobenzidine	TOT	µg/L	ND>50%	32	0%	---
4,6-dinitro-2-methylphenol	TOT	µg/L	ND>50%	7	0%	---
cis-1,3-dichloropropene	TOT	µg/L	ND>50%	32	0%	---
Dichlorodifluoromethane	TOT	µg/L	ND>50%	32	0%	---
Methyl Tertiary Butyl Ether	TOT	µg/L	ND>50%	32	0%	---
Nitrobenzene	TOT	µg/L	ND>50%	32	0%	---
trans-1,3-dichloropropene	TOT	µg/L	ND>50%	32	0%	---
2-Chloronaphthalene	TOT	µg/L	ND>50%	32	0%	---
4-Bromophenyl Phenyl Ether	TOT	µg/L	ND>50%	32	0%	---
4-Chlorophenyl Phenyl Ether	TOT	µg/L	ND>50%	32	0%	---
Bis(2-Chloroethoxy)Methane	TOT	µg/L	ND>50%	32	0%	---
Bis(2-Chloroethyl)Ether	TOT	µg/L	ND>50%	32	0%	---
Bis(2-Chloroisopropyl)Ether	TOT	µg/L	ND>50%	32	0%	---

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Bromodichloromethane	TOT	µg/L	ND>50%	32	0%	---
Bromomethane	TOT	µg/L	ND>50%	32	0%	---
Chlorobenzene	TOT	µg/L	ND>50%	32	0%	---
Chlorodibromomethane	TOT	µg/L	ND>50%	32	0%	---
Chloroethane	TOT	µg/L	ND>50%	32	3%	---
Chloroethene	TOT	µg/L	ND>50%	25	0%	---
Chloromethane	TOT	µg/L	ND>50%	32	0%	---
Cis-1,2-Dichloroethene	TOT	µg/L	ND>50%	32	0%	---
Dibromomethane	TOT	µg/L	ND>50%	32	0%	---
Dichloromethane	TOT	µg/L	ND>50%	7	0%	---
Hexachlorobutadiene	TOT	µg/L	ND>50%	32	0%	---
Hexachlorocyclopentadiene	TOT	µg/L	ND>50%	32	0%	---
Hexachloroethane	TOT	µg/L	ND>50%	32	0%	---
Tetrabromomethane	TOT	µg/L	ND>50%	32	0%	---
Tetrachloroethene	TOT	µg/L	ND>50%	32	6%	---
Tetrachloromethane	TOT	µg/L	ND>50%	25	0%	---
Trans-1,2-Dichloroethene	TOT	µg/L	ND>50%	32	0%	---
Tribromomethane	TOT	µg/L	ND>50%	32	0%	---
Trichloroethene	TOT	µg/L	ND>50%	32	0%	---
Trichlorofluoromethane	TOT	µg/L	ND>50%	32	0%	---
Trichloromethane	TOT	µg/L	2.3	25	100%	23
Vinyl Chloride	TOT	µg/L	ND>50%	7	0%	---
2-Chlorophenol	TOT	µg/L	ND>50%	32	0%	---
4-Chloro-3-Methylphenol	TOT	µg/L	ND>50%	32	0%	---
4-Methyl-2-Pentanone	TOT	µg/L	ND>50%	32	0%	---
Dimethyl Ketone	TOT	µg/L	237	32	94%	3,225
Isophorone	TOT	µg/L	ND>50%	32	0%	---
Methyl Ethyl Ketone	TOT	µg/L	ND>50%	32	0%	---
BTEX						
Benzene	TOT	µg/L	ND>50%	32	3%	---
Ethylbenzene	TOT	µg/L	ND>50%	32	3%	---
M & P Xylenes	TOT	µg/L	ND>50%	32	0%	---
O-Xylene	TOT	µg/L	ND>50%	32	0%	---
Styrene	TOT	µg/L	ND>50%	32	41%	---

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Toluene	TOT	µg/L	0.68	32	66%	8
Xylenes	TOT	µg/L	ND>50%	32	0%	---
METALS-TOTAL						
Aluminum	TOT	µg/L	203	32	100%	2,424
Antimony	TOT	µg/L	0.241	32	100%	3
Arsenic	TOT	µg/L	0.751	32	100%	8
Barium	TOT	µg/L	19.4	32	100%	258
Beryllium	TOT	µg/L	ND>50%	32	16%	---
Cadmium	TOT	µg/L	0.093	32	100%	1.3
Calcium	TOT	mg/L	22.2	32	100%	288,181
Chromium	TOT	µg/L	0.76	32	100%	9
Chromium III	TOT	mg/L	ND>50%	32	19%	---
Chromium Vi	TOT	mg/L	ND>50%	32	0%	---
Cobalt	TOT	µg/L	0.358	32	100%	4
Copper	TOT	µg/L	105	32	100%	1,340
Iron	TOT	µg/L	454	32	100%	5,824
Lead	TOT	µg/L	3.5	32	100%	44
Magnesium	TOT	mg/L	7.7	32	100%	99,581
Manganese	TOT	µg/L	47	32	100%	592
Mercury	TOT	µg/L	0.0183	32	66%	0.3
Molybdenum	TOT	µg/L	1.51	32	100%	18
Nickel	TOT	µg/L	2.28	32	100%	29
Potassium	TOT	mg/L	11	32	100%	142,181
Selenium	TOT	µg/L	0.283	32	100%	4
Silver	TOT	µg/L	0.098	32	100%	2
Sodium	TOT	mg/L	32	20	100%	380,762
Thallium	TOT	µg/L	0.0049	32	97%	0.06
Tin	TOT	µg/L	0.63	32	100%	9
Zinc	TOT	µg/L	82	32	100%	1,066
METALS - DISSOLVED						
Aluminum	DIS	µg/L	26	32	100%	226
Antimony	DIS	µg/L	0.215	32	100%	3
Arsenic	DIS	µg/L	0.571	32	100%	7
Barium	DIS	µg/L	8.9	32	100%	103
Beryllium	DIS	µg/L	ND>50%	32	0%	---

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Cadmium	DIS	µg/L	0.020	32	94%	0.22
Calcium	DIS	mg/L	19.6	32	100%	245,616
Chromium	DIS	µg/L	0.38	32	100%	4
Cobalt	DIS	µg/L	0.22	32	100%	2
Copper	DIS	µg/L	50	32	100%	563
Iron	DIS	µg/L	204	32	100%	2,345
Lead	DIS	µg/L	0.75	32	100%	7.5
Magnesium	DIS	mg/L	7.2	32	100%	92,508
Manganese	DIS	µg/L	32	32	100%	367
Mercury	DIS	µg/L	ND>50%	32	19%	---
Molybdenum	DIS	µg/L	1.4	32	100%	19
Nickel	DIS	µg/L	1.7	32	100%	20
Phosphorus	DIS	µg/L	3326	32	100%	39,232
Potassium	DIS	mg/L	10.8	32	100%	136,104
Selenium	DIS	µg/L	0.23	32	100%	2.87
Silver	DIS	µg/L	0.039	32	100%	0.56
Sodium	DIS	mg/L	32.6	20	100%	376,279
Thallium	DIS	µg/L	ND>50%	32	13%	---
Tin	DIS	µg/L	0.45	32	94%	5.3
Zinc	DIS	µg/L	27	32	100%	311
METALS - SPECIATED						
Methyl Mercury	TOT	ng/L	0.676	12	100%	0.01
Dibutyltin	TOT	µg/L	ND>50%	12	50%	---
Dibutyltin Dichloride	TOT	µg/L	ND>50%	12	50%	---
Monobutyltin	TOT	µg/L	ND>50%	12	50%	---
Monobutyltin Trichloride	TOT	µg/L	ND>50%	12	50%	---
Tributyltin	TOT	µg/L	ND>50%	12	0%	---
Tributyltin Chloride	TOT	µg/L	ND>50%	12	0%	---
ORGANICS						
Carbon Tetrachloride	TOT	µg/L	ND>50%	7	0%	---
Chloroform	TOT	µg/L	4.9	7	100%	122
Acrolein	TOT	µg/L	ND>50%	32	0%	---
Acrylonitrile	TOT	µg/L	ND>50%	32	0%	---
Alpha-Terpineol	TOT	µg/L	ND>50%	32	28%	---
N-Nitrosodi-N-Propylamine	TOT	µg/L	ND>50%	32	0%	---

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
N-Nitrosodimethylamine	TOT	µg/L	ND>50%	32	0%	---
N-Nitrosodiphenylamine	TOT	µg/L	ND>50%	32	0%	---
PAHs						
2-Methylnaphthalene	TOT	µg/L	0.034	32	91%	0.54
Acenaphthene	TOT	µg/L	0.050	32	94%	0.57
Acenaphthylene	TOT	µg/L	ND>50%	32	38%	---
Anthracene	TOT	µg/L	0.032	32	75%	0.31
Benzo(a)anthracene	TOT	µg/L	0.054	32	66%	0.36
Benzo(a)pyrene	TOT	µg/L	0.045	32	78%	0.35
Benzo(b)fluoranthene	TOT	µg/L	0.036	32	59%	0.30
Benzo(b)fluoranthene + Benzo(j)fluoranthene	TOT	µg/L	0.055	32	63%	0.43
Benzo(g,h,i)perylene	TOT	µg/L	ND>50%	32	22%	---
Benzo(k)fluoranthene	TOT	µg/L	0.024	32	56%	0.18
Chrysene	TOT	µg/L	0.060	32	72%	0.51
Dibenzo(a,h)anthracene	TOT	µg/L	ND>50%	32	9%	---
Fluoranthene	TOT	µg/L	0.12	32	97%	0.89
Fluorene	TOT	µg/L	0.06	32	100%	0.73
Indeno(1,2,3-c,d)pyrene	TOT	µg/L	ND>50%	32	25%	---
Naphthalene	TOT	µg/L	0.07	32	97%	1
Phenanthrene	TOT	µg/L	0.12	32	100%	1.3
Pyrene	TOT	µg/L	0.11	32	91%	0.9
Total Hmw-PAHs	TOT	µg/L	0.50	32	91%	3.7
Total Lmw-PAHs	TOT	µg/L	0.52	32	100%	6
Total PAHs	TOT	µg/L	1.0	32	100%	9
PHENOLICS						
2-Methyl-4,6-Dinitrophenol	TOT	µg/L	ND>50%	25	0%	---
2-Nitrophenol	TOT	µg/L	ND>50%	32	0%	---
4-Nitrophenol	TOT	µg/L	ND>50%	32	3%	---
Phenol	TOT	µg/L	5.0	32	94%	67
Total Phenols	TOT	mg/L	0.03841	32	100%	567
Pentachlorophenol	TOT	µg/L	ND>50%	32	0%	---
PHTHALATES						
N-Butylbenzyl Phthalate	TOT	µg/L	ND>50%	7	0%	---
Bis(2-Ethylhexyl)Phthalate	TOT	µg/L	ND>50%	32	31%	---
Butylbenzyl Phthalate	TOT	µg/L	ND>50%	25	4%	---

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Di-N-Butyl Phthalate	TOT	µg/L	ND>50%	32	0%	---
Di-N-Octyl Phthalate	TOT	µg/L	ND>50%	32	0%	---
Diethyl Phthalate	TOT	µg/L	1.1	32	91%	16
Dimethyl Phthalate	TOT	µg/L	ND>50%	26	0%	---
HIGH RESOLUTION						
PAHs						
1-Methylphenanthrene	TOT	ng/L	12	4	100%	0.18
2-Methylnaphthalene	TOT	ng/L	39	4	100%	0.6
Acenaphthene	TOT	ng/L	98	4	100%	1.06
Acenaphthylene	TOT	ng/L	4.9	4	100%	0.07
Anthracene	TOT	ng/L	34	4	100%	0.46
Benz[a]anthracene	TOT	ng/L	27	4	100%	0.84
Benzo[a]pyrene	TOT	ng/L	35	4	100%	1.09
Benzo[b]fluoranthene	TOT	ng/L	28	4	100%	0.86
Benzo[e]pyrene	TOT	ng/L	28	4	100%	0.87
Benzo[ghi]perylene	TOT	ng/L	31	4	100%	0.95
Benzo[j,k]Fluoranthenes	TOT	ng/L	50	4	100%	0.79
Chrysene	TOT	ng/L	50	4	100%	0.75
Dibenzo(a,h)anthracene	TOT	ng/L	9.3	4	100%	0.12
Dibenzothiophene	TOT	ng/L	27	4	100%	0.33
Fluoranthene	TOT	ng/L	145	4	100%	1.94
Fluorene	TOT	ng/L	50	4	100%	0.62
Indeno[1,2,3-cd]pyrene	TOT	ng/L	42	4	100%	0.67
Naphthalene	TOT	ng/L	151	4	100%	1.71
Perylene	TOT	ng/L	15	4	100%	0.23
Phenanthrene	TOT	ng/L	211	4	100%	2.82
Pyrene	TOT	ng/L	113	4	100%	1.57
PBDE						
Pbde 10	TOT	pg/L	ND>50%	4	8%	---
Pbde 100	TOT	pg/L	3109	4	100%	0.047
Pbde 105	TOT	pg/L	ND>50%	4	0%	---
Pbde 116	TOT	pg/L	ND>50%	4	0%	---
Pbde 119/120	TOT	pg/L	49	4	75%	0.0008
Pbde 12/13	TOT	pg/L	2.4	4	75%	0.00004
Pbde 126	TOT	pg/L	22	4	75%	0.00050

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pbde 128	TOT	pg/L	ND>50%	4	25%	---
Pbde 138/166	TOT	pg/L	147	4	100%	0.0025
Pbde 140	TOT	pg/L	49	4	100%	0.0008
Pbde 15	TOT	pg/L	13	4	100%	0.0002
Pbde 153	TOT	pg/L	1572	4	100%	0.024
Pbde 154	TOT	pg/L	1161	4	100%	0.018
Pbde 155	TOT	pg/L	98	4	100%	0.0015
Pbde 17/25	TOT	pg/L	92	4	100%	0.0014
Pbde 181	TOT	pg/L	ND>50%	4	25%	---
Pbde 183	TOT	pg/L	154	4	100%	0.002
Pbde 190	TOT	pg/L	13	4	58%	0.00021
Pbde 203	TOT	pg/L	103	4	100%	0.002
Pbde 206	TOT	pg/L	1084	4	100%	0.02
Pbde 207	TOT	pg/L	1280	4	100%	0.02
Pbde 208	TOT	pg/L	774	4	100%	0.01
Pbde 209	TOT	pg/L	18570	4	100%	0.3
Pbde 28/33	TOT	pg/L	248	4	100%	0.004
Pbde 30	TOT	pg/L	ND>50%	4	0%	---
Pbde 32	TOT	pg/L	ND>50%	4	17%	---
Pbde 35	TOT	pg/L	4.3	4	100%	0.00007
Pbde 37	TOT	pg/L	8.1	4	100%	0.00012
Pbde 47	TOT	pg/L	15720	4	100%	0.24
Pbde 49	TOT	pg/L	346	4	100%	0.005
Pbde 51	TOT	pg/L	42	4	100%	0.0007
Pbde 66	TOT	pg/L	272	4	100%	0.004
Pbde 7	TOT	pg/L	2.6	4	100%	0.00004
Pbde 71	TOT	pg/L	37	4	100%	0.0006
Pbde 75	TOT	pg/L	20	4	100%	0.0003
Pbde 77	TOT	pg/L	ND>50%	4	33%	---
Pbde 79	TOT	pg/L	66	4	100%	0.0010
Pbde 8/11	TOT	pg/L	3	4	100%	0.00005
Pbde 85	TOT	pg/L	627	4	100%	0.010
Pbde 99	TOT	pg/L	15,160	4	100%	0.23
Pcb 1	TOT	pg/L	14	4	100%	0.0002
Pcb 10	TOT	pg/L	ND>50%	4	0%	---
Pcb 103	TOT	pg/L	1.7	4	83%	0.00003

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 104	TOT	pg/L	ND>50%	4	42%	---
Pcb 105	TOT	pg/L	50	4	100%	0.0009
Pcb 106	TOT	pg/L	ND>50%	4	0%	---
Pcb 107/124	TOT	pg/L	5.7	4	100%	0.00010
Pcb 109	TOT	pg/L	7.7	4	100%	0.00013
Pcb 11	TOT	pg/L	241	4	100%	0.004
Pcb 110/115	TOT	pg/L	197	4	100%	0.0033
Pcb 111	TOT	pg/L	ND>50%	4	0%	---
Pcb 112	TOT	pg/L	ND>50%	4	0%	---
Pcb 114	TOT	pg/L	4.4	4	100%	0.00007
Pcb 118	TOT	pg/L	140	4	100%	0.0023
Pcb 12/13	TOT	pg/L	9.3	4	100%	0.0001
Pcb 120	TOT	pg/L	ND>50%	4	0%	---
Pcb 121	TOT	pg/L	1.2	4	58%	0.00002
Pcb 122	TOT	pg/L	1.4	4	67%	0.00003
Pcb 123	TOT	pg/L	5.7	4	100%	0.00010
Pcb 126	TOT	pg/L	ND>50%	4	25%	---
Pcb 127	TOT	pg/L	ND>50%	4	0%	---
Pcb 128/166	TOT	pg/L	19	4	100%	0.0003
Pcb 129/138/160/163	TOT	pg/L	164	4	100%	0.0028
Pcb 130	TOT	pg/L	9.4	4	100%	0.00016
Pcb 131	TOT	pg/L	2.7	4	92%	0.00005
Pcb 132	TOT	pg/L	57	4	100%	0.0010
Pcb 133	TOT	pg/L	2.9	4	100%	0.00005
Pcb 134/143	TOT	pg/L	9.8	4	100%	0.00017
Pcb 135/151/154	TOT	pg/L	64	4	100%	0.0011
Pcb 136	TOT	pg/L	23	4	92%	0.0004
Pcb 137	TOT	pg/L	9.3	4	100%	0.00016
Pcb 139/140	TOT	pg/L	4.2	4	100%	0.00007
Pcb 14	TOT	pg/L	ND>50%	4	0%	---
Pcb 141	TOT	pg/L	29	4	100%	0.0005
Pcb 142	TOT	pg/L	ND>50%	4	0%	---
Pcb 144	TOT	pg/L	10	4	100%	0.00017
Pcb 145	TOT	pg/L	ND>50%	4	0%	---
Pcb 146	TOT	pg/L	19	4	100%	0.0003
Pcb 147/149	TOT	pg/L	140	4	100%	0.0023

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 148	TOT	pg/L	ND>50%	4	42%	---
Pcb 15	TOT	pg/L	24	4	100%	0.0004
Pcb 150	TOT	pg/L	1.0	4	75%	0.00002
Pcb 152	TOT	pg/L	ND>50%	4	0%	---
Pcb 153/168	TOT	pg/L	161	4	100%	0.0027
Pcb 155	TOT	pg/L	11	4	100%	0.00018
Pcb 156157	TOT	pg/L	22	4	100%	0.0004
Pcb 158	TOT	pg/L	14	4	100%	0.00024
Pcb 159	TOT	pg/L	1.4	4	67%	0.00002
Pcb 16	TOT	pg/L	30	4	100%	0.0005
Pcb 161	TOT	pg/L	ND>50%	4	0%	---
Pcb 162	TOT	pg/L	ND>50%	4	8%	---
Pcb 164	TOT	pg/L	8.7	4	100%	0.00015
Pcb 165	TOT	pg/L	ND>50%	4	0%	---
Pcb 167	TOT	pg/L	6.2	4	100%	0.00011
Pcb 169	TOT	pg/L	ND>50%	4	0%	---
Pcb 17	TOT	pg/L	26	4	100%	0.0004
Pcb 170	TOT	pg/L	33	4	100%	0.0006
Pcb 171/173	TOT	pg/L	11	4	100%	0.00018
Pcb 172	TOT	pg/L	6.0	4	100%	0.00010
Pcb 174	TOT	pg/L	34	4	100%	0.0006
Pcb 175	TOT	pg/L	1.9	4	92%	0.00003
Pcb 176	TOT	pg/L	6.1	4	100%	0.00010
Pcb 177	TOT	pg/L	19	4	100%	0.00032
Pcb 178	TOT	pg/L	12	4	100%	0.00019
Pcb 179	TOT	pg/L	23	4	100%	0.00037
Pcb 18/30	TOT	pg/L	53	4	100%	0.0009
Pcb 180/193	TOT	pg/L	85	4	92%	0.0015
Pcb 181	TOT	pg/L	ND>50%	4	17%	---
Pcb 182	TOT	pg/L	ND>50%	4	33%	---
Pcb 183/185	TOT	pg/L	29	4	100%	0.00050
Pcb 184	TOT	pg/L	22	4	100%	0.0004
Pcb 186	TOT	pg/L	ND>50%	4	0%	---
Pcb 187	TOT	pg/L	57	4	100%	0.0010
Pcb 188	TOT	pg/L	ND>50%	4	33%	---
Pcb 189	TOT	pg/L	1.9	4	92%	0.00003

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 19	TOT	pg/L	5.6	4	100%	0.0001
Pcb 190	TOT	pg/L	6.8	4	100%	0.00012
Pcb 191	TOT	pg/L	1.6	4	92%	0.00003
Pcb 192	TOT	pg/L	ND>50%	4	8%	---
Pcb 194	TOT	pg/L	16	4	100%	0.00028
Pcb 195	TOT	pg/L	4.9	4	100%	0.00009
Pcb 196	TOT	pg/L	8.8	4	100%	0.00015
Pcb 197/200	TOT	pg/L	3.2	4	100%	0.00005
Pcb 198/199	TOT	pg/L	27	4	100%	0.00046
Pcb 2	TOT	pg/L	4.2	4	100%	0.0001
Pcb 20/28	TOT	pg/L	84	4	100%	0.0014
Pcb 201	TOT	pg/L	3.5	4	100%	0.0001
Pcb 202	TOT	pg/L	9.4	4	100%	0.00016
Pcb 203	TOT	pg/L	16	4	100%	0.00027
Pcb 204	TOT	pg/L	1.2	4	75%	0.00002
Pcb 205	TOT	pg/L	1.0	4	67%	0.00002
Pcb 206	TOT	pg/L	15	4	100%	0.00026
Pcb 207	TOT	pg/L	4.1	4	75%	0.00008
Pcb 208	TOT	pg/L	6.3	4	100%	0.00010
Pcb 209	TOT	pg/L	14	4	100%	0.0002
Pcb 21/33	TOT	pg/L	52	4	100%	0.0009
Pcb 22	TOT	pg/L	35	4	100%	0.0006
Pcb 23	TOT	pg/L	ND>50%	4	8%	---
Pcb 24	TOT	pg/L	0.97	4	58%	0.00002
Pcb 25	TOT	pg/L	5.6	4	100%	0.0001
Pcb 26/29	TOT	pg/L	13	4	100%	0.0002
Pcb 27	TOT	pg/L	3.8	4	100%	0.0001
Pcb 3	TOT	pg/L	11	4	100%	0.0002
Pcb 31	TOT	pg/L	77	4	100%	0.0013
Pcb 32	TOT	pg/L	16	4	100%	0.0003
Pcb 34	TOT	pg/L	ND>50%	4	8%	---
Pcb 35	TOT	pg/L	9.4	4	100%	0.00016
Pcb 36	TOT	pg/L	2.1	4	100%	0.00004
Pcb 37	TOT	pg/L	24	4	100%	0.0004
Pcb 38	TOT	pg/L	ND>50%	4	0%	---
Pcb 39	TOT	pg/L	1.0	4	67%	0.00002

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 4	TOT	pg/L	12	4	100%	0.0002
Pcb 40/41/71	TOT	pg/L	47	4	100%	0.0008
Pcb 42	TOT	pg/L	22	4	100%	0.0004
Pcb 43	TOT	pg/L	3.5	4	100%	0.00006
Pcb 44/47/65	TOT	pg/L	165	4	100%	0.003
Pcb 45/51	TOT	pg/L	25	4	100%	0.0004
Pcb 46	TOT	pg/L	5.0	4	100%	0.00008
Pcb 48	TOT	pg/L	19	4	100%	0.0003
Pcb 49/69	TOT	pg/L	56	4	100%	0.0009
Pcb 5	TOT	pg/L	1.5	4	67%	0.00002
Pcb 50/53	TOT	pg/L	11	4	100%	0.0002
Pcb 52	TOT	pg/L	187	4	100%	0.003
Pcb 54	TOT	pg/L	ND>50%	4	8%	---
Pcb 55	TOT	pg/L	1.3	4	83%	0.00002
Pcb 56	TOT	pg/L	35	4	100%	0.0006
Pcb 57	TOT	pg/L	ND>50%	4	0%	---
Pcb 58	TOT	pg/L	ND>50%	4	0%	---
Pcb 59/62/75	TOT	pg/L	6.7	4	100%	0.00011
Pcb 6	TOT	pg/L	12	4	100%	0.0002
Pcb 60	TOT	pg/L	21	4	100%	0.0003
Pcb 61/70/74/76	TOT	pg/L	178	4	100%	0.0029
Pcb 63	TOT	pg/L	3.1	4	100%	0.00005
Pcb 64	TOT	pg/L	41	4	100%	0.0007
Pcb 66	TOT	pg/L	67	4	100%	0.0011
Pcb 67	TOT	pg/L	2.0	4	100%	0.00003
Pcb 68	TOT	pg/L	12	4	100%	0.00019
Pcb 7	TOT	pg/L	3.7	4	100%	0.00007
Pcb 72	TOT	pg/L	ND>50%	4	25%	---
Pcb 73	TOT	pg/L	ND>50%	4	25%	---
Pcb 77	TOT	pg/L	6.9	4	100%	0.00011
Pcb 78	TOT	pg/L	ND>50%	4	0%	---
Pcb 79	TOT	pg/L	2.2	4	100%	0.00
Pcb 8	TOT	pg/L	39	4	100%	0.0007
Pcb 80	TOT	pg/L	ND>50%	4	0%	---
Pcb 81	TOT	pg/L	ND>50%	4	8%	---
Pcb 82	TOT	pg/L	20	4	100%	0.0003

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 83/99	TOT	pg/L	106	4	100%	0.0018
Pcb 84	TOT	pg/L	54	4	100%	0.0009
Pcb 85/116/117	TOT	pg/L	31	4	100%	0.0005
Pcb 86/87/97/108/119/125	TOT	pg/L	129	4	100%	0.0022
Pcb 88/91	TOT	pg/L	26	4	100%	0.0004
Pcb 89	TOT	pg/L	2.1	4	92%	0.00
Pcb 9	TOT	pg/L	2.8	4	100%	0.00005
Pcb 90/101/113	TOT	pg/L	208	4	100%	0.003
Pcb 92	TOT	pg/L	25	4	75%	0.0005
Pcb 93/95/98/100/102	TOT	pg/L	183	4	100%	0.0031
Pcb 94	TOT	pg/L	ND>50%	4	33%	---
Pcb 96	TOT	pg/L	1.4	4	75%	0.000
Pcb Teq 3	TOT	pg/L	0.04	4	100%	0.0000003
Pcb Teq 4	TOT	pg/L	0.09	4	100%	0.000001
PCBs Total	TOT	pg/L	4143	4	100%	0.07
Total Decachloro Biphenyl	TOT	pg/L	14	4	100%	0.0002
Total Dichloro Biphenyls	TOT	pg/L	345	4	100%	0.01
Total Heptachloro Biphenyls	TOT	pg/L	336	4	100%	0.006
Total Hexachloro Biphenyls	TOT	pg/L	772	4	100%	0.013
Total Monochloro Biphenyls	TOT	pg/L	28	4	100%	0.0004
Total Nonachloro Biphenyls	TOT	pg/L	21	4	100%	0.00037
Total Octachloro Biphenyls	TOT	pg/L	82	4	100%	0.00139
Total Pentachloro Biphenyls	TOT	pg/L	1195	4	100%	0.020
Total Tetrachloro Biphenyls	TOT	pg/L	913	4	100%	0.015
Total Trichloro Biphenyls	TOT	pg/L	437	4	100%	0.007
PESTICIDES						
1,2,3,4-Tetrachlorobenzene	TOT	ng/L	ND>50%	4	0%	---
1,2,3-Trichlorobenzene	TOT	ng/L	ND>50%	4	0%	---
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	TOT	ng/L	ND>50%	4	0%	---
1,2,4-trichlorobenzene	TOT	ng/L	ND>50%	4	40%	---
1,2-dichlorobenzene	TOT	ng/L	1.1	4	100%	0.02
1,3,5-Trichlorobenzene	TOT	ng/L	ND>50%	4	0%	---
1,3-dichlorobenzene	TOT	ng/L	2.5	4	88%	0.04
1,4-dichlorobenzene	TOT	ng/L	35	4	100%	0.6
2,3,5-trimethylnaphthalene	TOT	ng/L	13	4	100%	0.2

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
2,6-dimethylnaphthalene	TOT	ng/L	24	4	100%	0.4
2,4-DDD	TOT	ng/L	1.8	4	100%	0.03
2,4-DDE	TOT	ng/L	ND>50%	4	0%	---
2,4-DDT	TOT	ng/L	ND>50%	4	25%	---
4,4-DDD	TOT	ng/L	0.14	4	67%	0.00
4,4-DDE	TOT	ng/L	0.70	4	100%	0.012
4,4-DDT	TOT	ng/L	0.31	4	75%	0.005
Mirex	TOT	ng/L	ND>50%	4	0%	---
Aldrin	TOT	ng/L	ND>50%	4	17%	---
Alpha Chlordane	TOT	ng/L	0.17	4	100%	0.003
Alpha-Endosulfan	TOT	ng/L	0.26	4	91%	0.004
Alpha-Hch Or Alpha-Bhc	TOT	ng/L	ND>50%	4	33%	---
Beta-Endosulfan	TOT	ng/L	0.53	4	100%	0.01
Beta-Hch Or Beta-Bhc	TOT	ng/L	0.19	4	75%	0.003
Cis-Nonachlor	TOT	ng/L	0.08	4	83%	0.001
Delta-Hch Or Delta-Bhc	TOT	ng/L	ND>50%	4	0%	---
Dieldrin	TOT	ng/L	0.85	4	100%	0.013
Endosulfan Sulfate	TOT	ng/L	ND>50%	4	9%	---
Endrin	TOT	ng/L	ND>50%	4	9%	---
Endrin Aldehyde	TOT	ng/L	ND>50%	4	0%	---
Endrin Ketone	TOT	ng/L	ND>50%	4	0%	---
Hch, Gamma	TOT	ng/L	0.18	4	75%	0.003
Heptachlor	TOT	ng/L	ND>50%	4	33%	---
Heptachlor Epoxide	TOT	ng/L	ND>50%	4	9%	---
Hexachlorobenzene	TOT	ng/L	0.16	4	100%	0.002
Hexachlorobutadiene	TOT	ng/L	0.28	4	90%	0.004
Methoxyclor	TOT	ng/L	0.49	4	73%	0.01
Octachlorostyrene	TOT	ng/L	ND>50%	4	33%	---
Oxy-Chlordane	TOT	ng/L	0.074	4	75%	0.00
Pentachlorobenzene	TOT	ng/L	0.09	4	100%	0.0015
Trans-Chlordane	TOT	ng/L	0.21	4	100%	0.003
Trans-Nonachlor	TOT	ng/L	0.18	4	100%	0.00
PFOs						
PFBA	TOT	ng/L	37	4	100%	0.5
PFBS	TOT	ng/L	4.3	4	75%	0.1

Appendix B6, cont'd

Parameter	State	Unit	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
PFDA	TOT	ng/L	ND>50%	4	50%	---
PFDoA	TOT	ng/L	ND>50%	4	0%	---
PFHpA	TOT	ng/L	3.9	4	100%	0.1
PFHxA	TOT	ng/L	11	4	100%	0.2
PFHxS	TOT	ng/L	2.9	4	92%	0.01
PFNA	TOT	ng/L	1.2	4	75%	0.02
PFOA	TOT	ng/L	4.9	4	100%	0.1
PFOS	TOT	ng/L	5.3	4	92%	0.1
PFOSA	TOT	ng/L	ND>50%	4	0%	---
PFPeA	TOT	ng/L	17	4	100%	0.3
PFUnA	TOT	ng/L	ND>50%	4	0%	---
PPCPs				4		
2-Hydroxy-Ibuprofen	TOT	ng/L	24,230	4	100%	365
Bisphenol A	TOT	ng/L	106	4	100%	2
Furosemide	TOT	ng/L	1,212	4	100%	17
Gemfibrozil	TOT	ng/L	45	4	100%	0.8
Glipizide	TOT	ng/L	ND>50%	4	25%	---
Glyburide	TOT	ng/L	2.9	4	67%	0.04
Hydrochlorothiazide	TOT	ng/L	1,435	4	100%	20
Ibuprofen	TOT	ng/L	14,950	4	100%	206
Naproxen	TOT	ng/L	7,746	4	100%	112
Triclocarban	TOT	ng/L	7.6	4	100%	0.1
Triclosan	TOT	ng/L	127	4	100%	2.1
Warfarin	TOT	ng/L	6.3	4	100%	0.1
NONYLPHENOLS						
4-n-Octylphenol	TOT	ng/L	ND>50%	4	0%	---
NP	TOT	ng/L	342	4	100%	4.1
4-Nonylphenol Diethoxylates	TOT	ng/L	280	4	83%	4.7
4-Nonylphenol Monoethoxylates	TOT	ng/L	1,384	4	100%	18.1
Octylphenol	TOT	ng/L	ND>50%	4	11%	---

Appendix B7 Frequency of Detection and Loadings of Substances in McLoughlin Point Wastewaters

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
CONVENTIONALS						
Enterococci	TOT	CFU/100 mL	5,773	3	100%	---
Fecal Coliforms	TOT	CFU/100 mL	88,000	3	100%	---
Alkalinity - Total	TOT	mg/L	127	3	100%	4,679,936
Biochemical Oxygen Demand	TOT	mg/L	23	3	100%	879,545
Chloride	TOT	mg/L	59	3	100%	2,030,721
Chemical Oxygen demand	TOT	mg/L	59	3	100%	2,046,405
Hardness (as CaCO3)	DIS	mg/L	89	3	100%	3,251,954
Hardness (as CaCO3)	TOT	mg/L	90	3	100%	3,267,649
pH	TOT	pH	6.9	3	100%	---
pH @ 15°C	TOT	pH	6.8	3	100%	---
Sulfide	TOT	mg/L	0.027	3	100%	926
Sulfur	TOT	mg/L	9.8	2	100%	412,397
Sulphate	TOT	mg/L	28	2	100%	966,824
Temperature	TOT	°C	---	---	---	---
Total Organic Carbon	TOT	mg/L	13	3	100%	472,895
SAD Cyanide	TOT	mg/L	0.0022	2	100%	72
WAD Cyanide	TOT	mg/L	0.0010	3	67%	35
Carbonaceous Biochemical Oxygen Demand	TOT	mg/L	11.9	3	100%	449,102
Oil & Grease, total	TOT	mg/L	ND>50%	3	33%	---
Oil & Grease, Mineral	TOT	mg/L	ND>50%	3	0%	---
Total Suspended Solids	TOT	mg/L	13	3	100%	375,341
Specific Conductivity - 25°C.	TOT	µS/cm	577	3	100%	---
NUTRIENTS						
N - Kjeldahl Nitrogen	TOT	mg/L	16	3	100%	566,206
Nitrogen as N	TOT	mg/L	23	3	100%	812,129
N - Nh3 (As N)	TOT	mg/L	18	3	100%	649,383
N - Nh3 (As N)- Unionized	TOT	mg/L	0.03	3	100%	1,106
N - NO2 (As N)	TOT	mg/L	0.55	3	100%	19,958
N - NO3 (As N)	TOT	mg/L	6.8	3	100%	218,273
N - NO3 + NO2 (As N)	TOT	mg/L	7.4	3	100%	238,090

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
P - PO4 - Ortho (As P)	TOT	mg/L	1.8	3	100%	66,978
P - PO4 - Total (As P)	TOT	µg/L	2,180	3	100%	81,464
ORGANICS						
1,1,1,2-Tetrachloroethane	TOT	µg/L	ND>50%	3	0%	---
1,1,1-trichloroethane	TOT	µg/L	ND>50%	3	0%	---
1,1,2,2-tetrachloroethane	TOT	µg/L	ND>50%	3	0%	---
1,1,2-trichloroethane	TOT	µg/L	ND>50%	3	0%	---
1,1-dichloroethane	TOT	µg/L	ND>50%	3	0%	---
1,1-dichloroethene	TOT	µg/L	ND>50%	3	0%	---
1,2,4-trichlorobenzene	TOT	µg/L	ND>50%	3	0%	---
1,2-dibromoethane	TOT	µg/L	ND>50%	3	0%	---
1,2-dichlorobenzene	TOT	µg/L	ND>50%	3	0%	---
1,2-dichloroethane	TOT	µg/L	ND>50%	3	0%	---
1,2-dichloropropane	TOT	µg/L	ND>50%	3	0%	---
1,2-diphenylhydrazine	TOT	µg/L	ND>50%	3	0%	---
1,3-dichlorobenzene	TOT	µg/L	ND>50%	3	0%	---
1,4-dichlorobenzene	TOT	µg/L	ND>50%	3	0%	---
1,4-dioxane	TOT	µg/L	0.79	1	100%	18
2,4 + 2,5-Dichlorophenol	TOT	µg/L	ND>50%	3	0%	---
2,4,6-trichlorophenol	TOT	µg/L	ND>50%	3	0%	---
2,4-dimethylphenol	TOT	µg/L	ND>50%	3	0%	---
2,4-dinitrophenol	TOT	µg/L	ND>50%	3	0%	---
2,4-dinitrotoluene	TOT	µg/L	ND>50%	3	0%	---
2,6-dinitrotoluene	TOT	µg/L	ND>50%	3	0%	---
3,3-dichlorobenzidine	TOT	µg/L	ND>50%	3	0%	---
cis-1,3-dichloropropene	TOT	µg/L	ND>50%	3	0%	---
Dichlorodifluoromethane	TOT	µg/L	ND>50%	3	0%	---
Methyl Tertiary Butyl Ether	TOT	µg/L	ND>50%	3	0%	---
Nitrobenzene	TOT	µg/L	ND>50%	3	0%	---
trans-1,3-dichloropropene	TOT	µg/L	ND>50%	3	0%	---
2-Chloronaphthalene	TOT	µg/L	ND>50%	3	0%	---
4-Bromophenyl Phenyl Ether	TOT	µg/L	ND>50%	3	0%	---
4-Chlorophenyl Phenyl Ether	TOT	µg/L	ND>50%	3	0%	---
Bis(2-Chloroethoxy)Methane	TOT	µg/L	ND>50%	3	0%	---
Bis(2-Chloroethyl)Ether	TOT	µg/L	ND>50%	3	0%	---

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Bis(2-Chloroisopropyl)Ether	TOT	µg/L	ND>50%	3	0%	---
Bromodichloromethane	TOT	µg/L	ND>50%	3	0%	---
Bromomethane	TOT	µg/L	ND>50%	3	0%	---
Chlorobenzene	TOT	µg/L	ND>50%	3	0%	---
Chlorodibromomethane	TOT	µg/L	ND>50%	3	0%	---
Chloroethane	TOT	µg/L	ND>50%	3	0%	---
Chloroethene	TOT	µg/L	ND>50%	3	0%	---
Chloromethane	TOT	µg/L	ND>50%	3	0%	---
Cis-1,2-Dichloroethene	TOT	µg/L	ND>50%	3	0%	---
Dibromomethane	TOT	µg/L	ND>50%	3	0%	---
Hexachlorobutadiene	TOT	µg/L	ND>50%	3	0%	---
Hexachlorocyclopentadiene	TOT	µg/L	ND>50%	3	0%	---
Hexachloroethane	TOT	µg/L	ND>50%	3	0%	---
Tetrabromomethane	TOT	µg/L	ND>50%	3	0%	---
Tetrachloroethene	TOT	µg/L	ND>50%	3	0%	---
Tetrachloromethane	TOT	µg/L	ND>50%	3	0%	---
Trans-1,2-Dichloroethene	TOT	µg/L	ND>50%	3	0%	---
Tribromomethane	TOT	µg/L	ND>50%	3	0%	---
Trichloroethene	TOT	µg/L	ND>50%	3	0%	---
Trichlorofluoromethane	TOT	µg/L	ND>50%	3	0%	---
Trichloromethane	TOT	µg/L	1.4	3	100%	48
Vinyl Chloride	TOT	µg/L	ND>50%	0	0%	---
2-Chlorophenol	TOT	µg/L	ND>50%	3	0%	---
4-Chloro-3-Methylphenol	TOT	µg/L	ND>50%	3	0%	---
4-Methyl-2-Pentanone	TOT	µg/L	ND>50%	3	0%	---
Dimethyl Ketone	TOT	µg/L	ND>50%	3	33%	---
Isophorone	TOT	µg/L	ND>50%	3	0%	---
Methyl Ethyl Ketone	TOT	µg/L	ND>50%	3	0%	---
BTEX						
Benzene	TOT	µg/L	ND>50%	3	0%	---
Ethylbenzene	TOT	µg/L	ND>50%	3	0%	---
M & P Xylenes	TOT	µg/L	ND>50%	3	0%	---
O-Xylene	TOT	µg/L	ND>50%	3	0%	---
Styrene	TOT	µg/L	ND>50%	3	0%	---

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Toluene	TOT	µg/L	ND>50%	3	0%	---
Xylenes	TOT	µg/L	ND>50%	3	0%	---
METALS-TOTAL						
Aluminum	TOT	µg/L	32	3	100%	1,120
Antimony	TOT	µg/L	0.3	3	100%	9
Arsenic	TOT	µg/L	0.9	3	100%	28
Barium	TOT	µg/L	6.9	3	100%	226
Beryllium	TOT	µg/L	ND>50%	3	0%	---
Cadmium	TOT	µg/L	0.016	3	100%	0.59
Calcium	TOT	mg/L	24	3	100%	859,333
Chromium	TOT	µg/L	1.0	3	100%	32
Chromium III	TOT	mg/L	0.0012	3	67%	41
Chromium Vi	TOT	mg/L	ND>50%	3	0%	---
Cobalt	TOT	µg/L	0.62	3	100%	20
Copper	TOT	µg/L	23	3	100%	815
Iron	TOT	µg/L	802	3	100%	31,248
Lead	TOT	µg/L	0.38	3	100%	14
Magnesium	TOT	mg/L	7.4	3	100%	270,947
Manganese	TOT	µg/L	56	3	100%	2,028
Mercury	TOT	µg/L	0.0043	3	100%	0.2
Molybdenum	TOT	µg/L	0.93	3	100%	33
Nickel	TOT	µg/L	3.9	3	100%	122
Potassium	TOT	mg/L	13	3	100%	431,713
Selenium	TOT	µg/L	0.14	3	100%	5
Silver	TOT	µg/L	0.02	3	100%	1
Sodium	TOT	mg/L	36	2	100%	1,516,497
Thallium	TOT	µg/L	ND>50%	3	33%	---
Tin	TOT	µg/L	0.31	3	100%	11
Zinc	TOT	µg/L	19	3	100%	652
METALS - DISSOLVED						
Aluminum	DIS	µg/L	11	3	100%	394
Antimony	DIS	µg/L	0.26	3	100%	9
Arsenic	DIS	µg/L	0.86	3	100%	28
Barium	DIS	µg/L	4.5	3	100%	140

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Beryllium	DIS	µg/L	ND>50%	3	0%	---
Cadmium	DIS	µg/L	0.012	3	100%	0.39
Calcium	DIS	mg/L	24	3	100%	852,445
Chromium	DIS	µg/L	0.78	3	100%	26
Cobalt	DIS	µg/L	0.57	3	100%	19
Copper	DIS	µg/L	17	3	100%	615
Iron	DIS	µg/L	381	3	100%	14,570
Lead	DIS	µg/L	0.18	3	100%	6.48
Magnesium	DIS	mg/L	7.4	3	100%	273,696
Manganese	DIS	µg/L	41	3	100%	1,501
Mercury	DIS	µg/L	0.002	3	67%	0.08
Molybdenum	DIS	µg/L	0.9	3	100%	32
Nickel	DIS	µg/L	4	3	100%	113
Phosphorus	DIS	µg/L	1977	3	100%	73,490
Potassium	DIS	mg/L	13	3	100%	431,231
Selenium	DIS	µg/L	0.13	3	100%	4.7
Silver	DIS	µg/L	0.008	3	100%	0.3
Sodium	DIS	mg/L	37	2	100%	1,536,082
Thallium	DIS	µg/L	ND>50%	3	33%	---
Tin	DIS	µg/L	0.23	3	100%	8.1
Zinc	DIS	µg/L	17	3	100%	563
METALS - SPECIATED						
Methyl Mercury	TOT	ng/L	0.10	1	100%	0.002
Dibutyltin	TOT	µg/L	ND>50%	1	0%	---
Dibutyltin Dichloride	TOT	µg/L	ND>50%	1	0%	---
Monobutyltin	TOT	µg/L	0.005	1	100%	0.1
Monobutyltin Trichloride	TOT	µg/L	0.008	1	100%	0.2
Tributyltin	TOT	µg/L	ND>50%	1	0%	---
Tributyltin Chloride	TOT	µg/L	ND>50%	1	0%	---
ORGANICS						
Acrolein	TOT	µg/L	ND>50%	3	0%	---
Acrylonitrile	TOT	µg/L	ND>50%	3	0%	---
Alpha-Terpineol	TOT	µg/L	ND>50%	3	0%	---
N-Nitrosodi-N-Propylamine	TOT	µg/L	ND>50%	3	0%	---

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
N-Nitrosodimethylamine	TOT	µg/L	ND>50%	3	0%	---
N-Nitrosodiphenylamine	TOT	µg/L	ND>50%	3	0%	---
PAHs						
2-Methylnaphthalene	TOT	µg/L	0.31	3	67%	7.5
Acenaphthene	TOT	µg/L	0.25	3	100%	6.1
Acenaphthylene	TOT	µg/L	ND>50%	3	33%	---
Anthracene	TOT	µg/L	ND>50%	3	33%	---
Benzo(A)Anthracene	TOT	µg/L	ND>50%	3	33%	---
Benzo(A)Pyrene	TOT	µg/L	ND>50%	3	33%	---
Benzo(B)Fluoranthene	TOT	µg/L	ND>50%	3	33%	---
Benzo(B)Fluoranthene + Benzo(J)Fluoranthene	TOT	µg/L	ND>50%	3	33%	---
Benzo(G,H,I)Perylene	TOT	µg/L	ND>50%	3	0%	---
Benzo(K)Fluoranthene	TOT	µg/L	ND>50%	3	0%	---
Chrysene	TOT	µg/L	ND>50%	3	33%	---
Dibenzo(A,H)Anthracene	TOT	µg/L	ND>50%	3	0%	---
Fluoranthene	TOT	µg/L	0.062	3	67%	1.6
Fluorene	TOT	µg/L	0.14	3	100%	3.5
Indeno(1,2,3-C,D)Pyrene	TOT	µg/L	ND>50%	3	0%	---
Naphthalene	TOT	µg/L	0.45	3	100%	11
Phenanthrene	TOT	µg/L	0.085	3	100%	2.2
Pyrene	TOT	µg/L	0.030	3	67%	0.8
Total Hmw-PAHs	TOT	µg/L	0.11	3	67%	2.8
Total Lmw-PAHs	TOT	µg/L	3.8	3	100%	129
Total PAHs	TOT	µg/L	3.9	3	100%	132
PHENOLICS						
2-Methyl-4,6-Dinitrophenol	TOT	µg/L	ND>50%	3	0%	---
2-Nitrophenol	TOT	µg/L	ND>50%	3	0%	---
4-Nitrophenol	TOT	µg/L	ND>50%	3	0%	---
Phenol	TOT	µg/L	ND>50%	3	0%	---
Total Phenols	TOT	mg/L	0.0056	3	67%	188
Pentachlorophenol	TOT	µg/L	ND>50%	3	0%	---
PHTHALATES						
N-Butylbenzyl Phthalate	TOT	µg/L	---	---	---	---

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Bis(2-Ethylhexyl)Phthalate	TOT	µg/L	ND>50%	3	33%	---
Butylbenzyl Phthalate	TOT	µg/L	ND>50%	3	0%	---
Di-N-Butyl Phthalate	TOT	µg/L	ND>50%	3	0%	---
Di-N-Octyl Phthalate	TOT	µg/L	ND>50%	3	0%	---
Diethyl Phthalate	TOT	µg/L	0.08	3	67%	3.0
Dimethyl Phthalate	TOT	µg/L	ND>50%	3	0%	---
HIGH RESOLUTION						
PAHs						
1-Methylphenanthrene	TOT	ng/L	2.6	1	100%	0.1
2-Methylnaphthalene	TOT	ng/L	596	1	100%	14
Acenaphthene	TOT	ng/L	314	1	100%	7.3
Acenaphthylene	TOT	ng/L	5	1	100%	0.1
Anthracene	TOT	ng/L	24	1	100%	0.6
Benzo(a)anthracene	TOT	ng/L	8.1	1	100%	0.2
Benzo(a)pyrene	TOT	ng/L	7.8	1	100%	0.2
Benzo(b)fluoranthene	TOT	ng/L	5.4	1	100%	0.1
Benzo(e)pyrene	TOT	ng/L	5.0	1	100%	0.1
Benzo(g,h,i)perylene	TOT	ng/L	5.8	1	100%	0.1
Benzo[j,k]fluoranthenes	TOT	ng/L	6.3	1	100%	0.1
Chrysene	TOT	ng/L	7.7	1	100%	0.2
Dibenzo(a,h)anthracene	TOT	ng/L	0.97	1	100%	0.02
Dibenzothiophene	TOT	ng/L	10	1	100%	0.2
Fluoranthene	TOT	ng/L	30	1	100%	0.7
Fluorene	TOT	ng/L	95	1	100%	2.2
Indeno[1,2,3-cd]pyrene	TOT	ng/L	5.1	1	100%	0.1
Naphthalene	TOT	ng/L	748	1	100%	18
Perylene	TOT	ng/L	2.1	1	100%	0.05
Phenanthrene	TOT	ng/L	84	1	100%	2.0
Pyrene	TOT	ng/L	26	1	100%	0.6
PBDE						
Pbde 10	TOT	pg/L	2.9	1	100%	---
Pbde 100	TOT	pg/L	705	1	100%	0.02
Pbde 105	TOT	pg/L	ND>50%	1	0%	---
Pbde 116	TOT	pg/L	ND>50%	1	0%	---

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pbde 119/120	TOT	pg/L	13	1	100%	0.0003
Pbde 12/13	TOT	pg/L	ND>50%	1	0%	---
Pbde 126	TOT	pg/L	ND>50%	1	0%	---
Pbde 128	TOT	pg/L	ND>50%	1	0%	---
Pbde 138/166	TOT	pg/L	29	1	100%	0.0007
Pbde 140	TOT	pg/L	9.8	1	100%	0.0002
Pbde 15	TOT	pg/L	4.9	1	100%	0.0001
Pbde 153	TOT	pg/L	301	1	100%	0.007
Pbde 154	TOT	pg/L	221	1	100%	0.005
Pbde 155	TOT	pg/L	18	1	100%	0.0004
Pbde 17/25	TOT	pg/L	27	1	100%	0.0006
Pbde 181	TOT	pg/L	ND>50%	1	0%	---
Pbde 183	TOT	pg/L	55	1	100%	0.001
Pbde 190	TOT	pg/L	ND>50%	1	0%	---
Pbde 203	TOT	pg/L	45	1	100%	0.001
Pbde 206	TOT	pg/L	489	1	100%	0.01
Pbde 207	TOT	pg/L	679	1	100%	0.02
Pbde 208	TOT	pg/L	430	1	100%	0.01
Pbde 209	TOT	pg/L	7,250	1	100%	0.2
Pbde 28/33	TOT	pg/L	70	1	100%	0.002
Pbde 30	TOT	pg/L	ND>50%	1	0%	---
Pbde 32	TOT	pg/L	ND>50%	1	0%	---
Pbde 35	TOT	pg/L	1.4	1	100%	---
Pbde 37	TOT	pg/L	3.5	1	100%	0.00008
Pbde 47	TOT	pg/L	3,260	1	100%	0.08
Pbde 49	TOT	pg/L	99	1	100%	0.002
Pbde 51	TOT	pg/L	11	1	100%	0.0003
Pbde 66	TOT	pg/L	58	1	100%	0.001
Pbde 7	TOT	pg/L	2.4	1	100%	0.0001
Pbde 71	TOT	pg/L	14	1	100%	0.0003
Pbde 75	TOT	pg/L	5.7	1	100%	0.0001
Pbde 77	TOT	pg/L	ND>50%	1	0%	---
Pbde 79	TOT	pg/L	39	1	100%	0.0009
Pbde 8/11	TOT	pg/L	ND>50%	1	0%	---
Pbde 85	TOT	pg/L	116	1	100%	0.003

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pbde 99	TOT	pg/L	3,300	1	100%	0.08
Pcb 1	TOT	pg/L	12	1	100%	0.0003
Pcb 10	TOT	pg/L	1.6	1	100%	0.00004
Pcb 103	TOT	pg/L	ND>50%	1	0%	---
Pcb 104	TOT	pg/L	ND>50%	1	0%	---
Pcb 105	TOT	pg/L	10	1	100%	0.0002
Pcb 106	TOT	pg/L	ND>50%	1	0%	---
Pcb 107/124	TOT	pg/L	1.3	1	100%	0.00003
Pcb 109	TOT	pg/L	1.8	1	100%	0.00004
Pcb 11	TOT	pg/L	393	1	100%	0.009
Pcb 110/115	TOT	pg/L	40	1	100%	0.0009
Pcb 111	TOT	pg/L	ND>50%	1	0%	---
Pcb 112	TOT	pg/L	ND>50%	1	0%	---
Pcb 114	TOT	pg/L	ND>50%	1	0%	---
Pcb 118	TOT	pg/L	29	1	100%	0.0007
Pcb 12/13	TOT	pg/L	4.2	1	100%	0.0001
Pcb 120	TOT	pg/L	ND>50%	1	0%	---
Pcb 121	TOT	pg/L	ND>50%	1	0%	---
Pcb 122	TOT	pg/L	ND>50%	1	0%	---
Pcb 123	TOT	pg/L	1.3	1	100%	0.00003
Pcb 126	TOT	pg/L	ND>50%	1	0%	---
Pcb 127	TOT	pg/L	ND>50%	1	0%	---
Pcb 128/166	TOT	pg/L	4.8	1	100%	0.0001
Pcb 129/138/160/163	TOT	pg/L	39	1	100%	0.0009
Pcb 130	TOT	pg/L	2.1	1	100%	0.00005
Pcb 131	TOT	pg/L	ND>50%	1	0%	---
Pcb 132	TOT	pg/L	14	1	100%	0.0003
Pcb 133	TOT	pg/L	ND>50%	1	0%	---
Pcb 134/143	TOT	pg/L	2.7	1	100%	0.00006
Pcb 135/151/154	TOT	pg/L	12	1	100%	0.0003
Pcb 136	TOT	pg/L	4.7	1	100%	0.0001
Pcb 137	TOT	pg/L	2.4	1	100%	0.00006
Pcb 139/140	TOT	pg/L	ND>50%	1	0%	---
Pcb 14	TOT	pg/L	ND>50%	1	0%	---
Pcb 141	TOT	pg/L	5.4	1	100%	0.0001

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 142	TOT	pg/L	ND>50%	1	0%	---
Pcb 144	TOT	pg/L	1.8	1	100%	0.00004
Pcb 145	TOT	pg/L	ND>50%	1	0%	---
Pcb 146	TOT	pg/L	5.4	1	100%	0.0001
Pcb 147/149	TOT	pg/L	28	1	100%	0.0006
Pcb 148	TOT	pg/L	ND>50%	1	0%	---
Pcb 15	TOT	pg/L	9.5	1	100%	0.0002
Pcb 150	TOT	pg/L	ND>50%	1	0%	---
Pcb 152	TOT	pg/L	ND>50%	1	0%	---
Pcb 153/168	TOT	pg/L	34	1	100%	0.0008
Pcb 155	TOT	pg/L	3.3	1	100%	0.00008
Pcb 156157	TOT	pg/L	5.1	1	100%	0.0001
Pcb 158	TOT	pg/L	3.4	1	100%	0.00008
Pcb 159	TOT	pg/L	ND>50%	1	0%	---
Pcb 16	TOT	pg/L	8.6	1	100%	0.0002
Pcb 161	TOT	pg/L	ND>50%	1	0%	---
Pcb 162	TOT	pg/L	ND>50%	1	0%	---
Pcb 164	TOT	pg/L	1.9	1	100%	0.00004
Pcb 165	TOT	pg/L	ND>50%	1	0%	---
Pcb 167	TOT	pg/L	1.5	1	100%	0.00003
Pcb 169	TOT	pg/L	ND>50%	1	0%	---
Pcb 17	TOT	pg/L	9.7	1	100%	0.0002
Pcb 170	TOT	pg/L	6	1	100%	0.0001
Pcb 171/173	TOT	pg/L	1.4	1	100%	0.00003
Pcb 172	TOT	pg/L	1.1	1	100%	0.00003
Pcb 174	TOT	pg/L	6.2	1	100%	0.0001
Pcb 175	TOT	pg/L	ND>50%	1	0%	---
Pcb 176	TOT	pg/L	0.98	1	100%	0.00002
Pcb 177	TOT	pg/L	2.7	1	100%	0.00006
Pcb 178	TOT	pg/L	1.5	1	100%	0.00003
Pcb 179	TOT	pg/L	3.4	1	100%	0.00008
Pcb 18/30	TOT	pg/L	19	1	100%	0.0004
Pcb 180/193	TOT	pg/L	16	1	100%	0.0004
Pcb 181	TOT	pg/L	ND>50%	1	0%	---
Pcb 182	TOT	pg/L	ND>50%	1	0%	---

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 183/185	TOT	pg/L	3.3	1	100%	0.00008
Pcb 184	TOT	pg/L	5.6	1	100%	0.0001
Pcb 186	TOT	pg/L	ND>50%	1	0%	---
Pcb 187	TOT	pg/L	9.9	1	100%	0.0002
Pcb 188	TOT	pg/L	ND>50%	1	0%	---
Pcb 189	TOT	pg/L	ND>50%	1	0%	---
Pcb 19	TOT	pg/L	8.0	1	100%	0.0002
Pcb 190	TOT	pg/L	1.1	1	100%	0.00003
Pcb 191	TOT	pg/L	ND>50%	1	0%	---
Pcb 192	TOT	pg/L	ND>50%	1	0%	---
Pcb 194	TOT	pg/L	2.9	1	100%	0.00007
Pcb 195	TOT	pg/L	0.9	1	100%	0.00002
Pcb 196	TOT	pg/L	1.9	1	100%	0.00004
Pcb 197/200	TOT	pg/L	0.8	1	100%	0.00002
Pcb 198/199	TOT	pg/L	4.0	1	100%	0.00009
Pcb 2	TOT	pg/L	4.4	1	100%	0.0001
Pcb 20/28	TOT	pg/L	24	1	100%	0.0006
Pcb 201	TOT	pg/L	ND>50%	1	0%	---
Pcb 202	TOT	pg/L	1.3	1	100%	0.00003
Pcb 203	TOT	pg/L	2.2	1	100%	0.00005
Pcb 204	TOT	pg/L	ND>50%	1	0%	---
Pcb 205	TOT	pg/L	ND>50%	1	0%	---
Pcb 206	TOT	pg/L	3.2	1	100%	0.00008
Pcb 207	TOT	pg/L	ND>50%	1	0%	---
Pcb 208	TOT	pg/L	ND>50%	1	0%	---
Pcb 209	TOT	pg/L	4.8	1	100%	0.0001
Pcb 21/33	TOT	pg/L	12	1	100%	0.0003
Pcb 22	TOT	pg/L	10	1	100%	0.0002
Pcb 23	TOT	pg/L	ND>50%	1	0%	---
Pcb 24	TOT	pg/L	ND>50%	1	0%	---
Pcb 25	TOT	pg/L	4.3	1	100%	0.0001
Pcb 26/29	TOT	pg/L	6.9	1	100%	0.0002
Pcb 27	TOT	pg/L	4.6	1	100%	0.0001
Pcb 3	TOT	pg/L	6.3	1	100%	0.0001
Pcb 31	TOT	pg/L	24	1	100%	0.0005

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 32	TOT	pg/L	7.2	1	100%	0.0002
Pcb 34	TOT	pg/L	ND>50%	1	0%	---
Pcb 35	TOT	pg/L	3.1	1	100%	0.00007
Pcb 36	TOT	pg/L	0.73	1	100%	0.00002
Pcb 37	TOT	pg/L	6.2	1	100%	0.0001
Pcb 38	TOT	pg/L	ND>50%	1	0%	---
Pcb 39	TOT	pg/L	ND>50%	1	0%	---
Pcb 4	TOT	pg/L	35	1	100%	0.0008
Pcb 40/41/71	TOT	pg/L	12	1	100%	0.0003
Pcb 42	TOT	pg/L	5.7	1	100%	0.0001
Pcb 43	TOT	pg/L	1.2	1	100%	0.00003
Pcb 44/47/65	TOT	pg/L	52	1	100%	0.001
Pcb 45/51	TOT	pg/L	9.8	1	100%	0.0002
Pcb 46	TOT	pg/L	1.8	1	100%	0.00004
Pcb 48	TOT	pg/L	6.1	1	100%	0.0001
Pcb 49/69	TOT	pg/L	17	1	100%	0.0004
Pcb 5	TOT	pg/L	ND>50%	1	0%	---
Pcb 50/53	TOT	pg/L	6.6	1	100%	0.0002
Pcb 52	TOT	pg/L	45	1	100%	0.001
Pcb 54	TOT	pg/L	ND>50%	1	0%	---
Pcb 55	TOT	pg/L	ND>50%	1	0%	---
Pcb 56	TOT	pg/L	7.1	1	100%	0.0002
Pcb 57	TOT	pg/L	ND>50%	1	0%	---
Pcb 58	TOT	pg/L	ND>50%	1	0%	---
Pcb 59/62/75	TOT	pg/L	2.2	1	100%	0.00005
Pcb 6	TOT	pg/L	6.7	1	100%	0.0002
Pcb 60	TOT	pg/L	4.4	1	100%	0.0001
Pcb 61/70/74/76	TOT	pg/L	38	1	100%	0.0009
Pcb 63	TOT	pg/L	0.9	1	100%	0.00002
Pcb 64	TOT	pg/L	9.4	1	100%	0.0002
Pcb 66	TOT	pg/L	16	1	100%	0.0004
Pcb 67	TOT	pg/L	ND>50%	1	0%	---
Pcb 68	TOT	pg/L	3.1	1	100%	0.00007
Pcb 7	TOT	pg/L	1.6	1	100%	0.00004
Pcb 72	TOT	pg/L	ND>50%	1	0%	---

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Pcb 73	TOT	pg/L	ND>50%	1	0%	---
Pcb 77	TOT	pg/L	1.3	1	100%	0.00003
Pcb 78	TOT	pg/L	ND>50%	1	0%	---
Pcb 79	TOT	pg/L	ND>50%	1	0%	---
Pcb 8	TOT	pg/L	20	1	100%	0.0005
Pcb 80	TOT	pg/L	ND>50%	1	0%	---
Pcb 81	TOT	pg/L	ND>50%	1	0%	---
Pcb 82	TOT	pg/L	4.2	1	100%	0.0001
Pcb 83/99	TOT	pg/L	21	1	100%	0.0005
Pcb 84	TOT	pg/L	10	1	100%	0.0002
Pcb 85/116/117	TOT	pg/L	6.2	1	100%	0.0001
Pcb 86/87/97/108/119/125	TOT	pg/L	27	1	100%	0.0006
Pcb 88/91	TOT	pg/L	5.7	1	100%	0.0001
Pcb 89	TOT	pg/L	ND>50%	1	0%	---
Pcb 9	TOT	pg/L	1.6	1	100%	0.00004
Pcb 90/101/113	TOT	pg/L	47	1	100%	0.001
Pcb 92	TOT	pg/L	7.3	1	100%	0.0002
Pcb 93/95/98/100/102	TOT	pg/L	34	1	100%	0.0008
Pcb 94	TOT	pg/L	ND>50%	1	0%	---
Pcb 96	TOT	pg/L	ND>50%	1	0%	---
Pcb Teq 3	TOT	pg/L	0.01	1	100%	0.0000002
Pcb Teq 4	TOT	pg/L	0.05	1	100%	0.000001
PCBs Total	TOT	pg/L	1290	1	100%	0.03
Total Decachloro Biphenyl	TOT	pg/L	4.8	1	100%	0.0001
Total Dichloro Biphenyls	TOT	pg/L	470	1	100%	0.01
Total Heptachloro Biphenyls	TOT	pg/L	43	1	100%	0.001
Total Hexachloro Biphenyls	TOT	pg/L	147	1	100%	0.003
Total Monochloro Biphenyls	TOT	pg/L	23	1	100%	0.0005
Total Nonachloro Biphenyls	TOT	pg/L	3.2	1	100%	0.00008
Total Octachloro Biphenyls	TOT	pg/L	1.3	1	100%	0.00003
Total Pentachloro Biphenyls	TOT	pg/L	224	1	100%	0.005
Total Tetrachloro Biphenyls	TOT	pg/L	225	1	100%	0.005
Total Trichloro Biphenyls	TOT	pg/L	144	1	100%	0.003

