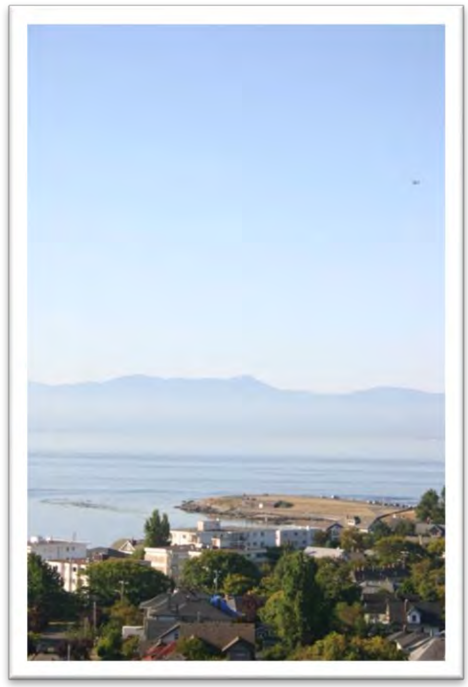
Core Area Wastewater Facilities

Environmental Monitoring Program - 2024 Report

Cycle 3 – Year 4

Capital Regional District | Parks, Recreation & Environmental Services, Environmental Protection



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CORE AREA WASTEWATER FACILITIES
ENVIRONMENTAL MONITORING PROGRAM
2024 REPORT

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EXECUTIVE SUMMARY

The Capital Regional District (CRD) commissioned a new tertiary treatment plant and outfall at McLoughlin Point (McLoughlin) in 2020. Prior to this, the CRD discharged fine-screened municipal wastewater through two core area outfalls located at Macaulay Point (Macaulay) and Clover Point (Clover). Optimization of the treatment processes at McLoughlin was ongoing through 2022. Therefore, 2020 through 2022 are considered transitional years for both sewage treatment and the associated wastewater and receiving environment monitoring program in the Core Area.

CRD staff have monitored quality of the wastewater, surface water and seafloor environments in the vicinity of the Macaulay and Clover outfalls since the late 1980s. The CRD shifted the focus of monitoring to McLoughlin in 2021, but there is significant overlap with historical monitoring locations.

The CRD is required to monitor for compliance with the Municipal Wastewater Regulation (MWR) 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 to assess the impacts of discharged sewage on the marine environment. This monitoring is done on a five-year cycle.

The 2024 Environmental Monitoring Program (EMP) report represents Year 4 of Cycle 3 and includes:

- Wastewater monitoring and analysis for conventional parameters, metals, other contaminants of concern substances and toxicity.
- Receiving environment monitoring, including surface water and water column analysis for bacteriological indicators, conventional parameters, metals and other priority substances (conducted quarterly at McLoughlin).
- Sediment chemistry, sediment pore-water chemistry, sediment toxicity, sediment and benthic invertebrate bioaccumulation and benthic community structure assessment (McLoughlin and Macaulay).
- Wet weather overflow and bypass sampling for bacteriological indicators indicating potential for human exposure to wastewater in the marine environment, and a subset of conventional parameters indicative of wastewater strength (conducted as needed at Macaulay and Clover, and shoreline overflow locations when bypass, overflow or wet weather events occurred).
- Additional investigations and research collaborations that address specific questions about water column and seafloor monitoring components and investigate emerging scientific issues regarding wastewater discharges and environmental effects.

RESULTS

The results presented in this report indicate risks to human health and the environment remain low based on contaminant concentrations outside of the initial dilution zone. The installation of tertiary treatment at McLoughlin has significantly reduced the concentrations and associated contaminant loadings to the marine receiving environment relative to the historical discharge from the Macaulay and Clover outfalls. These findings indicate that the low level of potential risks to human health and the environment has been further reduced.

During 2024, McLoughlin achieved a high-quality effluent with intermittent provincial regulatory exceedances. This was expected as regulatory limits are exceptionally low relative to treatment plant design capabilities. Possible changes to these limits, which are well below environmental protection goals, are being discussed with the regulator. In addition, source control and flow control measures in partnership with large private sector and CRD inputs such as the Hartland Residuals Treatment Facility and Hartland Landfill leachate effluent are being implemented to improve facility performance.

Wet weather high flows, (defined as two times annual dry weather flow amounts) are predicted to occur up to 70 days per year resulting in discharge of blended primary and tertiary effluent from the McLoughlin outfall. In 2024, there were only 16 days when blending occurred; however, most of these events occurred when the full tertiary treatment capacity was not exceeded. Operators are continuing to refine internal flow balancing to ensure blending only happens when full tertiary treatment capacity is exceeded.

Surface water and water column sampling confirmed that the new McLoughlin outfall was operating as predicted from plume dispersion and dilution modelling. Bacteriological and other contaminant levels in the receiving environment were well below those observed when Macaulay and Clover were discharging and were below human health guidelines. This further affirms the environmental benefit of installing treatment at McLoughlin Point.

The conveyance system is designed with numerous shoreline sanitary and combined sewer overflow and relief points that discharge during heavy rains, planned maintenance or following unexpected events. CRD staff conduct shoreline monitoring to assess human health risk for people engaged in recreational activities on beaches adjacent to the overflow locations. Shoreline samples were collected on seven dates in 2024 in response to overflows and bypasses.

The CRD operates a regional water conservation program targeting residential and industrial/commercial/institutional sectors. The program has contributed to a per capita decrease in water demand since the mid-1990s despite an annual average population growth rate of 1.6%. The program was active in 2024 with several major initiatives related to water leak detection and monitoring technology.

ADDITIONAL INVESTIGATIONS AND RESEARCH

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.

The CRD is sampling influent from the McLoughlin Wastewater Treatment Plant several times per week for the BC Centre for Disease Control (BCCDC) and for Public Health Agency of Canada. These groups are testing influent from McLoughlin and elsewhere in BC and Canada for both COVID-19, respiratory syncytial virus (RSV) and influenza analyses. Results are available on the BCCDC and the Public Health Canada websites. Results are published by the Public Health Agency of Canada weekly.

Additional investigations related to benthic invertebrate death assemblage assessment and benthos eDNA were completed in 2024; however, CRD support through the provision of wastewater samples is ongoing.

Finally, the CRD has continued to work with the BCCDC on respiratory illness surveillance in wastewater in 2024. McLoughlin samples are also now provided to the Public Health Agency of Canada under Health Canada for a similar program. These findings help inform public health authority decision-making related to respiratory illness response.

Discussions are ongoing with research laboratories regarding opportunities to assess the effectiveness of the McLoughlin WWTP to characterize and potentially reduce microplastic loadings to the environment. A small-scale microplastic characterization and quantification study was completed by Ocean Diagnostics Inc. (ODI) in 2024. The findings of this study indicated that 60% of microplastics were removed from the liquid stream in the primary treatment processes and only about 10% of microplastics were discharged to the receiving environment.

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 Biologica (the CRD’s contract benthic taxonomist). The researcher has been comparing “death assemblages” of molluscs and bivalves contained within the archived debris to “live” communities assessed as part of the routine sediment sampling program. The project is now complete, and results have recently been published in Kidwell et al., 2025.

Finally, the CRD continued participation in a second collaborative project with Biologica, University of Victoria 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 historical monitoring stations that have been abandoned. The project has a five-year timeline, and in 2021 the team optimized field collection methods and successfully isolated environmental DNA (eDNA) from several indicator species. The CRD will continue to provide support, including a sampling vessel and sample access in 2024 and beyond; however, the project has been completed with results published in 2025 (Acharya-Patel et al., 2025).

CORE AREA WASTEWATER FACILITIES
ENVIRONMENTAL MONITORING PROGRAM
2024 REPORT

Table of Contents

List of Tables

List of Figures

List of Appendices

Terms & Abbreviations

ADWF	Average Dry Weather Flow
BAF	Biological Aerated Filters
BCCDC	BC Centre for Disease Control
BOD	Biochemical Oxygen Demand
CALA	Canadian Association for Laboratory Accreditation Inc.
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
CPS	Clover Pump Station
CRD	Capital Regional District
CSO	Combined sewer overflow
CTD	Conductivity-temperature-depth
EMP	Environmental Monitoring Program
ENT	enterococci
ENV	BC Ministry of Environment and Parks
FC	Fecal Coliform
ICES	International Council for the Exploration of the Sea
IDZ	Initial Dilution Zone
LWMP	Liquid Waste Management Program
MBBR	Moving Bed Biofilm Reactors
MPWWTP	McLoughlin Point Wastewater Treatment Plant
MLD	Megalitres per day
MMAG	Marine Monitoring Advisory Group
MPS	Macaulay Pump Station
NH_3	Ammonia
NO_2	Nitrite
NO_3	Nitrate
NP	Nonylphenols
NSERC	Natural Sciences and Engineering Research Council of Canada
OC	Organochlorine pesticides
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCDD	Polychlorinated dibenzo-p-dioxins
PDBE	Polybrominated diphenyl ethers
PFAS	Per- and poly-fluoroalkyl substances
PFOS	Perfluorooctane sulfonate
PICES	North Pacific Marine Science Organization
PPCP	Pharmaceuticals and personal care products
QA/QC	Quality assurance/quality control
SCADA	Supervisory Control and Data Acquisition
SETAC	Society of Environmental Toxicology and Chemistry
SSAMEx	Salish Sea Ambient Monitoring Exchange
SSO	Sanitary sewer overflow
TDP	Total dissolved phosphorus
TKN	Total Kjeldahl nitrogen
TOC	Total organic carbon
TP	Total phosphorus

Terms & Abbreviations

TSS	Total Suspended Solids
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
MWR	Municipal Wastewater Regulation
WWTP	Wastewater Treatment Plant

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1.0 BACKGROUND

The Capital Regional District (CRD) treats Core Area wastewater at the McLoughlin Point Wastewater Treatment Plant (MPWWTP; Figure 1.1). This facility was commissioned in August 2020 to replace the previous practice of discharging fine-screened (6 mm) wastewater through the Macaulay Point (Macaulay) and Clover Point (Clover) outfalls. The MPWWTP receives wastewater for the Core Area catchment serving a population of 327,474 (CRD 2024 estimate). Wastewater is treated to a tertiary standard before being discharged through a 1,925 metre (m) long outfall to the Salish Sea (Juan de Fuca Strait). This 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 Point outfall terminus.

CRD Core Area Liquid Waste Management Plan and Sewage Treatment Upgrades

In March 2003, the CRD Core Area Liquid Waste Management Plan (LWMP) (CRD, 2000) was approved by the BC Ministry of Environment and Parks (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 Province requiring an amendment to the plan. The amendment detailed a schedule for the provision of secondary or better sewage treatment and requested that the CRD continue the current monitoring program. Plan amendment #7 (CRD, 2009) was submitted to ENV in December 2009, along with follow-up amendments #8 (CRD, 2010), #9 (CRD, 2014), #10 (CRD, 2016a), #11 (CRD, 2016b), and #12 (CRD, 2017). These amendments have all been conditionally approved by ENV and included the CRD’s commitment to build the new wastewater treatment 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 (CSO) locations in the Clover system, was also conditionally approved in June 2018.

The McLoughlin WWTP operates under *BC Municipal Wastewater Regulation* registration RE-108831, which was originally issued in June 2020 and revised in February 2021. The MPWWTP also meets all requirements of the Federal *Wastewater Systems Effluent Regulation* (WSER). The Macaulay and Clover outfalls historically operated under permits issued by ENV under the 2004 *BC Environmental Management Act* [formerly the *BC Waste Management Act* (BCMoE, 2004)]. Following the commissioning of the McLoughlin facility, the permit for Clover was cancelled effective June 20, 2021, and for Macaulay effective January 7, 2022. The transitional authorizations for Macaulay and Clover, to discharge deleterious substances under WSER, were cancelled as of December 31, 2020. Operation of all three outfalls is detailed in long-term direction of the LWMP (Appendix A1).

Sewage Treatment at McLoughlin Point Wastewater Treatment Plant

Screening and grit removal occurs at the Macaulay and Clover pump stations (Figure 1.1) prior to pumping flows to McLoughlin Point Wastewater Treatment Plant. The MPWWTP can handle up to 432 megalitres per day (MLD), which is four times the Average Dry Weather Flow (ADWF = 108 MLD per day). Treatment processes include:

- Primary Treatment:
  - Lamella plate settlers for flows up to 216 MLD (i.e., 2xADWF).
  - High rate Densadegs for flows exceeding 216 MLD and up to 432 MLD (i.e., 2-4xADWF).

- Secondary Treatment: a sequence of Moving Bed Biofilm Reactors (MBBR) and Biological Aerated Filters (BAF) for primary flows up to 216 MLD.

- Tertiary Treatment: Cloth Disk Filters for secondary flows up to 216 MLD.

Future Capacity and Demand Management

Water conservation is important to supporting the long-term efficiency and reliability of wastewater treatment operations. Through reduced water demand and peak usage, water conservation and demand management can reduce strain on wastewater treatment plant processes.

The CRD has an established regional water conservation program that includes targeted outreach and education for the residential and industrial/commercial/institutional sectors. The region has an annual service population growth rate of approximately 1.6%. In 2024, the regional per capita demand was 322 litres per capita per day, while the three-year average per capita demand is 335 litres per capita per day. Regional per capita demand has shown a steady annual decrease since the inception of the CRD water conservation program in the mid-1990s but has shown a plateauing trend in recent years.

The residential sector accounts for approximately 66% of total demand and the industrial/ commercial/institutional sector accounts for approximately 21% of total demand. The balance of demand is comprised of agricultural demand (3%) and non-revenue (leaks/losses) demand (10%).

In 2024, the CRD's residential water conservation program advanced regional water efficiency through targeted education and outreach initiatives. Our education campaigns continue to be foundational to our outreach. The Waterwise campaigns increased public awareness of water use restrictions and promoted sustainable outdoor and indoor water practices. Through Fix a Leak Week, residents were equipped to identify and repair household leaks, reducing unnecessary water loss. Our native plant gardening workshops and school programs teach residents of all ages hands-on tips for conserving water. These efforts supported the region's commitment to long-term water sustainability and responsible resource management.

In 2024, the CRD residential water conservation program attended 34 community events, hosted 10 native plant gardening workshops, with a total of 288 attendees, distributed 872 fix-a-leak-week kits and delivered a total of 31 school program sessions with 737 student registrants.

The institutional/commercial/industrial water conservation program focuses on improving water use efficiency through providing economical recommendations. In 2024, the program continued to conduct sector-specific water use assessments with a focus on high schools where a total of 9,500 m3/year and 4 tCO2e estimated savings were identified. During the assessments, 300 high efficiency faucet aerators were also distributed.

To reduce peak hour water demand, and WWTP loading spikes, 10 significant industrial and institutional water users and 10 golf courses were contacted and asked to move their operational hours away from the peak hours. Targeted outreach to 1000 ICI users also occurred and operations staff from all local municipal and school district were directly contacted with the messaging.

Water monitoring technology was piloted by installing a monitoring system at CRD Fisgard Headquarters as well as one commercial business, and at two Capital Regional Housing Corporation multi-unit buildings to further the program's understanding of emerging technologies and to build relationships with municipal meter reading staff and CRD property managers.

High Flow Bypass and Overflows

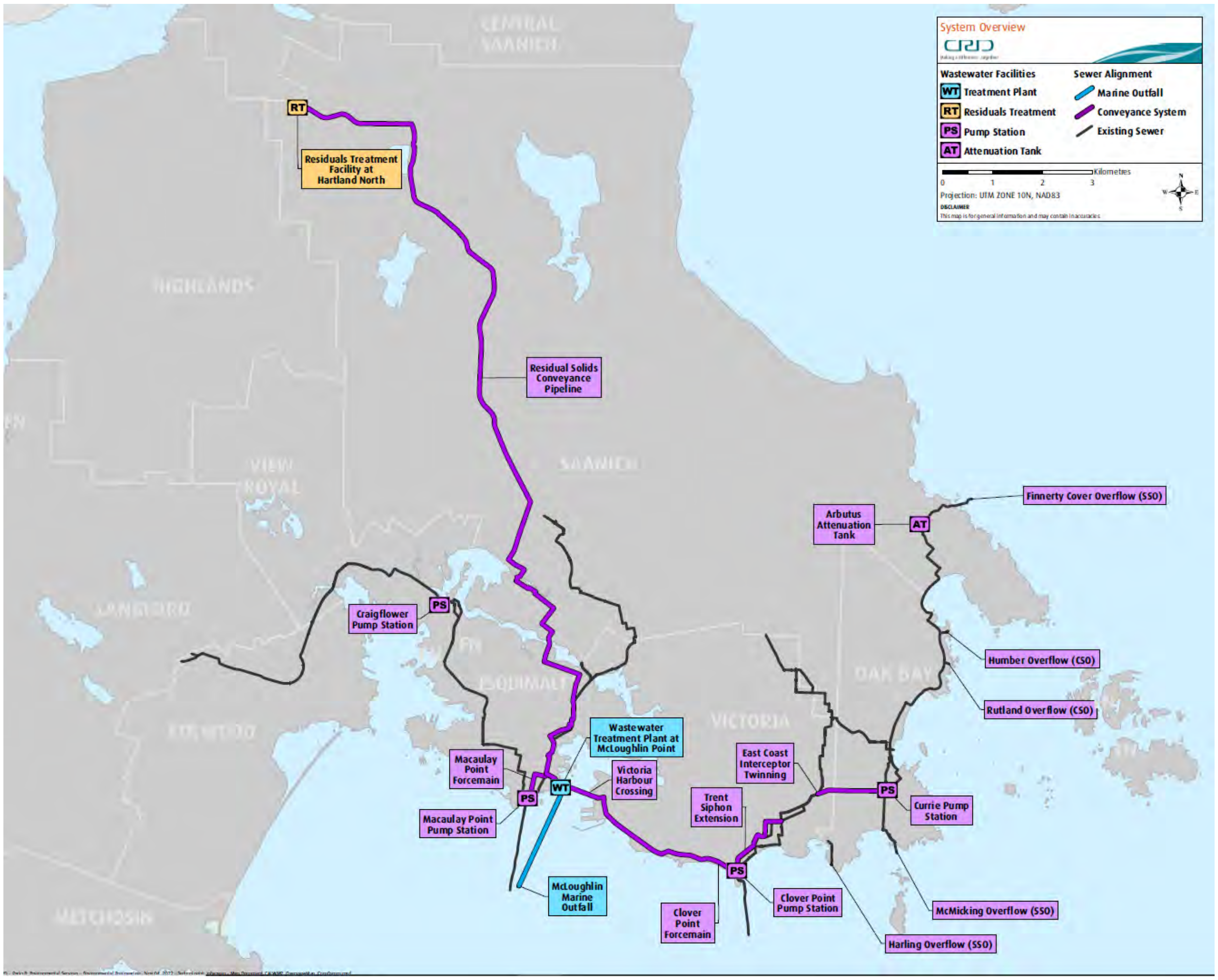
Flows up to 216 MLD (i.e., 2xADWF) receive full tertiary treatment at MPWWTP. When flows exceed 216 MLD, typically during wet weather, the flows above 216 MLD receive primary treatment only (high rate Densadeg) and are then blended with the tertiary effluent prior to outfall discharge.

Both Clover and Macaulay pump stations have upgraded capacity to pump 4xADWF to MPWWTP. During heavy rain events, flows may exceed this threshold. In these rain events, flows exceeding 4xADWF are screened to 6 mm and discharged out the Macaulay and/or Clover long outfalls – effectively operating as sanitary sewer overflow points for the upstream conveyance system. These overflows rarely occur since commissioning of the WWTP.

Wastewater has been discharged from the Macaulay and Point outfalls for over 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 discharge location was moved offshore. The outfall is now approximately 1,800 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 approximately 1,160 m long and discharges through a multiport diffuser at a depth of approximately 65 m.

The treated McLoughlin and screened wet weather Macaulay and Clover wastewaters are discharged to the deep, cold, and fast-moving waters of Juan de Fuca Strait. The non-saline wastewater is then rapidly diluted as it mixes with surrounding saline receiving water. As the wastewater plume mixes with the saline water, it rapidly rises and traps at mean depths of 20-50 m (McLoughlin) and 45-60 m (Macaulay and Clover), with some plume surfacing predicted and measured during periods of slack tide, predominantly during the winter months (Hodgins, 2006; Lorax, 2019).

Figure 1.1 Locations of Major Core Area Wastewater Facilities and Discharge Locations



In addition to the three main discharge points, there are several shoreline sanitary sewer overflow (SSO) and two combined sewer overflow (CSO) locations in the upstream conveyance system (Figure 1.1) that serve as wet weather and emergency bypass and overflow locations.

The Arbutus Flow Attenuation Tank was installed in the upstream conveyance system (near Haro Woods) as part of the MPWWTP construction project. The Marigold holding tank was constructed in 2004 to attenuate flows on the west side of the conveyance system. These holding tanks reduce the frequency of SSO discharge events relative to the old configuration.

The two CSO locations (Humber and Rutland pump stations) are within the District of Oak Bay. Oak Bay is required to separate these systems and is actively working towards this goal at Humber Pump Station. The separation plan for the collection system feeding Rutland pump station is still in planning stages. Until fully separated, the frequency of CSO discharge events will remain unchanged as they are operated independently of the adjacent trunk conveyance system during wet weather events.

1.1 Approach and Program Components

The current monitoring program components were developed in conjunction with BC ENV and MMAG, as part of the newest environmental monitoring program based on a five-year cycle. Information about the monitoring program for years prior to 2011 can be found in Appendix A. The first cycle (Cycle 1) took place from 2011-2015, but one component (the fish survey) was delayed until 2018 due to logistical challenges.

Cycle 2 began in 2016 and ended in 2020. Cycle 3 began in 2021 and will end in 2025. The objectives of the monitoring program [as presented in the Core Area Liquid Waste Management Plan (CRD, 2000) and updated in amendment #7 (CRD, 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 treatment managers regarding plant and outfall diffuser performance.
- Submit compliance monitoring results to regulatory agencies.
- Report to the 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 EMP Cycle 3 is presented in Table 1.1. The 2024 monitoring program is presented in Table 1.2 and consists of the following components:

- Wastewater monitoring and analysis for a list of substances, including conventional parameters, metals, other compounds of concern and toxicity (conducted monthly at McLoughlin).

- Initial dilution zone and receiving environment monitoring including surface water and water column analysis for bacteriological indicators of potential for human exposure to wastewater in the marine environment. Additionally, a list of substances, including conventional parameters, metals, and other priority substances (conducted quarterly at McLoughlin, and only if they are discharging coincident with routine McLoughlin sampling, around the Macaulay and Clover outfalls).

- Wet weather overflow and bypass sampling for bacteriological indicators of potential for human exposure to wastewater in the marine environment, and a subset of conventional parameters indicative of wastewater strength (conducted as needed at Macaulay and Clover, and around the various shoreline overflow locations when bypass, overflow or wet weather events occurred).

- Sediment chemistry, sediment pore-water chemistry, sediment toxicity, sediment and benthic invertebrate bioaccumulation and benthic community structure assessment (McLoughlin and Macaulay).

- Continuing additional investigations that address specific questions about water column and seafloor monitoring components and that investigate emerging scientific issues regarding wastewater discharges and environmental effects.

Reclaimed water monitoring is also a requirement of the EMP, but the reclaimed water system was abandoned early in 2021 due to operational challenges. As a result, no reclaimed water data will be presented in this report.

An evidence-based approach is used to assess potential environmental effects. Wastewater is analysed on a regular basis for substances present in sanitary sewage. The potential effects of these substances on organisms in surface waters and the water column are assessed by comparing predicted marine receiving environment concentrations to water quality guidelines. The predicted concentrations are calculated by 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. Human health risks are assessed via the surface, water column and shoreline bacteriological monitoring. Concentrations of substances present in the wastewater discharges are also analysed 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 proximal to the outfalls are monitored to assess effects of the discharges.

The organisms that have the potential for the most severe effects in the marine environment close to the outfalls are those that are sessile or have a limited range and are therefore exposed to the wastewater discharges for most or all their life stages. These organisms include benthic invertebrate communities near the McLoughlin and Macaulay outfalls and mussel communities off the Clover outfall. Prior to 2011, these organisms were monitored annually. As part of the revised EMP design, the 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 a finfish and crab health study.

In addition to the sediment toxicity and bioaccumulation studies, the health of the seafloor communities is evaluated by assessing organism presence, abundance, growth and reproductive status. These biological indicators provide a direct assessment of *in situ* 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 invertebrates, mussel, finfish and crab tissue.

The five-year monitoring cycles will continue to be supplemented by additional investigations according to priorities presented in this report and in response to emergent environmental concerns. Additional investigations are important elements of the monitoring program, with some of the investigations part of the requirements under the Core Area LWMP 2003 approval. Current additional investigations are presented in Table 6.1 and are discussed in Section 6.1. Results from these investigations are incorporated in the overall assessment of effects on the marine environment.

Monitoring year 2024 represents Cycle 3, Year 4 of the Environmental Monitoring Program (EMP; formerly the Wastewater and Marine Environment Program [WMEP]). As the Residuals Treatment Facility at Hartland Landfill is regulated under a separate provincial authorization (ME-109471), biosolids monitoring results are presented in separate reports (CRD, 2024 and HRMG, 2024).

1.2 Data Presentation and Analysis

Summary data reports are now prepared following each of the first four years of a five-year cycle, beginning with the 2011 monitoring year. These data reports will include any completed statistical assessments of the data, and the results used to confirm the suitability of the upcoming year's monitoring design. Additional guidance on the interpretation and analysis of this data beyond what is contained in this report is available upon request (Appendix A2; Golder, 2011). A more comprehensive interpretive report 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, 2021) and a summary of the findings was presented in CRD, 2021.

This report presents a summary of the results of the 2024 Core Area EMP (Cycle 3, Year 4), along with any data and analyses of results from previous years that have not yet been presented. Limited statistical analyses have been performed on the 2024 data; a more detailed and comprehensive statistical assessment of the results will be undertaken as part of the upcoming Cycle 3 (2021-2025) review that will be initiated in 2026.

Table 1.1 Monitoring Components of the Five-Year McLoughlin, Macaulay and Clover Environmental Monitoring Program (Cycle 3)

Monitoring Component	Sub-component	Year 1 (2021)			Year 2 (2022)			Year 3 (2023)			Year 4 (2024)			Year 5 (2025)		
		McL[1]	Mac[1]	Clo[1]	McL	Mac	Clo	McL	Mac	Clo	McL	Mac	Clo	McL	Mac	Clo
WASTEWATER																
Wastewater	daily, weekly, monthly and quarterly chemistry	√			√			√			√			√		
	quarterly high-resolution chemistry	√			√			√			√			√		
	monthly toxicity testing	√			√			√			√			√		
	ad hoc wet weather, overflow and bypass 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														√	√
	whole fish and fillet tissue chemistry														√	√
SURFACE WATER AND WATER COLUMN																
Surface Water	bacteria	√			√			√			√			√		
Water Column	bacteria, conventionals, metals	√			√			√			√			√		
Ad Hoc Wet Weather, Overflow and Bypass Events	surface and water column bacteria		√	√		√	√		√	√		√	√		√	√
	shoreline bacteria	various conveyance system sanitary and combined sewer overflow shoreline locations														
REPORTING AND ADDITIONAL INVESTIGATIONS																
Additional Investigations	dependent upon emerging environmental issues and recommendations	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Reporting	annual data summary report	√	√	√	√	√	√	√	√	√	√	√	√			
	five-year comprehensive report													√	√	√

Notes:
[1] McL-McLoughlin, Mac-Macaulay, Clo-Clover.

Table 1.2 Monitoring Components of the 2024 McLoughlin, Macaulay and Clover Environmental Monitoring Program

McLoughlin Outfall	Parameter	Monitoring Frequency
Wastewater	Flow	Daily
	Compliance monitoring	Federal – Weekly, Provincial – Various frequencies
	Conventional parameters[1] and priority substances[1]	Monthly
	Enhanced priority substances[1]	Quarterly (January, April, July, October)
	Toxicity – acute	Monthly
	Toxicity – chronic	Annually
Surface Water & Water Column	Indicator bacteria (fecal coliform and enterococci) and CTD (dissolved oxygen, salinity, temperature) Conventional parameters[1] and metals[1]	Quarterly with 5 sampling events in 30 days during each quarter
Benthic Invertebrate and Sediment	Conventional parameters[1] and priority and high resolution substances[1]	Two times in a five-year cycle (2022 and 2024)
Macaulay Outfall	**Parameter**	**Monitoring Frequency**
Wastewater	Flow	Measured during bypasses and overflows
	Indicator bacteria and select conventional parameters	Measured during bypasses and overflows
Surface Water & Water Column	Indicator bacteria (fecal coliform and enterococci) and CTD (dissolved oxygen, salinity, temperature) Conventional parameters[1] and metals[1]	Measured during bypasses and overflows if coincident with routine McLoughlin surface water sampling
Clover Outfall	**Parameter**	**Monitoring Frequency**
Wastewater	Flow	Measured during bypasses and overflows
	Indicator bacteria and select conventional parameters	Measured during bypasses and overflows
Surface Water & Water Column	Indicator bacteria (fecal coliform and enterococci) and CTD (dissolved oxygen, salinity, temperature) Conventional parameters[1] and metals[1]	Measured during bypasses and overflows if coincident with routine McLoughlin surface water sampling
Seafloor		One time in a five-year cycle (2025) at Clover
Conveyance Overflows	**Parameter**	**Monitoring Frequency**
Shoreline	Indicator bacteria (fecal coliform and enterococci)	Measured during bypasses and overflows

Notes:
[1]Analyte lists can be found in Appendices B1 (wastewater), and C1 (water column).
CTD: Conductivity, temperature and density

2.0 WASTEWATER MONITORING

2.1 Introduction

Influent and final effluent monitoring is conducted regularly to assess compliance with the registration requirements under the Municipal Wastewater Regulation and the Federal Wastewater Systems Effluent Regulations (WSER). Regulated parameters include carbonaceous biochemical oxygen demand (CBOD), un-ionized ammonia, toxicity, total suspended solids (TSS) and pH. Table 2.2 presents the federal and provincial limits for these regulated parameters.

Monitoring is also conducted to profile the chemical and physical constituents of influent and effluent before they are released to the marine receiving environment. Assessment of influent and effluent provides information on the concentrations and loadings of contaminants released to the marine receiving environment and provides an indication of which substances may be of environmental concern. These results are then used to direct the efforts of the receiving environment monitoring program and the CRD's Regional Source Control Program.

Wastewater monitoring is also required at the Clover and Macaulay pump stations during conveyance system wet weather overflows or planned and approved maintenance bypass events. The objective of this monitoring is to assess equivalency to primary treatment and provide data to determine potential risk to the receiving environment. If these events happen concurrently with routine MPWWTP surface water sampling, then receiving environment sampling around the Macaulay and Clover outfalls is also required (discussed in Section 3.0).

The MPWWTP provincial registration allows 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. The use of reclaimed water was discontinued in 2021 due to challenges meeting effluent quality compliance with the registration. This challenge was due to frequency of use: the reclaimed system was designed to operate more frequently than it was, resulting in fouling and non-compliance. The reclaimed water system was subsequently shut down.

2.2 Methods

Federal and Provincial Compliance Sampling

As required by the applicable regulations and registration, federal and provincial MPWWTP final effluent compliance monitoring was conducted using 24-hour flow-based composite samples. Flow-based sampling methods lead to samples taken proportional to the flow (recorded by the supervisory control and data acquisition system (SCADA). After collection, samples were immediately dispatched to two CALA certified laboratories to conduct chemical analyses (Bureau Veritas Laboratories [BV Labs, Burnaby, BC] and the in-house MPWWTP Laboratory).

Toxicity testing using rainbow trout and *Daphnia magna* was conducted monthly by Nautilus Environmental (Burnaby, BC & Calgary, AB) using final effluent grab samples. The rainbow trout test methods approved by regulators (provincial and federal) include both EPS 1/RM/50 and EPS 1/RM/13. Test method EPS 1/RM/13 does not use CO_2 aeration to adjust for pH drift while EPS 1/RM/50 does. To use test method EPS 1/RM/50, the operator must demonstrate that any toxicity is caused by ammonia and pH drift in the test conditions. Final effluent was tested initially in 2021 using 1/RM/13 but was switched to pH stabilized 1/RM/50 after ammonia toxicity was demonstrated (discussed further in Section 2.3.4). During 2024, the rainbow trout tests were transitioned to the single concentration method under EPS 1/RM/50.

Influent and effluent flow volumes were measured continuously (every few minutes) by a SCADA system at the MPWWTP influent and effluent points. Final effluent flow measurements were compared to maximum daily and annual mean flow limits specified in the permits. 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.

Wastewater Characterization

CRD staff conducted influent and effluent sampling at the MPWWTP to characterize wastewater and assess treatment plant performance. Samples were analysed daily, weekly, monthly, and/or quarterly for over 20 conventional parameters, including total suspended solids and nutrients. Approximately 500 substances were analysed monthly or quarterly as listed in Table 2.1 and Appendix B1. Acute toxicity tests were carried out monthly and chronic toxicity tests were carried out annually. In 2024, the rainbow trout alevin and embryo (EA) 30-day (survival and growth) chronic toxicity endpoints could not be completed due to organism availability challenges.

In 2024, MPWWTP influent and effluent samples were taken as 24-hour time-based composites (400 mL wastewater collected every 30 minutes for 24 hours and combined into one sample). Time-based composites, rather than flow-based composites, were used for wastewater characterisation to ensure the results were representative and that adequate sample volumes were collected.

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 and updated periodically in response to new information on analytical techniques, emerging contaminants of concern, and potential effects to the receiving environment. The list was most recently revised to align with Ocean Wise's Pollution Tracker Program.

Samples were delivered to Canadian Association for Laboratory Accreditation Inc. (CALA) certified laboratories for chemical analyses. Conventional and priority substance parameters were analysed by Bureau Veritas Laboratories (BV Labs, Burnaby, BC), and high-resolution analyses were conducted at SGS AXYS Analytical Services (Sidney, BC). Substances were analysed using methods suitable for comparison to applicable water quality guidelines. Acute (Appendix B7) and chronic (Appendix B8) wastewater toxicity testing was conducted by Nautilus Environmental (Burnaby, BC & Calgary, AB), using standardized and Environment and Climate Change Canada protocols.

Overflow and Bypass Sampling

As required by ENV, any overflow or bypass discharge event from either the Clover or Macaulay pump station must be sampled by automated composite samplers. These samplers are programmed to collect composite samples in 400 mL aliquots every 30 minutes if an overflow or bypass event results in discharge exceeding one hour. After collection, composite samples are then delivered to CALA certified laboratories for fecal coliform, enterococci, TSS and CBOD analyses.

Overflow sampling was not carried out in 2024. During the sole overflow event (DGIR 245050 on December 17-18 at Clover Point), the composite sampler failed to trigger due to pump failure. The issue was resolved, and periodic testing is planned to reduce risk of sampling failure during any future overflow events.

Table 2.1 Frequency of Wastewater Sampling by Analytical Group

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

Parameter Group	Influent and Final Effluent Analytics			
	Daily/ Weekly	Monthly	Quarterly	Annual
Conventionals (nutrients, oxygen demand, pH, TSS)	√	√	√	
Metals, total		√	√	
Metals, speciated (MeHg and tributyltin (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 pH stabilized or % survival at 100% effluent		√*		
Daphnia magna 48-hr LC50		√*		
Chronic Toxicity				
Ceriodaphnia dubia 7-day (survival and reproduction)				√*
Rainbow trout alevin and embryo (EA) 30-day (survival and growth)				√**
Pacific topsmelt 7-day (survival and growth)				√*
Echinoderm fertilization (reproduction)				√*
High-Resolution Analyses				
Nonylphenols (NP)			√	
Organochlorine pesticides (OC Pest)			√	
Pharmaceuticals and personal care products (PPCP)			√	
Polychlorinated biphenyls (PCB)			√	
Polycyclic aromatic hydrocarbons (PAH)			√	
Polybrominated diphenyl ethers (PBDE)			√	
Polychlorinated dibenzodioxins (PCDD)			√	
Per- and poly-fluoroalkyl substances (PFAS)			√	

Notes: *final effluent only; **endpoint was not completed due to organism supply challenges.

DATA QUALITY ASSESSMENT

CRD staff followed a rigorous quality assurance/quality control (QA/QC) assessment procedure for both field sampling procedures and laboratory analyses for the routine wastewater monitoring component (Golder, 2011). From each analytical batch (12 monthly batches in 2024), one sample was run as a laboratory triplicate analysis annually and one sample was randomly chosen for field triplicate analysis. In addition, one sample each month was analysed as a matrix spike. Trip and field blanks were tested once in 2024. The analytical laboratories also conducted internal QA/QC analyses, including method analyte spikes, method blanks and standard reference materials.

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

2.3 Results and Discussion

Table 2.2 presents the Federal and Provincial final effluent compliance limits.

Table 2.2 McLoughlin Point WWTP Provincial and Federal Compliance Limits – Final Effluent

Parameter	Unit	Provincial Limit		Federal Limit
		McLoughlin WWTP ≤216,000 m^3/day	McLoughlin WWTP* >216,000 m^3/day	McLoughlin WWTP ≤432,000 m^3/day
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)
pH	pH	6-9	---	---
Effluent Flow (maximum)	m^3/day	432,000		---

Notes:
*Provincial registration allows only 70 days per year >216,000 m^3/day.

2.3.1 Provincial Compliance Monitoring

Effluent monitoring is undertaken to ensure compliance with the provincial registration issued for MPWWTP; effluent quality limits vary depending on whether the facility is discharging solely tertiary effluent when flows are less than or equal to 216,000 m^3/day (≤2ADWF), or blended (primary + tertiary) effluent when flows are greater than 216,000 m^3/day (>2DWF). Table 2.2 presents these compliance limits. The MPWWTP is authorized to blend primary and tertiary flows for 70 days per year.

The average daily effluent flow from MPWWTP was 94,501 m^3/day and the maximum was 226,910 m^3/day on December 18, 2024, well below the limit of 432,000 m^3/day. Daily effluent flow is presented in Figure 2.1 and tabulated in Appendix B3. Daily influent flow is tabulated in Appendix B2.

Appendix B4 presents the compliance results for non-blended flow days (<216,000 m^3/day). MPWWTP effluent was not compliant with provincial registration requirements on the following occasions:

Monthly Averages

- The monthly average TSS concentration was out of compliance for 5 of 12 months (January, March, April, July and August).
- The monthly average CBOD concentration was out of compliance for 7 of 12 months (March, April, May, June, July, August and September).

Maximum Values

- The maximum TSS concentration was out of compliance three times in 2024 (January 29, July 22 and July 23).
- The maximum CBOD concentration was out of compliance twice in 2024 (August 18 and August 21).

The MPWWTP was designed to produce final effluent meeting 10 mg/L TSS and 10 mg/L CBOD; however, this design standard was not anticipated to be informative of the permit limits considering the plant discharges to the marine environment. Possible changes to these limits are being discussed with the regulator. In the meantime, source control and pre-treatment and flow control measures in partnership with large private sector and CRD inputs such as the Hartland Residuals Treatment Facility and Hartland Landfill leachate effluent are being implemented to improve facility performance.

Maximum CBOD and TSS concentrations for blended discharge days are presented in Table 2.3.

In 2024, there were 16 days when blended effluent discharge occurred. The discharge flow was in excess of the 216,000 m^3 discharge limit; October 19, 2024 (210,376 m^3) and December 18, 2024 (226,910 m^3). All 16 blended discharge dates are out of compliance because full tertiary treatment capacity was not achieved prior to blending. Operators continue to refine the instantaneous flow control set points that resulted in the premature blending.

Table 2.3 presents flow measurements and compliance results for the 16 days that blended discharges occurred. Results for all blended discharge days were below the provincial discharge limits of 130 mg/L CBOD and 130 mg/L TSS.

Toxicity Testing

Acute toxicity test results passed for all endpoints for each sampling event except for the sample collected on August 13, 2024 with a rainbow trout LC50 result of 99.2% [72.5% - >100% (95%CL)]. The two follow-up samples collected in two-week intervals were acceptable.

2.3.2 Federal Compliance Monitoring

Appendix B4 presents results of compliance to WSER. The MPWWTP was compliant with WSER limits for TSS, unionized ammonia and CBOD in 2024.

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Figure 2.1 McLoughlin Point WWTP Tertiary Effluent Flows in 2024

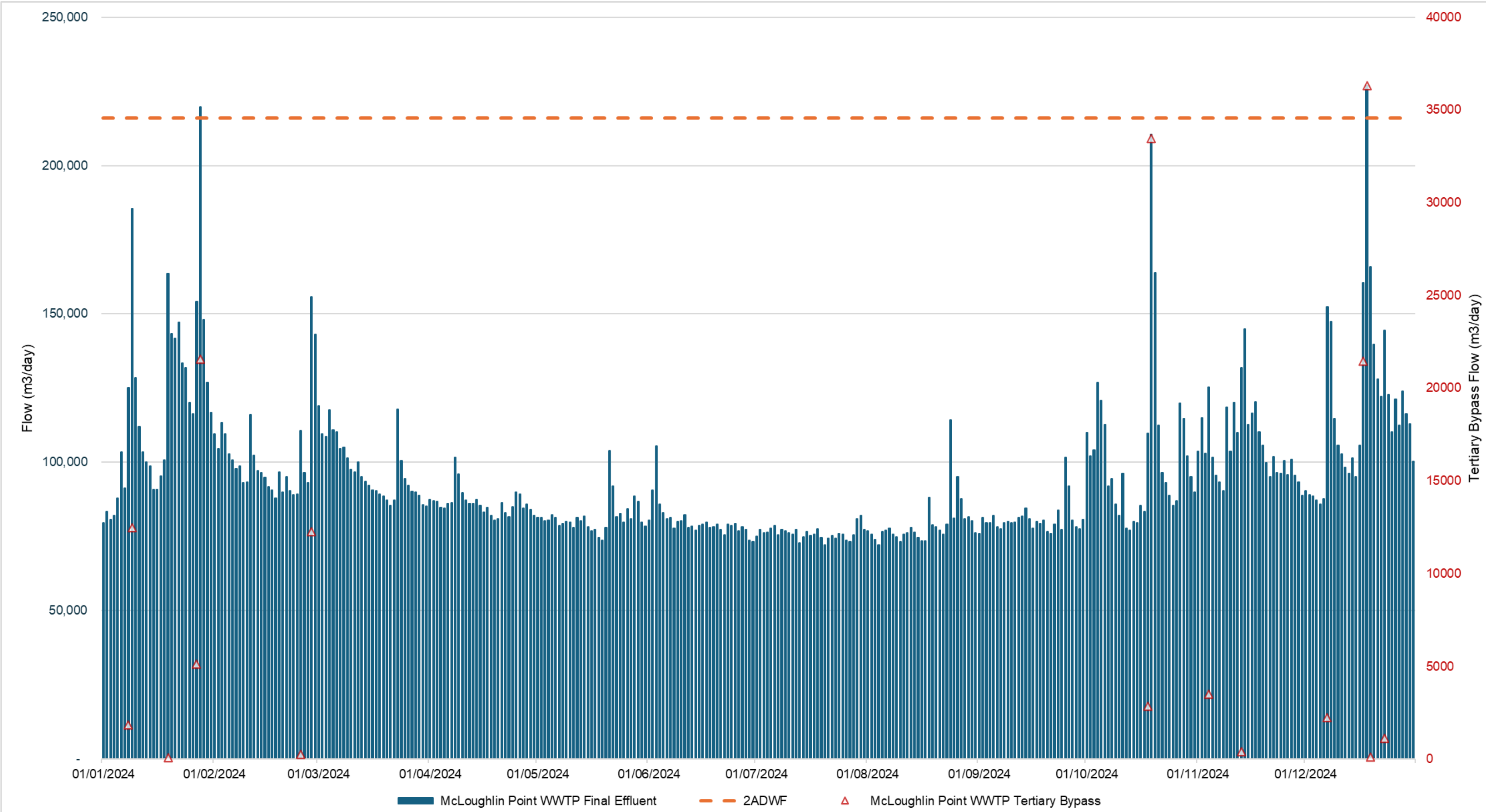


Table 2.3 McLoughlin Point WWTP Provincial Wastewater Compliance Results for 2024 Blended Effluent Days (>216,000 m³/day)

McLoughlin Point Wastewater Treatment Plant Final Effluent					
	Blended Days (cumulative to date)	Flow (not blended) m^3/day	Flow (blended) m^3/day	CBOD mg/L	TSS mg/L
Provincial Limit				130 (maximum)	130 (maximum)
Registration	70				
08/01/2024	1	125,135	1,860	14.1	23.0
09/01/2024	2	185,569	12,490	13.8	26.0
19/01/2024	3	163,663	70	-	-
27/01/2024	4	154,216	5,110	-	-
28/01/2024	5	219,715	21,560	13.3	36.0
25/02/2024	6	110,744	270	13.4	23.0
28/02/2024	7	155,739	12,250	18.1	37.0
18/10/2024	8	109,747	2,850	11.4	20.0
19/10/2024	9	210,376	33,470	5.8	15.0
04/11/2024	10	125,401	3,490	12.4	14.0
13/11/2024	11	131,938	410	14.0	14.0
07/12/2024	12	152,370	2,240	-	-
17/12/2024	13	160,510	21,440	20.1	28.0
18/12/2024	14	226,910	36,310	11.2	14.9
19/12/2024	15	165,950	120	-	8.0
23/12/2024	16	144,490	1,110	-	13.2

Notes:
*2ADWF – Two times average dry weather flow.
--- no sample
Grey shading indicates non-compliant blending occurred.
Red shading indicates exceedance to provincial limit.

2.3.3 Priority Substances

McLoughlin Point WWTP final effluent was analysed for priority substances as listed in Table 2.1 and Appendix B1. In 2024, 564 parameters (detection rate = 54%) were analysed as total concentration, and 42 parameters (detection rate = 95%) were analysed for their dissolved fraction. The frequencies of detection of all substances analysed in wastewater are included in Appendix B6 (McLoughlin).

As expected, McLoughlin Point WWTP effluent had lower loadings than the combined historical Clover and Macaulay loadings (CRD, 2020-2022) due to the efficacy of the tertiary treatment processes. Concentrations of substances that were frequently detected (greater than 50% of sampling events) in final effluent are presented in Table 2.4. Annual loadings to the marine environment are presented in Appendix B5 alongside influent loadings.

To determine the potential for effects of the wastewater discharges on the receiving environment, average and maximum wastewater concentrations of frequently detected substances (Table 2.4) were compared to the BC Approved and Working Water Quality Guidelines (ENV 2025; ENV 2025a) and CCME Environmental Quality Guidelines (CCME, 2025) developed to protect aquatic life. Conservative estimates of the minimum initial dilution of the wastewaters in receiving waters off the outfalls (113:1 for McLoughlin; Lorax, 2019) were applied to maximum wastewater substance concentrations 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 (100 m radius). 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 much higher in the marine receiving environments around the outfall (711:1 [median] for MPWWTP).

Before application of minimum initial dilution factors, several substances exceeded applicable guidelines in undiluted final effluent prior to discharge, including Enterococci, cadmium, copper, nickel, zinc, acenaphthene and weak acid dissociable cyanide (WAD) (Table 2.4).

After application of the minimum initial dilution factor, there were no substances exceeding applicable guidelines (except enterococci) in final effluent, indicating that receiving environment concentrations were unlikely to exceed guidelines beyond the initial dilution zone (i.e., the area that extends 100 m around the outfall diffusers), and the potential for effects on aquatic life were likely limited to within the initial dilution zone (IDZ).

In final effluent, the bacterial indicator enterococci (Appendix B4) routinely exceeded WQG protective of the public engaging in recreational activities such as swimming and shellfish collection (Health Canada, 2024). The enterococci average concentration was 40,208 CFU/100 mL. The enterococci modelled dilution ratio of 113:1 (Lorax, 2019) indicates environmental concentrations of 356 CFU/100 mL (Table 2.4). The MPWWTP does not use disinfection as part of tertiary treatment and as such, bacterial indicators are expected to continue to exceed water quality criteria.

Appendix B6 presents removal efficiency of the treatment process in 2024. These values are based on 12 samples of influent and effluent over a year and calculation of loadings from these concentrations and effluent flows. Of the hundreds of parameters measured, 24% were undetectable after treatment including pharmaceuticals, hormones, dioxins, PCBs, pesticides and oil and grease. Seventeen percent of parameters had a >90% removal efficiency and 36% had a removal efficiency >80%.

Table 2.4 Concentrations of Frequently Detected Substances (>50% of the time) in McLoughlin Point WWTP Final Effluent – 2024

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
Dichloro Biphenyls	TOT	µg/L	100%	1.85E-04	2.36E-04	1.28E-04	1.64E-06		
Heptachloro Biphenyls	TOT	µg/L	100%	8.12E-05	9.56E-05	5.68E-05	7.19E-07		
HEPTA-DIOXINS	TOT	µg/L	100%	1.25E-05	2.38E-05	3.58E-06	1.11E-07		
Hepta-Furans	TOT	µg/L	75%	1.07E-06	1.41E-06	7.11E-07	9.44E-09		
Hexachloro Biphenyls	TOT	µg/L	100%	2.08E-04	2.34E-04	1.76E-04	1.84E-06		
HEXA-DIOXINS	TOT	µg/L	100%	1.77E-06	3.26E-06	3.15E-07	1.57E-08		
Monochloro Biphenyls	TOT	µg/L	100%	3.50E-05	1.03E-04	1.00E-05	3.10E-07		
N-EtFOSAA	TOT	µg/L	100%	1.13E-03	1.69E-03	8.58E-04	1.00E-05		
NMeFOSAA	TOT	µg/L	100%	2.32E-03	3.23E-03	1.41E-03	2.10E-05		
Nonachloro Biphenyls	TOT	µg/L	67%	8.30E-06	1.41E-05	4.42E-06	7.35E-08		
Octachloro Biphenyls	TOT	µg/L	67%	---	3.31E-05	---	---		
PBDE 99	TOT	µg/L	100%	3.05E-03	4.03E-03	2.06E-03	2.70E-05		
PCB 96	TOT	µg/L	50%	---	---	---	---		
PCB Teq 3	TOT	µg/L	100%	6.09E-07	2.18E-06	5.06E-08	5.39E-09		
PCB-108 + 124	TOT	µg/L	100%	1.99E-06	2.23E-06	1.68E-06	1.80E-08		
PCBs Total	TOT	µg/L	100%	0.0015	0.0019	0.00125	1.35E-05		
Perfluorobutanoic acid	TOT	µg/L	100%	0.056	0.13	0.0188	0.00050		
PFHxS	TOT	µg/L	100%	0.011	0.0219	0.00236	0.000093		
PFNA	TOT	µg/L	100%	0.001	0.00207	0.000684	0.000012		
PFOA	TOT	µg/L	100%	0.018	0.0329	0.00289	0.000163		
Temperature	TOT	°C	100%	---	---	---	---		
Enterococci	TOT	CFU/100 mL	100%	40208	110000	3900	356	70 / 35	--- / 70
Fecal Coliforms	TOT	CFU/100 mL	100%	123100	580000	7900	1089		
Alkalinity - Total - Ph 4.5	TOT	µg/L	100%	172000	260000	74000	1520		
Chloride	DIS	µg/L	100%	88917	140000	60000	790		
Trimethoprim	TOT	µg/L	100%	0.24	0.265	0.233	0.00216		
Alkalinity - Bicarbonate	TOT	µg/L	100%	208333	310000	90000	1840		
Hardness (as CaCO3)	DIS	µg/L	100%	75392	99900	59800	667		
Hardness (as CaCO3)	TOT	µg/L	100%	76400	102000	58600	676		
Sulphate	DIS	µg/L	100%	26417	38000	20000	230		
N - Nh3 (As N)	TOT	µg/L	100%	1900	1900	1900	16.8	92000 / 14000	
N - NO2 (As N)	DIS	µg/L	100%	459	817	134	4.06		
N - NO3 (As N)	DIS	µg/L	100%	6110	10800	2060	54		
N - NO3 + No2 (As N)	DIS	µg/L	100%	6573	11600	2190	58		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
N - Tkn (As N)	TOT	µg/L	100%	33842	51800	19200	299		
N - Total (As N)	TOT	µg/L	100%	40225	55400	30200	356		
P - PO4 - Ortho (As P)	DIS	µg/L	100%	2875	4400	1300	25		
COD	TOT	µg/L	100%	89000	112000	70000	800		
Sulfamethoxazole	TOT	µg/L	100%	0.74	0.878	0.581	0.0066		
Dimethyl Ketone	TOT	µg/L	50%	---	---	---	---		
Uranium	DIS	µg/L	100%	0.013	0.035	0.0038	0.00012		
Lithium	DIS	µg/L	100%	2.32	2.61	2.03	0.021		
Potassium	DIS	µg/L	100%	15775	20000	12700	140		
Phenanthrene	TOT	µg/L	100%	0.036	0.056	0.022	0.00030		
Sodium	DIS	µg/L	100%	57183	73900	42000	506		
Barium	DIS	µg/L	100%	2.76	3.71	1.97	0.024		
Barium	TOT	µg/L	100%	4.85	6.95	3.14	0.043		
Calcium	DIS	µg/L	100%	18208	23300	14800	161.1		
Calcium	TOT	µg/L	100%	18408	23800	14400	163		
Magnesium	DIS	µg/L	100%	7278	10200	5560	64.4		
Magnesium	TOT	µg/L	100%	7403	10400	5500	66		
Strontium	DIS	µg/L	100%	72	105	52.7	0.64		
Antimony	DIS	µg/L	100%	0.28	0.317	0.214	0.0025		
Antimony	TOT	µg/L	100%	0.29	0.339	0.222	0.0025		
Arsenic	DIS	µg/L	100%	0.48	0.665	0.333	0.0043		
Arsenic	TOT	µg/L	100%	0.49	0.661	0.355	0.0043	--- / 12.5	--- / 12.5
Boron	DIS	µg/L	100%	191	291	137	1.7		
Silicon	DIS	µg/L	100%	3613	4560	2870	32		
Aluminum	DIS	µg/L	100%	14.61	20.4	11.7	0.129		
Aluminum	TOT	µg/L	100%	28.39	46.9	21.6	0.25		
Bismuth	DIS	µg/L	100%	0.18	0.232	0.0965	0.00155		
Lead	DIS	µg/L	100%	0.30	0.469	0.208	0.00261		
Lead	TOT	µg/L	100%	0.53	0.706	0.413	0.0047	140 / 2	
Tin	DIS	µg/L	100%	0.65	1.05	0.43	0.0060		
Phosphorus	DIS	µg/L	100%	3354	5010	1340	29.7		
pH	TOT	pH	100%	7.59	7.75	7.44	0.0672		
Selenium	DIS	µg/L	100%	0.15	0.184	0.118	0.0014		
Sodium	TOT	µg/L	100%	58013	72900	40800	513		
Sulfur	DIS	µg/L	100%	9050	13200	7300	80		
Sulfur	TOT	µg/L	100%	9163	12500	7400	80		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
Sulfanilamide	TOT	µg/L	100%	0.08	0.0862	0.0793	0.00072		
Dibutyltin	TOT	µg/L	50%	---	---	---	---		
Dibutyltin Dichloride	TOT	µg/L	50%	---	---	---	---		
Methyl Mercury	TOT	µg/L	50%	---	---	---	---		
Monobutyltin	TOT	µg/L	100%	0.039	0.07	0.008	0.00035		
Monobutyltin Trichloride	TOT	µg/L	100%	0.063	0.112	0.013	0.00055		
Cadmium	DIS	µg/L	100%	0.032	0.118	0.0095	0.00029		
Cadmium	TOT	µg/L	100%	0.049	0.159	0.0197	0.00043	--- / 0.12a	--- / 0.12
Chromium	DIS	µg/L	100%	1.42	3.05	0.43	0.013		
Chromium	TOT	µg/L	100%	1.64	3.25	0.46	0.015		
Cobalt	DIS	µg/L	100%	0.90	2.24	0.41	0.00795		
Cobalt	TOT	µg/L	100%	0.92	2.29	0.446	0.0081		
Copper	DIS	µg/L	100%	12.8	21.7	9.95	0.1137		
Copper	TOT	µg/L	100%	17.3	28.6	12.6	0.153	3 / 2	
Iron	DIS	µg/L	100%	445	840	279	3.94		
Iron	TOT	µg/L	100%	756	1290	493	6.69		
Manganese	DIS	µg/L	100%	49.7	76.3	35.7	0.4397		
Manganese	TOT	µg/L	100%	53.02	79	41.1	0.469	--- / 100a	
Mercury	DIS	µg/L	75%	0.003	0.0061	0.0019	0.00003		
Mercury	TOT	µg/L	83%	0.01	0.03	0.0032	0.00008	--- / 0.02	--- / 0.016
Molybdenum	DIS	µg/L	100%	1.39	2.09	0.84	0.0123		
Molybdenum	TOT	µg/L	100%	1.41	2.03	0.917	0.0124		
Nickel	DIS	µg/L	100%	4.80	8.95	2.35	0.0425		
Nickel	TOT	µg/L	100%	4.82	9.14	2.46	0.043	--- / 8.3a	
Selenium	TOT	µg/L	100%	1.69E-01	1.90E-01	1.34E-01	1.50E-03	--- / 2	
Silver	DIS	µg/L	100%	0.03	0.0897	0.0151	0.0003		
Silver	TOT	µg/L	100%	4.87E-02	1.35E-01	2.10E-02	4.00E-04	3.7 / 0.5	7.5 / ---
Roxithromycin	TOT	µg/L	100%	2.77E-03	4.30E-03	2.08E-03	2.50E-05		
Titanium	DIS	µg/L	100%	1.59	3.78	0.67	0.014		
Vanadium	DIS	µg/L	100%	0.64	1.3	0.31	0.006	--- / 5a	
Zinc	DIS	µg/L	100%	32.08	49.5	12.2	0.284		
Zinc	TOT	µg/L	100%	37.36	55.7	17.8	0.33	55 / 10	
WAD Cyanide	TOT	µg/L	92%	1.42	5.2	0.5	0.013	1 / ---	
Zirconium	DIS	µg/L	100%	0.33	0.39	0.21	0.003		
1,2,3,4-Tetrachlorobenzene	TOT	µg/L	75%	1.11E-04	2.26E-04	3.60E-05	9.80E-07		
1,3,5-Trichlorobenzene	TOT	µg/L	50%	---	---	---	---		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
1,7-Dimethylxanthine	TOT	µg/L	100%	5.92	9.43	2.37	0.05235		
Penicillin G	TOT	µg/L	75%	3.52E-03	3.79E-03	2.77E-03	3.00E-05		
Total/SAD Cyanide	TOT	µg/L	100%	2.16	5.90	1.10	0.019		
Trichloro Biphenyls	TOT	µg/L	100%	2.01E-04	2.82E-04	8.16E-05	1.78E-06		
1,2,3-Trichlorobenzene	TOT	µg/L	50%	---	---	---	---		
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	TOT	µg/L	50%	---	---	---	---		
Androstenedione	TOT	µg/L	100%	6.98E-03	8.15E-03	4.97E-03	6.20E-05		
Tin	TOT	µg/L	100%	0.62	1.02	0.39	0.0050		
Conductivity	TOT	uS/cm	100%	734	930	---	6.5		
17 alpha-Estradiol	TOT	µg/L	50%	---	---	---	---		
Equilenin	TOT	µg/L	50%	---	---	---	---		
Estriol	TOT	µg/L	50%	---	---	---	---		
Estrone	TOT	µg/L	75%	8.27E-03	1.30E-02	2.94E-03	7.00E-05		
4-n-Octylphenol	TOT	µg/L	50%	---	---	---	---		
4-Nonylphenol Diethoxylates	TOT	µg/L	100%	3.50E-01	6.30E-01	1.27E-01	3.10E-03		
4-Nonylphenol Monoethoxylates	TOT	µg/L	100%	1.99E+00	6.50E+00	4.34E-01	1.76E-02		
Np	TOT	µg/L	100%	2.47E-01	4.26E-01	3.82E-02	2.19E-03		
1-Methylphenanthrene	TOT	µg/L	100%	2.06E-03	2.51E-03	1.28E-03	1.80E-05		
2,3,5-trimethylnaphthalene	TOT	µg/L	100%	2.92E-03	4.12E-03	2.16E-03	2.60E-05		
2,6-dimethylnaphthalene	TOT	µg/L	100%	1.74E-03	2.18E-03	1.26E-03	1.50E-05		
Acenaphthene	TOT	µg/L	100%	3.61E-02	1.20E-01	1.80E-02	3.00E-04	--- / 1.0E-02	
Benzo[e]pyrene	TOT	µg/L	100%	1.28E-03	1.49E-03	9.68E-04	1.10E-05		
Benzo[J,K]Fluoranthenes	TOT	µg/L	100%	8.51E-04	1.13E-03	5.73E-04	8.00E-06		
Dibenzothiophene	TOT	µg/L	100%	3.43E-03	5.08E-03	2.13E-03	3.00E-05		
Fluoranthene	TOT	µg/L	92%	3.29E-02	6.10E-02	1.40E-02	3.00E-04		
Fluorene	TOT	µg/L	83%	6.86E-02	2.70E-01	1.20E-02	6.00E-04		
High Molecular Weight PAH`s	TOT	µg/L	92%	5.08E-02	1.10E-01	2.00E-02	4.00E-04		
Low Molecular Weight PAH`s	TOT	µg/L	100%	1.85E-01	4.90E-01	6.80E-02	1.60E-03		
Naphthalene	TOT	µg/L	100%	4.17E-02	1.60E-01	1.40E-02	4.00E-04		--- / 1.4
Phosphorus	TOT	µg/L	100%	3638	5350	1510	32		
Thiabendazole	TOT	µg/L	100%	2.70E-02	3.15E-02	2.53E-02	2.39E-04		
Pbde 119/120	TOT	µg/L	100%	7.43E-06	1.03E-05	3.61E-06	7.00E-08		
Pbde 12/13	TOT	µg/L	50%	---	---	---	---		
Pbde 138/166	TOT	µg/L	100%	3.43E-05	3.89E-05	3.01E-05	3.00E-07		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
Pbde 140	TOT	µg/L	100%	1.02E-05	1.17E-05	7.82E-06	9.00E-08		
Pbde 15	TOT	µg/L	100%	5.54E-06	6.54E-06	3.82E-06	5.00E-08		
Pbde 153	TOT	µg/L	100%	3.12E-04	3.52E-04	2.44E-04	2.76E-06		
Pbde 154	TOT	µg/L	100%	2.48E-04	2.88E-04	1.85E-04	2.19E-06		
Pbde 155	TOT	µg/L	100%	1.84E-05	2.09E-05	1.53E-05	1.60E-07		
Pbde 203	TOT	µg/L	75%	3.67E-05	5.25E-05	1.68E-05	3.20E-07		
Pbde 206	TOT	µg/L	75%	2.24E-04	3.45E-04	1.26E-04	2.00E-06		
Pbde 207	TOT	µg/L	100%	3.56E-04	5.02E-04	2.17E-04	3.20E-06		
Ofloxacin	TOT	µg/L	100%	3.84E-02	5.65E-02	3.01E-02	3.39E-04		
Pbde 208	TOT	µg/L	50%	---	---	---	---		
Organic Carbon	TOT	µg/L	100%	24667	41000	17000	220		
Pbde 209	TOT	µg/L	100%	3.52E-03	5.53E-03	2.42E-03	3.11E-05		
Pbde 100	TOT	µg/L	100%	6.44E-04	8.52E-04	4.25E-04	5.69E-06		
Pbde 37	TOT	µg/L	50%	---	---	---	---		
Pbde 47	TOT	µg/L	100%	3.25E-03	4.42E-03	2.08E-03	2.87E-05		
Pbde 126	TOT	µg/L	50%	---	---	---	---		
Pbde 49	TOT	µg/L	100%	9.50E-05	1.21E-04	3.39E-05	8.40E-07		
Pbde 51	TOT	µg/L	100%	1.30E-05	1.55E-05	9.25E-06	1.20E-07		
Pbde 66	TOT	µg/L	100%	6.83E-05	9.16E-05	4.31E-05	6.00E-07		
Pbde 7	TOT	µg/L	100%	3.41E-06	5.13E-06	1.78E-06	3.00E-08		
Pbde 71	TOT	µg/L	100%	1.62E-05	2.29E-05	4.81E-06	1.40E-07		
Pbde 79	TOT	µg/L	75%	4.71E-06	7.29E-06	1.13E-06	4.00E-08		
Pbde 17/25	TOT	µg/L	100%	5.17E-05	7.59E-05	2.98E-05	4.60E-07		
Pbde 8/11	TOT	µg/L	75%	1.52E-06	1.80E-06	1.15E-06	1.00E-08		
Pbde 183	TOT	µg/L	100%	5.27E-05	5.91E-05	4.41E-05	4.70E-07		
Pbde 85	TOT	µg/L	100%	1.15E-04	1.52E-04	7.75E-05	1.01E-06		
Decachloro Biphenyl	TOT	µg/L	100%	6.32E-06	1.08E-05	4.27E-06	5.59E-08		
PCB	TOT	µg/L	100%	2.02E-05	5.37E-05	7.76E-06	1.78E-07	1.0E-04 / ---	
PCB 10	TOT	µg/L	100%	1.11E-06	1.58E-06	7.05E-07	1.00E-08		
PCB 103	TOT	µg/L	50%	---	---	---	---		
PCB 104	TOT	µg/L	100%	4.77E-06	1.66E-05	3.26E-07	4.20E-08		
Pbde 28/33	TOT	µg/L	100%	5.35E-05	7.29E-05	3.54E-05	4.70E-07		
PCB 107	TOT	µg/L	100%	2.93E-06	3.52E-06	2.57E-06	2.60E-08		
PCB 110/115	TOT	µg/L	100%	5.87E-05	7.05E-05	4.57E-05	5.19E-07		
PCB 123	TOT	µg/L	75%	5.70E-06	1.89E-05	2.62E-07	5.00E-08		
Pbde 75	TOT	µg/L	100%	4.70E-06	6.72E-06	2.55E-06	4.00E-08		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
PCB 128/166	TOT	µg/L	100%	6.82E-06	7.43E-06	6.21E-06	6.00E-08		
PCB 129/138/160/163	TOT	µg/L	100%	4.67E-05	5.20E-05	3.86E-05	4.13E-07		
PCB 130	TOT	µg/L	75%	3.06E-06	3.22E-06	2.96E-06	2.70E-08		
PCB 131	TOT	µg/L	75%	1.99E-06	3.18E-06	8.63E-07	1.80E-08		
PCB 132	TOT	µg/L	100%	1.42E-05	1.72E-05	1.01E-05	1.26E-07		
PCB 133	TOT	µg/L	75%	1.91E-06	2.70E-06	1.02E-06	1.70E-08		
PCB 134/143	TOT	µg/L	50%	---	---	---	---		
PCB 105	TOT	µg/L	100%	1.83E-05	2.71E-05	1.45E-05	1.62E-07	9.0E-05 / ---	
PCB 135/151/154	TOT	µg/L	100%	1.86E-05	2.24E-05	1.47E-05	1.64E-07		
PCB 136	TOT	µg/L	100%	6.78E-06	7.86E-06	4.88E-06	6.00E-08		
PCB 137	TOT	µg/L	50%	---	---	---	---		
PCB 11	TOT	µg/L	100%	1.26E-04	1.54E-04	8.99E-05	1.12E-06		
PCB 14	TOT	µg/L	50%	---	---	---	---		
PCB 144	TOT	µg/L	75%	2.83E-06	3.47E-06	2.35E-06	2.50E-08		
PCB 114	TOT	µg/L	75%	5.62E-06	1.63E-05	1.30E-06	5.00E-08		
PCB 118	TOT	µg/L	100%	3.77E-05	4.10E-05	3.15E-05	3.33E-07		
PCB 12/13	TOT	µg/L	100%	3.98E-06	4.95E-06	2.21E-06	3.50E-08		
PCB 146	TOT	µg/L	100%	6.15E-06	7.71E-06	4.02E-06	5.40E-08		
PCB 147/149	TOT	µg/L	100%	3.45E-05	3.68E-05	3.01E-05	3.05E-07		
PCB 148	TOT	µg/L	50%	---	---	---	---		
PCB 15	TOT	µg/L	100%	1.59E-05	3.08E-05	8.14E-06	1.40E-07		
PCB 150	TOT	µg/L	50%	---	---	---	---		
PCB 152	TOT	µg/L	75%	3.64E-06	6.02E-06	9.86E-07	3.20E-08		
PCB 153/168	TOT	µg/L	100%	4.31E-05	4.75E-05	3.72E-05	3.81E-07		
PCB 156157	TOT	µg/L	100%	1.34E-05	3.39E-05	5.34E-06	1.19E-07		
PCB 16	TOT	µg/L	100%	1.43E-05	2.03E-05	9.40E-06	1.27E-07		
PCB 164	TOT	µg/L	75%	2.33E-06	2.91E-06	1.01E-06	2.10E-08		
PCB 167	TOT	µg/L	75%	5.60E-06	1.75E-05	1.42E-06	5.00E-08		
PCB 139/140	TOT	µg/L	50%	---	---	---	---		
PCB 169	TOT	µg/L	50%	---	---	---	---		
PCB 141	TOT	µg/L	100%	7.00E-06	8.31E-06	4.26E-06	6.20E-08		
PCB 17	TOT	µg/L	100%	1.29E-05	1.59E-05	8.91E-06	1.14E-07		
PCB 171/173	TOT	µg/L	75%	2.33E-06	2.88E-06	1.99E-06	2.10E-08		
PCB 172	TOT	µg/L	50%	---	---	---	---		
PCB 176	TOT	µg/L	75%	1.61E-06	1.72E-06	1.45E-06	1.40E-08		
PCB 177	TOT	µg/L	100%	4.90E-06	6.18E-06	3.81E-06	4.30E-08		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
PCB 178	TOT	µg/L	100%	2.87E-06	3.07E-06	2.51E-06	2.50E-08		
PCB 18/30	TOT	µg/L	100%	4.12E-05	5.27E-05	3.55E-05	3.65E-07		
PCB 180/193	TOT	µg/L	100%	2.44E-05	2.96E-05	2.17E-05	2.16E-07		
PCB 155	TOT	µg/L	100%	8.66E-06	1.58E-05	5.52E-06	7.70E-08		
PCB 183/185	TOT	µg/L	100%	1.14E-05	2.49E-05	6.17E-06	1.01E-07		
PCB 158	TOT	µg/L	75%	3.48E-06	4.53E-06	1.93E-06	3.10E-08		
PCB 184	TOT	µg/L	100%	7.89E-06	9.17E-06	5.42E-06	7.00E-08		
PCB 187	TOT	µg/L	100%	1.66E-05	2.59E-05	1.23E-05	1.46E-07		
PCB 188	TOT	µg/L	50%	---	---	---	---		
PCB 190	TOT	µg/L	75%	2.74E-06	4.63E-06	1.84E-06	2.40E-08		
PCB 170	TOT	µg/L	100%	1.06E-05	1.94E-05	6.50E-06	9.40E-08		
PCB 194	TOT	µg/L	100%	7.66E-06	1.32E-05	5.45E-06	6.80E-08		
PCB 195	TOT	µg/L	75%	1.90E-06	2.76E-06	1.13E-06	1.70E-08		
PCB 196	TOT	µg/L	75%	6.76E-06	1.80E-05	2.23E-06	6.00E-08		
PCB 197/200	TOT	µg/L	75%	1.53E-06	2.15E-06	1.17E-06	1.30E-08		
PCB 198/199	TOT	µg/L	100%	5.91E-06	6.67E-06	5.30E-06	5.20E-08		
PCB 2	TOT	µg/L	100%	4.18E-06	8.60E-06	1.94E-06	3.70E-08		
PCB 179	TOT	µg/L	100%	4.53E-06	5.75E-06	3.31E-06	4.00E-08		
PCB 20/28	TOT	µg/L	100%	4.34E-05	4.84E-05	3.77E-05	3.84E-07		
PCB 202	TOT	µg/L	75%	6.45E-06	1.83E-05	2.01E-06	5.70E-08		
PCB 203	TOT	µg/L	75%	3.31E-06	3.82E-06	2.41E-06	2.90E-08		
PCB 182	TOT	µg/L	50%	---	---	---	---		
PCB 205	TOT	µg/L	75%	3.56E-06	9.32E-06	5.29E-07	3.20E-08		
PCB 206	TOT	µg/L	100%	6.01E-06	1.07E-05	4.00E-06	5.30E-08		
PCB 208	TOT	µg/L	75%	4.76E-06	1.41E-05	9.55E-07	4.20E-08		
PCB 209	TOT	µg/L	100%	6.32E-06	1.08E-05	4.27E-06	5.60E-08		
PCB 189	TOT	µg/L	50%	---	---	---	---		
PCB 19	TOT	µg/L	100%	1.03E-05	2.44E-05	4.97E-06	9.20E-08		
PCB 21/33	TOT	µg/L	100%	2.51E-05	3.51E-05	1.25E-05	2.22E-07		
PCB 22	TOT	µg/L	100%	1.59E-05	2.18E-05	7.42E-06	1.41E-07		
PCB 23	TOT	µg/L	50%	---	---	---	---		
PCB 24	TOT	µg/L	50%	---	---	---	---		
PCB 25	TOT	µg/L	100%	6.02E-06	7.41E-06	3.42E-06	5.30E-08		
PCB 26/29	TOT	µg/L	100%	8.64E-06	1.14E-05	5.50E-06	7.60E-08		
PCB 27	TOT	µg/L	100%	4.03E-06	5.05E-06	3.51E-06	3.60E-08		
PCB 3	TOT	µg/L	100%	1.37E-05	4.06E-05	3.29E-06	1.21E-07		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
PCB 31	TOT	µg/L	100%	4.14E-05	4.95E-05	2.95E-05	3.66E-07		
PCB 34	TOT	µg/L	75%	1.15E-05	2.92E-05	2.13E-07	1.02E-07		
PCB 201	TOT	µg/L	50%	---	---	---	---		
PCB 37	TOT	µg/L	100%	1.40E-05	2.15E-05	9.42E-06	1.24E-07		
PCB 4	TOT	µg/L	100%	3.58E-05	6.47E-05	1.76E-05	3.17E-07		
PCB 40/41/71	TOT	µg/L	100%	1.93E-05	2.17E-05	1.37E-05	1.70E-07		
PCB 42	TOT	µg/L	100%	9.93E-06	1.22E-05	7.00E-06	8.80E-08		
PCB 43	TOT	µg/L	100%	6.75E-06	2.07E-05	1.63E-06	6.00E-08		
PCB 44/47/65	TOT	µg/L	100%	1.78E-04	2.87E-04	5.60E-05	1.57E-06		
PCB 46	TOT	µg/L	75%	2.68E-06	2.75E-06	2.52E-06	2.40E-08		
PCB 48	TOT	µg/L	100%	6.72E-06	8.45E-06	3.53E-06	5.90E-08		
PCB 49/69	TOT	µg/L	100%	3.10E-05	3.79E-05	2.62E-05	2.74E-07		
PCB 5	TOT	µg/L	100%	1.43E-06	1.94E-06	9.82E-07	1.30E-08		
PCB 50/53	TOT	µg/L	100%	6.16E-06	7.09E-06	5.09E-06	5.50E-08		
PCB 52	TOT	µg/L	100%	6.56E-05	7.43E-05	5.42E-05	5.81E-07		
PCB 56	TOT	µg/L	100%	1.63E-05	2.07E-05	1.13E-05	1.44E-07		
PCB 32	TOT	µg/L	100%	8.70E-06	1.15E-05	4.98E-06	7.70E-08		
PCB 35	TOT	µg/L	100%	4.24E-06	7.15E-06	1.49E-06	3.80E-08		
PCB 59/62/75	TOT	µg/L	100%	3.18E-06	4.33E-06	2.13E-06	2.80E-08		
PCB 6	TOT	µg/L	100%	6.66E-06	8.81E-06	3.81E-06	5.90E-08		
PCB 60	TOT	µg/L	100%	7.61E-06	1.08E-05	3.30E-06	6.70E-08		
PCB 61/70/74/76	TOT	µg/L	100%	5.36E-05	6.74E-05	3.22E-05	4.74E-07		
PCB 63	TOT	µg/L	75%	4.93E-06	1.12E-05	1.57E-06	4.40E-08		
PCB 64	TOT	µg/L	100%	1.55E-05	1.98E-05	8.44E-06	1.37E-07		
PCB 66	TOT	µg/L	100%	3.15E-05	3.43E-05	2.49E-05	2.79E-07		
PCB 7	TOT	µg/L	100%	9.07E-06	1.52E-05	5.39E-06	8.00E-08		
PCB 77	TOT	µg/L	100%	8.39E-06	1.77E-05	3.11E-06	7.40E-08		
PCB 8	TOT	µg/L	100%	2.36E-05	3.94E-05	1.14E-05	2.08E-07		
PCB 81	TOT	µg/L	100%	4.83E-06	1.54E-05	3.54E-07	4.30E-08		
PCB 82	TOT	µg/L	75%	5.91E-06	7.08E-06	4.97E-06	5.20E-08		
PCB 54	TOT	µg/L	100%	4.61E-06	1.62E-05	3.41E-07	4.10E-08		
PCB 55	TOT	µg/L	50%	---	---	---	---		
PCB 83/99	TOT	µg/L	100%	2.92E-05	3.41E-05	2.58E-05	2.59E-07		
PCB 84	TOT	µg/L	100%	1.32E-05	1.77E-05	9.53E-06	1.16E-07		
PCB 85/116/117	TOT	µg/L	100%	9.94E-06	1.31E-05	6.25E-06	8.80E-08		
PCB 86/87/97/108/119/125	TOT	µg/L	100%	5.91E-05	1.11E-04	3.50E-05	5.23E-07		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
PCB 88/91	TOT	µg/L	100%	8.92E-06	1.42E-05	5.71E-06	7.90E-08		
PCB 89	TOT	µg/L	50%	---	---	---	---		
PCB 9	TOT	µg/L	100%	3.56E-06	5.72E-06	1.95E-06	3.20E-08		
PCB 92	TOT	µg/L	100%	9.58E-06	1.08E-05	7.91E-06	8.50E-08		
PCB 93/95/98/100/102	TOT	µg/L	100%	4.54E-05	5.22E-05	4.06E-05	4.02E-07		
PCB 67	TOT	µg/L	50%	---	---	---	---		
PCB 68	TOT	µg/L	100%	3.94E-05	1.03E-04	3.52E-06	3.49E-07		
PCB174	TOT	µg/L	100%	1.73E-05	4.63E-05	4.48E-06	1.53E-07		
1,2,3,4,6,7,8-HPCDD	TOT	µg/L	100%	5.37E-06	9.72E-06	1.95E-06	4.80E-08		
1,2,3,4,6,7,8-HPCDF	TOT	µg/L	75%	5.96E-07	9.83E-07	3.77E-07	5.00E-09		
1,2,3,7,8-PECDF	TOT	µg/L	75%	4.13E-07	8.55E-07	2.41E-07	4.00E-09		
OCDD	TOT	µg/L	100%	4.99E-05	1.03E-04	1.02E-05	4.42E-07		
OCDF	TOT	µg/L	100%	1.01E-06	1.43E-06	5.27E-07	9.00E-09		
2,4-DDD	TOT	µg/L	100%	5.68E-05	6.90E-05	4.60E-05	5.00E-07		
4,4-DDD	TOT	µg/L	75%	7.08E-05	1.40E-04	3.20E-05	6.30E-07		
4,4-DDE	TOT	µg/L	100%	1.56E-04	1.78E-04	1.21E-04	1.38E-06		
4,4-DDT	TOT	µg/L	75%	9.06E-05	1.23E-04	6.30E-05	8.00E-07		
ABHC	TOT	µg/L	75%	7.73E-05	1.63E-04	1.80E-05	7.00E-07		
Aldrin	TOT	µg/L	50%	---	---	---	---		
Alpha Chlordane	TOT	µg/L	50%	---	---	---	---		
Beta-Endosulfan	TOT	µg/L	75%	1.08E-04	3.55E-04	9.00E-06	9.50E-07		
PCB 90/101/113	TOT	µg/L	100%	5.66E-05	6.58E-05	4.15E-05	5.01E-07		
Beta-Hch or Beta-Bhc	TOT	µg/L	100%	1.03E-04	1.41E-04	7.80E-05	9.00E-07		
Dieldrin	TOT	µg/L	100%	1.96E-04	2.14E-04	1.57E-04	1.73E-06		
Endosulfan Sulfate	TOT	µg/L	50%	---	---	---	---		
Endrin Aldehyde	TOT	µg/L	75%	1.28E-04	1.48E-04	1.13E-04	1.10E-06		
HCH, Gamma	TOT	µg/L	100%	9.10E-05	1.21E-04	7.30E-05	8.00E-07		
PCB Teq 4	TOT	µg/L	100%	1.26E-06	3.48E-06	4.44E-07	1.11E-08		
Heptachlor Epoxide	TOT	µg/L	50%	---	---	---	---		
Hexachlorobenzene	TOT	µg/L	75%	6.43E-05	1.04E-04	3.40E-05	5.70E-07		
Methoxyclor	TOT	µg/L	75%	1.26E-04	2.26E-04	7.70E-05	1.11E-06		
PCB45/51	TOT	µg/L	100%	2.62E-05	5.22E-05	1.09E-05	2.31E-07		
Mirex	TOT	µg/L	50%	---	---	---	---		
3:3 FTCA	TOT	µg/L	75%	3.89E-03	8.92E-03	1.57E-03	3.00E-05		
Pentachloro Biphenyls	TOT	µg/L	100%	2.92E-04	3.85E-04	1.72E-04	2.59E-06		
Pentachlorobenzene	TOT	µg/L	75%	5.08E-05	7.20E-05	3.30E-05	4.50E-07		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
5:3 FTCA	TOT	µg/L	100%	6.30E-02	1.18E-01	2.49E-02	5.60E-04		
6:2 FTS	TOT	µg/L	100%	4.81E-03	6.32E-03	3.34E-03	4.00E-05		
MeFOSAA	TOT	µg/L	100%	1.76E-03	2.15E-03	1.36E-03	1.60E-05		
PFBS	TOT	µg/L	100%	1.67E-02	3.51E-02	9.29E-04	1.48E-04		
PFDA	TOT	µg/L	100%	1.21E-03	1.72E-03	6.51E-04	1.10E-05		
PFHpA	TOT	µg/L	100%	8.35E-03	1.32E-02	1.72E-03	7.40E-05		
PFOS	TOT	µg/L	100%	4.05E-03	5.71E-03	2.51E-03	3.60E-05		
PFHxA	TOT	µg/L	100%	4.64E-02	7.53E-02	7.99E-03	4.10E-04		
Diethyl Phthalate	TOT	µg/L	50%	---	---	---	---		
2-Hydroxy-Ibuprofen	TOT	µg/L	100%	5.71E+00	8.12E+00	1.25E+00	5.05E-02		
Acetaminophen	TOT	µg/L	100%	2.86E-01	3.74E-01	4.01E-02	2.53E-03		
Azithromycin	TOT	µg/L	100%	2.49E-01	2.65E-01	2.39E-01	2.20E-03		
Bisphenol A	TOT	µg/L	100%	3.47E-01	9.90E-01	1.28E-01	3.07E-03		
PFPeA	TOT	µg/L	100%	3.89E-02	7.90E-02	9.59E-03	3.44E-04		
PFPeS	TOT	µg/L	50%	---	---	---	---		
Caffeine	TOT	µg/L	100%	9.50E+00	1.23E+01	4.09E+00	8.41E-02		
Carbamazepine	TOT	µg/L	100%	4.73E-01	5.50E-01	4.26E-01	4.18E-03		
Ciprofloxacin	TOT	µg/L	100%	1.84E-01	2.38E-01	1.41E-01	1.63E-03		
Clarithromycin	TOT	µg/L	100%	1.29E-01	1.42E-01	1.24E-01	1.14E-03		
Cloxacillin	TOT	µg/L	50%	---	---	---	---		
Dehydronifedipine	TOT	µg/L	100%	2.59E-03	3.21E-03	2.33E-03	2.30E-05		
Potassium	TOT	µg/L	100%	15950	20600	12600	141		
Diltiazem	TOT	µg/L	100%	2.08E-01	2.15E-01	1.94E-01	1.84E-03		
Pyrene	TOT	µg/L	92%	2.33E-02	3.68E-02	1.40E-02	2.00E-04		
Diphenhydramine	TOT	µg/L	100%	7.29E-01	7.71E-01	7.14E-01	6.45E-03		
Enrofloxacin	TOT	µg/L	75%	1.16E-03	1.28E-03	9.58E-04	1.00E-05		
Erythromycin-H2O	TOT	µg/L	100%	1.55E-02	3.08E-02	6.94E-03	1.40E-04		
Fluoxetine	TOT	µg/L	100%	3.53E-02	3.63E-02	3.35E-02	3.13E-04		
Sulfadiazine	TOT	µg/L	75%	9.02E-04	1.68E-03	5.73E-04	8.00E-06		
Furosemide	TOT	µg/L	100%	5.45E-01	6.08E-01	3.79E-01	4.83E-03		
Gemfibrozil	TOT	µg/L	100%	4.84E-02	5.46E-02	3.75E-02	4.28E-04		
Glyburide	TOT	µg/L	100%	3.07E-03	3.35E-03	2.38E-03	2.70E-05		
Hydrochlorothiazide	TOT	µg/L	100%	1.25	1.29	1.12	0.011		
Sulfide	TOT	µg/L	67%	60	290	18	0.5		
Ibuprofen	TOT	µg/L	100%	1.61	1.93	0.774	0.01426		
Tetrachloro Biphenyls	TOT	µg/L	100%	4.93E-04	6.79E-04	2.53E-04	4.36E-06		