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
PESTICIDES						
1,2,3,4-Tetrachlorobenzene	TOT	ng/L	ND>50%	1	0%	---
1,2,3-Trichlorobenzene	TOT	ng/L	ND>50%	1	0%	---
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	TOT	ng/L	ND>50%	1	0%	---
1,2,4-trichlorobenzene	TOT	ng/L	ND>50%	1	0%	---
1,2-dichlorobenzene	TOT	ng/L	0.9	1	100%	0.02
1,3,5-Trichlorobenzene	TOT	ng/L	ND>50%	1	0%	---
1,3-dichlorobenzene	TOT	ng/L	ND>50%	1	0%	---
1,4-dichlorobenzene	TOT	ng/L	69	1	100%	1.6
2,3,5-trimethylnaphthalene	TOT	ng/L	5.7	1	100%	0.1
2,6-dimethylnaphthalene	TOT	ng/L	21	1	100%	0.5
2,4-DDD	TOT	ng/L	0.5	1	100%	0.01
2,4-DDE	TOT	ng/L	ND>50%	1	0%	---
2,4-DDT	TOT	ng/L	ND>50%	1	0%	---
4,4-DDD	TOT	ng/L	ND>50%	1	0%	---
4,4-DDE	TOT	ng/L	0.12	1	100%	0.003
4,4-DDT	TOT	ng/L	0.06	1	100%	0.001
Mirex	TOT	ng/L	ND>50%	1	0%	---
Aldrin	TOT	ng/L	ND>50%	1	0%	---
Alpha Chlordane	TOT	ng/L	ND>50%	1	0%	---
Alpha-Endosulfan	TOT	ng/L	0.22	1	100%	0.005
Alpha-Hch Or Alpha-Bhc	TOT	ng/L	ND>50%	1	0%	---
Beta-Endosulfan	TOT	ng/L	0.63	1	100%	0.01
Beta-Hch Or Beta-Bhc	TOT	ng/L	0.07	1	100%	0.002
Cis-Nonachlor	TOT	ng/L	ND>50%	1	0%	---
Delta-Hch Or Delta-Bhc	TOT	ng/L	ND>50%	1	0%	---
Dieldrin	TOT	ng/L	0.23	1	100%	0.005
Endosulfan Sulfate	TOT	ng/L	ND>50%	1	0%	---
Endrin	TOT	ng/L	ND>50%	1	0%	---
Endrin Aldehyde	TOT	ng/L	ND>50%	1	0%	---
Endrin Ketone	TOT	ng/L	ND>50%	1	0%	---
Hch, Gamma	TOT	ng/L	0.13	1	100%	0.003
Heptachlor	TOT	ng/L	ND>50%	1	0%	---
Heptachlor Epoxide	TOT	ng/L	ND>50%	1	0%	---
Hexachlorobenzene	TOT	ng/L	0.05	1	100%	0.001

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
Hexachlorobutadiene	TOT	ng/L	0.14	1	100%	0.003
Methoxyclor	TOT	ng/L	ND>50%	1	0%	---
Octachlorostyrene	TOT	ng/L	ND>50%	1	0%	---
Oxy-Chlordane	TOT	ng/L	ND>50%	1	0%	---
Pentachlorobenzene	TOT	ng/L	0.04	1	100%	0.0009
Trans-Chlordane	TOT	ng/L	0.05	1	100%	0.001
Trans-Nonachlor	TOT	ng/L	ND>50%	1	0%	---
PFOs						
PFBA	TOT	ng/L	27	1	100%	0.6
PFBS	TOT	ng/L	19	1	100%	0.4
PFDA	TOT	ng/L	1.4	1	100%	0.03
PFDoA	TOT	ng/L	ND>50%	1	0%	---
PFHpA	TOT	ng/L	11	1	100%	0.3
PFHxA	TOT	ng/L	49	1	100%	1.1
PFHxS	TOT	ng/L	25	1	100%	0.6
PFNA	TOT	ng/L	1.4	1	100%	0.03
PFOA	TOT	ng/L	26	1	100%	0.6
PFOS	TOT	ng/L	6.6	1	100%	0.2
PFOSA	TOT	ng/L	ND>50%	1	0%	---
PFPeA	TOT	ng/L	28	1	100%	0.6
PFUnA	TOT	ng/L	ND>50%	1	0%	---
PPCPs						
2-Hydroxy-Ibuprofen	TOT	ng/L	15,400	1	100%	360
Bisphenol A	TOT	ng/L	9,620	1	100%	225
Furosemide	TOT	ng/L	1,580	1	100%	37
Gemfibrozil	TOT	ng/L	129	1	100%	3.0
Glipizide	TOT	ng/L	ND>50%	1	0%	---
Glyburide	TOT	ng/L	ND>50%	1	0%	---
Hydrochlorothiazide	TOT	ng/L	1,960	1	100%	46
Ibuprofen	TOT	ng/L	2,600	1	100%	61
Naproxen	TOT	ng/L	2,980	1	100%	70
Triclocarban	TOT	ng/L	4.1	1	100%	0.1
Triclosan	TOT	ng/L	53	1	100%	1.2
Warfarin	TOT	ng/L	6.7	1	100%	0.2

Appendix B7, cont'd

Parameter	State Code	Unit Code	Average Concentration	Frequency of Detection		Loading
				n	%	kg/year
NONYLPHENOLS						
4-n-Octylphenol	TOT	ng/L	---	---	---	---
NP	TOT	ng/L	96	1	100%	2.3
4-Nonylphenol Diethoxylates	TOT	ng/L	694	1	100%	16.2
4-Nonylphenol Monoethoxylates	TOT	ng/L	431	1	100%	10.1
Octylphenol	TOT	ng/L	ND>50%	1	0%	---

Appendix B8 Acute Toxicity Test Results and Bench Sheets

Acute Toxicity Test Results and Bench Sheets available upon request
Contact: CRD's Environmental Monitoring Program, 250.360.3296

Appendix B9 Chronic Toxicity Test Results and Bench Sheets

Chronic Toxicity Test Results and Bench Sheets available upon request
Contact: CRD's Environmental Monitoring Program, 250.360.3296

APPENDIX C
2020 SURFACE WATER MONITORING

Appendix C1 Substance List

Parameter	Surface Water (1 depth)/Edge of IDZ (3 depths)	
	1st day of 5 in 30	2nd to 5th day of 5 in 30
CONVENTIONAL VARIABLES		
conductivity	IDZ	IDZ
enterococci	SW and IDZ	SW and IDZ
fecal coliform	SW and IDZ	SW and IDZ
hardness (as $CaCO_3$)	IDZ	IDZ
ammonia (NH3)	IDZ	IDZ
total Kjeldahl nitrogen	IDZ	
nitrate	IDZ	IDZ
nitrite	IDZ	IDZ
nitrogen, total	IDZ	
oil & grease, mineral	IDZ	
oil & grease, total	IDZ	
organic carbon, total	IDZ	
pH	IDZ	IDZ
phosphate, dissolved	IDZ	
phosphate, total	IDZ	
salinity	IDZ	IDZ
sulphate	IDZ	
sulphide	IDZ	
suspended solids, total	IDZ	IDZ
temperature	IDZ	IDZ
CTD parameters	IDZ	IDZ
METALS TOTAL		
aluminum	IDZ	
antimony	IDZ	
arsenic	IDZ	
barium	IDZ	
beryllium	IDZ	
bismuth	IDZ	
cadmium	IDZ	
calcium	IDZ	
chromium	IDZ	
chromium VI	IDZ	
cobalt	IDZ	
copper	IDZ	
iron	IDZ	
lead	IDZ	
lithium	IDZ	
magnesium	IDZ	
manganese	IDZ	
mercury	IDZ	
molybdenum	IDZ	
nickel	IDZ	
phosphorus	IDZ	
potassium	IDZ	
selenium	IDZ	
silver	IDZ	
sodium	IDZ	

Appendix C1, cont'd

Parameter	Surface Water (1 depth)/Edge of IDZ (3 depths)	
	1st day of 5 in 30	2nd to 5th day of 5 in 30
strontium	IDZ	
thallium	IDZ	
tin	IDZ	
titanium	IDZ	
vanadium	IDZ	
zinc	IDZ	

Notes:
SW -Surface Water Stations, IDZ – initial dilution zone

Appendix C2   Stations

Macaulay Point	Latitude 48°	Longitude 123°
Mac-D1	Variable	
Mac-01	24.186	24.616
Mac-14	24.402	24.616
Mac-16	24.186	24.290
Mac-18	23.970	24.616
Mac-20	24.186	24.941
Mac-22	24.617	24.616
Mac-24	24.491	24.155
Mac-26	24.186	23.965
Mac-28	23.880	24.155
Mac-30	23.754	24.616
Mac-32	23.880	25.076
Mac-34	24.186	25.266
Mac-36	24.491	25.076
+ four dynamic edge of IDZ stations (3 depths)		
Clover Point	**Latitude 48°**	**Longitude 123°**
Clo-D1	Variable	
Clo-01	23.701	20.764
Clo-14	23.916	20.764
Clo-16	23.701	20.438
Clo-18	23.485	20.764
Clo-20	23.701	21.089
Clo-22	24.132	20.764
Clo-24	24.006	20.304
Clo-26	23.701	20.113
Clo-28	23.395	20.304
Clo-30	23.269	20.764
Clo-32	23.395	21.224
Clo-34	23.701	21.414
Clo-36	24.006	21.224
+ four dynamic edge of IDZ stations (3 depths)		
Reference		
Constance Bank	20.640	19.080

Appendix C3 Macaulay Point Surface Fecal Coliform and Enterococci Results - 5 Sampling Events in 30 Days

Fecal Coliforms	Winter						Spring						Summer						Autumn					
	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean
Mac-01	920	14	36	12	92	55	19	32	4	2	1	5	2	1	9	3	1	2	3	5	1	16	5	4
Mac-14	100	21	10	38	18	27	48	13	9	1	1	6	5	1	8	4	1	3	1	1	2	6	4	2
Mac-16	890	11	23	10	130	49	41	5	12	1	8	7	1	4	4	4	7	3	2	2	2	7	3	3
Mac-18	2000	22	19	22	140	76	35	7	15	2	2	7	1	1	1	1	1	1	14	6	2	6	5	6
Mac-20	60	30	17	16	53	30	72	12	1	2	1	4	1	1	16	1	2	2	1	6	1	4	8	3
Mac-22	96	13	2	56	12	18	53	29	35	13	1	15	3	1	23	2	13	4	1	10	1	4	4	3
Mac-24	120	13	20	33	6	23	34	11	40	10	1	11	4	6	18	2	9	6	18	11	1	2	9	5
Mac-26	120	10	12	16	87	29	51	11	1	1	1	4	9	1	2	1	8	3	4	9	1	13	8	5
Mac-28	610	8	37	12	64	43	16	7	1	1	1	3	1	6	1	1	1	1	4	3	3	7	2	3
Mac-30	480	22	17	18	61	46	37	8	1	2	1	4	1	1	1	1	1	1	2	4	6	5	1	3
Mac-32	830	9	33	17	14	36	51	6	---	1	1	4	1	1	3	2	3	2	8	1	6	8	2	4
Mac-34	26	19	37	13	5	16	48	1	6	1	1	3	1	1	10	2	4	2	1	2	11	4	1	2
Mac-36	59	34	25	16	12	25	19	4	1	1	2	3	1	1	19	1	4	2	1	4	4	6	3	3
Mac-D1	3200	13	34	12	110	71	---	---	---	---	---	---	---	1	13	1	---	2	---	2	480	1	2	7
CB-Ref	2	36	4	26	---	9	---	---	---	---	---	---	1	1	59	6	1	3	1	43	1	---	1	3

Notes: Red shaded cells indicates exceedance to BC WQG Geomean of 200 CFU/100 mL, --- denotes sample not taken due to weather issues

Enterococci	Winter						Spring						Summer						Autumn					
	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean
Mac-01	330	12	10	5	27	22	5	6	1	1	1	2	1	1	1	1	1	1	7	1	1	1	2	2
Mac-14	37	9	4	5	4	8	6	3	3	1	1	2	1	1	1	4	2	2	1	1	1	1	1	1
Mac-16	220	2	6	7	30	14	4	1	3	2	5	3	1	1	4	1	1	1	1	1	1	1	1	1
Mac-18	570	4	9	2	54	19	6	1	3	1	1	2	1	1	1	1	1	1	4	1	1	1	1	1
Mac-20	14	11	6	2	14	8	14	6	1	1	1	2	1	17	1	1	1	2	3	1	1	1	1	1
Mac-22	34	2	1	5	1	3	13	6	5	2	1	4	1	1	4	1	2	2	1	1	1	1	2	1
Mac-24	31	6	11	5	1	6	9	2	14	3	1	4	1	1	1	1	4	1	1	1	1	3	1	1
Mac-26	42	3	4	1	33	7	13	1	3	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1
Mac-28	260	3	8	1	10	9	3	2	2	2	1	2	1	8	1	1	1	2	1	1	3	1	1	1
Mac-30	210	10	6	7	17	17	14	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Mac-32	270	7	11	6	2	12	11	2	---	1	1	2	1	2	1	1	1	1	12	1	1	1	1	2
Mac-34	8	10	6	7	1	5	8	1	3	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Mac-36	18	17	8	8	6	10	5	1	1	1	1	1	1	1	6	1	1	1	1	1	1	1	1	1
Mac-D1	700	4	7	6	21	19	---	---	---	---	---	---	---	1	4	1	---	2	---	1	100	1	1	3
CB-Ref	4	27	1	1	---	3	---	---	---	---	---	---	1	1	1	1	1	1	---	8	1	1	---	2

Notes: Red shaded cells indicates exceedance to Health Canada's Geomean of 35 CFU/100 mL. Blue shaded cells indicate exceedances to Health Canada (2012) WQG of 70 CFU/100 mL, Geomean = Geometric Mean. --- not sampled due to weather issues

Appendix C4 Macaulay Point IDZ Results - 5 Sampling Events in 30 Days

Fecal Coliforms CFU/100 mL	BC Approved WQG = 200 CFU/100 mL (geometric mean over 5 samples)						
Winter							**Geomean**
		Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**	
CB Reference	Top	19	6	28	3	3	8
	Middle	22	5	35	3	27	13
	Bottom	20	3	93	3	31	14
Station 1	Top	3,400	18	37	9	81	70
	Middle	150	49	45	660	7,200	275
	Bottom	180	700	72	110	230	187
Station 2	Top	4,600	16	35	11	96	77
	Middle	74	110	490	2,600	4,000	529
	Bottom	73	44	85	7,400	1,600	318
Station 3	Top	500	24	52	17	39	53
	Middle	43	140	560	130	210	156
	Bottom	9	570	77	7,900	1,400	337
Station 4	Top	130	22	150	7	43	42
	Middle	25	590	4,900	15	180	181
	Bottom	14	1,100	39	---	82	84
Spring							**Geomean**
CB Reference	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 1	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 2	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 3	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 4	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Summer							**Geomean**
CB Reference	Top	1	6	1	2	---	2
	Middle	24	8	1	12	---	7
	Bottom	17	390	52	61	---	68
Station 1	Top	5	9	98	1	1	5
	Middle	29	6,200	2,400	12	26	168
	Bottom	16	3,400	150	1,000	50	210
Station 2	Top	2	21	29	6	55	13
	Middle	20	11,000	34	2	25	52
	Bottom	4,600	9,100	220	3,600	140	1,359
Station 3	Top	2	15	68	2	3	7
	Middle	11	9,500	40	6	910	118
	Bottom	1,200	4,100	92	7,600	900	1,254
Station 4	Top	3	9	480	3	4	11
	Middle	17	98	59	7	170	41
	Bottom	86	67	46	5	250	51

Appendix C4, cont'd

Fecal Coliforms CFU/100 mL	BC Approved WQG = 200 CFU/100 mL (geometric mean over 5 samples)						
Autumn							Geomean
CB Reference	Top	2	18	1	---	1	2
	Middle	1	21	15	---	1	4
	Bottom	1	900	2	---	130	22
Station 1	Top	2	21	29	6	55	13
	Middle	20	11,000	34	2	25	52
	Bottom	4,600	9,100	220	3,600	140	1,359
Station 2	Top	2	15	68	2	3	7
	Middle	11	9,500	40	6	910	118
	Bottom	1,200	4,100	92	7,600	900	1,254
Station 3	Top	3	9	480	3	4	11
	Middle	17	98	59	7	170	41
	Bottom	86	67	46	5	250	51
Station 4	Top	2	21	29	6	55	13
	Middle	20	11,000	34	2	25	52
	Bottom	4,600	9,100	220	3,600	140	1,359

Notes: Red Shaded cells indicate exceedance to BC WQG Geomean of 200 CFU/100 mL, Geomean = Geometric Mean, --- not sampled due to weather issues

Fecal Coliforms CFU/100 mL – Macaulay – (maximum value presented from each depth for each day)				
	Station #	**Top**	**Middle**	**Bottom**
Winter	Station 1	3,400	7,200	700
	Station 2	4,600	4,000	7,400
	Station 3	500	560	7,900
	Station 4	150	4,900	1,100
Geomean		**1041**	**2982**	**2590**
Spring	Station 1	---	---	---
	Station 2	---	---	---
	Station 3	---	---	---
	Station 4	---	---	---
Geomean				
Summer	Station 1	98	6,200	3,400
	Station 2	55	11,000	9,100
	Station 3	68	9,500	7,600
	Station 4	480	170	250
Geomean		**115**	**3,240**	**2,769**
Autumn	Station 1	100	150	600
	Station 2	160	170	560
	Station 3	560	280	1,800
	Station 4	150	720	2,800
Geomean		**191**	**268**	**1141**

Notes: Red Shaded cells indicate exceedance to BC WQG Geomean of 200 CFU/100 mL, Geo Mean = Geometric Mean. *Figure 3.3 is derived from these tables by taking the maximum value from each sampling day and depth to provide a worst-case scenario

Appendix C4, cont'd

Enterococci		Health Canada WQG = 35 CFU/100 mL (geometric mean over 5 samples) & 70 CFU/100 mL for single samples					
Winter							Geomean
		Day 1	Day 2	Day 3	Day 4	Day 5	
CB Reference	Top	4	3	19	1	1	3
	Middle	4	1	19	1	7	4
	Bottom	2	2	24	1	2	3
Station 1	Top	750	15	8	1	31	19
	Middle	57	6	9	110	480	44
	Bottom	50	6	12	2	34	12
Station 2	Top	2,400	46	21	68	19	79
	Middle	34	25	55	420	480	99
	Bottom	23	13	18	730	500	72
Station 3	Top	110	22	10	4	7	15
	Middle	13	22	150	25	55	36
	Bottom	1	22	22	1,100	290	43
Station 4	Top	39	7	37	3	5	11
	Middle	5	88	100	3	48	23
	Bottom	9	9	8	---	33	12
Spring							Geomean
CB Reference	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 1	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 2	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 3	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 4	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Summer							Geomean
CB Reference	Top	10	1	1	1	---	2
	Middle	11	3	1	2	---	3
	Bottom	4	2	4	1	---	2
Station 1	Top	2	2	47	1	1	3
	Middle	5	650	250	1	11	25
	Bottom	7	520	87	1,300	21	97
Station 2	Top	1	1	6	1	19	3
	Middle	5	3,400	5	1	10	15
	Bottom	770	2,300	16	800	68	274
Station 3	Top	1	7	110	1	1	4
	Middle	2	250	7	1	190	15
	Bottom	340	540	27	1,100	170	247
Station 4	Top	1	1	130	1	1	3
	Middle	4	17	17	1	71	10
	Bottom	3	6	14	1	78	7

Appendix C4, cont'd

Enterococci	Health Canada WQG = 35 CFU/100 mL (geometric mean over 5 samples) & 70 CFU/100 mL for single samples						
		Autumn					Geomean
CB Reference	Top	1	4	1	---	1	1
	Middle	1	1	1	---	1	1
	Bottom	1	4	1	---	1	1
Station 1	Top	16	1	1	1	1	2
	Middle	22	9	2	1	12	5
	Bottom	77	12	3	1	1	5
Station 2	Top	21	1	1	1	1	2
	Middle	22	10	1	1	1	3
	Bottom	110	13	6	1	1	6
Station 3	Top	53	1	1	1	2	3
	Middle	42	13	6	1	2	6
	Bottom	260	17	11	1	1	9
Station 4	Top	16	2	1	1	3	2
	Middle	95	15	1	1	2	5
	Bottom	520	11	11	1	1	9

Notes: Red Shaded cells indicate exceedance to Health Canada (2012) Geomean of 35 CFU/100 mL, Blue Shaded cells indicate exceedances to Health Canada (2012) single sample WQG of 70 CFU/100 mL, *Geo Mean = Geometric Mean,--- not sampled due to weather issues

Enterococci – Macaulay – (maximum value presented from each depth for each day) Health Canada WQG = 35 CFU/100 mL (geometric mean over 5 samples)				
	Station #	**Top**	**Middle**	**Bottom**
Winter	Station 1	750	480	50
	Station 2	2,400	480	730
	Station 3	110	150	1,100
	Station 4	39	100	33
Geomean		**296**	**242**	**191**
Spring	Station 1	---	---	---
	Station 2	---	---	---
	Station 3	---	---	---
	Station 4	---	---	---
Geomean		---	---	---
Summer	Station 1	47	650	1,300
	Station 2	19	3,400	2,300
	Station 3	110	250	1,100
	Station 4	130	71	78
Geomean		**60**	**445**	**712**
Autumn	Station 1	16	22	77
	Station 2	21	22	110
	Station 3	53	42	260
	Station 4	16	95	520
Geomean		**23**	**37**	**184**

Notes: Red Shaded cells indicate exceedance to BC WQG Geomean of 20 CFU/100 mL

Appendix C4, cont'd

NH_3 mg/L N – Macaulay							
BC Approved WQG = 22 mg/L N (average over 5 samples) or 148 mg/L N (maximum)							
Winter							Average
		Day 1	Day 2	Day 3	Day 4	Day 5	
CB Reference	Top	0.27	0.064	0.15	0.048	0.052	0.117
	Middle	0.1	0.027	0.23	0.035	0.06	0.090
	Bottom	0.099	0.11	0.099	0.057	0.086	0.090
Station 1	Top	0.05	0.056	0.11	0.13	<0.025	0.087
	Middle	0.04	0.06	0.11	0.029	0.15	0.078
	Bottom	<0.025	0.043	0.11	0.069	0.12	0.086
Station 2	Top	0.11	0.034	0.088	0.031	0.078	0.068
	Middle	0.065	0.064	0.17	0.086	0.13	0.103
	Bottom	0.15	<0.025	0.1	0.19	0.12	0.140
Station 3	Top	<0.025	0.055	0.11	0.066	0.059	0.073
	Middle	0.065	0.11	0.11	0.096	0.062	0.089
	Bottom	<0.025	0.041	0.077	0.11	0.13	0.090
Station 4	Top	<0.025	0.047	0.091	0.056	0.058	0.063
	Middle	0.089	<0.025	0.19	0.061	0.051	0.098
	Bottom	0.035	<0.025	0.15	0.062	0.09	0.084
Spring							Average
CB Reference	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 1	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 2	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 3	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 4	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Summer							Average
CB Reference	Top	0.095	0.067	0.053	0.025	---	0.060
	Middle	0.03	0.12	0.054	0.084	---	0.072
	Bottom	0.11	0.78	0.072	<0.025	---	0.321
Station 1	Top	0.048	0.11	0.084	0.065	0.099	0.081
	Middle	0.074	0.19	0.086	<0.025	0.1	0.113
	Bottom	0.07	0.083	0.056	0.16	0.094	0.093
Station 2	Top	<0.025	0.077	0.052	0.078	0.089	0.074
	Middle	<0.025	0.17	<0.025	0.035	0.08	0.095
	Bottom	0.08	0.16	0.066	0.11	0.062	0.096
Station 3	Top	0.082	0.1	0.066	0.048	0.15	0.089
	Middle	0.13	0.19	0.051	0.043	0.076	0.098
	Bottom	0.085	0.096	0.052	0.12	<0.025	0.088
Station 4	Top	0.083	0.12	<0.025	<0.025	0.092	0.098
	Middle	<0.025	0.075	0.059	0.03	0.057	0.055
	Bottom	<0.025	0.055	<0.025	0.04	0.05	0.048

Appendix C4, cont'd

NH_3 mg/L N – Macaulay							
BC Approved WQG = 22 mg/L N (average over 5 samples) or 148 mg/L N (maximum)							
Autumn							Average
CB Reference	Top	0.04	0.094	0.059	---	<0.025	0.064
	Middle	0.087	0.14	0.04	---	0.09	0.089
	Bottom	0.052	0.06	0.071	---	0.035	0.055
Station 1	Top	0.044	0.44	0.054	0.067	<0.025	0.151
	Middle	0.029	0.42	0.097	0.049	<0.025	0.149
	Bottom	0.028	0.37	0.055	0.038	0.034	0.105
Station 2	Top	0.063	0.41	0.054	0.037	<0.025	0.141
	Middle	0.028	0.029	0.081	0.033	0.044	0.043
	Bottom	0.062	0.094	<0.025	0.063	<0.025	0.073
Station 3	Top	0.03	0.33	<0.025	0.037	<0.025	0.132
	Middle	0.058	0.44	0.047	0.07	0.077	0.138
	Bottom	0.037	0.44	0.038	<0.025	0.047	0.141
Station 4	Top	0.048	0.38	<0.025	0.051	0.031	0.128
	Middle	0.055	0.063	<0.025	0.03	0.039	0.047
	Bottom	0.059	0.043	0.071	<0.025	<0.025	0.058

Notes: Shaded cells indicate exceedance to BC WQG, --- not sampled due to weather issues

Arsenic mg/L – Macaulay					
BC Approved WQG = 0.0125 mg/L (maximum)					
		Winter	Spring	Summer	Autumn
CB Reference	Top	0.00169	---	0.00178	0.00175
	Middle	0.00176	---	0.00182	0.0017
	Bottom	0.00164	---	0.00172	0.00163
Station 1	Top	0.0017	---	0.0017	0.00173
	Middle	0.00174	---	0.00165	0.00174
	Bottom	0.00173	---	0.00164	0.00168
Station 2	Top	0.00176	---	0.00167	0.00171
	Middle	0.00177	---	0.00167	0.0017
	Bottom	0.00169	---	0.00173	0.00181
Station 3	Top	0.00158	---	0.00165	0.00182
	Middle	0.00163	---	0.00174	0.0017
	Bottom	0.00164	---	0.00182	0.00178
Station 4	Top	0.00165	---	0.00176	0.00174
	Middle	0.00172	---	0.00176	0.00169
	Bottom	0.0016	---	0.00177	0.00177

Notes: Shaded cells indicate exceedance to BC WQG, --- not sampled due to weather issues

Appendix C4, cont'd

Copper mg/L – Macaulay					
BC Approved WQG= 0.002 mg/L (average over 5 samples) or 0.003 mg/L (maximum)					
		Winter	**Spring**	**Summer**	**Autumn**
CB Reference	Top	0.0007	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 1	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 2	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 3	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 4	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Zinc mg/L – Macaulay					
BC Working WQG = 0.01 mg/L (average of 5 samples)					
		Winter	**Spring**	**Summer**	**Autumn**
CB Reference	Top	0.0084	---	<0.003	<0.003
	Middle	0.0151	---	<0.003	<0.003
	Bottom	0.0061	---	<0.003	<0.003
Station 1	Top	<0.003	---	<0.003	<0.003
	Middle	<0.003	---	<0.003	<0.003
	Bottom	<0.003	---	<0.003	<0.003
Station 2	Top	<0.003	---	<0.003	<0.003
	Middle	<0.003	---	<0.003	<0.003
	Bottom	<0.003	---	0.0045	<0.003
Station 3	Top	<0.003	---	<0.003	<0.003
	Middle	<0.003	---	<0.003	<0.003
	Bottom	<0.003	---	0.0084	<0.003
Station 4	Top	<0.003	---	<0.003	<0.003
	Middle	<0.003	---	<0.003	<0.003
	Bottom	<0.003	---	<0.003	<0.003

Notes: Shaded cells indicate exceedance to BC WQG, --- not sampled due to weather issues

Appendix C4, cont'd

Cadmium mg/L – Macaulay					
BC Working WQG = 0.012 mg/L (maximum)					
		Winter	Spring	Summer	Autumn
CB Reference	Top	0.00007	---	0.000076	0.000074
	Middle	0.000072	---	0.000081	0.000079
	Bottom	0.000061	---	0.000077	0.000071
Station 1	Top	0.000071	---	0.000091	0.000074
	Middle	0.000077	---	0.000098	0.000077
	Bottom	0.000064	---	0.000088	0.000077
Station 2	Top	0.000065	---	0.000068	0.000063
	Middle	0.000071	---	0.000069	0.000075
	Bottom	0.000064	---	0.000071	0.000082
Station 3	Top	0.000064	---	0.000084	0.000072
	Middle	0.000081	---	0.000079	0.000056
	Bottom	0.000073	---	0.000088	0.000078
Station 4	Top	0.000086	---	0.000089	0.00008
	Middle	0.000055	---	0.000076	0.000079
	Bottom	0.000102	---	0.00008	0.000071

Notes: Shaded cells indicate exceedance to BC WQG, --- not sampled due to weather issues

Lead mg/L – Macaulay					
BC Approved WQG = 0.002 mg/L (average of 5 samples) or 0.140 mg/L N (maximum)					
		Winter	Spring	Summer	Autumn
CB Reference	Top	0.000058	---	<0.00005	<0.00005
	Middle	0.000072	---	<0.00005	<0.00005
	Bottom	0.000059	---	<0.00005	<0.00005
Station 1	Top	0.000066	---	<0.00005	<0.00005
	Middle	<0.00005	---	0.000056	<0.00005
	Bottom	<0.00005	---	0.000059	<0.00005
Station 2	Top	<0.00005	---	<0.00005	<0.00005
	Middle	<0.00005	---	<0.00005	<0.00005
	Bottom	<0.00005	---	<0.00005	<0.00005
Station 3	Top	<0.00005	---	<0.00005	<0.00005
	Middle	<0.00005	---	<0.00005	<0.00005
	Bottom	<0.00005	---	<0.00005	<0.00005
Station 4	Top	<0.00005	---	<0.00005	<0.00005
	Middle	<0.00005	---	<0.00005	<0.00005
	Bottom	0.000053	---	0.000052	<0.00005

Notes: Shaded cells indicate exceedance to BC WQG, --- not sampled due to weather issues

Appendix C4, cont'd

Boron mg/L – Macaulay BC Approved WQG = 1.2 mg/L (maximum)					
		Winter	**Spring**	**Summer**	**Autumn**
CB Reference	Top	3.36	---	3.34	3.31
	Middle	3.5	---	3.28	3.34
	Bottom	3.45	---	3.29	3.14
Station 1	Top	3.36	---	3.37	3.37
	Middle	3.28	---	3.4	3.64
	Bottom	3.71	---	3.34	3.42
Station 2	Top	3.35	---	3.25	3.42
	Middle	3.56	---	3.3	3.52
	Bottom	3.6	---	3.54	3.33
Station 3	Top	3.48	---	3.4	3.62
	Middle	3.48	---	3.39	3.29
	Bottom	3.32	---	3.4	3.42
Station 4	Top	3.42	---	3.46	3.44
	Middle	3.4	---	3.39	3.43
	Bottom	3.4	---	3.41	3.41

Notes: Shaded cells indicate exceedance to BC WQG, --- not sampled due to weather issues

Nickel mg/L – Macaulay BC Working WQG = 0.083 mg/L (maximum)					
		Winter	**Spring**	**Summer**	**Autumn**
CB Reference	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 1	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 2	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 3	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 4	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	0.00063	---	<0.0005	<0.0005

Notes: Shaded cells indicate exceedance to BC WQG, --- not sampled due to weather issues

Appendix C4, cont'd

Silver mg/L – Macaulay					
BC Approved WQG=0.003 mg/L (maximum) or 0.0015 mg/L (average over 5 samples)					
		Winter	Spring	Summer	Autumn
CB Reference	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001
Station 1	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001
Station 2	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001
Station 3	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001
Station 4	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001

Notes: Shaded cells indicate exceedance to BC WQG, --- not sampled due to weather issues

Appendix C5 Clover Point Surface Fecal Coliform and Enterococci Days Results – 5 Sampling Events in 30

Fecal Coliforms	Winter						Spring						Summer						Autumn					
	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean
Clo-01	4,900	13	11	42	38	65	23	6	57	14	27	20	1	1	22	2	4	3	26	35	3	2	3	7
Clo-14	130	24	7	31	120	38	53	69	68	5	8	25	3	1	11	7	1	3	46	100	24	4	5	19
Clo-16	86	33	4	35	54	29	11	9	49	11	12	14	1	1	5	5	2	2	18	55	3	2	7	8
Clo-18	72	16	7	24	30	23	9	1	40	13	20	10	1	21	1	1	10	3	13	19	1	1	4	4
Clo-20	3,400	11	17	26	21	51	10	8	39	12	23	15	4	7	3	7	3	4	9	30	4	1	1	4
Clo-22	170	54	4	45	120	46	68	66	17	12	16	27	29	1	8	3	20	7	38	59	4	8	4	12
Clo-24	120	21	8	33	94	36	110	2,700	93	11	30	98	21	1	23	1	22	6	40	98	43	7	2	19
Clo-26	92	25	17	43	46	38	57	7	62	11	17	22	2	1	9	5	6	4	29	56	3	3	5	9
Clo-28	64	37	17	8	18	23	5	3	39	17	8	10	1	26	2	1	13	4	23	19	3	1	4	6
Clo-30	74	27	19	6	68	27	9	1	28	4	17	7	2	25	1	1	1	2	16	5	2	2	4	4
Clo-32	68	9	16	25	25	23	10	3	39	4	14	9	3	21	1	2	1	3	12	5	3	3	5	5
Clo-34	500	7	26	32	22	36	15	5	28	10	24	14	8	1	1	7	2	3	24	38	1	2	5	6
Clo-36	150	19	10	14	93	33	36	70	78	3	7	21	6	2	5	4	11	5	36	72	39	2	5	16
Clo-D1	330	32	14	6	42	33	---	---	---	---	---	---	---	---	1	3	---	2	---	9	3	---	3	4
CB-Ref	2	36	4	26	---	9	---	---	---	---	---	---	1	1	59	6	1	3	1	43	1	---	1	3

Notes: * Red Shaded cells indicate exceedance to BC WQG Geomean of 200 CFU/100 mL, --- not sampled due to weather issues

Enterococci	Winter						Spring						Summer						Autumn					
	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean	1	2	3	4	5	Geomean
Clo-01	920	5	1	9	3	10	4	1	9	4	6	4	1	1	5	1	1	1	1	4	1	1	2	2
Clo-14	44	21	2	11	24	14	11	19	9	1	1	5	1	1	2	1	2	1	7	11	2	1	1	3
Clo-16	19	12	2	12	10	9	4	3	7	2	3	3	1	1	2	2	1	1	3	3	1	1	2	2
Clo-18	26	5	1	9	7	6	1	1	6	3	4	2	1	3	1	1	2	1	3	4	1	3	1	2
Clo-20	510	3	3	9	8	13	1	1	8	2	3	2	1	1	1	1	1	1	2	4	1	1	1	2
Clo-22	49	17	1	7	39	12	8	17	7	2	1	5	3	1	1	1	2	1	4	4	3	15	1	4
Clo-24	32	10	2	6	15	9	10	140	20	1	8	12	3	1	2	2	6	2	1	15	6	1	2	3
Clo-26	22	9	4	11	6	9	10	3	7	5	5	6	2	1	1	1	2	1	2	8	1	1	2	2
Clo-28	19	23	6	5	3	8	1	1	15	2	2	2	1	3	1	1	3	2	2	1	1	1	2	1
Clo-30	17	17	1	1	29	6	1	1	7	2	2	2	1	3	1	1	1	1	1	2	1	1	3	1
Clo-32	11	1	6	4	4	4	1	1	7	2	5	2	1	1	1	1	1	1	3	1	1	2	1	1
Clo-34	190	2	5	5	4	8	3	1	6	4	8	4	2	3	1	1	1	1	3	6	1	4	1	2
Clo-36	49	5	2	6	26	9	9	15	18	8	3	9	3	7	1	1	1	2	3	15	10	2	2	4
Clo-D1	110	25	3	10	12	16	---	---	---	---	---	---	---	---	11	1	---	3	---	2	1	1	---	1
CB-Ref	4	27	1	1	---	3	---	---	---	---	---	---	1	1	1	1	1	1	---	8	1	1	---	2

Notes: * Red shaded cells indicates exceedance to BC WQG Geomean of 20 CFU/100 mL. Blue shaded cells indicate exceedances to Health Canada (2012) WQG of 70 CFU/100 mL, *Geomean = Geometric Mean. --- not sampled due to weather issues

Appendix C6 Clover Point IDZ 5 Sampling Events in 30 Days Results

Fecal Coliforms CFU/100 mL							
BC Approved WQG = 200 CFU/100 mL (geometric mean over 5 samples)							
Winter							Geomean
		Day 1	Day 2	Day 3	Day 4	Day 5	
CB Reference	Top	19	6	28	3	3	8
	Middle	22	5	35	3	27	13
	Bottom	20	3	93	3	31	14
Station 1	Top	50	76	25	30	40	41
	Middle	46	16	16	18	2,700	56
	Bottom	13	18	15	15	1,200	36
Station 2	Top	64	340	33	29	56	65
	Middle	420	44	15	9	6,300	109
	Bottom	4,400	19	14	13	57	61
Station 3	Top	98	4,600	33	22	46	109
	Middle	62	31	12	5,200	3,000	205
	Bottom	14	15	51	2,600	25	59
Station 4	Top	80	2,800	18	18	49	81
	Middle	51	22	18	1,200	610	108
	Bottom	48	41	12	1,200	19	56
Spring							Geomean
CB Reference	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 1	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 2	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 3	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 4	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Summer							Geomean
CB Reference	Top	1	6	1	2	---	2
	Middle	24	8	1	12	---	7
	Bottom	17	390	52	61	---	68
Station 1	Top	26	7	27	6	8	12
	Middle	68	30	52	10	93	40
	Bottom	70	3,600	75	14	180	137
Station 2	Top	17	5	22	10	10	11
	Middle	43	18	35	10	66	28
	Bottom	400	17,000	66	23	1,700	445
Station 3	Top	7	12	7	5	9	8
	Middle	5	37	210	20	4,400	81
	Bottom	10	480	1,400	41	2,800	238
Station 4	Top	1	8	19	7	4	5
	Middle	540	45	770	21	210	153
	Bottom	490	110	910	6,200	64	455

Appendix C6, cont'd

Fecal Coliforms CFU/100 mL							
BC Approved WQG = 200 CFU/100 mL (geometric mean over 5 samples)							
Autumn							Geomean
CB Reference	Top	2	18	1	---	1	2
	Middle	1	21	15	---	1	4
	Bottom	1	900	2	---	130	22
Station 1	Top	40	35	2	13	1	8
	Middle	42	32	100	3	4	17
	Bottom	30	53	310	550	21	89
Station 2	Top	28	51	1	1	4	6
	Middle	36	53		6,000	2	69
	Bottom	35	130	48	2,800	5	79
Station 3	Top	22	44	1	4	1	5
	Middle	39	680	52	1,700	1	75
	Bottom	35	2,500	47	940	7	122
Station 4	Top	16	54	2	10	4	9
	Middle	39	1,200	36	10	2	32
	Bottom	39	6,300	50	180	93	183

Notes: Red Shaded cells indicate exceedance of BC WQG Geomean of 200 CFU/100 mL, Geomean = Geometric Mean

Fecal Coliforms – Clover – (maximum value presented from each depth for each day)				
	Station #	Top	Middle	Bottom
Winter	Station 1	76	2,700	1,200
	Station 2	340	6,300	4,400
	Station 3	4,600	5,200	2,600
	Station 4	2,800	1,200	1,200
Geomean		**760**	**3,210**	**2,015**
Spring	Station 1	---	---	---
	Station 2	---	---	---
	Station 3	---	---	---
	Station 4	---	---	---
Geomean		---	---	---
Summer	Station 1	27	93	3,600
	Station 2	22	66	17,000
	Station 3	12	4,400	2,800
	Station 4	19	770	6,200
Geomean		**19**	**380**	**5,709**
Autumn	Station 1	18	21	900
	Station 2	40	100	550
	Station 3	51	6,000	2,800
	Station 4	44	1,700	2,500
Geomean		**36**	**383**	**1,364**

Notes: * Red Shaded cells indicate exceedance of BC WQG Geomean of 200 CFU/100 mL. *Figure 3.3 is derived from these tables by taking the maximum value from each sampling day and depth to provide a worst-case scenario

Appendix C6, cont'd

Enterococci							
Health Canada WQG = 35 CFU/100 mL (geometric mean over 5 samples) & 70 CFU/100 mL for single samples							
Winter							**Geomean**
		Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**	
CB Reference	Top	4	3	19	1	1	3
	Middle	4	1	19	1	7	4
	Bottom	2	2	24	1	2	3
Station 1	Top	19	26	19	4	8	12
	Middle	16	9	8	5	670	21
	Bottom	1	9	9	1	150	7
Station 2	Top	11	700	24	260	13	57
	Middle	67	4	4	3	1,100	20
	Bottom	420	7	6	2	12	13
Station 3	Top	12	1,000	13	8	10	26
	Middle	12	5	9	1,100	1,300	60
	Bottom	2	5	4	320	3	8
Station 4	Top	22	590	6	43	35	41
	Middle	9	6	2	270	120	20
	Bottom	8	16	4	210	5	14
Spring							**Geomean**
CB Reference	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 1	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 2	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 3	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 4	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Summer							**Geomean**
CB Reference	Top	10	1	1	1	---	2
	Middle	11	3	1	2	---	3
	Bottom	4	2	4	1	---	2
Station 1	Top	3	1	3	1	3	2
	Middle	17	2	7	2	42	7
	Bottom	24	560	12	2	73	30
Station 2	Top	1	1	1	1	1	1
	Middle	21	8	3	2	33	8
	Bottom	100	6,900	7	3	900	105
Station 3	Top	1	1	1	2	4	2
	Middle	2	10	76	3	1,200	22
	Bottom	2	86	220	11	1,200	55
Station 4	Top	1	1	4	1	1	1
	Middle	98	9	180	4	100	36
	Bottom	96	14	190	1,200	31	99

Appendix C6, cont'd

Enterococci							
Health Canada WQG = 35 CFU/100 mL (geometric mean over 5 samples) & 70 CFU/100 mL for single samples							
Autumn							**Geomean**
CB Reference	Top	1	4	1	---	1	1
	Middle	1	1	1	---	1	1
	Bottom	1	4	1	---	1	1
Station 1	Top	7	7	1	1	1	2
	Middle	9	4	1	1	1	2
	Bottom	10	13	7	1	1	4
Station 2	Top	7	9	1	1	2	3
	Middle	2	11		1	1	2
	Bottom	8	10	6	1	2	4
Station 3	Top	1	9	1	1	3	2
	Middle	4	110	13	2	1	6
	Bottom	8	530	2	2	1	7
Station 4	Top	1	6	1	4	3	2
	Middle	4	160	2	4	1	6
	Bottom	4	2,400	5	3	1	11

Notes: Red Shaded cells indicate exceedance to Health Canada (2012) Geomean of 35 CFU/100 mL, Blue Shaded cells indicate exceedances to Health Canada (2012) single sample WQG of 70 CFU/100 mL, *Geo Mean = Geometric Mean,--- not sampled due to weather issues

Enterococci – Clover – (maximum value presented from each depth for each day) Health Canada WQG = 35 CFU/100 mL (geometric mean over 5 samples)				
	Station #	**Top**	**Middle**	**Bottom**
Winter	Station 1	26	670	150
	Station 2	700	1,100	420
	Station 3	1,000	1,300	320
	Station 4	590	270	210
Geomean		**322**	**713**	**255**
Spring	Station 1	---	---	---
	Station 2	---	---	---
	Station 3	---	---	---
	Station 4	---	---	---
Geomean		---	---	---
Summer	Station 1	3	42	560
	Station 2	1	33	6,900
	Station 3	4	1,200	1,200
	Station 4	4	180	1,200
Geomean		**4**	**465**	**1,200**
Autumn	Station 1	7	9	13
	Station 2	9	11	10
	Station 3	9	110	530
	Station 4	6	160	2,400
Geomean		**8**	**36**	**113**

Notes: Red Shaded cells indicate exceedance to BC WQG Geomean of 20 CFU/100 mL, Geomean = Geometric Mean

Appendix C6, cont'd

NH3 mg/L – Clover							
BC Approved WQG = 22 mg/L N (average over 5 samples) or 148 mg/L N (maximum)							
Winter							Average
		Day 1	Day 2	Day 3	Day 4	Day 5	
CB Reference	Top	0.27	0.064	0.15	0.048	0.052	0.117
	Middle	0.1	0.027	0.23	0.035	0.06	0.090
	Bottom	0.099	0.11	0.099	0.057	0.086	0.090
Station 1	Top	0.086	0.061	0.11	0.033	0.055	0.069
	Middle	0.14	0.05	0.19	<0.025	0.057	0.109
	Bottom	0.31	0.044	0.16	0.03	0.064	0.122
Station 2	Top	0.051	0.05	0.36	0.053	0.035	0.110
	Middle	0.097	0.05	0.1	0.035	0.12	0.080
	Bottom	0.11	<0.025	0.1	0.025	0.096	0.083
Station 3	Top	0.07	<0.025	0.12	0.067	0.073	0.083
	Middle	0.15	0.09	0.14	0.14	0.094	0.123
	Bottom	0.084	<0.025	0.5	0.039	0.057	0.170
Station 4	Top	0.063	<0.025	0.15	0.052	0.025	0.073
	Middle	0.083	0.048	0.24	0.091	0.097	0.112
	Bottom	0.077	0.031	0.14	0.21	0.086	0.109
Spring							Average
CB Reference	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 1	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 2	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 3	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Station 4	Top	---	---	---	---	---	---
	Middle	---	---	---	---	---	---
	Bottom	---	---	---	---	---	---
Summer							Average
CB Reference	Top	0.095	0.067	0.053	0.025	---	0.060
	Middle	0.03	0.12	0.054	0.084	---	0.072
	Bottom	0.11	0.78	0.072	<0.025	---	0.321
Station 1	Top	0.046	<0.025	0.096	0.025	0.12	<0.025
	Middle	0.11	0.048	0.075	0.032	0.1	0.073
	Bottom	0.093	0.04	0.1	0.15	0.058	0.088
Station 2	Top	0.084	0.098	0.047	0.059	0.047	0.067
	Middle	0.027	0.096	<0.025	<0.025	0.098	0.074
	Bottom	0.048	0.16	0.036	0.032	0.11	0.077
Station 3	Top	0.064	0.069	0.071	0.041	0.11	0.071
	Middle	0.06	0.086	0.025	0.032	0.089	0.058
	Bottom	0.061	0.076	0.078	0.1	0.091	0.081
Station 4	Top	0.072	0.069	0.066	0.04	0.1	0.069
	Middle	0.12	0.1	0.037	<0.025	0.086	0.086
	Bottom	0.035	<0.025	0.032	0.04	0.13	0.059

Appendix C6, cont'd

NH3 mg/L – Clover							
BC Approved WQG = 22 mg/L N (average over 5 samples) or 148 mg/L N (maximum)							
Autumn							Average
CB Reference	Top	0.04	0.094	0.059	---	<0.025	0.064
	Middle	0.087	0.14	0.04	---	0.09	0.089
	Bottom	0.052	0.06	0.071	---	0.035	0.055
Station 1	Top	0.029	0.27	0.046	<0.025	0.045	0.098
	Middle	0.039	0.067	0.068	<0.025	<0.025	0.058
	Bottom	0.062	<0.025	0.043	0.059	<0.025	0.055
Station 2	Top	0.064	0.54	0.036	0.086	0.06	0.157
	Middle	0.031	0.39	0.06	0.066	<0.025	0.137
	Bottom	0.053	0.24	0.079	1.1	0.032	0.301
Station 3	Top	0.041	0.4	0.051	0.072	0.051	0.123
	Middle	0.04	0.063	0.09	<0.025	0.039	0.058
	Bottom	0.31	0.053	<0.025	0.035	0.074	0.118
Station 4	Top	<0.025	0.29	<0.025	0.064	<0.025	0.177
	Middle	<0.025	0.26	0.097	0.05	0.06	0.117
	Bottom	0.031	0.2	0.025	0.026	0.033	0.063

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Arsenic mg/L – Clover					
BC Approved WQG = 0.0125 mg/L (maximum)					
		Winter	Spring	Summer	Autumn
Reference	Top	0.00169	---	0.00178	0.00175
	Middle	0.00176	---	0.00182	0.0017
	Bottom	0.00164	---	0.00172	0.00163
Station 1	Top	0.00168	---	0.00179	0.00159
	Middle	0.00176	---	0.0018	0.00164
	Bottom	0.00179	---	0.00179	0.0016
Station 2	Top	0.00167	---	0.00166	0.00175
	Middle	0.00172	---	0.00167	0.00175
	Bottom	0.00168	---	0.00171	0.00168
Station 3	Top	0.00167	---	0.00164	0.00167
	Middle	0.00173	---	0.00164	0.00169
	Bottom	0.00166	---	0.00178	0.00168
Station 4	Top	0.00165	---	0.00176	0.00166
	Middle	0.00174	---	0.0017	0.00165
	Bottom	0.00171	---	0.00178	0.00171

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Appendix C6, cont'd

Copper mg/L – Clover					
BC Approved WQG= 0.002 mg/L (average over 5 samples) or 0.003 mg/L (maximum)					
		Winter	Spring	Summer	Autumn
Reference	Top	0.0007	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 1	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 2	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 3	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 4	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Zinc mg/L – Clover					
BC Approved WQG = 0.01 mg/L (average of 5 samples)					
		Winter	Spring	Summer	Autumn
Reference	Top	0.0084	---	<0.003	<0.003
	Middle	0.0151	---	<0.003	<0.003
	Bottom	0.0061	---	<0.003	<0.003
Station 1	Top	0.0034	---	<0.003	<0.003
	Middle	<0.003	---	<0.003	<0.003
	Bottom	<0.003	---	<0.003	<0.003
Station 2	Top	<0.003	---	<0.003	<0.003
	Middle	<0.003	---	<0.003	<0.003
	Bottom	<0.003	---	<0.003	<0.003
Station 3	Top	<0.003	---	<0.003	<0.003
	Middle	<0.003	---	<0.003	<0.003
	Bottom	<0.003	---	<0.003	<0.003
Station 4	Top	0.0035	---	<0.003	<0.003
	Middle	<0.003	---	<0.003	<0.003
	Bottom	<0.003	---	<0.003	<0.003

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Appendix C6, cont'd

Cadmium mg/L – Clover BC Working WQG = 0.012 mg/L (maximum)					
		Winter	**Spring**	**Summer**	**Autumn**
Reference	Top	0.00007	---	0.000076	0.000074
	Middle	0.000072	---	0.000081	0.000079
	Bottom	0.000061	---	0.000077	0.000071
Station 1	Top	0.000067	---	0.000072	0.000077
	Middle	0.000072	---	0.000087	0.000102
	Bottom	0.000078	---	0.0001	0.000083
Station 2	Top	0.000064	---	0.000076	0.000072
	Middle	0.000069	---	0.000079	0.000084
	Bottom	0.000066	---	0.000115	0.000085
Station 3	Top	0.000068	---	0.000098	0.000084
	Middle	0.000068	---	0.000086	0.000085
	Bottom	0.000075	---	0.000078	0.000069
Station 4	Top	0.000083	---	0.000074	0.000074
	Middle	0.000064	---	0.000084	0.000086
	Bottom	0.000076	---	0.000077	0.000083

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Lead mg/L – Clover BC Approved WQG = 0.002 mg/L (average of 5 samples) or 0.140 mg/L N (maximum)					
		Winter	**Spring**	**Summer**	**Autumn**
Reference	Top	0.000058	---	<0.00005	<0.00005
	Middle	0.000072	---	<0.00005	<0.00005
	Bottom	0.000059	---	<0.00005	<0.00005
Station 1	Top	<0.00005	---	<0.00005	<0.00005
	Middle	<0.00005	---	0.000093	0.000087
	Bottom	<0.00005	---	<0.00005	<0.00005
Station 2	Top	<0.00005	---	<0.00005	<0.00005
	Middle	<0.00005	---	<0.00005	<0.00005
	Bottom	<0.00005	---	<0.00005	<0.00005
Station 3	Top	<0.00005	---	<0.00005	<0.00005
	Middle	<0.00005	---	<0.00005	<0.00005
	Bottom	<0.00005	---	<0.00005	<0.00005
Station 4	Top	<0.00005	---	<0.00005	<0.00005
	Middle	<0.00005	---	<0.00005	<0.00005
	Bottom	<0.00005	---	<0.00005	<0.00005

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Appendix C6, cont'd

Boron mg/L – Clover					
BC Approved WQG = 1.2 mg/L (maximum)					
		Winter	Spring	Summer	Autumn
Reference	Top	3.36	---	3.34	3.31
	Middle	3.5	---	3.28	3.34
	Bottom	3.45	---	3.29	3.14
Station 1	Top	3.55	---	3.39	3.41
	Middle	3.32	---	3.13	3.32
	Bottom	3.47	---	3.2	3.65
Station 2	Top	3.36	---	3.33	3.46
	Middle	3.38	---	3.37	3.44
	Bottom	3.43	---	3.29	3.49
Station 3	Top	3.36	---	3.31	3.22
	Middle	3.34	---	3.29	3.38
	Bottom	3.4	---	3.37	3.35
Station 4	Top	3.57	---	3.24	3.47
	Middle	3.46	---	3.38	3.26
	Bottom	3.42	---	3.4	3.5

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Silver mg/L – Clover					
BC Approved WQG=0.003 mg/L (average over 5 samples) or 0.0015 mg/L (maximum)					
		Winter	Spring	Summer	Autumn
Reference	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001
Station 1	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001
Station 2	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001
Station 3	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001
Station 4	Top	<0.0001	---	<0.0001	<0.0001
	Middle	<0.0001	---	<0.0001	<0.0001
	Bottom	<0.0001	---	<0.0001	<0.0001

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

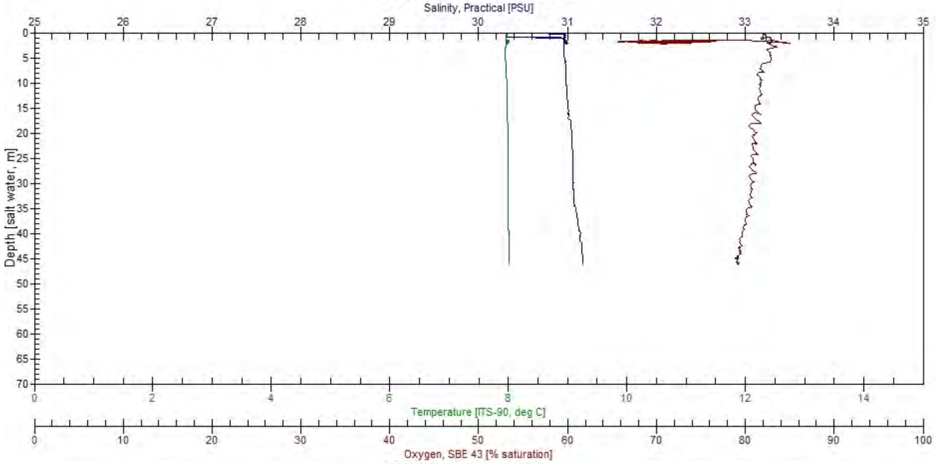
Appendix C6, cont'd

Nickel mg/L – Clover					
BC Working WQG = 0.0083 mg/L (maximum)					
		Winter	**Spring**	**Summer**	**Autumn**
Reference	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 1	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 2	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 3	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005
Station 4	Top	<0.0005	---	<0.0005	<0.0005
	Middle	<0.0005	---	<0.0005	<0.0005
	Bottom	<0.0005	---	<0.0005	<0.0005

Notes: Shaded cells indicate exceedance to BC WQG. --- not sampled due to weather issues

Appendix C7 CTD Plots

2020-01-21 CLO38.cnv



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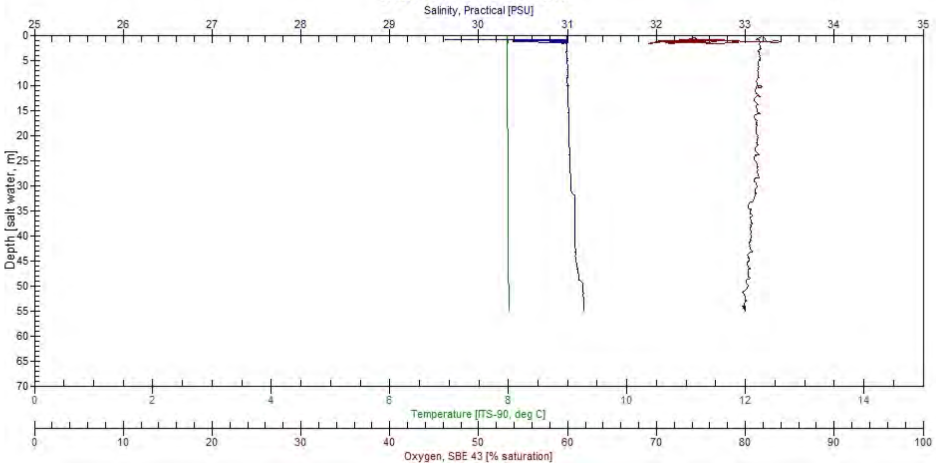

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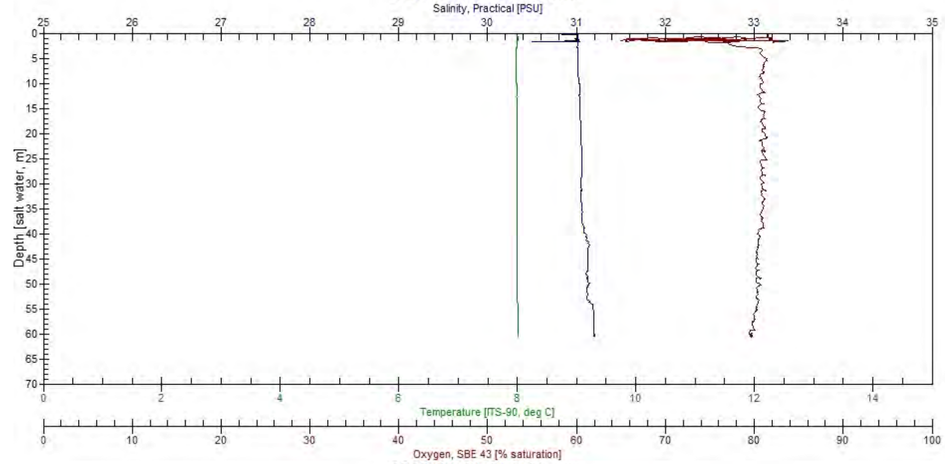

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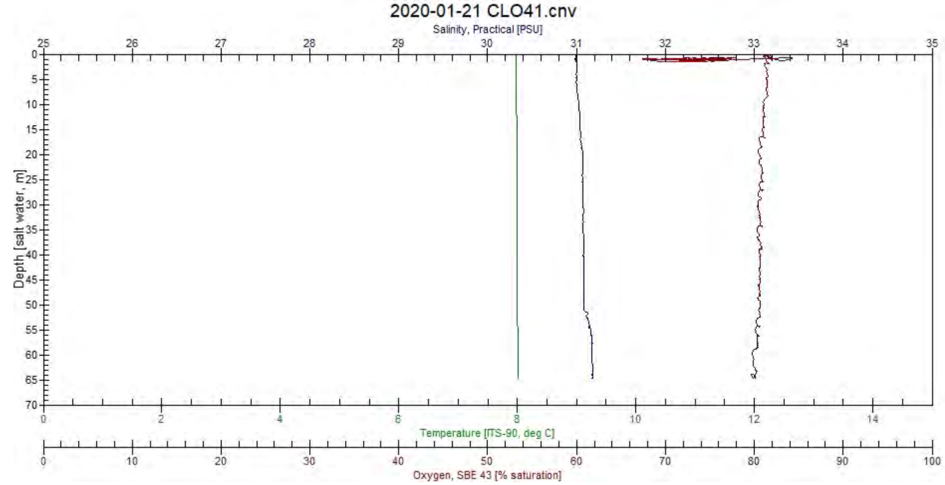
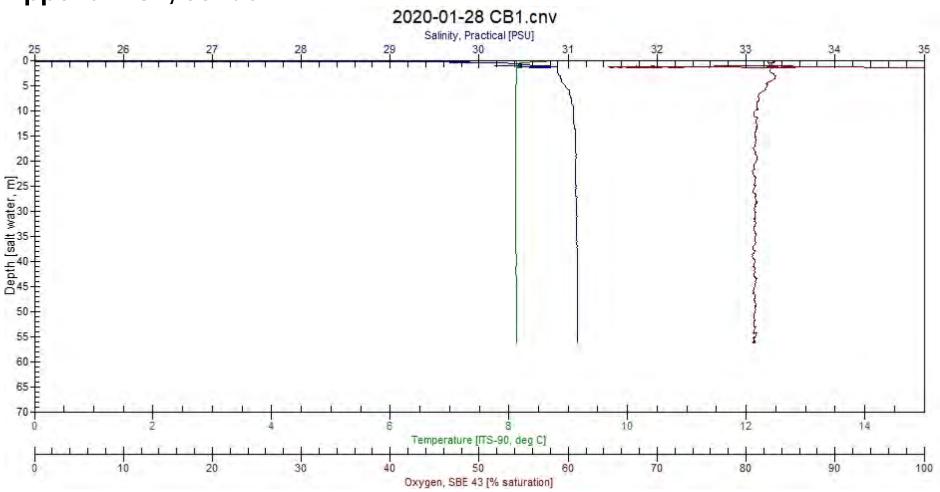
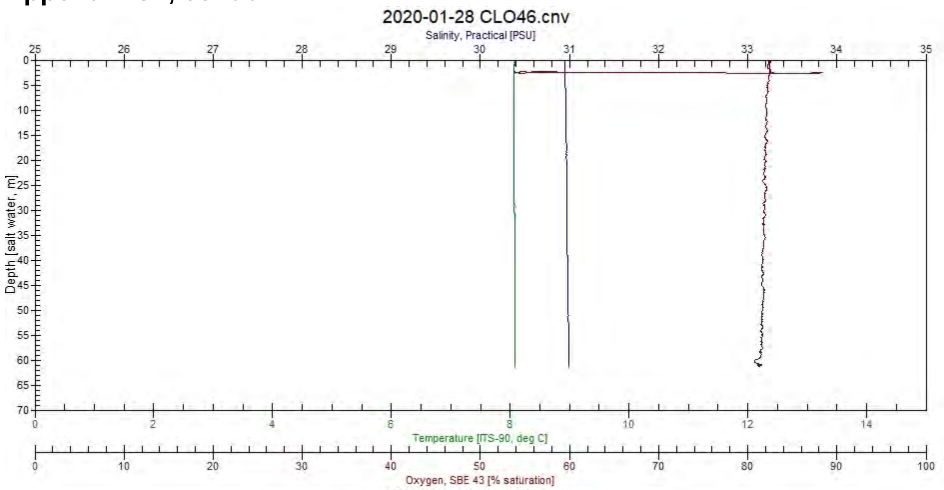
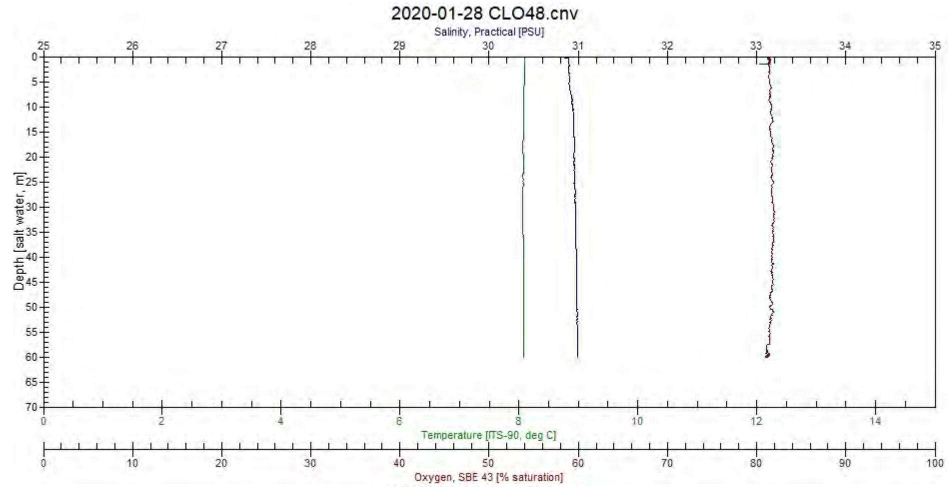