Table 2.4, cont'd

Parameter	State	Unit	Frequency of Detection	Average Concentration	Maximum Concentration	Minimum Concentration	113:1 Dilution	BC WQG (STA/LTC)	CCME/HC WQG (ST/LT)
Lincomycin	TOT	µg/L	100%	9.45E-03	1.53E-02	7.09E-03	8.40E-05		
Miconazole	TOT	µg/L	100%	2.93E-03	3.34E-03	2.49E-03	2.60E-05		
Naproxen	TOT	µg/L	100%	1.90	2.25	1.11	0.017		
Norfloxacin	TOT	µg/L	50%	---	---	---	---		
Total PAH	TOT	µg/L	100%	0.23	0.6	0.079	0.0021		
Total Phenols	TOT	µg/L	100%	4.05	5.4	2.2	0.04		
Progesterone	TOT	µg/L	100%	1.89E-03	2.56E-03	1.22E-03	1.70E-05		
Trans-Chlordane	TOT	µg/L	75%	5.13E-05	6.00E-05	4.50E-05	4.50E-07		
Trans-Nonachlor	TOT	µg/L	50%	---	---	---	---		
Triclosan	TOT	µg/L	100%	1.27E-02	1.40E-02	9.29E-03	1.10E-04		
Trichloromethane	TOT	µg/L	67%	1.30	1.9	1.00	0.01		
Triclocarban	TOT	µg/L	100%	1.55E-03	1.81E-03	1.21E-03	1.40E-05		
Tylosin	TOT	µg/L	75%	6.51E-04	8.14E-04	5.53E-04	6.00E-06		
Warfarin	TOT	µg/L	100%	2.88E-03	3.28E-03	2.67E-03	2.60E-05		

Notes:
*Dilution calculated from maximum concentration.
BC WQG = British Columbia Water Quality Guidelines for protection of marine aquatic life.
CCME WQG = Canadian Council of Ministers of the Environment water quality guidelines for protection of marine aquatic life.
HC = Health Canada Recreational Water Quality Guideline
Guidelines are approved unless otherwise stated.
a. working guideline
*Guidelines are maximum concentrations unless otherwise stated.
Orange shading indicates exceedance to BC WQG or CCME/HC WQG.

2.3.4 Acute Toxicity Testing

Acute toxicity tests measure the adverse health effects from a single exposure or from repeated exposure to a toxicant or mixture of toxicants over a short period of an organism's life. Acute toxicity results for the MPWWTP final effluent are reported as the lethal concentration 50 (LC50). The LC50 represents the effluent concentration that causes 50% mortality within the test period. An LC50 result that is less than 100% effluent is considered a failure. Some 96-hour Rainbow trout lethality tests were carried out as a single 100% concentration screening. The test result is reported as percent survival in 100% sample with <50% survival at 96-hours considered a failure. Refer to Appendix B7 for acute toxicity reports.

Table 2.5 presents the results from 2024 acute toxicity testing. Toxicity test results were acceptable for all samples except for the 96-hour Rainbow trout LC50 endpoint for the August 13 sample. The cause of the failure is suspected to be due to insufficient flushing of the effluent sample line prior to collection. Subsequent re-sampling events carried out on September 17, September 30 and October 16 were acceptable.

Daphnia magna toxicity testing is not required by regulations but is conducted as part of expanded EMP commitments. The *Daphnia magna* 48-hour LC50 results were >100% for all 2024 samples.

Table 2.5 McLoughlin Point WWTP Acute Toxicity Test Results – 2024

Sample Date	Rainbow trout (pH stabilized)		*Daphnia magna*
	96-hour LC50 (95%CL) (%v/v) pH Stabilized	96-hour (%) survival in 100% Effluent	48-hour LC50 (95%CL) (%v/v)
January 18, 2024	>100	---	>100
February 8, 2024	>100	---	>100
March 21, 2024	>100	---	>100
April 18, 2024	>100	---	>100
May 16, 2024	>100	---	>100
June 26, 2024	>100	---	>100
July 22, 2024	>100	---	>100
August 13, 2024	99.2 (72.5 – >100)	---	>100
September 17, 2024	>100	---	>100
September 30, 2024	>100	---	---
October 16, 2024	>100	---	>100
November 19, 2024	---	90	>100
December 17, 2024	---	80	>100

Notes: Test pass = >100%.
Results are presented as v/v%.
Shaded cells indicated test failure.
--- Test not conducted.

2.3.5 Chronic Toxicity Testing

Chronic toxicity tests measure adverse health effects from continuous or repeated exposures to a toxicant or mixture of toxicants over a significant portion of an organism's life. Chronic toxicity results are reported here as LC50 for lethal endpoints. Sublethal endpoints are reported as EC50, EC25 (effective concentration), and IC50 or IC25 (inhibition concentration) which are the concentrations that will have a specific non-lethal effect upon 50% or 25%, respectively, of the organisms in the specified test period (e.g., decreased fertilization or growth). All results are presented as v/v% (95% confidence limit [CL]). Refer to Appendix B8 for chronic toxicity reports.

Chronic toxicity testing was conducted using McLoughlin Point WWTP final effluent in December 2024. Test species included Pacific topsmelt (*Atherinops affinis*), *Ceriodaphnia dubia,* and echinoderm (*Strongylocentrotus purpuratus*). The planned 30-day Rainbow trout (*Oncorhynchus mykiss*) embryo/alevin viability test could not be carried out due to lack of organism availability.

The chronic toxicity test results show that chronic effects would occur only at effluent concentrations much greater than those predicted at the limits of the initial dilution zone (i.e., 0.9% v/v effluent based on the modelled dilution ratio of 113:1) (Lorax, 2019). Marine receptors outside of the initial dilution zone are expected to be protected from chronic toxicity associated with the final effluent because of the rapid plume dilution. Additionally, the range and life history of most receiving environment species would limit the duration of exposure to the undiluted effluent plume due to movement of the organism.

The 2024 McLoughlin Point WWTP final effluent chronic toxicity test results are summarized in Table 2.6 below.

Table 2.6 McLoughlin Point WWTP Chronic Toxicity Test Results – 2024

Endpoint	% v/v (CL)
7-day Pacific topsmelt	
Survival - LC50	66.9 (62.1 – 72.1)
Dry Biomass - IC25	45.0 (36.8 – 51.6)
Dry Biomass - IC50	58.4 (48.6 – 68.2)
Dry Weight - IC25	43.6 (29.7 – 57.6)
Dry Weight - IC50	82.1 (28.3 – >100)
7-day *Ceriodaphnia dubia*	
Survival - LC50	70.1 (50.0 – 100)
Reproduction - IC25	58.9 (30.4 – 59.7)
Reproduction - IC50	70.5 (59.4 – 71.2)
10-minute echinoderm fertilization	
Fertilization - IC25	>100
Fertilization - IC50	>100
30-day Rainbow trout embryo-alevin*	
Embryo Survival - LC25	N/A
Embryo Survival - LC50	N/A
Embryo Viability - EC25	N/A
Embryo Viability - EC50	N/A

Notes: CL = 95% confidence limits. * = test not carried out.

2.3.6 Overall Assessment

The 2024 McLoughlin Point WWTP wastewater monitoring results continue to show improvement compared to historical Macaulay and Clover results (CRD, 2020). This trend, continuing from 2023, reflects significant improvement in wastewater effluent quality since the commissioning of the WWTP. Tertiary effluent quality requirements were generally met except for the dates and months with non-compliant maximum and average concentrations, respectively. Treatment process optimization was ongoing throughout 2024 to consistently meet provincial and federal wastewater regulations in the future. The optimization process will continue through 2025, with occasional non-compliance events expected throughout this time. Additionally, source control and flow control measures in partnership with large private sector and CRD inputs such as the Hartland Residuals Treatment Facility and Hartland Landfill leachate effluent are being implemented to improve facility performance.

All effluent quality parameters were predicted to be below applicable water quality guidelines in the marine receiving environment at the edge of the initial dilution zone, except for bacteriological indicators. The use of estimated minimum initial dilution factors allows for a conservative (i.e., highly protective) estimation of potential effects in the marine receiving environment. However, predicted average initial dilution factors are much higher around the outfall (711:1 median for McLoughlin Point). This shows overall risk to human health and the environment is lower than predictions indicate. These bacteriological indicator guideline exceedances will continue as disinfection has not been installed as part of the new McLoughlin treatment process. Disinfection is not feasible at Macaulay or Clover during rain-associated bypasses. Overall, the magnitude of bacteriological indicator exceedances has been greatly reduced with tertiary treatment at McLoughlin.

Overall, the 2024 results continue to indicate that the MPWWTP has resulted in significant reductions in contaminant loading to the receiving environment.

3.0 SURFACE WATER MONITORING

3.1 Introduction

CRD staff have been monitoring receiving waters around the Macaulay and Clover outfalls for fecal bacteria indicator 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 receiving environment during recreational activities such as kite surfing, diving and swimming. Observed impacts at the shoreline have been attributed to stormwater discharges, which are currently monitored by the CRD's Stormwater Quality Program.

The McLoughlin Point WWTP commenced operation in August 2020. Since the beginning of 2021, surface water and initial dilution zone (IDZ) sampling shifted from Clover and Macaulay receiving environments to the McLoughlin receiving environment. The IDZ is defined by BC ENV as the 100-metre radius surrounding the end of the outfall and is the area most impacted by wastewater discharge.

The Clover Point and Macaulay Point pump stations no longer serve as regular discharge points of screened wastewater. Since the construction of the MPWWTP, Clover and Macaulay discharge directly to the environment from their respective long outfalls during heavy rain events or planned overflow and bypass events during maintenance. In the event of overflow discharge from either Clover or Macaulay outfalls, surface water sampling is carried out if vessel availability and weather conditions permit. Heavy rainfall events triggering overflow discharges are often associated with unsafe boating conditions thereby often preventing sampling.

3.2 Methods

In 2024, staff collected 5 samples in 30 days ("5-in-30") in each quarter (i.e., January, April, July, and October) at the IDZ and at the surface of the receiving environment at stations around the McLoughlin outfall (Figure 3.1). Sampling was conducted using the University of Victoria's 16-m science vessel, the MSV John Strickland. Wet weather overflow or bypass sampling from Macaulay or Clover would also be carried out using this vessel if coincident with a MPWWTP sampling event.

Surface water and IDZ sampling parameters are presented in Appendix C1. For surface water sampling, CRD staff collected samples at a depth of 1 m using a sampling pole. For IDZ sampling, staff collected samples using a Seabird ECO55 rosette sampler with a SBE19PlusV2 conductivity-temperature-depth (CTD) instrument. The CTD instrument was also equipped with a SBE43 dissolved oxygen sensor. Water column profiles recorded at each IDZ station and water column samples were collected at the top (5 m below surface), middle (middle of the predicted plume trapping depth), and bottom (5 m above the seafloor) depths of the water column. CTD casts were captured at each IDZ sample station and measured the depth, conductivity, salinity, temperature and dissolved oxygen.

Surface water sampling stations are presented in Figure 3.1 and Appendix C2. The surface sampling grid, consisting of a total of 13 stations, was used to ensure good spatial coverage of the receiving environment where plume surfacing is most likely to occur. In addition, samples were collected at the location at which a drift drogue was retrieved each day (see Appendix C2, sample D1). 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. Reference stations were also sampled at Parry Bay and at Constance Bank (Figure 3.1).

For each sampling event, the predicted current direction and plume trapping depth were determined using the CRD's hydrodynamic C3 model. The model incorporates local conditions (historical 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 analytical data. 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 specific day and time. Grab samples were collected using a Seabird ECO55 rosette sampler, decanted into sample bottles and preserved for analysis of metals, various conventional parameters and nutrients (Appendix C1). Bacteriological indicators, ammonia, hardness, metals, total suspended solids and pH samples were analysed for each of the "5-in-30" sampling events.

Additional analyses including oil and grease, phosphorus, sulphide and total organic carbon were carried out for samples collected on only one day per quarter (usually the first of the “5-in-30” sets).

The surface and IDZ water column samples were analysed for two bacteriological indicators (fecal coliforms and enterococci) by BV Labs (Victoria, BC).

Bacteriological results were evaluated against water quality guidelines BC ENV (2025a; 2025b) for recreational primary contact (for informational purposes only) and to Health Canada (2012) guidelines for recreational water quality. The Health Canada guidelines for enterococci are:

- The geometric mean of 5 samples collected in 30 days should not exceed 35 CFU/100 mL.
- Single enterococci values should not exceed 70 CFU/100 mL.

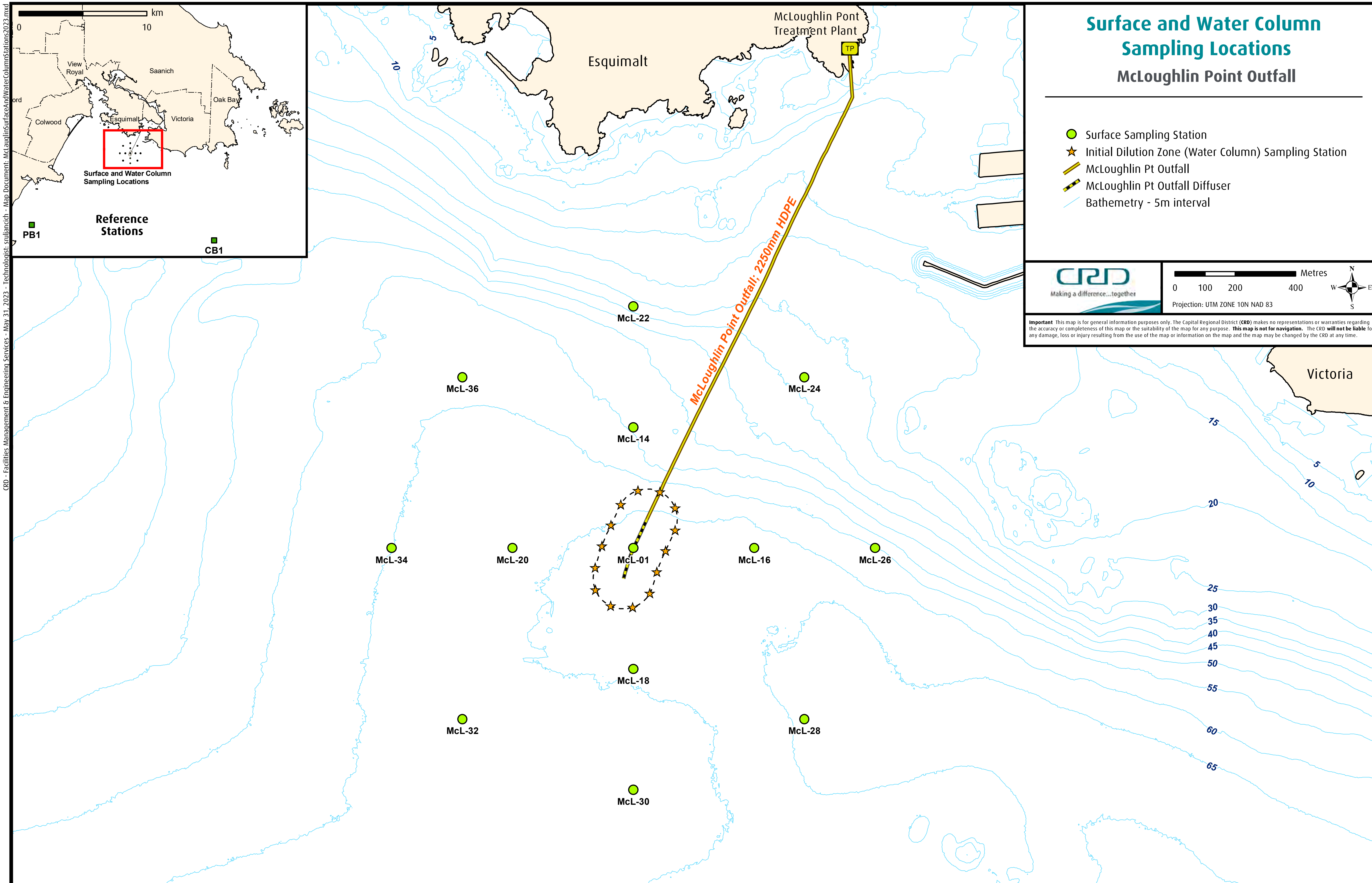
All other IDZ water column results were evaluated against approved BC Water Quality Guidelines for the Protection of Aquatic Life (BC ENV 2025a; 2025b).

Model Validation

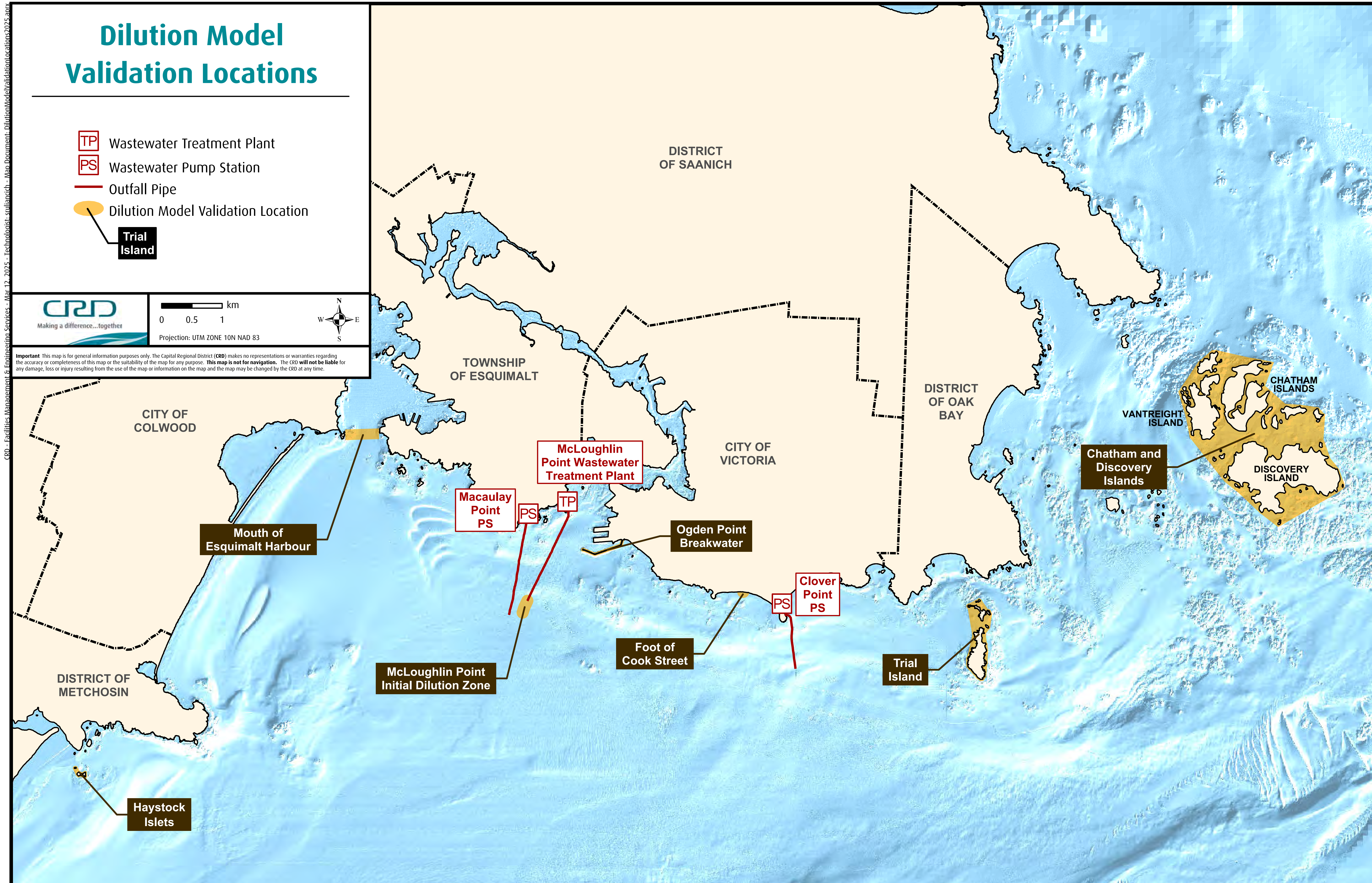
The registration under the Municipal Wastewater Regulation (MWR), Authorization #RE108831, requires plume dispersion and dilution modelling using concurrent effluent and receiving environment water quality samples at the edge of the IDZ at McLoughlin Point outfall, far-field sites (Haystock Islets, Ogden Point, Cook Street, Chatham and Discovery Islands, Trial Island) and at Clover (CPS) and Macaulay pump stations (MPS) during potential overflow events, for modelled scenarios 1, 2 and 3 (Lorax, 2019). Station locations are provided in Figure 3.2.

The three modelled scenarios are based on the influent flow hydrographs prepared by Lorax (2019) representing typical conditions expected up to the year 2030.

- Scenario 1 represents summer conditions with flows of about 80% of the average dry weather flow (ADWF) for MPWWTP (ADWF of 108,000 m3/day) of tertiary-treated effluent.
- Scenario 2 represents wet weather conditions providing discharge through only the MPWWTP outfall (flows 0.5 x to 2.9 x ADWF when MPWWTP is discharging primary + tertiary blended effluent).
- Scenario 3 represents wet weather storm conditions (flows >4 x ADWF) providing discharge through both the MPWWTP (primary + tertiary blended effluent) and CPS (screened effluent) deep outfalls.



CRD - Facilities Management & Engineering Services - May 31, 2023 - Technologist: sruljancich - Map Document: McLauglinSurfaceAndWaterColumnStations2023.mxd


Dilution Model Validation Locations
TP Wastewater Treatment Plant
PS Wastewater Pump Station
Outfall Pipe
Dilution Model Validation Location
Trial Island
km
0 0.5 1
Projection: UTM ZONE 10N NAD 83
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Making a difference...together
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CRD - Facilities Management & Engineering Services - Mar 12, 2025 - Technologist: sruliancich - Map Document: DilutionModelValidationLocations2025.aprx
DISTRICT OF SAANICH
TOWNSHIP OF ESQUIMALT
CITY OF COLWOOD
CITY OF VICTORIA
DISTRICT OF OAK BAY
DISTRICT OF METCHOSIN
CHATHAM ISLANDS
VANTREIGHT ISLAND
DISCOVERY ISLAND
Chatham and Discovery Islands
McLoughlin Point Wastewater Treatment Plant
Macaulay Point PS
PS
TP
Ogden Point Breakwater
Mouth of Esquimalt Harbour
Clover Point PS
PS
Foot of Cook Street
McLoughlin Point Initial Dilution Zone
Trial Island
Haystock Islets

3.3 Results and Discussion

3.3.1 Surface Water Sampling

CRD staff collected 320 surface water samples at McLoughlin's WWTP marine receiving environment in 2024.

Fecal coliform results for each sampling event (including seasonal geometric means) are presented in Appendix C3. Seasonal geometric means by station were one or two orders of magnitude below the provincial guideline of 200 CFU/100 mL. The maximum fecal coliform concentration measured in 2024 was 93 CFU/100 mL at McL-20 on January 30, 2024.

Enterococci results for each sampling event (including seasonal station geometric means) are presented in Appendix C4. All seasonal geometric means were below the federal guideline of a geomean of 35 CFU/100 mL. Of the 320 samples, two individual enterococci measurements were above the federal single value guideline of 70 CFU/100 mL with 130 CFU/100 mL at McL-34 on April 23, 2024 and 165 CFU/100 mL at McL-01 on October 10, 2024.

The frequency and location of exceedances from McLoughlin WWTP are much less than results from historical Clover and Macaulay receiving environment monitoring (CRD, 2020). Surface water sampling results indicate that treatment has substantively reduced bacteria concentrations in effluent by up to two orders of magnitude. Subsequently, the surface water results in the receiving environment show lower concentrations of bacteria when surfacing occurs (CRD, 2021-2022).

Overall, results indicate that the McLoughlin WWTP effluent plume was mostly trapped below the surface, as predicted by the CRD's hydrodynamic C3 model. Therefore, 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).

3.3.2 Initial Dilution Zone Water Column Sampling

Analytical results for each round of IDZ water column sampling for select parameters are presented in Appendices C5-C16. CTD and dissolved oxygen plots for each sampling event are presented in Appendix C17.

Bacteriological Results

The geometric means of the 5-in-30 fecal coliform water column results did not exceed guidelines during any season (historical guideline) (Appendix C5).

The geometric means of the 5-in-30 enterococci water column results did not exceed guidelines. The results for two samples collected in Spring (Station 2 bottom = 97 CFU/100 mL; Station 3 bottom = 99 CFU/100 mL), two samples collected in Summer (Station 3 middle = 81 CFU/100 mL; Station 4 middle = 96 CFU/100 mL), and one sample collected in Autumn (Station 1 bottom = 71 CFU/100 mL) exceeded the federal maximum single enterococci guidelines of 70 CFU/100 mL (Appendix C6).

Metals, Metalloids and Nutrients

Cadmium concentrations were acceptable for all 5-in-30 averages and therefore met the BC long-term chronic (LTC); however, there were 21 individual samples that exceeded the guideline (Appendix C11). These results continue the trend first observed in 2023 and will be monitored going forward.

The 5-in-30 average copper concentration at IDZ Station 1 Bottom (winter) and at IDZ Station 3 Middle (autumn) each exceeded the BC LTC guideline. These exceedances were both driven by results from a single sample from the series with all other results from the sets below the detection limit. Copper concentrations exceeded the BC short-term acute (STA) guideline in 1.1% of 2024 samples: two winter samples, one summer sample, and one autumn sample.

Lead concentrations for the IDZ Station 2 Top and Reference – Parry Bay 5-in-30 averages exceeded the LTC guideline (Appendix C13). Both exceedances were the result of elevated lead concentrations reported for the April 2 Spring sampling event. Lead concentrations for all 2024 IDZ samples were below the BC STA guideline.

The 5-in-30 average zinc concentration exceeded the BC LTC guideline at IDZ Station 1 Top for the Spring set, for 7 of 12 IDZ stations for the Autumn set, and for two depth stations each at the reference stations (Appendix C16). The zinc BC STA guideline was also exceeded by the results for the April 2 IDZ Station 1 Top sample, the October 29 IDZ Station 3 Top sample and the October 29 IDZ Station 4 Top sample.

Concentrations of total boron exceeded the provincial guideline of 1.2 mg/L in all samples, with values ranging from 2.96 to 8.14 mg/L (Appendix C10). Background boron concentrations, as demonstrated at the reference stations, are approximately 4.0 mg/L in southern Vancouver Island marine waters (BCMoE, 2006). In the context of the reference station and regional background concentrations, these exceedances are expected.

Total ammonia as nitrogen concentrations were well below the selected site-specific provincial marine WQG of 1 mg/L. The maximum concentration observed was 0.33 mg/L and most results were below 0.05 mg/L.

These results indicate an improvement of IDZ water quality since wastewater treatment was operational. Past bacteriological results at middle and bottom depths showed consistent exceedances (CRD, 2020). The treatment process has reduced the concentration of bacterial indicators, heavy metals, and nutrients in the water column as well as on the water surface by up to an order of magnitude or more. The marine sample results for 2024 reflect the anticipated 113:1 IDZ dilution factor when compared to the MPWWTP final effluent concentrations.

Water Column Profiles

Water column profiles of temperature, salinity and dissolved oxygen (Appendix C17) generally followed expected seasonal patterns for the Strait of Georgia (well mixed in winter and stratified in summer). It appears that the plume was only occasionally detected by the CTD sensors as expected due to rapid mixing in the IDZ. 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 in the IDZ, only six profiles showed any evidence of a sewage plume layer, using decreases in dissolved oxygen as the primary indicator. This study confirms that bacteria concentrations are a reliable indicator of sewage plume, and they will continue as the main monitoring tool for plume detection.

CTD profiling will continue as part of the routine Environmental Monitoring Program. The data will be regularly fed into the oceanographic plume dispersion and dilution modelling to maintain an up-to-date database of background conditions.

3.3.3 Dilution Model Validation

Model validation sampling was conducted on June 20, 2024 under Scenario 1 during ebb tide. As shown in Table 3.1, bacteriological indicators were below the detection limit at all stations. These results are expected during regular operations.

Table 3.1 Model Validation Far-field Surface Water Sampling Results June 2024

		Bacteria (CFU/100mL)		Bacterial Source Tracking (gene copies/mL)			
Station name	Depth (m)	Enterococci	Fecal Coliform	Human	Gull	Canada Goose	Dog
Haystock Islets	1	<1	<1	ND	ND	ND	ND
Ogden Point Breakwater	1	<1	<1	ND	ND	ND	ND
Foot of Cook Street	1	<1	<1	2.7	ND	ND	ND
Trial Island	1	<1	<1	ND	ND	ND	ND
Chatham Island	1	<1	<1	ND	ND	ND	ND

It was not possible to capture the remaining scenarios and staff availability limited the ability to repeat previous scenarios. Staff will continue to monitor for an opportunity to sample during Scenario 2 and 3.

3.3.4 Overall Assessment

Overall, the 2024 surface fecal coliform and enterococci results indicate that the McLoughlin WWTP has reduced impacts to the receiving environment. The treated effluent plume was trapped well below the marine surface and the diffusers were effectively diluting the effluent. There were no exceedances on the surface at any time of the year for enterococci. Two enterococci values exceeded federal maximum single enterococci guidelines. Compared to the MPWWTP final effluent concentrations, the marine sample results reflected concentrations below the 113:1 dilution factor expected.

Regulatory exceedances were observed for IDZ samples for boron, cadmium, copper, lead and zinc. The frequency and range of parameters exceeding guidelines increased again in 2024; however, no causative pattern has emerged. This trend will continue to be monitored, and quality assurance measures will be reviewed with field staff.

Nutrients results show no potential for eutrophication of the marine receiving environment. Results were well-below the applicable marine water quality guideline and similar to reference station concentrations.

In summary, the new McLoughlin WWTP treatment processes have substantively reduced potential impacts to human health and the marine receiving environment, particularly from a bacteriological perspective, relative to the historical Macaulay and Clover discharges.

4.0 OVERFLOW AND BYPASS MONITORING

4.1 Introduction

During high volume storm events, the input to the Core Area conveyance system (Figure 1.1) may exceed system capacity, resulting in overflows at combined sewer overflow (CSO) and sanitary sewer overflow (SSO) relief points. There are also periodic bypass events to allow for planned maintenance of the treatment works or following unexpected non-routine or emergency events.

There are multiple overflow relief points in the system (Table 4.2), but most are never used, and are only in place for emergencies. the frequency of overflows has decreased following recent conveyance system upgrades. The historical and predicted future overflow frequencies for overflow relief points are presented in Table 4.1.

The McLoughlin Wastewater Treatment Plant, and the conveyance system upgrades, have reduced the frequency of overflows from most SSO points. These additions include the 5,000 m^3 underground Arbutus Attenuation Tank, that temporarily stores wastewater flows during high volume storm events, and moderates release into the downstream system. The frequency of overflows at the Humber and Rutland CSO locations, however, will remain unchanged until the District of Oak Bay completes separation of wastewater and stormwater systems in the Uplands neighbourhood. The Marigold holding tank was constructed in 2004 to attenuate flows on the west side of the conveyance system.

In the event of an overflow or bypass, sampling may be required at adjacent beaches and/or stormwater outputs (Table 4.2, Appendix D1). Protocols were developed in consultation with Island Health and approved by ENV. The purpose of shoreline monitoring is to assess risk for people engaged in recreational activities on beaches adjacent to the overflows by comparing bacterial results to recreational guidelines (Health Canada 2012 and 2024).

During the spring and summer (May 1 to September 14), the CRD monitors overflow events, if any occur. Monitoring occurs both during and after overflow events, if possible and safe. CRD staff post temporary beach advisory signs and contact Emergency Management BC (EMBC) and Island Health.

The monitoring and advisory response varies during the remainder of the year (September 15 to April 30). For the Humber and Rutland CSO locations, permanent signage has been posted at all potentially affected beaches advising beach users to stay out of the water for 48 hours after any weather event, and no sampling is undertaken for routine wet weather overflows. For the remaining SSO locations, and any unexpected non-routine or emergency CSO discharges, CRD staff conduct shoreline monitoring.

In the event of a planned or unplanned bypass at the McLoughlin WWTP, the CRD notifies ENV and analyzes the effluent composite sample.

Table 4.1 Overflow Frequency Pre- and Post-Treatment Plant/Conveyance System Upgrade

Location	Pre-Upgrade	Post-Upgrade
Finnerty	3-4 times/year	>25-year frequency storm
Humber	7-10 times/year	7-10 times/year
Rutland	7-10 times/year	7-10 times/year
McMicking	3-4 times/year	>25-year frequency storm
Clover Long Outfall	continuous	61 hours/year
Clover Short Outfall	3-4 times/year	>100-year frequency storm
Macaulay Long Outfall	continuous	>10-year frequency storm
Macaulay Short Outfall	1-2 times/decade	>100-year frequency storm
McLoughlin	n/a	Planned or unplanned bypass due to maintenance, equipment malfunctions or high flow.

4.2 Methods

A network of shoreline and stormwater sampling stations cover the beach area around the CSO/SSO locations. Shoreline stations are named based on their proximity to the overflow/relief point in the conveyance system, (e.g., HUM-H for Humber H). Storm drains are numbered, with stormwater stations named using that number in combination with “SW”.

When sampling is required, CRD staff select sampling stations based on the location of the overflow/bypass event(s) (Appendix D1) and collect a sample approximately 48 hours after the event occurs. Samples are collected concurrently at adjacent stormwater discharges.

Staff collect samples by submerging a sterile 500 mL plastic bottle into the marine surface waters as far as the sampling technician can reach from the shoreline, or by holding the bottle in the stormwater discharge flow. Samples are sent to Bureau Veritas (Burnaby, BC) for analysis for enterococci. Results are compared to Health Canada (2012) guideline limit of 70 CFU/100 mL for a single sample.

Table 4.2 Sanitary Sewer Overflow and Combined Sewer Overflow Locations

Outfall	Discharge Site	Location*		Treatment Equipment	Diffusers	Discharge Type
		Latitude	Longitude			
Clover Point Pump Station Long Outfall	Marine Outfall	48.394	-123.346	Travelling Panel Screen	Yes	Screened overflows
Humber Pump Station	Marine Outfall	48.449	-123.291	Bar Screen	N/A	Screened overflows
Rutland Pump Station	Marine Outfall	48.441	-123.291	Bar Screen	N/A	Screened overflows
Arbutus Trunk at Finnerty Cove	Marine Outfall	48.473	-123.286	N/A	N/A	Unscreened
Currie Major Pump Station (through McMicking Outfall)	Marine Outfall	48.409	-123.306	Travelling Bar Screen	N/A	Screened overflows from Currie
Currie Minor Pump Station (through McMicking Outfall)	Marine Outfall	48.409	-123.306	N/A	N/A	Unscreened from Currie
Penrhyn Minor Pump Station	Local Storm Sewer	48.459	-123.292	N/A	N/A	Unscreened
Hood Pump Station (through McMicking Outfall)	Marine Outfall	48.409	-123.306	N/A	N/A	Unscreened
East Coast Interceptor at Broom	Local Storm Sewer (Marine Discharge)	48.428	-123.307	N/A	N/A	Unscreened
Bowker Trunk to Bowker Creek at Monterey Avenue	Creek/River	48.429	-123.314	N/A	N/A	Unscreened
Northeast Trunk-B at Broom	Local Storm Sewer (Marine Discharge)	48.428	-123.308	N/A	N/A	Unscreened
Harling Pump Station	Local Storm Sewer (Marine Discharge)	48.407	-123.324	N/A	N/A	Unscreened
Clover Point Pump Station Emergency Bypass Outfall	Marine Outfall	48.404	-123.348	Travelling Panel Screen	N/A	Can be screened and unscreened
Clover Point Pump Station Short Outfall	Marine Outfall	48.402	-123.347	Travelling Panel Screen	N/A	Can be screened and unscreened
Macaulay Point Pump Station Long Outfall	Marine Outfall	48.403	-123.410	Travelling Panel Screen	Yes	Screened overflows
Macaulay Point Pump Station Short Outfall	Marine Outfall	48.416	-123.407	Travelling Panel Screen	N/A	Can be screened and unscreened
Head Street Northwest	Local Storm Sewer	48.427	-123.399	N/A	N/A	Unscreened
Sea Terrace Northwest Trunk	Local Storm Sewer	48.431	-123.394	N/A	N/A	Unscreened
Harriet Siphon Northwest Trunk to Gorge	Marine Outfall	48.443	-123.392	N/A	N/A	Unscreened
Gorge Siphon to Gorge	Marine Outfall	48.440	-123.388	N/A	N/A	Unscreened
Craigflower Pump Station at manhole S0560 on Shoreline Trunk	Marine Outfall	48.453	-123.425	N/A	N/A	Unscreened
Langcove Pump Station	Local Storm Sewer	48.433	-123.419	N/A	N/A	Unscreened
Marigold Pump Station to local storm sewer and into Colquitz Creek	Creek/River	48.468	-123.399	N/A	N/A	Unscreened

4.3 Results and Discussion

There were 26 overflow and unplanned bypass events in 2024, as listed in Table 4.3. Based on time of year and overflow location, shoreline sampling was conducted; these results are reported in Table 4.4.

Shoreline sampling results show exceedances of the BC Recreational Water Quality Guidelines for five of six samples collected exceeded the Enterococci single concentration maximum guideline and two results exceeded the five-sample geometric mean guideline (Table 4.4). No other exceedances were reported.

Table 4.3 2024 Core Area Overflow and Bypass Events

Date	Location	DGIR Number (Dangerous Good Incident Report)	Type of Event	Receiving Environment Monitoring Conducted
08-Jan-2024	Humber, Rutland	240084 240085	Heavy rain overflow	none
28-Feb-2024	Clover PS	240925	Heavy rain overflow	none
01-Mar-2024	McLoughlin	240951	Secondary bypass	none
29-May-2024	Rutland	242124	Heavy rain overflow	Shoreline sampling
03-Jun-2024	Rutland	242203	Heavy rain overflow	Shoreline sampling
14-Aug-2024	Humber, Rutland	243251 243252	Heavy rain overflow	none
24-Aug-2024	Humber, Rutland	243343 243344	Heavy rain overflow	Shoreline sampling
26-Aug-2024	Humber, Rutland	243371 243372	Heavy rain overflow	Shoreline sampling
16-Sep-2024	Macaulay PS	243632	Unplanned bypass	none
18-Oct-2024	Humber, Rutland, Clover PS	244092 244093 244094	Unplanned tertiary bypass	none
19-Oct-2024	Humber, Rutland, Clover PS	244092 244093 244094	Heavy rain overflow	none
04-Nov-2024	Humber, Rutland	244392 244393	Heavy rain overflow	Shoreline sampling
06-Dec-2024	Humber, Rutland	244873 244874	Heavy rain overflow	Shoreline sampling
17-Dec-2024	Humber, Rutland, Clover PS	245048 244049 245050	Heavy rain overflow	none

Table 4.4 2024 Core Area Overflow and Bypass Sampling Event Results

Overflow and Bypass Shoreline Sampling Results									
				Enterococci (CFU/100 mL)		*E. coli* (CFU/100 mL)		Fecal coliforms (CFU100 mL)	
Overflow Location(s)	Overflow Date	Related DGIR Number	Sampling Date	Geometric mean	Maximum	Geometric mean	Maximum	Geometric Mean	Maximum
Rutland	29-May-24	242124	29-May-24	17	**86**	---	---	58	330
Rutland	03-Jun-24	242203	03-Jun-24	**35**	**130**	---	---	55	200
Humber & Rutland	17-Aug-24	243251; 243252	19-Aug-24	3	19	---	---	---	---
Humber & Rutland	24-Aug-24	243343; 243344	28-Aug-24	14	**140**	---	---	---	---
Humber & Rutland	26-Aug-24	243371; 243372	28-Aug-24			---	---		
Humber, Rutland, Clover PS	19-Oct-24	244092; 244093; 244094	29-Oct-24	**58**	**150**	30[x]	51	---	---
Humber, Rutland	04-Nov-24	244392; 244393	05-Nov-24	9	**66**	---	---	---	---

Formatting indicates exceedances as follows:
≤ 35 Enterococci / 100 mL; geometric mean concentration (minimum five samples)
≤ 70 Enterococci / 100 mL; single sample maximum concentration
≤ 200 E. coli / 100 mL; geometric mean concentration (minimum five samples)
≤ 400 E. coli / 100 mL; single sample maximum concentration
Notes:
[x] – only two samples were collected which is less than the minimum five samples required to calculate a geometric mean

4.4 Overall Assessment

Previous overflow and bypass sampling conducted in the Core Area has reaffirmed that the wastewater signal in the vicinity of the overflow or bypass has generally dissipated by 48 hours following the events, therefore the risk to humans recreating on nearby beaches is highest in the immediate 48 hours after rain events. Effluent flows from the MPWWTP were non-detectable at far-field monitoring stations. Overflow and bypass samples will continue to be conducted as required in 2025.

5.0 SEAFLOOR MONITORING

Sediment chemistry, pore-water chemistry, toxicity and benthic invertebrate surveys were conducted at Macaulay and McLoughlin Point outfalls in 2024. The results are currently outstanding and will be reported on as an addendum in early 2026 (Appendix E).

6.0 ADDITIONAL INVESTIGATIONS

CRD staff conduct additional investigations to address focused or emerging issues, clarify aspects of the program, and provide concurrent data for the assessment of environmental effects. The Society of Ecotoxicology and Chemistry (SETAC) review of the program agreed that one-time investigations are appropriate to fill information gaps, as needed (SETAC, 2006).

In 2006, the MMAG completed a comprehensive review of the list of additional investigations. 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. In 2013, following the move to advance treatment, the MMAG was tasked with reviewing and reprioritizing the list, as well as adding any additional potential new studies. This review was put on hold in 2015 at the last meeting of the MMAG.

Investigations addressing emerging scientific issues are most effectively conducted through collaborative research programs. For instance, when concerns around pharmaceuticals and personal care products (PPCPs) first arose, laboratory methods for quantification of these substances were not yet commercially available in Canada. As a result, early assessments were carried out as research programs leveraging shared resources with university research laboratories. Since then, commercial laboratories have established standardized methods, and PPCP analyses are now a routine component of the EMP.

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, several opportunistic collaborative opportunities have come up in recent years. Section 6.1 summarizes investigations that were ongoing, completed or initiated in 2024.

Table 6.1 Core Area Additional Investigations Prioritization by MMAG (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 (chemical, biological, and toxicological).	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).	TBD
	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 was added to the bacteriological target analyte list in 2011. Consideration of additional pathogens will be re-evaluated in the advisory group additional investigation review.	TBD
	Bacteria source identification.	Determine the different sources of fecal coliform to differentiate between various mammals, such as cows, dogs and humans.	Low	Conducted at near and far-field sites.	Completed in 2021.
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). The priority of this investigation is now likely lower due to the implementation of tertiary treatment and the subsequent ≈95% reduction in effluent solid concentrations.	TBD

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 the 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.	Results were presented in the 2019 annual report. Study was repeated in 2025.
	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).	TBD
	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).	TBD
	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).	TBD
	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).	TBD
	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).	TBD

Notes:
TBD – to be determined according to advisory group additional investigations review findings.

6.1 Investigations Completed or Underway from 2021 - 2024

The EMP completed or participated in the following additional investigations:

- Participation in the Ocean Wise Conservation Association's SSAMEx and Pollution Tracker programs.
- Continuation of efforts to assess microplastics in wastewater, biosolids and environmental samples.
- Completion 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 BC Centre for Disease Control and the Public Health Agency of Canada collaboration to assess COVID-19, influenza and RSV presence in BC and Canadian wastewaters.

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

The Ocean Wise Conservation Association's (OWCA) SSAMEx program is a trans-boundary initiative with the aim to build on current monitoring initiatives, enable data sharing to fill gaps for the Salish Sea, and provide a platform for discussion and dialogue. 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 OWCA'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 supports new and existing sampling efforts through coordinating laboratory analyses. 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. Results can be found at https://pollutiontracker.org/.

The OWCA has recently ceased further work on both the SSAMEx and Pollution Tracker programs. As such, the CRD will no longer be supporting these programs directly. However, in 2024 the MPWWTP/Macaulay seafloor monitoring program followed SSAMEx protocols and included an expanded sediment contaminant list in alignment with the Pollution Tracker target analyte list. The 2024 wastewater target analyte list was similar.

6.1.2 Microplastic Analysis

Microplastics are an emerging environmental concern. These contaminants are ubiquitous in the environment and wastewater treatment plants have been identified as significant point sources. Over the past decade, the CRD has collaborated with several organizations working to develop methods for analyzing microplastics in wastewater, marine waters and marine life. Only recently, by late 2023, have commercial laboratories begun offering microplastic analysis services using relatively standardized methods.

The CRD initiated microplastic assessments by participating in two collaborations with organizations that were developing standardized methods. The OWCA used CRD wastewater and sediment samples collected in 2016-2017 to develop analytical methodologies for quantifying and characterizing plastics in wastewater and environmental samples. Similarly, Vancouver Island University (VIU) used 2015 Clover Point mussel samples to develop methods for assessing plastic accumulation in marine life tissues. As these collaborations were method development efforts, they did not provide results that could be used to directly evaluate wastewater and receiving environment impacts.

The CRD contracted Ocean Diagnostics, Inc. (ODI) to conduct a limited three-day mass balance study of microplastics at the MPWWTP in 2024. ODI has refined standardized methods for microplastics separation from complex matrices such as influent and biosolids. Using samples of wastewater collected at various points in the treatment process (influent, mid-treatment and final effluent), along with biosolids, ODI determined that the MPWWTP processes microplastics in a similar manner to most other wastewater treatment plants. Typically, it is the settling and coagulation processes (the primary treatment processes) at treatment plants that result in the greatest reduction of microplastics in the liquid stream. At the MPWWTP, ODI found that about 60% of microplastics were removed from the liquid stream in the primary treatment processes. These microplastics were sequestered to biosolids. Only about 10% of the microplastics coming into the facility were found in the final effluent discharged to the Salish Sea. The fate of the remaining 30% of microplastics could not be determined under this study design. Further assessment is being considered, including analyses of marine receiving environment samples near the outfall. Results from the ODI study can be found in Yang et al., 2025.

6.1.3 Benthos Death Assemblages

In 2016, the CRD worked with Biologica Environmental Services Ltd. (Biologica) and a University of Chicago researcher on a benthic invertebrate death assemblage study. The researcher compared “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 staff provided debris from 2010, 2014 and 2017 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 one kilometre away from the Macaulay diffuser, slightly farther than what the routine environmental monitoring program stations would capture. Preliminary findings were presented at various scientific conferences.

The project is now complete, and results have recently been published in Kidwell et al., 2025.

6.1.4 Benthos Toxicogenomic Tool Development

Benthic taxonomy is a useful tool for the assessment of anthropogenic stressors and determining the environmental 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 compared to programs that took place pre-2011. This has resulted in a loss of temporal and spatial resolution for the program.

In 2016, Biologica Environmental Services Ltd. and a UVIC researcher presented CRD staff with a research project that would result in 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 historical 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.

Biologica is the financial driver of the research and development project, in collaboration with the UVIC researcher that historically developed Clover mussel eDNA tools. To date, CRD monitoring program staff have provided benthos samples collected in 2017, 2019 and 2022, 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 students for preliminary method development.

In 2019, Biologica and UVIC were successful in obtaining a grant application to fully implement the project and a five-year project was initiated. 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.

The team has confirmed the best field sample collection methods to optimize eDNA signals and has since developed assays for several positive, negative and control benthic species to assess wastewater effects around marine outfalls in the Salish Sea. Work is progressing on isolating eDNA from additional indicator species using sediment samples collected during the September 2022 and 2024 seafloor sampling program around the McLoughlin and Macaulay outfalls.

Results have been presented at various scientific conferences and in a recently published journal article (Acharya-Patel et al., 2025). More journal articles are anticipated as the development project concludes. The tool is expected to be incorporated into the routine McLoughlin/Macaulay seafloor monitoring program.

6.1.5 COVID-19 in Wastewater

Throughout the world, researchers have been investigating ways to predict timing of COVID-19 and other pathogen outbreaks to inform health care planning. Wastewater epidemiology is now widely used to predict outbreaks of various pathogens sometimes as much as a week or two before patients start presenting with widespread symptoms in health care facilities. The CRD has been participating in related studies since 2020.

The CRD initially provided weekly wastewater samples from Macaulay, Clover and the Saanich Peninsula wastewater treatment plants to a consortium of researchers from UVIC and Pani Energy Inc. (Victoria, BC). McLoughlin samples were provided once the new plant was commissioned in early 2021. The samples were used to develop a method to detect COVID-19 in wastewater, determine the sensitivity of the method, and whether results correlate with the number of reported cases in community. Results from this study can be found in Masri *et. al*., (2022).

In 2022, the CRD started providing the BC Centre for Disease Control (BCCDC) with McLoughlin wastewater samples that were initially analyzed for COVID-19, but were then expanded to include influenza and Respiratory Syncytial Virus (RSV) analyses. CRD results, along with other treatment plants throughout the province, can be found via an online data dashboard at https://bccdc.shinyapps.io/respiratory_wastewater/.

In addition, the CRD started providing McLoughlin wastewater samples in May 2024 to the National Microbiology Laboratory at the Public Health Agency of Canada, also for analysis of COVID-19, influenza and RSV. These results are used by national health authorities, in conjunction with the BCCDC results, to determine pathogen concentrations and patterns across the country.

6.1.6 Investigations Planned for 2025

No new additional investigations are planned for 2025, though any opportunistic project of relevance will be considered.

7.0 CONCLUSIONS

The monitoring results for 2024 reflect continued treatment optimization for the MPWWTP treatment in the Core Area. Commissioning of the MPWWTP began in August 2020, with flows gradually diverted from the Macaulay and Clover pump stations to the new facility. In 2021, all core area flows were treated at MPWWTP. EMP monitoring requirements remain in place for Macaulay and Clover; however, monitoring is now only related to bypass/overflow events. The routine monitoring components of the program, and the additional investigations, served to effectively assess the impacts of the McLoughlin, Macaulay, and Clover discharges on the marine receiving environment.

CRD staff conducted MPWWTP influent and effluent sampling throughout 2024 to meet regulatory compliance requirements and to determine contaminant removal efficiency of the tertiary treatment processes.

In 2024, EMP staff conducted routine receiving environment monitoring of surface water and the water column at McLoughlin. No surface water or water column sampling at Macaulay or Clover took place as overflow events were not coincident with the routine McLoughlin sampling.

Sediment and benthic invertebrate monitoring was conducted at McLoughlin and Macaulay in 2024; however, the results were not available at the time of reporting and will be reported in an addendum to be published in early 2026. Sediment, mussel, finfish and crab studies are scheduled for Clover for 2025.

Additional research and investigations were ongoing in 2024. 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.

The MPWWTP processes were still undergoing optimization in 2024, with an expectation that optimization will be completed in 2025. The results for 2025 should provide a better overview of the efficacy of treatment and resulting reductions of effects to the marine environment compared to conditions prior to commissioning. The installation of tertiary treatment was expected to substantively reduce overall contaminant loading to the environment and reduce the footprint of impact. This expectation has been reflected in the 2024 results. The CRD is committed to continuing the EMP to assess these improvements both spatially and temporally.

7.1 Wastewater

Wastewater regulatory compliance results indicated that the quality of the wastewater from McLoughlin achieved tertiary standards for most of the year. Federal compliance limits were met the entire year. Provincial regulatory limits were intermittently exceeded from January to September when compared to the compliance limits of 10 mg/L monthly average for TSS and CBOD. Monthly averages exceeded the TSS limit for five months and CBOD for seven months. The CRD is in discussions with ENV to allow a monthly average of 25 mg/L for TSS and CBOD for McLoughlin effluent, which is consistent with the federal limit. The proposed change would result in the TSS and CBOD permit limit of 10 mg/L no longer being in effect. If the limit is relaxed, the MPWWTP is expected to be 100% compliant in the future.

The CRD is investigating the potential that large, intermittent discharges from CRD inputs such as the Hartland Residuals Treatment Facility and Hartland Landfill leachate effluent are impacting facility performance.