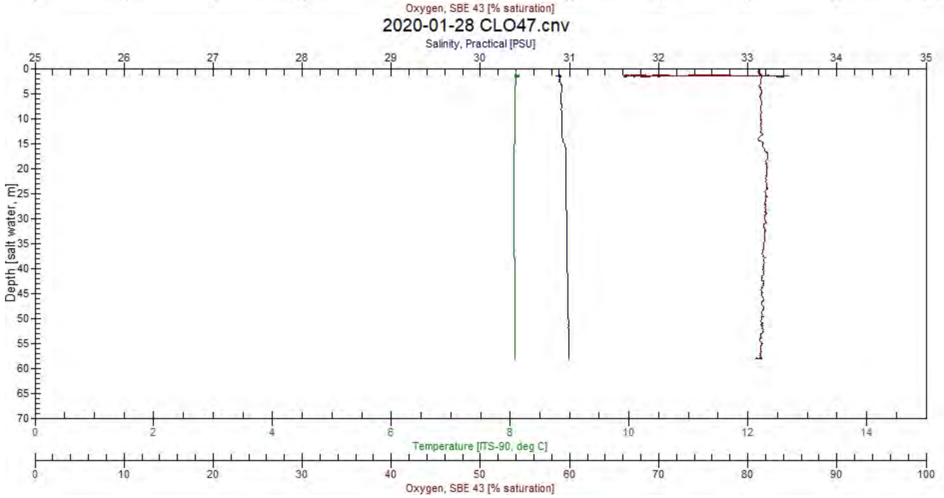
Appendix C7, cont'd

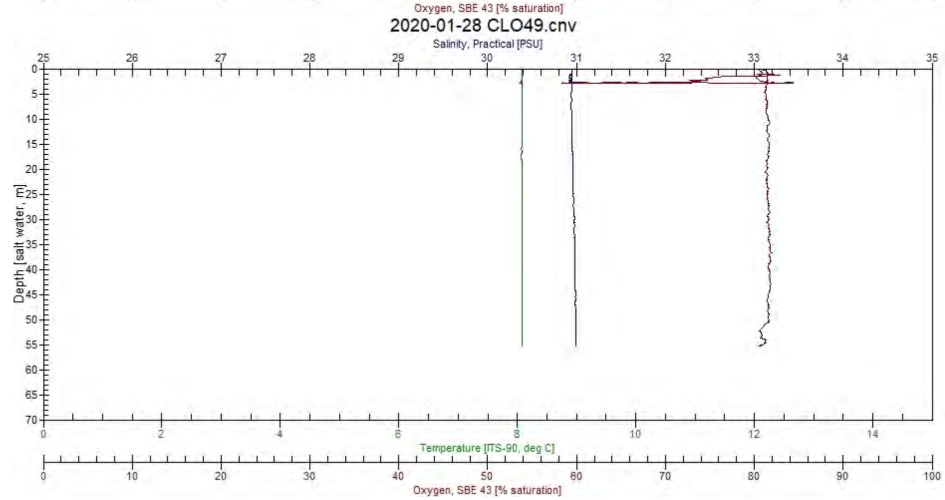


Appendix C7, cont'd

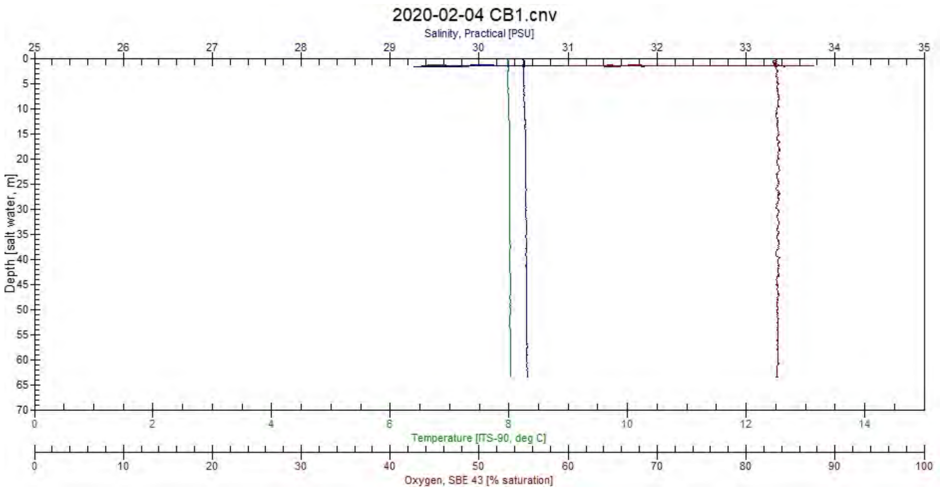




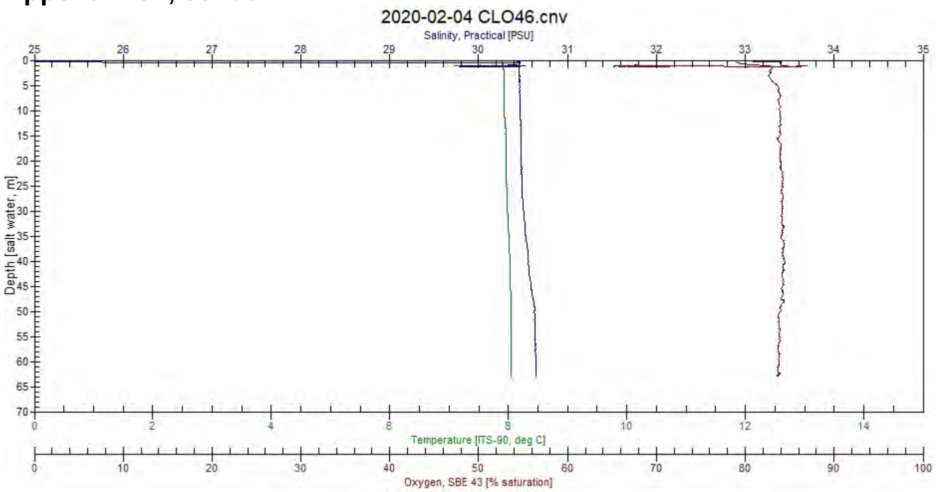


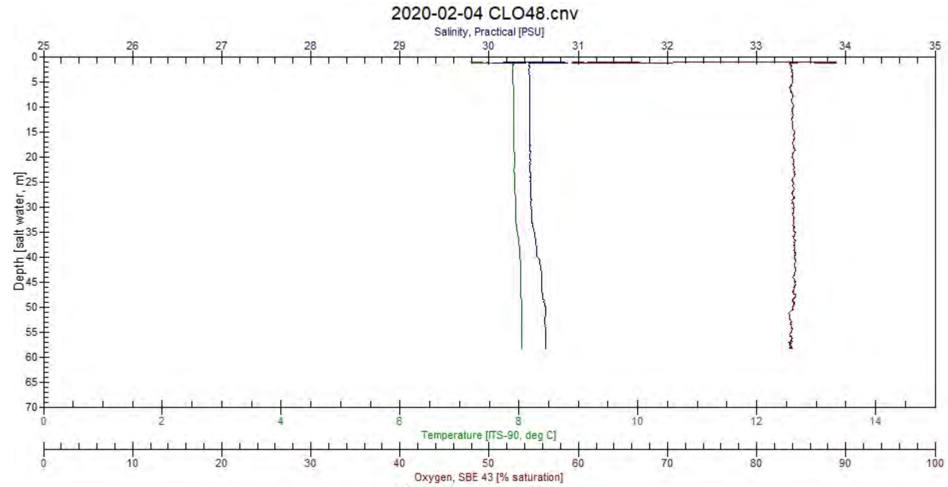


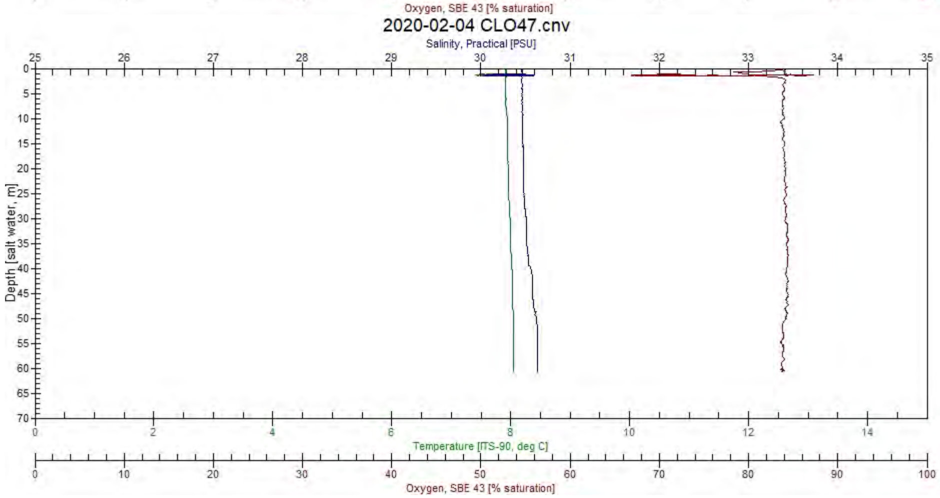
Appendix C7, cont'd

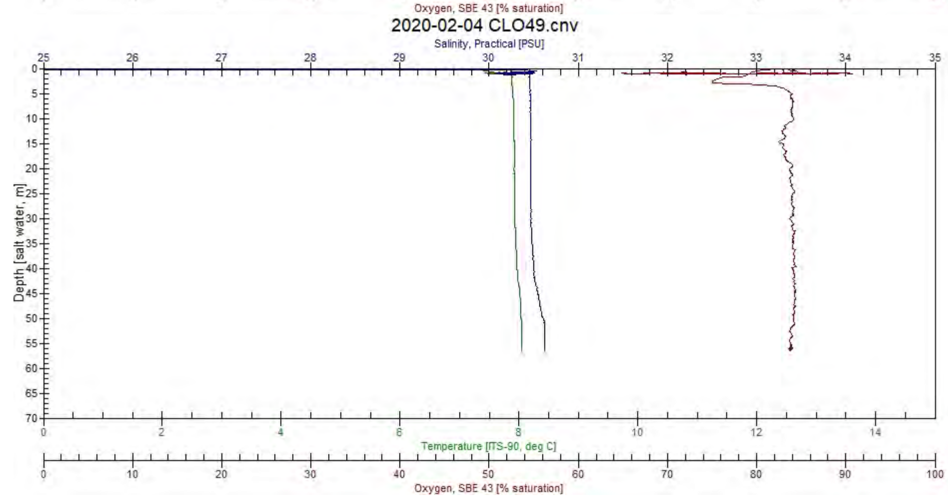


Appendix C7, cont'd









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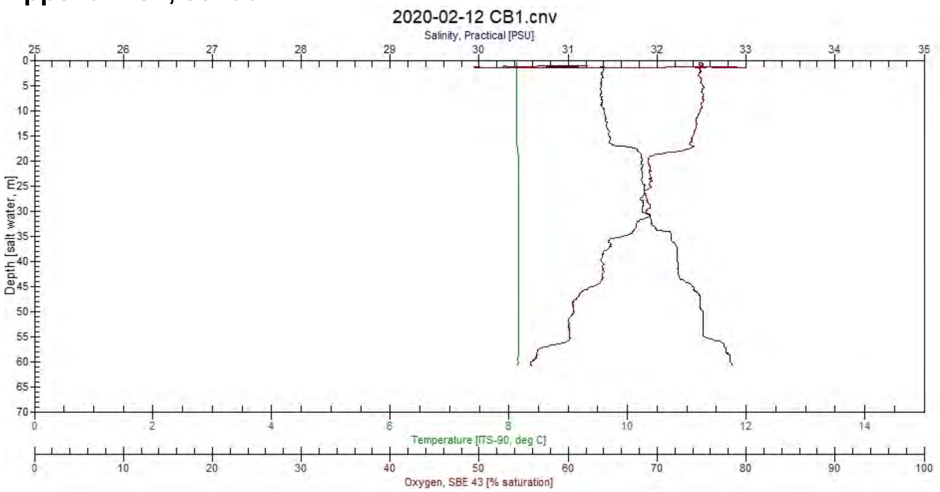

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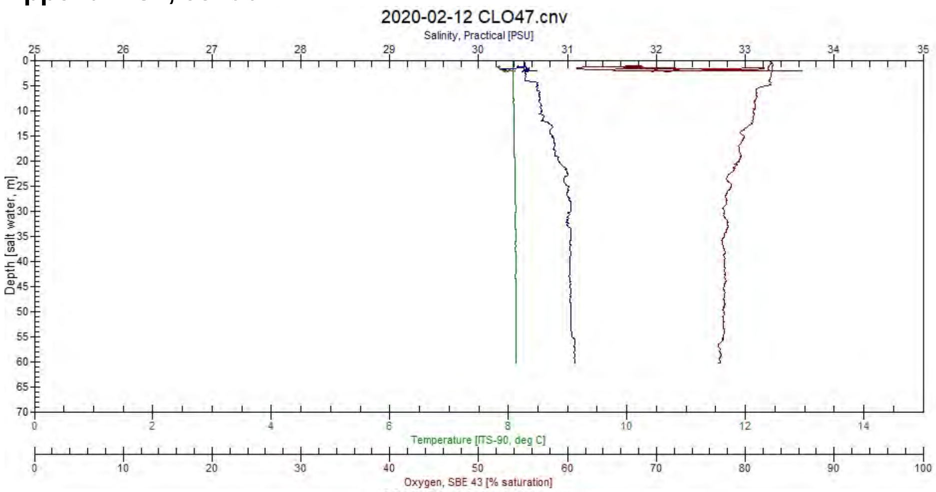

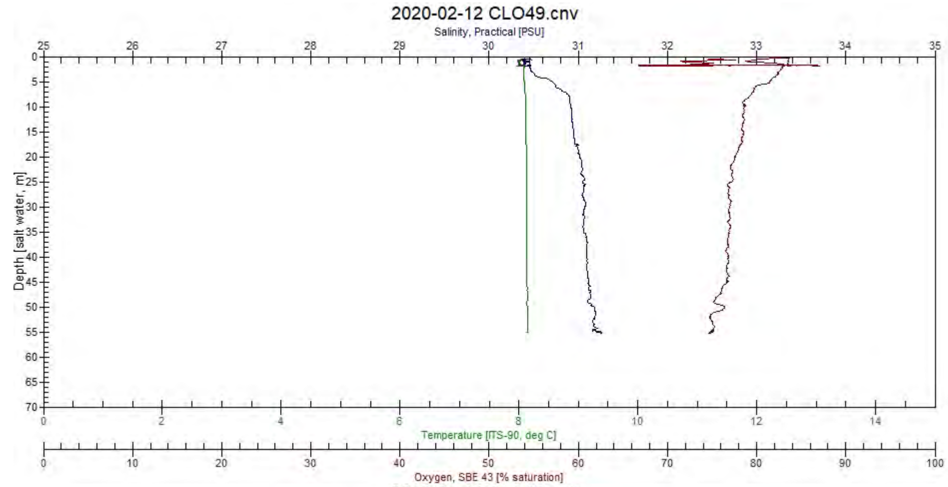

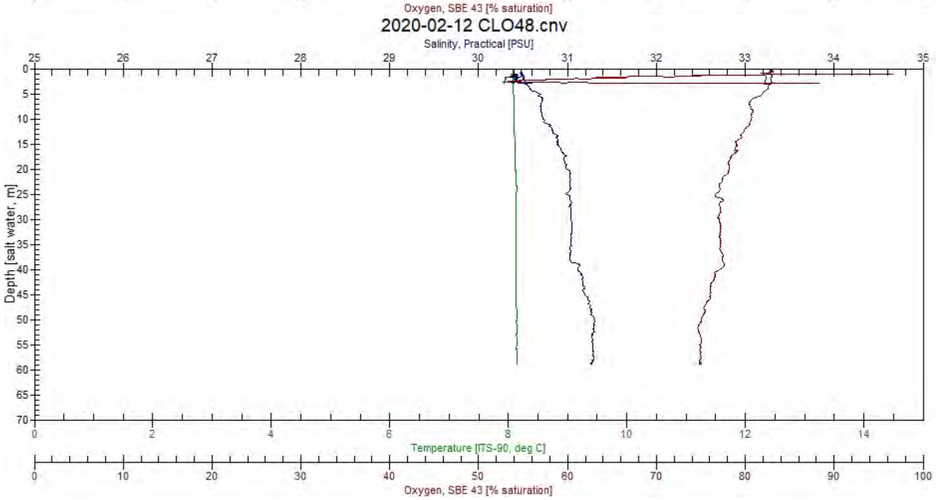

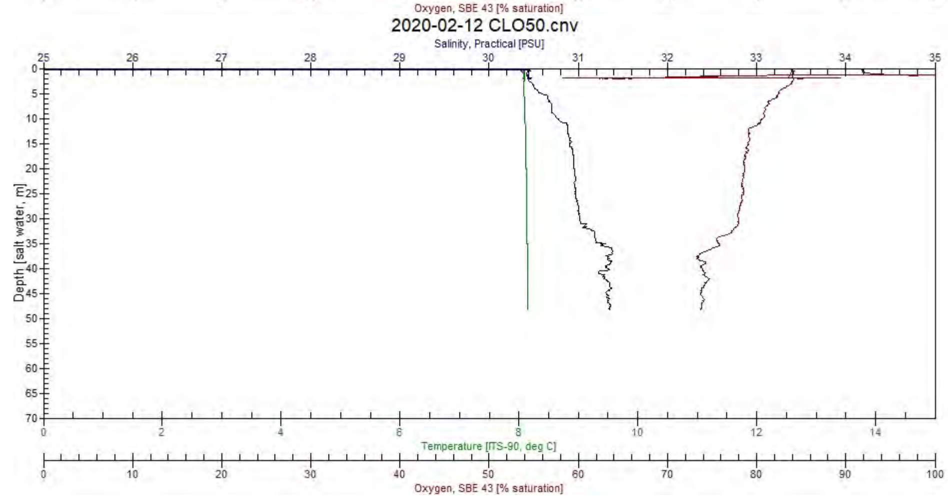

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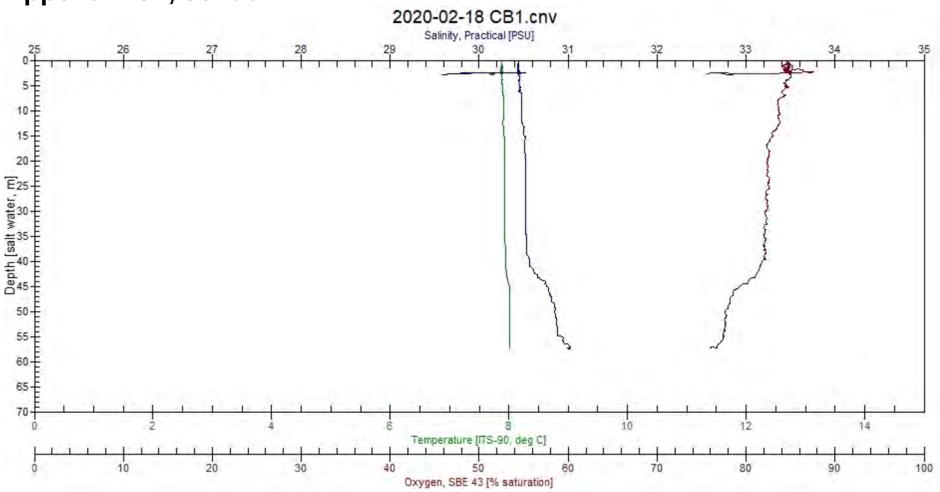

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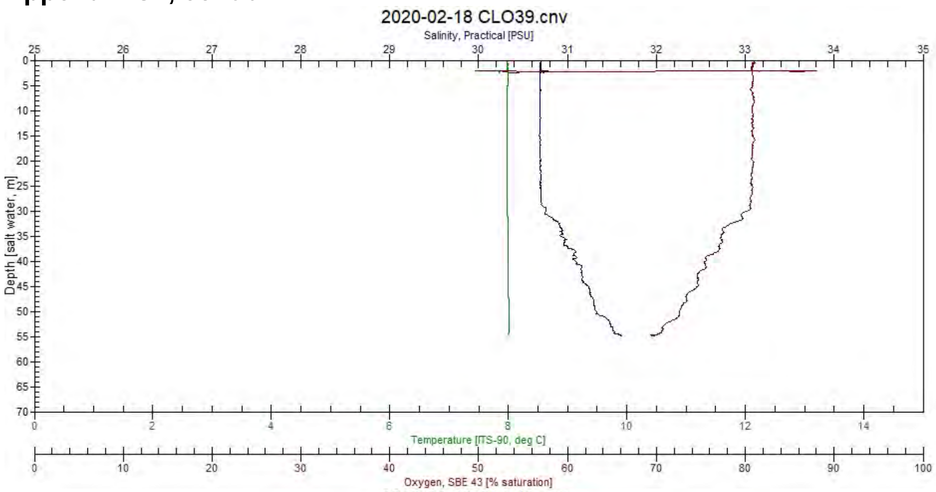

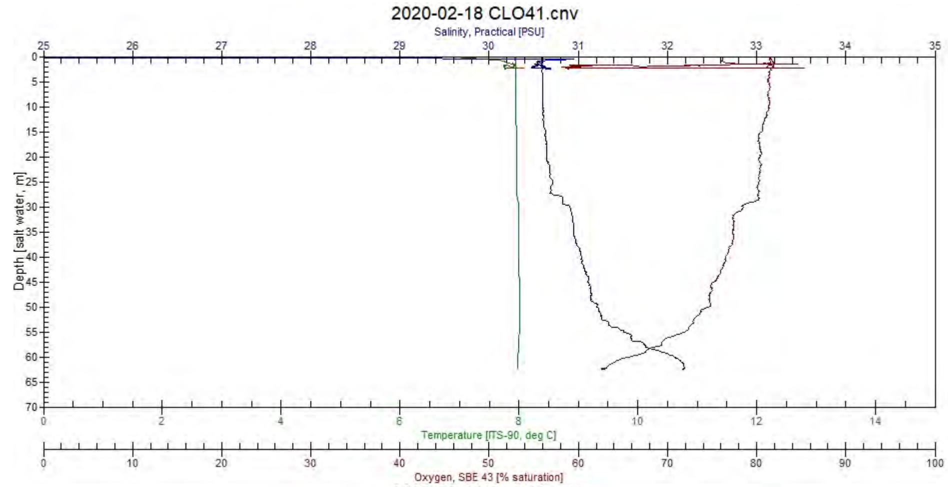

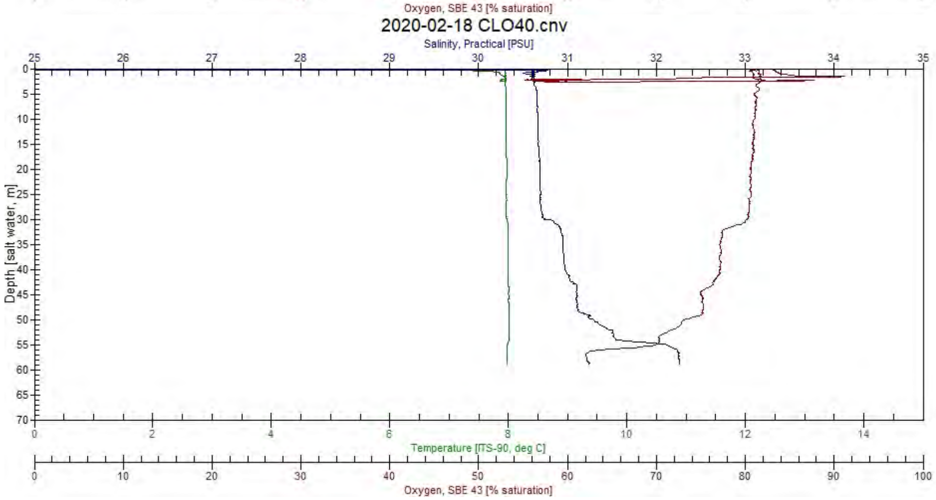

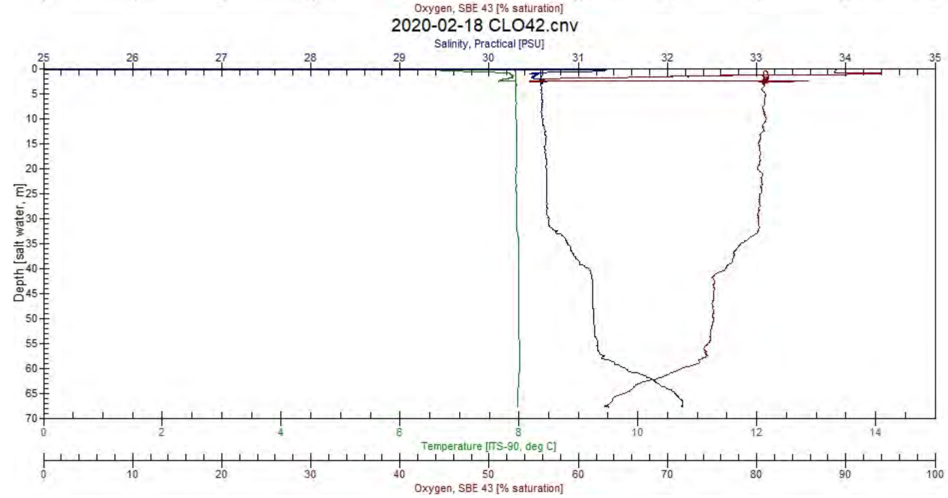

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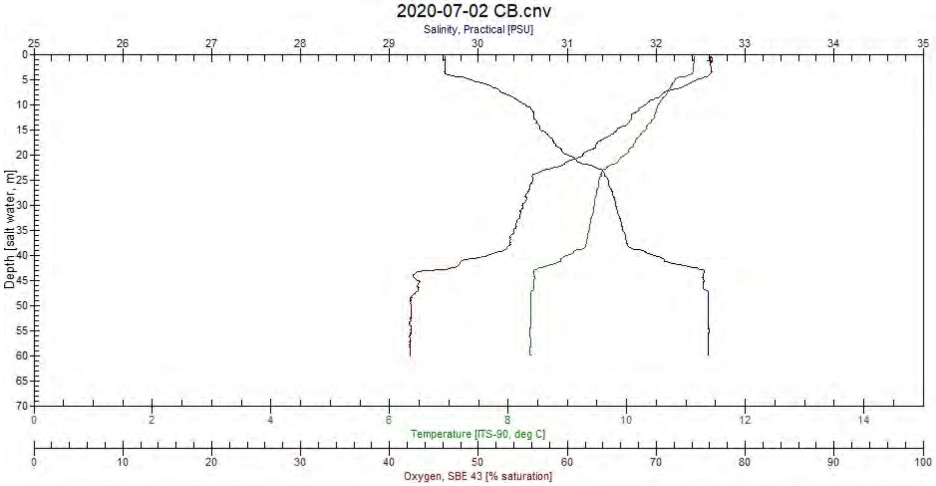

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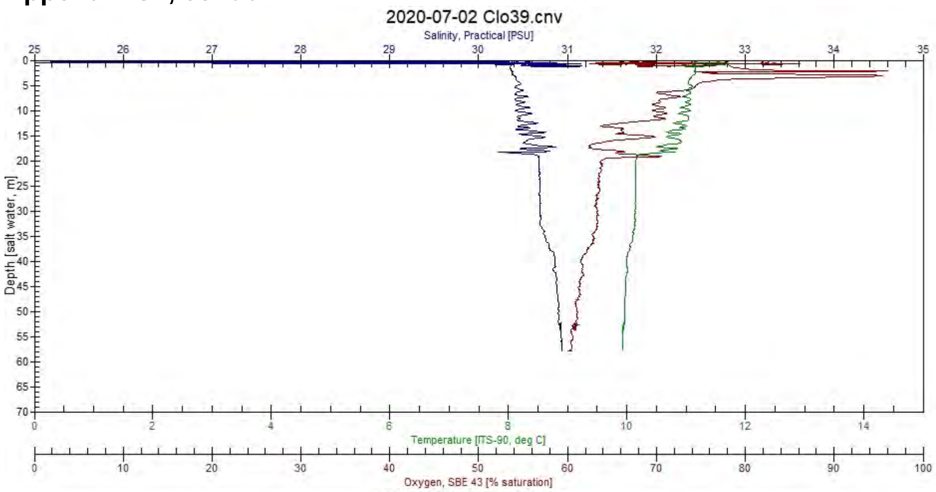

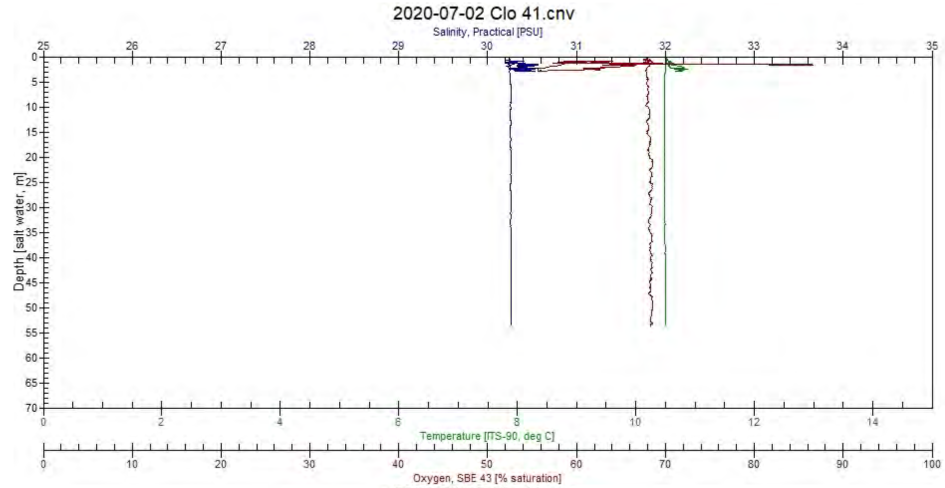

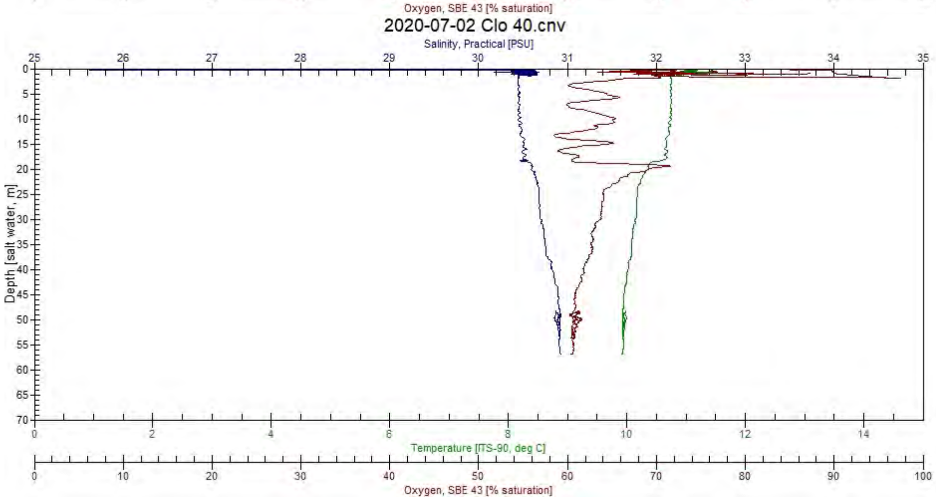

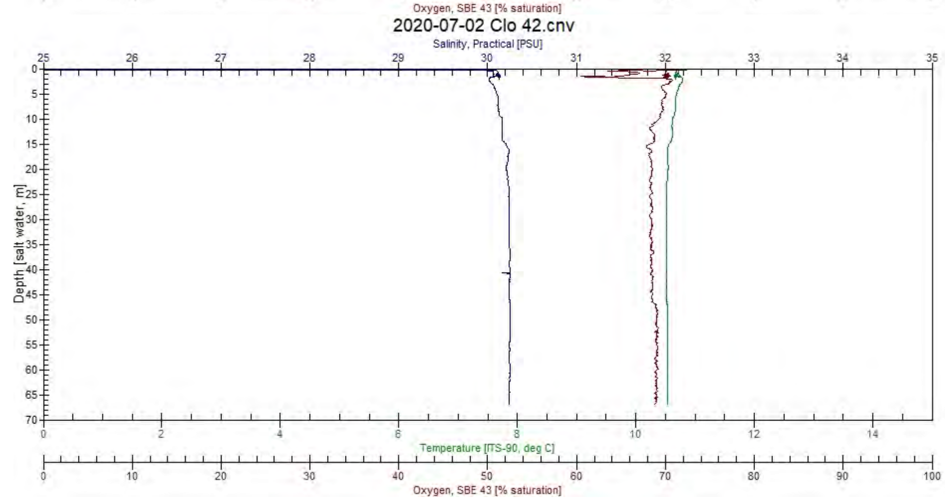

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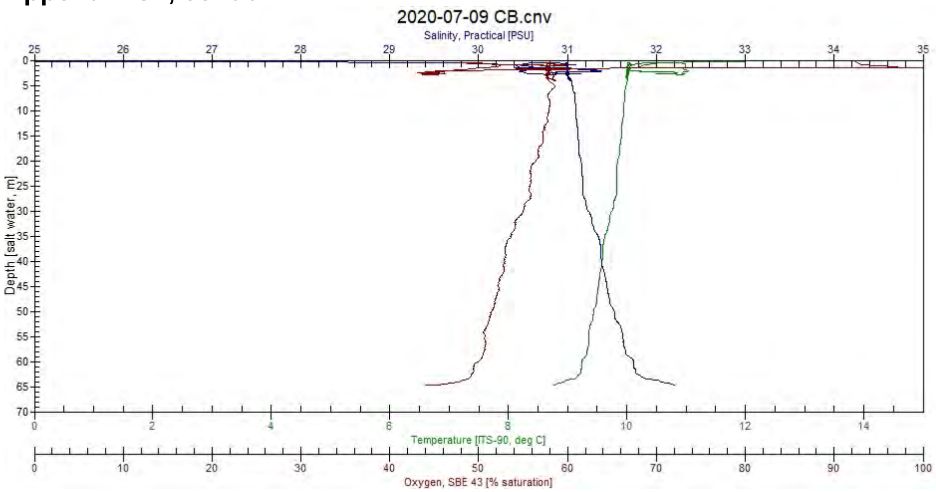

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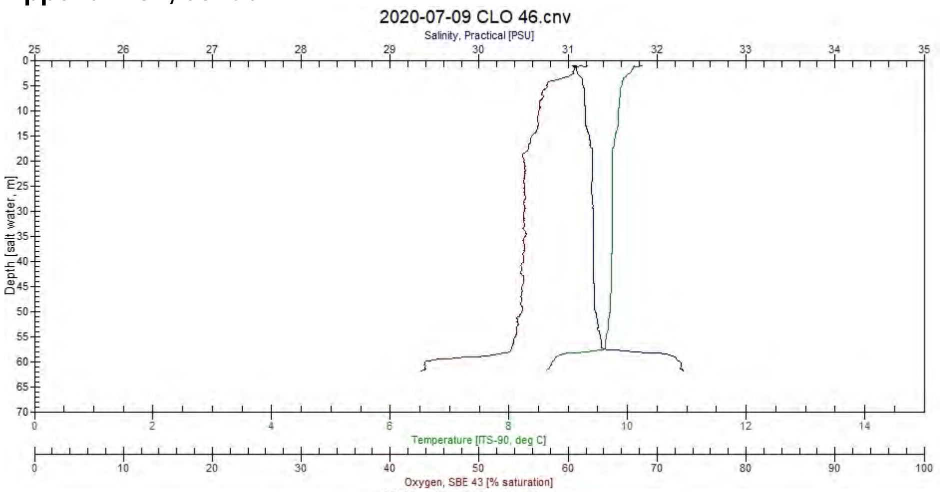

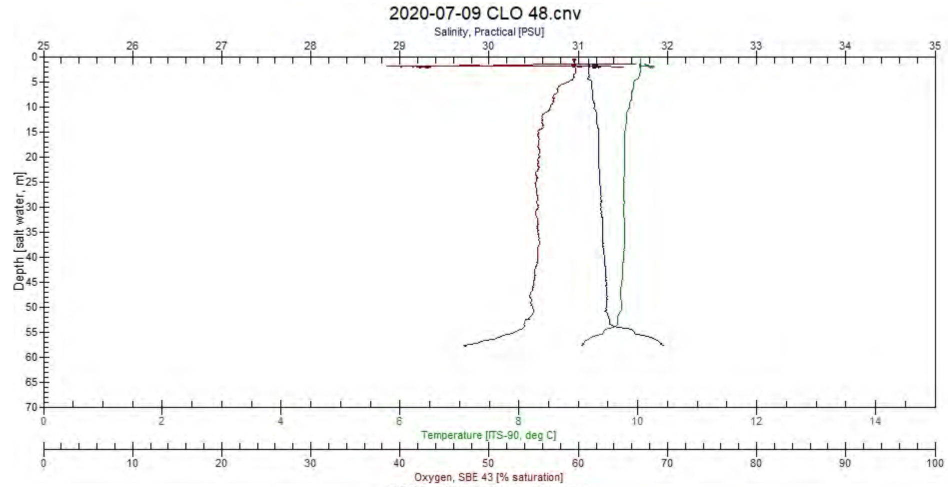

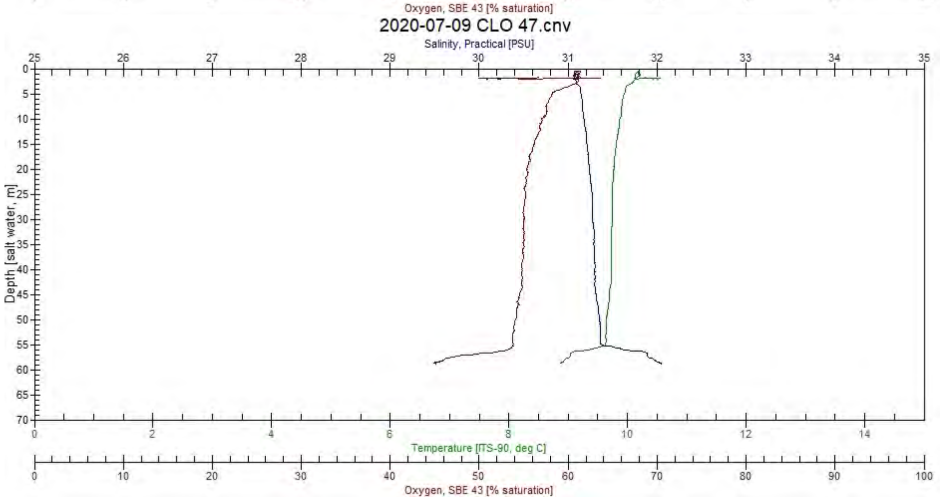

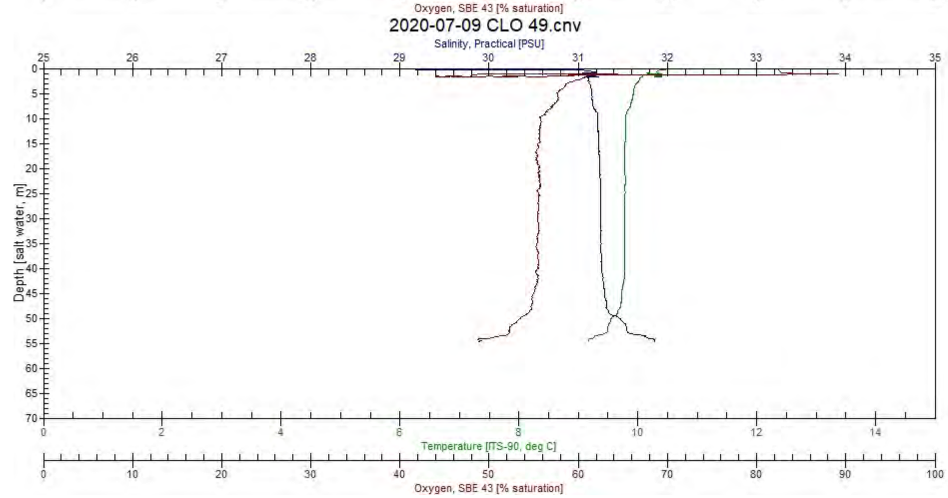

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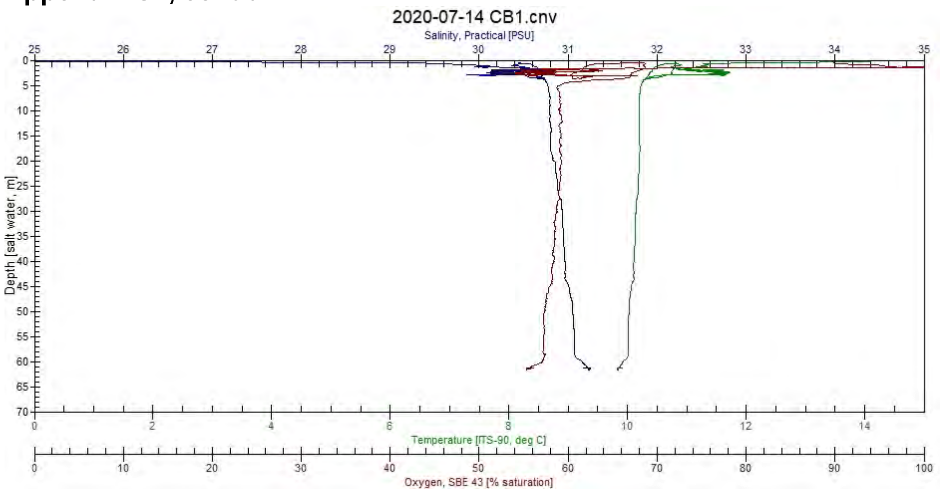

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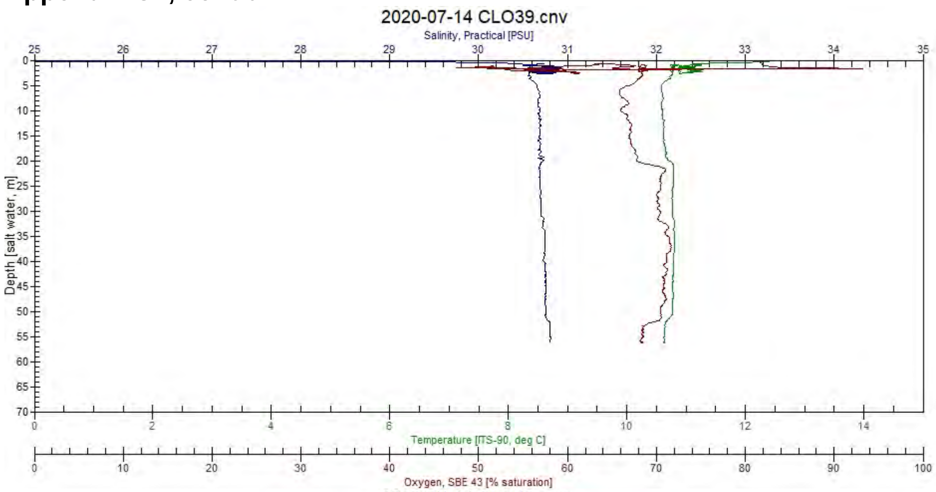

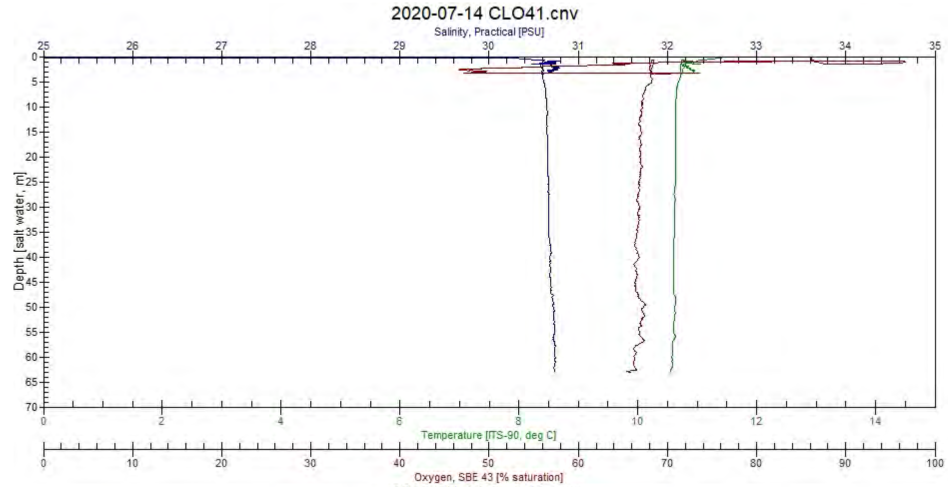

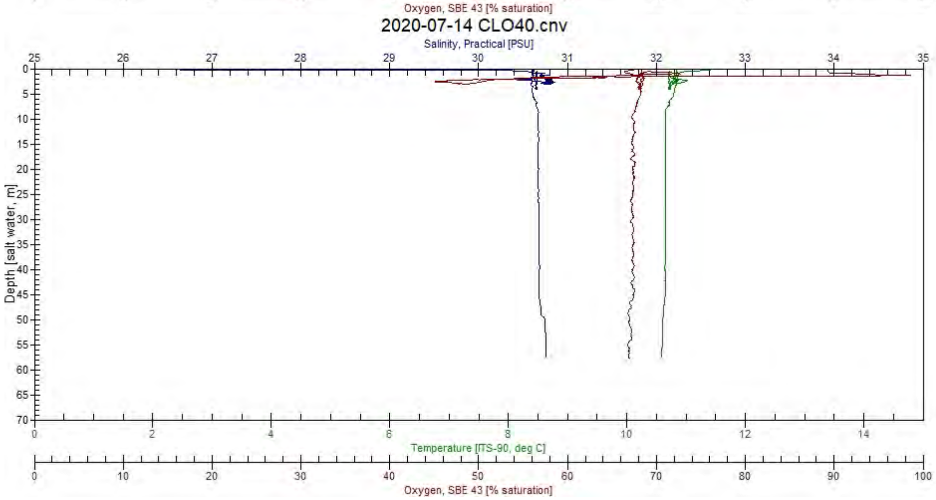

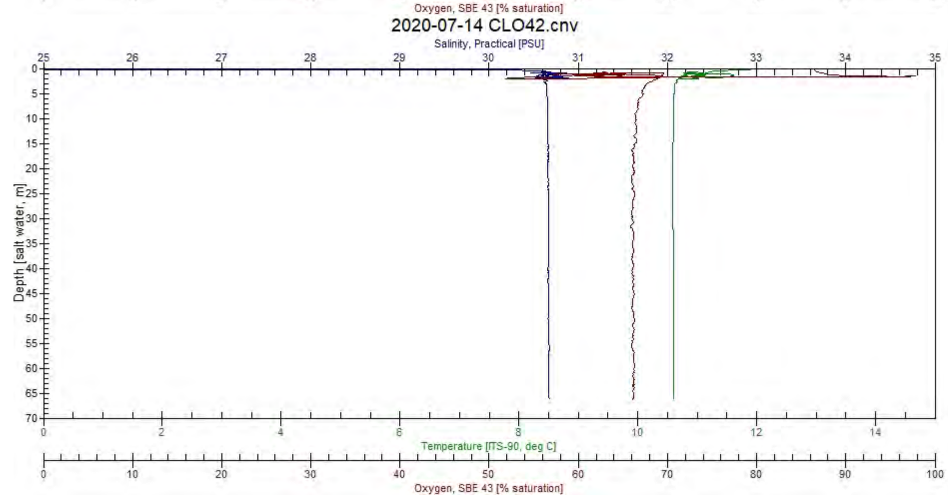

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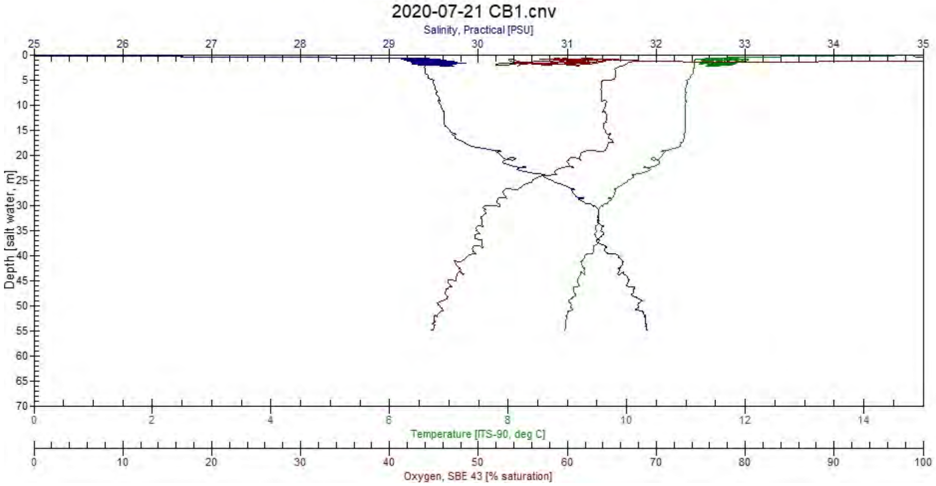

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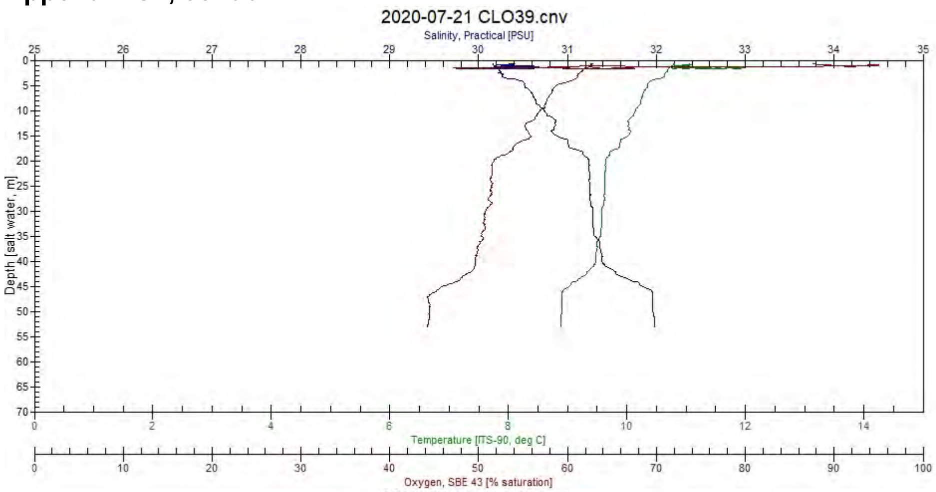

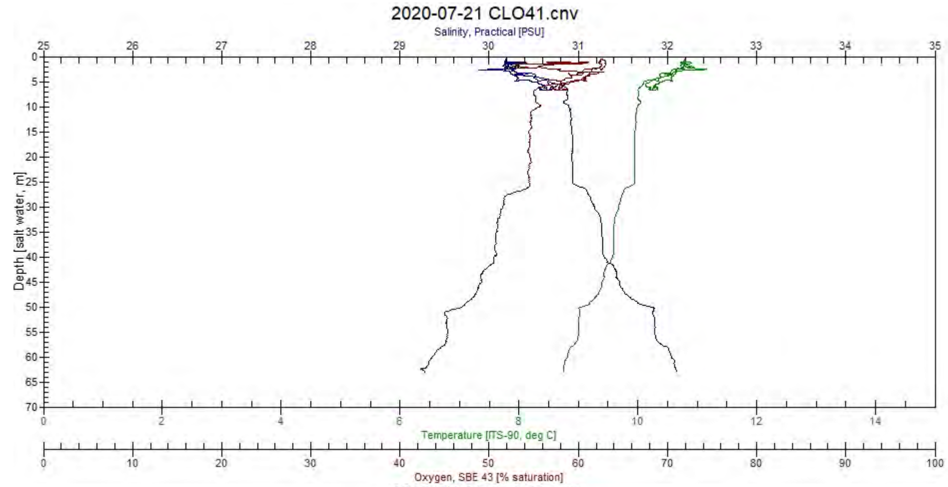

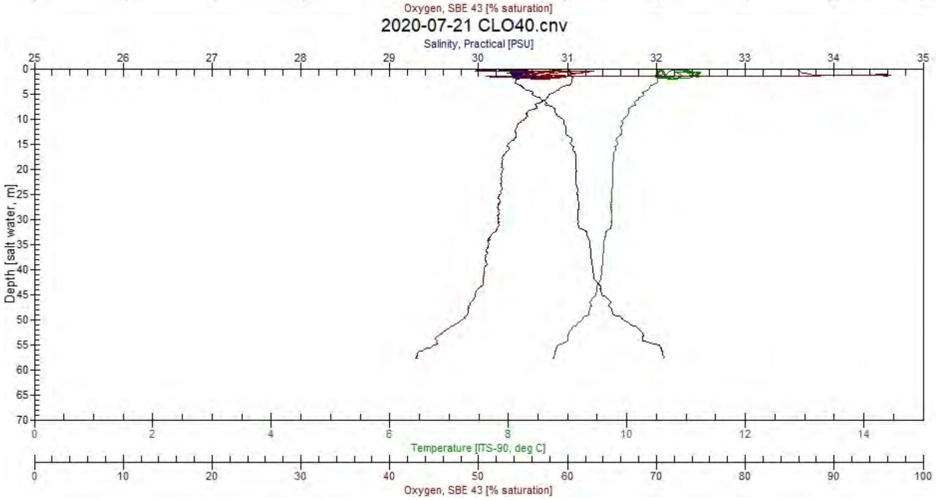

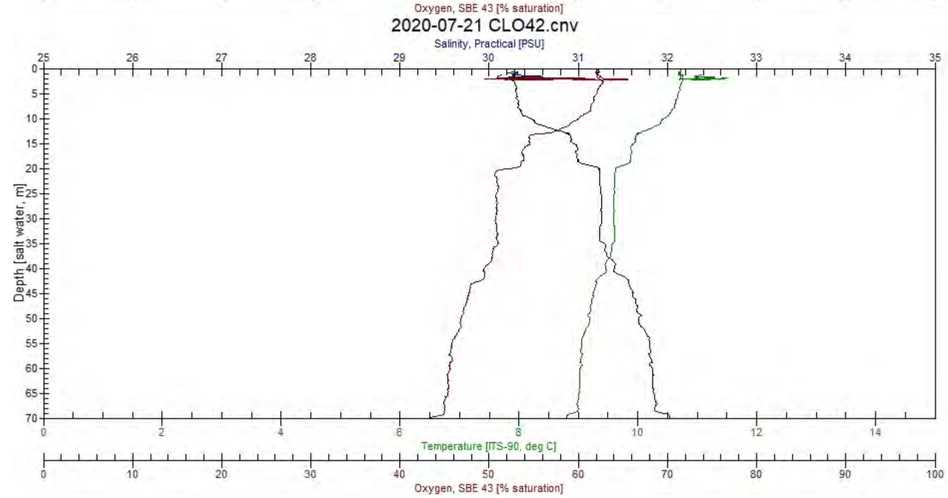

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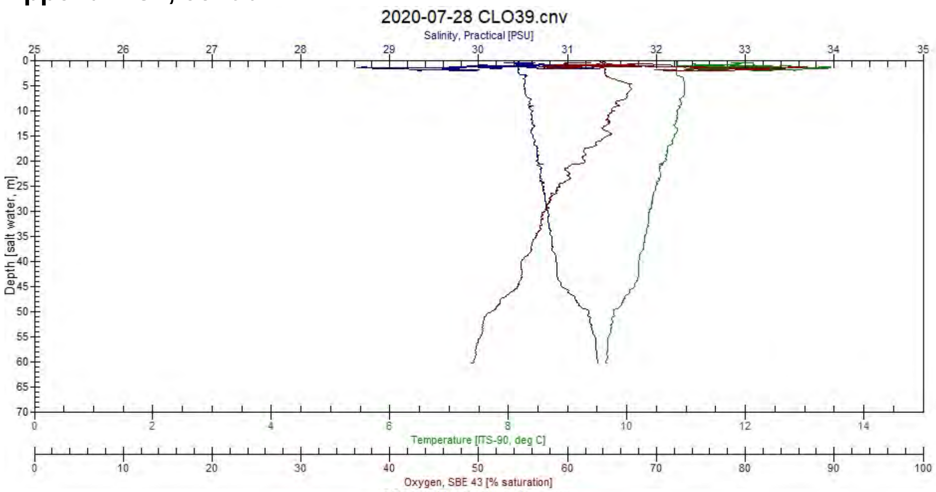

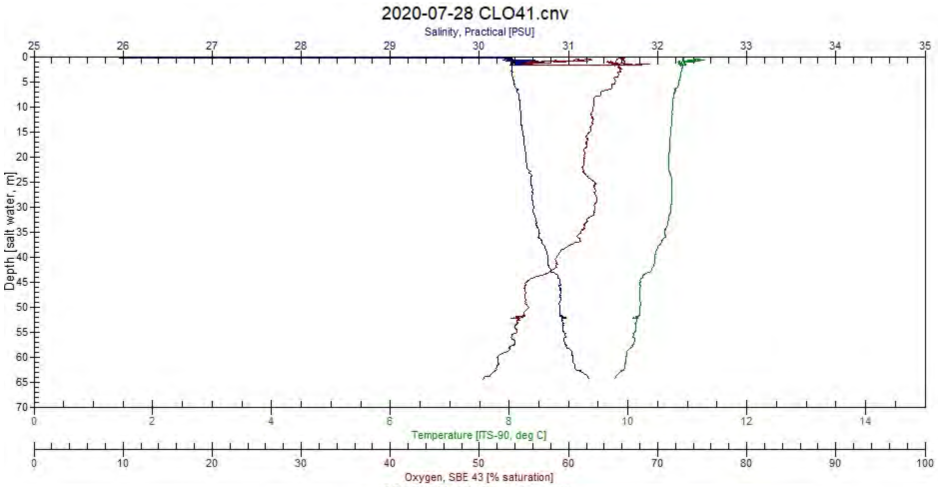

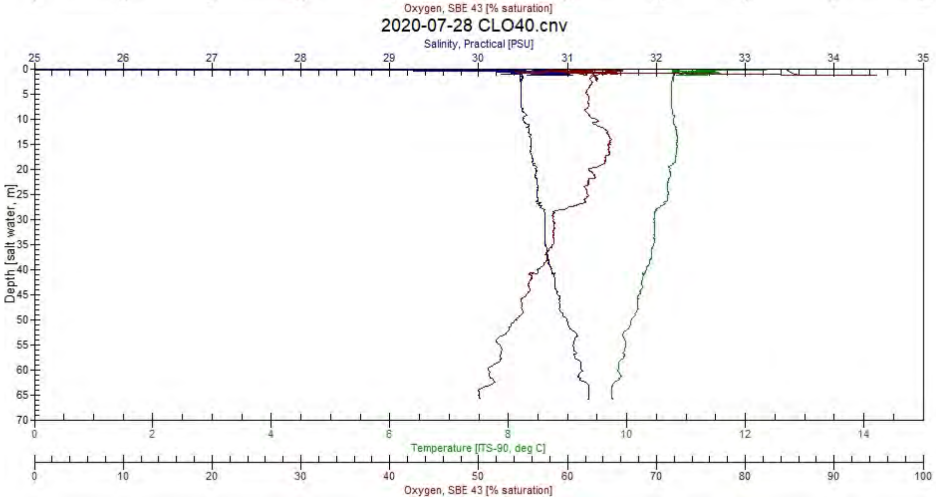

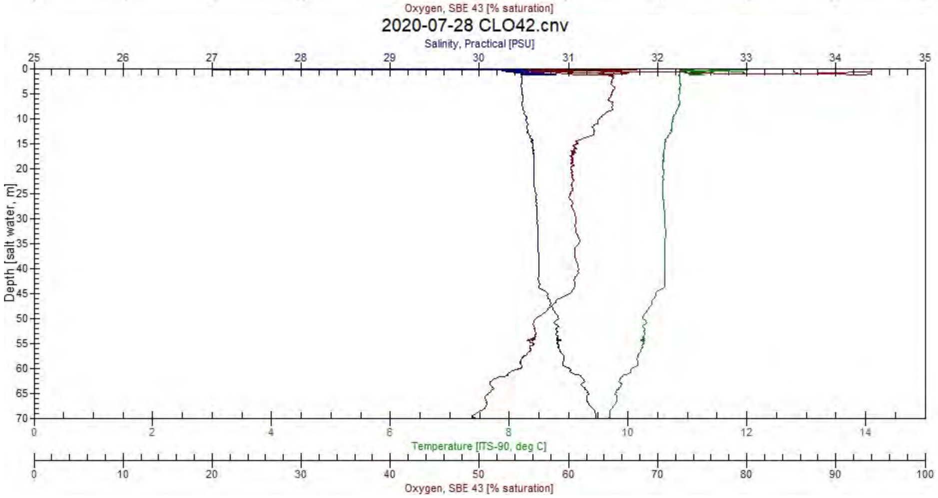

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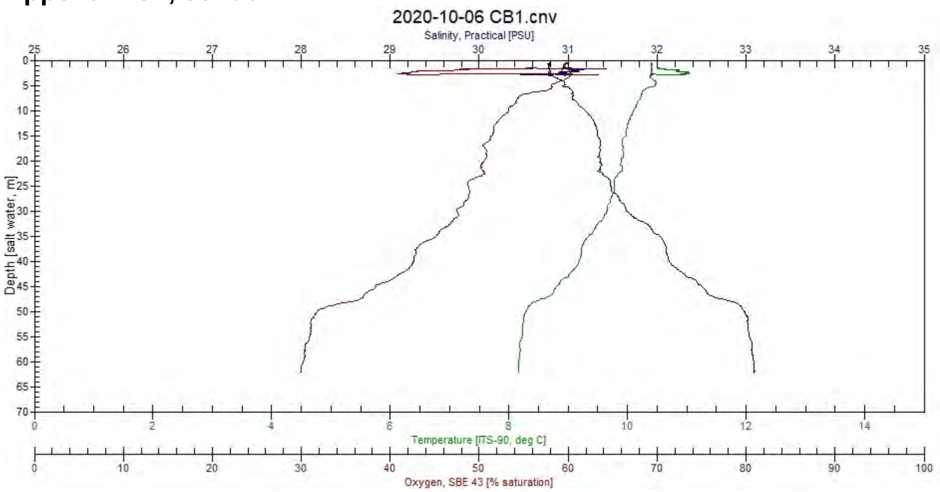

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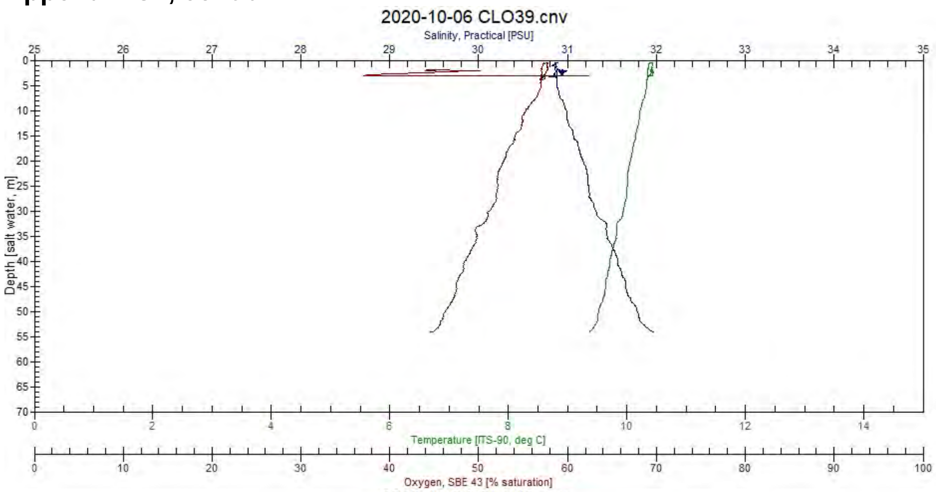