Wastewater priority substance monitoring results confirmed the efficacy of the tertiary treatment plant to substantively reduce concentrations and loadings of contaminants to the marine receiving environment relative to historical untreated discharges out of Macaulay and Clover. Except for bacteriological indicators, the estimated receiving environment concentrations (based on applying predicted minimum initial dilution factors to wastewater concentrations) were not predicted to exceed applicable provincial and federal water quality guidelines for the protection of human health and aquatic life. Most were below guidelines in wastewater even before discharge. More detailed concentration and loading assessments will be undertaken in 2025 as part of the monitoring program cycle review.

Tertiary treatment at McLoughlin has also improved acute toxicity with the acceptable results for all but one McLoughlin acute rainbow trout and invertebrate toxicity tests. The test failure was determined to be related to failure to adequately flush a previously unused effluent sampling line. These results represent a significant improvement over historical Macaulay and Clover discharge practices. McLoughlin effluent was also much less chronically toxic than historical Macaulay and Clover effluents, further affirming the value of advanced treatment to reduce the potential for adverse effects to organisms around the outfall.

Chronic toxicity results indicated that the predicted wastewater concentrations at the edge of the McLoughlin IDZ would have little to no effect on organism health based on the calculated dilution factor.

Bacteriological guideline exceedances are expected to continue at McLoughlin, because effluent disinfection was not included as a treatment process. Despite this, the magnitude and duration of the exceedances has decreased substantially relative to historical Macaulay and Clover flows; bacterial concentrations in the McLoughlin final effluent are an order of magnitude lower than for Macaulay and Clover effluents. In addition, overflows from the Clover long outfall will now only occur during significant rain events and have not occurred at Macaulay due to rainfall to date. 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. Wet weather discharges will be further reduced through the ongoing implementation of CRD and municipal inflow and infiltration reduction programs.

There are many unregulated and emerging substances that the CRD monitors. The potential influence of these substances on the environment is less-well understood. The CRD attempts to assess the risk of these contaminants through toxicity testing and through additional investigations as described in Section 6.0.

7.2 Reclaimed Water

The reclaimed water system was disconnected and decommissioned in 2021 due to operational challenges. As such, no reclaimed water samples were collected for analysis in 2024.

7.3 Surface Water

In 2024, surface water fecal coliform and enterococci results indicated that the outfall plume was predominantly trapped below the ocean surface. The potential for human exposure to elevated fecal coliform and enterococci concentrations around the outfall was very low. Fecal coliform and enterococci results were infrequently above thresholds used to assess risk to human health, as expected based on effluent quality and outfall design. These exceedances occurred mostly during the autumn sampling period when surfacing events are more frequently predicted.

The 2024 water column monitoring (at depths of 5 m or greater) confirmed that bacteriological indicators rarely exceeded either provincial or federal guidelines at the edge of the IDZ around the McLoughlin outfall. Magnitude and frequency of exceedances were much lower than historical observations around the Clover and Macaulay outfalls, affirming the environmental improvement of tertiary treatment at McLoughlin. These minor exceedances were expected, based on the wastewater concentrations of the bacteriological indicators (in the hundreds of thousands of bacteria per 100 mL) and the intended design of the outfall diffusers, even with tertiary treatment and the lack of disinfection. The diffusers were designed specifically to ensure that the wastewater plumes were well-diluted and trapped below the surface.

Overall, the fecal coliform and enterococci results were within the concentrations predicted by plume dispersion model. The moderately high bacterial counts in the receiving environment can be attributed to higher wastewater flows in winter, coupled with the oceanography of this area during the winter months (i.e., 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 much less frequent in summer than in winter.

While the plume was predominantly trapped below the surface, with low risk to human health, there is potential ecological risk to pelagic organisms. The 2024 water column monitoring results for metals were generally low or similar to regional background levels (e.g., boron) indicating that risk to organisms was also likely low. Several metals were elevated compared to previous years such as cadmium, copper, lead, and zinc. These exceedances were very infrequent and occurred sporadically at multiple depths across seasons both at IDZ stations and reference stations. These unusual findings will be considered going forward and quality assurance procedures will be reviewed with all sampling staff.

Overall, the bacteriological monitoring results indicated that the surface water effects of the outfall were limited and substantively lower than the signals observed historically around the Clover and Macaulay outfalls. The McLoughlin plume was predominantly trapped at depth (below 40 m) for most of the year, and substantially diluted wastewater only occasionally reached the surface.

The CRD's continued commitment to promoting water is expected to prevent increases in per capita decrease in water demand. Reduced demand and smoothing of peak demand serves to improve performance consistency of wastewater treatment processes.

7.4 Overflow and Bypass Monitoring

The conveyance system is designed with numerous shoreline sanitary and combined sewer overflow and relief points that discharge during heavy rains, planned maintenance activities or following unexpected non-routine or emergency events. Shoreline monitoring is required to assess human health risk for people engaged in recreational activities on beaches adjacent to the overflows. Overflow monitoring was conducted on seven dates in 2024. Previous monitoring confirmed that wastewater overflow signals typically dissipate within 48-hours. Overall, risk to human health is short-lived following bypass and overflow events.

7.5 Seafloor Monitoring

Seafloor monitoring is required every two to three years around the Macaulay and McLoughlin outfalls and every five years around the Clover outfall. Sediment and benthic invertebrates were sampled at the Macaulay and MPWWTP outfalls in 2024 and will be reported on in an addendum in 2026 as the data was not ready for reporting.

7.6 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 participated in several investigations including SSAMEx, Pollution Tracker, and benthos assemblage analysis method development during from 2021 and concluding in 2024.

The CRD hired a private contractor to conduct a mass balance of microplastics at the McLoughlin WWTP which was reported on in 2024. These results provided some insights into the fate of microplastics received in the MPWWTP influent; however, follow-up investigations may be necessary to provide a more fulsome understanding.

Additional investigations related to benthic invertebrate death assemblage assessment and benthos eDNA were completed in 2024; however, CRD support through the provision of wastewater samples is ongoing.

Finally, the CRD has continued to work with the BCCDC on respiratory illness surveillance in wastewater in 2024. McLoughlin samples are also now provided to the Public Health Agency of Canada under Health Canada for a similar program. These findings help inform public health authority decision-making related to respiratory illness response.

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APPENDIX A

ENVIRONMENTAL MONITORING PROGRAM HISTORY

Appendix A1 Program History

CRD staff have conducted monitoring of wastewater discharges, surface waters and the seafloor environment in the vicinity of the Macaulay and Clover outfalls since the late 1980s. The program has undergone several changes over the years. Monitoring of wastewater, marine surface waters close to the outfalls, and benthic communities were conducted in the 1970s and 1980s in collaboration with the University of Victoria (UVIC) and independent consultants. 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. (1992) (EVS). 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 an advisory group made up of academics and other experts in environmental effects assessment and monitoring (Marine Monitoring Advisory Group (MMAG).

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, with changes primarily in increased frequency of monitoring. Special 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 are provided below.

The Society of Environmental Toxicology and Chemistry (SETAC) completed a review of the CRD Core Area LWMP 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 several 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, considering 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 the MMAG and consultants familiar with the monitoring program data reviewed the new program (Golder, 2011) and provided recommendations. There is also a commitment within the five-year monitoring program that CRD and ENV 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 and other external expert reviews, and the transition to treatment at McLoughlin in 2020. Since 2020, EMP revisions have primarily included 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, along with effluent quality monitoring once the MPWWTP commissioning began in 2020. In addition, wastewater monitoring at Macaulay and Clover was significantly reduced as of December 31, 2020. This shift to monitoring at the McLoughlin facility aligned with the cancellation of the Federal Transitional Authorizations for Clover and Macaulay. The monitoring program shifted to McLoughlin starting in 2021, which aligns with Cycle 3, Year 1 of the EMP.

With the commissioning of the MPWWTP came the need to manage sludge and, subsequently, biosolids produced at the Residuals Treatment Facility (RTF) located at Hartland Landfill. As previously noted, the RTF is under a separate provincial authorization. Biosolids monitoring results are presented in other reports (CRD, 2024 and HRMG, 2024).

APPENDIX A2

GUIDANCE MANUAL FOR THE ASSESSMENT AND ANALYSIS OF WMEP DATA

Available upon request.

Contact: CRD Environmental Monitoring Program 250.360.3082

APPENDIX B
2024 WASTEWATER MONITORING

Appendix B1	Priority Substance List and Sampling Frequency
Appendix B2	McLoughlin Point Wastewater Treatment Plant Influent Flow (m^3/day)
Appendix B3	McLoughlin Point Wastewater Treatment Plant Tertiary Effluent Flow (m3/day)
Appendix B4	McLoughlin Point WWTP Federal and Provincial Wastewater Compliance Results
Appendix B5	Frequency of Detection, Loadings and Percent Removal of Substances in McLoughlin Influent and Final Effluent
Appendix B6	Acute Toxicity Test Result Bench Sheets (available upon request)
Appendix B7	Chronic Toxicity Test Result Bench Sheets (available upon request)

Appendix B1 Priority Substance List and Sampling Frequency

Substance	McLoughlin WWTP Influent and Effluent (full list) Quarterly	(modified list) 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	√	√
selenium	√	√
silver	√	√

Appendix B1, cont'd

Substance	McLoughlin WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
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	√	√
2-chlorophenol	√	√
4-chloro-3-methylphenol	√	√
pentachlorophenol	√	√
NON-CHLORINATED PHENOLICS		
2,4-dimethylphenol	√	√
2,4-dinitrophenol	√	√

Appendix B1, cont'd

Substance	McLoughlin WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
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	√*	
PCB-31	√*	
PCB-37	√*	
PCB-40	√*	
PCB-44	√*	
PCB-43/49	√*	
PCB-52/73	√*	
PCB-54	√*	
PCB-56/60	√*	

Appendix B1, cont'd

Substance	McLoughlin WWTP Influent and Effluent (full list) Quarterly	(modified list) Monthly
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	√	
bis(2-chloroisopropyl)ether	√	
hexachlorobenzene	√	
hexachlorobutadiene	√	
hexachlorocyclopentadiene	√	
hexachloroethane	√	
isophorone	√	√
nitrobenzene	√	√
N-nitrosodimethylamine	√	√
N-nitrosodi-n-propylamine	√	√
N-nitrosodiphenylamine	√	√

Appendix B1, cont'd

Substance	McLoughlin WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
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	√	√
trans-1,2-dichloroethene	√	√
trans-1,3-dichloropropene	√	√
trichloroethene	√	√
trichlorofluoromethane	√	√
Trihalomethanes		
bromodichloromethane	√	√
chlorodibromomethane	√	√
tribromomethane	√	√
trichloromethane	√	√
Ketones		
dimethyl ketone	√	√
methyl ethyl ketone	√	√

Appendix B1, cont'd

Substance	McLoughlin WWTP Influent and Effluent	
	(full list)	(modified list)
	Quarterly	Monthly
methyl isobutyl ketone	√	√
alpha-terpineol	√	√
High Resolution Analysis		
Nonylphenols (NP)	√	
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 (PCB)	√	
TOXICITY-ACUTE		
96-hr Rainbow Trout - pH stabilized		√
48-hr Daphnia magna		√
TOXICITY-CHRONIC (Annual)		
Rainbow Trout Avelin and Egg Test (EA)	√**x	
Ceriodaphnia 7-day	√**	
Top smelt 7-day	√**	
Echinoderm fertilization	√**	

Notes:
√* Analyses were conducted at a higher resolution (i.e., at SGS AXYS Analytics), **annually. [x]endpoint not completed due to organism supply challenges.

Appendix B2 McLoughlin Point Wastewater Treatment Plant Influent Flow (m^3/day)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	81,140	111,450	120,330	88,990	83,200	82,040	76,680	78,410	77,480	111,620	105,380	92,050
2	85,120	106,800	111,060	88,520	83,000	92,070	77,362	77,250	82,970	84,876	116,680	91,020
3	82,310	115,300	110,120	88,210	81,770	107,370	77,720	75,240	81,160	80,947	104,680	90,450
4	83,780	111,040	119,390	86,560	82,090	87,340	77,950	73,580	81,080	100,154	127,120	88,990
5	89,560	104,260	112,490	86,280	83,780	84,850	79,440	78,060	83,540	122,360	103,340	87,640
6	105,070	102,190	112,180	87,970	82,930	82,480	80,280	78,480	79,910	114,330	97,210	89,270
7	92,760	99,350	106,620	88,060	80,260	82,920	76,820	79,130	79,170	93,430	95,100	154,380
8	126,830	100,220	106,730	103,310	80,890	79,230	78,620	77,100	81,130	96,130	92,070	149,190
9	187,440	94,720	103,120	97,910	81,570	81,600	114,790	76,230	81,610	87,580	120,260	116,420
10	130,160	95,190	99,170	91,100	81,180	81,870	77,450	74,610	81,010	83,490	105,280	107,640
11	113,370	117,830	98,160	89,110	79,570	84,130	77,200	77,030	81,360	97,870	121,650	104,820
12	104,770	103,950	101,870	87,850	82,910	79,790	78,750	77,450	83,150	79,210	111,720	99,960
13	101,500	98,620	96,840	87,820	81,940	80,050	74,230	79,250	83,520	78,380	133,200	97,780
14	100,500	98,230	95,260	88,970	83,690	78,630	76,320	78,070	86,270	81,340	146,910	103,010
15	92,620	96,430	93,840	86,870	79,830	79,990	78,100	77,080	82,290	81,710	114,630	96,720
16	92,640	93,290	92,330	84,520	78,630	80,820	76,830	75,370	79,290	87,130	117,890	107,320
17	96,990	92,370	91,940	86,210	79,070	81,450	77,350	74,830	81,610	85,150	122,430	162,330
18	102,410	89,260	90,860	125,800	76,110	79,610	79,100	89,620	81,000	111,330	111,960	229,400
19	165,120	98,270	90,310	82,170	75,070	79,990	76,220	80,710	82,150	212,350	107,030	167,540
20	144,960	91,600	88,800	82,490	79,510	80,700	73,870	79,750	78,190	165,160	101,260	141,440
21	143,370	96,560	86,990	87,770	105,650	78,910	75,970	78,690	77,550	114,510	96,820	129,510
22	148,700	92,020	88,820	84,610	93,720	77,040	76,860	77,570	80,630	98,710	103,610	123,860
23	135,510	90,610	119,800	83,450	83,260	80,500	76,230	81,190	85,550	95,330	98,160	146,240
24	133,820	90,890	102,140	86,870	84,420	80,180	77,700	116,290	78,790	90,530	97,790	124,520
25	121,870	112,340	95,950	91,750	81,440	81,060	77,480	83,150	103,550	87,310	102,350	111,730
26	118,010	98,420	93,850	90,950	85,950	78,530	75,270	96,760	93,610	89,100	97,530	123,160
27	266,560	94,700	91,630	85,870	82,540	79,750	74,850	89,630	82,080	121,560	102,650	114,050
28	221,660	157,200	91,580	87,540	90,080	79,040	76,970	82,610	79,730	116,730	97,240	125,560
29	150,140	145,120	90,300	85,680	88,630	75,190	82,380	83,560	78,890	104,040	95,070	117,750
30	128,510		87,290	83,820	81,510	74,430	83,680	81,779	82,270	96,800	90,400	114,600
31	118,230		86,990		80,110		78,800	77,711		91,610		113,790
Average	124,691	103,387	99,250	89,234	83,042	81,719	78,751	80,845	82,351	101,961	107,914	120,069
Maximum	266,560	157,200	120,330	125,800	105,650	107,370	114,790	116,290	103,550	212,350	146,910	229,400
Minimum	81,140	89,260	86,990	82,170	75,070	74,430	73,870	73,580	77,480	78,380	90,400	87,640

Annual Average	**96,125**

Appendix B3 McLoughlin Point Wastewater Treatment Plant Effluent Flow (m^3/day)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	79,552	109,635	118,898	87,446	81,468	80,575	75,112	76,931	76,005	110,102	103,631	90,390
2	83,313	104,628	109,581	87,005	81,355	90,593	77,362	75,777	81,428	102,150	114,971	89,150
3	80,676	113,462	108,680	86,682	80,142	105,520	76,193	73,876	79,653	104,210	103,022	88,640
4	82,073	109,441	117,679	84,830	80,400	85,836	76,349	72,183	79,580	126,850	125,401	87,290
5	87,929	102,784	110,905	84,463	82,273	83,055	77,777	76,696	81,963	120,836	101,715	85,970
6	103,379	100,698	110,120	86,046	81,311	80,855	78,716	76,995	78,277	112,786	95,647	87,650
7	91,233	97,890	104,634	86,369	78,694	81,348	75,453	77,724	77,645	91,951	93,324	152,370
8	125,135	98,657	104,927	101,547	79,302	77,728	77,337	75,733	79,671	94,536	90,450	147,420
9	185,569	93,084	101,500	96,051	79,925	79,999	76,927	74,772	80,064	85,970	118,504	114,680
10	128,406	93,324	97,675	89,652	79,761	80,154	76,240	73,216	79,532	81,975	103,793	105,820
11	111,921	116,145	96,621	87,344	77,960	82,192	75,754	75,740	79,811	96,253	120,051	102,870
12	103,359	102,304	100,179	86,151	81,310	77,974	77,230	76,097	81,402	77,765	110,074	98,260
13	100,048	97,059	95,023	86,117	80,274	78,348	72,862	77,896	81,871	77,009	131,938	96,170
14	98,791	96,576	93,576	87,440	81,867	77,139	74,846	76,349	84,636	79,994	144,958	101,350
15	90,896	94,906	92,229	85,348	78,264	78,572	76,610	74,715	80,882	79,512	112,713	95,090
16	90,939	91,735	90,687	83,090	76,967	79,218	75,248	73,428	77,801	85,323	116,562	105,620
17	95,358	90,725	90,443	84,680	77,333	79,786	75,737	73,526	80,032	83,318	120,325	160,510
18	100,808	87,803	89,157	82,025	74,594	77,953	77,564	88,206	79,415	109,747	110,307	226,910
19	163,663	96,805	88,666	80,515	73,683	78,327	74,604	78,992	80,533	210,376	105,670	165,950
20	143,325	90,030	87,175	81,005	78,035	79,116	72,108	78,196	76,636	163,732	99,852	139,790
21	141,711	95,018	85,363	86,298	104,001	77,241	74,298	77,174	76,008	112,446	95,191	127,960
22	147,069	90,381	87,226	82,976	92,008	75,519	75,188	75,814	79,172	96,559	101,910	122,260
23	133,340	89,112	117,926	81,653	81,709	79,019	74,480	79,097	83,833	93,174	96,390	144,490
24	131,826	89,214	100,545	84,989	82,787	78,603	76,033	114,277	77,281	88,914	96,230	122,840
25	120,195	110,744	94,452	89,936	79,795	79,435	75,776	81,096	101,766	85,479	100,640	110,120
26	116,332	96,535	92,253	89,242	84,397	76,793	73,693	95,066	91,894	87,051	95,810	121,230
27	154,216	93,110	90,138	84,531	80,935	78,144	73,278	87,661	80,561	119,804	101,010	112,440
28	219,715	155,739	89,851	85,803	88,539	77,403	75,593	80,965	78,197	114,743	95,490	123,850
29	148,059	143,155	88,768	84,136	86,782	73,731	80,976	81,647	77,521	102,048	93,410	116,250
30	126,870	---	85,751	82,061	79,881	73,278	82,104	80,275	80,764	95,079	88,900	112,850
31	116,693	---	85,267	---	78,495	---	77,281	76,270	---	89,963	---	100,280
Average	119,432	101,748	97,610	86,181	81,427	80,115	76,088	79,238	80,794	102,570	106,263	117,951
Minimum	219,715	155,739	118,898	101,547	104,001	105,520	82,104	114,277	101,766	210,376	144,958	226,910
Maximum	79,552	87,803	85,267	80,515	73,683	73,278	72,108	72,183	76,005	77,009	88,900	85,970
											Annual Average	**94,140**

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).

Appendix B4 McLoughlin Point WWTP Federal and Provincial Wastewater Compliance Results

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Jan 01, 2024	79552	0	6.0		7.7					
Jan 02, 2024	83313	0	6.0		14.7	22.9			130000	23000
Jan 03, 2024	80676	0	7.0	7.60	8.4					
Jan 04, 2024	82073	0	7.0		9.6	31.8				
Jan 05, 2024	87929	0								
Jan 06, 2024	103379	0								
Jan 07, 2024	91233	0	10.0		9.5	16.5				
Jan 08, 2024	125135	1860	23.0	7.40	14.1					
Jan 09, 2024	185569	12490	26.0		13.8	11.9	1.3	0.8	550000	170000
Jan 10, 2024	128406	0	7.0		6.6					
Jan 11, 2024	111921	0	7.0		11.0	22.3				
Jan 12, 2024	103359	0								
Jan 13, 2024	100048	0								
Jan 14, 2024	98791	0	10.0		9.0	26.8				
Jan 15, 2024	90896	0	7.0	7.50	9.7					
Jan 16, 2024	90939	0	6.0		7.7	19.0			91000	20000
Jan 17, 2024	95358	0	9.0		9.9					
Jan 18, 2024	100808	0	7.0		8.8	18.8				
Jan 19, 2024	163663	70								
Jan 20, 2024	143325	0								
Jan 21, 2024	141711	0	15.0		14.9	21.8				
Jan 22, 2024	147069	0	16.0	7.50	11.0					
Jan 23, 2024	133340	0	13.0		11.2	22.6	2.4	2.0	310000	63000
Jan 24, 2024	131826	0	12.0		12.0					
Jan 25, 2024	120195	0	10.0		14.4	15.7				
Jan 26, 2024	116332	0								
Jan 27, 2024	154216	5110								
Jan 28, 2024	219715	21560	36.0		13.3	12.3				
Jan 29, 2024	148059	0	25.0		12.7					
Jan 30, 2024	126870	0	20.0		12.0	22.6			105000	20000
Jan 31, 2024	116693	0	18.0		11.4					
Monthly Total :	**3702399**	**41090**								
Monthly Average :	**119432**	**1325**	**13.2**	**7.50**	**11.0**	**20.4**	**1.9**	**1.4**	**237200**	**59200**
Monthly Max :	**219715**	**21560**	**36.0**	**7.60**	**14.9**	**31.8**	**2.4**	**2.0**	**550000**	**170000**
Monthly Min :	**79552**	**0**	**6.0**	**7.40**	**6.6**	**11.9**	**1.3**	**0.8**	**91000**	**20000**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**X**								
TPF = 0 Average :	**109773**		**10.9**	**7.53**	**10.6**	**21.9**	**2.4**	**2.0**	**159000**	**31500**
TPF = 0 Max[3] :	**148059**		**25.0**	**7.60**	**14.9**	**31.8**	**2.4**	**2.0**	**310000**	**63000**
TPF = 0 Min :	**79552**		**6.0**	**7.50**	**6.6**	**15.7**	**2.4**	**2.0**	**91000**	**20000**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**X**	**Y**	**X**					
TPF > 0 # of Days[4] :		**5**								
TPF > 0 Average :	**169660**	**8218**	**28.33**	**7.40**	**13.7**	**12.1**	**1.3**	**0.8**	**550000**	**170000**
TPF > 0 Max[3] :	**219715**	**21560**	**36.00**	**7.40**	**14.1**	**12.3**	**1.3**	**0.8**	**550000**	**170000**
TPF > 0 Min :	**125135**	**70**	**23.00**	**7.40**	**13.3**	**11.9**	**1.3**	**0.8**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Appendix B4, cont'd

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Feb 01, 2024	109635	0	15.0		12.1	18.7				
Feb 02, 2024	104628	0								
Feb 03, 2024	113462	0								
Feb 04, 2024	109441	0	6.0		9.4	29.2				
Feb 05, 2024	102784	0	11.0		9.8					
Feb 06, 2024	100698	0	14.0		13.4	30.3	3.2	2.8	250000	24000
Feb 07, 2024	97890	0	16.0	7.70	13.6					
Feb 08, 2024	98657	0	11.0	7.49	11.9	26.5	2.6	2.1	38000	9300
Feb 09, 2024	93084	0								
Feb 10, 2024	93324	0								
Feb 11, 2024	116145	0	7.0		4.9	32.3				
Feb 12, 2024	102304	0	7.0	7.40	7.7					
Feb 13, 2024	97059	0	9.0		9.0	19.4			98000	13000
Feb 14, 2024	96576	0	7.0		8.6					
Feb 15, 2024	94906	0	7.0		9.9	31.5				
Feb 16, 2024	91735	0								
Feb 17, 2024	90725	0	10.0		11.0					
Feb 18, 2024	87803	0	9.0		6.5	29.9				
Feb 19, 2024	96805	0	13.0		9.2					
Feb 20, 2024	90030	0	10.0		10.6	25.7	2.9	2.5	220000	30000
Feb 21, 2024	95018	0	11.0		11.5					
Feb 22, 2024	90381	0	9.0	7.65	10.2	23.7				
Feb 23, 2024	89112	0								
Feb 24, 2024	89214	0								
Feb 25, 2024	110744	270	23.0		13.4	29.0				
Feb 26, 2024	96535	0	7.0		11.2					
Feb 27, 2024	93110	0	7.0		5.0	27.1			130000	12000
Feb 28, 2024	155739	12250	37.0		18.1					
Feb 29, 2024	143155	0	11.0	7.50	10.7	13.7				
Monthly Total :	**2950699**	**12520**								
Monthly Average :	**101748**	**432**	**11.7**	**7.55**	**10.4**	**25.9**	**2.9**	**2.5**	**147200**	**17660**
Monthly Max :	**155739**	**12250**	**37.0**	**7.70**	**18.1**	**32.3**	**3.2**	**2.8**	**250000**	**30000**
Monthly Min :	**87803**	**0**	**6.0**	**7.40**	**4.9**	**13.7**	**2.6**	**2.1**	**38000**	**9300**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**X**								
TPF = 0 Average :	**99415**		**9.9**	**7.55**	**9.8**	**25.7**	**2.9**	**2.5**	**147200**	**17660**
TPF = 0 Max[3] :	**143155**		**16.0**	**7.70**	**13.6**	**32.3**	**3.2**	**2.8**	**250000**	**30000**
TPF = 0 Min :	**87803**		**6.0**	**7.40**	**4.9**	**13.7**	**2.6**	**2.1**	**38000**	**9300**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**X**	**Y**	**X**					
TPF > 0 # of Days[4] :		**2**								
TPF > 0 Average :	**133242**	**6260**	**30.00**	**0.00**	**15.8**	**29.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max[3] :	**155739**	**12250**	**37.00**	**0.00**	**18.1**	**29.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**110744**	**270**	**23.00**	**0.00**	**13.4**	**29.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Mar 01, 2024	118898	130								
Mar 02, 2024	109581	0								
Mar 03, 2024	108680	0	8.0		8.9	25.6				
Mar 04, 2024	117679	0	15.0		13.2					
Mar 05, 2024	110905	0	15.0		14.5	24.4	2.3	2.0	950000	110000
Mar 06, 2024	110120	0	14.0		16.3					
Mar 07, 2024	104634	0	11.0	7.70	11.8	26.8				
Mar 08, 2024	104927	0								
Mar 09, 2024	101500	0								
Mar 10, 2024	97675	0	9.0		11.6	30.9				
Mar 11, 2024	96621	0	9.0		10.0					
Mar 12, 2024	100179	0	11.0		10.5	20.8			110000	16000
Mar 13, 2024	95023	0	8.0	7.60	12.3					
Mar 14, 2024	93576	0	8.0		12.3	31.3				
Mar 15, 2024	92229	0								
Mar 16, 2024	90687	0								
Mar 17, 2024	90443	0	16.0		10.1	28.5				
Mar 18, 2024	89157	0	7.0		8.6					
Mar 19, 2024	88666	0	7.0		10.8	24.0	3.2	2.7	240000	30000
Mar 20, 2024	87175	0	8.0		9.3					
Mar 21, 2024	85363	0	8.0	7.89	9.2	22.8	3.0	2.4	180000	32000
Mar 22, 2024	87226	0								
Mar 23, 2024	117926	0								
Mar 24, 2024	100545	0	12.0		8.9	24.4				
Mar 25, 2024	94452	0	13.0		9.7					
Mar 26, 2024	92253	0	11.0		9.6	28.3			270000	31000
Mar 27, 2024	90138	0	15.0	7.60	14.4					
Mar 28, 2024	89851	0								
Mar 29, 2024	88768	0								
Mar 30, 2024	85751	0								
Mar 31, 2024	85267	0	11.0		10.7	21.0				
Monthly Total :	**3025895**	**130**								
Monthly Average :	**97610**	**4**	**10.8**	**7.70**	**11.1**	**25.7**	**2.8**	**2.4**	**350000**	**43800**
Monthly Max :	**118898**	**130**	**16.0**	**7.89**	**16.3**	**31.3**	**3.2**	**2.7**	**950000**	**110000**
Monthly Min :	**85267**	**0**	**7.0**	**7.60**	**8.6**	**20.8**	**2.3**	**2.0**	**110000**	**16000**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**X**								
TPF = 0 Average :	**96900**		**10.8**	**7.70**	**11.1**	**25.7**	**2.8**	**2.4**	**350000**	**43800**
TPF = 0 Max[3] :	**117926**		**16.0**	**7.89**	**16.3**	**31.3**	**3.2**	**2.7**	**950000**	**110000**
TPF = 0 Min :	**85267**		**7.0**	**7.60**	**8.6**	**20.8**	**2.3**	**2.0**	**110000**	**16000**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**X**	**Y**	**X**					
TPF > 0 # of Days[4] :		**1**								
TPF > 0 Average :	**118898**	**130**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max[3] :	**118898**	**130**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**118898**	**130**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Date ↓	Total Daily Flow [1] m³/d	Total Primary Flow [2] m³/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Apr 01, 2024	87446	0	13.0		12.7					
Apr 02, 2024	87005	0	16.0		15.9	26.9				
Apr 03, 2024	86682	0	21.0		21.7				400000	52000
Apr 04, 2024	84830	0	18.0	7.00	14.4	28.6				
Apr 05, 2024	84463	0								
Apr 06, 2024	86046	0								
Apr 07, 2024	86369	0	11.0		7.5	28.0				
Apr 08, 2024	101547	0	25.0		18.9					
Apr 09, 2024	96051	0	10.0	7.60	8.6	19.8	2.5	1.9	260000	38000
Apr 10, 2024	89652	0	9.0		5.8					
Apr 11, 2024	87344	0	13.0		14.2	30.4				
Apr 12, 2024	86151	0								
Apr 13, 2024	86117	0								
Apr 14, 2024	87440	0	10.0	7.60	6.5	32.3				
Apr 15, 2024	85348	0	14.0		11.1					
Apr 16, 2024	83090	0	14.0		12.6	34.3			320000	40000
Apr 17, 2024	84680	0	9.0		9.8					
Apr 18, 2024	82025	0	14.0	7.47	14.3	35.3	4.3	3.4		60000
Apr 19, 2024	80515	0								
Apr 20, 2024	81005	0								
Apr 21, 2024	86298	0	16.0		11.4	27.4				
Apr 22, 2024	82976	0	15.0		10.8					
Apr 23, 2024	81653	0	10.0	7.60	11.2	26.6	3.5	2.9	800000	75000
Apr 24, 2024	84989	0	14.0		14.8					
Apr 25, 2024	89936	0	22.0		17.2	29.1				
Apr 26, 2024	89242	0								
Apr 27, 2024	84531	0								
Apr 28, 2024	85803	0	13.0		13.0	40.5				
Apr 29, 2024	84136	0	18.0		10.6					
Apr 30, 2024	82061	0	12.0		14.7	35.2			650000	99000
Monthly Total :	**2585431**	**0**								
Monthly Average :	**86181**	**0**	**14.4**	**7.45**	**12.6**	**30.3**	**3.4**	**2.7**	**486000**	**60667**
Monthly Max :	**101547**	**0**	**25.0**	**7.60**	**21.7**	**40.5**	**4.3**	**3.4**	**800000**	**99000**
Monthly Min :	**80515**	**0**	**9.0**	**7.00**	**5.8**	**19.8**	**2.5**	**1.9**	**260000**	**38000**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**Y**								
TPF = 0 Average :	**86181**		**14.4**	**7.45**	**12.6**	**30.3**	**3.4**	**2.7**	**486000**	**60667**
TPF = 0 Max³ :	**101547**		**25.0**	**7.60**	**21.7**	**40.5**	**4.3**	**3.4**	**800000**	**99000**
TPF = 0 Min :	**80515**		**9.0**	**7.00**	**5.8**	**19.8**	**2.5**	**1.9**	**260000**	**38000**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**X**	**Y**	**X**					
TPF > 0 # of Days⁴ :		**0**								
TPF > 0 Average :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max³ :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Date ↓	Total Daily Flow [1] m³/d	Total Primary Flow [2] m³/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
May 01, 2024	81468	0	12.0		12.2					
May 02, 2024	81355	0	11.0	7.90	13.0	40.2				
May 03, 2024	80142	0								
May 04, 2024	80400	0								
May 05, 2024	82273	0	11.0		10.9	41.7				
May 06, 2024	81311	0	9.0		11.1					
May 07, 2024	78694	0	7.0	7.40	10.2	30.4	3.3	2.9	650000	6900
May 08, 2024	79302	0	7.0		11.5					
May 09, 2024	79925	0	9.0		12.3	41.5				
May 10, 2024	79761	0								
May 11, 2024	77960	0								
May 12, 2024	81310	0	8.0		10.7	37.1				
May 13, 2024	80274	0	10.0		15.4				1200000	130000
May 14, 2024	81867	0	9.0	7.80	13.9	46.7				
May 15, 2024	78264	0	8.0		12.2					
May 16, 2024	76967	0	9.0	7.66	11.9	31.7	4.1	3.7	94000	62000
May 17, 2024	77333	0								
May 18, 2024	74594	0								
May 19, 2024	73683	0	5.0		6.5	36.9				
May 20, 2024	78035	0	7.0		8.8					
May 21, 2024	104001	0	16.0		17.1	30.4	4.0	3.5	270000	31000
May 22, 2024	92008	0	15.0		15.2					
May 23, 2024	81709	0	7.0	7.70	11.1	35.9				
May 24, 2024	82787	0								
May 25, 2024	79795	0								
May 26, 2024	84397	0	7.0		6.5	30.6				
May 27, 2024	80935	0	9.0		10.7					
May 28, 2024	88539	0	10.0		14.3	35.8			810000	160000
May 29, 2024	86782	0	8.0		12.4					
May 30, 2024	79881	0	10.0	7.60	13.0	31.0				
May 31, 2024	78495	0	4.0		5.1					
Monthly Total :	**2524247**	**0**								
Monthly Average :	**81427**	**0**	**9.0**	**7.68**	**11.6**	**36.1**	**3.8**	**3.4**	**604800**	**77980**
Monthly Max :	**104001**	**0**	**16.0**	**7.90**	**17.1**	**46.7**	**4.1**	**3.7**	**1200000**	**160000**
Monthly Min :	**73683**	**0**	**4.0**	**7.40**	**5.1**	**30.4**	**3.3**	**2.9**	**94000**	**6900**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**Y**								
TPF = 0 Average :	**81427**		**9.0**	**7.68**	**11.6**	**36.1**	**3.8**	**3.4**	**604800**	**77980**
TPF = 0 Max³ :	**104001**		**16.0**	**7.90**	**17.1**	**46.7**	**4.1**	**3.7**	**1200000**	**160000**
TPF = 0 Min :	**73683**		**4.0**	**7.40**	**5.1**	**30.4**	**3.3**	**2.9**	**94000**	**6900**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**Y**	**Y**	**X**					
TPF > 0 # of Days⁴ :		**0**								
TPF > 0 Average :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max³ :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Appendix B4, cont'd

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Jun 01, 2024	80575	0	4.0		4.0					
Jun 02, 2024	90593	0	11.0		10.5	32.6				
Jun 03, 2024	105520	0	11.0		12.0					
Jun 04, 2024	85836	0	10.0		11.8	35.8	3.0	2.6	700000	55000
Jun 05, 2024	83055	0	9.0		11.7					
Jun 06, 2024	80855	0	12.0	7.60	15.7	36.8				
Jun 07, 2024	81348	0								
Jun 08, 2024	77728	0								
Jun 09, 2024	79999	0	7.0		8.3	30.9				
Jun 10, 2024	80154	0	15.0		16.1					
Jun 11, 2024	82192	0	15.0		19.3	47.2				
Jun 12, 2024	77974	0	14.0		17.1				840000	90000
Jun 13, 2024	78348	0	8.0	7.70	14.5	30.9				
Jun 14, 2024	77139	0								
Jun 15, 2024	78572	0								
Jun 16, 2024	79218	0	8.0		9.7	38.8				
Jun 17, 2024	79786	0	9.0		12.8					
Jun 18, 2024	77953	0	9.0		11.9	29.0			1500000	120000
Jun 19, 2024	78327	0	7.0		7.9					
Jun 20, 2024	79116	0	7.0	7.70	13.9	37.2	3.2	2.8		
Jun 21, 2024	77241	0								
Jun 22, 2024	75519	0								
Jun 23, 2024	79019	0	9.0		9.8	44.3				
Jun 24, 2024	78603	0	7.0		10.1					
Jun 25, 2024	79435	0	12.0	7.80	11.7	54.5			1200000	140000
Jun 26, 2024	76793	0	11.0	7.71	6.5		5.4	4.4	120000	63000
Jun 27, 2024	78144	0	7.0		10.2	47.5				
Jun 28, 2024	77403	0								
Jun 29, 2024	73731	0								
Jun 30, 2024	73278	0	8.0		8.9	36.4				
Monthly Total :	**2403454**	**0**								
Monthly Average :	**80115**	**0**	**9.5**	**7.70**	**11.6**	**38.6**	**3.9**	**3.3**	**872000**	**93600**
Monthly Max :	**105520**	**0**	**15.0**	**7.80**	**19.3**	**54.5**	**5.4**	**4.4**	**1500000**	**140000**
Monthly Min :	**73278**	**0**	**4.0**	**7.60**	**4.0**	**29.0**	**3.0**	**2.6**	**120000**	**55000**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**Y**								
TPF = 0 Average :	**80115**		**9.5**	**7.70**	**11.6**	**38.6**	**3.9**	**3.3**	**872000**	**93600**
TPF = 0 Max[3] :	**105520**		**15.0**	**7.80**	**19.3**	**54.5**	**5.4**	**4.4**	**1500000**	**140000**
TPF = 0 Min :	**73278**		**4.0**	**7.60**	**4.0**	**29.0**	**3.0**	**2.6**	**120000**	**55000**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**Y**	**Y**	**X**					
TPF > 0 # of Days[4] :		**0**								
TPF > 0 Average :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max[3] :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Jul 01, 2024	75112	0	16.0		10.6					
Jul 02, 2024	77362	0	15.0	7.80	13.0	34.1	4.6	3.6	230000	47000
Jul 03, 2024	76193	0	14.0		19.4					
Jul 04, 2024	76349	0	11.0		13.7	34.3				
Jul 05, 2024	77777	0								
Jul 06, 2024	78716	0								
Jul 07, 2024	75453	0	8.0		7.9	42.3				
Jul 08, 2024	77337	0	11.0		9.5					
Jul 09, 2024	76927	0	12.0	7.90	12.0	36.8			3200000	240000
Jul 10, 2024	76240	0	14.0		23.4					
Jul 11, 2024	75754	0	13.0		17.2	37.8	4.1	3.7		
Jul 12, 2024	77230	0								
Jul 13, 2024	72862	0								
Jul 14, 2024	74846	0	8.0	7.80	10.8	31.9				
Jul 15, 2024	76610	0	14.0		15.0					
Jul 16, 2024	75248	0	12.0		17.4	43.4			1300000	190000
Jul 17, 2024	75737	0	13.0		20.7					
Jul 18, 2024	77564	0	11.0		19.7	46.5				
Jul 19, 2024	74604	0								
Jul 20, 2024	72108	0								
Jul 21, 2024	74298	0								
Jul 22, 2024	75188	0	32.0	7.80	20.0	32.8	4.5	3.6		
Jul 23, 2024	74480	0	28.0		20.7	32.7			2600000	150000
Jul 24, 2024	76033	0	19.0		24.1					
Jul 25, 2024	75776	0	14.0		17.1	43.8				
Jul 26, 2024	73693	0								
Jul 27, 2024	73278	0	6.0		12.0					
Jul 28, 2024	75593	0	8.0		10.7	47.5				
Jul 29, 2024	80976	0	13.0		12.4					
Jul 30, 2024	82104	0	17.0		14.5	39.9			920000	200000
Jul 31, 2024	77281	0	13.0		19.6					
Monthly Total :	**2358729**	**0**								
Monthly Average :	**76088**	**0**	**14.0**	**7.83**	**15.7**	**38.8**	**4.4**	**3.6**	**1650000**	**165400**
Monthly Max :	**82104**	**0**	**32.0**	**7.90**	**24.1**	**47.5**	**4.6**	**3.7**	**3200000**	**240000**
Monthly Min :	**72108**	**0**	**6.0**	**7.80**	**7.9**	**31.9**	**4.1**	**3.6**	**230000**	**47000**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**Y**								
TPF = 0 Average :	**76088**		**14.0**	**7.83**	**15.7**	**38.8**	**4.4**	**3.6**	**1650000**	**165400**
TPF = 0 Max[3] :	**82104**		**32.0**	**7.90**	**24.1**	**47.5**	**4.6**	**3.7**	**3200000**	**240000**
TPF = 0 Min :	**72108**		**6.0**	**7.80**	**7.9**	**31.9**	**4.1**	**3.6**	**230000**	**47000**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**X**	**Y**	**X**					
TPF > 0 # of Days[4] :		**0**								
TPF > 0 Average :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max[3] :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Appendix B4, cont'd

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Aug 01, 2024	76931	0	13.0	7.80	18.0	47.7				
Aug 02, 2024	75777	0		7.82			4.7	3.4	790000	92000
Aug 03, 2024	73876	0								
Aug 04, 2024	72183	0	9.0	7.90	5.8	42.7				
Aug 05, 2024	76696	0	6.0		5.8				650000	43000
Aug 06, 2024	76995	0	15.0		14.3	42.6	4.7	3.9		
Aug 07, 2024	77724	0								
Aug 08, 2024	75733	0	12.0		13.6	36.5				
Aug 09, 2024	74772	0								
Aug 10, 2024	73216	0								
Aug 11, 2024	75740	0	5.0		5.4	33.4				
Aug 12, 2024	76097	0	9.0		7.2				2800000	180000
Aug 13, 2024	77896	0	16.0	7.90	16.6	49.1				
Aug 14, 2024	76349	0	11.0		15.2					
Aug 15, 2024	74715	0	9.0	8.00	13.2	40.1				
Aug 16, 2024	73428	0								
Aug 17, 2024	73526	0								
Aug 18, 2024	88206	0	21.0		31.0	41.3				
Aug 19, 2024	78992	0	21.0		24.9				4000000	
Aug 20, 2024	78196	0	22.0		24.9	44.3	6.3	5.5		
Aug 21, 2024	77174	0	20.0		26.2					
Aug 22, 2024	75814	0	13.0	8.10	14.3	35.0				85000
Aug 23, 2024	79097	0								
Aug 24, 2024	114277	0	15.0		9.3	37.7				
Aug 25, 2024	81096	0	14.0		14.2	38.8				
Aug 26, 2024	95066	0	17.0		11.9					
Aug 27, 2024	87661	0	7.0		9.1	35.1			680000	65000
Aug 28, 2024	80965	0	6.0		11.1					
Aug 29, 2024	81647	0	6.0	7.90	10.4	44.3				
Aug 30, 2024	80275	0								
Aug 31, 2024	76270	0								
Monthly Total :	**2456390**	**0**								
Monthly Average :	**79238**	**0**	**12.7**	**7.92**	**14.4**	**40.6**	**5.2**	**4.3**	**1784000**	**93000**
Monthly Max :	**114277**	**0**	**22.0**	**8.10**	**31.0**	**49.1**	**6.3**	**5.5**	**4000000**	**180000**
Monthly Min :	**72183**	**0**	**5.0**	**7.80**	**5.4**	**33.4**	**4.7**	**3.4**	**650000**	**43000**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**Y**								
TPF = 0 Average :	**79238**		**12.7**	**7.92**	**14.4**	**40.6**	**5.2**	**4.3**	**1784000**	**93000**
TPF = 0 Max[3] :	**114277**		**22.0**	**8.10**	**31.0**	**49.1**	**6.3**	**5.5**	**4000000**	**180000**
TPF = 0 Min :	**72183**		**5.0**	**7.80**	**5.4**	**33.4**	**4.7**	**3.4**	**650000**	**43000**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**X**	**Y**	**X**					
TPF > 0 # of Days[4] :		**0**								
TPF > 0 Average :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max[3] :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Sep 01, 2024	76005	0	7.0		9.2	30.1				
Sep 02, 2024	81428	0	6.0	7.55	10.3		4.8	3.5	91000	18000
Sep 03, 2024	79653	0	11.0		12.7	29.2	5.0	4.6	540000	50000
Sep 04, 2024	79580	0	13.0		17.5					
Sep 05, 2024	81963	0	12.0	7.60	12.5	51.0				
Sep 06, 2024	78277	0								
Sep 07, 2024	77645	0								
Sep 08, 2024	79671	0	10.0		11.9	39.4				
Sep 09, 2024	80064	0	10.0		10.7				610000	45000
Sep 10, 2024	79532	0	10.0		9.7	29.4				
Sep 11, 2024	79811	0	17.0		15.3					
Sep 12, 2024	81402	0	11.0	7.80	16.0	48.5				
Sep 13, 2024	81871	0								
Sep 14, 2024	84636	0								
Sep 15, 2024	80882	0								
Sep 16, 2024	77801	0	4.0		9.8				2500000	110000
Sep 17, 2024	80032	0	12.0	7.90	11.3	44.3	5.7	5.1		
Sep 18, 2024	79415	0								
Sep 19, 2024	80533	0	11.0		12.0	52.7				
Sep 20, 2024	76636	0	5.0		10.0	35.3				
Sep 21, 2024	76008	0	5.0		8.4					
Sep 22, 2024	79172	0	4.0		4.8	30.6				
Sep 23, 2024	83833	0	6.0		8.3					
Sep 24, 2024	77281	0	7.0	7.90	8.5	32.8			530000	50000
Sep 25, 2024	101766	0	8.0		9.3					
Sep 26, 2024	91894	0	5.0		8.3	42.2				
Sep 27, 2024	80561	0								
Sep 28, 2024	78197	0								
Sep 29, 2024	77521	0	4.0		5.2	25.7				
Sep 30, 2024	80764	0	5.0		5.8					
Monthly Total :	**2423834**	**0**								
Monthly Average :	**80794**	**0**	**8.3**	**7.75**	**10.3**	**37.8**	**5.2**	**4.4**	**854200**	**54600**
Monthly Max :	**101766**	**0**	**17.0**	**7.90**	**17.5**	**52.7**	**5.7**	**5.1**	**2500000**	**110000**
Monthly Min :	**76005**	**0**	**4.0**	**7.55**	**4.8**	**25.7**	**4.8**	**3.5**	**91000**	**18000**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**Y**								
TPF = 0 Average :	**80794**		**8.3**	**7.75**	**10.3**	**37.8**	**5.2**	**4.4**	**854200**	**54600**
TPF = 0 Max[3] :	**101766**		**17.0**	**7.90**	**17.5**	**52.7**	**5.7**	**5.1**	**2500000**	**110000**
TPF = 0 Min :	**76005**		**4.0**	**7.55**	**4.8**	**25.7**	**4.8**	**3.5**	**91000**	**18000**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**Y**	**Y**	**X**					
TPF > 0 # of Days[4] :		**0**								
TPF > 0 Average :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max[3] :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**0**	**0**	**0.00**	**0.00**	**0.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Oct 01, 2024	110102	0	8.0		8.6	35.4			760000	73000
Oct 02, 2024	102150	0	7.0		12.6					
Oct 03, 2024	104210	0	10.0	7.80	12.1	35.8				
Oct 04, 2024	126850	0								
Oct 05, 2024	120836	0								
Oct 06, 2024	112786	0	5.0		5.6	35.1				
Oct 07, 2024	91951	0	5.0		8.0					
Oct 08, 2024	94536	0	12.0		12.7	31.6	4.0	3.5	840000	95000
Oct 09, 2024	85970	0	4.0		6.0					
Oct 10, 2024	81975	0	5.0	7.60	6.7	32.2				
Oct 11, 2024	96253	0								
Oct 12, 2024	77765	0								
Oct 13, 2024	77009	0	8.0		6.0	29.7				
Oct 14, 2024	79994	0	10.0		8.4					
Oct 15, 2024	79512	0	12.0		10.7	35.7			810000	55000
Oct 16, 2024	85323	0	10.0		12.8					
Oct 17, 2024	83318	0	7.0	7.76	8.6	49.4	3.0	2.2		110000
Oct 18, 2024	109747	2850	20.0		11.4					
Oct 19, 2024	210376	33470	15.0		5.8					
Oct 20, 2024	163732	0	10.0	7.40	5.7	13.9				
Oct 21, 2024	112446	0	4.0		4.0					
Oct 22, 2024	96559	0	3.0		5.6	24.6	1.7	1.4	260000	23000
Oct 23, 2024	93174	0	4.0		5.5					
Oct 24, 2024	88914	0	4.0		5.1	31.1				
Oct 25, 2024	85479	0								
Oct 26, 2024	87051	0								
Oct 27, 2024	119804	0	6.0			19.5				
Oct 28, 2024	114743	0	6.0							
Oct 29, 2024	102048	0	7.0		7.4	27.8			67000	9300
Oct 30, 2024	95079	0	5.0		6.5					
Oct 31, 2024	89963	0	6.0	7.60	8.8	36.1				
Monthly Total :	**3179655**	**36320**								
Monthly Average :	**102570**	**1172**	**7.7**	**7.63**	**8.0**	**31.3**	**2.9**	**2.4**	**547400**	**60883**
Monthly Max :	**210376**	**33470**	**20.0**	**7.80**	**12.8**	**49.4**	**4.0**	**3.5**	**840000**	**110000**
Monthly Min :	**77009**	**0**	**3.0**	**7.40**	**4.0**	**13.9**	**1.7**	**1.4**	**67000**	**9300**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**X**								
TPF = 0 Average :	**98605**		**6.9**	**7.63**	**8.0**	**31.3**	**2.9**	**2.4**	**547400**	**60883**
TPF = 0 Max[3] :	**163732**		**12.0**	**7.80**	**12.8**	**49.4**	**4.0**	**3.5**	**840000**	**110000**
TPF = 0 Min :	**77009**		**3.0**	**7.40**	**4.0**	**13.9**	**1.7**	**1.4**	**67000**	**9300**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**Y**	**Y**	**Y**					
TPF > 0 # of Days[4] :		**2**								
TPF > 0 Average :	**160062**	**18160**	**17.50**	**0.00**	**8.6**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max[3] :	**210376**	**33470**	**20.00**	**0.00**	**11.4**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**109747**	**2850**	**15.00**	**0.00**	**5.8**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Nov 01, 2024	103631	0			11.6					
Nov 02, 2024	114971	0		7.50	9.3				13000	15000
Nov 03, 2024	103022	0	7.0		6.2	26.6				
Nov 04, 2024	125401	3490	14.0		12.4					
Nov 05, 2024	101715	0	5.0		8.7	21.8	2.8	2.3	11000	1300
Nov 06, 2024	95647	0	5.0		8.5					
Nov 07, 2024	93324	0	7.0	7.70	15.0	26.7				
Nov 08, 2024	90450	0								
Nov 09, 2024	118504	0								
Nov 10, 2024	103793	0	5.0	7.70	5.9	32.3				
Nov 11, 2024	120051	0	6.0		7.6					
Nov 12, 2024	110074	0	8.0		8.8	21.3			21000	1800
Nov 13, 2024	131938	410	14.0		14.0					
Nov 14, 2024	144958	0	8.0		8.7	22.9				
Nov 15, 2024	112713	0								
Nov 16, 2024	116562	0								
Nov 17, 2024	120325	0	5.0		5.7	16.9				
Nov 18, 2024	110307	0	4.0		5.7					
Nov 19, 2024	105670	0	3.8	7.87	7.2	32.2	2.9	2.9	26000	9100
Nov 20, 2024	99852	0	4.0		7.5					
Nov 21, 2024	95191	0	5.0	7.60	9.2	22.1				
Nov 22, 2024	101910	0								
Nov 23, 2024	96390	0								
Nov 24, 2024	96230	0	4.0	7.70	6.4	33.5				
Nov 25, 2024	100640	0	6.0		9.5					
Nov 26, 2024	95810	0	4.0	7.70	9.2	35.0	3.2	3.2	56000	21000
Nov 27, 2024	101010	0	5.0							
Nov 28, 2024	95490	0	4.0	7.70	5.0	33.1				
Nov 29, 2024	93410	0								
Nov 30, 2024	88900	0								
Monthly Total :	**3187889**	**3900**								
Monthly Average :	**106263**	**130**	**6.2**	**7.68**	**8.7**	**27.0**	**3.0**	**2.8**	**25400**	**9640**
Monthly Max :	**144958**	**3490**	**14.0**	**7.87**	**15.0**	**35.0**	**3.2**	**3.2**	**56000**	**21000**
Monthly Min :	**88900**	**0**	**3.8**	**7.50**	**5.0**	**16.9**	**2.8**	**2.3**	**11000**	**1300**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**X**								
TPF = 0 Average :	**104663**		**5.3**	**7.68**	**8.2**	**27.0**	**3.0**	**2.8**	**25400**	**9640**
TPF = 0 Max[3] :	**144958**		**8.0**	**7.87**	**15.0**	**35.0**	**3.2**	**3.2**	**56000**	**21000**
TPF = 0 Min :	**88900**		**3.8**	**7.50**	**5.0**	**16.9**	**2.8**	**2.3**	**11000**	**1300**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**Y**	**Y**	**Y**					
TPF > 0 # of Days[4] :		**2**								
TPF > 0 Average :	**128670**	**1950**	**14.00**	**0.00**	**13.2**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Max[3] :	**131938**	**3490**	**14.00**	**0.00**	**14.0**	**0.0**	**0.0**	**0.0**	**0**	**0**
TPF > 0 Min :	**125401**	**410**	**14.00**	**0.00**	**12.4**	**0.0**	**0.0**	**0.0**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Appendix B4, cont'd

Date ↓	Total Daily Flow [1] m^3/d	Total Primary Flow [2] m^3/d	TSS [3] mg/L	pH	CBOD [3] mg/L	NH3 mg/L	Total Phosphate mg/L	Orthophosphate mg/L	FC CFU/100mL	Enterococci CFU/100mL
Dec 01, 2024	90390	0	5.4		6.3	32.5				
Dec 02, 2024	89150	0	4.2	7.46	8.1				110000	42000
Dec 03, 2024	88640	0	4.4		10.0	40.7	4.2	3.7	49000	12000
Dec 04, 2024	87290	0	3.8		9.8					
Dec 05, 2024	85970	0	5.8	8.10	12.3	33.1				
Dec 06, 2024	87650	0								
Dec 07, 2024	152370	2240								
Dec 08, 2024	147420	0	9.0		9.0	20.2				
Dec 09, 2024	114680	0	3.2		7.9					
Dec 10, 2024	105820	0	5.0		8.9	28.9	3.5	3.0	32000	5400
Dec 11, 2024	102870	0	5.8		7.8					
Dec 12, 2024	98260	0	5.8	7.70	12.2	31.7				
Dec 13, 2024	96170	0								
Dec 14, 2024	101350	0								
Dec 15, 2024	95090	0	6.0	7.20	9.3	21.7				
Dec 16, 2024	105620	0	8.8		12.1					
Dec 17, 2024	160510	21440	28.0	7.57	20.1	18.0	3.0	2.5	95000	58000
Dec 18, 2024	226910	36310	14.9		11.2					
Dec 19, 2024	165950	120	8.0			12.7				
Dec 20, 2024	139790	0			5.2					
Dec 21, 2024	127960	0			7.1					
Dec 22, 2024	122260	0	9.2		12.0					
Dec 23, 2024	144490	1110	13.2						730000	83000
Dec 24, 2024	122840	0	5.2							
Dec 25, 2024	110120	0	5.0		7.4					
Dec 26, 2024	121230	0	6.8		13.0					
Dec 27, 2024	112440	0								
Dec 28, 2024	123850	0								
Dec 29, 2024	116250	0	5.0		7.8	17.8				
Dec 30, 2024	112850	0	5.2		7.4				26000	7200
Dec 31, 2024	100280	0	5.6		8.9	18.7				
Monthly Total :	**3656470**	**61220**								
Monthly Average :	**117951**	**1975**	**7.5**	**7.61**	**9.7**	**25.1**	**3.5**	**3.1**	**173667**	**34600**
Monthly Max :	**226910**	**36310**	**28.0**	**8.10**	**20.1**	**40.7**	**4.2**	**3.7**	**730000**	**83000**
Monthly Min :	**85970**	**0**	**3.2**	**7.20**	**5.2**	**12.7**	**3.0**	**2.5**	**26000**	**5400**
Provincial Limits:	**432000**	**Footnote 2**								
Compliance Status :	**Y**	**X**								
TPF = 0 Average :	**107932**		**5.7**	**7.62**	**9.1**	**27.3**	**3.8**	**3.4**	**54250**	**16650**
TPF = 0 Max[3] :	**147420**		**9.2**	**8.10**	**13.0**	**40.7**	**4.2**	**3.7**	**110000**	**42000**
TPF = 0 Min :	**85970**		**3.2**	**7.20**	**5.2**	**17.8**	**3.5**	**3.0**	**26000**	**5400**
Provincial Limits:			**Max 25/Avg 10**	**6 - 9**	**Max 25/Avg 10**					
Compliance Status :			**Y**	**Y**	**Y**					
TPF > 0 # of Days[4] :		**5**								
TPF > 0 Average :	**170046**	**12244**	**16.03**	**7.57**	**15.7**	**15.4**	**3.0**	**2.5**	**412500**	**70500**
TPF > 0 Max[3] :	**226910**	**36310**	**28.00**	**7.57**	**20.1**	**18.0**	**3.0**	**2.5**	**730000**	**83000**
TPF > 0 Min :	**144490**	**120**	**8.00**	**7.57**	**11.2**	**12.7**	**3.0**	**2.5**	**0**	**0**
Provincial Limits:			**Max 130**		**Max 130**					
Compliance Status :			**Y**		**Y**					

Notes:

1 Total Daily Flow represents all effluent being discharged to the marine receiving environment and consists of full tertiary effluent or blended tertiary + primary effluent. Blended effluent is typically only discharged during wet weather events when the treatment capacity of the tertiary portion of the system (i.e. 216,000 m^3/day) is exceeded. The provincial limit for Total Daily Flow is a maximum of 432,000 m^3/day.

2 Total Primary Flow (TPF) represents the portion of the Total Daily Flow that has received only primary treatment. This primary effluent is blended with tertiary effluent prior to discharge. As above, this typically only occurs during wet weather events. TPF is deemed noncompliant if it occurs on a day when Total Daily Flow is less than the tertiary treatment capacity of 216,000 m^3/day.

3 Provincial limits for pH, TSS, and CBOD are contingent upon whether tertiary or blended tertiary + primary effluent is being discharged. On days when only tertiary effluent is discharged, the compliance limits are 25 mg/L maximum and 10 mg/L average for TSS and CBOD, and pH within a range of 6 9. On days when blended tertiary + primary effluent is discharged, the compliance limit is 130 mg/L maximum for TSS and CBOD.

4 The provincial limit for blended tertiary + primary effluent discharge is 70 days per calendar year.

Blue shading indicates that single values exceed the maximum limit.
Orange shading indicates that average values exceed the monthly average limit.

Appendix B5 Frequency of Detection, Loadings and Percent Removal of Substances in McLoughlin Influent and Final Effluent

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Chloride	DIS	µg/L	100%	85000	3085029	100%	88917	3127215	-1%
Total/SAD Cyanide	TOT	µg/L	92%	3.98	133.35	100%	2.2	77.3	42%
WAD Cyanide	TOT	µg/L	83%	2.52	82.9	92%	1.4	50.1	40%
Hardness (as CaCO3)	DIS	µg/L	100%	76142	2739933	100%	75392	2649051	3%
Hardness (as CaCO3)	TOT	µg/L	100%	85600	3076611	100%	76400	2684117	13%
Sulphate	DIS	µg/L	100%	24583	885156	100%	26417	939597	-6%
Organic Carbon	TOT	µg/L	100%	141167	4962205	100%	24667	830767	83%
Oil & Grease, Mineral	TOT	µg/L	8%	---	---	0%	---	---	---
Oil & grease, total	TOT	µg/L	100%	16617	577597	17%	---	---	100%
Sulfide	TOT	µg/L	100%	546.42	17780	67%	60	2002	89%
Tetrabromomethane	TOT	µg/L	0%	---	---	0%	---	---	---
4-Methyl-2-Pentanone	TOT	µg/L	0%	---	---	0%	---	---	---
Dimethyl Ketone	TOT	µg/L	100%	103.42	3531	50%	---	---	100%
Endrin Ketone	TOT	µg/L	0%	---	---	0%	---	---	---
Isophorone	TOT	µg/L	17%	---	---	0%	---	---	---
Uranium	DIS	µg/L	100%	0.034	1.3	100%	0.013	0.47	63%
Lithium	DIS	µg/L	100%	2.33	81	100%	2.32	79.57	2%
Potassium	DIS	µg/L	100%	15758	549422	100%	15775	538700	2%
Potassium	TOT	µg/L	100%	16500	576244	100%	15950	545033	5%
Sodium	DIS	µg/L	100%	56975	2048971	100%	57183	2005166	2%
Sodium	TOT	µg/L	100%	56025	1954359	100%	58013	1996991	-2%
Barium	DIS	µg/L	100%	6.1	225	100%	2.76	97	57%
Barium	TOT	µg/L	100%	19.1	684	100%	4.85	170	75%
Beryllium	TOT	µg/L	33%	---	---	8%	---	---	---
Beryllium	DIS	µg/L	0%	---	---	0%	---	---	---
Calcium	DIS	µg/L	100%	18408.33	661693	100%	18208	638866	3%
Calcium	TOT	µg/L	100%	21266.67	763132	100%	18408	645759	15%
Magnesium	DIS	µg/L	100%	7315.83	263712	100%	7278	256285	3%
Magnesium	TOT	µg/L	100%	7875.00	283676	100%	7403	260712	8%
Strontium	DIS	µg/L	100%	79.61	2901	100%	72	2569	11%
Thallium	TOT	µg/L	92%	0.04	1.6	8%	---	---	100%
Thallium	DIS	µg/L	8%	---	---	17%	---	---	---
Antimony	TOT	µg/L	100%	0.32	11	100%	0.29	10.02	10%
Antimony	DIS	µg/L	100%	0.33	11.8	100%	0.28	9.82	17%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Arsenic	DIS	µg/L	100%	0.58	21	100%	0.48	16.80	19%
Arsenic	TOT	µg/L	100%	0.65	23	100%	0.49	16.94	27%
Boron	DIS	µg/L	100%	185	6652	100%	191	6680	0%
Silicon	DIS	µg/L	100%	3653	129934	100%	3613	125850	3%
Aluminum	DIS	µg/L	100%	24.43	856	100%	14.61	498.86	42%
Aluminum	TOT	µg/L	100%	194.69	7101.6	100%	28.39	982.69	86%
Bismuth	DIS	µg/L	100%	0.18	6.2	100%	0.18	5.92	5%
Lead	DIS	µg/L	100%	0.44	15	100%	0.30	9.89	34%
Lead	TOT	µg/L	100%	2.69	95	100%	0.53	18.21	81%
Tin	DIS	µg/L	100%	1.00	35	100%	0.65	22.47	35%
Tin	TOT	µg/L	100%	0.64	22	100%	0.62	21.21	4%
Phosphorus	DIS	µg/L	100%	5118	176375	100%	3354	111105	37%
Phosphorus	TOT	µg/L	100%	6673	228750	100%	3638	120484	47%
Selenium	DIS	µg/L	100%	0.21	7.1	100%	0.15	5.24	27%
Selenium	TOT	µg/L	100%	0.28	9.8	100%	0.17	5.78	41%
Sulfur	DIS	µg/L	100%	8617	305600	100%	9050	318189	-4%
Sulfur	TOT	µg/L	100%	9100	320187	100%	9163	317604	1%
Chromium III	TOT	µg/L	17%	---	---	17%	---	---	---
Chromium VI	TOT	µg/L	0%	---	---	8%	---	---	---
Dibutyltin	TOT	µg/L	100%	0.007	0.310	50%	---	---	100%
Dibutyltin Dichloride	TOT	µg/L	100%	0.010	0.419	50%	---	---	100%
Methyl Mercury	TOT	µg/L	100%	0.00048	0.018	50%	---	---	100%
Monobutyltin	TOT	µg/L	100%	0.026	1.16	100%	0.039	1.68	-45%
Monobutyltin Trichloride	TOT	µg/L	100%	0.042	1.89	100%	0.063	2.69	-42%
Tributyltin	TOT	µg/L	0%	---	---	0%	---	---	---
Tributyltin Chloride	TOT	µg/L	0%	---	---	0%	---	---	---
Cadmium	DIS	µg/L	100%	0.06	2.0	100%	0.032	1.04	47%
Cadmium	TOT	µg/L	100%	0.21	7.1	100%	0.049	1.58	78%
Chromium	DIS	µg/L	100%	1.79	64.7	100%	1.42	49.4	24%
Chromium	TOT	µg/L	100%	2.50	88.7	100%	1.64	57.0	36%
Cobalt	DIS	µg/L	100%	0.79	28.8	100%	0.90	32.0	-11%
Cobalt	TOT	µg/L	100%	1.01	36.6	100%	0.92	32.6	11%
Copper	DIS	µg/L	100%	20.89	712	100%	12.8	434.9	39%
Copper	TOT	µg/L	100%	40.77	1424	100%	17.3	582.1	59%
Iron	DIS	µg/L	100%	671.5	23753	100%	445	14939	37%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Iron	TOT	µg/L	100%	1741.33	60754.7	100%	756.4	25597	58%
Manganese	DIS	µg/L	100%	42.02	1512	100%	49.7	1741	-15%
Manganese	TOT	µg/L	100%	61.21	2194	100%	53	1858	15%
Mercury	DIS	µg/L	75%	0.01	0.14	75%	0.0033	0.1	36%
Mercury	TOT	µg/L	83%	0.03	0.85	83%	0.0087	0.2	79%
Molybdenum	DIS	µg/L	100%	0.99	34.3	100%	1.39	48.4	-41%
Molybdenum	TOT	µg/L	100%	1.13	39.1	100%	1.41	48.7	-24%
Nickel	DIS	µg/L	100%	3.85	136	100%	4.80	165.3	-21%
Nickel	TOT	µg/L	100%	4.67	165	100%	4.82	165.8	-1%
Silver	TOT	µg/L	100%	0.06	2.1	100%	0.049	1.6	22%
Silver	DIS	µg/L	100%	0.06	2.1	100%	0.033	1.1	48%
Titanium	DIS	µg/L	100%	2.67	95.5	100%	1.59	55.1	42%
Vanadium	DIS	µg/L	100%	0.72	26.3	100%	0.64	22.4	15%
Zinc	DIS	µg/L	100%	20.5	697	100%	32.1	1142.4	-64%
Zinc	TOT	µg/L	100%	95.8	3362	100%	37.4	1320.8	61%
Zirconium	DIS	µg/L	100%	0.65	24.4	100%	0.33	11.81	52%
1,1,1,2-Tetrachloroethane	TOT	µg/L	0%	---	---	0%	---	---	---
Dichlorodifluoromethane	TOT	µg/L	0%	---	---	0%	---	---	---
Nitrobenzene	TOT	µg/L	0%	---	---	0%	---	---	---
N-nitrosodimethylamine	TOT	µg/L	0%	---	---	0%	---	---	---
N-Nitrosodi-N-Propylamine	TOT	µg/L	0%	---	---	0%	---	---	---
Benzene	TOT	µg/L	0%	---	---	0%	---	---	---
Ethylbenzene	TOT	µg/L	67%	0.66	19.4	0%	---	---	100%
Toluene	TOT	µg/L	100%	6.31	192	17%	---	---	100%
Xylenes	TOT	µg/L	25%	---	---	0%	---	---	---
1,2,3,4-Tetrachlorobenzene	TOT	µg/L	75%	0.00019	0.0041	75%	0.000111	0.00168	59%
1,3,5-Trichlorobenzene	TOT	µg/L	50%	---	---	50%	---	---	---
1,4-Dioxane	TOT	µg/L	0%	---	---	25%	---	---	---
1,7-Dimethylxanthine	TOT	µg/L	100%	31.30	1136	100%	5.9	203.6	82%
Acrolein	TOT	µg/L	8%	---	---	0%	---	---	---
Acrolein	TOT	µg/L	8%	---	---	0%	---	---	---
Acrylonitrile	TOT	µg/L	0%	---	---	0%	---	---	---
Delta-Hch Or Delta-Bhc	TOT	µg/L	0%	---	---	0%	---	---	---
Dibromomethane	TOT	µg/L	0%	---	---	0%	---	---	---
Pentachlorobenzene	TOT	µg/L	100%	0.00012	0.0044	75%	0.000051	0.0014	69%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Perfluorobutanoic acid	TOT	µg/L	100%	0.034	1.31	100%	0.056	1.90	-45%
Tetrachloromethane	TOT	µg/L	0%	---	---	0%	---	---	---
Trans-Chlordane	TOT	µg/L	100%	0.00022	0.0082	75%	0.000051	0.0013	84%
Trans-Nonachlor	TOT	µg/L	100%	0.00016	0.0058	50%	---	---	100%
Tribromomethane	TOT	µg/L	0%	---	---	0%	---	---	---
Trichloromethane	TOT	µg/L	100%	2.91	100	67%	1.30	30.33	70%
1,2-diphenylhydrazine	TOT	µg/L	0%	---	---	0%	---	---	---
2,4-dinitrotoluene	TOT	µg/L	0%	---	---	0%	---	---	---
2,6-dinitrotoluene	TOT	µg/L	0%	---	---	0%	---	---	---
3,3-dichlorobenzidine	TOT	µg/L	0%	---	---	0%	---	---	---
4-Bromophenyl Phenyl Ether	TOT	µg/L	0%	---	---	0%	---	---	---
4-Chlorophenyl Phenyl Ether	TOT	µg/L	0%	---	---	0%	---	---	---
Hexachlorocyclopentadiene	TOT	µg/L	0%	---	---	0%	---	---	---
Hexachloroethane	TOT	µg/L	0%	---	---	0%	---	---	---
Alpha-Terpineol	TOT	µg/L	100%	9.01	306	0%	---	---	100%
1,1,1-trichloroethane	TOT	µg/L	0%	---	---	0%	---	---	---
1,1,2,2-tetrachloroethane	TOT	µg/L	0%	---	---	0%	---	---	---
1,1,2-trichloroethane	TOT	µg/L	0%	---	---	0%	---	---	---
1,1-dichloroethane	TOT	µg/L	0%	---	---	0%	---	---	---
1,1-dichloroethene	TOT	µg/L	0%	---	---	0%	---	---	---
1,2,3-Trichlorobenzene	TOT	µg/L	75%	0.00016	0.0035	50%	---	---	100%
1,2,4,5-/1,2,3,5-Tetrachlorobenzene	TOT	µg/L	75%	0.00012	0.0019	50%	---	---	100%
1,2,4-trichlorobenzene	TOT	µg/L	0%	---	---	0%	---	---	---
1,2-dibromoethane	TOT	µg/L	0%	---	---	0%	---	---	---
1,2-dichlorobenzene	TOT	µg/L	0%	---	---	0%	---	---	---
1,2-dichloroethane	TOT	µg/L	0%	---	---	0%	---	---	---
1,2-dichloropropane	TOT	µg/L	0%	---	---	0%	---	---	---
1,3-dichlorobenzene	TOT	µg/L	0%	---	---	0%	---	---	---
1,4-dichlorobenzene	TOT	µg/L	0%	---	---	0%	---	---	---
Bromodichloromethane	TOT	µg/L	0%	---	---	0%	---	---	---
Bromomethane	TOT	µg/L	0%	---	---	0%	---	---	---
Chlorobenzene	TOT	µg/L	0%	---	---	0%	---	---	---
Chlorodibromomethane	TOT	µg/L	0%	---	---	0%	---	---	---
Chloroethane	TOT	µg/L	0%	---	---	0%	---	---	---
Chloroethene	TOT	µg/L	0%	---	---	0%	---	---	---