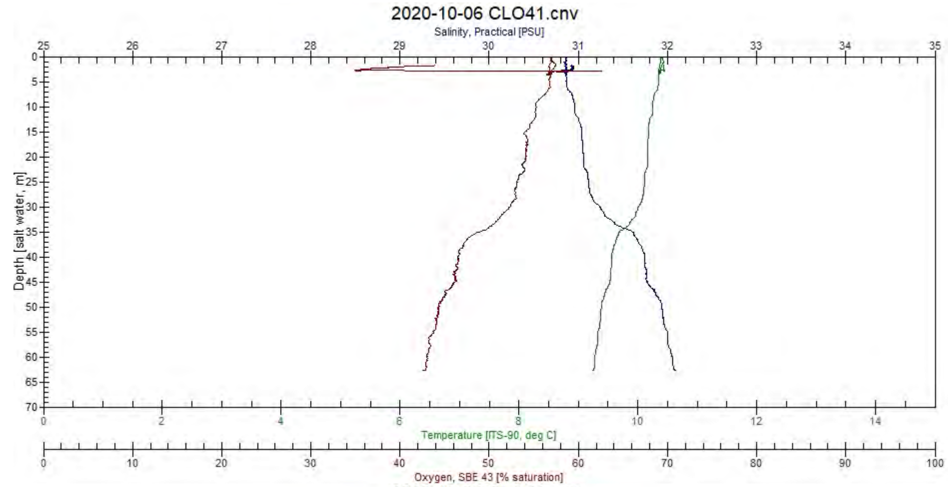

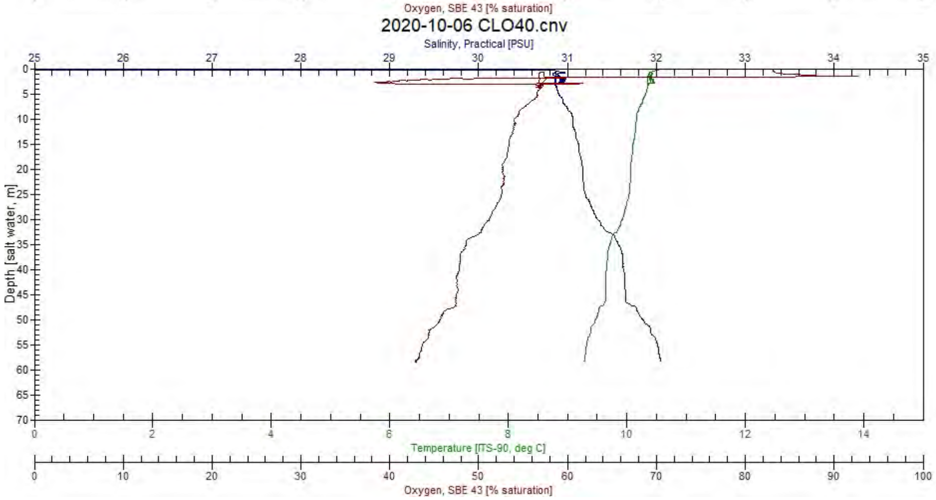

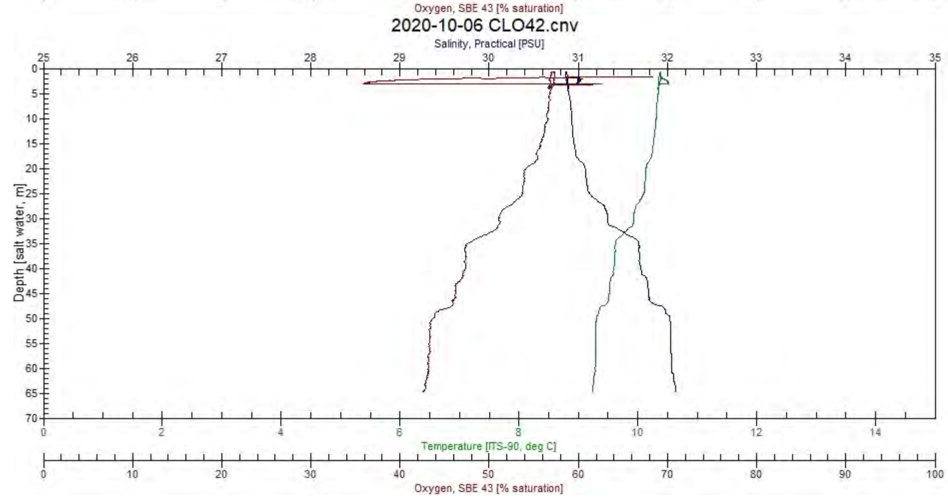

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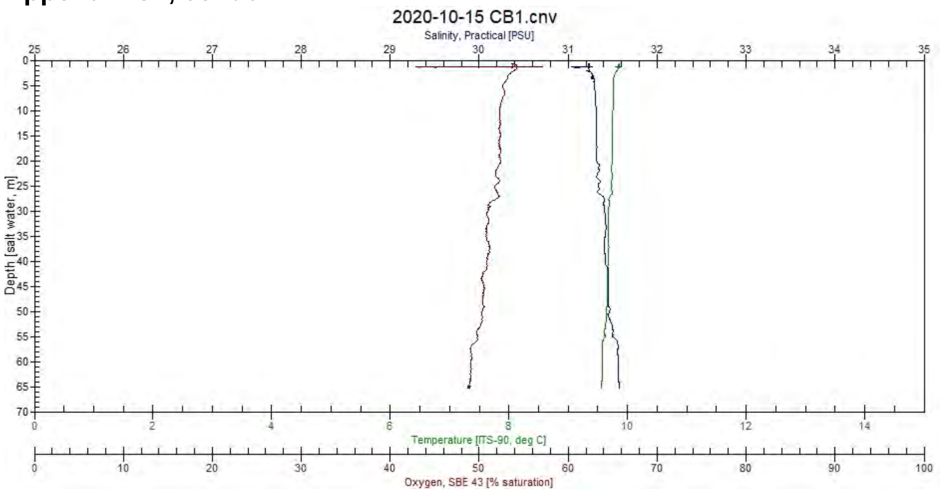

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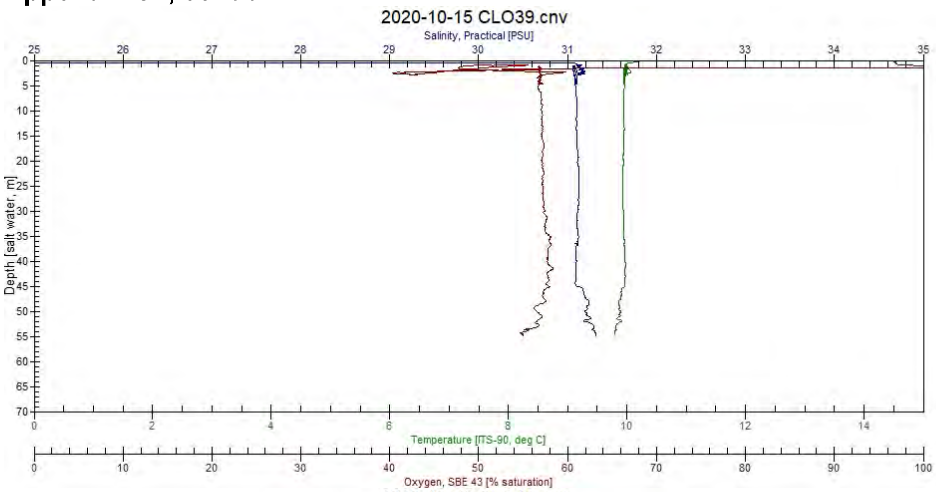

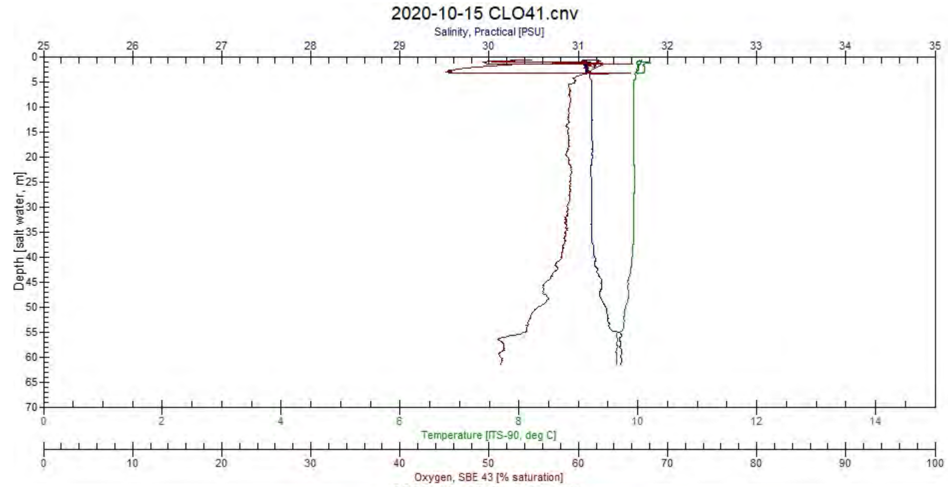

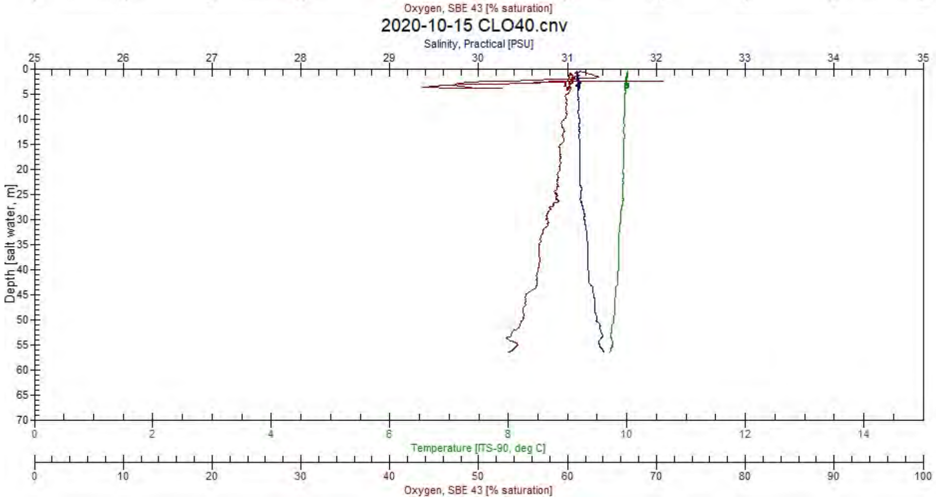

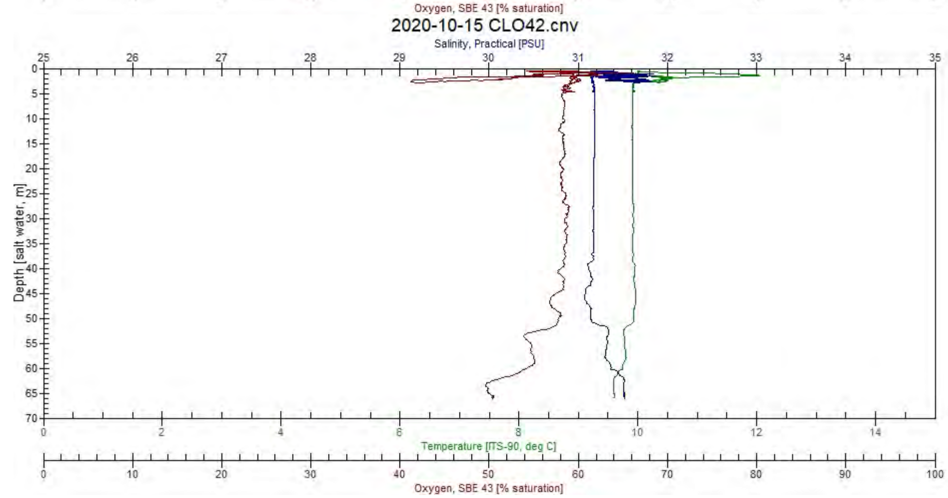

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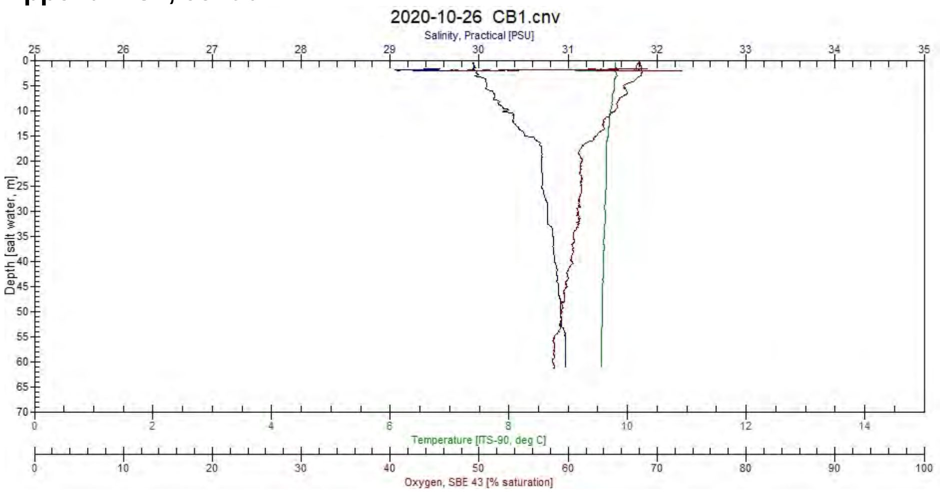

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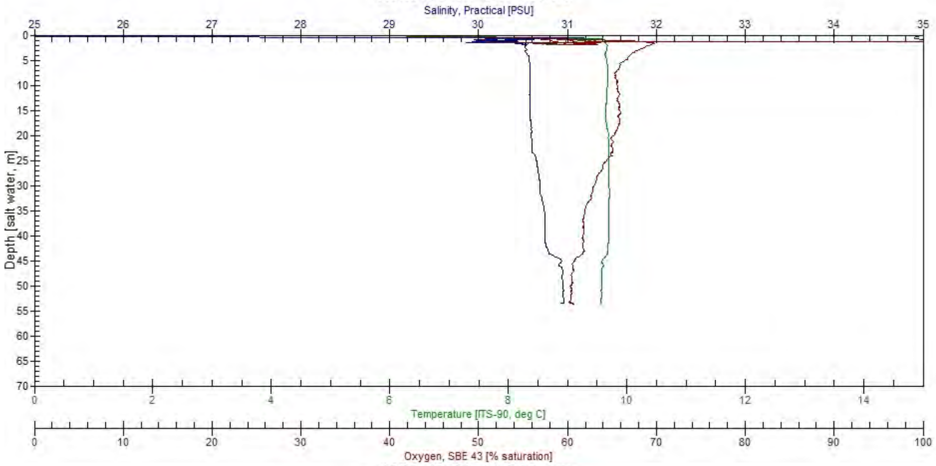

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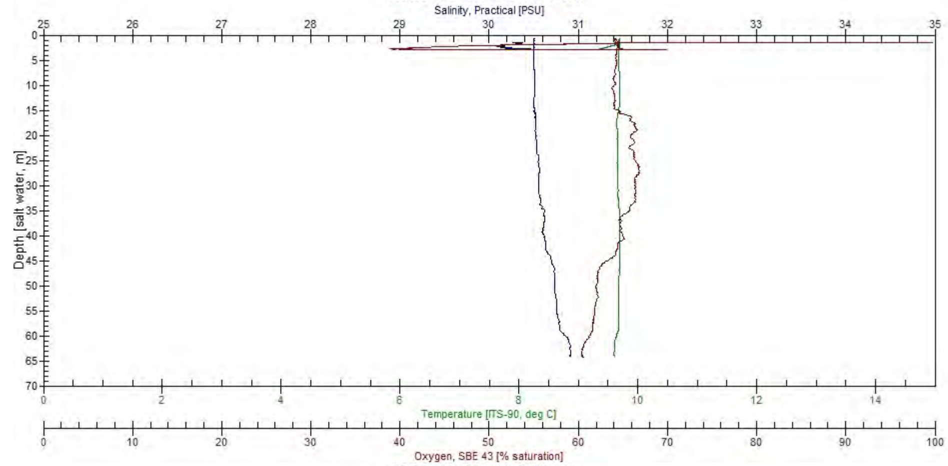

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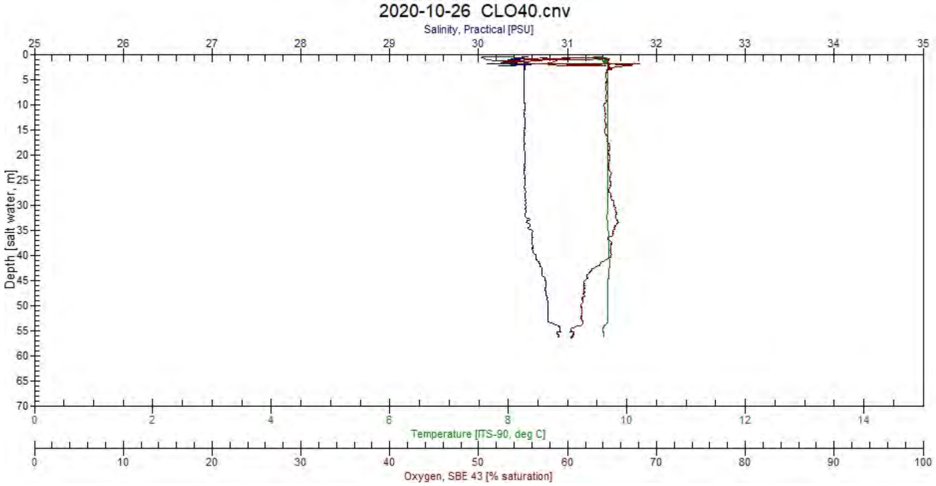

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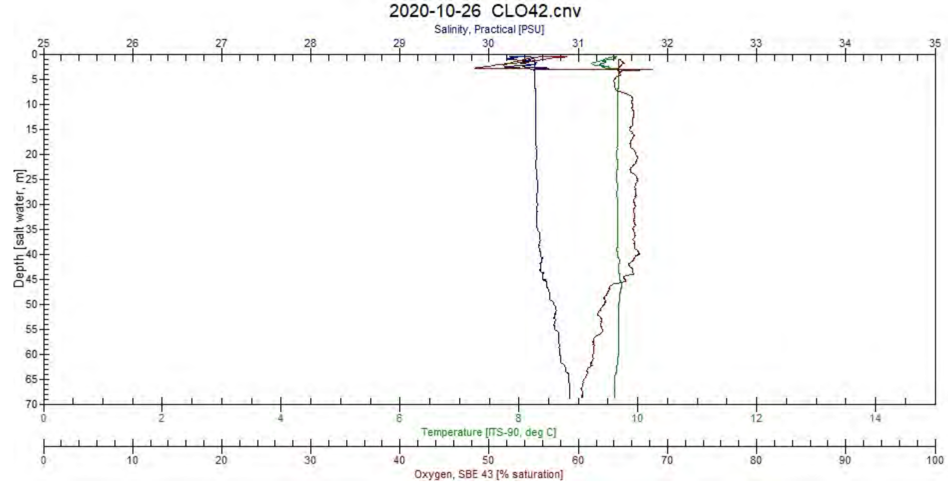

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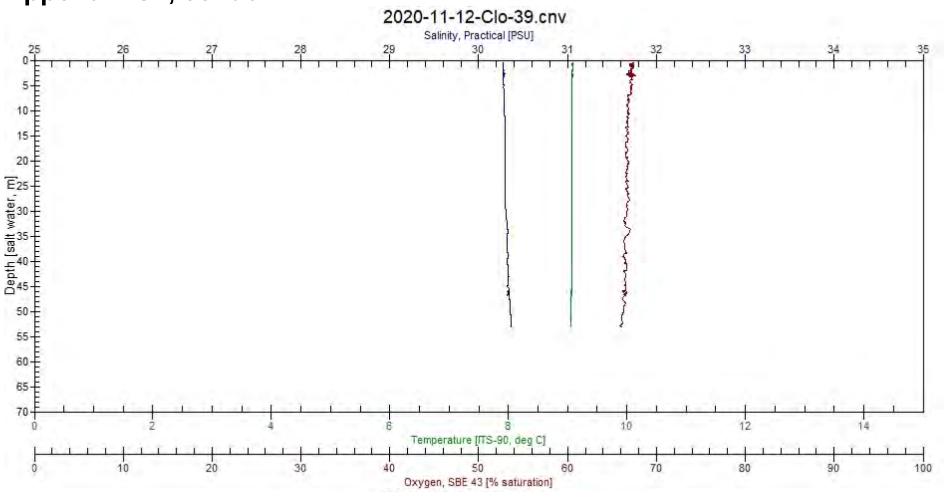

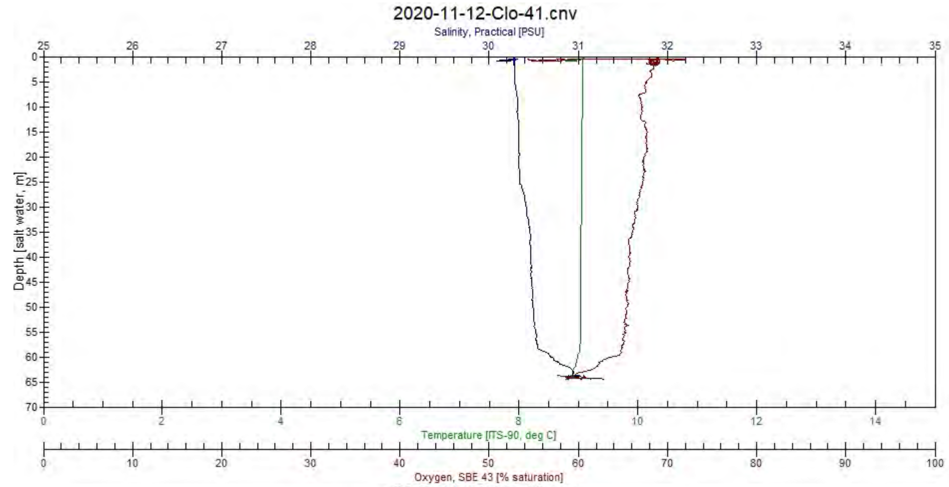

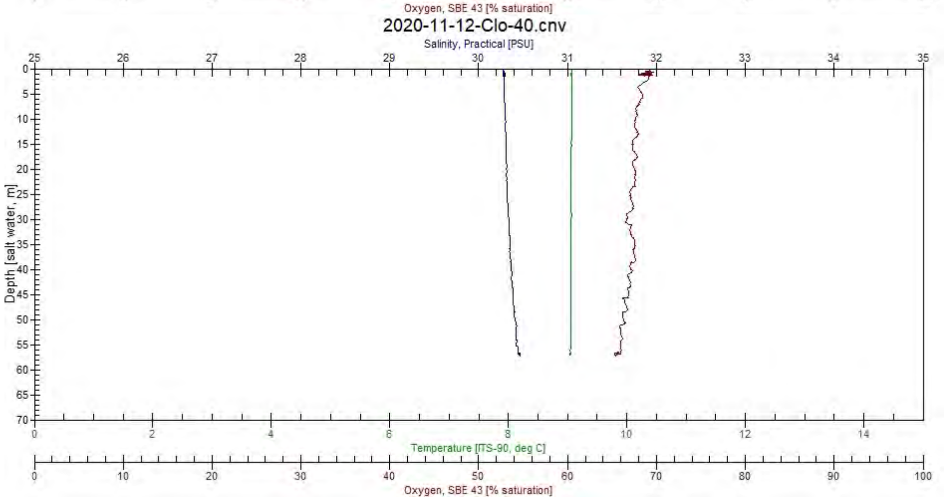

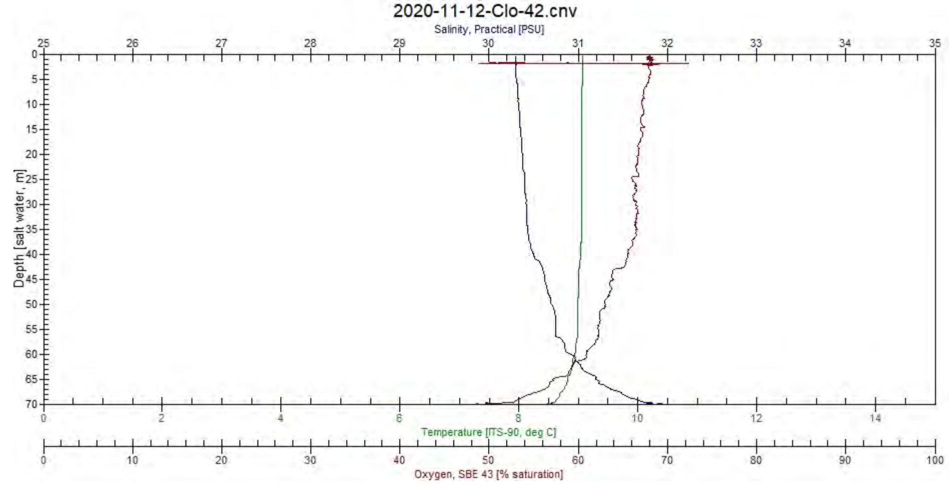

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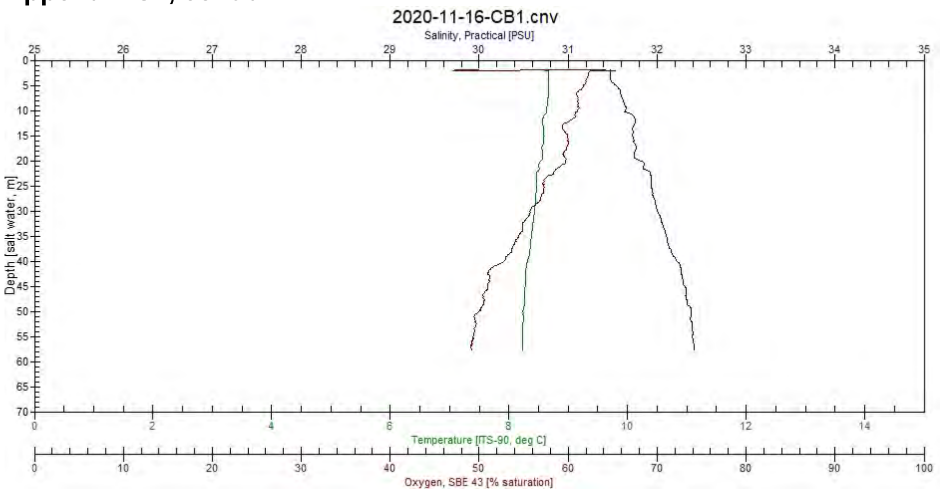

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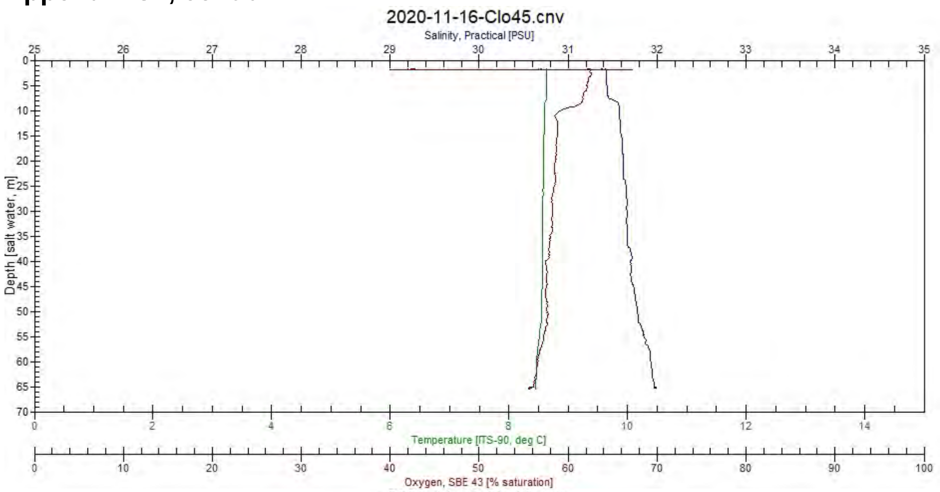

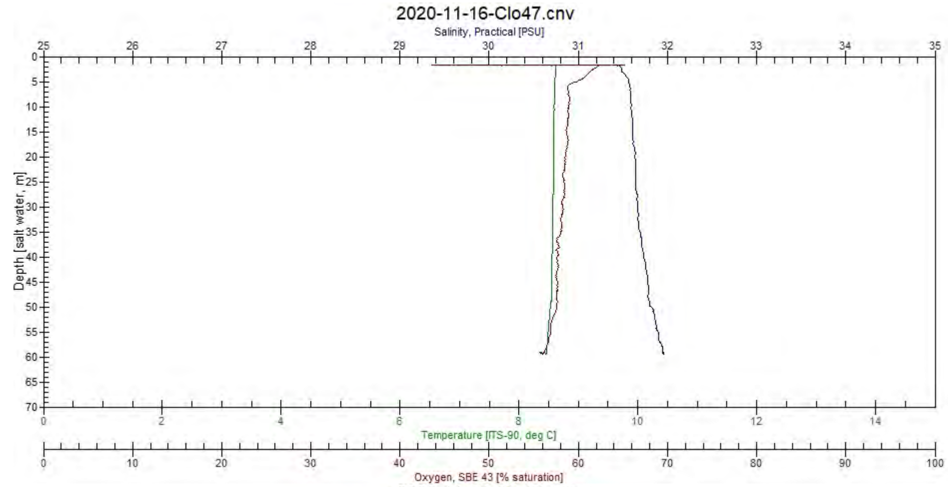

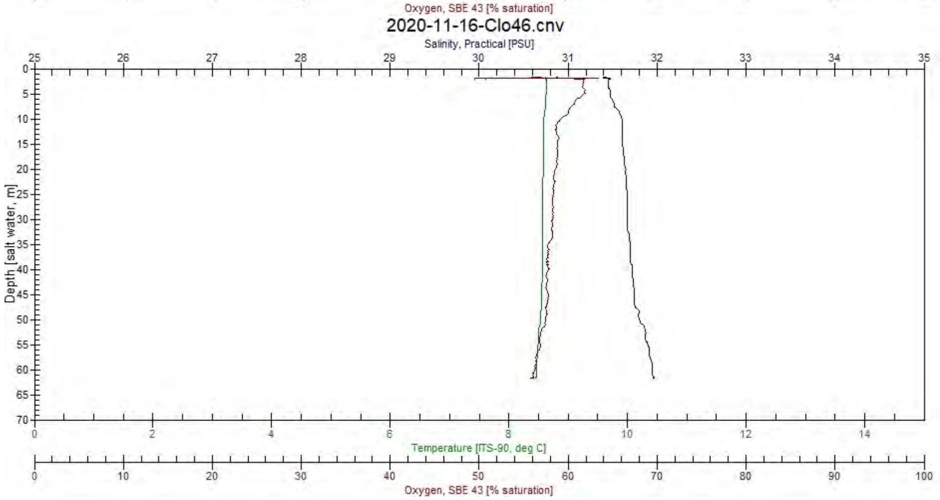

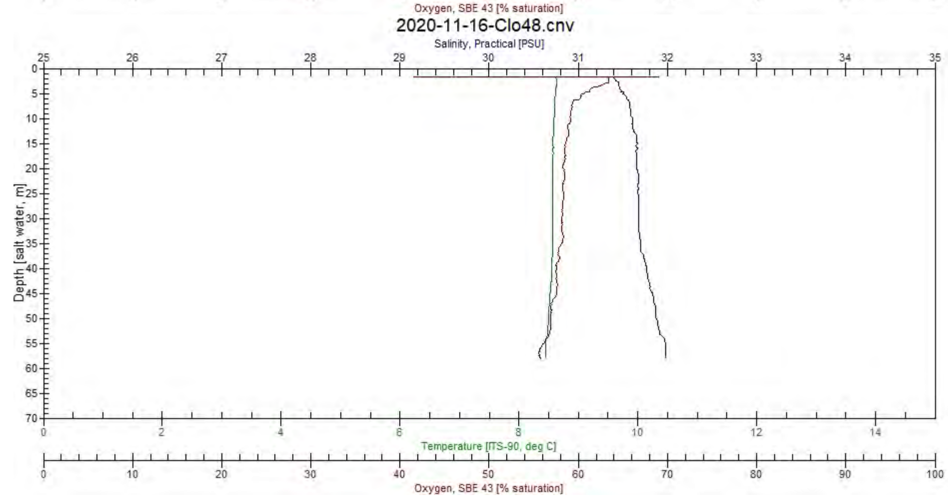

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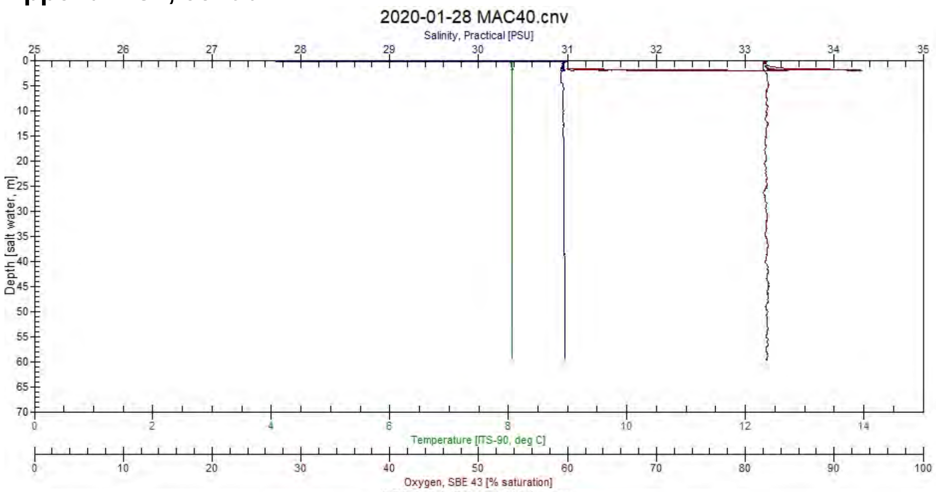

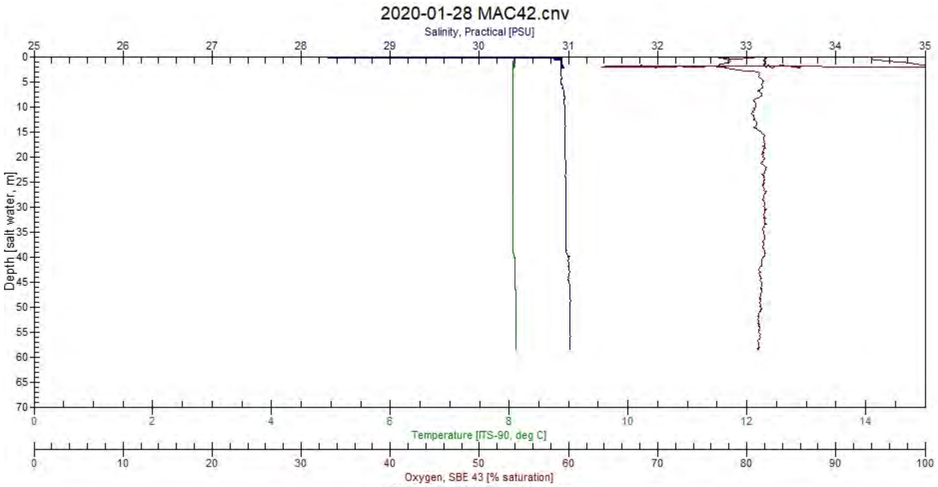

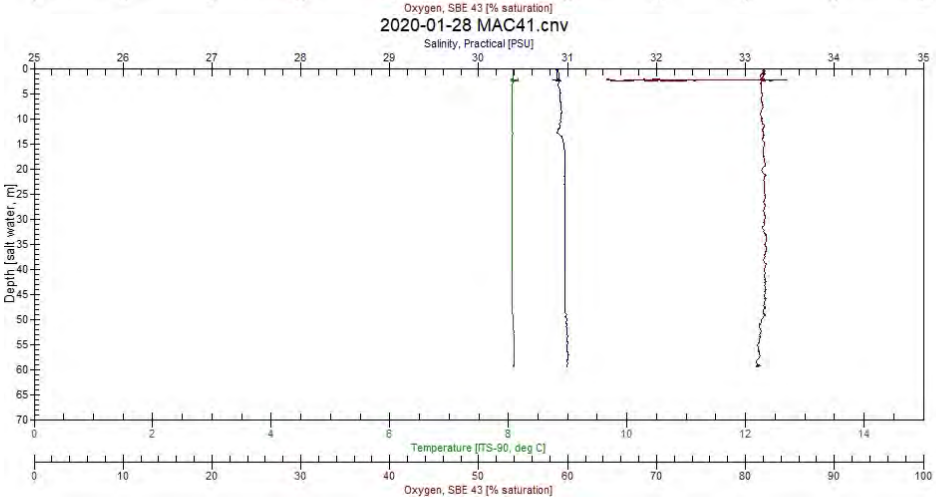

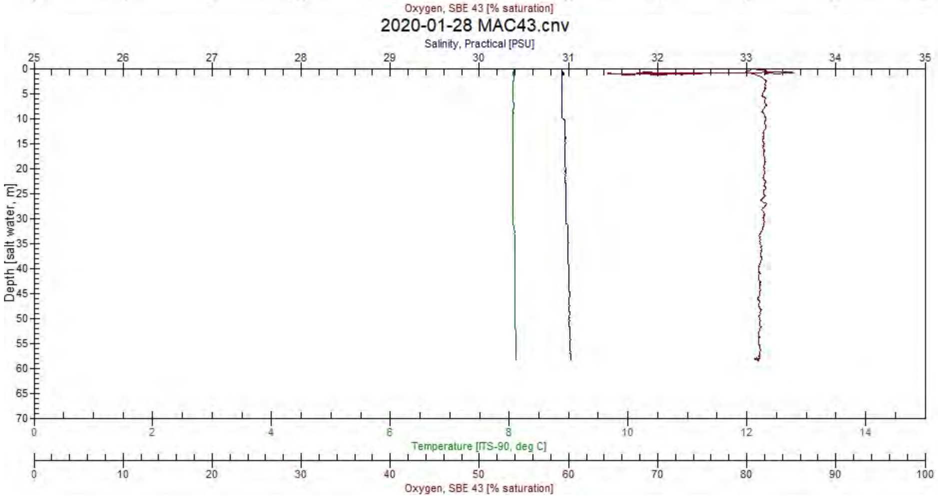

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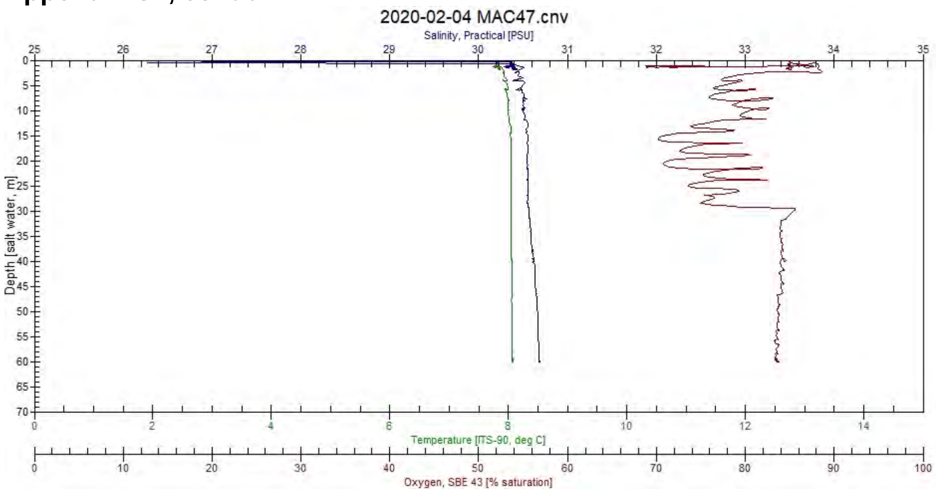

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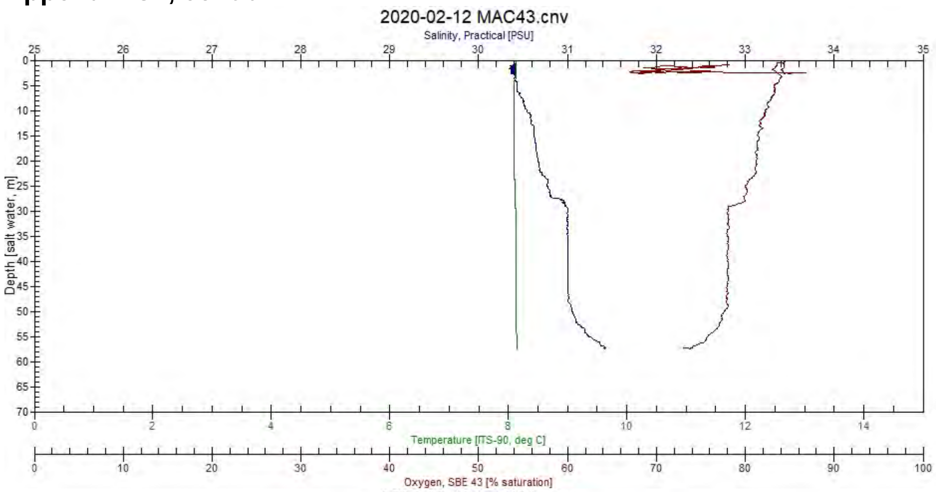

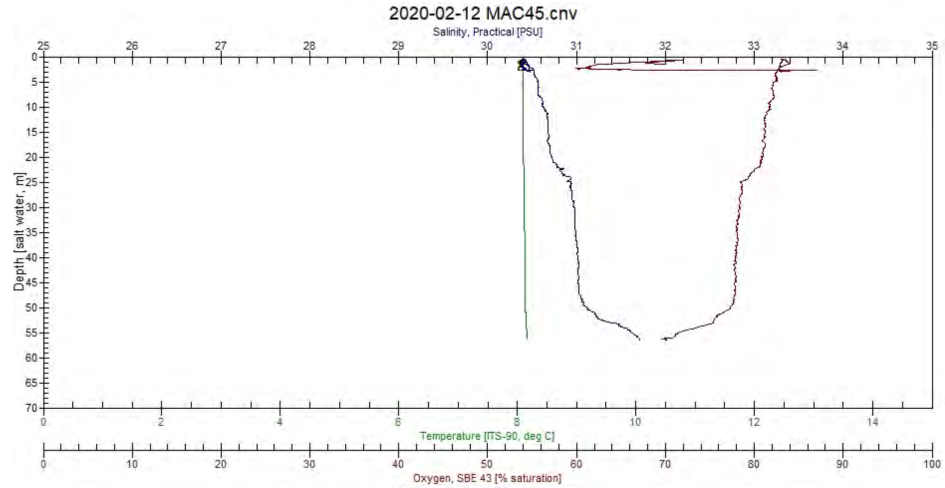

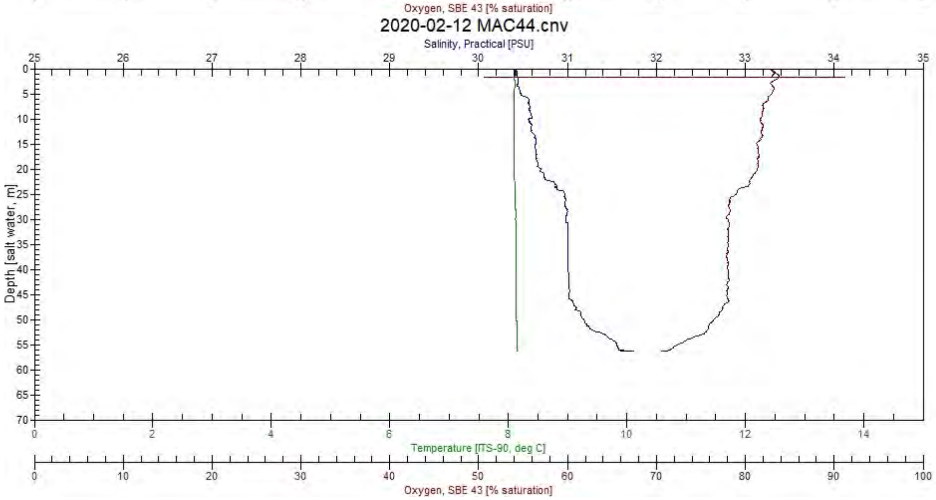

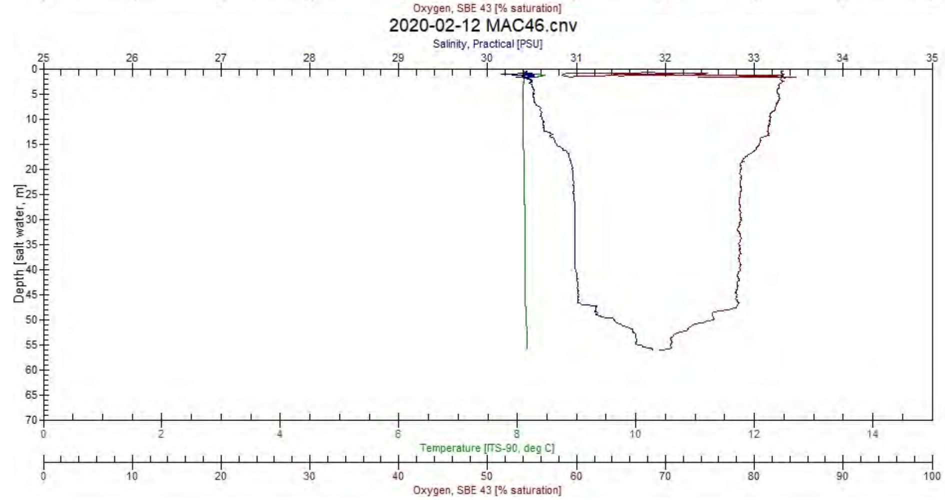

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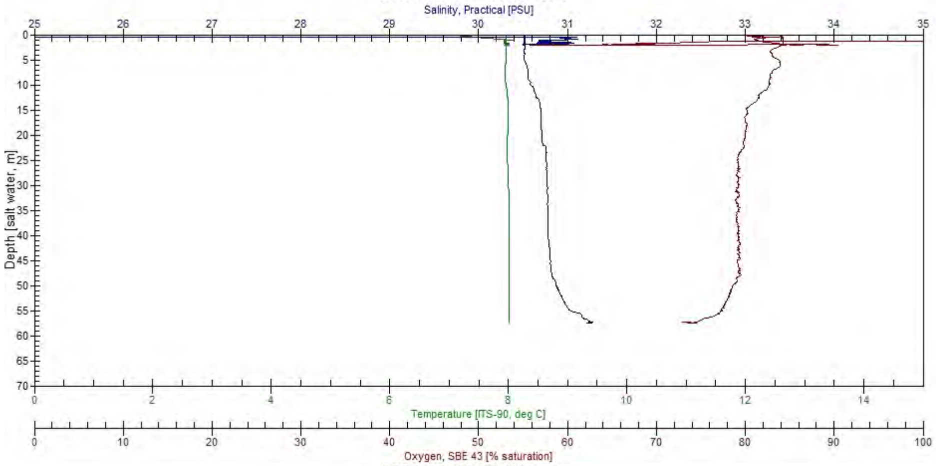

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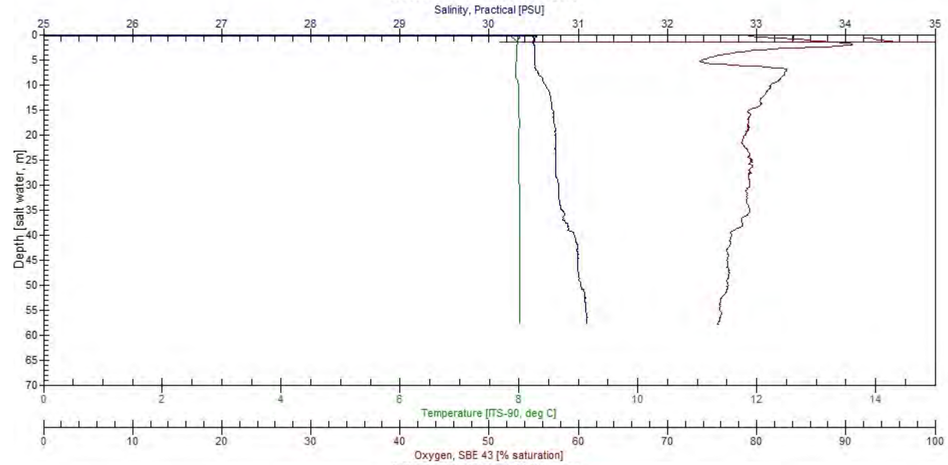

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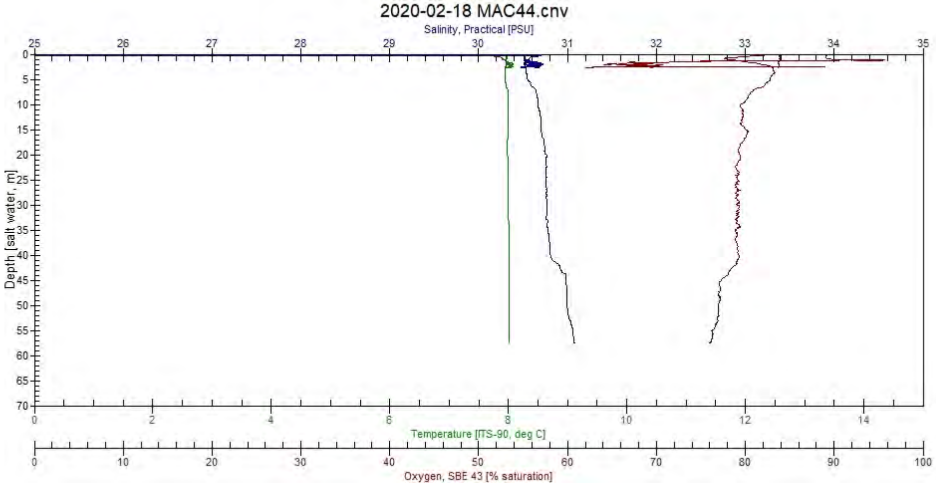

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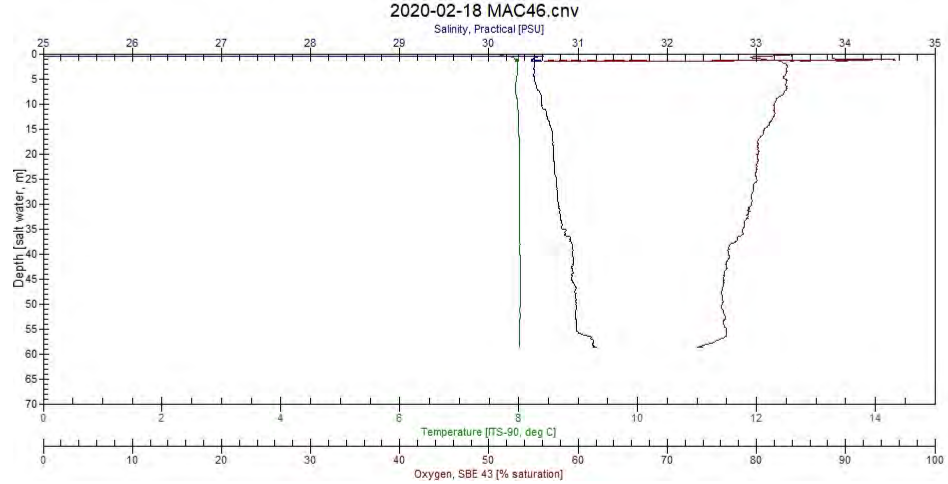

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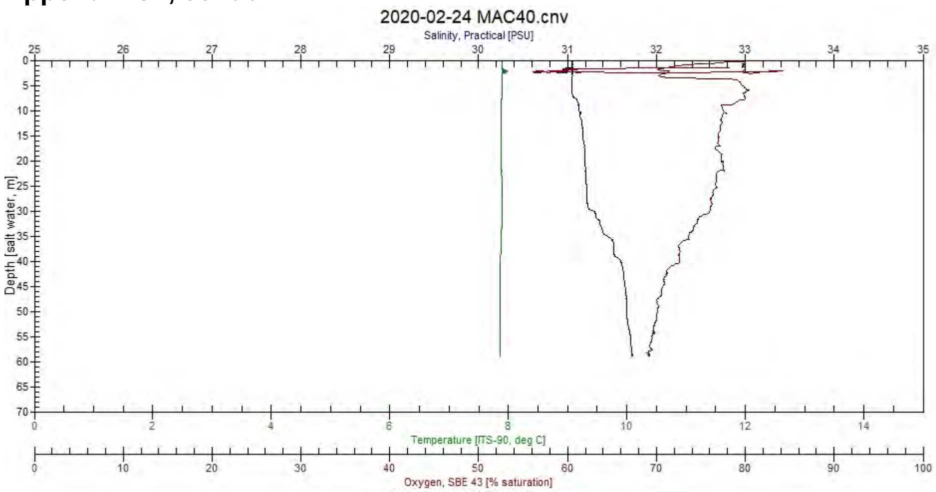

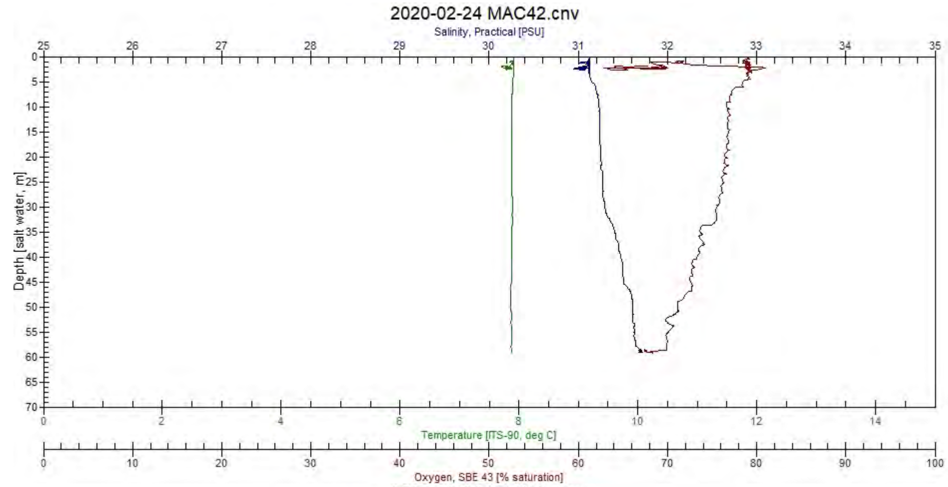

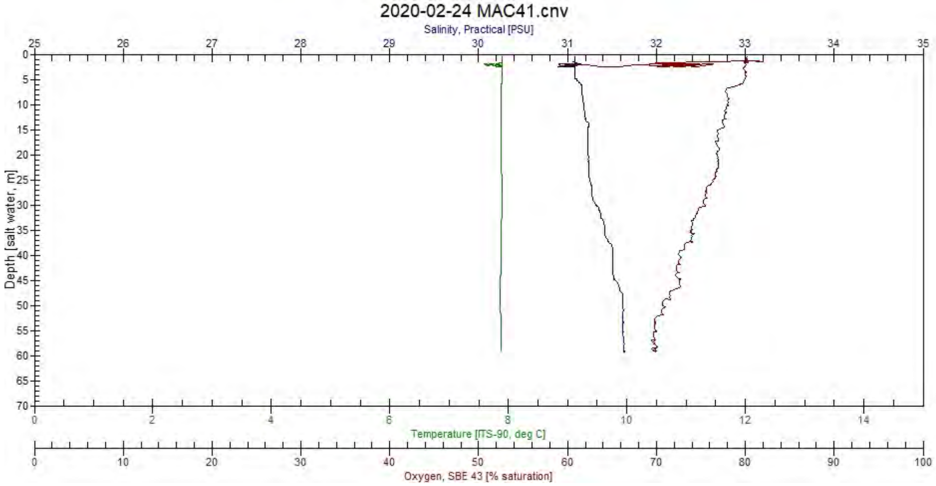

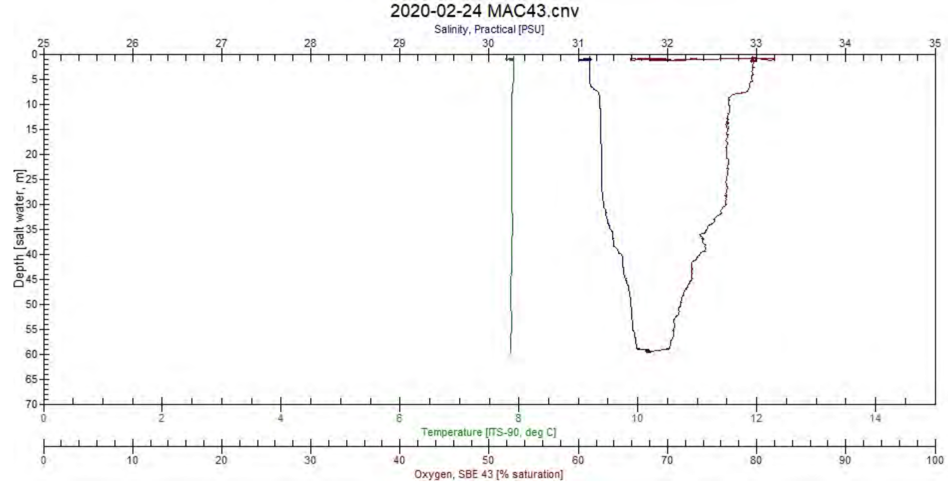

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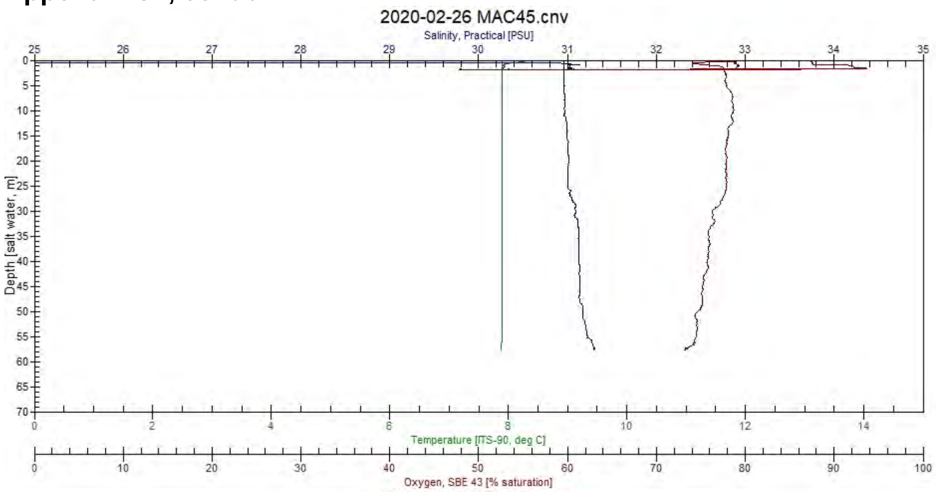

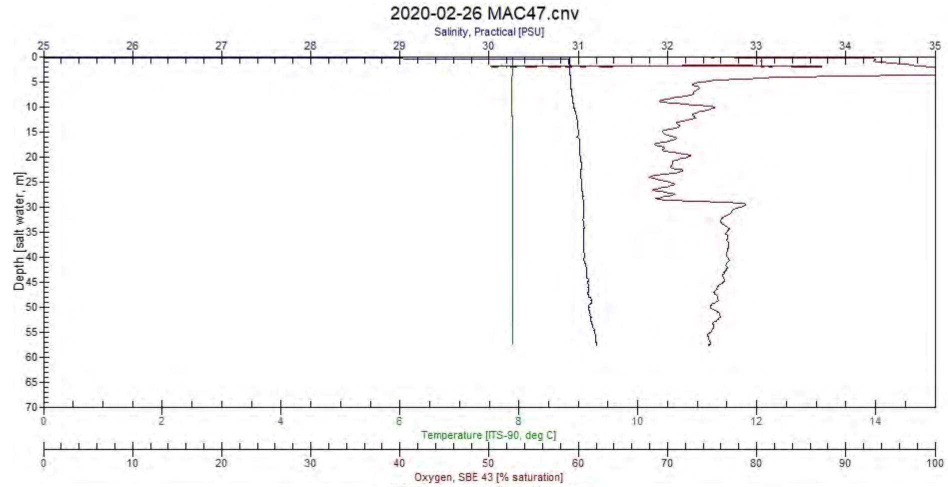

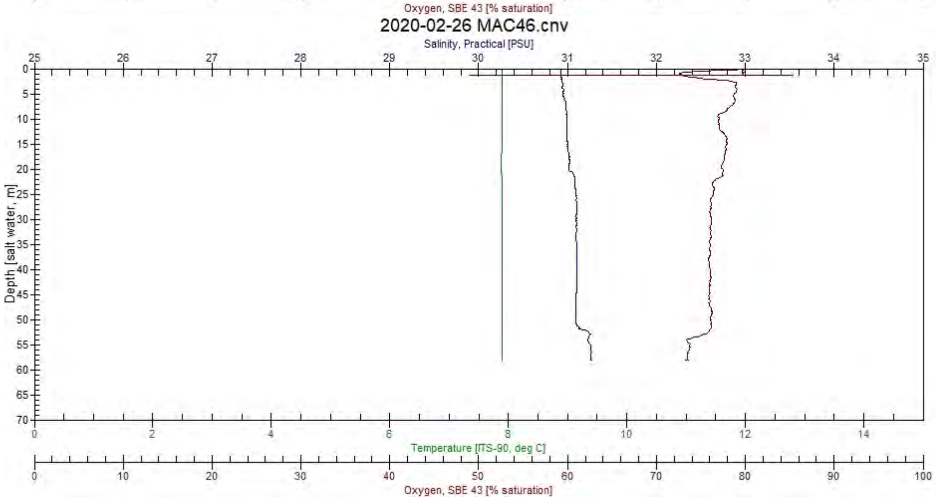

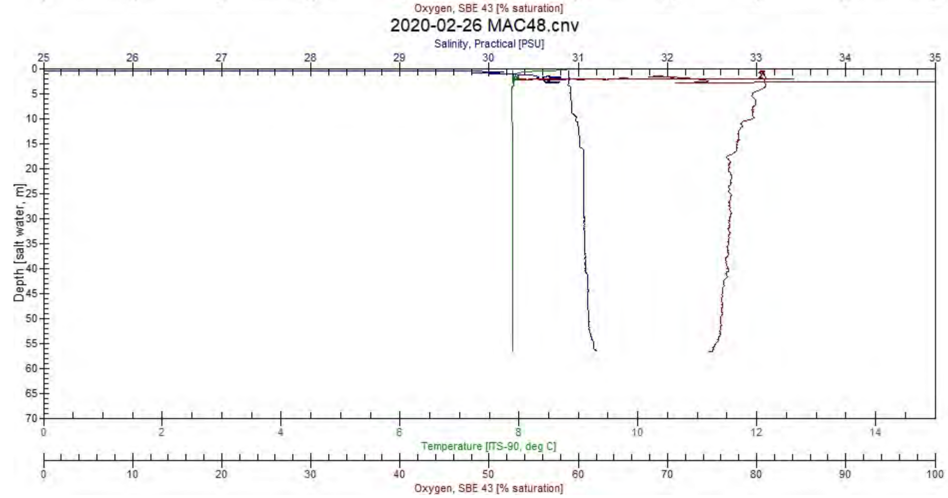

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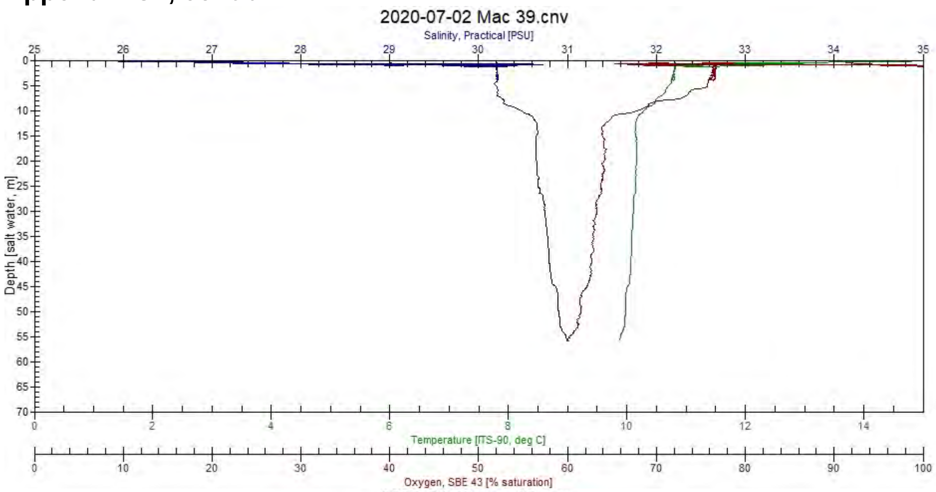

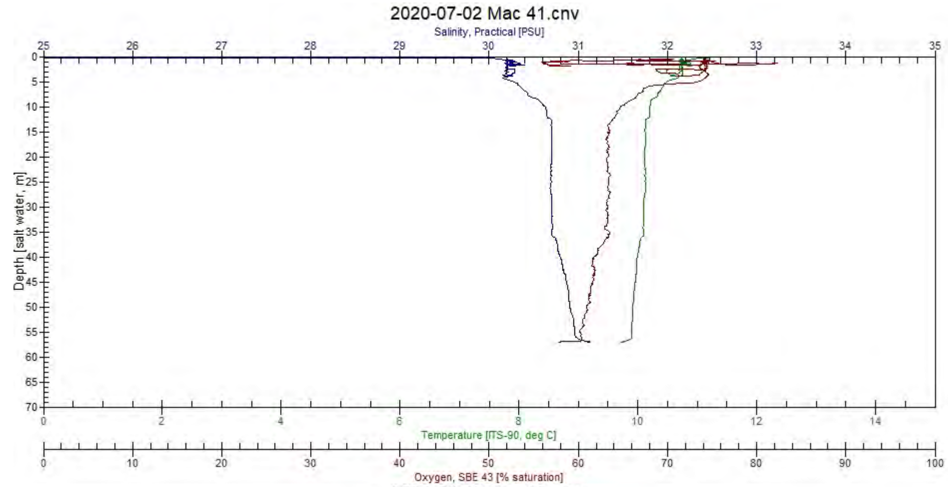

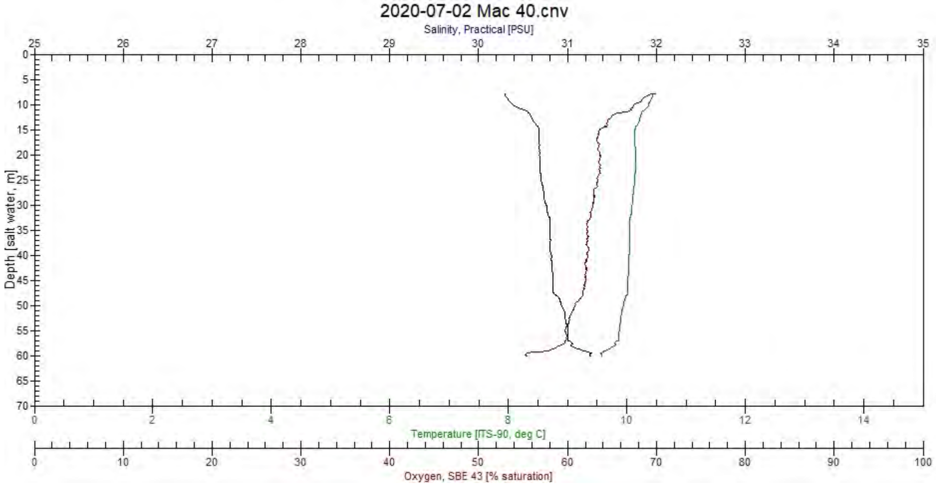

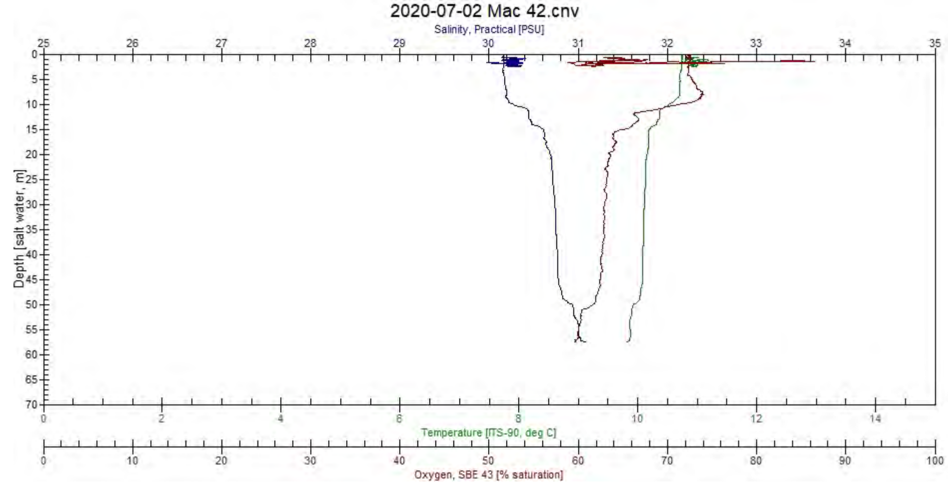

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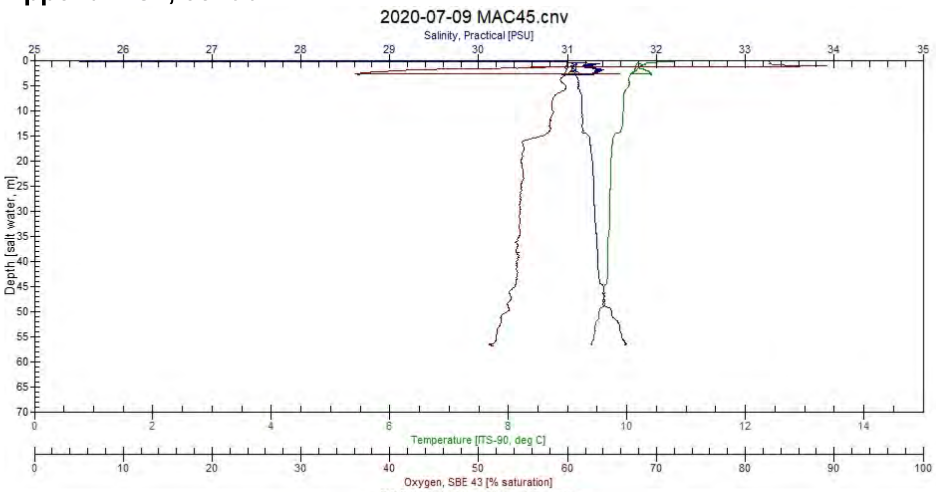

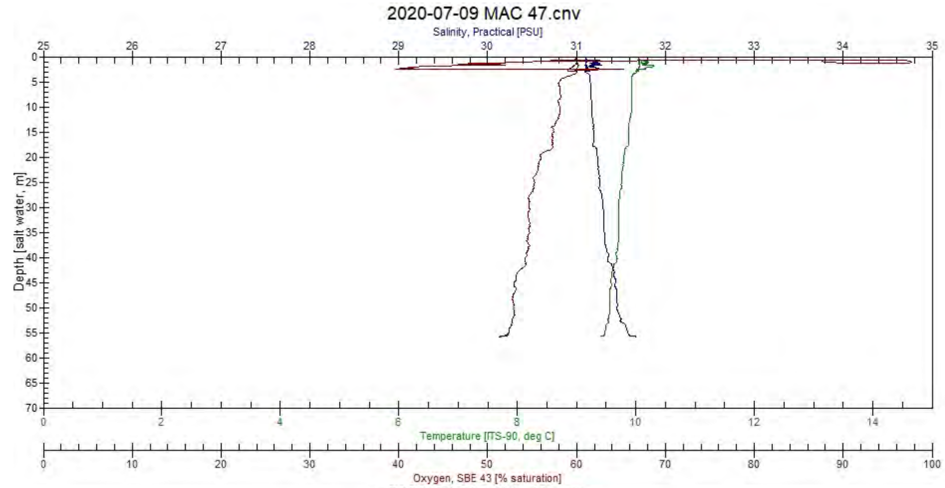

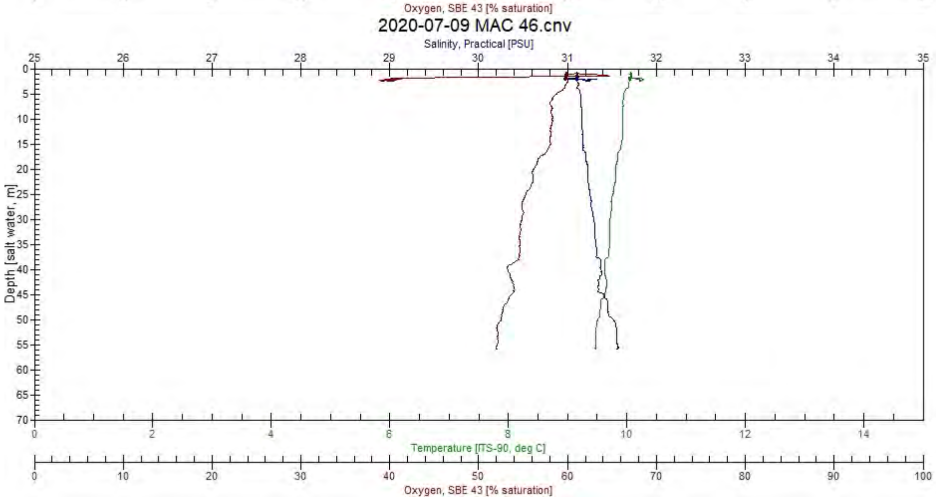

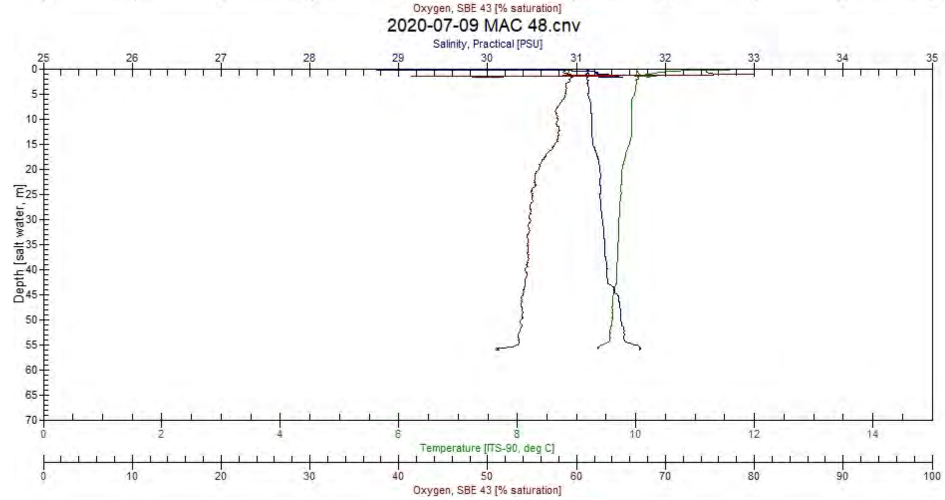

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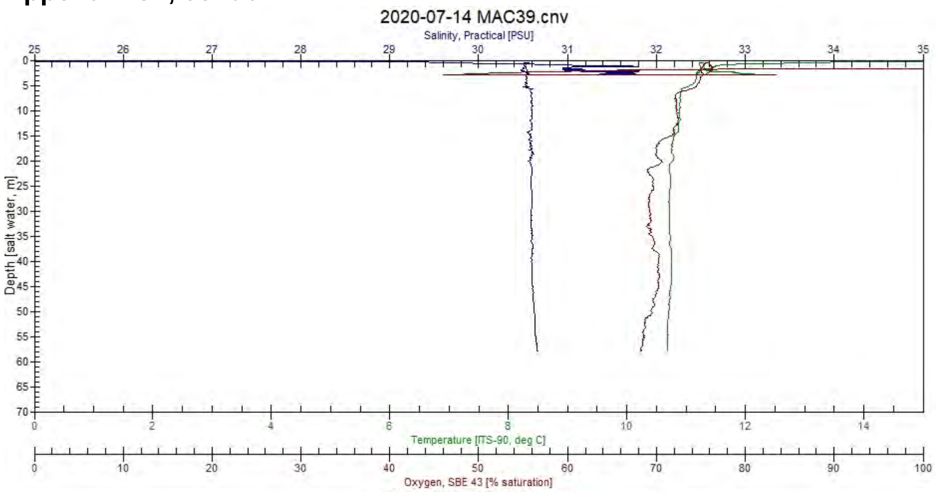

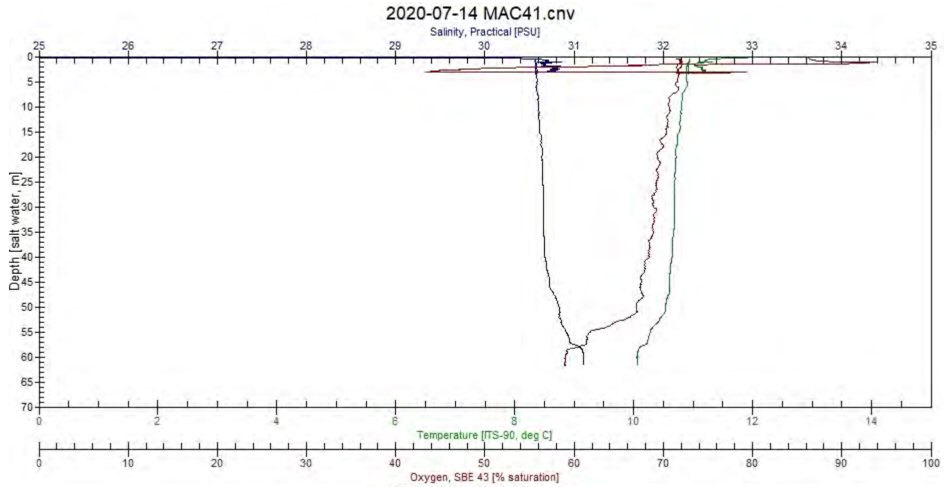

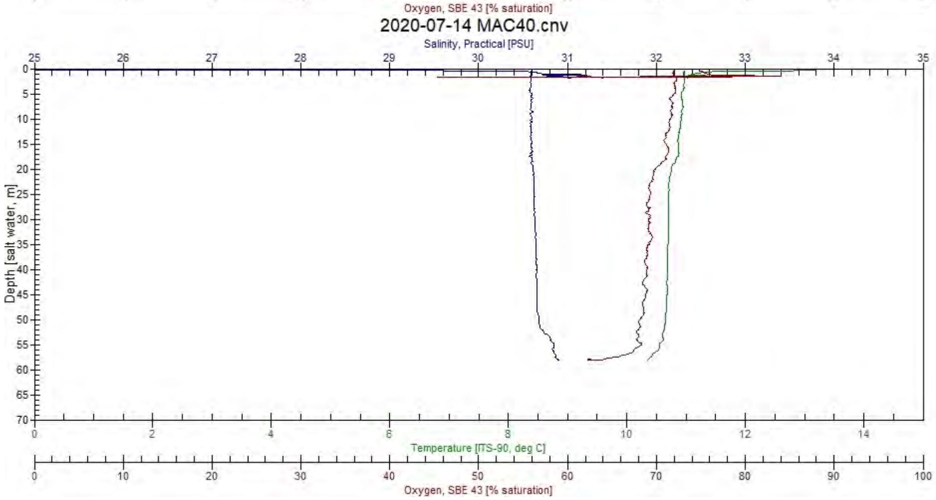

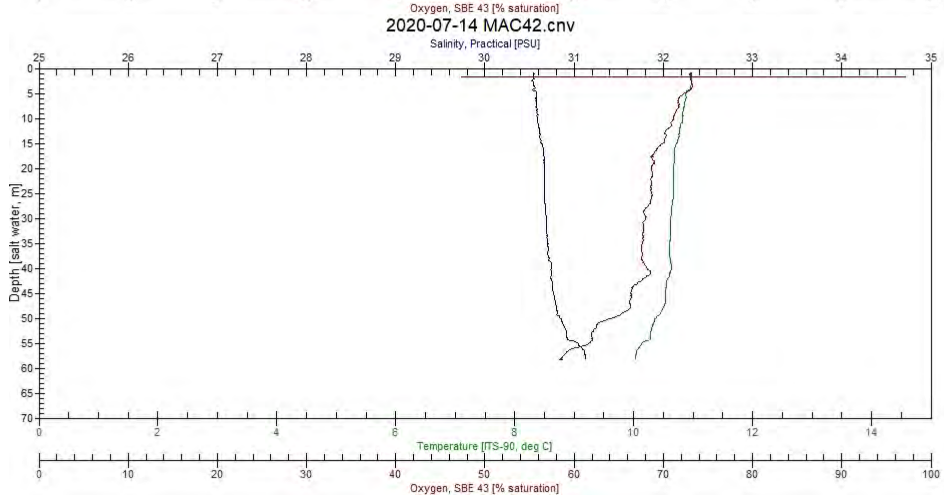

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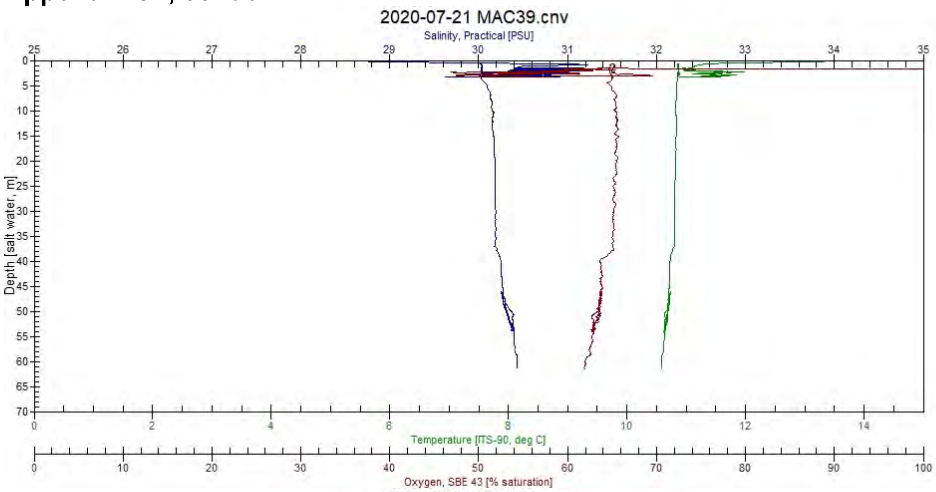

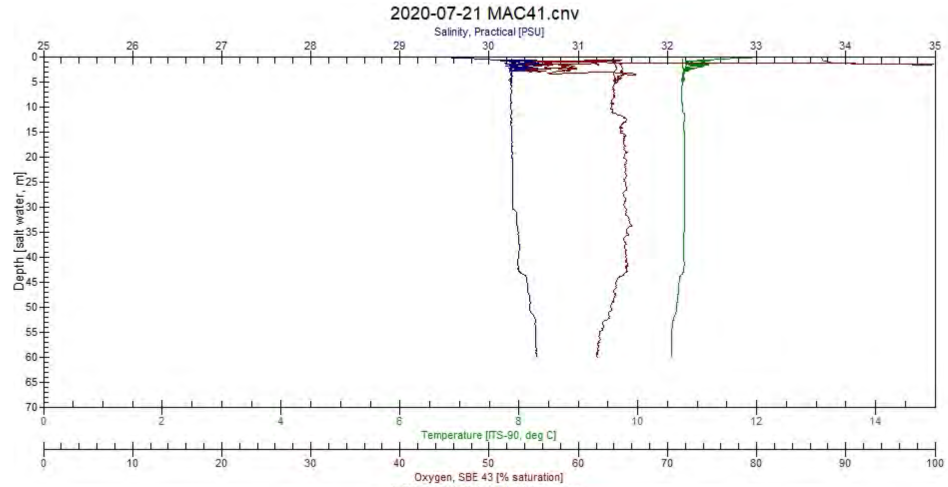

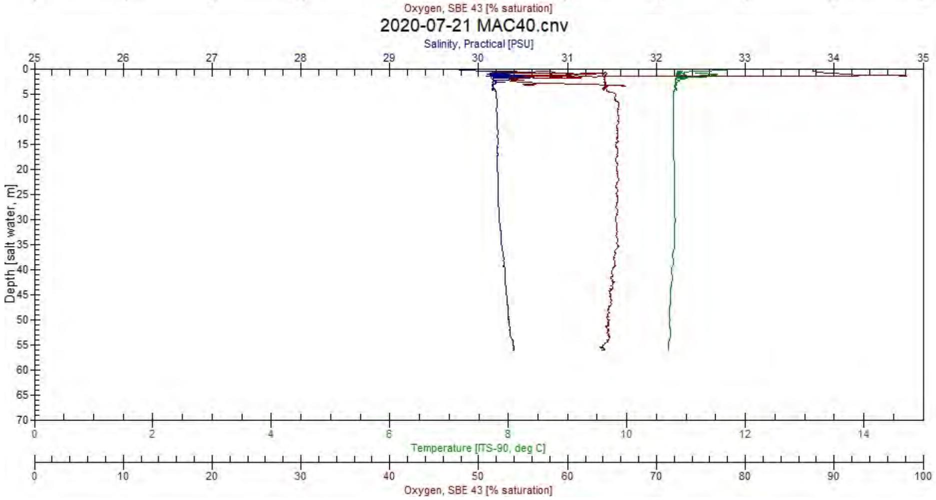

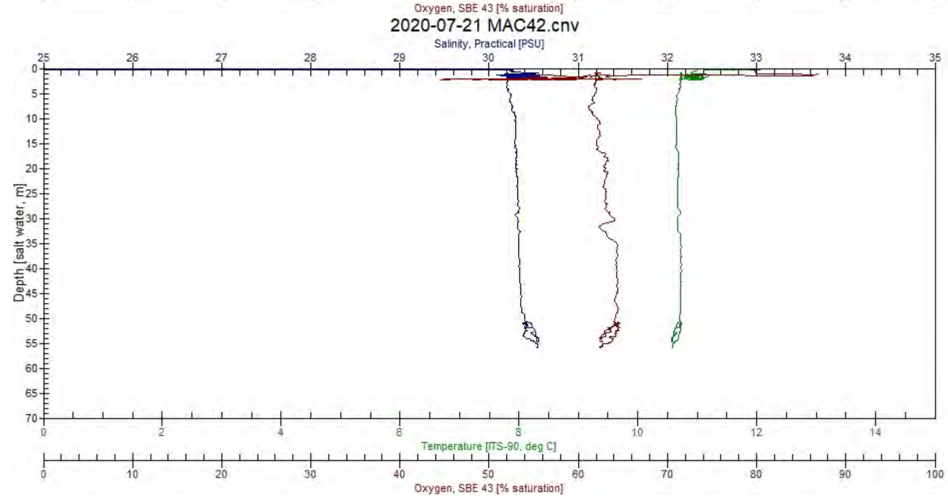

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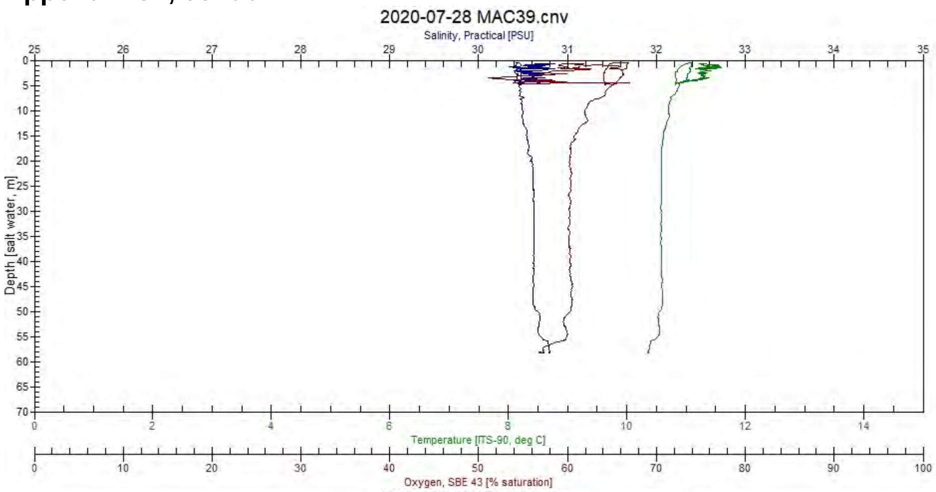

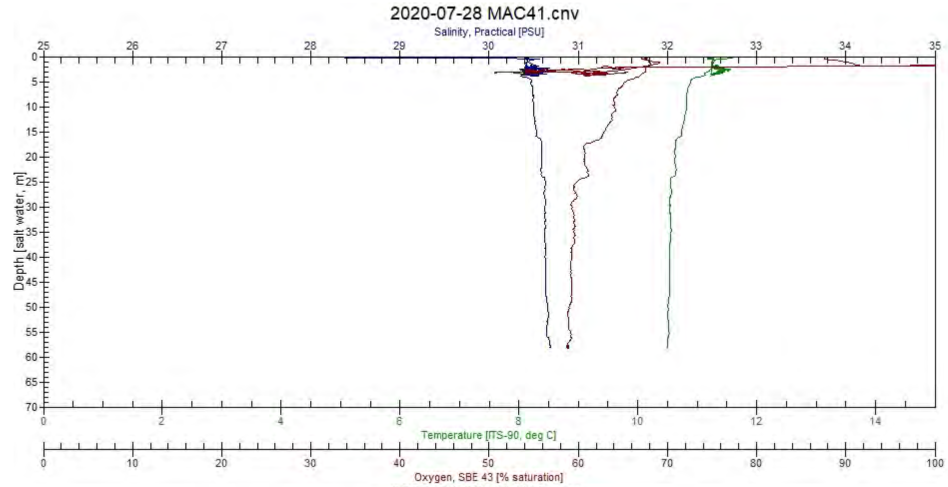

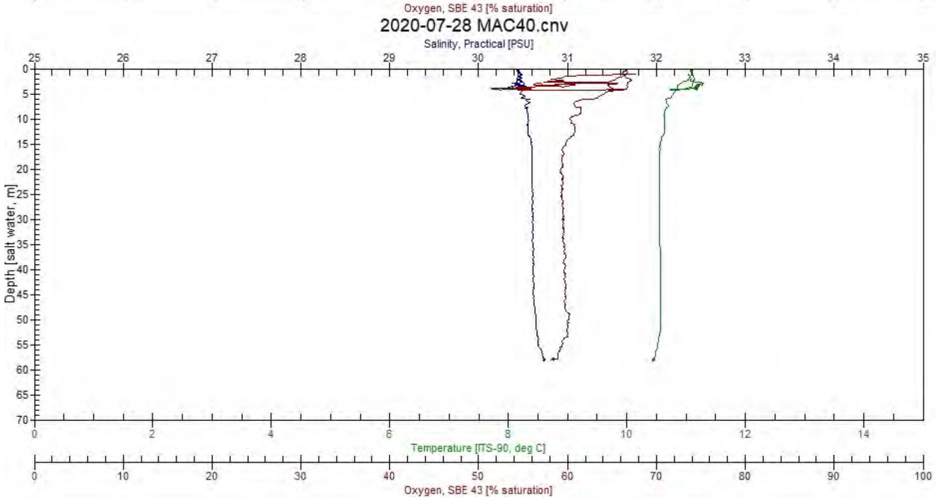

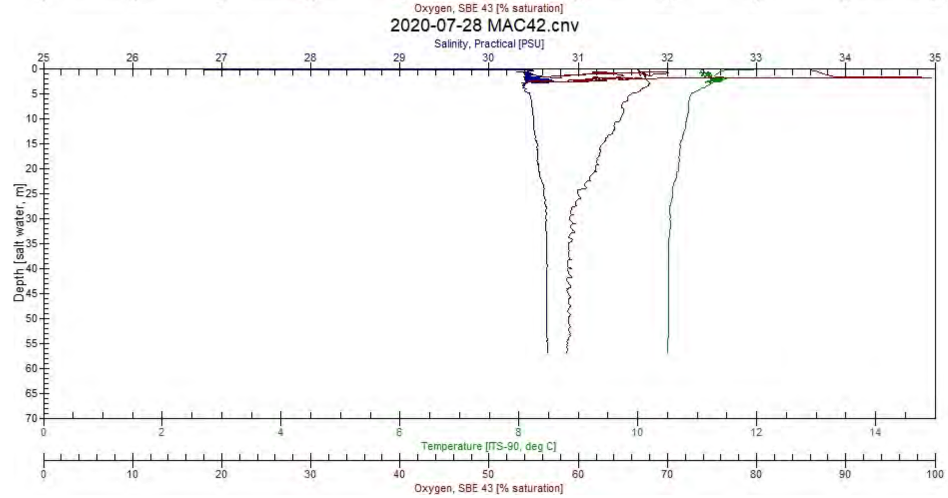

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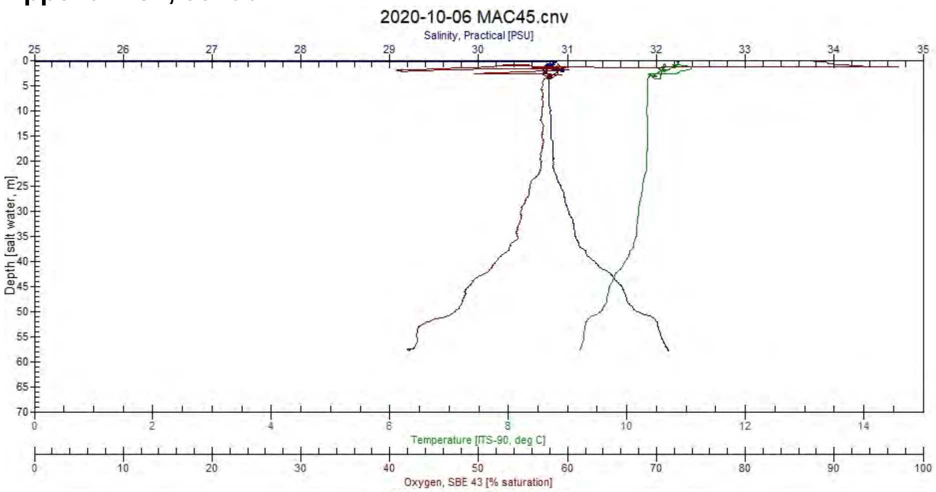

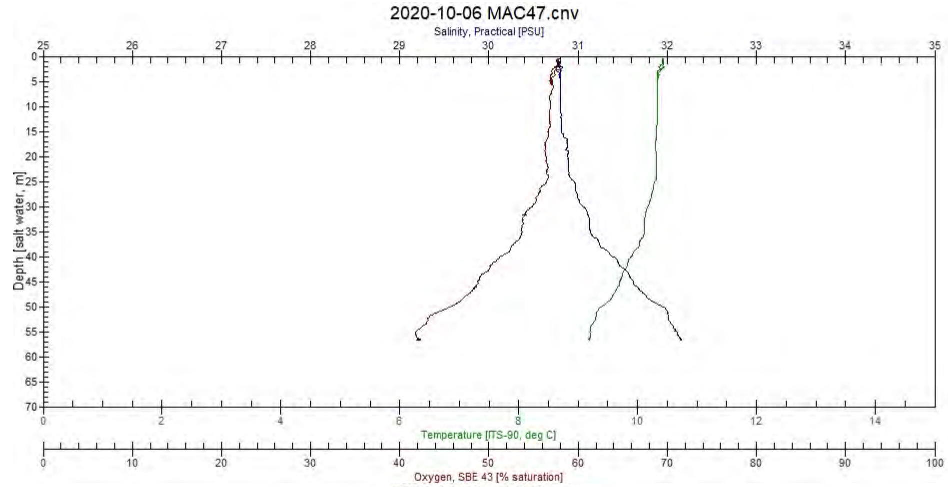

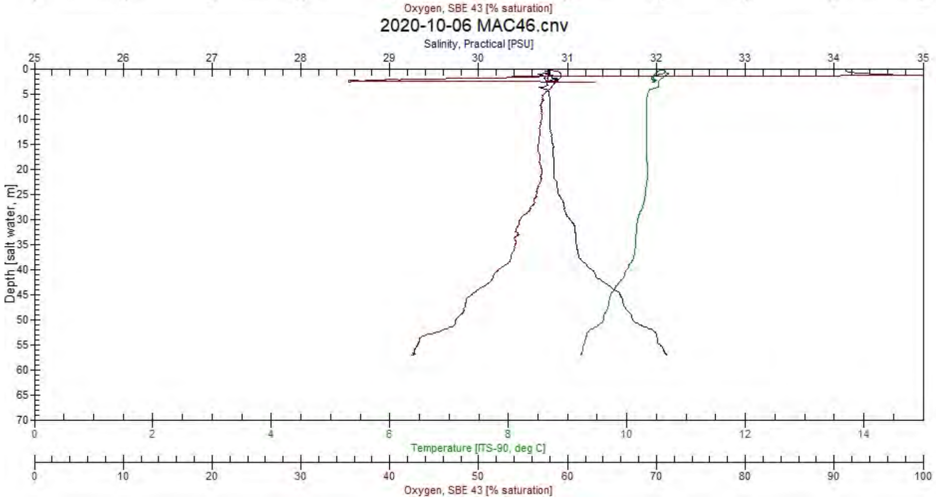

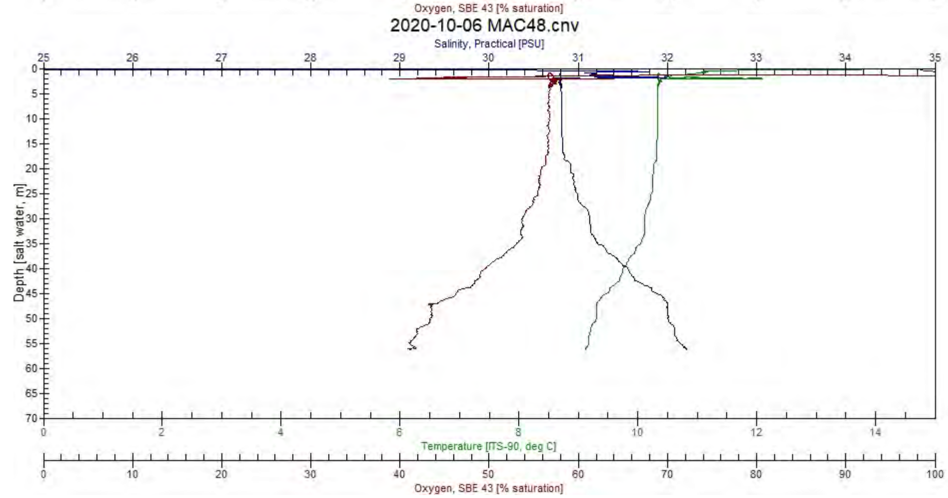

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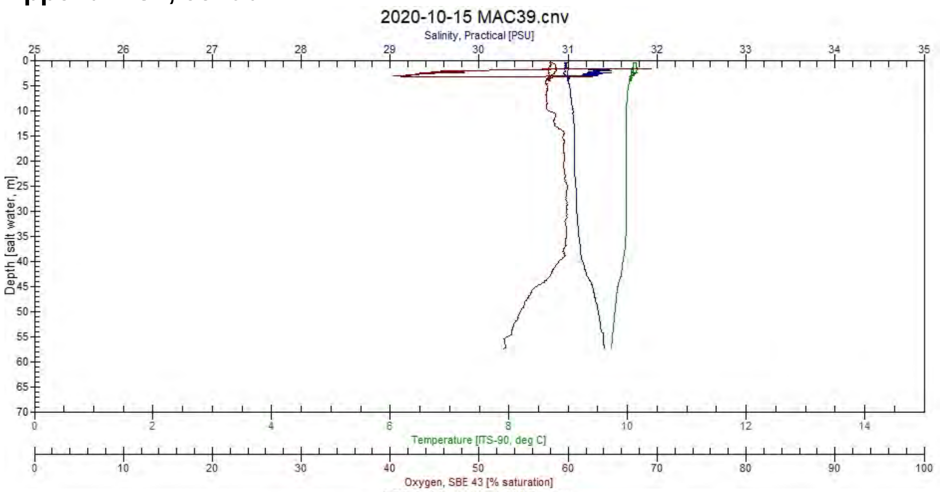

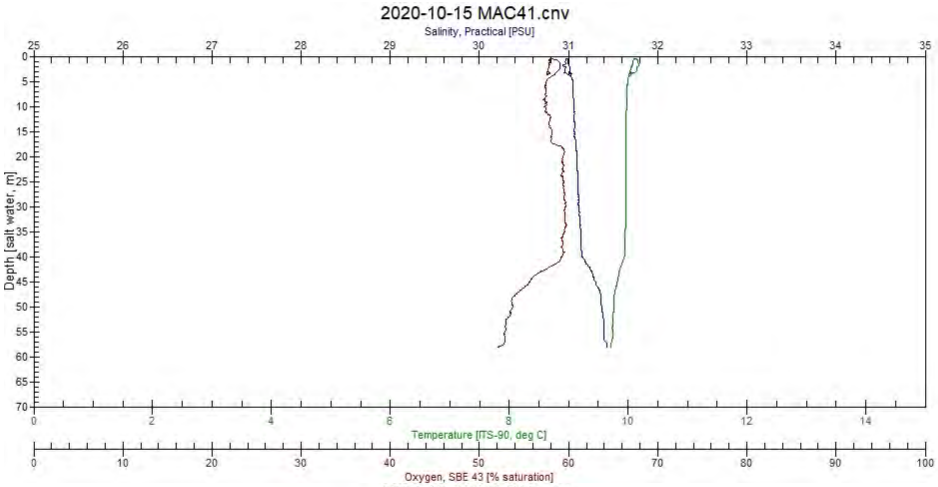

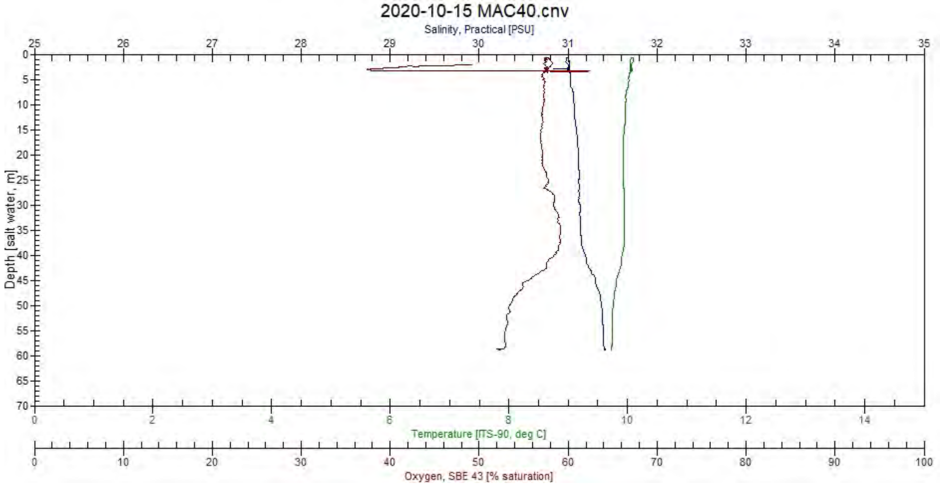

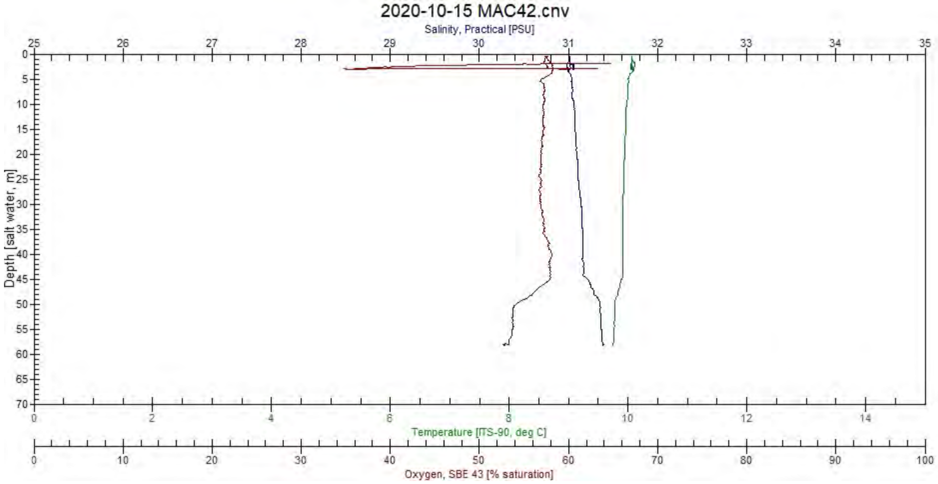

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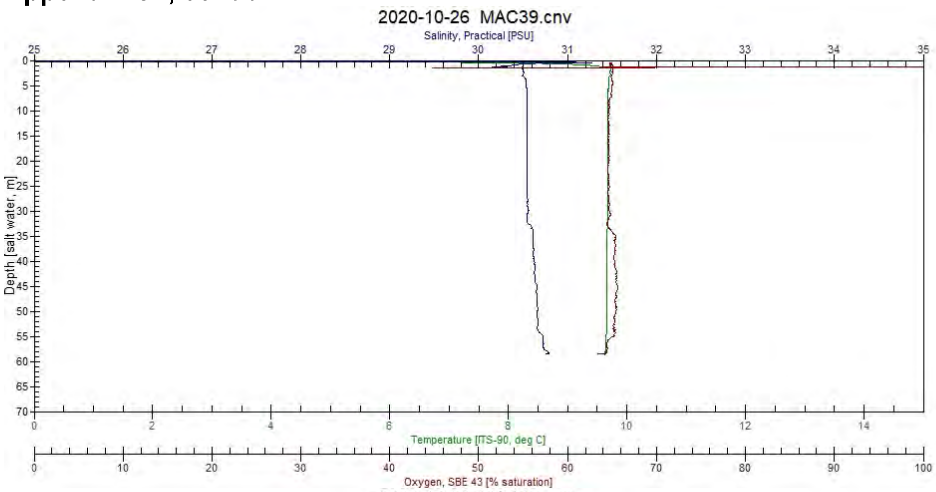

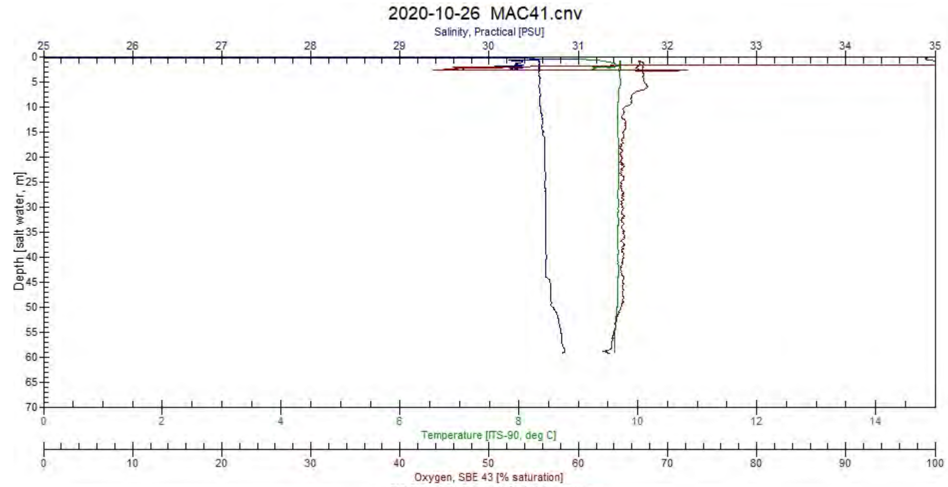

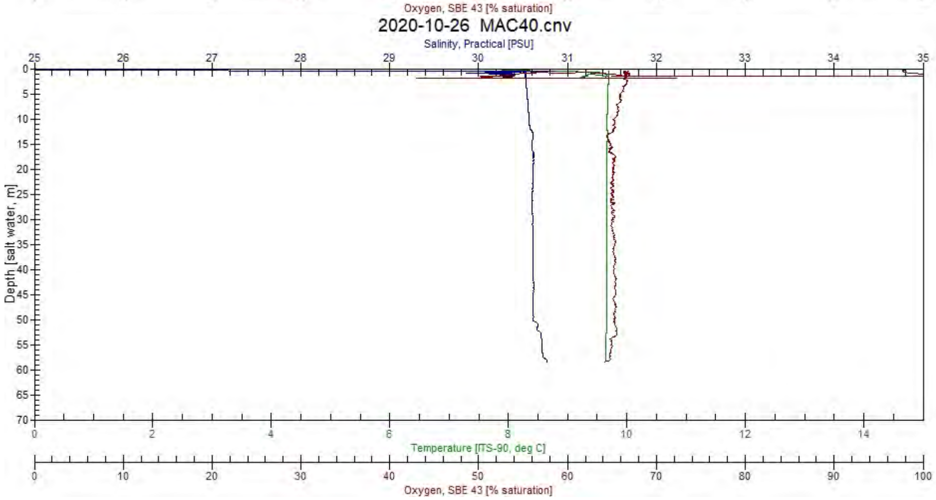

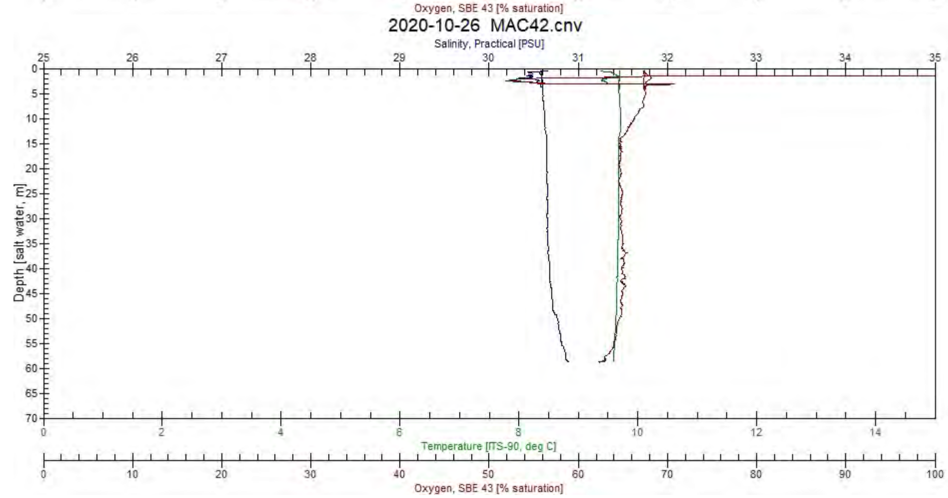

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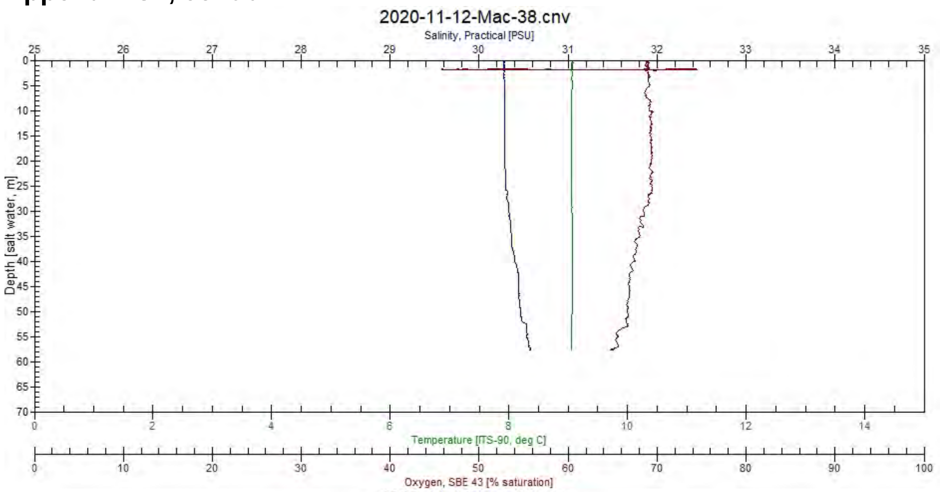

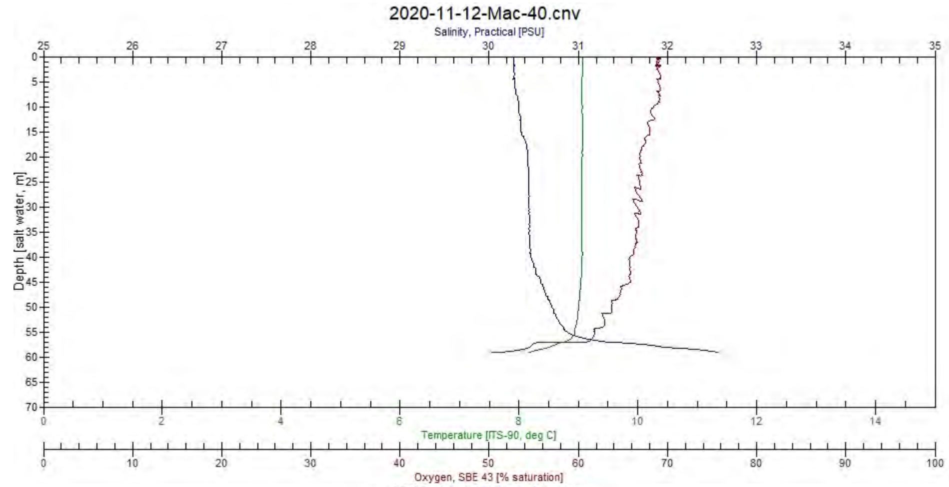

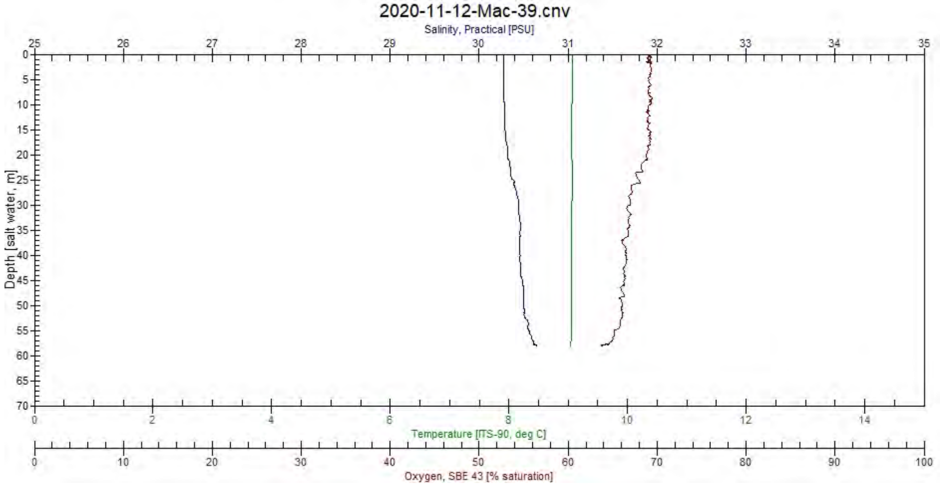

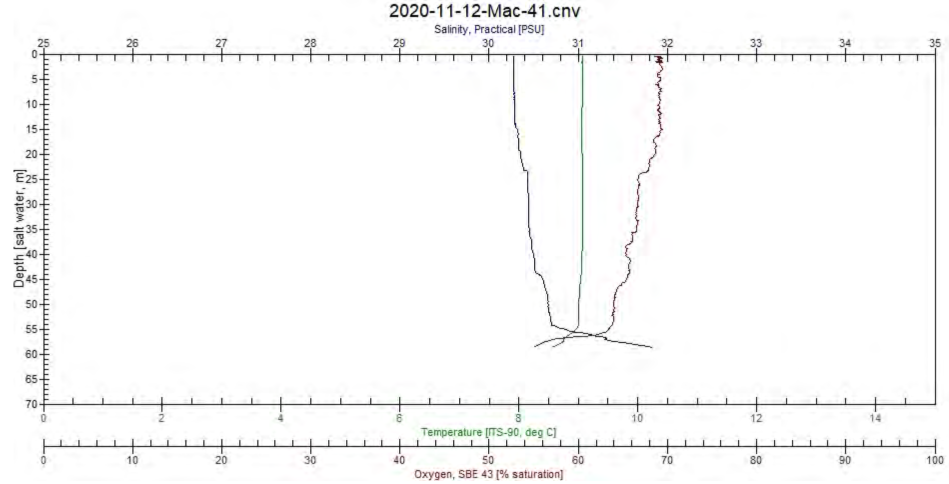

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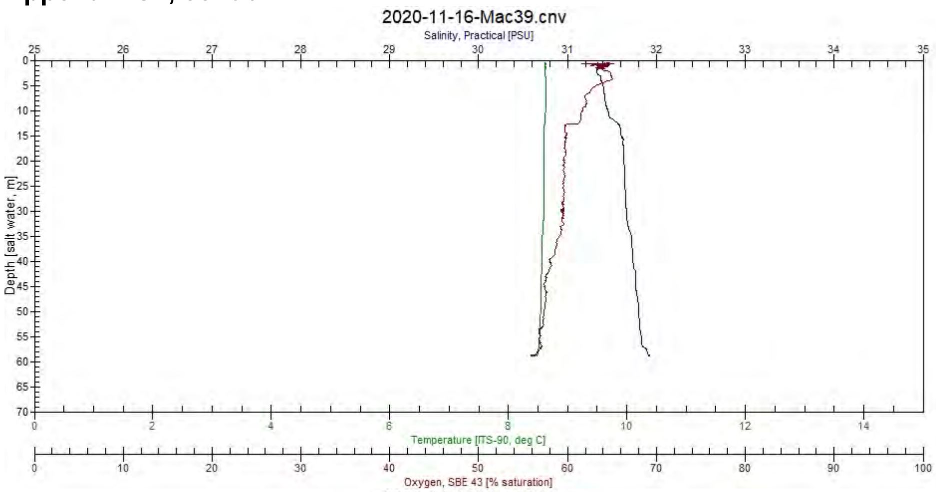

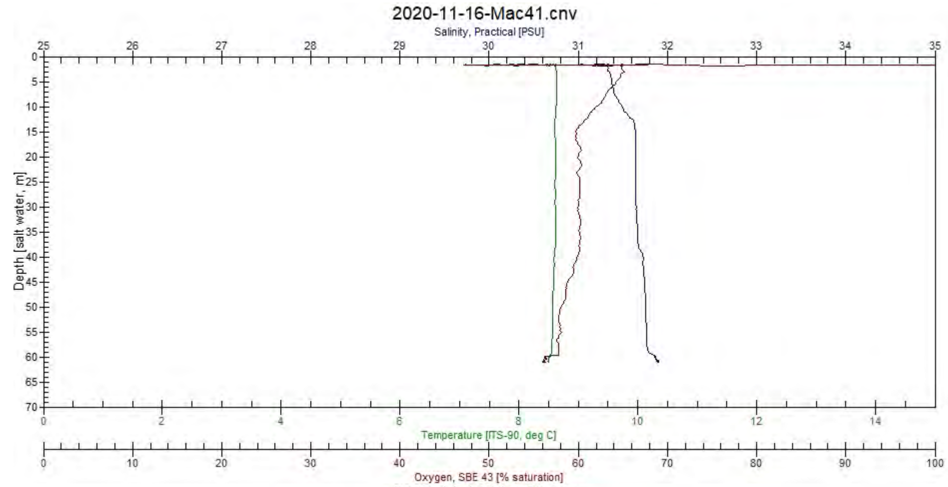

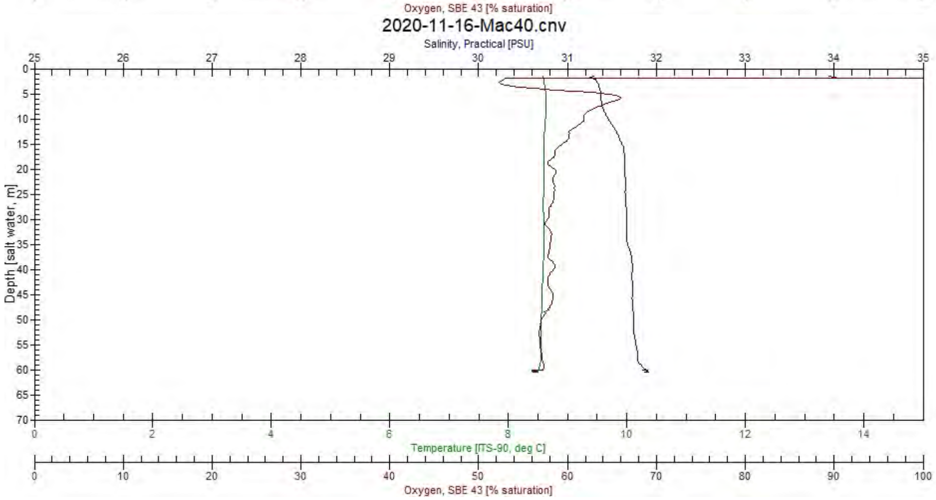

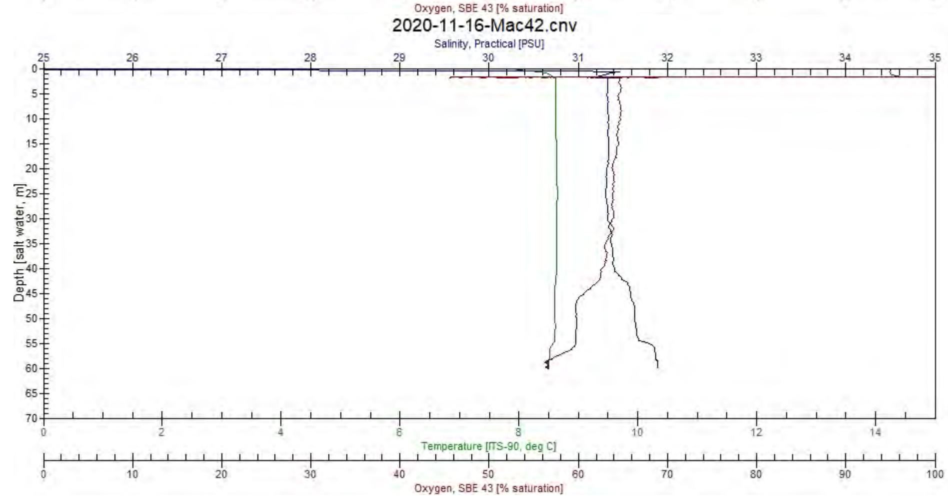

APPENDIX D
2020 SEAFLOOR MONITORING

Appendix D1	Sediment and Tissue Chemistry Parameter List
Appendix D2	Seafloor Stations Locations and Distance Groupings
Appendix D3	Tissue Chemistry
Appendix D4	Sediment Chemistry
Appendix D5	Mussel Physical Measurements
Appendix D6	Histology and Gonad Development Report (available upon request)
Appendix D7	Hatfield (2021) Macaulay and Clover Point Outfalls Wastewater and Marine Environment Program Comprehensive Review (2011-2019) (available upon request)

Appendix D1 Sediment and Tissue Chemistry Parameter List

Parameter	Mussel Tissue	Sediment
CONVENTIONAL PARAMETERS		
Moisture		√
Carbon		√
Carbon Nitrogen Ratio		√
Lipids	√	
Moisture (low - res.)	√	√
Total Nitrogen		√
Inorganic Nitrogen		√
Organic Carbon (C)		√
Particle Size		√
pH		√
Sulphide		√
Sulphur		√
Total Cyanide		√
METALS TOTAL		
Aluminum (Al)	√	√
Antimony (Sb)	√	√
Arsenic (As)	√	√
Barium (Ba)	√	√
Beryllium (Be)	√	√
Bismuth (Bi)	√	√
Cadmium (Cd)	√	√
Calcium (Ca)	√	√
Chromium (Cr)	√	√
Cobalt (Co)	√	√
Copper (Cu)	√	√
Iron (Fe)	√	√
Lead (Pb)	√	√
Lithium (Li)	√	√
Magnesium (Mg)	√	√
Manganese (Mn)	√	√
Mercury (Hg)	√	√
Mercury (Hg)	√	√
Molybdenum (Mo)	√	√
Nickel (Ni)	√	√
Phosphorus (P)	√	√
Potassium (K)	√	√
Selenium (Se)	√	√
Silver (Ag)	√	√
Sodium (Na)	√	√
Strontium (Sr)	√	√
Thallium (Tl)	√	√
Tin (Sn)	√	√
Titanium (Ti)	√	√
Vanadium (V)	√	√
Zinc (Zn)	√	√

Appendix D1, Sediment and Tissue Chemistry Parameter List, cont'd

Parameter	Mussel Tissue	Sediment
METALS EXTRACTABLE		√
Cadmium (Cd)		√
Copper (Cu)		√
Lead (Pb)		√
Mercury (Hg)		√
Nickel (Ni)		√
Sulphide		√
Zinc (Zn)		√
PHENOLIC COMPOUNDS		
Total Phenols		√
CHLORINATED PHENOLICS		
2,4 + 2,5-Dichlorophenol	√	√
2,4,6-trichlorophenol	√	√
2-chlorophenol	√	√
4-chloro-3-methylphenol	√	√
Pentachlorophenol	√	√
NON CHLORINATED PHENOLICS		
2,4-dimethylphenol		√
2,4-dinitrophenol		√
2-nitrophenol		√
4,6-dinitro-2-methylphenol		√
4-nitrophenol		√
Phenol		√
SEMIVOLATILE ORGANICS		
Bis(2-ethylhexyl)phthalate	√	√
Butyl benzyl 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	√	√
N-nitroso-di-n-propylamine	√	√
N-nitrosodiphenylamine	√	√

Appendix D1, Sediment and Tissue Chemistry Parameter List, cont'd

Parameter	Mussel Tissue	Sediment
VOLATILE ORGANICS		
Monocyclic Aromatic Hydrocarbons		
1,2-dichlorobenzene	√	√
1,3-dichlorobenzene	√	√
1,4-dichlorobenzene	√	√
Benzene	√	√
Chlorobenzene	√	√
Ethylbenzene	√	√
m & p-Xylene	√	√
o-Xylene	√	√
Styrene	√	√
Toluene	√	√
Xylenes (Total)	√	√
Aliphatic		
Acrylonitrile	√	√
Methyl-tert-buty lether (MTBE)	√	√
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-dibromoethane	√	√
1,2-dichloroethane	√	√
1,2-dichloropropane	√	√
2-Chloroethylvinyl ether	√	√
Bromomethane	√	√
Carbon tetrachloride	√	√
Chloroethane	√	√
Chloroform	√	√
Chloromethane	√	√
cis-1,2-dichloroethene	√	√
cis-1,3-dichloropropene	√	√
Dibromomethane	√	√
Dichloromethane	√	√
Tetrabromomethane	√	√
Tetrachloroethene	√	√
trans-1,2-dichloroethene	√	√
trans-1,3-dichloropropene	√	√
Trichloroethene	√	√
Trichlorofluoromethane	√	√
Vinyl chloride	√	√
Trihalomethanes		√
Bromodichloromethane	√	√
Bromoform	√	√
Chlorodibromomethane	√	√
Tribromomethane	√	√
trichlorofluoromethane	√	√

Appendix D1, Sediment and Tissue Chemistry Parameter List, cont'd

Parameter	Mussel Tissue	Sediment
Ketones		
4-Methyl-2-pentanone (MIBK)	√	√
Dimethyl ketone	√	√
Endrin ketone	√	√
Methyl ethyl ketone	√	√
TERPENES		
alpha-Terpineol	√	√
HIGH RESOLUTION ANALYSES		
NP	√*	√*
PAH	√*	√*
PBDE	√*	√*
PCB	√*	√*
PCDD	√*	√*
OC Pesticides	√*	√*
PFAS	√*	√*
PPCP	√*	√*

Notes:
√* Analyses were conducted at a higher resolution (i.e., at SGS AXYS Analytics)

Appendix D2 2020 Seafloor Stations Locations and Distance Groupings

Station	Latitude 48°	Longitude -123°	Distance Grouping*
Clover Point Outfall (C0)	23.66	20.76	Outfall
100 m East (C1E)	23.66	20.65	Near Field
200 m East (C2E)	23.66	20.59	Near Field
100 m West (C1W)	23.66	20.86	Far Field
100 m South West (C1SW)	23.61	20.84	Far Field
100 m South (C1S)	23.58	20.75	Far Field
200 m South (C2S)	23.54	20.75	Far Field
100 m South East (C1SE)	23.61	20.67	Far Field
100 m North East (C1NE)	23.76	20.67	Far Field
100 m North West (C1NW)	23.77	20.88	Far Field
Finnerty Cove (FC7000ESE)	29.15	14.84	Reference
Constance Bank #1 (CB1)	20.64	19.08	Reference
Constance Bank #2 (CB2)	20.69	18.99	Reference
Constance Bank #3 (CB3)	20.60	19.18	Reference

Notes: *Golder (2011)