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Chloromethane	TOT	µg/L	0%	---	---	0%	---	---	---
Cis-1,2-Dichloroethene	TOT	µg/L	0%	---	---	0%	---	---	---
Cis-1,3-dichloropropene	TOT	µg/L	0%	---	---	0%	---	---	---
Hexachlorobutadiene	TOT	µg/L	0%	---	---	0%	---	---	---
M & P Xylenes	TOT	µg/L	25%	---	---	0%	---	---	---
Methyl Ethyl Ketone	TOT	µg/L	0%	---	---	0%	---	---	---
Methyl Tertiary Butyl Ether	TOT	µg/L	0%	---	---	0%	---	---	---
O-Xylene	TOT	µg/L	0%	---	---	0%	---	---	---
Styrene	TOT	µg/L	42%	---	---	8%	---	---	---
Tetrachloroethene	TOT	µg/L	8%	---	---	0%	---	---	---
Trans-1,2-Dichloroethene	TOT	µg/L	0%	---	---	0%	---	---	---
Trans-1,3-dichloropropene	TOT	µg/L	0%	---	---	0%	---	---	---
Trichloroethene	TOT	µg/L	0%	---	---	0%	---	---	---
Trichlorofluoromethane	TOT	µg/L	0%	---	---	0%	---	---	---
17 beta-Estradiol 3-benzoate	TOT	µg/L	0%	---	---	0%	---	---	---
Allyl Trenbolone	TOT	µg/L	0%	---	---	33%	---	---	---
Androstenedione	TOT	µg/L	100%	0.26	9.0	100%	0.0070	0.221	98%
Androsterone	TOT	µg/L	0%	---	---	33%	---	---	---
Desogestrel	TOT	µg/L	0%	---	---	0%	---	---	---
Mestranol	TOT	µg/L	0%	---	---	0%	---	---	---
Norethindrone	TOT	µg/L	0%	---	---	0%	---	---	---
Norgestrel	TOT	µg/L	33%	---	---	0%	---	---	---
Progesterone	TOT	µg/L	100%	0.068	2.4	100%	0.0019	0.059	98%
Testosterone	TOT	µg/L	100%	0.093	3.2	33%	---	---	100%
Total Phenols	TOT	µg/L	100%	36.4	1211	100%	4.05	138.5	89%
2,4 + 2,5 Dichlorophenol	TOT	µg/L	0%	---	---	0%	---	---	---
2-Chlorophenol	TOT	µg/L	0%	---	---	0%	---	---	---
4-Chloro-3-Methylphenol	TOT	µg/L	0%	---	---	0%	---	---	---
Pentachlorophenol	TOT	µg/L	0%	---	---	0%	---	---	---
2,4-dimethylphenol	TOT	µg/L	0%	---	---	0%	---	---	---
2,4-dinitrophenol	TOT	µg/L	0%	---	---	0%	---	---	---
2-Methyl-4,6-Dinitrophenol	TOT	µg/L	0%	---	---	0%	---	---	---
2-Nitrophenol	TOT	µg/L	0%	---	---	0%	---	---	---
Phenol	TOT	µg/L	83%	9.53	292	0%	---	---	100%
2,4,6-trichlorophenol	TOT	µg/L	0%	---	---	0%	---	---	---

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
17 alpha-Dihydroequilin	TOT	µg/L	0%	---	---	0%	---	---	---
17 beta-Estradiol	TOT	µg/L	75%	0.017	0.51	0%	---	---	100%
Equilenin	TOT	µg/L	0%	---	---	50%	---	---	---
Equilin	TOT	µg/L	0%	---	---	0%	---	---	---
Estriol	TOT	µg/L	100%	0.22	8.0	50%	---	---	100%
Estrone	TOT	µg/L	100%	0.060	2.2	75%	0.0083	0.27	88%
4-Nitrophenol	TOT	µg/L	0%	---	---	0%	---	---	---
4-n-Octylphenol	TOT	µg/L	0%	---	---	50%	---	---	---
4-Nonylphenol Diethoxylates	TOT	µg/L	100%	0.50	18	100%	0.35	11.67	34%
4-Nonylphenol Monoethoxylates	TOT	µg/L	100%	8.54	265	100%	1.99	59.90	77%
NP	TOT	µg/L	100%	1.02	37	100%	0.25	8.01	78%
1-Methylphenanthrene	TOT	µg/L	100%	0.019	0.70	100%	0.0021	0.07	90%
2,3,5-trimethylnaphthalene	TOT	µg/L	100%	0.025	0.86	100%	0.0029	0.10	88%
2,6-dimethylnaphthalene	TOT	µg/L	100%	0.038	1.4	100%	0.0017	0.06	96%
2-Chloronaphthalene	TOT	µg/L	0%	---	---	0%	---	---	---
2-Methylnaphthalene	TOT	µg/L	100%	0.12	4.1	33%	---	---	100%
Acenaphthene	TOT	µg/L	100%	0.15	5.4	100%	0.04	1.26	77%
Acenaphthylene	TOT	µg/L	67%	0.030	0.9	8%	---	---	100%
Anthracene	TOT	µg/L	100%	0.046	1.7	25%	---	---	100%
Benzo(B)Fluoranthene + Benzo(J)Fluoranthene	TOT	µg/L	92%	0.044	1.5	0%	---	---	100%
Benzo(K)Fluoranthene	TOT	µg/L	83%	0.021	0.69	0%	---	---	100%
Benzo[a]anthracene	TOT	µg/L	100%	0.060	2.2	8%	---	---	100%
Benzo[a]pyrene	TOT	µg/L	83%	0.074	2.6	42%	---	---	100%
Benzo[b]fluoranthene	TOT	µg/L	75%	0.042	1.4	0%	---	---	100%
Benzo[e]pyrene	TOT	µg/L	100%	0.039	1.5	100%	0.0013	0.045	97%
Benzo[ghi]perylene	TOT	µg/L	25%	---	---	0%	---	---	---
Benzo[J,K]Fluoranthenes	TOT	µg/L	100%	0.043	1.6	100%	0.00085	0.029	98%
Chrysene	TOT	µg/L	100%	0.094	3.5	8%	---	---	100%
dibenzo(a,h)anthracene	TOT	µg/L	8%	---	---	0%	---	---	---
Dibenzothiophene	TOT	µg/L	100%	0.036	1.3	100%	0.0034	0.12	91%
Fluoranthene	TOT	µg/L	100%	0.21	7.7	92%	0.033	1.1	86%
Fluorene	TOT	µg/L	100%	0.39	13.3	83%	0.069	2.2	84%
High Molecular Weight PAH`s	TOT	µg/L	100%	0.51	18	92%	0.051	1.7	91%
Indeno(1,2,3-C,D)Pyrene	TOT	µg/L	25%	---	---	0%	---	---	---
Low Molecular Weight PAH`s	TOT	µg/L	100%	0.99	34.0	100%	0.18	6.3	81%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Naphthalene	TOT	µg/L	100%	0.18	6.2	100%	0.042	1.4	77%
Perylene	TOT	µg/L	100%	0.013	0.52	0%	---	---	100%
Phenanthrene	TOT	µg/L	100%	0.29	10	100%	0.036	1.3	88%
Pyrene	TOT	µg/L	100%	0.16	6.0	92%	0.023	0.72	88%
Quinoline	TOT	µg/L	0%	---	---	0%	---	---	---
Total PAH	TOT	µg/L	100%	1.49	52	100%	0.23	8.0	85%
PBDE 10	TOT	µg/L	0%	---	---	0%	---	---	---
PBDE 100	TOT	µg/L	100%	0.0038	0.136	100%	0.00064	0.022	84%
PBDE 105	TOT	µg/L	50%	---	---	0%	---	---	---
PBDE 116	TOT	µg/L	0%	---	---	25%	---	---	---
PBDE 119/120	TOT	µg/L	100%	0.000037	0.0014	100%	0.0000074	0.00025	81%
PBDE 12/13	TOT	µg/L	75%	0.0000078	0.00031	50%	---	---	100%
PBDE 126	TOT	µg/L	75%	0.0000082	0.00028	50%	---	---	100%
PBDE 128	TOT	µg/L	25%	---	---	0%	---	---	---
PBDE 138/166	TOT	µg/L	100%	0.00017	0.0065	100%	0.000034	0.0012	82%
PBDE 140	TOT	µg/L	100%	0.00007	0.0024	100%	0.000010	0.0004	86%
PBDE 15	TOT	µg/L	100%	0.000037	0.0014	100%	0.0000055	0.00020	86%
PBDE 153	TOT	µg/L	100%	0.00191	0.069	100%	0.00031	0.0108	84%
PBDE 154	TOT	µg/L	100%	0.00142	0.051	100%	0.00025	0.0086	83%
PBDE 155	TOT	µg/L	100%	0.00012	0.0045	100%	0.000018	0.00064	86%
PBDE 17/25	TOT	µg/L	100%	0.00019	0.0069	100%	0.000052	0.0017	75%
PBDE 181	TOT	µg/L	25%	---	---	0%	---	---	---
PBDE 183	TOT	µg/L	100%	0.00035	0.01	100%	0.000053	0.0019	85%
PBDE 190	TOT	µg/L	0%	---	---	0%	---	---	---
PBDE 203	TOT	µg/L	100%	0.00017	0.006	75%	0.000037	0.0010	83%
PBDE 206	TOT	µg/L	100%	0.0012	0.045	75%	0.00022	0.0052	89%
PBDE 207	TOT	µg/L	75%	0.0012	0.035	100%	0.00036	0.013	63%
PBDE 208	TOT	µg/L	75%	0.00075	0.019	50%	---	---	100%
PBDE 209	TOT	µg/L	100%	0.035	1.30	100%	0.0035	0.13	90%
PBDE 28/33	TOT	µg/L	100%	0.00030	0.011	100%	0.000053	0.0018	83%
PBDE 30	TOT	µg/L	0%	---	---	0%	---	---	---
PBDE 32	TOT	µg/L	50%	---	---	0%	---	---	---
PBDE 35	TOT	µg/L	100%	0.0000026	0.00010	25%	---	---	100%
PBDE 37	TOT	µg/L	100%	0.0000062	0.00023	50%	---	---	100%
PBDE 47	TOT	µg/L	100%	0.019	0.67	100%	0.0032	0.11	84%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
PBDE 49	TOT	µg/L	100%	0.00064	0.023	100%	0.000095	0.0032	86%
PBDE 51	TOT	µg/L	100%	0.000077	0.0029	100%	0.000013	0.00045	84%
PBDE 66	TOT	µg/L	100%	0.00038	0.014	100%	0.000068	0.0023	83%
PBDE 7	TOT	µg/L	100%	0.000015	0.00058	100%	0.0000034	0.00012	80%
PBDE 71	TOT	µg/L	100%	0.000054	0.0020	100%	0.000016	0.00053	73%
PBDE 75	TOT	µg/L	100%	0.000030	0.0011	100%	0.0000047	0.00016	86%
PBDE 77	TOT	µg/L	75%	0.0000031	0.000094	0%	---	---	100%
PBDE 79	TOT	µg/L	100%	0.000017	0.00065	75%	0.0000047	0.00015	78%
PBDE 8/11	TOT	µg/L	100%	0.0000096	0.00037	75%	0.0000015	0.000043	88%
PBDE 85	TOT	µg/L	100%	0.00069	0.025	100%	0.00011	0.0039	84%
PBDE 99	TOT	µg/L	100%	0.018	0.64	100%	0.0030	0.104	84%
Decachloro Biphenyl	TOT	µg/L	100%	0.000026	0.00096	100%	0.0000063	0.00024	75%
PCB 10	TOT	µg/L	100%	0.0000059	0.00022	100%	0.0000011	0.000041	81%
PCB 103	TOT	µg/L	75%	0.0000040	0.00012	50%	---	---	100%
PCB 104	TOT	µg/L	75%	0.0000035	0.00014	100%	0.0000048	0.00020	-45%
PCB 105	TOT	µg/L	100%	0.000075	0.0027	100%	0.000018	0.00067	75%
PCB 106	TOT	µg/L	25%	---	---	0%	---	---	---
PCB 107/124	TOT	µg/L	100%	0.0000071	0.0003289	0%	---	---	100%
PCB 109	TOT	µg/L	100%	0.0000125	0.0005798	0%	---	---	100%
PCB 11	TOT	µg/L	100%	0.0004815	0.0175	100%	0.00013	0.00438	75%
PCB 110/115	TOT	µg/L	100%	0.0003125	0.0112	100%	0.000059	0.00202	82%
PCB 111	TOT	µg/L	50%	---	---	25%	---	---	---
PCB 112	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 114	TOT	µg/L	100%	0.0000080	0.0002940	75%	0.0000056	0.00021	28%
PCB 118	TOT	µg/L	100%	0.0001953	0.0070732	100%	0.0000377	0.00133	81%
PCB 12/13	TOT	µg/L	100%	0.0000252	0.0009162	100%	0.0000040	0.00014	85%
PCB 120	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 121	TOT	µg/L	75%	0.0000022	0.000072	25%	---	---	100%
PCB 122	TOT	µg/L	75%	0.0000039	0.00012	25%	---	---	100%
PCB 123	TOT	µg/L	100%	0.0000094	0.00036	75%	0.0000057	0.0002411	33%
PCB 126	TOT	µg/L	75%	0.0000058	0.00019	25%	---	---	100%
PCB 127	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 128/166	TOT	µg/L	100%	0.000037	0.00135	100%	0.0000068	0.00024	82%
PCB 129/138/160/163	TOT	µg/L	100%	0.000271	0.00989	100%	0.0000467	0.0016	83%
PCB 130	TOT	µg/L	100%	0.000015	0.000526	75%	0.0000031	0.000075	86%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
PCB 131	TOT	µg/L	75%	0.0000052	0.000149	75%	0.0000020	0.000037	75%
PCB 132	TOT	µg/L	100%	0.000084	0.00306	100%	0.0000142	0.00049	84%
PCB 133	TOT	µg/L	100%	0.0000057	0.000214	75%	0.0000019	0.000040	81%
PCB 134/143	TOT	µg/L	100%	0.000014	0.000528	50%	---	---	100%
PCB 135/151/154	TOT	µg/L	100%	0.000098	0.00361	100%	0.0000186	0.00066	82%
PCB 136	TOT	µg/L	100%	0.000037	0.00133	100%	0.0000068	0.00024	82%
PCB 137	TOT	µg/L	100%	0.000013	0.000477	50%	---	---	100%
PCB 139/140	TOT	µg/L	100%	0.0000075	0.000276	50%	---	---	100%
PCB 14	TOT	µg/L	100%	0.0000061	0.000218	50%	---	---	100%
PCB 141	TOT	µg/L	100%	0.000046	0.00170	100%	0.0000070	0.00024	86%
PCB 142	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 144	TOT	µg/L	100%	0.000014	0.00052	75%	0.0000028	0.00007	86%
PCB 145	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 146	TOT	µg/L	100%	0.000038	0.0014	100%	0.0000061	0.00021	85%
PCB 147/149	TOT	µg/L	100%	0.00020	0.0073	100%	0.000034	0.00121	83%
PCB 148	TOT	µg/L	100%	0.000002	0.000074	50%	---	---	100%
PCB 15	TOT	µg/L	100%	0.000072	0.0026	100%	0.000016	0.00060	77%
PCB 150	TOT	µg/L	75%	0.000002	0.000056	50%	---	---	100%
PCB 152	TOT	µg/L	50%	---	---	75%	0.0000036	0.00011	---
PCB 153/168	TOT	µg/L	100%	0.00026	0.0095	100%	0.000043	0.00151	84%
PCB 155	TOT	µg/L	100%	0.000028	0.00104	100%	0.0000087	0.00033	68%
PCB 156157	TOT	µg/L	100%	0.000032	0.00116	100%	0.000013	0.00054	53%
PCB 158	TOT	µg/L	100%	0.000023	0.00082	75%	0.0000035	0.00010	88%
PCB 159	TOT	µg/L	0%	---	---	25%	---	---	---
PCB 16	TOT	µg/L	100%	0.000076	0.00270	100%	0.000014	0.00048	82%
PCB 161	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 162	TOT	µg/L	25%	---	---	25%	---	---	---
PCB 164	TOT	µg/L	100%	0.000014	0.00052	75%	0.0000023	0.000071	86%
PCB 165	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 167	TOT	µg/L	100%	0.000010	0.00036	75%	0.0000056	0.00022	39%
PCB 169	TOT	µg/L	0%	---	---	50%	---	---	---
PCB 17	TOT	µg/L	100%	0.000080	0.0029	100%	0.0000129	0.00044	85%
PCB 170	TOT	µg/L	100%	0.000046	0.0017	100%	0.0000106	0.00041	76%
PCB 171/173	TOT	µg/L	100%	0.000015	0.00057	75%	0.0000023	0.00006	90%
PCB 172	TOT	µg/L	100%	0.000010	0.00038	50%	---	---	100%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
PCB 175	TOT	µg/L	100%	0.0000030	0.00011	25%	---	---	100%
PCB 176	TOT	µg/L	100%	0.0000087	0.00032	75%	0.0000016	0.000039	88%
PCB 177	TOT	µg/L	100%	0.000031	0.0012	100%	0.0000049	0.00017	85%
PCB 178	TOT	µg/L	100%	0.000017	0.0006	100%	0.0000029	0.00010	84%
PCB 179	TOT	µg/L	100%	0.000031	0.0011	100%	0.0000045	0.00016	86%
PCB 18/30	TOT	µg/L	100%	0.000202	0.0072	100%	0.0000412	0.00147	80%
PCB 180/193	TOT	µg/L	100%	0.000140	0.0051	100%	0.0000244	0.00088	83%
PCB 181	TOT	µg/L	75%	0.0000017	0.000042	25%	---	---	100%
PCB 182	TOT	µg/L	75%	0.0000016	0.000062	50%	---	---	100%
PCB 183/185	TOT	µg/L	100%	0.000041	0.0015	100%	0.0000114	0.00044	71%
PCB 184	TOT	µg/L	100%	0.000048	0.0017	100%	0.0000079	0.00027	84%
PCB 186	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 187	TOT	µg/L	100%	0.000083	0.0031	100%	0.0000166	0.00061	80%
PCB 188	TOT	µg/L	75%	0.0000027	0.00011	50%	---	---	100%
PCB 189	TOT	µg/L	75%	0.0000024	0.000067	50%	---	---	100%
PCB 19	TOT	µg/L	100%	0.000034	0.0013	100%	0.0000103	0.00041	68%
PCB 190	TOT	µg/L	100%	0.000011	0.00038	75%	0.0000027	0.000072	81%
PCB 191	TOT	µg/L	100%	0.0000017	0.000064	25%	---	---	100%
PCB 192	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 194	TOT	µg/L	100%	0.0000272	0.00098	100%	0.0000077	0.00029	71%
PCB 195	TOT	µg/L	100%	0.0000092	0.00034	75%	0.0000019	0.000044	87%
PCB 196	TOT	µg/L	100%	0.0000148	0.00055	75%	0.0000068	0.00025	54%
PCB 197/200	TOT	µg/L	100%	0.0000076	0.00028	75%	0.0000015	0.000034	88%
PCB 198/199	TOT	µg/L	100%	0.0000399	0.0015	100%	0.0000059	0.00021	86%
PCB 2	TOT	µg/L	100%	0.0000123	0.00045	100%	0.0000042	0.00016	65%
PCB 20/28	TOT	µg/L	100%	0.0002210	0.0079	100%	0.0000434	0.0015	81%
PCB 201	TOT	µg/L	100%	0.0000052	0.00019	50%	---	---	100%
PCB 202	TOT	µg/L	100%	0.0000132	0.00049	75%	0.0000064	0.00024	50%
PCB 203	TOT	µg/L	100%	0.0000245	0.00090	75%	0.0000033	0.000092	90%
PCB 204	TOT	µg/L	100%	0.0000023	0.000081	25%	---	---	100%
PCB 205	TOT	µg/L	75%	0.0000022	0.000052	75%	0.0000036	0.00012	-124%
PCB 206	TOT	µg/L	100%	0.0000297	0.0011	100%	0.0000060	0.00023	79%
PCB 207	TOT	µg/L	100%	0.0000038	0.00014	25%	---	---	100%
PCB 208	TOT	µg/L	100%	0.0000103	0.00038	75%	0.0000048	0.00018	54%
PCB 209	TOT	µg/L	100%	0.0000249	0.00091	100%	0.0000063	0.00024	74%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
PCB 21/33	TOT	µg/L	100%	0.0001548	0.0055	100%	0.0000251	0.00083	85%
PCB 22	TOT	µg/L	100%	0.0000934	0.0033	100%	0.0000159	0.00053	84%
PCB 23	TOT	µg/L	50%	---	---	50%	---	---	---
PCB 24	TOT	µg/L	100%	0.000002	0.000084	50%	---	---	100%
PCB 25	TOT	µg/L	100%	0.000038	0.0014	100%	0.0000060	0.00021	85%
PCB 26/29	TOT	µg/L	100%	0.000052	0.0019	100%	0.0000086	0.00029	84%
PCB 27	TOT	µg/L	100%	0.000030	0.0011	100%	0.0000040	0.00014	88%
PCB 3	TOT	µg/L	100%	0.000039	0.0014	100%	0.000014	0.00056	60%
PCB 31	TOT	µg/L	100%	0.000224	0.0080	100%	0.000041	0.0014	82%
PCB 32	TOT	µg/L	100%	0.000055	0.0020	100%	0.0000087	0.00029	85%
PCB 34	TOT	µg/L	100%	0.0000031	0.00013	75%	0.000012	0.00046	-255%
PCB 35	TOT	µg/L	100%	0.000023	0.00083	100%	0.0000042	0.00014	83%
PCB 36	TOT	µg/L	75%	0.0000058	0.00019	25%	---	---	100%
PCB 37	TOT	µg/L	100%	0.000067	0.00241	100%	0.000014	0.00051	79%
PCB 38	TOT	µg/L	0%	---	---	25%	---	---	---
PCB 4	TOT	µg/L	100%	0.00017	0.0066	100%	0.000036	0.00135	80%
PCB 40/41/71	TOT	µg/L	100%	0.000098	0.0035	100%	0.000019	0.00068	81%
PCB 42	TOT	µg/L	100%	0.000054	0.0020	100%	0.0000099	0.00034	83%
PCB 43	TOT	µg/L	100%	0.0000065	0.00023	100%	0.0000067	0.00028	-24%
PCB 44/47/65	TOT	µg/L	100%	0.00038	0.014	100%	0.00018	0.00615	55%
PCB 46	TOT	µg/L	100%	0.000015	0.00055	75%	0.0000027	0.000064	88%
PCB 48	TOT	µg/L	100%	0.000038	0.0013	100%	0.0000067	0.00023	83%
PCB 49/69	TOT	µg/L	100%	0.00016	0.0059	100%	0.000031	0.00108	82%
PCB 5	TOT	µg/L	100%	0.0000057	0.00020	100%	0.0000014	0.000053	74%
PCB 50/53	TOT	µg/L	100%	0.000043	0.0016	100%	0.0000062	0.00021	87%
PCB 52	TOT	µg/L	100%	0.000343	0.012	100%	0.000066	0.0023	81%
PCB 54	TOT	µg/L	100%	0.0000032	0.00013	100%	0.0000046	0.00020	-53%
PCB 55	TOT	µg/L	100%	0.0000035	0.00013	50%	---	---	100%
PCB 56	TOT	µg/L	100%	0.000069	0.0024	100%	0.000016	0.00058	76%
PCB 57	TOT	µg/L	100%	0.0000028	0.00012	25%	---	---	100%
PCB 58	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 59/62/75	TOT	µg/L	100%	0.000017	0.00062	100%	0.0000032	0.00011	83%
PCB 6	TOT	µg/L	100%	0.000041	0.0015	100%	0.0000067	0.00023	84%
PCB 60	TOT	µg/L	100%	0.0000414	0.00146	100%	0.0000076	0.00025	83%
PCB 61/70/74/76	TOT	µg/L	100%	0.0002883	0.010305	100%	0.000054	0.0018	82%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
PCB 63	TOT	µg/L	100%	0.000025	0.00083	75%	0.0000049	0.00014	83%
PCB 64	TOT	µg/L	100%	0.000088	0.0031	100%	0.000015	0.00052	83%
PCB 66	TOT	µg/L	100%	0.00015	0.0053	100%	0.000032	0.0011	79%
PCB 67	TOT	µg/L	100%	0.0000058	0.00021	50%	---	---	100%
PCB 68	TOT	µg/L	100%	0.000030	0.00109	100%	0.000039	0.0014	-30%
PCB 7	TOT	µg/L	100%	0.000020	0.00070	100%	0.0000091	0.00030	57%
PCB 72	TOT	µg/L	100%	0.0000016	0.000060	0%	---	---	100%
PCB 73	TOT	µg/L	50%	---	---	25%	---	---	---
PCB 77	TOT	µg/L	100%	0.000017	0.00061	100%	0.0000084	0.00032	47%
PCB 78	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 79	TOT	µg/L	50%	---	---	0%	---	---	---
PCB 8	TOT	µg/L	100%	0.000132	0.0048	100%	0.0000236	0.00087	82%
PCB 80	TOT	µg/L	0%	---	---	0%	---	---	---
PCB 81	TOT	µg/L	75%	0.0000042	0.00017	100%	0.0000048	0.00021	-20%
PCB 82	TOT	µg/L	100%	0.000032	0.0012	75%	0.0000059	0.00015	87%
PCB 83/99	TOT	µg/L	100%	0.000147	0.0054	100%	0.000029	0.0011	81%
PCB 84	TOT	µg/L	100%	0.000065	0.0023	100%	0.000013	0.00045	81%
PCB 85/116/117	TOT	µg/L	100%	0.000052	0.0019	100%	0.000010	0.00035	82%
PCB 86/87/97/108/119/125	TOT	µg/L	100%	0.00023	0.0083	100%	0.000059	0.00212	74%
PCB 88/91	TOT	µg/L	100%	0.000037	0.0014	100%	0.000009	0.00032	77%
PCB 89	TOT	µg/L	50%	---	---	50%	---	---	---
PCB 9	TOT	µg/L	100%	0.000012	0.00043	100%	0.00000356	0.00012	72%
PCB 90/101/113	TOT	µg/L	100%	0.00027	0.0099	100%	0.000057	0.0020	80%
PCB 92	TOT	µg/L	100%	0.000045	0.0016	100%	0.0000096	0.00033	79%
PCB 93/95/98/100/102	TOT	µg/L	100%	0.00023	0.0085	100%	0.000045	0.0016	81%
PCB 94	TOT	µg/L	75%	0.0000025	0.000067	25%	---	---	100%
PCB 96	TOT	µg/L	100%	0.0000028	0.00010	50%	---	---	100%
PCB Teq 3	TOT	µg/L	100%	0.0000015	0.000058	100%	0.00000061	0.000026	54%
PCB Teq 4	TOT	µg/L	100%	0.0000022	0.000084	100%	0.00000126	0.000052	39%
PCBs Total	TOT	µg/L	100%	0.0076	0.28	100%	0.0015	0.053	81%
1,2,3,4,6,7,8-HPCDD	TOT	µg/L	100%	0.000087	0.0035	100%	0.0000054	0.00020	94%
1,2,3,4,6,7,8-HPCDF	TOT	µg/L	100%	0.0000031	0.00012	75%	0.00000060	0.000012	90%
1,2,3,4,7,8,9-HPCDF	TOT	µg/L	25%	---	---	0%	---	---	---
1,2,3,4,7,8-HXCDD	TOT	µg/L	25%	---	---	0%	---	---	---
1,2,3,4,7,8-HXCDF	TOT	µg/L	75%	0.00000041	0.0000065	0%	---	---	100%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
1,2,3,6,7,8-HXCDD	TOT	µg/L	100%	0.0000023	0.000089	25%	---	---	100%
1,2,3,6,7,8-HXCDF	TOT	µg/L	0%	---	---	0%	---	---	---
1,2,3,7,8,9-HXCDD	TOT	µg/L	100%	0.00000088	0.000035	0%	---	---	100%
1,2,3,7,8,9-HXCDF	TOT	µg/L	0%	---	---	0%	---	---	---
1,2,3,7,8-PECDD	TOT	µg/L	0%	---	---	0%	---	---	---
1,2,3,7,8-PECDF	TOT	µg/L	75%	0.00000051	0.0000079	75%	0.00000041	0.0000064	18%
2,3,4,6,7,8-HXCDF	TOT	µg/L	0%	---	---	0%	---	---	---
2,3,4,7,8-PECDF	TOT	µg/L	0%	---	---	0%	---	---	---
2,3,7,8-TCDD	TOT	µg/L	0%	---	---	0%	---	---	---
2,3,7,8-TCDF	TOT	µg/L	75%	0.00000054	0.0000090	0%	---	---	100%
OCDD	TOT	µg/L	100%	0.00051	0.020	100%	0.000050	0.0019	91%
OCDF	TOT	µg/L	100%	0.0000064	0.00025	100%	0.0000010	0.000038	85%
2,4-DDD	TOT	µg/L	100%	0.00026	0.0095	100%	0.000057	0.00200	79%
2,4-DDE	TOT	µg/L	50%	---	---	25%	---	---	---
2,4-DDT	TOT	µg/L	75%	0.00012	0.0034	25%	---	---	100%
4,4-DDD	TOT	µg/L	100%	0.00025	0.0093	75%	0.000071	0.0022	76%
4,4-DDE	TOT	µg/L	100%	0.00084	0.031	100%	0.00016	0.0054	83%
4,4-DDT	TOT	µg/L	75%	0.00026	0.0083	75%	0.000091	0.0023	72%
ABHC	TOT	µg/L	25%	---	---	75%	0.000077	0.0021	---
Aldrin	TOT	µg/L	75%	0.000053	0.0013	50%	---	---	100%
Alpha Chlordane	TOT	µg/L	100%	0.000183	0.0067	50%	---	---	100%
Beta-Endosulfan	TOT	µg/L	50%	---	---	75%	0.00011	0.0041	---
Beta-Hch Or Beta-Bhc	TOT	µg/L	100%	0.00020	0.0071	100%	0.00010	0.0036	50%
Bis(2-Chloroethoxy)Methane	TOT	µg/L	0%	---	---	0%	---	---	---
Bis(2-Chloroethyl)Ether	TOT	µg/L	0%	---	---	0%	---	---	---
Bis(2-Chloroisopropyl)Ether	TOT	µg/L	0%	---	---	0%	---	---	---
Cis-Nonachlor	TOT	µg/L	75%	0.000048	0.0014	25%	---	---	100%
Dieldrin	TOT	µg/L	100%	0.00076	0.027	100%	0.00020	0.0068	75%
Endosulfan Sulfate	TOT	µg/L	25%	---	---	50%	---	---	---
Endrin	TOT	µg/L	25%	---	---	25%	---	---	---
Endrin Aldehyde	TOT	µg/L	67%	0.00063	0.020	75%	0.00013	0.0033	83%
HCH, Gamma	TOT	µg/L	100%	0.00027	0.010	100%	0.00009	0.0033	67%
Heptachlor	TOT	µg/L	25%	---	---	25%	---	---	---
Heptachlor Epoxide	TOT	µg/L	75%	0.00011	0.0038	50%	---	---	100%
Hexachlorobenzene	TOT	µg/L	100%	0.00022	0.0081	75%	0.000064	0.0018	78%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Methoxyclor	TOT	µg/L	75%	0.00023	0.0056	75%	0.00013	0.0023	60%
Mirex	TOT	µg/L	75%	0.000066	0.0019	50%	---	---	100%
Octachlorostyrene	TOT	µg/L	100%	0.000017	0.00079	0%	---	---	100%
Oxychlordane	TOT	µg/L	75%	0.00046	0.017	25%	---	---	100%
3:3 FTCA	TOT	µg/L	50%	---	---	75%	0.0039	0.13	---
4:2 FTS	TOT	µg/L	0%	---	---	0%	---	---	---
5:3 FTCA	TOT	µg/L	100%	0.34	12.9	100%	0.063	2.2	83%
6:2 FTS	TOT	µg/L	75%	0.0049	0.12	100%	0.0048	0.17	-36%
7:3 FTCA	TOT	µg/L	50%	---	---	0%	---	---	---
8:2 FTS	TOT	µg/L	0%	---	---	0%	---	---	---
ADONA	TOT	µg/L	0%	---	---	0%	---	---	---
HFPO-DA	TOT	µg/L	0%	---	---	0%	---	---	---
MeFOSAA	TOT	µg/L	100%	0.0028	0.12	100%	0.0018	0.064	46%
N-EtFOSA	TOT	µg/L	0%	---	---	0%	---	---	---
N-EtFOSE	TOT	µg/L	0%	---	---	0%	---	---	---
NFDHA	TOT	µg/L	0%	---	---	0%	---	---	---
N-MeFOSA	TOT	µg/L	0%	---	---	0%	---	---	---
N-MeFOSE	TOT	µg/L	0%	---	---	0%	---	---	---
PFBS	TOT	µg/L	100%	0.018	0.71	100%	0.017	0.63	10%
PFDoA	TOT	µg/L	25%	---	---	0%	---	---	---
PFDoS	TOT	µg/L	0%	---	---	0%	---	---	---
PFDS	TOT	µg/L	25%	---	---	0%	---	---	---
PFEESA	TOT	µg/L	0%	---	---	0%	---	---	---
PFHpS	TOT	µg/L	0%	---	---	0%	---	---	---
PFHxS	TOT	µg/L	100%	0.012	0.46	100%	0.011	0.39	14%
PFMBA	TOT	µg/L	0%	---	---	0%	---	---	---
PFMPA	TOT	µg/L	0%	---	---	0%	---	---	---
PFNS	TOT	µg/L	0%	---	---	0%	---	---	---
PFPeS	TOT	µg/L	25%	---	---	50%	---	---	---
PFTeDA	TOT	µg/L	0%	---	---	0%	---	---	---
PFTrDA	TOT	µg/L	25%	---	---	0%	---	---	---
PFUnA	TOT	µg/L	0%	---	---	0%	---	---	---
Bis(2-Ethylhexyl)Phthalate	TOT	µg/L	92%	7.45	242	0%	---	---	100%
Butylbenzyl Phthalate	TOT	µg/L	0%	---	---	0%	---	---	---
Diethyl Phthalate	TOT	µg/L	92%	1.72	56	50%	---	---	100%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Dimethyl Phthalate	TOT	µg/L	25%	---	---	0%	---	---	---
Di-N-Butyl Phthalate	TOT	µg/L	33%	---	---	17%	---	---	---
Di-N-Octyl Phthalate	TOT	µg/L	0%	---	---	0%	---	---	---
2-Hydroxy-Ibuprofen	TOT	µg/L	100%	29	1060	100%	5.71	201	81%
Acetaminophen	TOT	µg/L	100%	113	4026	100%	0.29	9.9	100%
Azithromycin	TOT	µg/L	100%	0.25	9.2	100%	0.25	8.8	4%
Bisphenol A	TOT	µg/L	100%	2.60	97.9	100%	0.35	13	87%
Caffeine	TOT	µg/L	100%	86	3116	100%	9.50	331	89%
Carbadox	TOT	µg/L	0%	---	---	0%	---	---	---
Carbamazepine	TOT	µg/L	100%	0.51	18	100%	0.47	16.6	9%
Cefotaxime	TOT	µg/L	0%	---	---	0%	---	---	---
Ciprofloxacin	TOT	µg/L	100%	0.31	11.1	100%	0.18	6.5	41%
Clarithromycin	TOT	µg/L	100%	0.14	5.3	100%	0.13	4.6	13%
Clinafloxacin	TOT	µg/L	0%	---	---	0%	---	---	---
Cloxacillin	TOT	µg/L	0%	---	---	50%	---	---	---
Dehydronifedipine	TOT	µg/L	100%	0.0018	0.065	100%	0.0026	0.092	-42%
Digoxigenin	TOT	µg/L	0%	---	---	0%	---	---	---
Digoxin	TOT	µg/L	0%	---	---	0%	---	---	---
Diltiazem	TOT	µg/L	100%	0.24	8.9	100%	0.21	7.4	17%
Diphenhydramine	TOT	µg/L	100%	0.89	33	100%	0.73	26	21%
Enrofloxacin	TOT	µg/L	75%	0.0028	0.079	75%	0.0012	0.029	63%
Erythromycin-H2O	TOT	µg/L	75%	0.015	0.479	100%	0.015	0.53	-10%
Flumequine	TOT	µg/L	0%	---	---	0%	---	---	---
Fluoxetine	TOT	µg/L	100%	0.042	1.6	100%	0.035	1.25	20%
Furosemide	TOT	µg/L	100%	0.93	34.1	100%	0.55	19.2	44%
Gemfibrozil	TOT	µg/L	100%	0.073	2.7	100%	0.048	1.7	36%
Glipizide	TOT	µg/L	50%	---	---	0%	---	---	---
Glyburide	TOT	µg/L	75%	0.0042	0.13	100%	0.0031	0.11	17%
Hydrochlorothiazide	TOT	µg/L	100%	1.64	60	100%	1.25	44	26%
Ibuprofen	TOT	µg/L	100%	15.4	558	100%	1.61	56.4	90%
Lincomycin	TOT	µg/L	100%	0.0081	0.30	100%	0.0095	0.34	-14%
Lomefloxacin	TOT	µg/L	0%	---	---	0%	---	---	---
Miconazole	TOT	µg/L	100%	0.0059	0.22	100%	0.0029	0.10	52%
Naproxen	TOT	µg/L	100%	8.03	294	100%	1.90	67	77%
Norfloxacin	TOT	µg/L	0%	---	---	50%	---	---	---