Appendix D3 Tissue Chemistry

	Unit	DL	Reference				Outfall	Near Field		Far Field								
			Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
Conventionals																		
Lipids	%	0	0.6	0.2	0.4	0.4	0.9	1.1	1.1	0.8	1.1	0.6	1	0.6	0.7	0.8	0.7	0.7
Moisture	%	0.3	83	87	87	86	84	83	83	85	82	86	82	84	83	84	85	83
Metals																		
Aluminum	mg/kg	1.2	221	359	321	285	203	193	172	315	268	248	274	251	257	155	142	126
Antimony	mg/kg	0.0059	0.0244	0.0433	0.0422	0.0409	0.0273	0.0261	0.0232	0.0314	0.0342	0.0263	0.0607	0.0568	0.0322	0.027	0.0215	0.0478
Arsenic	mg/kg	0.024	15	18.8	18.7	16.4	14.4	13.3	12.5	14.4	14.1	15.1	14.8	13.7	13.3	13.1	13.8	12.5
Barium	mg/kg	0.059	2.73	4.22	5.03	4.25	3.82	3.23	2.1	3.43	3.23	3.07	2.66	3.96	3.61	2.87	2.32	2.18
Beryllium	mg/kg	0.0059	0.0253	0.0393	0.0509	0.0442	0.031	0.0239	0.0173	0.0328	0.029	0.0286	0.0235	0.0341	0.0314	0.0216	0.0207	0.0179
Bismuth	mg/kg	0.0059	0.0185	0.0338	0.0383	0.0324	0.0672	0.0614	0.0459	0.0499	0.0338	0.0349	0.0262	0.0485	0.0455	0.0255	0.0234	0.0216
Boron	mg/kg	1.2	27.9	36.1	38.7	35.4	29.5	26.7	26.1	32	28.3	33.4	28	32.8	28.6	30.4	31.3	29.3
Cadmium	mg/kg	0.0059	18.1	31.1	37	28.9	16.1	17.7	15.3	18	15.3	20.8	14	21.9	20.8	14.5	15.4	13.6
Calcium	mg/kg	12	4060	14700	7090	5430	22600	7730	4070	13300	3540	3580	2860	8960	3840	3550	9740	3050
Chromium	mg/kg	0.059	5.93	5.01	3.44	8.06	2.97	5.59	1.58	2.59	8.42	16.4	6.98	2.4	2.99	0.913	0.842	0.913
Cobalt	mg/kg	0.0074	1.4	2.02	2.21	1.79	1.42	1.08	0.853	1.2	1.18	1.24	1.17	1.28	1.34	0.945	0.95	0.895
Copper	mg/kg	0.059	45.9	51.9	74.1	59.6	49.5	84.6	76.7	72.9	48.8	53.2	49.8	63	65.8	49.7	50.4	50.4
Iron	mg/kg	1.5	643	2150	1420	1570	551	522	437	696	1010	730	716	1140	804	644	427	384
Lead	mg/kg	0.0059	3.73	6.43	9.06	7.35	10.9	11	5.77	7.91	5.65	5.73	4.01	8.3	7.91	4.25	3.71	3.44
Magnesium	mg/kg	2.4	4660	6800	7180	6490	4820	4240	4330	5300	4300	5960	4170	4940	4600	5260	5540	4950
Manganese	mg/kg	0.059	269	396	443	274	425	284	170	204	225	186	187	229	289	177	174	159
Mercury	mg/kg	0.012	0.309	0.751	0.871	0.656	0.333	0.258	0.24	0.287	0.288	0.38	0.336	0.342	0.298	0.222	0.234	0.201
Molybdenum	mg/kg	0.024	1.67	2.28	2.31	2.3	2.45	2.07	1.64	1.66	1.67	2.05	2.13	5.61	2.42	1.89	1.31	1.7
Nickel	mg/kg	0.059	12.1	20.2	21.6	21.3	12.4	10	6.15	9.76	13.5	17.1	13	12	11.4	7.37	7.22	6.97
Phosphorus	mg/kg	12	10800	9500	11000	10500	10500	13800	13700	14200	13600	14200	11000	13300	13200	11200	11600	10400
Potassium	mg/kg	12	12900	12300	13800	13200	12300	13600	13500	14400	13000	14600	12600	12600	13400	12900	13700	12200
Selenium	mg/kg	0.059	6.53	8.6	9	8.66	6.73	6.07	5.68	7.08	6.59	6.81	7.56	6.47	6.79	6.38	6.66	5.86
Silver	mg/kg	0.0059	1.43	3.15	1.76	1.76	6.25	2.06	2.57	5.55	3.78	2.32	1.46	5.92	1.99	3.04	3.81	3.6
Sodium	mg/kg	12	30900	49300	52200	46900	33400	27700	28700	35300	27500	41200	27100	33400	30300	36000	38500	35000
Strontium	mg/kg	0.059	57.4	119	96.1	80.6	141	78	52.7	88.9	46.4	54.9	38	85.5	53.7	50.5	91.1	43.3
Thallium	mg/kg	0.0024	0.0092	0.0158	0.026	0.0201	0.0128	0.0114	0.0115	0.0113	0.0134	0.0092	0.013	0.0594	0.0303	0.0238	0.0077	0.008
Tin	mg/kg	0.12	< 0.11	< 0.15	< 0.16	< 0.14	< 0.12	< 0.11	< 0.11	< 0.13	< 0.11	< 0.14	< 0.11	< 0.12	< 0.12	< 0.13	< 0.13	< 0.12
Titanium	mg/kg	0.12	10.1	16.7	15.3	12.8	9.95	8.64	8.72	13.6	13.1	11.1	13.2	13.2	8.07	7.73	6.7	6.44
Uranium	mg/kg	0.0024	0.328	0.419	0.534	0.489	0.253	0.213	0.205	0.334	0.501	0.252	1.07	1.13	0.474	0.494	0.298	1.1
Vanadium	mg/kg	0.12	2.64	5.6	6.17	5.85	2.79	2	1.51	2.74	4.27	2.72	6.47	8.37	3.63	3.02	1.95	4.38
Zinc	mg/kg	0.24	414	573	761	498	697	558	377	476	421	400	386	517	578	375	350	336
PHENOLICS																		
2-Chlorophenol	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
4-Chloro-3-Methylphenol	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Dimethyl Ketone	µg/g	1.5	4.6	1100	370	< 1.8	< 2	230	5.8	85	210	310	130	140	< 1.8	120	120	120
Isophorone	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Methyl Ethyl Ketone	µg/g	1.2	< 1.2	< 1.6	< 2	< 1.2	< 1.6	< 1.2	< 1.2	< 1.2	< 1.2	< 1.6	< 1.2	< 1.2	< 1.2	< 1.2	< 1.6	< 1.2
Methyl Isobutyl Ketone	µg/g	1.2	< 1.2	< 1.6	< 2	< 1.2	< 1.6	< 1.2	< 1.2	< 1.2	< 1.2	< 1.6	< 1.2	< 1.2	< 1.2	< 1.2	< 1.6	< 1.2
2,5-Dichlorophenol	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
2-Methyl-4,6-Dinitrophenol	µg/g	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
2-Nitrophenol	µg/g	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Nitrophenol	µg/g	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Phenol	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
SEMI VOLATILE ORGANICS																		
Bis(2-Ethylhexyl)Phthalate	µg/g	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Butylbenzyl Phthalate	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
Di-N-Butyl Phthalate	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
Di-N-Octyl Phthalate	µg/g	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Diethyl Phthalate	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
Dimethyl Phthalate	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4

Appendix D3, Tissue Chemistry, cont'd

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
MISCELLANEOUS SEMIVOLATILE ORGANICS	µg/g	DL																
4-Bromophenyl Phenyl Ether	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
4-Chlorophenyl Phenyl Ether	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Bis(2-Chloroethoxy)Methane	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Bis(2-Chloroethyl)Ether	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
Bis(2-Chloroisopropyl)Ether	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
N-Nitrosodi-N-Propylamine	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Nitrobenzene	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2,4-trichlorobenzene	ng/g	0.144	0.5	0.893	0.571	0.499	0.49	0.58	0.424	0.603	0.45	---	0.697	---	3.15	0.679	0.457	0.317
2,4-dinitrotoluene	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
2,6-dinitrotoluene	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
3,3-dichlorobenzidine	µg/g	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Hexachlorobenzene	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
Hexachlorobutadiene	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Hexachlorocyclopentadiene	µg/g	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Hexachloroethane	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Nitrosodiphenylamine/Diphenylamine	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
VOLATILE ORGANICS	µg/g																	
1,1,1,2-Tetrachloroethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,1,1-trichloroethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,1,2,2-tetrachloroethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,1,2-trichloroethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,1-dichloroethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,1-Dichloroethylene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,2,3,4-Tetrachlorobenzene	ng/g	0.144	< 0.151	< 0.184	< 0.174	< 0.168	< 0.128	< 0.125	< 0.123	< 0.136	< 0.119	< 0.144	< 0.146	< 0.131	< 0.124	< 0.144	< 0.142	< 0.144
1,2,3-Trichlorobenzene	ng/g	0.144	< 0.151	< 0.184	< 0.174	< 0.168	< 0.128	< 0.125	< 0.123	< 0.136	< 0.119	---	< 0.146	---	1.36	< 0.144	< 0.142	< 0.144
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	ng/g	0.144	< 0.151	< 0.184	< 0.174	< 0.168	< 0.128	< 0.125	< 0.123	< 0.136	< 0.119	< 0.144	< 0.146	< 0.131	< 0.124	< 0.144	< 0.142	< 0.144
1,2,4-trichlorobenzene	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
1,2-dichlorobenzene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,2-dichloroethane	µg/g	0.15	< 0.15	< 0.2	< 0.25	< 0.15	< 0.2	< 0.15	< 0.15	< 0.15	< 0.15	< 0.2	< 0.15	< 0.15	< 0.15	< 0.15	< 0.2	< 0.15
1,2-dichloropropane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,3,5-Trichlorobenzene	ng/g	0.144	< 0.151	< 0.184	< 0.174	< 0.168	< 0.128	< 0.125	< 0.123	< 0.136	< 0.119	---	< 0.146	---	< 0.124	< 0.144	< 0.142	< 0.144
1,3-dichlorobenzene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,4-dichlorobenzene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
1,7-Dimethylxanthine	ng/g	139	---	< 196	---	---	< 139	---	---	----	----	---	---	------	---	------	------	------
2,3,5-trimethylnaphthalene	ng/g	0.111	0.514	1.23	0.939	0.995	0.664	0.583	0.469	0.806	0.734	0.597	1.14	0.666	0.605	0.546	0.578	0.482
2,4,6-trichlorophenol	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
2,4-dichlorophenol	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
2,4-dimethylphenol	µg/g	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
2,4-dinitrophenol	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
2,6-dimethylnaphthalene	ng/g	0.23	0.861	1.6	1.13	1.41	0.91	0.728	0.632	1.25	0.934	0.908	1.29	0.889	0.798	0.88	0.759	0.73
Bromodichloromethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Bromomethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Chlorobenzene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Chlorodibromomethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Chloroethane	µg/g	0.6	< 0.6	< 0.8	< 1	< 0.6	< 0.8	< 0.6	< 0.6	< 0.6	< 0.6	< 0.8	< 0.6	< 0.6	< 0.6	< 0.6	< 0.8	< 0.6
Chloroethene	µg/g	0.057	< 0.057	< 0.076	< 0.095	< 0.057	< 0.076	< 0.057	< 0.057	< 0.057	< 0.057	< 0.076	< 0.057	< 0.057	< 0.057	< 0.057	< 0.076	< 0.057
Chloromethane	µg/g	1.2	< 1.2	< 1.6	< 2	< 1.2	< 1.6	< 1.2	< 1.2	< 1.2	< 1.2	< 1.6	< 1.2	< 1.2	< 1.2	< 1.2	< 1.6	< 1.2
Cis-1,2-Dichloroethene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
cis-1,3-dichloropropene	µg/g	0.09	< 0.09	< 0.12	< 0.15	< 0.09	< 0.12	< 0.09	< 0.09	< 0.09	< 0.09	< 0.12	< 0.09	< 0.09	< 0.09	< 0.09	< 0.12	< 0.09
Cis-Nonachlor	ng/g	0.0288	0.055	0.056	0.045	0.05	0.061	0.075	0.075	0.055	0.067	0.07	0.081	0.048	0.059	0.069	0.058	0.073
Delta-Hch Or Delta-Bhc	ng/g	0.313	< 0.143	< 0.197	< 0.209	< 0.151	< 0.161	< 0.156	< 0.14	< 0.163	< 0.178	< 0.256	< 0.181	< 0.24	< 0.16	< 0.204	< 0.28	< 0.313
Dichloromethane	µg/g	0.15	< 0.15	< 0.2	< 0.25	< 0.15	< 0.2	< 0.15	< 0.15	< 0.15	< 0.15	< 0.2	< 0.15	< 0.15	< 0.15	< 0.15	< 0.2	< 0.15
Dieldrin	ng/g	0.0719	0.257	0.254	0.195	0.171	0.273	0.408	0.338	0.254	0.328	0.281	0.282	0.137	0.184	0.226	0.208	0.233
Endosulfan Sulfate	ng/g	0.354	< 0.175	< 0.128	< 0.16	< 0.148	< 0.245	< 0.132	< 0.168	< 0.198	0.15	< 0.389	< 0.148	< 0.214	< 0.246	< 0.222	< 0.33	< 0.354
Endrin	ng/g	0.0719	< 0.0755	< 0.0919	< 0.087	< 0.0839	0.126	0.075	0.073	< 0.0679	0.111	0.125	0.09	0.155	0.094	0.084	< 0.0786	0.127
Endrin Aldehyde	ng/g	0.811	< 0.489	< 0.404	< 0.468	< 0.481	< 1.25	0.578	< 0.391	< 1.24	< 0.94	< 0.457	< 0.842	< 0.824	< 0.766	0.158	< 3.11	< 0.811

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
Endrin Ketone	ng/g	0.191	< 0.11	< 0.157	< 0.149	< 0.106	< 0.176	< 0.13	< 0.105	< 0.192	< 0.171	< 0.229	< 0.18	< 0.206	< 0.125	< 0.201	< 0.283	< 0.191
Ethylene Dibromide	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Hch, Gamma	ng/g	0.0288	0.074	0.063	0.061	0.06	0.069	0.075	0.076	0.059	0.067	0.079	0.085	0.057	0.079	0.077	0.081	0.077
Heptachlor	ng/g	0.0288	< 0.0302	< 0.0368	< 0.0348	< 0.0336	< 0.0256	0.026	0.032	0.039	0.026	< 0.0288	< 0.0293	< 0.0262	< 0.0248	< 0.0289	< 0.0284	< 0.0288
Heptachlor Epoxide	ng/g	0.0719	0.094	< 0.0919	0.153	< 0.0839	0.093	< 0.0627	< 0.0613	< 0.0679	< 0.0603	0.119	< 0.0732	0.075	< 0.062	0.092	0.089	< 0.0719
Methoxyclor	ng/g	0.967	< 0.743	< 0.844	< 0.633	< 0.493	< 0.477	< 0.963	< 0.634	< 0.998	< 0.897	< 1.3	< 0.704	< 1.14	< 0.422	< 1.48	< 2.06	< 0.967
Methyl Tertiary Butyl Ether	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Octachlorostyrene	ng/g	0.0288	< 0.0302	< 0.0368	< 0.0348	< 0.0336	< 0.0256	< 0.0251	< 0.0245	0.006	< 0.0238	< 0.0288	< 0.0293	0.004	< 0.0248	< 0.0289	< 0.0284	< 0.0288
Oxy-Chlordane	ng/g	0.0288	0.055	0.049	0.056	0.048	0.067	0.071	0.07	0.05	0.066	0.049	0.064	0.05	0.037	0.052	0.057	0.047
Pentachlorobenzene	ng/g	0.0144	0.101	0.132	0.107	0.111	0.11	0.132	0.12	0.126	0.111	0.187	0.128	0.156	0.118	0.152	0.108	0.097
Pentachlorophenol	µg/g	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
Tetrachloroethene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Tetrachloromethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Trans-1,2-Dichloroethene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
trans-1,3-dichloropropene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Trans-Chlordane	ng/g	0.0288	0.108	0.154	0.2	0.186	0.237	0.227	0.18	0.134	0.191	0.163	0.129	0.138	0.208	0.14	0.15	0.15
Trans-Nonachlor	ng/g	0.0288	0.321	0.411	0.537	0.457	0.43	0.384	0.339	0.294	0.456	0.422	0.326	0.276	0.435	0.342	0.38	0.381
Tribromomethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Trichloroethene	µg/g	0.03	< 0.03	< 0.04	< 0.05	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03
Trichlorofluoromethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Trichloromethane	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
BTEX																		
O-Xylene	µg/g	0.06	< 0.06	< 0.08	< 0.1	< 0.06	< 0.08	< 0.06	< 0.06	< 0.06	< 0.06	< 0.08	< 0.06	< 0.06	< 0.06	< 0.06	< 0.08	< 0.06
Styrene	µg/g	0.12	< 0.12	< 0.16	< 0.2	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12	< 0.12	< 0.12	< 0.12	< 0.16	< 0.12
Toluene	µg/g	0.06	< 0.06	0.25	0.26	0.066	< 0.08	0.064	< 0.06	0.06	0.1	0.15	0.14	0.088	< 0.06	0.075	0.096	0.088
Xylenes	µg/g	0.06	< 0.06	< 0.08	< 0.1	< 0.06	< 0.08	< 0.06	< 0.06	< 0.06	< 0.06	< 0.08	< 0.06	< 0.06	< 0.06	< 0.06	< 0.08	< 0.06
Benzene	µg/g	0.018	0.056	0.079	0.099	0.099	0.077	0.084	0.056	0.083	0.056	0.081	0.093	0.04	0.067	0.09	0.063	0.1
Ethylbenzene	µg/g	0.03	< 0.03	< 0.04	< 0.05	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03
M & P Xylenes	µg/g	0.06	< 0.06	< 0.08	< 0.1	< 0.06	< 0.08	< 0.06	< 0.06	< 0.06	< 0.06	< 0.08	< 0.06	< 0.06	< 0.06	< 0.06	< 0.08	< 0.06
ORGANOCHLORINE PESTICIDES																		
Mirex	ng/g	0.0288	< 0.0302	< 0.0368	< 0.0348	< 0.0336	< 0.0256	< 0.0251	< 0.0245	< 0.0272	< 0.0238	< 0.0288	< 0.0293	< 0.0262	< 0.0248	< 0.0289	< 0.0284	< 0.0288
2,4-DDD	ng/g	0.0288	0.05	0.049	< 0.0522	0.053	0.304	0.44	0.287	0.13	0.289	0.124	0.228	0.087	0.193	0.14	0.143	0.15
2,4-DDE	ng/g	0.0288	< 0.0302	< 0.0368	< 0.0348	< 0.0336	0.029	0.032	0.035	< 0.0272	0.029	0.03	0.038	< 0.0262	0.025	< 0.0289	0.029	0.029
2,4-DDT	ng/g	0.0424	< 0.0498	< 0.0551	< 0.0778	< 0.0597	< 0.0665	< 0.0871	< 0.0604	< 0.0908	< 0.07	< 0.152	< 0.0499	< 0.0837	< 0.0456	0.03	0.038	< 0.0424
4,4-DDE	ng/g	0.0288	0.923	0.885	0.744	0.804	0.944	1.09	1.08	0.77	1.05	0.965	1.35	0.666	0.746	0.868	0.972	0.925
4,4-DDT	ng/g	0.0538	< 0.063	< 0.0697	< 0.102	< 0.0727	< 0.0817	0.152	0.132	< 0.118	< 0.0814	< 0.176	0.09	< 0.102	0.072	0.064	0.074	0.083
4,4-DDD	ng/g	0.0438	0.146	0.13	0.1	0.126	0.161	0.201	0.193	0.121	0.153	< 0.158	0.214	0.1	0.131	0.156	0.163	0.169
Aldrin	ng/g	0.0288	< 0.0302	< 0.0368	< 0.0348	< 0.0336	< 0.0256	< 0.0251	< 0.0245	< 0.0272	< 0.0238	< 0.0288	< 0.0293	< 0.0262	< 0.0248	< 0.0289	< 0.0284	< 0.0288
Alpha Chlordane	ng/g	0.0288	0.145	0.127	0.125	0.132	0.193	0.229	0.21	0.151	0.184	0.169	0.21	0.117	0.135	0.149	0.162	0.153
Alpha-Endosulfan	ng/g	0.193	< 0.101	< 0.101	0.154	0.119	< 0.139	0.212	0.16	< 0.121	< 0.133	< 0.229	0.107	0.142	0.216	0.11	< 0.182	< 0.193
Alpha-Hch Or Alpha-Bhc	ng/g	0.0288	0.277	0.267	0.23	0.253	0.336	0.304	0.328	0.301	0.309	0.295	0.334	0.278	0.277	0.326	0.305	0.284
Beta-Endosulfan	ng/g	0.431	< 0.212	0.305	0.793	0.21	< 0.298	0.394	< 0.204	0.482	< 0.181	< 0.473	0.254	< 0.26	0.525	< 0.269	< 0.4	< 0.431
Beta-Hch Or Beta-Bhc	ng/g	0.0288	0.292	0.203	0.184	0.202	0.265	0.319	0.308	0.24	0.274	0.26	0.352	0.194	0.217	0.253	0.288	0.275
High Resolution Analysis																		
PAHs																		
1-Methylphenanthrene	ng/g	0.129	0.443	0.803	0.66	0.783	0.781	0.601	0.576	0.729	0.599	0.558	0.809	0.525	0.533	0.524	0.507	0.458
2-Methylnaphthalene	ng/g	0.0875	1.22	2.35	1.8	2.5	1.51	1.26	1.06	2.28	1.37	1.6	2.11	1.38	1.36	1.44	1.28	1.18
Acenaphthene	ng/g	0.11	0.273	< 0.563	< 0.317	0.238	0.457	0.44	0.307	0.361	0.33	0.262	0.328	0.271	0.29	< 0.305	0.334	0.29
Acenaphthylene	ng/g	0.0639	0.129	0.273	0.181	0.172	0.19	0.167	0.164	0.199	0.172	0.218	0.211	0.15	0.15	0.231	0.176	0.141
Anthracene	ng/g	0.0306	0.159	0.182	0.239	0.227	0.895	0.567	0.6	0.342	0.28	0.202	0.267	0.256	0.381	0.204	0.277	0.259
Benzo(A)Anthracene	ng/g	0.0435	0.62	0.598	0.897	0.67	2.09	1.7	1.26	1.29	0.881	0.997	0.914	0.887	1.65	0.971	1.12	1.13
Benzo(A)Pyrene	ng/g	0.134	0.448	0.477	0.566	0.413	1.18	0.925	0.651	0.775	0.464	0.704	0.707	0.454	1.56	0.588	0.613	0.657
Benzo(B)Fluoranthene	ng/g	0.0848	1.1	1.22	1.24	1.13	1.83	1.73	1.4	1.46	1.41	1.47	1.44	1.14	1.96	1.46	1.4	1.4
Benzo(E)Pyrene	ng/g	0.127	0.557	0.854	0.623	0.687	1.49	1.27	0.893	1	0.776	0.922	0.911	0.776	1.37	0.793	0.718	0.855
Benzo(G,H,I)Perylene	ng/g	0.111	0.562	0.735	0.768	0.582	1.1	0.666	0.554	0.648	0.561	0.597	0.64	0.497	1.4	0.505	0.54	0.473
Benzo[J,K]Fluoranthenes	ng/g	0.0939	1.06	0.958	1.26	0.974	1.56	1.51	1.06	1.16	0.979	1.12	1.13	0.956	1.82	1.31	1.33	1.44
Chrysene	ng/g	0.0458	1.55	2.1	2.15	1.92	3.16	2.88	2.38	2.34	2	1.9	2.23	1.82	2.97	1.92	1.98	2.06

Appendix D3, Tissue Chemistry, cont'd

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
Dibenzo(A,H)Anthracene	ng/g	0.161	0.0994	0.166	0.132	0.143	0.206	< 0.13	< 0.134	0.169	0.104	0.145	0.107	< 0.161	0.23	< 0.145	0.114	< 0.161
Dibenzothiophene	ng/g	0.0597	0.161	0.333	0.233	0.246	0.39	0.282	0.201	0.263	0.249	0.224	0.252	0.205	0.246	0.205	0.219	0.206
Fluoranthene	ng/g	0.0556	2.26	2.56	3.13	2.18	4.73	3.9	2.63	2.97	2.7	2.76	2.96	2.51	3.48	2.93	3	3.09
Fluorene	ng/g	0.0708	0.403	0.436	0.384	0.476	0.509	0.387	0.33	0.535	0.429	0.347	0.423	0.464	0.435	0.337	0.352	0.371
Indeno(1,2,3-C,D)Pyrene	ng/g	0.119	0.404	0.635	0.613	0.442	0.709	0.47	0.456	0.575	0.418	0.462	0.521	0.425	1.17	0.351	0.487	0.454
Naphthalene	ng/g	0.124	2.14	3.69	2.76	3.04	2.92	2.1	1.95	3.3	2.25	2.37	2.8	2.64	2.29	2.7	2.42	2.39
Perylene	ng/g	0.138	1.85	2.7	2.47	2.12	2.28	2.06	1.85	2.1	2.23	1.77	2.7	1.76	2.32	1.95	1.98	2.16
Phenanthrene	ng/g	0.0304	4.41	5.7	5.1	4.92	7.8	6.67	4.83	6.02	5.09	4.69	5	5	5.83	5.05	5.17	5.2
Pyrene	ng/g	0.054	1.32	1.04	3.18	0.82	2.46	1.87	1.02	1.28	0.948	1.4	1.22	0.871	2.18	1.15	1.14	1.16
PBDEs																		
Pbde 10	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	< 0.815	< 0.725	< 0.778	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 100	pg/g	1.37	119	88.6	77.9	86	613	1870	1420	707	507	394	466	375	657	404	428	433
Pbde 105	pg/g	4.07	< 2.36	< 1.65	< 2.22	< 2.23	< 9.31	< 6.16	< 3.47	< 11.2	< 6.31	< 5.14	< 8.12	< 3.65	< 9.51	< 3.98	< 5.83	< 4.07
Pbde 116	pg/g	5.11	< 3.02	< 2.12	< 2.84	< 2.86	< 11.5	< 7.62	< 4.29	< 14	< 7.92	< 6.36	< 10.2	< 4.58	< 11.9	< 5	< 7.32	< 5.11
Pbde 119/120	pg/g	3.3	2.38	2.02	< 1.81	2.27	8.77	25.8	20.9	12	6.47	5.81	7.01	7.28	< 7.72	9.36	8.85	7.96
Pbde 12/13	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	< 0.815	< 0.725	< 0.778	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 126	pg/g	2.45	< 1.33	< 1.17	< 1.28	< 1.26	< 5.14	4.12	3.33	< 6.54	< 3.92	< 3.06	< 5.01	< 2.21	< 4.62	< 2.33	< 3.57	< 2.45
Pbde 128	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	1.1	< 1.49	3.11	< 1.1	1.82	< 1.35	< 2.55	< 1.69	< 3.49	1.39	< 2.93	1.36
Pbde 138/166	pg/g	0.897	1.72	< 1.17	1.33	1.32	8.85	29.3	23.4	13	8.89	6.29	7.63	6.76	11.1	7.69	7.35	8.29
Pbde 140	pg/g	0.897	1.56	< 1.17	1.39	1.15	6.1	14.9	12	6.88	4.96	5.16	4.48	3.9	5.77	4.14	5.04	5.31
Pbde 15	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	1.33	2.79	2.15	1.19	0.914	< 0.932	< 0.927	< 0.83	1.12	< 0.913	0.953	< 0.897
Pbde 153	pg/g	0.897	34.9	27.4	24.4	25.6	194	528	414	252	185	128	156	136	210	148	164	155
Pbde 154	pg/g	0.897	41.9	35.5	26.8	30.8	173	453	362	216	168	125	148	126	195	138	143	145
Pbde 155	pg/g	0.897	11.3	10.3	9.45	9.73	21.1	45.6	38	23.3	22.6	18.5	21.4	16.8	23.4	17.9	20.6	19.8
Pbde 17/25	pg/g	0.897	10.3	9.09	8.88	9.92	24.4	37.1	31.8	18.9	17.1	15.6	16.1	14.8	17.7	16.5	18.5	18.4
Pbde 181	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	< 0.815	< 0.725	< 0.778	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 183	pg/g	0.897	6.41	1.79	1.28	1.33	1.51	3.54	6.69	2.32	3.05	2.21	2.08	1.22	4.99	1.64	2.09	2.43
Pbde 190	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	< 0.815	0.926	< 0.798	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 203	pg/g	0.897	7.78	6.32	2.33	3.55	12.5	20.1	16.8	15.5	8.16	10.7	8.92	8.88	11.9	7.89	7.02	9.77
Pbde 206	pg/g	0.897	33.1	32.7	9.77	24.6	32.2	61.7	49	37.6	19	40.6	28.4	27.6	38.9	24.4	25	30.4
Pbde 207	pg/g	0.897	44.2	55.6	21.2	15.5	43.2	61.2	69.3	48.8	35.4	63.8	43.5	29.6	54	32.5	43.5	58.4
Pbde 208	pg/g	0.897	28.2	41.4	8.39	19.3	55.9	104	96	61	33.9	49.9	38	43.4	67.3	33.4	28.5	46.7
Pbde 209	pg/g	7.64	445	275	188	207	384	458	459	432	224	437	402	326	370	249	323	472
Pbde 28/33	pg/g	0.897	24.2	22.8	19.7	17.2	66.6	164	128	81.5	54.1	39.7	43.4	51	77.2	41.3	44.5	44.3
Pbde 30	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	< 0.815	< 0.725	< 0.778	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 32	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	< 0.815	< 0.725	< 0.778	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 35	pg/g	0.897	1.16	1.4	< 1.11	< 1.06	1.79	3.23	3	1.55	1.55	1.51	< 0.927	1.49	1.59	2.21	2.02	2.09
Pbde 37	pg/g	0.897	1.62	2.36	2.88	2.18	1.74	2.61	2.6	2.87	2.06	1.33	2.01	1.87	2.49	2.43	2.6	2.59
Pbde 47	pg/g	0.897	678	652	574	512	4310	11000	8760	5400	3250	2250	2180	3140	5130	2210	2370	2340
Pbde 49	pg/g	0.897	30.5	22.6	18.8	19.6	66.2	148	120	68.5	66	50.7	66.1	42	76.7	55.2	56.2	56.1
Pbde 51	pg/g	0.897	2.94	2.19	2.03	2.22	6.41	12.5	9.33	5.86	5.76	5.36	6.04	3.51	5.69	4.42	5.34	5.55
Pbde 66	pg/g	0.897	12.5	9.33	7.14	9.58	52.8	165	130	64.3	47.5	35.1	44.1	31.5	74.6	35.5	38.9	41
Pbde 7	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	< 0.815	< 0.725	< 0.778	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 71	pg/g	0.897	1.38	1.62	2.11	< 1.06	3.82	10.2	8.04	4.96	3.63	4.51	4.48	1.58	3.68	0.974	3.18	3.23
Pbde 75	pg/g	0.897	1.47	< 1.17	< 1.11	< 1.06	3.5	10.1	8.43	3.48	3.19	2.6	2.69	1.93	3.83	2.55	2.83	2.99
Pbde 77	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	< 0.815	< 0.725	< 0.778	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 79	pg/g	0.897	16.2	19.5	18	17.7	24	33.5	30.2	24.8	21.8	24.1	21.6	17.1	26	19.7	22.6	22.7
Pbde 8/11	pg/g	0.897	< 0.974	< 1.17	< 1.11	< 1.06	0.996	1.16	0.826	< 0.855	< 0.765	< 0.932	< 0.927	< 0.83	< 0.781	< 0.913	< 0.899	< 0.897
Pbde 85	pg/g	3.28	3.75	2.96	3.16	2.29	25.8	114	110	37.5	25.8	23.9	27.8	18.9	57.5	24	24	25.2
Pbde 99	pg/g	2.03	279	229	194	215	2220	6880	5290	2710	1790	1380	1630	1390	2280	1480	1630	1600
PCBs																		
Pcb 1	pg/g	0.449	3.22	5.66	4.23	6.35	3.03	3.49	3.56	4.52	2.87	4.56	4.07	6.66	4.03	4.57	3.76	3.62
Pcb 10	pg/g	0.584	< 0.535	< 1.02	< 0.739	< 1.32	< 0.84	< 0.382	< 0.475	< 0.463	< 0.445	< 0.664	< 0.829	< 0.602	< 0.669	< 0.795	< 0.997	< 0.584
Pcb 103	pg/g	0.463	2.61	1.98	1.33	1.75	2.11	3.12	3.03	1.98	2.82	2.02	3.12	1.73	2.03	2.07	3.15	2.16
Pcb 104	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 105	pg/g	0.67	59	41.3	37.8	40.7	62.4	87.4	76.9	57.1	89.7	61.8	80.8	43.5	55.1	62.4	70.3	64.4
Pcb 106	pg/g	0.53	< 0.761	< 0.657	< 0.556	< 0.588	< 0.686	< 0.363	< 0.443	< 0.67	< 0.491	< 1.6	< 0.854	< 0.537	< 0.695	< 0.701	< 1.1	< 0.53

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
Pcb 107/124	pg/g	0.573	5.79	4.49	3.49	4	7	8.79	7.6	5.87	8.52	5.99	8.44	4.52	5.44	5.93	6.54	6.79
Pcb 109	pg/g	0.484	16.3	11.4	10.7	11.9	16.3	19.7	19.3	14.5	22	19	23.2	12.1	13.9	15.9	17.3	17.6
Pcb 11	pg/g	0.614	32	35.5	29.1	32.7	23.8	25.7	22.1	22.6	19.3	23.5	29	25.5	21.8	23.6	20.1	23.4
Pcb 110/115	pg/g	0.449	102	73.5	64.3	73.3	115	143	130	104	152	106	139	73	75.7	115	121	116
Pcb 111	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.497	0.698	0.867	< 0.428	0.63	< 0.494	0.702	< 0.415	< 0.391	< 0.456	0.639	0.565
Pcb 112	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.47	< 0.363	< 0.389	< 0.428	< 0.382	< 0.47	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 114	pg/g	0.646	2.41	< 0.804	2.23	2.28	3.64	4.89	4.98	3.44	5.48	2.47	5.38	2.12	3.61	3.58	3.83	3.72
Pcb 118	pg/g	0.619	182	122	112	119	190	261	240	177	262	195	256	129	171	185	202	202
Pcb 12/13	pg/g	0.613	2.26	2.29	1.98	2.27	2.25	1.81	1.66	1.82	1.29	1.3	1.9	1.88	2.25	1.45	1.46	1.51
Pcb 120	pg/g	0.449	1.98	1.67	1.25	1.56	1.93	1.78	2.12	1.85	2.35	1.8	2.63	1.3	1.87	1.83	2.05	2.04
Pcb 121	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	0.603	1.03	0.826	< 0.428	0.618	< 0.494	0.54	0.5	0.477	< 0.456	< 0.473	< 0.449
Pcb 122	pg/g	0.594	1.26	< 0.737	0.769	1.24	1.61	2.39	1.9	1.54	2.29	< 1.77	2.11	1.22	1.29	1.76	< 1.23	1.91
Pcb 123	pg/g	0.639	3.57	2.63	2.8	2.46	4.55	6.33	5.61	3.59	5.14	3.98	5.5	2.49	3.95	3.67	3.83	4.22
Pcb 126	pg/g	0.648	< 0.987	< 0.8	0.747	< 0.75	0.985	0.808	0.8	< 0.851	< 0.623	< 1.99	< 1.09	< 0.739	< 0.917	< 0.917	< 1.5	0.693
Pcb 127	pg/g	0.525	< 0.758	< 0.652	< 0.556	< 0.587	< 0.687	< 0.367	< 0.449	< 0.68	0.933	< 1.63	< 0.847	< 0.533	< 0.689	< 0.696	< 1.09	0.743
Pcb 128/166	pg/g	0.866	37.9	30.5	28.8	29.8	43.4	50.8	44.9	33.5	57.3	48.7	60.7	30.3	35.4	44.5	45.2	45.6
Pcb 129/138/160/163	pg/g	0.851	319	234	205	224	277	367	333	248	387	329	458	220	284	298	333	314
Pcb 130	pg/g	1.07	20	15.7	12.7	15.7	17.2	20.5	20.4	16.7	24.1	20.1	28	14.2	18.7	20.2	20.6	19.4
Pcb 131	pg/g	1.07	1.89	1.33	0.846	1.28	1.23	2.22	2.19	1.3	2.62	1.78	2.2	1.21	1.96	1.72	2.28	1.6
Pcb 132	pg/g	1.09	44.9	36.4	29.1	34.5	42.6	55.5	50.4	37.3	60.7	49.4	73.6	32	47.4	44.2	53.3	48.5
Pcb 133	pg/g	1.01	8.51	6.24	4.84	6.15	7.44	8.26	8.72	6.56	9.59	8.99	12	5.65	7.54	7.88	9.1	9.23
Pcb 134/143	pg/g	1.02	10.6	7.09	6.44	7.1	10.1	14.2	12.6	9.12	12.5	11.3	15.2	7.24	11	10.2	13.2	11.1
Pcb 135/151/154	pg/g	0.449	101	66.2	53.6	58.8	82.3	100	91	70.7	109	87.9	127	59.8	83	85.8	93.5	88.9
Pcb 136	pg/g	0.449	19.5	13	11.6	12.5	17	24.4	23.2	15.8	23.5	18.8	27.7	13.8	18.7	18.8	21.4	19.7
Pcb 137	pg/g	0.951	10	7.32	5.39	6.76	8.79	12.7	10.8	8.27	12.9	9.99	12.8	6.28	9.38	10.3	9.94	9.24
Pcb 139/140	pg/g	0.934	4.36	3.57	2.92	3.29	4.06	6.93	5.08	4.31	5.78	5.2	7.17	3.45	5.07	4.98	5.29	5.01
Pcb 14	pg/g	0.59	< 0.55	< 1.03	< 0.759	< 1.35	< 0.837	< 0.39	< 0.485	< 0.473	< 0.45	< 0.678	< 0.837	< 0.608	< 0.676	< 0.803	< 1.01	< 0.59
Pcb 141	pg/g	0.937	19.9	15.2	13	16	24.1	34.1	31.1	23.5	30.6	24.7	33.8	17.9	22	22.5	27.3	25.4
Pcb 142	pg/g	1.03	< 1.2	< 0.843	< 0.649	< 1.03	< 0.854	< 0.619	< 0.631	< 0.428	< 1.46	< 0.466	< 1.29	< 0.619	< 0.889	< 0.808	< 1.36	< 1.03
Pcb 144	pg/g	0.449	6.39	4.36	4.16	4.7	5.12	7.99	7.39	4.38	6.49	6.5	9.1	4.14	7.05	5.67	6.29	6.16
Pcb 145	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 146	pg/g	0.851	87.9	55	43.9	51.7	67.3	81.4	77	60	85.7	76.6	107	51.2	67.2	63.9	74.2	70.9
Pcb 147/149	pg/g	0.917	199	144	119	131	181	232	208	155	238	205	294	136	196	184	211	193
Pcb 148	pg/g	0.449	11.5	4.1	6.19	7.56	4.48	3	2.45	2.15	5.22	2.58	6.46	3.1	3.33	4.24	5.9	4.64
Pcb 15	pg/g	0.623	3.41	3.15	3.43	3.2	4.42	5	3.95	3.07	3.24	3.51	4.35	3.03	3.1	3.52	3.25	3.43
Pcb 150	pg/g	0.449	0.645	0.762	< 0.556	0.808	0.811	0.984	0.906	0.581	1.02	0.577	1.34	0.685	0.972	0.828	0.861	0.909
Pcb 152	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 153/168	pg/g	0.784	419	314	259	297	375	464	455	334	508	427	609	298	393	385	445	419
Pcb 155	pg/g	0.449	1.18	0.93	0.779	0.963	2.95	5.89	4.74	2.69	2.35	2.01	2.48	1.73	2.55	1.71	1.76	2.05
Pcb 156157	pg/g	0.976	10.9	9.2	8.4	8.97	14.5	20.4	17.7	14.5	18.6	13.7	19.8	9.06	10.4	15.2	17.2	16.3
Pcb 158	pg/g	0.667	15	12.1	9.26	10.1	14.4	21	19	13.4	19.5	16.5	22.3	11.2	17.3	15.1	17.7	16.6
Pcb 159	pg/g	0.716	2.65	2.18	2.02	2.82	2.48	2.87	2.61	2.14	3.21	3.47	3.58	2.15	2.73	2.42	2.52	2.8
Pcb 16	pg/g	0.449	2.61	3.24	2.64	2.21	3.18	3.01	2.47	1.93	2.43	2.03	2.95	2.22	2.55	2.25	2.36	1.97
Pcb 161	pg/g	0.731	< 0.84	< 0.599	< 0.556	< 0.722	< 0.563	< 0.421	< 0.429	< 0.428	< 1.04	< 0.466	< 0.918	< 0.439	< 0.631	< 0.574	< 0.965	< 0.731
Pcb 162	pg/g	0.746	1.45	1.23	< 0.556	< 0.737	1.34	1.95	1.76	1.94	1.27	2.21	2.27	0.908	2.04	1.65	1.58	1.47
Pcb 164	pg/g	0.743	12	9.79	8.38	9.7	12.7	16.3	16.4	10.5	17.8	16	21.3	9.06	14.1	13.1	15.3	15.2
Pcb 165	pg/g	0.83	1.1	< 0.679	< 0.556	< 0.82	< 0.665	< 0.503	0.941	0.601	< 1.18	1.16	< 1.04	< 0.498	< 0.716	0.85	1.16	1.06
Pcb 167	pg/g	0.788	13.5	9.35	8.74	9.94	13.6	16	15.5	12.4	17	14.1	19.1	10.1	11.6	14	13.8	14.1
Pcb 169	pg/g	0.826	< 0.975	< 0.684	< 0.556	< 0.797	< 0.698	< 0.497	< 0.505	< 0.428	< 1.18	< 0.612	< 1.04	< 0.522	< 0.684	< 0.66	< 1.13	< 0.826
Pcb 17	pg/g	0.449	5.72	5.47	4.01	5.58	7.27	7.98	5.34	4.87	6.03	5.77	7.83	4.49	5.04	6.06	6.74	5.89
Pcb 170	pg/g	0.449	37.4	35.3	27.9	29.8	34.6	45.2	42	35.1	47.9	40	58.3	28.9	33.8	41.2	42.3	41.5
Pcb 171/173	pg/g	0.449	16.4	14.1	10.2	11.9	12.6	15.3	15	11.7	17.3	16.3	21.4	10.9	10.7	14.8	16	14.6
Pcb 172	pg/g	0.449	11.1	8.54	7.61	8.18	10.7	11.7	10.8	9.65	12.3	11.3	13.3	7.86	9.46	10.3	11.8	11
Pcb 174	pg/g	0.449	53.4	43.9	36.7	40.1	49.2	56.3	55.8	43.2	64	63.5	73.1	36.7	49.5	50.7	53.3	54.3
Pcb 175	pg/g	0.449	1.93	2.12	1.34	1.86	1.26	1.76	2.35	1.23	2.36	2.04	2.47	1.19	2.46	1.55	1.78	2.1
Pcb 176	pg/g	0.449	5.03	4.16	3.61	4	4.03	4.85	4.94	3.9	5.47	5	7.11	3.51	5.45	4.31	5.42	4.94
Pcb 177	pg/g	0.449	53	48.6	37.6	41.4	42	45.9	44.8	36.6	58.8	55.4	68.4	37.5	44.6	48.6	48	50.2

Appendix D3, Tissue Chemistry, cont'd

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
Pcb 178	pg/g	0.449	31.6	26.9	21.1	24.4	25.7	28	27.7	21.7	36.1	34	42.6	21.1	27.9	28.2	32	30.6
Pcb 179	pg/g	0.449	29.5	24.3	19.9	20.1	24.4	27.6	25.8	20.3	31.5	28.4	40.8	18.6	25.8	25.6	27.7	26.7
Pcb 18/30	pg/g	0.449	6.56	7.7	6.43	5.86	7.94	7.95	6.14	5.22	6.93	6.62	9.22	5.52	6.69	7.27	7.54	7.26
Pcb 180/193	pg/g	0.449	132	118	95.8	103	141	168	163	132	172	147	206	108	112	144	151	155
Pcb 181	pg/g	0.449	0.749	0.638	< 0.556	< 0.53	< 0.407	< 0.363	0.474	0.695	0.589	0.69	0.786	< 0.415	0.441	0.507	< 0.45	0.684
Pcb 182	pg/g	0.449	< 0.487	1.18	0.822	1.06	0.799	1.34	1.25	0.738	1.78	1.37	1.56	1.01	1.15	1.01	1.23	1.26
Pcb 183/185	pg/g	0.449	37.8	30.1	24.3	29	30.2	43	40.8	29.9	41.2	35.6	53	25.7	40.3	35.4	39.4	36.6
Pcb 184	pg/g	0.449	0.741	< 0.584	< 0.556	0.574	1.7	5.73	5.01	2.18	1.86	1.48	2.23	1.53	3.44	1.62	1.93	1.73
Pcb 186	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 187	pg/g	0.449	184	157	128	142	154	166	161	129	203	184	245	128	153	157	181	173
Pcb 188	pg/g	0.449	0.973	0.607	0.965	< 0.53	0.595	0.721	0.955	0.78	0.961	0.816	1.35	0.452	0.737	0.825	1.29	0.82
Pcb 189	pg/g	0.449	0.868	0.943	< 0.556	0.785	1.02	1.12	1.11	0.987	1.33	1.14	1.4	0.887	0.653	1.08	1.09	1.42
Pcb 19	pg/g	0.449	0.807	0.755	1.1	0.986	1.05	0.847	0.724	1.05	0.953	1.18	0.857	1.04	0.931	1.04	1.02	0.954
Pcb 190	pg/g	0.449	7.9	7.4	5.1	6.19	7.8	8.39	8.63	6.23	9.57	9.35	11.1	5.21	6.81	8.27	8.23	8.05
Pcb 191	pg/g	0.449	1.01	1.01	0.728	1.08	0.591	1.04	1.18	0.937	1.03	1.12	1.28	0.672	1.08	0.796	0.496	1.16
Pcb 192	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 194	pg/g	0.449	20	21.6	17.7	17.9	22.3	23.7	23.8	21.7	27	24.4	29.6	17.1	13.5	21.4	26.5	24.8
Pcb 195	pg/g	0.449	7.47	7.28	5.17	5.49	6.05	6.81	6.07	6.49	7.94	7.73	9.89	4.76	6.36	6.44	7.35	7.05
Pcb 196	pg/g	0.449	8.5	8.87	8.12	7.44	6.95	10.1	9.83	7.33	10.1	9.4	12.1	6.51	10.2	8.49	8.42	8.44
Pcb 197/200	pg/g	0.449	3.64	3.7	3.34	2.43	3	4.11	3.96	3.01	4.27	3.59	5.1	2.72	3.63	3.42	4.41	3.8
Pcb 198/199	pg/g	0.449	57.1	57.8	45.5	48.5	48.3	49.6	48.3	45.5	65.8	62.9	74	40.4	56.5	53.4	58	55.6
Pcb 2	pg/g	0.449	2.72	4.66	3.63	4.67	2.38	2.47	2.73	3.39	2.3	3.32	3.13	4.78	2.8	3.27	2.97	2.89
Pcb 20/28	pg/g	0.449	40.7	32.7	29.5	29.9	41.2	58.2	51.5	37	41.9	38.9	74.6	31.4	41.2	38.7	41.2	41.4
Pcb 201	pg/g	0.449	3.88	4.27	3.51	3.35	2.38	3.24	3.27	2.39	3.45	3.77	5.38	2.66	4.78	3.13	3.93	3.91
Pcb 202	pg/g	0.449	19.7	20.7	16.3	16.8	16.8	17.5	17.7	15.5	22.5	20.8	26.7	14.1	15.7	16.9	18.8	19
Pcb 203	pg/g	0.449	23.2	23.7	19.1	19.9	21.4	24.9	22.8	20	30.7	27	33	16.9	23.8	23.7	23.7	24.8
Pcb 204	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	0.498	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 205	pg/g	0.449	1.33	1.14	1.16	1.04	0.959	0.992	0.998	0.942	1.44	1.41	1.78	0.796	0.991	1.24	1.44	1.35
Pcb 206	pg/g	1.19	21.1	22.9	18.9	20.5	19.7	18.9	19.7	20.8	23.9	26.2	27.2	19.2	20.9	20.6	23.1	21.6
Pcb 207	pg/g	0.813	4.88	5.08	1.72	3.45	1.83	1.93	1.84	2.09	2.84	2.54	4.93	1.64	3.54	4.31	3.87	4.46
Pcb 208	pg/g	0.901	9.02	9.34	8.7	8.48	7.36	7.16	7.19	7.22	9.7	9.34	10.7	7.49	8.25	8.35	9.2	9.15
Pcb 209	pg/g	0.449	21.2	24.2	20.4	20.7	17.2	15	16.1	18.1	22.7	20.9	26.9	18.7	19.2	20	21.8	21
Pcb 21/33	pg/g	0.449	8.15	6.62	6.33	5.58	7.39	8.32	6.96	5.55	6.33	6.1	8.2	5.46	6.25	6.06	6.03	6.6
Pcb 22	pg/g	0.449	8.83	7.78	6.84	6.56	8.71	11.3	10.5	7.6	8.1	6.95	9.47	6.52	8.25	7.23	7.83	8.21
Pcb 23	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 24	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 25	pg/g	0.449	7.8	12.9	10.1	8.74	10.3	10.7	10	13.1	9.94	8.2	12.7	12.4	12.6	9.27	9.34	9.37
Pcb 26/29	pg/g	0.449	3.82	2.93	2.61	3.09	4.12	4.94	3.95	3.23	3.69	3.18	5.37	3.19	3.68	3.82	4.09	3.75
Pcb 27	pg/g	0.449	0.753	0.648	< 0.556	0.595	0.922	0.882	0.795	0.579	0.718	0.522	0.943	0.541	0.664	0.838	1.02	0.934
Pcb 3	pg/g	0.449	5.23	9.56	7.09	14.7	4.43	4.36	4.65	5.54	4.04	5.98	4.7	7.82	4.78	6.46	9.73	7.74
Pcb 31	pg/g	0.449	26.5	26.8	21.4	22.5	29.6	37.2	30.3	25.9	26.8	23.1	38	22.2	26.6	24.9	25.7	26.7
Pcb 32	pg/g	0.449	2.23	1.69	1.33	1.24	2.3	2.57	2.18	1.64	1.82	1.44	2.25	1.54	1.8	2.06	2.12	2
Pcb 34	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 35	pg/g	0.449	1.21	1	0.745	0.915	1.18	1.98	1.21	0.674	1.04	0.9	1.02	0.773	0.959	0.891	0.933	1
Pcb 36	pg/g	0.449	1.79	1.63	1.29	1.27	2.04	2.76	2.41	1.7	2.16	2.14	2.73	1.73	1.82	2.02	2.01	2.02
Pcb 37	pg/g	0.449	10.5	4.02	3.67	4.2	7.09	11	9.04	5.85	5.94	5.43	13.1	3.72	5.9	5.3	5.94	5.26
Pcb 38	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 39	pg/g	0.449	0.578	< 0.584	< 0.556	< 0.53	0.547	0.689	0.457	0.495	0.689	0.53	0.707	< 0.415	0.445	< 0.456	< 0.45	0.504
Pcb 4	pg/g	1.25	2.21	3.41	3.09	3.52	< 1.81	2.46	2.2	2.32	2.25	3.06	2.94	3.34	2.22	3.09	2.54	2.58
Pcb 40/41/71	pg/g	0.449	19.1	9.81	9.07	10.6	14.4	19.5	16.8	11.7	14.3	11.7	16.3	10.8	12.4	13.5	14.5	14
Pcb 42	pg/g	0.449	14.9	9.33	8.46	8.53	12.4	18.1	15.1	11.3	13.2	11.3	18.8	9.03	11.7	12	13.4	14
Pcb 43	pg/g	0.449	1.01	< 0.584	< 0.556	< 0.53	0.793	1.35	1.13	0.709	1.2	0.957	1.36	0.62	0.802	1.17	1.56	0.934
Pcb 44/47/65	pg/g	0.449	59.3	35.9	34.2	37.6	55.1	87.8	70.6	49.2	60.1	45.9	71.7	41.2	51.6	52.7	58	58.3
Pcb 45/51	pg/g	0.449	4.32	2.58	2.32	2.81	4.1	5.33	4.51	2.77	3.77	2.92	4.64	2.7	2.96	4	3.68	3.68
Pcb 46	pg/g	0.449	1.05	< 0.584	< 0.556	0.606	0.959	1.05	1.05	0.465	0.629	0.569	0.952	0.484	0.803	0.724	0.712	0.911
Pcb 48	pg/g	0.449	6.77	4.65	3.67	5.16	6.73	9.6	6.88	5.18	6.71	4.93	9.57	4.65	5.17	6.05	6.43	5.88
Pcb 49/69	pg/g	0.449	38	27.4	23	25.4	35.9	50.3	42.6	30.8	42.8	31.1	50.7	25.9	33.3	34.8	40.3	37.4

Appendix D3, Tissue Chemistry, cont'd

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
Pcb 5	pg/g	0.636	2.26	< 1.11	< 0.821	< 1.46	< 0.898	< 0.415	< 0.516	< 0.503	< 0.485	< 0.721	1.23	< 0.656	< 0.729	< 0.866	< 1.09	< 0.636
Pcb 50/53	pg/g	0.449	2.57	1.9	1.88	1.75	2.74	4.22	2.98	1.96	2.45	2.25	3.52	1.73	2.04	2.82	3.58	3.14
Pcb 52	pg/g	0.449	80.1	51	46.9	54.7	77.7	119	98.1	68.6	91.3	68.3	107	54.9	67.7	74.9	83.3	84
Pcb 54	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 55	pg/g	0.746	< 0.734	< 0.719	< 0.941	< 0.841	1.35	0.784	1.11	0.701	< 0.649	< 0.589	< 0.761	< 0.562	< 0.823	< 0.784	< 0.949	< 0.746
Pcb 56	pg/g	0.746	18.9	11.6	11.7	12.5	16.9	23.3	21.6	14	16.7	12.7	20.8	11.4	14	14.2	16.5	15.2
Pcb 57	pg/g	0.683	< 0.66	< 0.658	< 0.846	< 0.756	< 0.567	0.462	0.485	< 0.465	< 0.594	< 0.547	< 0.697	< 0.515	< 0.754	< 0.718	< 0.869	< 0.683
Pcb 58	pg/g	0.714	< 0.702	< 0.688	< 0.9	< 0.804	< 0.571	0.422	0.429	< 0.482	< 0.621	< 0.567	< 0.729	< 0.538	< 0.788	< 0.75	< 0.908	< 0.714
Pcb 59/62/75	pg/g	0.449	3.83	2.75	2.48	2.7	3.69	5.15	4.64	3.27	4.16	3.51	5.69	2.69	3.53	4.39	4.25	4.37
Pcb 6	pg/g	0.577	0.853	1.36	1.37	< 1.31	1.16	0.996	0.72	0.833	0.994	0.964	< 0.819	1.1	0.742	1.12	1.2	1.23
Pcb 60	pg/g	0.734	15.2	8.82	8.21	9.27	13.2	20.8	18.1	11.9	13.9	12.3	22	9.23	12.3	11.7	13.1	12.6
Pcb 61/70/74/76	pg/g	0.679	117	77.3	78.4	81.3	109	160	132	99.2	123	91.6	140	81.5	100	101	113	111
Pcb 63	pg/g	0.669	3.68	2.54	2.27	2.16	3.46	4.3	3.94	2.64	3.52	2.88	4.81	2.16	3.13	3.11	3.25	3.73
Pcb 64	pg/g	0.449	16.9	9.6	8.63	10.6	13.7	18.9	16.3	11.6	15.9	11.2	18.9	10.3	12.5	14	15.4	15
Pcb 66	pg/g	0.669	56.8	37.4	35.4	37.5	56.1	83.9	71.2	50.6	60.2	49.4	78.2	40.1	51	49.2	55.9	54.7
Pcb 67	pg/g	0.61	2.26	1.48	1.26	1.25	2	2.55	2.3	1.99	2.04	1.66	3.11	1.64	1.87	1.6	2.15	1.72
Pcb 68	pg/g	0.668	2.79	2.4	1.97	1.53	3.34	5.82	4.71	3.69	3.5	2.91	3.47	2.75	3.73	2.64	2.41	2.79
Pcb 7	pg/g	0.594	0.608	< 1.04	< 0.758	< 1.35	< 0.858	1.05	< 0.495	< 0.483	< 0.453	< 0.692	< 0.843	< 0.613	< 0.681	< 0.809	< 1.01	< 0.594
Pcb 72	pg/g	0.661	1.07	1.27	1.18	0.975	1.41	1.93	1.57	1.09	1.54	1.34	1.55	1.44	0.943	1.19	1.75	1.12
Pcb 73	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
Pcb 77	pg/g	0.795	5.5	3.37	2.67	3.08	4.88	7.75	6.84	4.44	5.78	5.05	8.38	3.23	4.14	4.65	4.95	4.92
Pcb 78	pg/g	0.711	< 0.701	< 0.685	< 0.898	< 0.803	< 0.593	< 0.402	< 0.435	< 0.49	< 0.619	< 0.576	< 0.726	< 0.536	< 0.785	< 0.747	< 0.905	< 0.711
Pcb 79	pg/g	0.595	2.13	1.05	0.919	1.99	2.31	2.87	2.55	2.01	2.62	2.38	3.4	1.56	2.03	2.03	2.13	2.11
Pcb 8	pg/g	0.532	4.74	5.88	4.22	4.9	6.76	4.92	4.22	4.2	4.24	4.41	5.13	4.49	3.87	4.99	4.67	4.66
Pcb 80	pg/g	0.636	< 0.618	< 0.613	< 0.792	< 0.708	< 0.513	< 0.363	0.459	< 0.43	< 0.553	< 0.506	< 0.649	< 0.48	< 0.702	< 0.668	< 0.809	< 0.636
Pcb 81	pg/g	0.783	< 0.766	< 0.74	< 0.944	< 0.812	< 0.648	< 0.444	< 0.464	< 0.518	< 0.691	< 0.61	< 0.76	< 0.546	< 0.859	< 0.802	< 0.993	< 0.783
Pcb 82	pg/g	0.591	10.1	8.49	6.68	7.69	11.3	15	14	11.7	15.4	11.2	15	7.39	10.9	11.9	13	11.8
Pcb 83/99	pg/g	0.545	145	98	85.7	91.3	136	187	169	129	174	142	193	93.4	130	142	157	147
Pcb 84	pg/g	0.585	19.1	12.5	9.15	12.4	19.9	26.1	22.2	17	25.5	16.4	23.8	13.2	16.4	19.1	20.7	20.8
Pcb 85/116/117	pg/g	0.449	32.2	21.5	18.7	20.5	31.8	41.8	40	29.7	39.7	33.6	45.9	22.4	29.3	32.2	35.9	33.5
Pcb 86/87/97/108/119/125	pg/g	0.459	82.5	55.6	46	51.4	80	115	104	76.8	105	80.8	108	54.1	73.1	80.5	87.9	80.8
Pcb 88/91	pg/g	0.522	16.3	10.9	9.14	8.45	15.5	19.2	17.2	12.2	18.4	15.4	19.6	9.57	13.1	15.3	16.7	16.5
Pcb 89	pg/g	0.557	0.822	< 0.584	0.578	< 0.53	0.91	1.01	0.926	< 0.494	0.88	1.31	0.9	0.636	0.699	0.583	0.711	0.612
Pcb 9	pg/g	0.561	0.608	< 0.981	< 0.722	< 1.28	< 0.811	< 0.375	< 0.466	< 0.454	< 0.428	< 0.651	< 0.796	< 0.579	< 0.643	< 0.764	< 0.958	< 0.561
Pcb 90/101/113	pg/g	0.462	190	128	109	119	190	257	231	176	236	192	242	124	160	192	203	198
Pcb 92	pg/g	0.534	35.2	23.8	20.8	22.5	35.2	48.4	42.8	30.8	44.3	33.6	46.3	23.1	31.1	35.6	39.3	36.5
Pcb 93/95/98/100/102	pg/g	0.507	84.2	63.1	53.2	59.3	93.7	135	112	85.3	119	83.4	117	63	85.6	92.3	97.9	97.6
Pcb 94	pg/g	0.568	< 0.487	< 0.584	< 0.556	< 0.53	< 0.714	0.767	0.77	< 0.511	0.518	< 0.707	< 0.645	< 0.415	< 0.418	0.595	< 0.675	< 0.568
Pcb 96	pg/g	0.449	0.503	< 0.584	< 0.556	< 0.53	0.425	0.76	0.561	< 0.428	0.449	< 0.466	< 0.464	< 0.415	0.405	< 0.456	< 0.45	0.519
Pcb Teq 3	pg/g	---	0.0302	0.0168	0.0195	0.0209	0.0546	0.0557	0.0438	0.0329	0.0486	0.0333	0.0446	0.0233	0.0451	0.0784	0.0365	0.066
Pcb Teq 4	pg/g	---	0.839	0.988	0.949	0.896	0.72	0.649	0.665	0.728	0.675	0.794	0.795	0.712	0.686	0.822	0.771	0.8
PCBs Total	pg/g	---	3740	2810	2420	2600	3550	4620	4190	3180	4550	3750	5210	2650	3330	3550	3880	3800
Total Dichloro Biphenyls	pg/g	---	46.9	46.8	36.4	40.8	37.2	40.9	31.9	34.8	30.3	32.7	41.4	35.2	33.2	37.8	27.3	34.1
Total Heptachloro Biphenyls	pg/g	---	590	508	421	433	532	622	606	483	706	628	847	435	519	567	621	604
Total Hexachloro Biphenyls	pg/g	---	1350	973	830	929	1220	1570	1440	1080	1650	1400	1950	938	1240	1240	1380	1330
Total Monochloro Biphenyls	pg/g	---	5.94	10.3	7.86	11	5.41	5.96	6.29	7.91	5.17	7.88	7.2	11.4	6.83	7.84	6.73	6.51
Total Nonachloro Biphenyls	pg/g	---	30.1	37.3	29.3	29	28.9	28	28.7	30.1	36.4	38.1	42.8	28.3	32.7	24.9	36.2	35.2
Total Octachloro Biphenyls	pg/g	---	120	144	116	101	127	140	133	92.5	172	156	196	105	130	135	138	149
Total Pentachloro Biphenyls	pg/g	---	984	676	590	644	1010	1380	1240	934	1330	998	1320	670	834	990	1090	1060
Total Tetrachloro Biphenyls	pg/g	---	470	288	278	297	436	654	544	381	476	362	589	302	396	407	446	449
Total Trichloro Biphenyls	pg/g	---	127	107	92.2	96.1	134	166	135	115	125	108	189	101	125	116	114	116
PCDDs																		
1,2,3,4,6,7,8-HPCDD	pg/g	0.449	1.33	1.87	1.18	1.27	1.13	0.891	0.958	1.09	1.13	0.782	1.3	1.28	1.03	1.4	1.2	1.43
1,2,3,4,6,7,8-HPCDF	pg/g	0.449	0.622	< 0.584	< 0.556	0.54	0.603	< 0.363	< 0.389	0.661	< 0.382	< 0.466	< 0.464	< 0.415	0.407	0.609	< 0.45	< 0.449
1,2,3,4,7,8,9-HPCDF	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.446	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
1,2,3,4,7,8-HXCDD	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
1,2,3,4,7,8-HXCDF	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449

Appendix D3, Tissue Chemistry, cont'd

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
1,2,3,6,7,8-HXCDD	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
1,2,3,6,7,8-HXCDF	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
1,2,3,7,8,9-HXCDD	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
1,2,3,7,8,9-HXCDF	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	0.451	0.578	< 0.45	< 0.449
1,2,3,7,8-PECDD	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
1,2,3,7,8-PECDF	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
2,3,4,6,7,8-HXCDF	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
2,3,4,7,8-PECDF	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
2,3,7,8-TCDD	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
2,3,7,8-TCDF	pg/g	0.449	< 0.487	< 0.584	< 0.556	< 0.53	0.428	0.464	< 0.389	< 0.428	0.486	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	0.512
OCDD	pg/g	0.449	8.8	8.93	5.57	6.16	4.51	3.8	3.36	5	4.35	5.15	5.58	3.71	4.34	4.66	4.37	4.77
OCDF	pg/g	0.449	0.545	0.967	< 0.556	0.632	0.659	< 0.363	< 0.389	0.469	0.42	< 0.466	0.56	< 0.415	0.396	0.528	< 0.45	0.531
TOTAL HEPTA-DIOXINS	pg/g	---	3.18	< 0.584	2.88	< 0.53	2.92	2.03	0.958	1.34	1.21	1.95	1.3	1.28	< 0.391	1.4	2.53	2.88
TOTAL HEPTA-FURANS	pg/g	---	0.622	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	0.661	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	0.609	< 0.45	< 0.449
TOTAL HEXA-DIOXINS	pg/g	---	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	0.627	< 0.389	1.03	< 0.382	< 0.466	< 0.464	0.437	< 0.391	1.19	0.798	1.28
TOTAL HEXA-FURANS	pg/g	---	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	0.451	0.578	< 0.45	< 0.449
TOTAL PENTA-DIOXINS	pg/g	---	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
TOTAL PENTA-FURANS	pg/g	---	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	0.364	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
TOTAL TETRA-DIOXINS	pg/g	---	< 0.487	< 0.584	< 0.556	< 0.53	< 0.407	< 0.363	< 0.389	< 0.428	< 0.382	< 0.466	< 0.464	< 0.415	< 0.391	< 0.456	< 0.45	< 0.449
TOTAL TETRA-FURANS	pg/g	---	< 0.487	< 0.584	< 0.556	< 0.53	0.462	1.36	1.01	0.436	1.09	0.635	1.39	< 0.415	0.403	0.51	< 0.45	0.5
PFOS																		
PFBA	ng/g	2.55	< 2.17	< 3.14	< 2.95	< 2.88	< 2.28	< 1.97	< 2.16	< 2.38	< 2.07	< 2.53	< 2.12	< 2.3	< 2.17	< 2.59	< 2.53	< 2.55
PFBS	ng/g	0.638	< 0.542	< 0.786	< 0.736	< 0.72	< 0.569	< 0.493	< 0.541	< 0.596	< 0.518	< 0.633	< 0.531	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PFDA	ng/g	0.638	< 0.542	0.839	0.838	< 0.72	< 0.569	< 0.493	< 0.541	< 0.596	< 0.518	< 0.633	< 0.531	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PFDoA	ng/g	0.638	< 0.542	< 0.786	< 0.736	< 0.72	< 0.569	< 0.5	< 0.541	< 0.596	< 0.518	< 0.633	< 0.531	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PFHpA	ng/g	0.638	< 0.542	< 0.786	< 0.736	< 0.72	< 0.569	< 0.493	< 0.541	< 0.596	< 0.518	< 0.633	< 0.531	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PFHxA	ng/g	0.638	< 0.542	< 0.786	< 0.736	< 0.72	< 0.569	< 0.493	< 0.541	< 0.596	< 0.518	< 0.633	< 0.531	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PFHxS	ng/g	0.638	< 0.542	< 0.786	< 0.736	< 0.72	< 0.569	< 0.493	< 0.541	< 0.596	< 0.518	< 0.633	< 0.531	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PFNA	ng/g	0.638	0.826	1.02	1.17	0.88	< 0.569	0.563	< 0.541	< 0.596	0.735	0.749	0.57	0.788	< 0.544	< 0.648	0.707	0.683
PFOA	ng/g	0.638	< 0.542	< 0.786	< 0.736	< 0.72	< 0.569	< 0.493	0.627	< 0.596	< 0.518	< 0.633	< 0.531	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PFOS	ng/g	0.638	1.11	1.6	1.96	1.86	0.67	< 0.493	< 0.541	< 0.596	0.809	0.924	1.04	0.625	0.625	0.79	0.656	0.776
PFOSA	ng/g	0.638	< 0.542	< 0.786	< 0.736	< 0.72	< 0.569	< 0.493	< 0.541	< 0.596	< 0.518	< 0.633	< 0.531	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PFPeA	ng/g	1.28	< 1.08	< 1.57	< 1.47	< 1.44	< 1.14	< 0.985	< 1.08	< 1.19	< 1.04	< 1.27	< 1.06	< 1.15	< 1.09	< 1.3	< 1.26	< 1.28
PFUnA	ng/g	0.638	0.64	1.06	0.888	0.895	< 0.569	< 0.493	< 0.541	< 0.596	0.536	< 0.633	0.737	< 0.574	< 0.544	< 0.648	< 0.632	< 0.638
PPCPs																		
2-Hydroxy-Ibuprofen	ng/g	10.4	12.9	14	18.1	< 11.1	< 9.22	14	16.1	< 9.39	12	23.6	18.6	9.42	13.5	16.4	17.9	18.3
4-Epianhydrochlortetracycline [Eactc]	ng/g	138		< 196			< 138											
4-Epianhydrotetracycline [Eatc]	ng/g	34.6		< 49			< 34.6											
4-Epichlortetracycline [Ectc]	ng/g	34.6		< 49			< 34.6											
4-Epioxytetracycline [Eotc]	ng/g	13.8		< 19.6			< 13.8											
4-Epitetracycline [Etc]	ng/g	13.8		< 19.6			< 13.8											
Acetaminophen	ng/g	34.6		< 49			< 34.6											
Albuterol	ng/g	1.65		< 2.34			< 1.65											
Alprazolam	ng/g	0.693		< 1.89			< 0.693											
Amitriptyline	ng/g	0.693		< 0.98			< 0.693											
Amlodipine	ng/g	3.46		< 4.9			< 3.46											
Amphetamine	ng/g	1.65		< 2.34			< 1.65											
Amsacrine	ng/g	0.185		< 0.261			< 0.185											
Anhydrochlortetracycline [Actc]	ng/g	34.6		116			105											
Anhydrotetracycline [Atc]	ng/g	34.6		< 49			< 34.6											
Atenolol	ng/g	1.65		< 2.34			< 1.65											
Atorvastatin	ng/g	6.59		< 9.38			< 6.59											
Azathioprine	ng/g	4.62		< 6.54			< 4.62											
Azithromycin	ng/g	3.46		< 5.08			< 3.46											
Benzoylecgonine	ng/g	0.693		< 0.98			< 0.693											
Benztropine	ng/g	1.15		< 1.63			< 1.15											
Betamethasone	ng/g	11.5		< 16.4			< 11.5											

Appendix D3, Tissue Chemistry, cont'd

			Reference								Outfall		Near Field				Far Field																	
	Unit	DL	Finnerty Cove		Constance Bank #1		Constance Bank #2		Constance Bank #3		Clover Point Outfall		100 m East		200 m East		100 m West		100 m South West		100 m South		200 m South		100 m South East		100 m North East		100 m North West		100 m North West		100 m North West	
Bisphenol A	ng/g	15.5	<	13	<	19.6	<	18.2	<	16.6	<	13.8	<	12.2	<	13	<	14.1	<	12.6	<	15.3	<	13.3	<	13.5	<	13.4	<	15.5	<	14.9	<	15.5
Busulfan	ng/g	18			<	20.8					<	18																						
Caffeine	ng/g	34.6			<	49					<	34.6																						
Carbadox	ng/g	11.9			<	12.5					<	11.9																						
Carbamazepine	ng/g	3.46			<	4.9					<	3.46																						
Cefotaxime	ng/g	13.9			<	19.6					<	13.9																						
Chlortetracycline	ng/g	13.8			<	19.6					<	13.8																						
Cimetidine	ng/g	3.3			<	4.69					<	3.3																						
Ciprofloxacin	ng/g	13.9			<	22.2						36.7																						
Citalopram	ng/g	1.18			<	1.31					<	1.18																						
Clarithromycin	ng/g	3.46			<	4.9					<	3.46																						
Clinafloxacin	ng/g	72.9			<	70.6					<	72.9																						
Clonidine	ng/g	6.59			<	9.38					<	6.59																						
Clotrimazole	ng/g	0.923			<	1.31						6.96																						
Cloxacillin	ng/g	17.4			<	11.7					<	17.4																						
Cocaine	ng/g	0.844			<	0.662					<	0.844																						
Codeine	ng/g	6.59			<	9.38					<	6.59																						
Colchicine	ng/g	1.85			<	2.61					<	1.85																						
Cotinine	ng/g	1.65			<	2.34					<	1.65																						
Cyclophosphamide	ng/g	1.85			<	2.61					<	1.85																						
Daunorubicin	ng/g	18.5			<	26.1					<	18.5																						
Deet	ng/g	1.39				7.66						4.69																						
Dehydronifedipine	ng/g	1.39			<	1.96					<	1.39																						
Demeclocycline	ng/g	34.6			<	49					<	34.6																						
Desmethyldiltiazem	ng/g	0.346			<	0.49					<	0.346																						
Diatrizoic acid	ng/g	55.4			<	78.4					<	55.4																						
Diazepam	ng/g	1.5			<	2.62					<	1.5																						
Digoxigenin	ng/g	281				374						357																						
Digoxin	ng/g	13.9			<	19.6					<	13.9																						
Diltiazem	ng/g	3.27			<	2.31					<	3.27																						
Diphenhydramine	ng/g	1.39			<	1.96					<	1.39																						
Doxorubicin	ng/g	55.4			<	78.4					<	55.4																						
Doxycycline	ng/g	13.8			<	19.6					<	13.8																						
Drospirenone	ng/g	---				---						---																						
Enalapril	ng/g	1.65			<	2.34					<	1.65																						
Enrofloxacin	ng/g	6.93			<	9.8					<	6.93																						
Erythromycin-H2O	ng/g	5.31			<	7.52					<	5.31																						
Etoposide	ng/g	4.62			<	6.54					<	4.62																						
Flumequine	ng/g	3.46			<	4.9					<	3.46																						
Fluocinonide	ng/g	85.9			<	19.6					<	85.9																						
Fluoxetine	ng/g	3.46			<	4.9					<	3.46																						
Fluticasone Propionate	ng/g	16.4			<	23.8					<	16.4																						
Furosemide	ng/g	10.4	<	8.7	<	13.1	<	12.1	<	11.1	<	9.22	<	8.13	<	8.66	<	9.39	<	8.37	<	10.2	<	8.85	<	9.01	<	8.93	<	10.4	<	9.95	<	10.4
Gemfibrozil	ng/g	2.07	<	1.74	<	2.61	<	2.42	<	2.21	<	1.84	<	1.63	<	1.73	<	1.88	<	1.67	<	2.04	<	1.77	<	1.8	<	1.79	<	2.07	<	1.99	<	2.07
Glipizide	ng/g	2.07	<	1.74	<	2.61	<	2.42	<	2.21	<	1.84	<	1.63	<	1.73	<	1.88	<	1.67	<	2.04	<	1.77	<	1.8	<	1.79	<	2.07	<	1.99	<	2.07
Glyburide	ng/g	2.07	<	1.74	<	2.61	<	2.42	<	2.21	<	1.84	<	1.63	<	1.73	<	1.88	<	1.67	<	2.04	<	1.77	<	1.8	<	1.79	<	2.07	<	1.99	<	2.07
Hydrochlorothiazide	ng/g	22.8	<	19.1	<	28.8	<	26.7	<	24.3	<	20.3	<	17.9	<	19	<	20.7	<	18.4	<	22.4	<	19.5	<	19.8	<	19.6	<	22.8	<	21.9	<	22.8
Hydrocodone	ng/g	6.59			<	9.38					<	6.59																						
Hydrocortisone	ng/g	591			<	310					<	591																						
Ibuprofen	ng/g	10.4	<	8.7	<	13.1	<	12.1	<	11.1	<	9.22	<	8.13	<	8.66	<	9.39	<	8.37	<	10.2	<	8.85	<	9.01	<	8.93	<	10.4	<	9.95	<	10.4
Iopamidol	ng/g	185				515						424																						
Isochlortetracycline	ng/g	13.8			<	19.6					<	13.8																						
Lincomycin	ng/g	6.93			<	9.8					<	6.93																						
Lomefloxacin	ng/g	31.4			<	28.8					<	31.4																						
Medroxyprogesterone Acetate	ng/g	9.23			<	13.1					<	9.23																						
Melphalan	ng/g	83.6			<	99					<	83.6																						
Meprobamate	ng/g	9.24			<	13.1					<	9.24																						

Appendix D3, Tissue Chemistry, cont'd

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
Metformin	ng/g	1.65		< 2.34			< 1.65											
Methylprednisolone	ng/g	9.24		< 13.1			< 9.24											
Metoprolol	ng/g	3.46		< 4.9			< 3.46											
Metronidazole	ng/g	9.23		< 13.1			< 9.23											
Miconazole	ng/g	4.33		< 5.25			< 4.33											
Minocycline	ng/g	138		< 196			< 138											
Moxifloxacin	ng/g	9.23		< 13.1			< 9.23											
Naproxen	ng/g	5.18	< 4.35	< 6.54	< 6.06	< 5.52	< 4.61	< 4.07	< 4.33	< 4.69	< 4.18	< 5.1	< 4.42	< 4.5	< 4.46	< 5.18	< 4.98	< 5.18
Norfloxacin	ng/g	34.6		< 49			< 34.6											
Norfluoxetine	ng/g	3.46		< 4.9			< 3.46											
Norgestimate	ng/g	61.3		< 54			< 61.3											
Norverapamil	ng/g	0.346		< 0.49			< 0.346											
Ofloxacin	ng/g	3.46		< 23.3			< 3.46											
Ormetoprim	ng/g	1.39		< 1.96			< 1.39											
Oxacillin	ng/g	6.93		< 9.8			< 6.93											
Oxazepam	ng/g	9.23		< 13.1			< 9.23											
Oxolinic Acid	ng/g	2.07		< 2.72			< 2.07											
Oxycodone	ng/g	3.3		< 4.69			< 3.3											
Oxytetracyclin	ng/g	13.8		< 19.6			< 13.8											
Paroxetine	ng/g	9.24		< 13.1			< 9.24											
Penicillin G	ng/g	6.93		< 9.8			< 6.93											
Penicillin V	ng/g	23.1		< 32.7			< 23.1											
Prednisolone	ng/g	46.2		< 65.4			< 46.2											
Prednisone	ng/g	46.2		< 65.4			< 46.2											
Promethazine	ng/g	0.923		< 1.31			< 0.923											
Propoxyphene	ng/g	0.693		< 0.98			< 0.693											
Propranolol	ng/g	4.62		< 6.54			< 4.62											
Ranitidine	ng/g	3.3		< 4.69			< 3.3											
Rosuvastatin	ng/g	9.23		< 13.1			< 9.23											
Roxithromycin	ng/g	1.05		< 1.13			< 1.05											
Sarafloxacin	ng/g	34.6		< 61			< 34.6											
Sertraline	ng/g	1.26		< 1.79			28.3											
Simvastatin	ng/g	46.2		< 65.4			< 46.2											
Sulfachloropyridazine	ng/g	19		< 4.9			< 19											
Sulfadiazine	ng/g	3.46		< 4.9			< 3.46											
Sulfadimethoxine	ng/g	0.693		< 0.98			< 0.693											
Sulfamerazine	ng/g	2.79		< 3.89			< 2.79											
Sulfamethazine	ng/g	1.39		< 1.96			< 1.39											
Sulfamethizole	ng/g	4.62		< 6.54			< 4.62											
Sulfamethoxazole	ng/g	4.62		< 6.54			< 4.62											
Sulfanilamide	ng/g	40.9		< 75.1			< 40.9											
Sulfathiazole	ng/g	3.46		< 4.9			< 3.46											
Tamoxifen	ng/g	0.923		< 1.31			< 0.923											
Teniposide	ng/g	9.23		< 13.1			< 9.23											
Tetracycline	ng/g	13.8		< 19.6			< 13.8											
Theophylline	ng/g	249		< 230			< 249											
Thiabendazole	ng/g	3.46		< 4.9			< 3.46											
Trenbolone	ng/g	9.24		< 13.1			< 9.24											
Trenbolone Acetate	ng/g	2.79		< 7.41			4.83											
Triamterene	ng/g	1.65		< 2.34			30.5											
Triclocarban	ng/g	1.04	< 0.87	< 1.31	< 1.21	< 1.11	< 0.922	< 0.813	< 0.866	< 0.939	< 0.837	< 1.02	< 0.885	< 0.901	< 0.893	< 1.04	< 0.995	< 1.04
Triclosan	ng/g	15.5	< 13	< 19.6	< 18.2	< 16.6	27.6	35.3	< 13	< 14.1	< 12.6	< 15.3	< 13.3	< 13.5	16.7	< 15.5	< 14.9	< 15.5
Trimethoprim	ng/g	3.46		< 4.9			< 3.46											
Tylosin	ng/g	13.9		< 19.6			< 13.9											
Valsartan	ng/g	9.49		< 21.6			< 9.49											

Appendix D3, Tissue Chemistry, cont'd

			Reference				Outfall	Near Field		Far Field								
	Unit	DL	Finnerty Cove	Constance Bank #1	Constance Bank #2	Constance Bank #3	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	200 m South	100 m South East	100 m North East	100 m North West	100 m North West	100 m North West
Venlafaxine	ng/g	0.923		< 1.31			< 0.923											
Verapamil	ng/g	0.346		< 0.49			< 0.346											
Virginiamycin	ng/g	36.7		184			155											
Warfarin	ng/g	1.04	< 0.87	< 1.31	< 1.21	< 1.11	< 0.922	< 0.813	< 0.866	< 0.939	< 0.837	< 1.02	< 0.885	< 0.901	< 0.893	< 1.04	< 0.995	< 1.04

*All results reported in dry weight unless otherwise indicated, shaded results indicated detected

Appendix D4 Sediment Chemistry

	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Outfall: Clover Point Outfall	Near Field: 100 m East	Near Field: 200 m East	Far Field: 100 m West	Far Field: 100 m South West	Far Field: 100 m South	Far Field: 100 m North West	Far Field: 100 m North West	Far Field: 100 m North West	Far Field: 100 m South East	Far Field: 100 m North East	Far Field: 200 m South	Reference: Constance Bank #3	Reference: Constance Bank #2	Reference: Constance Bank #1	Reference: Finnerty Cove
Pore Water	Units	DL																			
N - Nh3 (As N)	mg/L	0.15				180	31	24	46	57	29	33			28	34	18	24	18	36	12
Sulfide	mg/L	0.0018				6	0.37	0.08	0.19	0.2	0.072	0.6			0.24	0.043	0.026	0.0092	0.0088	0.011	0.017
Dissolved Organic Carbon	mg/L	10				400	< 50	110	160	170	150	150			140	120	130	150	140	160	140
Hydrogen Sulfide	mg/L	0.0019				6.4	0.39	0.085	0.2	0.21	0.076	0.64			0.25	0.046	0.027	0.0098	0.0093	0.012	0.018
Sediment																					
CONVENTIONALS																					
C:N						0.726	0.757	0.85	---	8.2	---	3.24	1.37	1.25	0.762	---	0.91	1.24	---	1.19	2.19
Carbon	%	0.05				1.2	1	1.1	1.6	1.9	1.9	2.1	2.5	1.8	1.5	1.9	1.5	2.4	2.6	1.9	3.4
Particle Size, gravel	%	2				21	3.2	2.4	2.1	5.8	< 2	< 2	7	10	5.8	9	< 2	29	8.6	4.5	6.5
Particle Size, sand	%	2				71	82	82	81	77	81	76	69	66	78	72	82	47	60	65	58
Particle Size, silt	%	2				3.7	8.9	9	9.8	9.6	12	13	14	15	8.7	11	11	16	20	21	21
Particle Size, clay	%	2				5	6	7	7.1	8	7.5	10	10	8.8	7.2	7.8	7.3	8.1	11	9.9	14
Total Nitrogen	%	0.2				1.6	1.3	1.3	< 0.2	0.2	< 0.2	0.7	1.8	1.5	1.9	< 0.2	1.6	1.9	< 0.2	1.6	1.6
Total Organic Carbon	%	0.05				0.67	0.37	0.94	0.6	0.99	0.79	0.75	0.61	0.76	1.7	0.56	0.5	0.54	0.87	0.82	0.77
Sulfur	%	0.06				0.3	0.25	0.26	0.27	0.18	0.24	0.15	0.14	0.16	0.24	0.19	0.14	0.15	0.16	0.19	0.15
Moisture	%	0.3				28	32	34	29	34	35	36	35	37	34	33	33	28	40	44	35
Hardness (as CaCO3)	mg/L	0.5					5750	4670	4560	5410	4560	4960			5070	4880	5250	5500	5610	5500	5350
pH	pH	0.1				8.03	7.92	7.73	7.85	7.92	7.73	7.87			7.93	7.78	7.83	7.87	7.82	7.95	7.75
Total Cyanide	mg/kg	2				< 2	< 1	< 1	< 1	< 1	< 1	< 2	< 2	< 2	< 1	< 1	< 2	< 2	< 2	< 2	< 2
Salinity	g/L	0.01				33.6	28.3	27.8	28.3	31.9	29	30.8			30.7	30.4	32.4	32.7	32.9	32.7	32.4
PHENOLICS																					
2,4,6-trichlorophenol	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
2,4-dichlorophenol	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
2,4-dimethylphenol	µg/g	0.4			0.029	< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
2,4-dinitrophenol	µg/g	4				< 1	< 1	< 4	< 1	< 4	< 1	< 2	< 1	< 2	< 1	< 4	< 4	< 2	< 4	< 4	< 4
2,5-Dichlorophenol	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
2-Chlorophenol	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
2-Methyl-4,6-Dinitrophenol	µg/g	2				< 0.5	< 0.5	< 2	< 0.5	< 2	< 0.5	< 1	< 0.5	< 1	< 0.5	< 2	< 2	< 1	< 2	< 2	< 2
2-Nitrophenol	µg/g	2				< 0.5	< 0.5	< 2	< 0.5	< 2	< 0.5	< 1	< 0.5	< 1	< 0.5	< 2	< 2	< 1	< 2	< 2	< 2
SEM AND AVS																					
AVS	µmol/g	1.56				17.1	4.38	18.1	8.34	3.75	0.88	15	14.8	13.1	8.06	16.5	3.94	1.2	7.09	0.45	4.81
Cadmium	µmol/g	0.0089				< 0.005	< 0.005	< 0.005	< 0.005	< 0.0089	< 0.005	< 0.0089	< 0.005	< 0.005	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.005	< 0.005	< 0.0089
Copper	µmol/g	0.019				0.109	0.054	0.06	0.047	0.037	0.044	0.052	0.067	0.089	0.042	0.028	0.028	0.037	0.061	0.03	0.061
Lead	µmol/g	0.028				0.055	< 0.02	0.024	< 0.02	< 0.028	< 0.02	< 0.028	< 0.02	0.025	< 0.028	< 0.028	< 0.028	< 0.028	0.025	< 0.02	< 0.028
Mercury	µmol/g	0.00005				< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	<E 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Nickel	µmol/g	0.05				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.053	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.051
Zinc	µmol/g	0.0092				1.42	0.205	0.232	0.184	0.138	0.126	0.19	0.194	0.197	0.184	0.165	0.125	0.143	0.184	0.111	0.205
METALS																					
Aluminum	mg/kg	100				11300	9370	10400	10700	10900	11400	12200	12300	12200	10600	11700	11100	13100	12700	12700	13100
Antimony	mg/kg	0.1				0.32	0.18	0.15	0.16	0.17	0.18	0.15	0.2	0.14	0.18	0.14	0.16	0.17	0.16	0.18	0.19
Arsenic	mg/kg	0.2	42	50	57	10.5	6.22	6	7.78	5.13	6.23	4.45	4.5	4.98	5.66	4.77	5.18	4.99	4.97	4.61	4.19
Barium	mg/kg	0.1				46.2	22.6	26.7	28.6	27	23.6	29.3	30.3	30.5	23.7	28	28.4	29.7	30.3	28.8	32.1
Beryllium	mg/kg	0.2				< 0.2	< 0.2	0.26	0.24	0.24	0.27	0.3	0.28	0.31	0.25	0.28	0.29	0.32	0.3	0.28	0.3
Bismuth	mg/kg	0.1				4	0.21	0.17	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.08	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Boron	mg/kg	1				16.6	19.1	21.2	20.3	21.7	23.8	21.6	22.3	23.2	22.6	21.8	24.4	24.6	24.7	24.6	24.4
Cadmium	mg/kg	0.05	4.2	5	5.1	0.592	0.369	0.359	0.418	0.242	0.199	0.162	0.151	0.171	0.325	0.227	0.152	0.173	0.158	0.183	0.149
Calcium	mg/kg	100				12200	19300	13500	26100	27900	33400	29600	29000	40000	20600	24300	41600	31800	40900	32500	54600
Chromium	mg/kg	0.5	160	190	260	19.2	19.2	21.5	20.7	23.4	24.3	22.4	22.7	23.4	22.3	22.3	23.2	25.1	23.7	23.9	24.6
Cobalt	mg/kg	0.1				6.03	5.96	6.24	5.95	6.45	6.83	6.33	6.37	6.51	6.57	6.45	6.76	6.88	6.53	6.66	6.54
Copper	mg/kg	0.5	108	130	390	202	15.8	15.4	17.9	11.5	11.7	12.5	13.1	12.7	12.5	12.5	11.1	14.8	13	13.1	15.8
Iron	mg/kg	100				18100	17100	18400	18400	20600	21700	21700	20900	21800	20100	20500	20300	22600	22100	21500	22000

Appendix D4, Sediment Chemistry, cont'd

	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Outfall: Clover Point Outfall	Near Field: 100 m East	Near Field: 200 m East	Far Field: 100 m West	Far Field: 100 m South West	Far Field: 100 m South	Far Field: 100 m North West	Far Field: 100 m North West	Far Field: 100 m North West	Far Field: 100 m South East	Far Field: 100 m North East	Far Field: 200 m South	Reference: Constance Bank #3	Reference: Constance Bank #2	Reference: Constance Bank #1	Reference: Finnerty Cove
Lead	mg/kg	0.1	112	130	450	329	4.72	8.88	6.95	6.24	5.23	5.86	5.92	7.94	5.06	4.98	11.3	6.4	6.35	6.16	6.69
Lithium	mg/kg	0.5				9.95	10.6	13	13.1	13.3	14.1	16	15.6	16.1	13.9	14.8	13.9	18.3	16.6	17	18.4
Magnesium	mg/kg	100				6090	5670	6130	5900	6250	6600	6440	6620	6650	6210	6260	6440	7080	6730	6730	6980
Manganese	mg/kg	0.2				205	187	185	189	198	217	207	201	211	193	200	205	233	222	227	234
Mercury	mg/kg	0.05	0.7	0.84	0.41	0.256	4.16	0.084	0.081	< 0.05	5.66	< 0.05	< 0.05	< 0.05	0.052	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	mg/kg	0.1				2.72	2.12	3.61	1.56	0.85	0.68	0.53	0.49	0.53	2.02	0.75	0.58	0.51	0.57	0.58	0.52
Nickel	mg/kg	0.5				15.7	15.5	17	16.4	17.7	19	16.9	17.7	17.7	18	16.8	18.4	19	18.6	19	18.8
Potassium	mg/kg	100				1170	1300	1530	1590	1630	1780	1800	1770	1810	1600	1660	1730	1950	1920	1930	1910
Selenium	mg/kg	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	< 0.5	< 0.5
Silver	mg/kg	0.05	2.2		6.1	0.538	2.13	0.059	< 0.05	0.051	1.8	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sodium	mg/kg	100				3730	3660	5220	4430	4400	4810	4680	5340	5700	4200	4620	4710	5930	5840	5560	5980
Strontium	mg/kg	0.1				56.8	104	73.2	104	150	170	178	169	270	97.1	136	212	188	232	173	410
Thallium	mg/kg	0.05				0.141	0.175	0.183	0.132	0.142	0.147	0.109	0.107	0.109	0.157	0.134	0.138	0.104	0.094	0.1	0.076
Tin	mg/kg	0.1				1.99	1.21	0.64	0.61	0.47	1.39	0.62	0.9	0.6	0.83	0.49	15.7	0.46	0.44	0.43	0.5
Titanium	mg/kg	1				670	535	521	401	542	608	608	665	613	626	546	675	698	637	741	801
Tungsten	mg/kg	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	< 0.5	< 0.5
Uranium	mg/kg	0.05				0.943	0.88	1.26	0.877	0.7	0.764	0.706	0.617	0.675	0.829	0.676	0.682	0.707	0.709	0.739	0.618
Vanadium	mg/kg	1				44.3	41.3	42.3	40.4	43.1	45.2	44.2	43	43.3	44.6	43.4	42.8	45.3	43	44.4	42.4
Zinc	mg/kg	1	271	330	410	136	40.2	43.2	46.8	42.6	42.6	45.8	45.4	46.9	43.4	44.8	42.1	49.9	47.4	47.1	50.3
Zirconium	mg/kg	0.5				0.83	< 0.5	0.66	0.85	0.92	0.56	0.56	0.89	0.97	0.7	0.51	1.16	2.37	1.21	1.75	3.74
PHTHALATES																					
Diethyl Phthalate	µg/g	0.8				< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
Dimethyl Phthalate	µg/g	0.8				< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
Di-N-Butyl Phthalate	µg/g	0.8				< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
Di-N-Octyl Phthalate	µg/g	2				< 0.5	< 0.5	< 2	< 0.5	< 2	< 0.5	< 1	< 0.5	< 1	< 0.5	< 2	< 2	< 1	< 2	< 2	< 2
Butylbenzyl Phthalate	µg/g	0.8				< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
ORGANICS																					
1,1,1,2-Tetrachloroethane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,1,1-trichloroethane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,1,2,2-tetrachloroethane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,1,2-trichloroethane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,1-dichloroethane	mg/kg	0.025				< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1-dichloroethene	mg/kg	0.025				< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,3,4-Tetrachlorobenzene	ng/g	0.0193				0.022	---	0.079	---	---	0.037	0.043	0.039	0.035	0.036	0.048	0.033	0.057	0.063	0.064	0.057
1,2,3-Trichlorobenzene	mg/kg	0.03				< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
1,2,3-Trichlorobenzene	ng/g	0.0193				---	---	---	---	---	---	0.076	0.07	---	---	0.077	---	---	---	---	0.119
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	ng/g	0.0193				0.019	---	0.066	---	---	0.027	0.032	0.03	0.027	0.031	0.04	0.022	0.045	0.041	0.051	0.046
1,2,4-trichlorobenzene	mg/kg	0.03				< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
1,2,4-Trichlorobenzene	ng/g	0.0193			0.031	---	---	---	---	---	---	0.316	0.275	---	---	0.415	---	---	---	---	0.413
1,2-dibromoethane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,2-dichlorobenzene	mg/kg	0.02			0.035	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,2-dichlorobenzene	ng/g	---				---	---	---	---	---	---	---	0.129	---	---	---	---	---	---	---	---
1,2-dichloroethane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,2-dichloropropane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,3,5-Trichlorobenzene	ng/g	0.0193				---	---	---	---	---	---	< 0.0187	< 0.0186	---	---	< 0.0206	---	---	---	---	< 0.0193
1,3,5-trimethylbenzene	mg/kg	0.2				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,3-dichlorobenzene	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,3-dichlorobenzene	ng/g	---				---	---	---	---	---	---	---	0.053	---	---	---	---	---	---	---	---
1,4-dichlorobenzene	mg/kg	0.02			0.11	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,4-dichlorobenzene	ng/g	---				---	---	---	---	---	---	---	1.48	---	---	---	---	---	---	---	---
1,7-Dimethylxanthine	ng/g	55				< 60.7														< 55	
2,3,5-trimethylnaphthalene	ng/g	0.0497				8.39	18.9	74.9	23.9	86.2	19.1	44.2	40.6	84.3	187	25.9	31.6	30.5	29.1	31.5	23.8
2,4-dinitrotoluene	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
2,6-dimethylnaphthalene	ng/g	0.0987				9.34	17.9	23.5	19.2	28.5	20	37.5	32.9	38.7	56.5	28.2	22	38.7	37.3	37.2	31.1
2,6-dinitrotoluene	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
3,3-dichlorobenzidine	µg/g	2				< 0.5	< 0.5	< 2	< 0.5	< 2	< 0.5	< 1	< 0.5	< 1	< 0.5	< 2	< 2	< 1	< 2	< 2	< 2
4-Bromophenyl Phenyl Ether	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
4-Chloro-3-Methylphenol	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
4-Chlorophenyl Phenyl Ether	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
4-Nitrophenol	µg/g	2				< 0.5	< 0.5	< 2	< 0.5	< 2	< 0.5	< 1	< 0.5	< 1	< 0.5	< 2	< 2	< 1	< 2	< 2	< 2

Appendix D4, Sediment Chemistry, cont'd

	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Outfall	Near Field		Far Field									Reference			
						Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Benzene	mg/kg	0.005				< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Bis(2-Chloroethoxy)Methane	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
Bis(2-Chloroethyl)Ether	µg/g	0.8				< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
Bis(2-Chloroisopropyl)Ether	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
Bis(2-Ethylhexyl)Phthalate	µg/g	2				< 0.5	< 0.5	< 2	< 0.5	< 2	< 0.5	< 1	< 0.5	< 1	< 0.5	< 2	< 2	< 1	< 2	< 2	< 2
Bromobenzene	mg/kg	0.2				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bromodichloromethane	mg/kg	0.05				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromomethane	mg/kg	0.3				< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Chlorobenzene	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chlorodibromomethane	mg/kg	0.05				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chloroethane	mg/kg	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	< 0.1	< 0.1
Chloroethene	mg/kg	0.04				< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Chloromethane	mg/kg	0.05				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cis-1,2-Dichloroethene	mg/kg	0.03				< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
cis-1,3-dichloropropene	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dibromomethane	mg/kg	0.08				< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Endrin Ketone	µg/g	0.004				< 0.002	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.003	< 0.003	< 0.004	< 0.004
Ethylbenzene	mg/kg	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	< 0.01
Hexachlorobenzene	µg/g	0.8				< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
Hexachlorobutadiene	mg/kg	0.2				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexachlorocyclopentadiene	µg/g	2				< 0.5	< 0.5	< 2	< 0.5	< 2	< 0.5	< 1	< 0.5	< 1	< 0.5	< 2	< 2	< 1	< 2	< 2	< 2
Hexachloroethane	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
Isophorone	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
Isopropylbenzene	mg/kg	0.2				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
M & P Xylenes	mg/kg	0.04				< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
M,P-Cresol	µg/g	0.8				< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
Methyl Tertiary Butyl Ether	mg/kg	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	< 0.1	< 0.1
Mirex	ng/g	0.0039				< 0.0038	< 0.0037	< 0.004	< 0.0037	< 0.0038	< 0.0038	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0041	< 0.004	< 0.0038	< 0.0038	< 0.004	< 0.0039
Nitrobenzene	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
Nitrosodiphenylamine/Diphenylamine	µg/g	0.8				< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
N-Nitrosodi-N-Propylamine	µg/g	0.4				< 0.1	< 0.1	< 0.4	< 0.1	< 0.4	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
O-Xylene	mg/kg	0.04				< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Pentachlorophenol	µg/g	0.8			0.36	< 0.2	< 0.2	< 0.8	< 0.2	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
Phenol	µg/g	0.8	0.1-1		0.42	0.21	< 0.2	< 0.8	0.51	< 0.8	< 0.2	< 0.4	< 0.2	< 0.4	< 0.2	< 0.8	< 0.8	< 0.4	< 0.8	< 0.8	< 0.8
Styrene	mg/kg	0.03				< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.086	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Tetrachloroethene	mg/kg	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	< 0.01
Tetrachloromethane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Toluene	mg/kg	0.05				0.085	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Trans-1,2-Dichloroethene	mg/kg	0.03				< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
trans-1,3-dichloropropene	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Tribromomethane	mg/kg	0.05				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Trichloroethene	mg/kg	0.009				< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009
Trichlorofluoromethane	mg/kg	0.2				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Trichloromethane	mg/kg	0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
VPH	mg/kg	10				< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Xylenes	mg/kg	0.04				< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
HIGH RESOLUTION ANALYSIS																					
PESTICIDES																					
2,4-DDD	ng/g	0.0043				0.214	0.085	0.121	0.072	0.042	0.047	0.034	0.039	0.046	0.05	0.059	0.028	0.018	0.017	0.016	0.016
2,4-DDE	ng/g	0.0039				0.006	0.007	0.006	0.005	0.005	0.005	0.007	0.007	0.006	0.005	0.005	0.007	0.007	0.008	0.006	0.008
2,4-DDT	ng/g	0.0104				< 0.0175	0.024	0.009	< 0.0129	< 0.0213	< 0.0123	< 0.01	< 0.0089	0.006	< 0.0121	< 0.0197	< 0.0073	0.006	< 0.011	0.007	< 0.0104
4,4-DDD	ng/g	0.0069	7.81a			0.113	0.07	0.066	0.037	0.048	0.052	0.058	0.063	0.064	0.053	0.052	0.055	0.067	0.066	0.052	0.063
4,4-DDE	ng/g	0.0039				0.167	0.13	0.122	0.083	0.096	0.094	0.111	0.123	0.12	0.099	0.105	0.116	0.124	0.141	0.108	0.141
4,4-DDT	ng/g	0.0138	4.77a			0.031	0.073	0.016	< 0.0161	< 0.027	< 0.0165	0.014	0.013	0.011	< 0.0155	< 0.0252	< 0.0089	0.011	< 0.0136	0.01	< 0.0138
Aldrin	ng/g	0.0039				< 0.0038	< 0.0039	< 0.004	< 0.0037	< 0.0038	< 0.0038	< 0.0037	< 0.0037	< 0.0079	< 0.0037	< 0.0041	< 0.004	< 0.0038	< 0.0038	< 0.004	< 0.0039
Alpha Chlordane	ng/g	0.0039				0.044	0.017	0.011	0.005	< 0.0038	< 0.0038	< 0.0037	< 0.0037	0.004	0.005	0.01	< 0.004	< 0.0038	0.004	< 0.004	< 0.0039
Alpha-Endosulfan	ng/g	0.0323				< 0.0257	< 0.0659	< 0.0884	< 0.0485	< 0.0303	< 0.0288	< 0.0261	< 0.0627	< 0.0158	< 0.0631	< 0.0195	< 0.036	0.012	< 0.0778	< 0.0295	< 0.0323
Alpha-Hch Or Alpha-Bhc	ng/g	0.0039				0.013	0.022	0.024	0.023	0.012	0.013	0.014	0.017	0.016	0.018	0.021	0.015	0.015	0.019	0.013	0.015
Beta-Endosulfan	ng/g	0.0454				< 0.061	< 0.156	< 0.32	< 0.0856	< 0.0702	< 0.0558	0.061	< 0.113	0.04	< 0.131	0.03	< 0.0476	0.026	< 0.106	0.048	0.048
Beta-Hch Or Beta-Bhc	ng/g	0.0039				0.019	0.035	0.032	0.014	0.017	0.016	0.018	0.023	0.02	0.021	0.021	0.017	0.02	0.023	0.021	0.021

Appendix D4, Sediment Chemistry, cont'd

	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Outfall	Near Field		Far Field									Reference			
						Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Cis-Nonachlor	ng/g	0.0039				0.011	< 0.0044	< 0.0046	< 0.0037	< 0.0038	< 0.0038	< 0.0037	< 0.0037	< 0.0104	< 0.0037	0.01	< 0.004	< 0.0038	< 0.0038	< 0.004	< 0.0039
Delta-Hch Or Delta-Bhc	ng/g	0.0097				< 0.0095	< 0.0208	< 0.0218	< 0.0195	< 0.0388	< 0.0112	< 0.0115	< 0.0219	< 0.0168	< 0.0237	< 0.0103	< 0.0129	< 0.0094	< 0.0136	< 0.015	< 0.0097
Dieldrin	ng/g	0.0098	4.3			0.043	0.029	0.047	< 0.0166	0.013	0.01	< 0.0094	0.02	0.017	0.73	0.012	0.01	0.01	< 0.0182	0.012	0.017
Endosulfan Sulfate	ng/g	0.0373				< 0.0502	< 0.129	< 0.263	< 0.0704	< 0.0578	< 0.0459	< 0.0355	< 0.0928	< 0.0322	< 0.108	< 0.0225	< 0.0392	0.041	< 0.0872	< 0.0307	< 0.0373
Endrin	ng/g	0.0117	62.4			< 0.0118	< 0.0306	< 0.0363	< 0.0175	< 0.0126	0.01	< 0.01	< 0.0232	< 0.0092	0.033	< 0.0103	< 0.0128	< 0.0094	< 0.0247	< 0.01	< 0.0117
Endrin Aldehyde	ng/g	0.0899				< 0.101	< 0.197	< 0.375	< 0.107	< 0.244	< 0.0697	< 0.0979	< 0.186	< 0.201	< 0.187	< 0.0637	< 0.0412	< 0.0367	< 0.0364	< 0.0524	< 0.0899
Endrin Ketone	ng/g	0.0134				< 0.0136	< 0.0315	< 0.031	< 0.0187	< 0.0579	< 0.0128	< 0.0149	< 0.0222	< 0.027	< 0.0395	< 0.0113	< 0.0147	< 0.0094	< 0.017	< 0.0149	< 0.0134
Hch, Gamma	ng/g	0.0039				0.004	< 0.0046	0.013	0.005	< 0.0053	< 0.0038	< 0.0037	< 0.0037	0.006	0.004	0.005	< 0.004	0.005	< 0.0038	< 0.004	< 0.0039
Heptachlor	ng/g	0.0039	2.74			0.01	---	< 0.004	---	---	---	< 0.0037	< 0.0037	< 0.0039	---	---	< 0.004	< 0.0038	< 0.0038	< 0.004	< 0.0039
Heptachlor Epoxide	ng/g	0.0096				< 0.0095	< 0.0093	< 0.01	< 0.0093	< 0.0095	< 0.0094	< 0.0094	< 0.0093	0.01	< 0.0091	< 0.0103	< 0.0099	< 0.0094	< 0.0094	< 0.01	< 0.0096
Hexachlorobenzene	ng/g	0.0019				0.042	0.035	0.042	0.056	0.044	0.044	0.053	0.059	0.051	0.045	0.059	0.043	0.066	0.076	0.069	0.07
Hexachlorobutadiene	ng/g	0.0023				---	---	---	---	---	---	0.024	0.021	---	---	0.032	---	---	---	---	0.028
Methoxyclor	ng/g	0.0307				0.127	< 0.125	< 0.173	< 0.0434	< 0.24	< 0.0343	< 0.026	< 0.0718	< 0.0522	< 0.103	< 0.0318	< 0.0284	< 0.023	< 0.039	< 0.0318	< 0.0307
Octachlorostyrene	ng/g	0.0039				< 0.0038	< 0.0037	< 0.004	< 0.0037	< 0.0038	< 0.0038	< 0.0037	< 0.0037	< 0.004	< 0.0037	< 0.0041	< 0.004	< 0.0038	< 0.0038	< 0.004	< 0.0039
Oxy-Chlordane	ng/g	0.0039				< 0.0038	< 0.0114	< 0.0044	0.005	< 0.0038	< 0.0038	0.012	0.018	< 0.0269	0.012	0.006	0.01	< 0.0039	0.02	< 0.004	1.17
Pentachlorobenzene	ng/g	0.0019				0.048	0.024	0.029	0.047	0.026	0.025	0.03	0.029	0.023	0.025	0.033	0.024	0.039	0.045	0.039	0.043
Trans-Chlordane	ng/g	0.0039				0.057	0.024	0.014	0.005	< 0.0038	< 0.0038	< 0.0037	< 0.0037	0.005	0.006	0.014	< 0.004	< 0.0038	< 0.0038	< 0.004	< 0.0039
Trans-Nonachlor	ng/g	0.0039				0.032	0.015	0.009	0.005	< 0.0038	< 0.0038	0.004	0.004	0.005	0.005	0.02	< 0.004	< 0.0038	0.004	< 0.004	0.004
PAHS																					
1-Methylphenanthrene	ng/g	0.15				23.5	9.14	18.9	23.6	42.5	11.1	13.4	15.2	38	21.2	10.7	17.3	12.3	12	14.5	11.4
2-Methylnaphthalene	ng/g	0.0883	201	240		13	28	36.2	26.1	46.8	34.1	59.6	50.2	38.3	80.4	39	29.4	57.4	54.8	50	40.5
Acenaphthene	ng/g	0.0842	88.9	110	500	12.8	2.52	3.12	9	5.1	1.82	1.48	1.43	1.99	3.44	1.17	1.87	1.37	1.63	1.32	1.29
Acenaphthylene	ng/g	0.0463	128	150	1300	61.1	6.66	6.09	8.77	1.22	1.69	1.26	0.705	0.988	1.63	0.566	3.16	0.584	0.547	0.545	0.691
Anthracene	ng/g	0.122	245	290		141	10.4	14.3	39.1	7.41	2.13	1.79	2.32	2.77	9.63	1.52	3.52	1.2	1.26	1.25	1.33
Benzo(a)Anthracene	ng/g	0.0719	693	830		301	28.8	106	81	14.4	9.57	4.14	4.56	6.45	18.7	3.23	15.7	3.12	2.9	2.88	2.95
Benzo(a)Pyrene	ng/g	0.103	763	920		305	34.6	112	86.1	13.2	13.2	4.58	4.78	6.19	19	3.71	14.5	3.26	2.9	3.08	3.02
Benzo(b)Fluoranthene	ng/g	0.0705				256	24.2	85.1	57.6	10.1	11.8	4.84	5.45	6.19	15.3	4.37	10.8	4	3.8	3.89	3.96
Benzo(e)Pyrene	ng/g	0.0976				215	22.2	80.4	56.4	10.1	11.1	4.07	4.78	6.98	12.8	3.99	10.2	3.55	3.23	3.4	3.47
Benzo(g,h,i)Perylene	ng/g	0.085			670	230	24.5	83.7	55.1	9.32	11.5	4.15	4.78	6.29	14.1	4.38	9.2	3.52	3.3	3.47	3.51
Benzo[j,k]Fluoranthenes	ng/g	0.0759				261	27.3	101	66.7	10.4	12.2	3.5	4.02	4.94	15.8	3.59	11.4	2.7	2.25	2.61	2.7
Chrysene	ng/g	0.0754	846	1000	1400	289	29.1	92.2	92.1	17.9	18.3	7.4	8.06	10.9	19.9	6.59	19.2	6.82	6.56	7.02	6.44
Dibenzo(a,h)Anthracene	ng/g	0.0948	135	160	230	47.1	4.98	17.1	11.7	2.18	2.06	0.886	1.04	1.54	3.02	0.922	2.65	0.721	0.637	0.72	0.718
Dibenzothiophene	ng/g	0.0987				23.4	2.41	3.1	7.23	6.89	2.45	2.39	2.48	4.46	2.67	2.09	3.51	2.59	2.58	3.07	2.47
Fluoranthene	ng/g	0.0455	1494	1800	1700	719	57.6	181	170	25.1	29.8	8.4	8.35	9.74	30	7.7	16.8	7.71	8.1	7.92	7.74
Fluorene	ng/g	0.0257	144	170	540	36.1	4.19	5.52	11.2	8.45	2.83	4.73	4.74	6.41	5.45	4.04	4.34	5.27	5.48	6.16	5.06
Indeno(1,2,3-c,d)Pyrene	ng/g	0.0841				225	24	81.6	52.8	7.93	10.2	3.29	3.89	4.2	12.6	3.4	7.91	2.62	2.38	2.54	2.58
Naphthalene	ng/g	0.165	391	470	2100	22.4	38.8	26.4	37.1	61.5	30.8	51.1	29	21	39.4	19.1	16.3	32.9	34	26.2	23.1
Perylene	ng/g	0.102				98.7	15.4	40.5	30	14.6	12.3	14.5	16.6	16.2	16.8	15.2	15.5	18.1	16.1	19.3	18.2
Phenanthrene	ng/g	0.121	544	650	1500	522	47.9	46.8	151	71.5	39.3	28.7	31.1	47.3	40.9	27.4	28.9	32.1	31.7	34.9	28.9
Pyrene	ng/g	0.0442	1398	1700	2600	572	58.8	191	170	23.5	31.7	8.79	9.59	10.9	28.3	7.98	15.7	8.08	7.98	8.04	7.79
PBDES																					
Pbde 10	pg/g	0.123				< 0.119	< 0.118	< 0.128	< 0.118	< 0.119	< 0.121	< 0.117	< 0.117	< 0.117	< 0.4	< 0.12	< 0.126	< 0.119	< 0.118	< 0.128	< 0.123
Pbde 100	pg/g	0.123				108	34.7	28.6	22.4	12.3	9.51	11.2	12	13.5	15.6	16.7	6.23	4.6	5.64	5.4	5.75
Pbde 105	pg/g	0.137				< 4.07	< 0.595	< 0.891	< 0.136	< 0.443	< 0.164	< 0.267	< 0.285	< 0.348	< 0.219	< 0.36	< 0.187	< 0.124	< 0.149	< 0.128	< 0.137
Pbde 116	pg/g	0.188				< 4.88	< 0.729	< 1.09	< 0.167	< 0.54	< 0.201	< 0.325	< 0.346	< 0.424	< 0.268	< 0.438	< 0.228	< 0.17	< 0.182	< 0.128	< 0.188
Pbde 119/120	pg/g	0.137				< 3.15	1.03	0.911	0.728	< 0.357	0.196	0.365	0.313	0.33	0.494	< 0.289	0.169	0.142	0.23	0.214	0.191
Pbde 12/13	pg/g	0.123				1.14	1.65	2.99	0.422	0.263	0.602	0.29	0.279	0.351	0.514	0.375	0.33	0.537	0.45	0.606	0.405
Pbde 126	pg/g	0.123				< 2.61	< 0.333	< 0.513	< 0.118	< 0.207	< 0.121	< 0.153	< 0.148	< 0.182	< 0.116	< 0.188	< 0.126	< 0.119	< 0.118	< 0.128	< 0.123
Pbde 128	pg/g	0.801				< 2	< 3.54	< 8.34	< 1.62	0.133	< 2.36	< 0.369	< 1.05	< 1.4	< 1.82	< 0.697	< 0.999	< 0.355	< 0.706	< 0.538	< 0.801
Pbde 138/166	pg/g	0.177				4.94	1.37	1.41	0.824	0.339	0.557	0.329	0.334	0.542	0.392	0.552	0.247	0.168	0.303	< 0.128	< 0.177
Pbde 140	pg/g	0.123				1.79	< 0.419	< 0.633	< 0.263	0.18	< 0.291	0.195	0.184	0.184	< 0.256	0.248	0.133	< 0.119	< 0.118	< 0.128	< 0.123
Pbde 15	pg/g	0.123				3.58	4.6	8.52	1.47	0.984	0.953	1.34	1.29	1.28	1.47	1.37	0.749	0.928	0.98	0.906	1.29
Pbde 153	pg/g	0.134				45.4	10.7	11.8	8.06	4.57	3.57	4.5	4.93	5.2	5.34	6.1	2.44	1.62	2.34	1.92	1.86
Pbde 154	pg/g	0.123				36.1	9.49	9.16	7.72	4.27	3.7	4.72	4.63	5.16	4.92	5.87	2.57	2.15	2.55	2.27	2.57
Pbde 155	pg/g	0.123				3.72	1.72	1.67	1.49	0.997	0.912	1.17	1.23	1.31	1.37	1.36	0.816	0.798	1.01	0.758	0.978
Pbde 17/25	pg/g	0.123				48.7	18.6	22.4	10.3	8.6	6.92	8.67	8.39	9.66	10.6	10.9	4.8	4.1	4.36	4.12	5.76
Pbde 181	pg/g	0.203				< 1.09	< 0.294	< 0.457	< 0.177	< 0.231	< 0.236	< 0.117	< 0.117	< 0.117	< 0.267	< 0.196	< 0.126	< 0.148	< 0.118	< 0.128	< 0.203
Pbde 183	pg/g	0.123				10.7	2.66	14.7	1.51	1.23	0.993	1.16	1.08	1.37	1.56	1.34	0.637	0.687	1.02	1.34	0.929
Pbde 190	pg/g	0.27				< 1.84	< 0.514	< 0.798	< 0.309	< 0.385	< 0.411	0.222	0.162	0.253	< 0.467	< 0.328	< 0.126	< 0.197	0.204	0.147	< 0.27
Pbde 203	pg/g	0.684				29.8	1.47	3.75	0.916	0.883	0.989	2.1	1.3	2.24	2.08	1.04	1.01	0.905	1	1.06	1.18

Appendix D4, Sediment Chemistry, cont'd

	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Outfall	Near Field		Far Field									Reference			
						Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Pbde 206	pg/g	0.123				67.3	9.17	13.7	4.01	9.09	7.67	22.2	17	22.4	13.3	18.9	14.1	14.9	14.3	8.4	13.7
Pbde 207	pg/g	0.123				88	7.28	9.09	1.32	5.98	4.15	18.6	13	21.1	5.85	12.7	16	4.07	10	8.01	3.25
Pbde 208	pg/g	0.123				54.9	3.8	3.85	1.34	4.58	3.45	12.8	5.85	11.1	2.83	8.94	8.96	6.62	8.27	4.52	4.51
Pbde 209	pg/g	5.19				1360	678	786	430	173	531	315	369	399	855	360	220	220	206	199	201
Pbde 28/33	pg/g	0.123				12.2	8.46	9.1	4.59	3.73	3.21	4.16	4.05	4.43	3.91	5.12	2.42	2.66	3.07	2.72	3.76
Pbde 30	pg/g	0.123				< 0.176	< 0.127	< 0.135	< 0.295	< 0.119	< 0.121	< 0.117	< 0.117	< 0.117	< 0.144	< 0.12	< 0.126	< 0.119	< 0.118	< 0.128	< 0.123
Pbde 32	pg/g	0.123				< 0.144	0.232	0.329	1.34	< 0.119	0.179	< 0.117	0.146	< 0.117	0.127	< 0.12	< 0.126	< 0.119	< 0.118	< 0.128	< 0.123
Pbde 35	pg/g	0.123				0.235	0.128	0.159	1.45	< 0.119	< 0.121	< 0.117	< 0.117	< 0.117	< 0.116	< 0.12	< 0.126	< 0.119	< 0.118	< 0.128	< 0.123
Pbde 37	pg/g	0.123				0.455	0.321	0.409	0.413	0.361	0.19	0.447	0.509	0.451	0.187	0.43	0.412	0.209	0.576	0.439	0.229
Pbde 47	pg/g	0.123				545	208	150	111	60.9	45.4	53.8	56.6	65.2	78.1	83.5	30.6	23.3	27.6	24.6	31.3
Pbde 49	pg/g	0.123				83.3	28.7	32.6	15.2	8.66	5.84	7.33	7.75	9.51	13.3	11.8	4.98	3.8	4.59	4.06	4.81
Pbde 51	pg/g	0.123				6.56	2.41	2.68	1.24	0.76	0.667	0.781	0.708	0.887	1.33	1.02	0.517	0.492	0.482	0.413	0.588
Pbde 66	pg/g	0.123				15.7	5.78	3.36	3.61	1.65	1.79	2.13	1.99	2.36	2.44	2.52	1.2	0.993	1.09	1.08	1.47
Pbde 7	pg/g	0.123				7.86	5.74	8.51	2.32	3.76	2.88	2.27	0.279	1.94	3.17	2.78	1.12	1.21	1.37	0.174	1.65
Pbde 71	pg/g	0.123				8.52	0.912	< 0.128	< 0.118	0.273	0.604	0.902	0.609	0.772	< 0.116	0.832	0.407	0.433	0.317	0.227	0.408
Pbde 75	pg/g	0.123				0.962	0.351	0.269	0.23	< 0.119	< 0.121	0.123	0.181	0.185	0.142	0.165	< 0.126	< 0.119	< 0.118	< 0.128	< 0.123
Pbde 77	pg/g	0.123				< 0.119	< 0.118	< 0.128	< 0.118	< 0.119	< 0.121	< 0.117	< 0.117	< 0.117	< 0.116	< 0.12	< 0.126	< 0.119	< 0.118	< 0.128	< 0.123
Pbde 79	pg/g	0.123				3.83	2.58	2.68	2.31	2.05	1.91	0.912	0.844	1.28	2.23	1.04	1.02	0.623	2.16	0.911	0.568
Pbde 8/11	pg/g	0.123				6.35	10.3	15.7	3.76	2.71	2.78	2.29	3.07	2.3	3.83	3.17	1.13	1.71	1.78	1.94	2.94
Pbde 85	pg/g	0.123				17.6	4.59	3.35	2.67	< 0.356	0.861	0.893	1.07	1.49	1.46	1.44	0.517	0.216	0.323	0.304	0.237
Pbde 99	pg/g	0.123				482	141	111	89.3	41.7	31.2	36.4	39.9	44	52.7	58.8	19.9	11.9	14.9	13.6	15.3
PCBS																					
Pcb 1	pg/g	0.378				4.83	2.51	3.43	8.38	2.4	2.51	3.1	2.54	2.39	2.59	3.2	2.81	3.58	3.49	3.25	3.4
Pcb 10	pg/g	1.29				< 0.859	< 0.603	< 0.648	< 1.87	< 0.647	< 0.773	< 0.773	< 0.714	< 0.499	< 0.615	< 0.593	< 0.525	< 1.04	< 0.928	< 1.3	< 1.29
Pcb 103	pg/g	0.268				0.567	0.811	0.394	147	0.263	0.241	0.327	0.276	0.688	0.304	0.344	0.373	< 0.249	0.356	< 0.267	< 0.268
Pcb 104	pg/g	0.156				< 0.0979	< 0.0588	< 0.0771	1.55	< 0.0665	< 0.0863	< 0.0979	< 0.103	< 0.0816	< 0.0635	< 0.0666	< 0.0628	< 0.159	< 0.12	< 0.0999	< 0.156
Pcb 105	pg/g	0.316				29.2	17.7	13.3	24700	10.4	9.48	13.2	13.4	44.3	17.7	14.2	15.2	14.2	13.5	11.1	15.3
Pcb 106	pg/g	0.304				< 0.783	< 0.311	< 0.294	< 6.02	< 0.188	< 0.222	< 0.397	< 0.257	< 0.425	< 0.273	< 0.265	< 0.258	< 0.447	< 0.318	< 0.22	< 0.304
Pcb 107/124	pg/g	0.316				3.28	1.97	1.27	2200	0.981	0.863	1.06	1.14	5.41	1.37	1.12	1.32	1.14	1.33	0.643	1.46
Pcb 109	pg/g	0.311				4.73	3.1	2.75	3280	2.13	1.94	2.75	2.79	7.78	2.5	2.8	2.93	3.2	2.78	2.35	2.94
Pcb 11	pg/g	1.43				18.6	18.6	19.6	15.4	19.8	14.2	23	23.4	17.7	14.6	17.9	14	23.6	28.8	22.3	29.1
Pcb 110/115	pg/g	0.201				101	62.4	37.3	87900	22.2	21.7	30.2	31.8	128	41.2	32.2	35	32.5	28.9	22.2	27
Pcb 111	pg/g	0.199				< 0.245	< 0.0981	< 0.116	< 2.54	< 0.114	< 0.0822	< 0.138	< 0.132	< 0.2	< 0.151	< 0.117	< 0.081	< 0.185	< 0.161	< 0.212	< 0.199
Pcb 112	pg/g	0.191				< 0.229	< 0.0919	< 0.108	< 2.44	< 0.106	< 0.0769	< 0.129	< 0.123	< 0.187	< 0.142	< 0.109	< 0.0756	< 0.177	< 0.154	< 0.198	< 0.191
Pcb 114	pg/g	0.296				1.44	0.854	0.803	1340	0.483	0.508	0.593	0.571	2.7	0.73	0.672	0.617	0.683	0.63	0.528	< 0.296
Pcb 118	pg/g	0.287				71.4	43.1	31.1	56700	21.5	21.5	29.1	30.5	112	35.7	28.5	33	31	30.6	24.8	32.7
Pcb 12/13	pg/g	1.39				4.39	1.59	3	4.14	1.18	1.09	1.81	1.67	1.31	1.23	1.3	1.57	2.12	2.88	2.39	2.09
Pcb 120	pg/g	0.19				< 0.226	< 0.0906	0.118	< 2.43	0.187	0.151	0.214	0.25	0.26	< 0.14	0.121	0.223	< 0.177	0.201	0.231	< 0.19
Pcb 121	pg/g	0.225				< 0.26	< 0.105	< 0.123	< 2.87	< 0.121	< 0.0875	< 0.148	< 0.141	< 0.214	< 0.161	< 0.125	< 0.0866	< 0.209	< 0.182	< 0.227	< 0.225
Pcb 122	pg/g	0.334				< 0.947	0.749	0.488	607	< 0.227	< 0.269	< 0.476	< 0.308	1.81	0.456	< 0.326	< 0.31	< 0.491	0.44	0.387	< 0.334
Pcb 123	pg/g	0.307				1.24	0.832	0.518	1060	0.432	0.346	0.85	0.97	2.14	0.814	0.679	0.711	0.711	0.96	0.422	1.04
Pcb 126	pg/g	0.355				< 1.07	< 0.429	< 0.386	43.7	< 0.209	< 0.281	< 0.493	0.369	< 0.612	< 0.322	0.413	< 0.343	< 0.519	< 0.422	< 0.262	< 0.355
Pcb 127	pg/g	0.301				< 0.924	< 0.367	< 0.347	147	< 0.221	< 0.262	< 0.435	< 0.282	< 0.466	< 0.322	< 0.291	< 0.283	< 0.443	< 0.315	< 0.241	< 0.301
Pcb 128/166	pg/g	0.214				15.8	9.04	5.93	13000	4.13	4.19	5.32	5.55	23.9	7.92	5.68	5.51	5.55	5.32	4.16	5.23
Pcb 129/138/160/163	pg/g	0.22				103	102	38.3	78300	33.4	31.9	36.1	49.6	158	45.3	40.8	40.4	36.2	36.6	28.7	39.4
Pcb 130	pg/g	0.284				5.97	4.39	2.15	3790	1.78	2.19	2.59	2.81	11.1	2.75	2.67	2.9	2.44	2.52	2.14	2.22
Pcb 131	pg/g	0.271				1.78	1.2	0.547	863	0.384	0.367	0.336	< 0.487	2.34	0.643	0.26	0.482	0.419	< 0.409	< 0.264	0.375
Pcb 132	pg/g	0.29				41.5	43.5	10.5	28700	7.28	7.15	9.04	14	54.1	12.3	12.8	11.9	9.87	10	5.74	8.63
Pcb 133	pg/g	0.271				1.27	1.46	0.629	490	0.433	< 0.234	0.685	0.564	2.03	0.585	0.659	0.723	0.71	0.65	0.412	0.796
Pcb 134/143	pg/g	0.287				6.26	6.33	1.77	3120	1.18	1.38	1.44	1.72	9.16	1.8	1.75	2.04	1.32	1.28	0.836	1.25
Pcb 135/151/154	pg/g	0.257				33.9	58.1	11.1	11100	7.95	7.3	10.4	22.9	39.2	9.86	11.8	13.4	11.1	11.1	7.53	10.6
Pcb 136	pg/g	0.202				13	18.8	3.85	5910	1.75	2.42	3.34	6.95	15.4	3.31	3.72	3.71	3.26	3.1	1.91	2.87
Pcb 137	pg/g	0.271				5.42	1.53	1.47	4060	1.01	1.1	1.11	1.25	10.3	1.85	1.81	1.33	1.27	1.83	1.16	1.24
Pcb 139/140	pg/g	0.25				1.92	0.684	0.659	1120	0.635	0.441	0.711	0.754	3.09	0.716	0.383	0.566	0.594	0.666	0.524	0.613
Pcb 14	pg/g	1.27				0.92	< 0.644	0.725	< 1.84	< 0.692	< 0.826	< 0.823	< 0.76	< 0.532	< 0.658	< 0.631	< 0.559	< 1.02	< 0.913	< 1.38	< 1.27
Pcb 141	pg/g	0.245				16.3	22.3	3.99	8610	2.66	3.02	4.67	8.44	24.9	5.09	5	4.05	4.15	3.96	2.38	4.17
Pcb 142	pg/g	0.285				< 0.662	< 0.229	< 0.245	< 4.5	< 0.109	< 0.237	< 0.35	< 0.514	< 0.774	< 0.187	< 0.267	< 0.329	< 0.395	< 0.43	< 0.279	< 0.285
Pcb 144	pg/g	0.269				5.22	9.93	1.62	1710	0.898	0.839	1.23	2.75	7.19	1.22	1.57	1.61	1.57	1.42	0.853	1.11
Pcb 145	pg/g	0.216				< 0.0862	< 0.0777	< 0.0896	23.2	< 0.0707	< 0.0753	< 0.104	< 0.0947	< 0.0739	< 0.0674	< 0.0969	< 0.0744	< 0.179	< 0.145	< 0.0787	< 0.216
Pcb 146	pg/g	0.244				16.4	15.9	7.02	7120	4.96	5.36	6.49	7.84	22.2	7.25	6.29	7	6.83	7.07	5.41	8.16

Appendix D4, Sediment Chemistry, cont'd

						Outfall	Near Field		Far Field									Reference			
	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Pcb 147/149	pg/g	0.247				88.6	140	29.9	42200	20.7	18.8	26.2	45.3	106	25.5	28.7	31.1	26.6	27.4	17.4	25.7
Pcb 148	pg/g	0.26				0.982	1.14	0.836	24.2	1.85	0.744	1.73	2.1	2.19	0.805	1.49	0.697	0.947	0.743	0.483	0.857
Pcb 15	pg/g	1.14				10.1	5	7.88	11.3	5.36	5.98	7.15	6.5	6.77	5.02	6	7.57	8.66	8.99	7.77	9.76
Pcb 150	pg/g	0.206				0.163	< 0.0757	< 0.0873	40.7	< 0.0689	< 0.0734	< 0.0986	< 0.0897	0.271	< 0.0656	< 0.0918	0.089	< 0.171	< 0.139	< 0.0746	< 0.206
Pcb 152	pg/g	0.202				0.096	< 0.0702	< 0.081	69.6	< 0.064	< 0.0681	< 0.0951	< 0.0865	0.188	< 0.0609	< 0.0885	< 0.068	< 0.168	< 0.136	< 0.0719	< 0.202
Pcb 153/168	pg/g	0.203				85.6	117	34.5	45500	25.6	27	32.4	52.6	114	35.7	34.5	36.2	34	35.6	25.5	35.9
Pcb 155	pg/g	0.175				0.316	0.172	0.101	0.234	0.105	< 0.0704	< 0.0949	< 0.0763	0.123	0.083	0.116	0.089	< 0.145	< 0.106	< 0.0817	< 0.175
Pcb 156157	pg/g	0.239				14.1	6.46	4.17	9600	3.01	3.23	4.25	5.04	25.8	6.18	5.16	4.23	3.84	4	2.99	4.26
Pcb 158	pg/g	0.167				9.97	8.95	3.26	6370	2	2.32	2.67	3.72	16.2	3.6	2.88	2.38	2.78	2.7	2.11	2.9
Pcb 159	pg/g	0.185				< 0.45	< 0.156	0.204	145	0.358	0.261	< 0.21	< 0.308	< 0.464	< 0.127	0.528	0.343	< 0.256	< 0.279	< 0.167	0.398
Pcb 16	pg/g	0.242				7.49	3.3	4.5	16.4	2.15	2.08	3.49	3.1	2.64	2.7	2.26	2.59	3.16	2.53	2.05	3.12
Pcb 161	pg/g	0.179				< 0.439	< 0.152	< 0.162	< 2.81	< 0.0725	< 0.157	< 0.22	< 0.324	< 0.487	< 0.124	< 0.168	< 0.207	< 0.247	< 0.269	< 0.175	< 0.179
Pcb 162	pg/g	0.192				< 0.455	< 0.157	< 0.168	201	0.086	< 0.163	< 0.214	< 0.315	0.558	0.29	< 0.164	< 0.201	< 0.265	< 0.289	0.205	< 0.192
Pcb 164	pg/g	0.18				6.27	7.39	2.5	3470	1.51	1.43	2.12	2.6	9.5	2.27	2.26	2.31	2.14	1.78	1.36	1.62
Pcb 165	pg/g	0.223				< 0.529	< 0.183	< 0.196	< 3.51	< 0.0873	< 0.189	< 0.273	< 0.401	< 0.604	< 0.15	< 0.208	< 0.256	< 0.308	< 0.336	< 0.217	< 0.223
Pcb 167	pg/g	0.188				4.56	2.77	1.58	2660	1.3	1.04	1.93	1.66	7.21	2.1	1.67	1.54	1.33	1.53	1.16	1.69
Pcb 169	pg/g	0.219				< 0.542	< 0.181	< 0.193	< 11.1	< 0.0855	< 0.185	< 0.249	< 0.39	< 0.596	< 0.147	< 0.204	< 0.247	< 0.299	< 0.345	< 0.206	< 0.219
Pcb 17	pg/g	0.217				12	4.82	5.74	20.4	2.74	3.11	4.09	4.13	3.86	3.47	3.14	3.72	4.71	4.02	2.84	4
Pcb 170	pg/g	0.218				20.9	17.7	7.62	4300	5.8	5.52	6.73	23.7	19.8	6.84	7.58	6.36	6.9	7.03	5.61	7.24
Pcb 171/173	pg/g	0.226				5.97	6.54	2.55	1380	1.79	1.96	2.32	5.88	6.43	2.46	2.67	2.08	2.85	2.26	2.09	2.55
Pcb 172	pg/g	0.235				3.25	3.01	1.55	623	0.931	1.08	1.29	4.78	3.54	1.28	1.32	1.14	1.21	1.31	0.941	1.46
Pcb 174	pg/g	0.216				22.5	26	6.74	2900	4.12	4.08	6.58	26.7	14.3	5.84	7.06	6.7	7.31	6.47	5.08	6.75
Pcb 175	pg/g	0.208				1.03	1.28	0.255	117	0.251	< 0.0955	< 0.131	1.3	0.559	0.288	0.24	0.288	0.648	0.34	< 0.0727	0.358
Pcb 176	pg/g	0.159				2.97	4.52	1.28	332	0.46	0.69	1.02	4.02	2.05	0.846	1.2	1.13	1.06	1.01	0.612	0.928
Pcb 177	pg/g	0.212				13.2	14.2	5.26	1650	3.51	3.84	5.96	16.3	9.32	4.39	5.07	4.67	5.68	5.55	4.7	5.76
Pcb 178	pg/g	0.218				5.15	5.21	2.29	371	1.4	1.73	2.01	7.11	3.11	1.57	1.91	2.49	2.32	2.7	1.69	2.64
Pcb 179	pg/g	0.166				12.2	15.4	3.89	733	2.12	2.37	3.91	16.1	6.26	2.98	3.89	4.01	3.38	4.07	2.76	3.58
Pcb 18/30	pg/g	0.178				22.1	10.4	13.2	92.6	6.34	6.81	8.61	9.1	9.14	8.46	7.51	8.47	11.2	8.57	6.59	8.62
Pcb 180/193	pg/g	0.199				52.3	54.1	19	6650	12.5	13.7	16.7	75.9	37.6	15.5	20.9	18.5	16.2	16.7	13.1	17.2
Pcb 181	pg/g	0.22				0.276	0.154	< 0.128	126	< 0.0728	0.107	< 0.141	< 0.119	0.468	< 0.0804	< 0.0848	< 0.0743	< 0.242	< 0.196	< 0.0787	< 0.22
Pcb 182	pg/g	0.198				< 0.11	0.191	< 0.117	33	< 0.0665	0.113	< 0.125	0.204	0.15	0.092	< 0.0753	< 0.0659	< 0.217	< 0.176	< 0.0698	< 0.198
Pcb 183/185	pg/g	0.203				16.1	19	5.84	1760	3.35	3.14	4.51	18.6	10.2	4.68	5.19	4.82	5.33	4.94	4.32	5.37
Pcb 184	pg/g	0.158				0.371	0.201	0.175	3.15	< 0.0594	< 0.0705	< 0.106	< 0.0891	0.186	0.095	0.225	< 0.0628	< 0.173	< 0.14	< 0.064	< 0.158
Pcb 186	pg/g	0.173				< 0.0958	< 0.0594	< 0.102	3.26	< 0.0594	< 0.0779	< 0.117	< 0.0986	< 0.0692	< 0.0638	< 0.0705	< 0.0628	< 0.19	< 0.154	< 0.0653	< 0.173
Pcb 187	pg/g	0.196				31.5	33.7	11.8	2130	8.83	9.91	12.1	38	16.9	10.4	11.6	12.1	12.6	12.9	9.65	14.1
Pcb 188	pg/g	0.149				< 0.0915	< 0.0588	< 0.102	3.34	< 0.0599	< 0.0779	< 0.119	< 0.0948	0.112	0.072	0.073	< 0.0628	< 0.167	< 0.127	< 0.0661	< 0.149
Pcb 189	pg/g	0.205				0.884	0.597	0.491	202	< 0.0785	0.272	0.328	0.659	0.872	0.36	0.273	< 0.0628	< 0.183	0.381	0.305	< 0.205
Pcb 19	pg/g	0.272				2.9	1.19	1.88	6.82	0.638	0.712	1.03	1.07	0.84	1.03	0.608	1.6	0.93	0.821	1.25	0.945
Pcb 190	pg/g	0.163				3.78	3.43	1.8	762	0.834	0.71	1.5	5.25	3.63	1.16	1.53	1.28	1.41	1.17	1.03	1.25
Pcb 191	pg/g	0.168				0.923	0.78	< 0.0999	163	0.206	0.2	0.214	1.1	0.873	0.316	0.25	0.26	0.345	0.205	0.153	0.171
Pcb 192	pg/g	0.191				< 0.104	< 0.0643	< 0.11	< 0.375	< 0.0625	< 0.0843	< 0.123	< 0.103	< 0.0725	< 0.069	< 0.0738	< 0.0647	< 0.209	< 0.17	< 0.0685	< 0.191
Pcb 194	pg/g	0.233				10.2	6.07	4.87	616	2.81	3.29	3.71	32.7	5.35	3.16	4.73	4.24	3.38	3.47	3	4.2
Pcb 195	pg/g	0.248				4.54	3.15	1.95	165	1.29	1.52	1.79	12	2.39	1.37	1.7	1.72	1.34	1.63	1.58	1.63
Pcb 196	pg/g	0.207				6.14	3.59	2.14	185	1.94	1.35	2.23	14.1	3.03	1.57	2.78	2.22	1.85	2.23	2.23	2.31
Pcb 197/200	pg/g	0.161				3.24	2.1	0.906	57.3	0.673	0.982	1.13	6.85	1.55	0.858	1.05	1.04	0.961	0.987	1.08	1
Pcb 198/199	pg/g	0.218				12.9	8.57	5.13	349	4.44	4.51	6.53	37.6	8.06	5.27	6.35	6.78	6.59	5.57	5.17	6.13
Pcb 2	pg/g	0.38				14	9.1	13.5	10.1	13.4	11.1	12.8	12.5	10.1	10.7	13.4	8.49	14.2	26.2	10.3	18.9
Pcb 20/28	pg/g	0.335				37.5	20.3	28.1	123	17.4	17.4	23	22.1	21.8	19.7	17.7	19.9	27.7	25.8	20.4	31
Pcb 201	pg/g	0.166				1.93	1.46	0.891	30.1	0.454	0.661	0.716	4.85	1.19	0.671	0.652	0.891	0.846	0.709	0.733	0.77
Pcb 202	pg/g	0.162				3.53	2.33	1.92	48.3	1.42	1.57	1.55	7.03	1.78	1.28	1.57	2.1	1.46	1.61	1.14	2.01
Pcb 203	pg/g	0.199				7.85	5.26	3.44	236	2.13	2.23	3.18	22.2	4.62	2.51	3.65	3.56	3.15	3.11	2.66	3.22
Pcb 204	pg/g	0.164				< 0.0979	< 0.0781	< 0.0946	< 0.287	< 0.0752	< 0.0952	< 0.12	< 0.0955	< 0.0735	< 0.0688	< 0.0746	< 0.0744	< 0.161	< 0.159	< 0.0676	< 0.164
Pcb 205	pg/g	0.205				0.516	0.269	0.283	32.5	0.206	0.199	0.179	1.69	0.359	0.158	0.164	0.204	0.26	0.227	0.237	0.209
Pcb 206	pg/g	0.865				7.4	3.24	3.74	186	3.15	3.71	4.47	15.7	4.9	3.42	4.08	11.9	3.69	4.68	3.26	4.23
Pcb 207	pg/g	0.604				0.748	< 0.634	< 0.74	11.4	< 0.553	< 0.688	< 0.525	1.77	0.582	< 0.5	0.65	2.66	0.586	0.748	< 0.554	0.626
Pcb 208	pg/g	0.701				2.08	1.32	1.16	21.1	1.1	1.37	1.58	3.51	1.64	0.997	1.26	6.33	1.57	1.59	1.34	1.63
Pcb 209	pg/g	0.194				7.16	3.14	3.63	8.22	3.66	3.87	6.19	6.59	4.54	3.98	4.12	137	4.13	4.7	4.29	4.57
Pcb 21/33	pg/g	0.325				18.3	9.99	13.8	56.8	7.19	7.94	10.3	8.67	9.71	8.95	7.93	7.92	10.7	9.94	8.56	11.1
Pcb 22	pg/g	0.371				13.5	6.63	8.65	30.5	4.78	4.88	6.7	6.37	6.61	5.45	4.9	5.98	8	7.3	5.72	8.1
Pcb 23	pg/g	0.36				< 0.197	< 0.163	< 0.193	< 0.555	< 0.207	< 0.231	< 0.229	< 0.187	< 0.181	< 0.152	< 0.207	< 0.132	< 0.212	< 0.159	< 0.284	< 0.36

Appendix D4, Sediment Chemistry, cont'd

						Outfall	Near Field		Far Field									Reference			
	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Pcb 24	pg/g	0.162				0.247	0.12	0.281	0.511	< 0.119	< 0.123	< 0.133	< 0.123	0.099	< 0.107	< 0.126	< 0.0694	< 0.152	< 0.139	< 0.161	< 0.162
Pcb 25	pg/g	0.284				2.52	1.18	1.85	35	1.03	1.14	1.49	1.55	2.33	1.39	1.23	1.34	2.12	1.74	1.31	1.88
Pcb 26/29	pg/g	0.346				7	2.66	4.23	10.5	2.16	2.16	3.1	3	2.85	2.45	2.38	2.47	3.88	3.46	2.71	3.77
Pcb 27	pg/g	0.148				1.46	0.777	0.819	2.82	0.454	0.464	0.839	0.711	0.712	0.682	0.613	0.598	0.75	0.818	0.568	0.725
Pcb 3	pg/g	0.273				7.61	2.94	3.94	3.91	3.48	2.43	2.59	2.52	2.11	2.28	2.34	2.16	2.31	2.93	2.6	2.82
Pcb 31	pg/g	0.321				28.4	17.8	21.2	430	12.4	12.2	16.1	16.1	17	14.2	12.4	15.9	22.1	23	15	21.7
Pcb 32	pg/g	0.334				7.36	2.93	4.17	15.8	2.08	1.95	2.57	2.79	2.69	2.52	1.9	2.63	3.25	2.76	1.97	3.16
Pcb 34	pg/g	0.36				0.243	< 0.163	< 0.193	< 0.554	< 0.207	< 0.23	< 0.22	< 0.18	< 0.174	< 0.151	< 0.198	0.175	< 0.211	< 0.159	< 0.272	< 0.36
Pcb 35	pg/g	0.362				2.47	0.903	2.03	< 0.558	0.874	0.928	0.985	1.09	0.811	< 0.166	0.886	0.928	1.02	1.09	1.21	1.3
Pcb 36	pg/g	0.333				< 0.195	0.3	0.478	< 0.512	0.421	0.295	0.908	0.507	0.467	0.352	0.527	0.33	0.627	0.76	0.993	0.907
Pcb 37	pg/g	0.314				10.7	5.28	7.31	85.6	4.72	4.99	6.57	6.64	6.84	4.97	5.58	6.27	8.35	7.79	6.77	8.84
Pcb 38	pg/g	0.316				0.322	0.15	< 0.177	5.98	< 0.19	< 0.212	0.228	< 0.168	< 0.162	0.239	< 0.185	0.125	< 0.186	0.31	< 0.254	< 0.316
Pcb 39	pg/g	0.331				0.339	0.247	0.552	18.6	0.225	< 0.218	< 0.214	< 0.175	< 0.169	0.237	< 0.193	0.263	< 0.195	0.311	< 0.265	0.349
Pcb 4	pg/g	1.77				4.77	3.26	5.1	18	1.95	2.84	3	2.97	2.71	2.79	2.95	2.94	3.56	3.77	3.43	3.95
Pcb 40/41/71	pg/g	0.3				17.2	9.39	11.2	1790	5.65	6.2	10	8.34	10.3	8.36	6.92	9.87	9.82	8.7	7.47	10.9
Pcb 42	pg/g	0.314				11.3	5.97	6.64	752	3.4	3.67	4.81	5.32	5.48	5.16	3.82	5.13	6.82	6.2	4.19	6.08
Pcb 43	pg/g	0.358				1.33	0.505	0.656	54.3	0.352	0.305	0.758	0.569	0.675	0.273	0.496	0.294	0.432	0.525	0.291	0.427
Pcb 44/47/65	pg/g	0.268				31.8	15.9	19.8	16900	11.6	10.4	15.7	14.2	19.9	13.3	12	13.7	17.4	15.1	11.6	16.9
Pcb 45/51	pg/g	0.314				5.84	2.45	2.97	137	1.21	1.29	2.25	1.6	2	1.86	1.2	1.52	2.13	1.77	1.46	1.87
Pcb 46	pg/g	0.356				2.34	0.95	1.2	80.5	0.555	0.534	1.01	0.891	0.783	0.763	0.457	0.838	0.616	0.759	0.411	0.696
Pcb 48	pg/g	0.309				6.82	2.88	4.79	290	2.11	1.83	3.37	2.86	2.99	2.96	2.28	2.64	3.18	2.52	2.25	2.82
Pcb 49/69	pg/g	0.259				21.9	11.9	14.1	7210	7.13	6.89	11.3	10.4	14	9.38	8.92	9.42	12.2	11.4	7.94	12.2
Pcb 5	pg/g	1.38				< 0.972	< 0.682	< 0.733	< 1.99	< 0.732	< 0.874	< 0.874	< 0.807	< 0.565	< 0.696	< 0.671	< 0.594	< 1.1	< 0.986	< 1.47	< 1.38
Pcb 50/53	pg/g	0.295				5.67	2.37	3	615	1.36	1.49	1.91	1.72	2.13	1.89	1.79	2.16	1.85	1.64	1.14	1.9
Pcb 52	pg/g	0.293				47.9	22.1	26.8	56600	14	12.8	21.1	19.2	38.2	17.6	15.9	17	21	17.3	12.9	20
Pcb 54	pg/g	0.24				< 0.167	< 0.0919	0.107	0.504	< 0.0898	< 0.133	< 0.171	0.118	< 0.103	0.139	< 0.112	0.207	< 0.203	< 0.156	< 0.171	< 0.24
Pcb 55	pg/g	0.477				0.869	0.416	0.494	102	< 0.392	0.543	0.803	0.584	0.816	0.491	0.49	0.601	0.793	0.669	0.608	0.512
Pcb 56	pg/g	0.475				15.6	10.1	11.2	2860	6.64	7.6	10.8	9.8	10.9	8.02	8.37	10.1	13.4	12	9.09	13.5
Pcb 57	pg/g	0.422				0.277	< 0.354	< 0.408	3800	< 0.351	< 0.373	< 0.421	< 0.406	< 0.377	< 0.322	< 0.447	< 0.484	< 0.506	< 0.383	< 0.398	< 0.422
Pcb 58	pg/g	0.445				< 0.255	< 0.366	< 0.422	< 7.15	< 0.363	< 0.386	< 0.431	< 0.416	< 0.386	< 0.333	< 0.458	< 0.495	< 0.534	< 0.405	< 0.408	< 0.445
Pcb 59/62/75	pg/g	0.217				2.45	1.29	1.57	80.8	0.924	0.746	1.8	1.51	1.76	1.08	0.773	1.56	1.53	1.63	0.921	1.54
Pcb 6	pg/g	1.23				3.25	1.56	2.59	7.29	1.15	1.54	1.44	1.61	1.57	1.56	1.65	1.74	2.17	2.06	1.59	1.91
Pcb 60	pg/g	0.457				8.01	6.94	6.49	982	4.26	4.44	6.48	6.69	6.73	4.86	5.14	6.88	7.9	8.16	5.6	8.49
Pcb 61/70/74/76	pg/g	0.415				59.7	35.1	40.1	47800	24	24.6	36.8	34.9	52.1	28.6	29.4	34.7	44.5	39.8	31.4	46.3
Pcb 63	pg/g	0.433				1.25	0.7	0.99	233	0.548	0.543	1.04	0.79	1.08	0.689	0.522	0.873	0.868	0.927	0.919	0.937
Pcb 64	pg/g	0.219				13.8	7.69	8.66	4120	4.4	4.43	7.27	6.08	8.49	5.99	5.54	6.2	7.97	7.11	5.13	7.88
Pcb 66	pg/g	0.454				29.9	19.2	23	7670	15.5	16.9	23.3	22.4	26.1	17.6	18.6	21.5	28.6	26.8	21.1	30.5
Pcb 67	pg/g	0.349				1	0.465	0.915	45.5	0.364	0.329	0.478	0.519	0.621	0.528	< 0.372	0.45	0.603	0.618	0.492	0.716
Pcb 68	pg/g	0.415				< 0.241	< 0.346	0.797	8.58	0.418	< 0.364	< 0.409	< 0.395	0.656	< 0.315	< 0.435	< 0.47	< 0.498	< 0.377	< 0.387	< 0.415
Pcb 7	pg/g	1.26				< 0.882	< 0.619	< 0.665	< 1.83	< 0.665	< 0.793	< 0.792	< 0.731	0.512	< 0.632	< 0.608	< 0.538	< 1.01	< 0.906	< 1.33	< 1.26
Pcb 72	pg/g	0.423				0.358	< 0.355	< 0.409	< 6.8	< 0.352	< 0.374	0.459	< 0.407	< 0.378	< 0.323	< 0.448	< 0.484	< 0.508	0.456	< 0.398	0.583
Pcb 73	pg/g	0.232				< 0.156	< 0.0805	< 0.0735	< 0.195	< 0.0824	0.15	< 0.153	< 0.116	< 0.113	< 0.0982	< 0.105	0.135	< 0.196	< 0.15	< 0.125	< 0.232
Pcb 77	pg/g	0.375				3.64	2.83	2.88	79.7	2.19	2.37	3.04	3.25	3.81	2.32	2.38	3	3.71	3.51	3.14	4.1
Pcb 78	pg/g	0.409				< 0.268	< 0.386	< 0.445	< 6.57	< 0.382	< 0.406	< 0.449	< 0.434	< 0.403	< 0.351	< 0.478	< 0.516	< 0.491	< 0.372	< 0.425	< 0.409
Pcb 79	pg/g	0.334				0.838	0.414	0.41	915	0.43	0.336	0.393	0.416	1.13	0.46	< 0.365	0.572	0.529	0.589	0.391	0.577
Pcb 8	pg/g	1.14				17.1	7.82	12.1	33.3	5.95	5.98	8.16	9.51	8.04	7.05	7.03	8.58	11.4	11.4	7.68	11.7
Pcb 80	pg/g	0.388				< 0.233	< 0.335	< 0.386	< 6.23	< 0.332	< 0.353	< 0.396	< 0.382	< 0.355	< 0.305	< 0.421	< 0.455	< 0.465	< 0.352	< 0.375	< 0.388
Pcb 81	pg/g	0.376				< 0.237	< 0.343	< 0.415	31.3	< 0.34	< 0.369	< 0.391	< 0.417	< 0.396	< 0.314	< 0.437	< 0.43	< 0.459	< 0.339	< 0.368	< 0.376
Pcb 82	pg/g	0.297				12.7	6.37	4.9	7430	3.1	3	3.72	3.78	13.6	5.67	5.78	5.43	4.29	4.02	2.63	3.68
Pcb 83/99	pg/g	0.289				45.9	32.4	22.2	36900	15.1	14.6	20.9	21.4	63	20.7	19.7	23.4	21	20.3	14.6	19.8
Pcb 84	pg/g	0.331				21.7	11	7.83	20500	3.74	3.87	6	5.27	25.2	7.44	5.87	6.17	6.08	5.35	3.35	5.24
Pcb 85/116/117	pg/g	0.227				14.2	7.69	6.04	9660	4.51	4.58	6.26	5.91	19.5	6.57	6.16	7.38	6.21	5.77	4.65	5.83
Pcb 86/87/97/108/119/125	pg/g	0.239				54.5	31.6	22.3	54200	14.1	13.1	19.8	19.6	76.9	23.5	20.7	21.4	20.6	18.8	14	17.9
Pcb 88/91	pg/g	0.289				10.8	4.44	3.62	9210	2.35	2.29	2.77	3.18	11.4	3.42	3.27	3.24	3.3	2.96	2.2	3.1
Pcb 89	pg/g	0.317				0.821	0.622	0.442	307	0.21	0.221	0.304	0.32	0.876	0.404	0.238	0.406	0.467	0.325	< 0.313	0.407
Pcb 9	pg/g	1.21				< 0.831	< 0.583	0.804	2.76	< 0.626	< 0.748	< 0.753	< 0.696	0.487	< 0.595	< 0.578	< 0.512	< 0.974	< 0.869	< 1.26	< 1.21
Pcb 90/101/113	pg/g	0.245				83.1	69.7	33.7	71600	20.8	20.4	27.9	31.2	120	32.6	28.3	32.1	30.3	28.5	19.2	27.5
Pcb 92	pg/g	0.296				15	10	5.65	11200	3.59	3.28	4.85	4.75	21	5.39	4.97	5.1	4.99	4.72	3.11	4.77
Pcb 93/95/98/100/102	pg/g	0.279				64.5	42.2	24.3	62500	13.5	11.7	18.6	21.2	81.3	21.7	18.7	19.9	19.8	16	11.9	15.8
Pcb 94	pg/g	0.322				0.447	0.244	0.26	129	< 0.172	0.127	< 0.211	0.208	0.438	< 0.23	< 0.18	0.165	< 0.299	< 0.261	< 0.325	< 0.322

Appendix D4, Sediment Chemistry, cont'd

	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Outfall	Near Field		Far Field									Reference			
						Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Pcb 96	pg/g	0.14				0.625	0.299	0.133	194	0.06	< 0.068	0.156	0.175	0.437	< 0.0582	0.264	0.152	0.234	0.164	0.098	< 0.14
Pcb Teq 3	pg/g	---				0.494	0.106	0.323	13.7	0.231	0.337	0.235	0.324	0.781	0.307	0.202	0.399	0.531	0.446	0.397	0.559
Pcb Teq 4	pg/g	---				0.531	0.188	0.365	14.1	0.276	0.358	0.312	0.381	0.831	0.35	0.272	0.445	0.54	0.487	0.439	0.598
PCBs Total	pg/g	---	189000			1770	1440	831	919000	525	522	706	1110	1900	729	679	885	788	787	537	795
Total Decachloro Biphenyl	pg/g	---				7.16	3.14	3.63	8.22	3.66	3.87	6.19	6.59	4.54	3.98	4.12	137	4.13	4.7	< ---	4.57
Total Heptachloro Biphenyls	pg/g	---				184	205	63.6	24200	42.2	43.4	51.3	232	130	56.8	57.5	58.9	66.6	65.5	43.6	61.1
Total Hexachloro Biphenyls	pg/g	---				464	571	163	278000	114	111	143	229	659	174	166	164	133	155	103	154
Total Monochloro Biphenyls	pg/g	---				26.4	14.6	20.9	22.4	19.3	16	18.5	17.6	14.6	15.6	16.6	11.3	20.1	32.6	13.6	25.1
Total Nonachloro Biphenyls	pg/g	---				2.83	4.56	< ---	219	4.25	3.71	6.05	19.2	7.12	4.42	5.34	20.9	5.85	6.27	< ---	2.26
Total Octachloro Biphenyls	pg/g	---				36.4	30.7	15.2	1720	11.1	12.8	16.8	137	22.3	16.7	18.1	19.6	18.1	17.9	9.98	18.5
Total Pentachloro Biphenyls	pg/g	---				533	333	213	461000	132	132	181	190	735	224	189	213	199	183	131	182
Total Tetrachloro Biphenyls	pg/g	---				288	152	188	153000	105	108	162	151	203	130	122	147	184	167	127	185
Total Trichloro Biphenyls	pg/g	---				171	88.1	118	951	65.6	62.8	76.6	85.9	85.8	75.2	63.6	79.6	105	97.4	70.5	108
PCDDS																					
1,2,3,4,6,7,8-HPCDD	pg/g	0.0614				5.83	2.49	3.05	2.83	2.9	3.42	4.17	4.49	4.74	4.18	3.34	4.41	5.09	5.81	4.94	6.38
1,2,3,4,6,7,8-HPCDF	pg/g	0.0614				1.25	0.718	0.884	2.99	0.868	1.07	1.31	1.22	1.7	1.08	0.985	1.1	1.49	1.5	1.27	1.68
1,2,3,4,7,8,9-HPCDF	pg/g	0.0614				0.161	0.066	0.067	1.84	0.063	< 0.0604	0.08	0.089	0.428	0.085	0.069	< 0.0628	0.071	0.108	0.085	0.116
1,2,3,4,7,8-HXCDD	pg/g	0.0614				0.22	0.072	0.111	0.06	0.077	0.074	0.121	0.106	0.458	0.082	0.109	0.095	0.134	0.134	0.136	0.181
1,2,3,4,7,8-HXCDF	pg/g	0.0614				0.229	0.107	0.131	6.71	0.101	0.099	0.147	0.126	0.457	0.13	0.1	0.107	0.14	0.18	0.128	0.202
1,2,3,6,7,8-HXCDD	pg/g	0.0614				0.445	0.258	0.379	0.256	0.329	0.422	0.503	0.525	0.755	0.456	0.433	0.623	0.571	0.618	0.612	0.818
1,2,3,6,7,8-HXCDF	pg/g	0.0614				0.205	< 0.0588	0.106	3.33	0.062	0.098	0.095	0.088	0.416	0.107	0.087	0.072	0.112	0.093	0.072	0.112
1,2,3,7,8,9-HXCDD	pg/g	0.0614				0.734	0.336	0.456	0.39	0.508	0.572	0.671	0.755	1.12	0.525	0.61	0.647	0.833	0.898	0.772	1.04
1,2,3,7,8,9-HXCDF	pg/g	0.0614				0.13	0.066	0.085	0.098	< 0.0594	< 0.0604	0.089	0.074	0.396	0.067	< 0.0598	0.067	< 0.0593	0.06	< 0.064	0.11
1,2,3,7,8-PECDD	pg/g	0.0614				0.179	0.084	0.124	0.083	0.099	0.118	0.19	0.162	0.417	0.107	0.135	0.166	0.171	0.186	0.143	0.228
1,2,3,7,8-PECDF	pg/g	0.0614				0.172	0.075	0.126	0.204	0.063	0.08	0.099	0.09	0.297	0.119	0.107	0.104	0.088	0.103	0.092	0.128
2,3,4,6,7,8-HXCDF	pg/g	0.0614				0.176	< 0.0588	0.084	0.476	< 0.0594	0.084	0.094	0.096	0.39	0.081	0.089	< 0.0628	0.081	0.093	0.086	0.125
2,3,4,7,8-PECDF	pg/g	0.0614				0.193	0.077	0.112	1.17	0.067	0.089	0.12	0.123	0.343	0.108	0.118	0.104	0.112	0.118	0.113	0.131
2,3,7,8-TCDD	pg/g	0.0614				0.078	0.065	0.083	0.07	0.067	0.067	0.117	0.081	0.129	0.075	0.091	0.079	0.102	0.109	0.082	0.132
2,3,7,8-TCDF	pg/g	0.0614				0.21	0.169	0.245	0.201	0.214	0.233	0.407	0.305	0.301	0.26	0.258	0.408	0.355	0.364	0.304	0.496
OCDD	pg/g	0.0768				46.5	18.3	18.7	15.6	17	18.4	24.9	24.8	26.1	23.6	18.8	27.1	31.9	34.1	29.7	37
OCDF	pg/g	0.0614				1.54	0.77	1.04	4.66	1.04	1.19	1.52	1.56	1.99	1.26	1.09	1.41	1.78	1.67	1.87	2.07
TOTAL HEPTA-DIOXINS	pg/g	---				12.1	5.87	6.95	6.25	6.97	7.57	10.1	10.3	10.7	9.06	8.12	10.3	12.3	13.9	11.8	15.1
TOTAL HEPTA-FURANS	pg/g	---				2.73	1.5	1.96	7.8	0.989	2.2	2.72	2.86	3.52	2.2	2.16	2.51	3.15	3.37	3.05	3.81
TOTAL HEXA-DIOXINS	pg/g	---				4.55	2.32	3.26	2.81	3.42	3.97	4.92	4.88	5.88	3.88	3.53	5.57	5.92	6.05	5.3	7.74
TOTAL HEXA-FURANS	pg/g	---				1.92	0.553	1.15	19.4	0.813	1.43	1.23	1.34	2.46	1.38	1.32	1.14	1.7	1.57	1.48	1.91
TOTAL PENTA-DIOXINS	pg/g	---				0.998	0.318	0.767	0.451	0.511	0.371	0.764	0.754	1.3	0.78	0.421	0.877	0.963	0.567	1.02	1.43
TOTAL PENTA-FURANS	pg/g	---				1.64	0.565	1.22	9.48	0.477	0.855	1.31	0.752	1.44	1.12	0.874	0.861	1.34	1.41	0.865	1.83
TOTAL TETRA-DIOXINS	pg/g	---				0.698	0.29	0.52	0.169	0.234	0.354	1.85	0.7	0.62	0.181	0.288	0.756	0.822	0.911	0.448	0.89
TOTAL TETRA-FURANS	pg/g	---				1.19	1.02	1.85	2.4	1.02	1.41	1.09	2.5	2.29	2.59	2.25	2.26	2.29	2.48	2.51	2.74
PFOS																					
PFBA	ng/g	0.151				< 0.159	< 0.155	< 0.145	< 0.152	< 0.151	< 0.15	< 0.15	< 0.152	< 0.148	< 0.165	< 0.155	< 0.149	< 0.152	< 0.163	< 0.157	< 0.151
PFBS	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	< 0.0379	< 0.0407	< 0.0393	< 0.0379
PFDA	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	< 0.0379	< 0.0407	< 0.0393	0.043
PFDoA	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	< 0.0379	< 0.0407	< 0.0393	< 0.0379
PFHpA	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	< 0.0379	< 0.0407	< 0.0393	< 0.0379
PFHxA	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	< 0.0379	< 0.0407	< 0.0393	< 0.0379
PFHxS	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	< 0.0379	< 0.0407	< 0.0393	< 0.0379
PFNA	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	0.039	< 0.0407	< 0.0393	0.04
PFOA	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0365	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	0.057	< 0.0407	< 0.0393	< 0.0379
PFOS	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	0.044	0.057	0.052	< 0.0379
PFOSA	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	< 0.0374	< 0.038	< 0.037	< 0.0413	< 0.0386	< 0.0373	< 0.0379	< 0.0407	< 0.0393	< 0.0379
PFPeA	ng/g	0.0757				< 0.0795	< 0.0773	< 0.0726	< 0.0762	< 0.0757	< 0.075	< 0.0748	< 0.0761	< 0.074	< 0.0826	< 0.0773	< 0.0746	< 0.0758	< 0.0815	< 0.0786	< 0.0757
PFUnA	ng/g	0.0379				< 0.0397	< 0.0387	< 0.0363	< 0.0381	< 0.0378	< 0.0375	0.038	< 0.038	0.047	< 0.0413	< 0.0386	< 0.0373	0.061	0.051	0.048	0.048
NONYLPHENOLS																					
Np	ng/g	0.545				484	74.6	27.4	16.8	9.18	11.5	9.29	9.91	9.11	10.9	12.6	11.9	7.78	7.48	7.15	7.29
4-Nonylphenol Diethoxylates	ng/g	2.35				29.2	< 4.19	< 2.08	< 3.77	< 3.01	< 2.36	< 7.27	< 3.07	< 2.54	< 4.32	< 1.94	< 2.38	< 2.65	< 3.49	< 6.02	< 2.35
4-Nonylphenol Monoethoxylates	ng/g	0.799				74.9	6.46	7.34	3.72	< 1.18	1.1	1.48	< 1.04	1.72	< 2.05	1.48	1.1	1.44	1.21	1.94	1.47

Appendix D4, Sediment Chemistry, cont'd

						Outfall	Near Field		Far Field									Reference			
	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Octylphenol	ng/g	0.174				< 0.123	< 0.137	< 0.131	< 0.0924	< 0.116	< 0.102	< 0.176	< 0.162	< 0.162	< 0.184	< 0.091	< 0.15	< 0.131	< 0.202	< 0.238	< 0.174
PPCPS																					
2-Hydroxy-Ibuprofen	ng/g	3.52				< 4.05	< 3.42	< 3.91	< 3.57	< 3.57	< 3.66	< 3.69	< 4.49	< 3.73	< 3.72	< 3.76	< 3.79	< 4.03	< 3.98	< 3.67	< 3.52
Acetaminophen	ng/g	13.8				< 15.2														< 13.8	
Albuterol	ng/g	0.282				< 0.305														< 0.282	
Alprazolam	ng/g	0.275				< 0.304														< 0.275	
Amitriptyline	ng/g	---				2.17														---	
Amlodipine	ng/g	---				< 1.52														---	
Amphetamine	ng/g	0.282				0.322														0.34	
Amsacrine	ng/g	---				---														---	
Atenolol	ng/g	0.282				< 0.305														< 0.282	
Atorvastatin	ng/g	---				---														---	
Azathioprine	ng/g	1.83				< 2.02														< 1.83	
Azithromycin	ng/g	---				< 1.52														---	
Benzoylecgonine	ng/g	0.275				< 0.304														< 0.275	
Benztropine	ng/g	---				---														---	
Betamethasone	ng/g	---				< 1.52														---	
Bisphenol A	ng/g	5.28				< 6.07	< 5.13	< 5.87	< 5.36	< 5.36	< 5.49	< 5.54	< 6.74	< 5.6	< 5.58	< 5.63	< 5.69	< 6.04	< 5.97	< 5.5	< 5.28
Busulfan	ng/g	3.67				< 4.05														< 3.67	
Caffeine	ng/g	13.8				17.7														< 13.8	
Carbadox	ng/g	---				< 2.05														---	
Carbamazepine	ng/g	1.38				2.5														< 1.38	
Cefotaxime	ng/g	---				< 9.96														---	
Cimetidine	ng/g	0.564				1.47														< 0.564	
Ciprofloxacin	ng/g	---				---														---	
Citalopram	ng/g	---				---														---	
Clarithromycin	ng/g	1.38				< 1.52														< 1.38	
Clinafloxacin	ng/g	---				---														---	
Clonidine	ng/g	1.13				< 1.22														< 1.13	
Clotrimazole	ng/g	6.9				2.03														< 6.9	
Cloxacillin	ng/g	---				< 3.04														---	
Cocaine	ng/g	3.83				< 0.572														< 3.83	
Codeine	ng/g	1.13				< 1.22														< 1.13	
Colchicine	ng/g	---				---														---	
Cotinine	ng/g	0.282				< 0.305														< 0.282	
Cyclophosphamide	ng/g	0.733				< 0.81														< 0.733	
Daunorubicin	ng/g	22.2				< 8.1														< 22.2	
Deet	ng/g	0.55				2.51														1.35	
Dehydronifedipine	ng/g	---				< 0.607														---	
Desmethyldiltiazem	ng/g	---				1.24														---	
Diatrizoic acid	ng/g	22				< 24.3														< 22	
Diazepam	ng/g	0.275				< 0.304														< 0.275	
Digoxigenin	ng/g	---				< 12.1														---	
Digoxin	ng/g	---				< 6.07														---	
Diltiazem	ng/g	---				< 1.93														---	
Diphenhydramine	ng/g	---				2.84														---	
Doxorubicin	ng/g	---				---														---	
Drospirenone	ng/g	7.33				< 8.1														< 7.33	
Enalapril	ng/g	0.282				< 0.305														< 0.282	
Enrofloxacin	ng/g	---				---														---	
Erythromycin-H2O	ng/g	3.76				2.33														13.8	
Etoposide	ng/g	1.83				< 2.02														< 1.83	
Flumequine	ng/g	---				< 1.52														---	
Fluocinonide	ng/g	5.5				< 6.07														< 5.5	
Fluoxetine	ng/g	56.7				< 1.52														< 56.7	
Fluticasone Propionate	ng/g	---				< 2.02														---	
Furosemide	ng/g	3.52				< 4.05	< 3.42	< 3.91	< 3.57	< 3.57	< 3.66	< 3.69	< 4.49	< 3.73	< 3.72	< 3.76	< 3.79	< 4.03	< 3.98	< 3.67	< 3.52
Gemfibrozil	ng/g	0.704				< 0.81	< 0.684	0.828	< 0.714	< 0.714	< 0.732	< 0.739	< 0.898	< 0.747	< 0.745	< 0.751	< 0.758	< 0.805	< 0.797	< 0.733	< 0.704
Glipizide	ng/g	0.704				< 0.81	< 0.684	< 0.783	< 0.714	< 0.714	< 0.732	< 0.739	< 0.898	< 0.747	< 0.745	< 0.751	< 0.758	< 0.805	< 0.797	< 0.733	< 0.704
Glyburide	ng/g	0.704				< 0.81	< 0.684	< 0.783	< 0.714	< 0.714	< 0.732	< 0.739	< 0.898	< 0.747	< 0.745	< 0.751	< 0.758	< 0.805	< 0.797	< 0.733	< 0.704

Appendix D4, Sediment Chemistry, cont'd

						Outfall	Near Field		Far Field									Reference			
	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Hydrochlorothiazide	ng/g	7.74				< 8.91	< 7.53	< 8.61	< 7.86	< 7.85	< 8.05	< 8.13	< 9.88	< 8.21	< 8.19	< 8.26	< 8.34	< 8.85	< 8.76	< 8.07	< 7.74
Hydrocodone	ng/g	1.13				< 1.22														< 1.13	
Hydrocortisone	ng/g	55				< 60.7														< 55	
Ibuprofen	ng/g	3.52				< 4.05	< 3.42	< 3.91	< 3.57	< 3.57	< 3.66	< 3.69	< 4.49	< 3.73	< 3.72	< 3.76	< 3.79	< 4.03	< 3.98	< 3.67	< 3.52
Iopamidol	ng/g	142				115														474	
Lincomycin	ng/g	---				< 3.04														---	
Lomefloxacin	ng/g	---				---														---	
Medroxyprogesterone Acetate	ng/g	3.67				< 4.05														< 3.67	
Melphalan	ng/g	32.7				< 35.7														< 32.7	
Meprobamate	ng/g	---				< 4.05														---	
Metformin	ng/g	0.282				1.11														< 0.282	
Methylprednisolone	ng/g	3.67				< 4.05														< 3.67	
Metoprolol	ng/g	75				< 2.39														< 75	
Metronidazole	ng/g	3.67				< 4.05														< 3.67	
Miconazole	ng/g	---				2.22														---	
Moxifloxacin	ng/g	---				---														---	
Naproxen	ng/g	1.76				< 2.02	< 1.71	< 1.96	< 1.79	< 1.79	< 1.83	< 1.85	< 2.25	< 1.87	< 1.86	< 1.88	< 1.9	< 2.01	< 1.99	< 1.83	< 1.76
Norfloxacin	ng/g	---				---														---	
Norfluoxetine	ng/g	1.38				< 1.52														< 1.38	
Norgestimate	ng/g	---				< 6.8														---	
Norverapamil	ng/g	---				< 0.152														---	
Ofloxacin	ng/g	---				---														---	
Ormetoprim	ng/g	---				< 0.607														---	
Oxacillin	ng/g	---				< 10.1														---	
Oxazepam	ng/g	3.67				< 4.05														< 3.67	
Oxolinic Acid	ng/g	---				< 0.607														---	
Oxycodone	ng/g	0.564				< 0.61														< 0.564	
Paroxetine	ng/g	12.5				< 4.05														< 12.5	
Penicillin G	ng/g	---				< 3.04														---	
Penicillin V	ng/g	---				< 3.04														---	
Prednisolone	ng/g	---				< 6.07														---	
Prednisone	ng/g	---				< 67.5														---	
Promethazine	ng/g	---				< 1.4														---	
Propoxyphene	ng/g	1.75				< 0.458														< 1.75	
Propranolol	ng/g	1.83				< 2.02														< 1.83	
Ranitidine	ng/g	0.564				< 0.61														< 0.564	
Rosuvastatin	ng/g	3.67				< 4.05														< 3.67	
Roxithromycin	ng/g	0.275				< 0.304														< 0.275	
Sarafloxacin	ng/g	---				---														---	
Sertraline	ng/g	---				5.26														---	
Simvastatin	ng/g	---				---														---	
Sulfachloropyridazine	ng/g	1.38				< 1.52														< 1.38	
Sulfadiazine	ng/g	1.38				< 1.52														< 1.38	
Sulfadimethoxine	ng/g	0.606				< 0.304														< 0.606	
Sulfamerazine	ng/g	0.55				< 0.828														< 0.55	
Sulfamethazine	ng/g	0.55				< 0.607														< 0.55	
Sulfamethizole	ng/g	1.4				< 0.782														< 1.4	
Sulfamethoxazole	ng/g	1.31				< 1.23														< 1.31	
Sulfanilamide	ng/g	13.8				< 15.2														< 13.8	
Sulfathiazole	ng/g	1.38				< 1.52														< 1.38	
Tamoxifen	ng/g	0.367				< 0.405														< 0.367	
Teniposide	ng/g	3.67				< 4.05														< 3.67	
Theophylline	ng/g	55				< 60.7														< 55	
Thiabendazole	ng/g	---				< 1.52														---	
Trenbolone	ng/g	3.67				< 4.05														< 3.67	
Trenbolone Acetate	ng/g	0.275				< 0.304														< 0.275	
Triamterene	ng/g	0.282				0.644														< 0.282	
Triclocarban	ng/g	0.352				4.82	10.7	2.36	1.1	0.638	1.46	0.723	0.589	0.667	1.23	0.946	0.523	< 0.403	< 0.398	< 0.367	< 0.352
Triclosan	ng/g	5.28				9.65	15.2	< 5.87	6.04	< 5.36	< 5.49	< 5.54	< 6.74	< 5.6	< 5.58	< 5.63	< 5.69	< 6.04	< 5.97	< 5.5	< 5.28
Trimethoprim	ng/g	1.38				< 1.52														< 1.38	

Appendix D4, Sediment Chemistry, cont'd

						Outfall	Near Field		Far Field									Reference			
	Unit	DL	CCME PEL[1]	BC-CSR TYPICAL[2]	WSDOE-Sediment Quality Standards[3]	Clover Point Outfall	100 m East	200 m East	100 m West	100 m South West	100 m South	100 m North West	100 m North West	100 m North West	100 m South East	100 m North East	200 m South	Constance Bank #3	Constance Bank #2	Constance Bank #1	Finnerty Cove
Tylosin	ng/g	5.5				< 6.07														< 5.5	
Valsartan	ng/g	---				---														---	
Venlafaxine	ng/g	---				---														---	
Verapamil	ng/g	---				0.194														---	
Virginiamycin	ng/g	---				< 3.48														---	
Warfarin	ng/g	0.352				< 0.405	< 0.342	< 0.391	< 0.357	< 0.357	< 0.366	< 0.369	< 0.449	< 0.373	< 0.372	< 0.376	< 0.379	< 0.403	< 0.398	< 0.367	< 0.352
10-Hydroxy-Amitriptyline	ng/g	---				< 0.152														---	
Zidovudine	ng/g	22				< 24.3														< 22	

Notes:
[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)
Grey highlighting indicates that concentration exceeds at least one of the sediment criteria *All results reported in dry weight unless otherwise indicated

Appendix D5 Mussel Physical Measurements

INDIVIDUAL MUSSEL INFORMATION						
CRD ID	Individual Mussel ID	Shell Length (mm)	Shell Width (mm)	Tissue Wet Weight (g)	Shell Weight (g)	Shell Age (years)
CO	1	100	46	---	28.0	18.0
CO	2	80	37	---	18.2	19.0
CO	3	85	40	---	23.4	19.0
CO	4	90	40	---	21.8	16.0
CO	5	83	40	---	17.0	11.0
CO	6	76	38	---	18.7	19.0
CO	7	92	38	---	21.4	16.0
CO	8	94	41	---	25.3	20.0
CO	9	83	32	---	16.4	15.0
CO	10	87	43	---	22.9	13.0
CO	11	97	43	18.5	25.8	16.0
CO	12	84	35	12.0	18.6	17.0
CO	13	88	38	11.4	19.0	19.0
CO	14	87	37	15.0	20.8	n/a
CO	15	93	43	15.7	32.5	22.0
CO	16	95	42	18.1	24.3	16.0
CO	17	80	35	12.5	14.2	14.0
CO	18	88	39	14.8	18.6	13.0
CO	19	98	40	16.6	29.8	30.0
CO	20	83	41	13.9	16.8	15.0
CO	21	92	41	18.5	27.5	20.0
CO	22	70	35	10.3	13.2	11.0
CO	23	71	38	9.4	10.6	10.0
CO	24	86	38	12.3	18.1	18.0
CO	25	98	42	20.9	26.2	19.0
CB1	1	80	36		11.9	12.0
CB1	2	73	34		10.8	23.0
CB1	3	85	36		16.6	22.0
CB1	4	80	38		13.4	23.0
CB1	5	64	32		5.9	10.0
CB1	6	75	30		13.8	21.0
CB1	7	64	32		6.4	10.0
CB1	8	74	33		9.0	16.0
CB1	9	80	35		15.7	27.0
CB1	10	75	32		13.4	31.0
CB1	11	70	33	5.2	6.4	11.0
CB1	12	85	38	13.9	16.5	21.0
CB1	13	82	37	11.4	12.7	18.0
CB1	14	80	36	10.7	12.3	27.0
CB1	15	82	31	11.9	15.3	36.0
CB1	16	71	29	7.3	10.9	19.0
CB1	17	72	35	9.0	10.1	16.0
CB1	18	78	34	7.6	10.2	18.0
CB1	19	73	33	8.7	12.6	30.0
CB1	20	75	33	6.1	10.9	17.0
CB1	21	66	31	5.7	6.6	8.0

Appendix D5, Mussel Physical Measurements, cont'd

INDIVIDUAL MUSSEL INFORMATION						
CRD ID	**Individual Mussel ID**	**Shell Length (mm)**	**Shell Width (mm)**	**Tissue Wet Weight (g)**	**Shell Weight (g)**	**Shell Age (years)**
CB1	22	80	35	7.2	12.8	15.0
CB1	23	75	33	8.8	9.6	12.0
CB1	24	81	36	9.3	16.1	14.0
CB1	25			2.3	4.6	n/a
CB2	1	63	34		7.8	14.0
CB2	2	63	31		6.4	9.0
CB2	3	80	35		12.2	19.0
CB2	4	86	36		17.3	24.0
CB2	5	69	32		8.1	9.0
CB2	6	73	34		9.4	11.0
CB2	7	74	38		8.5	10.0
CB2	8	70	33		8.6	9.0
CB2	9	93	40		17.1	23.0
CB2	10	84	39		18.3	17.0
CB2	11	76	37	10.9	11.3	15.0
CB2	12	70	37	8.4	8.9	11.0
CB2	13	77	29	8.3	13.1	n/a
CB2	14	85	42	14.8	16.0	17.0
CB2	15	72	35	7.9	7.9	11.0
CB2	16	76	32	9.7	15.8	27.0
CB2	17	85	36	9.5	16.0	23.0
CB2	18	79	35	5.3	11.7	17.0
CB2	19	89	38	14.1	17.6	26.0
CB2	20	73	30	7.7	11.2	26.0
CB2	21	92	42	14.7	21.0	32.0
CB2	22	87	36	12.6	16.5	23.0
CB2	23	88	40	8.7	15.9	17.0
CB2	24	75	35	8.9	11.7	12.0
CB2	25					n/a
CB3	1	69	27		10.6	25.0
CB3	2	93	40		22.6	26.0
CB3	3	76	30		11.5	21.0
CB3	4	84	30		15.6	33.0
CB3	5	80	33		14.2	14.0
CB3	6	8	37		14.2	20.0
CB3	7	75	30		12.3	16.0
CB3	8	81	30		9.4	23.0
CB3	9	87	34		15.6	15.0
CB3	10	85	35		24.0	21.0
CB3	11	81	33	11.3	16.9	21.0
CB3	12	76	35	7.4	15.1	37.0
CB3	13	80	30	6.4	10.8	16.0
CB3	14	82	35	12.8	16.5	18.0
CB3	15	78	35	8.1	12.3	16.0
CB3	16	87	38	13.5	18.6	25.0
CB3	17	75	32	8.0	11.8	20.0
CB3	18	97	41	15.2	17.9	21.0
CB3	19	70	33	8.1	10.0	12.0

Appendix D5, Mussel Physical Measurements, cont'd

INDIVIDUAL MUSSEL INFORMATION						
CRD ID	Individual Mussel ID	Shell Length (mm)	Shell Width (mm)	Tissue Wet Weight (g)	Shell Weight (g)	Shell Age (years)
CB3	20	87	36	12.3	14.1	18.0
CB3	21	86	37	9.5	14.9	17.0
CB3	22	75	35	8.0	11.9	18.0
CB3	23	74	37	8.1	10.1	16.0
CB3	24	80	34	13.6	14.6	19.0
CB3	25	92	37	13.5	20.3	23.0
C100SE	1	86	39		17.5	16.0
C100SE	2	81	38		15.2	14.0
C100SE	3	88	40		26.2	21.0
C100SE	4	95	43		20.2	25.0
C100SE	5	90	38		24.1	30.0
C100SE	6	90	44		22.3	15.0
C100SE	7	77	35		17.6	16.0
C100SE	8	89	44		21.2	22.0
C100SE	9	78	35		16.4	21.0
C100SE	10	85	38		14.1	16.0
C100SE	11	81	37	13.1	16.8	22.0
C100SE	12	85	39	11.5	25.1	20.0
C100SE	13	83	37	14.1	21.8	30.0
C100SE	14	86	43	9.9	14.7	22.0
C100SE	15	82	33	8.3	14.0	17.0
C100SE	16	75	34	11.8	8.0	24.0
C100SE	17	80	35	13.6	16.6	21.0
C100SE	18	83	41	14.4	24.2	21.0
C100SE	19	80	36	10.0	16.9	25.0
C100SE	20	81	38	12.3	14.4	16.0
C100SE	21	87	40	14.9	17.3	20.0
C100SE	22	76	35	9.8	18.9	n/a
C100SE	23	72	33	11.3	11.5	14.0
C100SE	24	69	36	8.0	12.7	14.0
C100SE	25	78	37	22.2	16.4	18.0
C100S	1	93	41		23.3	27.0
C100S	2	80	37		15.6	15.0
C100S	3	90	42		23.2	17.0
C100S	4	75	35		14.6	18.0
C100S	5	83	41		17.4	17.0
C100S	6	85	37		14.9	16.0
C100S	7	84	37		18.2	20.0
C100S	8	92	39		27.6	24.0
C100S	9	75	37		11.9	8.0
C100S	10	85	40		22.8	18.0
C100S	11	83	39	18.2	18.2	24.0
C100S	12	75	35	12.4	13.1	17.0
C100S	13	86	40	20.1	22.0	18.0
C100S	14	93	43	19.0	26.6	22.0
C100S	15	87	34	16.2	19.0	18.0
C100S	16	87	36	13.1	18.6	18.0
C100S	17	78	37	13.0	21.4	16.0

Appendix D5, Mussel Physical Measurements, cont'd

INDIVIDUAL MUSSEL INFORMATION						
CRD ID	**Individual Mussel ID**	**Shell Length (mm)**	**Shell Width (mm)**	**Tissue Wet Weight (g)**	**Shell Weight (g)**	**Shell Age (years)**
C100S	18	87	41	14.5	18.2	17.0
C100S	19	89	41	16.0	24.8	22.0
C100S	20	78	35	10.8	13.0	16.0
C100S	21	85	39	15.1	15.7	14.0
C100S	22	81	40	16.3	14.7	13.0
C100S	23	89	36	18.3	18.5	35.0
C100S	24	85	33	18.3	22.2	18.0
C100S	25	86	43	15.5	19.5	12.0
C100SW	1	92	42		19.0	9.0
C100SW	2	66	33		9.2	8.0
C100SW	3	76	35		12.1	15.0
C100SW	4	88	42		17.8	14.0
C100SW	5	69	36		11.1	10.0
C100SW	6	89	37		6.8	16.0
C100SW	7	71	34		11.7	14.0
C100SW	8	92	41		24.6	21.0
C100SW	9	88	40		16.4	15.0
C100SW	10	90	38		26.6	21.0
C100SW	11	97	42	4.3	25.8	23.0
C100SW	12	90	44	18.2	27.9	25.0
C100SW	13	84	37	14.6	19.8	27.0
C100SW	14	66	33	6.7	8.9	8.0
C100SW	15	92	47	16.8	25.6	20.0
C100SW	16	89	36	9.9	14.9	15.0
C100SW	17	78	38	10.0	11.5	9.0
C100SW	18	89	38	13.5	18.6	18.0
C100SW	19	79	39	11.9	14.1	10.0
C100SW	20	75	36	10.8	14.0	12.0
C100SW	21	95	40	19.7	26.1	18.0
C100SW	22	88	41	15.1	25.1	23.0
C100SW	23	95	41	16.5	20.7	17.0
C100SW	24	74	35	9.4	11.7	16.0
C100SW	25	81	36	13.4	16.8	15.0
C100W	1	77	38		21.6	16.0
C100W	2	90	43		24.5	17.0
C100W	3	93	37		27.5	27.0
C100W	4	96	39		22.6	16.0
C100W	5	83	42		20.0	16.0
C100W	6	95	43		21.2	12.0
C100W	7	90	41		24.9	21.0
C100W	8	96	44		30.4	17.0
C100W	9	104	42		40.3	26.0
C100W	10	97	39		28.9	25.0
C100W	11	95	38	17.3	28.0	21.0
C100W	12	84	37	12.4	17.8	17.0
C100W	13	82	47	24.2	33.0	19.0
C100W	14	88	43	18.7	19.5	14.0
C100W	15	105	48	25.6	34.4	26.0

Appendix D5, Mussel Physical Measurements, cont'd

INDIVIDUAL MUSSEL INFORMATION						
CRD ID	Individual Mussel ID	Shell Length (mm)	Shell Width (mm)	Tissue Wet Weight (g)	Shell Weight (g)	Shell Age (years)
C100W	16	85	37	14.6	18.7	14.0
C100W	17	103	47	20.3	25.3	15.0
C100W	18	91	40	15.8	22.6	16.0
C100W	19	90	40	16.2	23.3	12.0
C100W	20	80	40	18.3	20.7	16.0
C100W	21	99	45	23.4	29.3	21.0
C100W	22	90	40	15.2	18.8	13.0
C100W	23	103	42	19.0	34.7	22.0
C100W	24	93	43	21.0	25.3	17.0
C100W	25	91	40	18.4	29.8	26.0
C100NW	1	75	32		14.3	20.0
C100NW	2	95	45		30.3	23.0
C100NW	3	102	47		30.8	28.0
C100NW	4	100	45		23.6	15.0
C100NW	5	85	40		22.5	32.0
C100NW	6	115	47		34.3	21.0
C100NW	7	105	47		27.2	13.0
C100NW	8	91	41		16.7	14.0
C100NW	9	87	45		24.2	18.0
C100NW	10	109	48		45.8	29.0
C100NW	11	100	45	18.7	29.7	22.0
C100NW	12	80	39	12.5	14.9	11.0
C100NW	13	87	42	13.6	18.5	16.0
C100NW	14	92	45	16.7	21.2	12.0
C100NW	15	78	38	11.1	15.7	14.0
C100NW	16	110	55	34.0	37.6	29.0
C100NW	17	90	41	20.0	22.0	24.0
C100NW	18	95	42	20.1	27.1	21.0
C100NW	19	81	41	16.1	15.1	10.0
C100NW	20	76	40	13.0	12.6	9.0
C100NW	21	85	35	13.9	15.4	15.0
C100NW	22	91	48	26.3	27.3	18.0
C100NW	23	82	40	13.5	14.6	13.0
C100NW	24	108	40	29.0	35.0	16.0
C100NW	25					n/a
C100NE	1	96	41		31.4	21.0
C100NE	2	86	39		19.1	14.0
C100NE	3	75	37		17.2	21.0
C100NE	4	94	39		26.1	16.0
C100NE	5	92	36		21.1	24.0
C100NE	6	101	46		36.4	29.0
C100NE	7	96	40		25.6	23.0
C100NE	8	86	40		23.6	18.0
C100NE	9	86	38		20.5	15.0
C100NE	10	85	36		17.9	22.0
C100NE	11	80	36	13.7	16.4	14.0
C100NE	12	100	46	18.7	24.2	22.0
C100NE	13	92	40	14.6	25.7	23.0

Appendix D5, Mussel Physical Measurements, cont'd

INDIVIDUAL MUSSEL INFORMATION						
CRD ID	**Individual Mussel ID**	**Shell Length (mm)**	**Shell Width (mm)**	**Tissue Wet Weight (g)**	**Shell Weight (g)**	**Shell Age (years)**
C100NE	14	96	40	12.5	27.6	35.0
C100NE	15	90	38	17.3	30.6	23.0
C100NE	16	95	42	9.2	30.6	24.0
C100NE	17	81	40	10.6	17.0	12.0
C100NE	18	96	41	17.6	31.1	26.0
C100NE	19	90	38	13.6	19.2	15.0
C100NE	20	79	40	12.2	15.6	14.0
C100NE	21	100	44	16.9	33.5	25.0
C100NE	22	91	39	15.0	21.7	22.0
C100NE	23	89	40	14.3	17.0	18.0
C100NE	24	92	41	17.5	25.3	23.0
C100NE	25	90	40	13.1	22.8	16.0
C100E	1	90	38		23.4	21.0
C100E	2	80	34		18.4	18.0
C100E	3	85	37		16.4	12.0
C100E	4	88	38		21.6	25.0
C100E	5	83	38		20.4	19.0
C100E	6	81	36		17.7	17.0
C100E	7	81	39		16.3	15.0
C100E	8	95	42		24.0	15.0
C100E	9	77	38		13.5	11.0
C100E	10	90	40		20.1	11.0
C100E	11	95	43	13.8	20.8	19.0
C100E	12	88	40	12.0	20.2	23.0
C100E	13	83	38	15.9	20.9	n/a
C100E	14	83	38	13.2	18.7	19.0
C100E	15	86	40	17.0	20.3	19.0
C100E	16	87	40	16.8	19.9	22.0
C100E	17	98	43	19.5	31.4	27.0
C100E	18	88	41	15.1	19.4	20.0
C100E	19	87	37	12.2	17.0	17.0
C100E	20	72	38	9.1	17.5	n/a
C100E	21	85	40	15.7	17.8	17.0
C100E	22	64	32	7.3	8.0	7.0
C100E	23	86	40	12.6	15.8	20.0
C100E	24	90	46	11.8	17.3	11.0
C100E	25	83	38	14.5	18.8	25.0
C200E	1	88	40		25.8	27.0
C200E	2	87	35		17.6	21.0
C200E	3	94	42		25.9	19.0
C200E	4	79	38		13.8	12.0
C200E	5	98	41		21.2	22.0
C200E	6	79	36		12.5	19.0
C200E	7	91	41		21.6	20.0
C200E	8	88	40		20.4	18.0
C200E	9	90	41		27.5	15.0
C200E	10	79	38		18.6	24.0
C200E	11	88	41	15.2	19.1	13.0

Appendix D5, Mussel Physical Measurements, cont'd

INDIVIDUAL MUSSEL INFORMATION						
CRD ID	Individual Mussel ID	Shell Length (mm)	Shell Width (mm)	Tissue Wet Weight (g)	Shell Weight (g)	Shell Age (years)
C200E	12	80	40	12.6	18.8	21.0
C200E	13	81	38	13.6	19.7	16.0
C200E	14	75	35	10.2	16.4	12.0
C200E	15	97	41	19.1	27.3	16.0
C200E	16	99	45	18.0	32.1	21.0
C200E	17	73	35	12.0	10.7	9.0
C200E	18	81	37	11.6	20.1	22.0
C200E	19	86	36	12.9	19.4	24.0
C200E	20	74	38	8.6	12.1	12.0
C200E	21	82	34	14.2	14.4	14.0
C200E	22	96	39	17.0	26.6	24.0
C200E	23	97	40	16.0	20.1	n/a
C200E	24	93	46	15.8	27.2	26.0
C200E	25	71	33	9.1	10.3	14.0
C200S	1	85	35		18.7	19.0
C200S	2	76	35		12.9	14.0
C200S	3	90	42		26.4	37.0
C200S	4	85	40		17.1	15.0
C200S	5	88	41		20.7	20.0
C200S	6	67	35		8.7	9.0
C200S	7	81	37		19.2	23.0
C200S	8	75	35		11.7	13.0
C200S	9	68	34		9.2	10.0
C200S	10	71	35		11.5	14.0
C200S	11	70	34	8.5	10.2	9.0
C200S	12	85	36	12.3	24.9	27.0
C200S	13	71	37	8.0	11.6	12.0
C200S	14	67	33	7.1	9.0	13.0
C200S	15	75	35	9.8	11.7	14.0
C200S	16	68	36	7.0	10.2	9.0
C200S	17	76	37	10.5	12.9	11.0
C200S	18	75	36	9.0	12.0	18.0
C200S	19	82	37	10.4	15.6	14.0
C200S	20	90	35	11.1	25.2	28.0
C200S	21	85	36	10.9	22.4	40.0
C200S	22	72	32	7.6	15.9	16.0
C200S	23	70	35	9.2	12.5	16.0
C200S	24	86	35	13.3	17.4	17.0
C200S	25	80	38	11.6	16.0	15.0
FC7000SE	1	70	34		15.4	11.0
FC7000SE	2	72	34		14.6	14.0
FC7000SE	3	90	41		23.3	22.0
FC7000SE	4	62	33		10.4	12.0
FC7000SE	5	81	41		17.4	11.0
FC7000SE	6	92	43		22.0	14.0
FC7000SE	7	91	39		25.8	24.0
FC7000SE	8	62	31		9.9	8.0
FC7000SE	9	82	38		19.5	20.0

Appendix D5, Mussel Physical Measurements, cont'd

INDIVIDUAL MUSSEL INFORMATION						
CRD ID	Individual Mussel ID	Shell Length (mm)	Shell Width (mm)	Tissue Wet Weight (g)	Shell Weight (g)	Shell Age (years)
FC7000SE	10	87	42		21.2	13.0
FC7000SE	11	71	32	10.2	14.3	24.0
FC7000SE	12	70	29	7.0	12.1	13.0
FC7000SE	13	89	44	14.8	20.2	12.0
FC7000SE	14	78	39	9.8	22.6	20.0
FC7000SE	15	81	38	9.6	17.2	17.0
FC7000SE	16	52	29	6.3	7.2	9.0
FC7000SE	17	88	40	12.3	28.4	29.0
FC7000SE	18	88	44	13.1	22.7	16.0
FC7000SE	19	77	39	11.0	15.1	11.0
FC7000SE	20	73	37	10.3	11.9	8.0
FC7000SE	21	62	31	6.4	8.0	10.0
FC7000SE	22	90	37	16.5	24.2	20.0
FC7000SE	23	76	32	7.9	14.3	17.0
FC7000SE	24	84	37	12.7	18.4	14.0
FC7000SE	25	80	39	10.9	17.3	8.0

Appendix D6
Histology and Gonad Development Report, available upon request
Contact: CRD's Environmental Monitoring Program, 250.360.3296

Appendix D7
Hatfield (2021) Macaulay and Clover Point Outfalls Wastewater and Marine Environment Program Comprehensive Review (2011-2019), available upon request
Contact: CRD's Environmental Monitoring Program, 250.360.3296