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
Norgestimate	TOT	µg/L	0%	---	---	0%	---	---	---
Ofloxacin	TOT	µg/L	100%	0.057	2.1	100%	0.038	1.4	35%
Ormetoprim	TOT	µg/L	0%	---	---	0%	---	---	---
Oxacillin	TOT	µg/L	0%	---	---	0%	---	---	---
Oxolinic Acid	TOT	µg/L	0%	---	---	0%	---	---	---
Penicillin G	TOT	µg/L	0%	---	---	75%	0.0035	0.10	---
Penicillin V	TOT	µg/L	0%	---	---	0%	---	---	---
Roxithromycin	TOT	µg/L	100%	0.0042	0.15	100%	0.0028	0.10	35%
Sarafloxacin	TOT	µg/L	0%	---	---	0%	---	---	---
Sulfachloropyridazine	TOT	µg/L	0%	---	---	0%	---	---	---
Sulfadiazine	TOT	µg/L	75%	0.0021	0.057	75%	0.00090	0.028	50%
Sulfadimethoxine	TOT	µg/L	0%	---	---	0%	---	---	---
Sulfamerazine	TOT	µg/L	25%	---	---	25%	---	---	---
Sulfamethazine	TOT	µg/L	25%	---	---	0%	---	---	---
Sulfamethizole	TOT	µg/L	0%	---	---	0%	---	---	---
Sulfamethoxazole	TOT	µg/L	100%	1.62	60	100%	0.74	26	56%
Sulfanilamide	TOT	µg/L	100%	0.070	2.6	100%	0.081	2.9	-12%
Sulfathiazole	TOT	µg/L	0%	---	---	0%	---	---	---
Thiabendazole	TOT	µg/L	100%	0.029	1.0	100%	0.027	0.95	9%
Triclocarban	TOT	µg/L	100%	0.0030	0.11	100%	0.0016	0.055	50%
Triclosan	TOT	µg/L	75%	0.036	1.1	100%	0.013	0.45	59%
Trimethoprim	TOT	µg/L	100%	0.35	13	100%	0.24	8.6	32%
Tylosin	TOT	µg/L	0%	---	---	75%	0.000651	0.018	---
Virginiamycin	TOT	µg/L	0%	---	---	0%	---	---	---
Warfarin	TOT	µg/L	100%	0.0034	0.12	100%	0.0029	0.10	17%
11Cl-PF3OUdS	TOT	µg/L	0%	---	---	0%	---	---	---
9Cl-PF3ONS	TOT	µg/L	0%	---	---	0%	---	---	---
Dichloro Biphenyls	TOT	µg/L	100%	0.00093	0.034	100%	0.000185	0.0064	81%
Heptachloro Biphenyls	TOT	µg/L	100%	0.00050	0.018	100%	0.000081	0.0029	85%
Hepta-Dioxins	TOT	µg/L	100%	0.00018	0.0073	100%	0.000013	0.00047	94%
Hepta-Furans	TOT	µg/L	100%	0.0000078	0.00031	75%	0.0000011	0.000025	92%
Hexachloro Biphenyls	TOT	µg/L	100%	0.0012	0.045	100%	0.000208	0.0072	84%
Hexa-Dioxins	TOT	µg/L	100%	0.000050	0.0020	100%	0.0000018	0.000065	97%
Hexa-Furans	TOT	µg/L	100%	0.0000026	0.00010	25%	---	---	100%
Monochloro Biphenyls	TOT	µg/L	100%	0.00010	0.0038	100%	0.000035	0.0014	62%

Appendix B5, cont'd

Parameter	State	Unit	Influent			Effluent			% Removal
			% Freq	Mean (µg/L)	Load (kg/year)	% Freq	Mean (µg/L)	Load (kg/year)	
N-EtFOSAA	TOT	µg/L	75%	0.0024	0.087	100%	0.0011	0.04020	54%
Nonachloro Biphenyls	TOT	µg/L	100%	0.000043	0.0016	75%	0.0000062	0.0002	85%
Octachloro Biphenyls	TOT	µg/L	100%	0.000124	0.0044	75%	0.000021	0.00074	83%
PCB	TOT	µg/L	100%	0.000055	0.0021	100%	0.000020	0.001	60%
PCB174	TOT	µg/L	100%	0.000056	0.0021	100%	0.000017	0.00063	70%
PCB39	TOT	µg/L	50%	---	---	25%	---	---	---
PCB45/51	TOT	µg/L	100%	0.000073	0.0026	100%	0.000026	0.00093	65%
Pentachloro Biphenyls	TOT	µg/L	100%	0.0015	0.054	100%	0.00029	0.01003	82%
Penta-Dioxins	TOT	µg/L	75%	0.0000061	0.00016	25%	---	---	100%
Penta-Furans	TOT	µg/L	100%	0.0000020	0.000076	25%	---	---	100%
PFDA	TOT	µg/L	100%	0.0016	0.063	100%	0.0012	0.043	31%
PFHpA	TOT	µg/L	100%	0.0097	0.39	100%	0.0083	0.30	23%
PFHxA	TOT	µg/L	100%	0.043	1.7	100%	0.046	1.7	-1%
PFNA	TOT	µg/L	100%	0.0015	0.057	100%	0.0014	0.049	15%
PFOA	TOT	µg/L	100%	0.022	0.85	100%	0.018	0.69	19%
PFOS	TOT	µg/L	100%	0.0086	0.33	100%	0.0041	0.15	56%
PFOSA	TOT	µg/L	25%	---	---	0%	---	---	---
PFPeA	TOT	µg/L	100%	0.026	1.01	100%	0.039	1.36	-35%
Tetrachloro Biphenyls	TOT	µg/L	100%	0.0019	0.069	100%	0.00049	0.017	75%
Tetra-Dioxins	TOT	µg/L	75%	0.00000075	0.000013	0%	---	---	100%
Tetra-Furans	TOT	µg/L	75%	0.0000035	0.000055	25%	---	---	100%
Trichloro Biphenyls	TOT	µg/L	100%	0.0012	0.044	100%	0.00020	0.0068	85%

Appendix B6 Acute Toxicity Test Results and Bench Sheets

Acute Toxicity Test Results and Bench Sheets available upon request
Contact: CRD's Environmental Monitoring Program, 250.360.3082

Appendix B7 Chronic Toxicity Test Results and Bench Sheets

Chronic Toxicity Test Results and Bench Sheets available upon request
Contact: CRD's Environmental Monitoring Program, 250.360.3082

APPENDIX C
2024 SURFACE WATER MONITORING

Appendix C1	Parameter List
Appendix C2	Surface Water Stations
Appendix C3	McLoughlin Point Surface Results - 5 Sampling Events in 30 Days - Fecal Coliforms
Appendix C4	McLoughlin Point Surface Results - 5 Sampling Events in 30 Days - Enterococci
Appendix C5	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days - Fecal Coliforms
Appendix C6	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days - Enterococci
Appendix C7	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – NH_3
Appendix C8	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Silver
Appendix C9	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Arsenic
Appendix C10	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Boron
Appendix C11	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Cadmium
Appendix C12	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Copper
Appendix C13	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Lead
Appendix C14	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Manganese
Appendix C15	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Nickel
Appendix C16	McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Zinc
Appendix C17	CTD Plots

Appendix C1 Parameter List

Parameter	Edge of IDZ (3 depths top, middle, bottom)*	Surface Water (1 m depth)
CONVENTIONAL VARIABLES		
conductivity	x	
enterococci	x	x
fecal coliform	x	x
hardness (as $CaCO_3$)	x	
ammonia (NH_3)	x	
total Kjeldahl nitrogen	x*	
nitrate	x	
nitrite	x	
nitrogen, total	x	
oil & grease, mineral	x*	
oil & grease, total	x*	
organic carbon, total	x*	
pH	x	
phosphate, dissolved	x*	
phosphate, total	x*	
salinity	x	
sulphate	x	
sulphide	x	
suspended solids, total	x	
temperature	x	
CTD parameters	x	
METALS TOTAL		
aluminum	x	
antimony	x	
arsenic	x	
barium	x	
beryllium	x	
bismuth	x	
cadmium	x	
calcium	x	
chromium	x	
chromium VI	x	
cobalt	x	
copper	x	
iron	x	
lead	x	
lithium	x	
magnesium	x	
manganese	x	
mercury	x	
molybdenum	x	
nickel	x	
phosphorus	x	
potassium	x	
selenium	x	
silver	x	
sodium	x	

Appendix C1, cont'd

Parameter	Edge of IDZ (3 depths top, middle, bottom)*	Surface Water (1 m depth)
strontium	x	
thallium	x	
tin	x	
titanium	x	
vanadium	x	
zinc	x	

Notes: IDZ – initial dilution zone, *Top=5 m depth, middle=in predicted plume, bottom=5 m off bottom, x* sampled once in each 5 in 30 sample quarter.

Appendix C2 Surface Water Stations

McLoughlin Point	Latitude 48º	Longitude 123º
McL-01	24.299	24.409
McL-14	24.515	24.411
McL-16	24.300	24.085
McL-18	24.083	24.407
McL-20	24.298	24.733
McL-22	24.731	24.412
McL-24	24.606	23.953
McL-26	24.302	23.760
McL-28	23.996	23.948
McL-30	23.867	24.405
McL-32	23.992	24.865
McL-34	24.297	25.057
McL-36	24.603	24.870
Sample D1	Variable location depending on wind and current	
+ four dynamic edge of IDZ stations at 3 depths (5 m, middle of predicted plume and 5 m above bottom depth)		
Macaulay Point	**Latitude 48˚**	**Longitude 123˚**
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 at 3 depths (5 m, middle of predicted plume and 5 m above bottom depth)		
Clover Point	**Latitude 48˚**	**Longitude 123˚**
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 at 3 depths (5 m, middle of predicted plume and 5 m above bottom depth)		

Appendix C2, cont'd

Reference	Latitude 48º	Longitude 123º
Constance Bank	20.640	19.080
Parry Bay	21.258	30.647

Appendix C3 McLoughlin Point Surface Results 5 Sampling Events in 30 Days - Fecal Coliforms

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
McL-01	1.5	2	2.5	6	9	3	2	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	1	<1	<1	<1	5	1
McL-14	5	21	<1	3.5	4	4	1	1	<1	<1	1	1	<1	<1	1	1	<1	2	<1	1	<1	<1	5	1
McL-16	2	11	4	2	10	4	1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	4	1
McL-18	3	7	1	6	<1	3	1.5	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	2	<1	1	<1	<1.5	1	1
McL-20	2	93	28	8	<3.5	11	<1	<1.5	<1	<1	<1	1	<1	<1	1	<1	<1	3	<1	<1	<1	<1	2	1
McL-22	5	49	28	5	3	10	1	<1	<1	<1	2	1	<1	<1	<1	1	1	1	4	<1	2	<1	8	2
McL-24	3	70	7	3	4	7	3	<1	<1	<2	1	1	<1	<1	3	2	1	1	<1.5	<1	<1	2	10	2
McL-26	3.5	12	<1	2	7	4	1	<1	<1	<1	<1	1	<1	1	1	1	<1	1	1	1	1	<1	4	1
McL-28	8	24	<1.5	6	2	5	1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	4.5	1
McL-30	1	18	<1	10	<1	3	<1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	1	<1	<1	<1	1
McL-32	2	4	3	8	2	3	2	<1	1	<1	<1	1	<1	<1	<1	<1	<1	1	1	<1	<1	<1	4	1
McL-34	4	46	4	2	2	5	2	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	1	<1	<1	19	3	2
McL-36	4	50	<1	5	1	4	3	1	<1	2	<1	1	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	2	1
McL-D1	6	3	<1	7	1	3	<1	1	<1	<1	<1	1	<1	<1	<1	<1	1	4	<1	1	<1	<1	1	1
Ref-CB	2	5	1	<1	<1	2	<1	1	10	1	1	2	<1	<1	1	<1	<1	1	<1	<1	<1	<1	1	1
Ref-PB	2	2	3	<1	1	2	1	<1	2	4	1	2	<1	<1	<1	<1	<1	1	<1	<1	<1	1	3	1

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

Appendix C4 McLoughlin Point Surface Results 5 Sampling Events in 30 Days - Enterococci

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
McL-01	1	<1	<1	1	3.5	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1.5	1	<1	165	<1	<1	<1	3
McL-14	1	8	<1	<1	1	2	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1
McL-16	<1	4	<1	1	2	2	<1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	1	3	1
McL-18	2	2	<1	<1	1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	4	1
McL-20	<1	32	7	2	1	3	<1	<1	<1	<1	<1	1	<1	<1	2	<1	<1	1	<1	<1	<1	<1	1	1
McL-22	1	22.5	4	2	2	3	<1	<1	<1	<1	2	1	<1	<1	<1	<1	1	1	2	<1	<1	<1	<1	1
McL-24	<1	28	2	1	3	3	1	<1	<1	<1	<1	1	<1	<1	<1	<1	2	1	<1	10	1	1	12	3
McL-26	9.5	11	<1	1	1	3	<1	<1	<1	<1	<1	1	<1	<1	1	<1	<1	1	<1	<1	<1	<1	1	1
McL-28	5	10	<1	1	<1	2	1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<2.5	<1	<1	6	2
McL-30	2	11	<1	2.5	<1	2	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	32	<1	<1	10	3
McL-32	<1	<1	<1	2	<1	1	<1	<1	1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	1	4	1
McL-34	2	17	1	2	2	3	<1	<1	<1	130	<1	3	<1	8	<1	<1	<1	2	<1	<1	<1	2	4	2
McL-36	1	28	<1	<1	<1	2	<1	<1	<1	1	1	1	<1	10	<1	<1	<1	2	1	<1	<1	1	3	1
McL-D1	<1	1	1	<1	1	1	<1	1	<1	<1	<1	1	<1			<1	<1	1	<1	<1	<1	<1	4	1
Ref-CB	<1	2	1	<1	<1	1	3	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1
Ref-PB	<1	1	<1	<1	<1	1	1	<1	1	<1	1	1	<1	<1	<1	<1	<1	1	1	<1	2	<1	<1	1

Notes: Red shaded cells indicate exceedance to Health Canada's Geomean of 35 CFU/100 mL Blue shaded cells indicate exceedance to Health Canada (2012) WQG of 70 CFU/100 mL, Geomean = Geometric Mean.

Appendix C5 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days - Fecal Coliforms (CFU/100mL)

Fecal	Historical BC WQG GeoMean 200 CFU/100mL						
Winter							**Geomean**
Station 1	Top	5	48	11	33	3	12
	Middle	<1	87	26	7	<1	7
	Bottom	50	32	13	2	<1	8
Station 2	Top	4	3	10	5	2	4
	Middle	<1	93	14	18	<1	7
	Bottom	4	100	10	<1	<1	5
Station 3	Top	4	2	7	30	3	6
	Middle	3	12	25	14	<1	7
	Bottom	3	79	10	<1	6	7
Station 4	Top	<1	1	5	27	3	3
	Middle	<1	5	16	6	58	8
	Bottom	2	17	6	1	29	6
Ref - CB	Top	2	2	1	<1	<1	1
	Middle	<1	3	1	<1	<1	1
	Bottom	5	1	<1	1	1	1
Ref - PB	Top	2	6	4	1	<1	2
	Middle	3	4	1	<1	<1	2
	Bottom	<1	5	6	<1	<1	2
Spring							**Geomean**
Station 1	Top	3	<1	<1	1	<1	1
	Middle	1	2	4	<1	59	3
	Bottom	<1	3	26	28	70	11
Station 2	Top	5	1	1	<1	<1	1
	Middle	1	3	3	1	<1	2
	Bottom	1	3	9	140	16	9
Station 3	Top	7	<1	1	<1	<1	1
	Middle	<1	2	4	<1	42	3
	Bottom	<1	3	12	130	46	12
Station 4	Top	8	1	<1	1	1	2
	Middle	82	<1	7	12	15	10
	Bottom	2	7	10	29	92	13
Ref - CB	Top	1	2	1	<1	<1	1
	Middle	<1	<1	<1	<1	<1	1
	Bottom	1	<1	<1	27	8	3
Ref - PB	Top	1	5	9	<1	2	2
	Middle	4	1	3	11	5	4
	Bottom	<1	2	1	3	<1	1
Summer							**Geomean**
Station 1	Top	<1	<1	<1	<1	<1	1
	Middle	100	98	25	1	4	16
	Bottom	100	110	38	5	3	23
Station 2	Top	1	<1	<1	<1	<1	1
	Middle	230	79	<1	15	130	32
	Bottom	96	85	67	16	84	59
Station 3	Top	<1	<1	<1	<1	<1	1
	Middle	250	<1	1	10	56	11
	Bottom	150	4	42	36	55	35
Station 4	Top	1	<1	<1	<1	1	1
	Middle	410	1	1	29	18	12
	Bottom	150	3	<1	32	54	15

Appendix C5, cont'd

Fecal	Historical BC WQG GeoMean 200 CFU/100mL						
Ref - CB	Top	<1	<1	<1	<1	<1	1
	Middle	<1	<1	<1	<1	1	1
	Bottom	<1	<1	<1	<1	<1	1
Ref - PB	Top	<1	<1	<1	<1	<1	1
	Middle	2	2	1	1	<1	1
	Bottom	2	<1	1	<1	2	1
	Autumn						**Geomean**
Station 1	Top	7	2	<1	<1	4	2
	Middle	260	1	23	1	70	13
	Bottom	300	80	15	2	110	38
Station 2	Top	1	2	<1	3	9	2
	Middle	6	110	19	1	13	11
	Bottom	54	27	17	<1	80	18
Station 3	Top	1	1	<1	<1	5	1
	Middle	19	120	18	2	13	16
	Bottom	<1	88	41	3	4	8
Station 4	Top	2	19	1	1	3	3
	Middle	8	110	65	<1	21	16
	Bottom	2	61	100	<1	4	9
Ref - CB	Top	1	<1	<1	1	<1	1
	Middle	<1	1	1	<1	<1	1
	Bottom	<1	1	1	<1	<1	1
Ref - PB	Top	1	1	1	<1	1	1
	Middle	<1	<1	3	<1	2	1
	Bottom	<1	1	5	1	1	1

Notes:
Orange shaded cells indicate exceedance to BC WQG Geomean of 200 CFU/100 mL, Geomean = Geometric Mean

Appendix C6 - McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Enterococci (CFU/100mL)

Enterococci	Health Canada Geometric Mean 35 CFU/100 mL and Maximum 70 CFU/100 mL						
Winter							**Geomean**
Station 1	Top	3	18	4	10	1	5
	Middle	<1	32	3	3	<1	3
	Bottom	6	14	6	<1	<1	3
Station 2	Top	4	1	1	2	<1	2
	Middle	1	37	6	2	<1	3
	Bottom	<1	46	3	<1	<1	3
Station 3	Top	<1	3	2	10	<1	2
	Middle	1	5	4	10	1	3
	Bottom	1	30	6	<1	3	4
Station 4	Top	<1	<1	1	5	3	2
	Middle	<1	1	2	6	31	3
	Bottom	2	6	2	<1	7	3
Ref - CB	Top	1	2	<1	<1	1	1
	Middle	<1	1	1	<1	<1	1
	Bottom	3	1	<1	2	<1	1
Ref - PB	Top	1	<1	1	<1	1	1
	Middle	<1	2	1	1	<1	1
	Bottom	<1	1	2	1	<1	1
Spring							**Geomean**
Station 1	Top	<1	<1	<1	<1	<1	1
	Middle	1	1	4	<1	24	2
	Bottom	<1	<1	7	13	32	5
Station 2	Top	1	<1	<1	<1	<1	1
	Middle	<1	1	1	1	<1	1
	Bottom	<1	<1	3	97	10	5
Station 3	Top	2	<1	<1	<1	<1	1
	Middle	<1	1	<1	1	10	2
	Bottom	1	2	1	99	14	5
Station 4	Top	1	<1	<1	<1	1	1
	Middle	21	<1	1	2	<1	2
	Bottom	<1	1	1	14	41	4
Ref - CB	Top	<1	<1	<1	<1	<1	1
	Middle	<1	<1	<1	<1	<1	1
	Bottom	2	<1	<1	<1	<1	1
Ref - PB	Top	<1	<1	2	<1	<1	1
	Middle	<1	1	<1	6	<1	1
	Bottom	<1	2	<1	2	<1	1
Summer							**Geomean**
Station 1	Top	<1	<1	<1	<1	1	1
	Middle	23	35	6	2	<1	6
	Bottom	32	49	11	<1	<1	7
Station 2	Top	<1	<1	<1	11	<1	1
	Middle	66	32	1	11	44	10
	Bottom	41	27	29	1	23	15
Station 3	Top	<1	<1	<1	<1	<1	1
	Middle	81	1	<1	1	9	4
	Bottom	24	1	22	5	16	8

Appendix C6, cont'd

Station 4	Top	<1	<1	<1	<1	<1	1
	Middle	96	1	1	1	3	3
	Bottom	52	<1	1	1	4	3
Ref - CB	Top	<1	<1	<1	<1	<1	1
	Middle	<1	<1	<1	<1	<1	1
	Bottom	<1	<1	<1	<1	<1	1
Ref - PB	Top	<1	<1	<1	<1	<1	1
	Middle	<1	<1	<1	1	<1	1
	Bottom	<1	<1	<1	<1	<1	1
Autumn							**Geomean**
Station 1	Top	<1	1	<1	<1	<1	1
	Middle	63	<1	3	<1	13	5
	Bottom	71	23	4	<1	22	11
Station 2	Top	<1	<1	<1	<1	2	1
	Middle	2	35	2	3	4	4
	Bottom	11	6	1	<1	23	4
Station 3	Top	1	<1	<1	<1	1	1
	Middle	3	39	1	<1	8	4
	Bottom	44	21	5	<1	1	5
Station 4	Top	<1	<1	<1	<1	1	1
	Middle	5	19	12	1	5	6
	Bottom	<1	20	30	1	2	4
Ref - CB	Top	<1	<1	<1	1	1	1
	Middle	<1	<1	<1	<1	<1	1
	Bottom	<1	<1	<1	<1	<1	1
Ref - PB	Top	<1	<1	<1	<1	2	1
	Middle	<1	1	1	<1	<1	1
	Bottom	<1	1	<1	<1	<1	1

Notes:
Orange 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, *Geomean = Geometric Mean

Appendix C7 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – NH_3 (mg/L N)

NH_3	BC Approved LTC WQG = 1.1 mg/L (NH_3 as N)* (average over 5 samples)						
Winter							Average
Station 1	Top	0.046	0.030	0.042	0.049	0.039	0.041
	Middle	0.048	0.075	0.042	0.047	0.049	0.052
	Bottom	0.048	0.053	0.045	0.045	0.039	0.046
Station 2	Top	0.065	0.039	0.028	0.043	0.049	0.045
	Middle	0.050	0.076	0.049	0.028	0.059	0.052
	Bottom	0.039	0.075	0.048	0.049	0.041	0.050
Station 3	Top	0.045	0.034	0.048	0.055	0.048	0.046
	Middle	0.040	0.038	0.041	0.047	0.040	0.041
	Bottom	0.035	0.077	0.038	0.036	0.046	0.046
Station 4	Top	0.044	0.037	0.050	0.041	0.046	0.044
	Middle	0.045	0.038	0.049	0.038	0.072	0.048
	Bottom	0.044	0.028	0.043	0.039	0.047	0.040
Ref - CB	Top	0.056	0.018	0.055	0.054	0.033	0.043
	Middle	0.032	0.029	0.040	0.047	0.020	0.034
	Bottom	0.055	0.027	0.040	0.035	0.030	0.037
Ref - PB	Top	0.058	0.032	0.035	0.046	0.051	0.044
	Middle	0.035	0.037	0.037	0.033	0.032	0.035
	Bottom	0.036	0.025	0.044	0.028	0.041	0.035
Spring							Average
Station 1	**Average**	0.053	0.072	0.048	0.025	0.045	0.049
	Middle	0.042	0.042	0.028	0.041	0.060	0.043
	Bottom	0.037	0.047	0.038	0.033	0.067	0.044
Station 2	Top	0.054	0.058	0.060	0.043	0.041	0.051
	Middle	0.078	0.056	0.052	0.057	0.04	0.057
	Bottom	0.33	0.050	0.038	0.087	0.058	0.113
Station 3	Top	0.043	0.062	0.037	0.044	0.041	0.045
	Middle	0.095	0.051	0.042	0.047	0.041	0.055
	Bottom	0.033	0.046	0.029	0.095	0.045	0.050
Station 4	Top	0.045	0.046	0.040	0.065	0.022	0.044
	Middle	0.048	0.094	0.052	0.11	0.065	0.074
	Bottom	0.062	0.049	0.043	0.044	0.07	0.054
Ref - CB	Top	0.050	0.045	0.045	0.044	0.049	0.046
	Middle	0.041	0.044	0.036	0.022	0.028	0.034
	Bottom	0.055	0.041	0.045	0.046	0.039	0.045
Ref - PB	Top	0.047	0.043	0.05	0.051	0.042	0.047
	Middle	0.053	0.049	0.047	0.04	0.042	0.046
	Bottom	0.054	0.049	0.052	0.048	0.037	0.048
Summer							Average
Station 1	Top	0.062	0.096	0.085	0.08	0.053	0.075
	Middle	0.078	0.13	0.11	0.087	0.049	0.091
	Bottom	0.090	0.16	0.10	0.074	0.06	0.097
Station 2	Top	0.065	0.085	0.074	0.088	0.052	0.073
	Middle	0.15	0.12	0.078	0.083	0.13	0.11
	Bottom	0.082	0.087	0.17	0.090	0.10	0.11
Station 3	Top	0.071	0.14	0.085	0.084	0.046	0.085
	Middle	0.19	0.072	0.07	0.083	0.07	0.097
	Bottom	0.083	0.046	0.15	0.0745	0.069	0.085
Station 4	Top	0.068	0.081	0.083	0.075	0.06	0.073
	Middle	0.20	0.081	0.068	0.099	0.059	0.10
	Bottom	0.12	0.078	0.084	0.092	0.061	0.087
Ref - CB	Top	0.066	0.083	0.062	0.095	0.058	0.073

Appendix C7, cont'd

NH_3	BC Approved LTC WQG = 1.1 mg/L (NH_3 as N)* (average over 5 samples)						
	Middle	0.046	0.042	0.044	0.084	0.049	0.053
	Bottom	0.057	0.091	0.047	0.077	0.063	0.067
Ref - PB	Top	0.064	0.087	0.11	0.068	0.056	0.077
	Middle	0.057	0.083	0.071	0.07	0.045	0.065
	Bottom	0.061	0.069	0.091	0.11	0.044	0.075
Autumn							**Average**
Station 1	Top	0.048	0.045	0.051	0.046	0.036	0.045
	Middle	0.11	0.04	0.046	0.052	0.061	0.062
	Bottom	0.10	0.067	0.053	0.056	0.072	0.070
Station 2	Top	0.050	0.064	0.036	0.052	0.028	0.046
	Middle	0.043	0.0755	0.027	0.044	0.021	0.042
	Bottom	0.037	0.055	0.039	0.046	0.056	0.047
Station 3	Top	0.043	0.055	0.046	0.044	0.038	0.045
	Middle	0.032	0.076	0.063	0.037	0.027	0.047
	Bottom	0.026	0.055	0.056	0.043	0.031	0.042
Station 4	Top	0.045	0.050	0.053	0.043	0.037	0.046
	Middle	0.033	0.079	0.070	0.043	0.029	0.051
	Bottom	0.035	0.066	0.13	0.035	0.014	0.056
Ref - CB	Top	0.046	0.042	0.084	0.045	0.031	0.050
	Middle	0.033	0.017	0.041	0.03	0.033	0.031
	Bottom	0.024	0.024	0.044	0.029	0.022	0.029
Ref - PB	Top	0.054	0.045	0.055	0.045	0.031	0.046
	Middle	0.033	0.044	0.044	0.097	0.021	0.048
	Bottom	0.012	0.040	0.042	0.046	0.026	0.033

Notes:
LTC – long-term chronic
Shaded cells indicate exceedance to BC WQG, Approved Guideline
*based on salinity = 30 ppt, Temperature = 15ºC and pH = 8.2

Appendix C8 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Silver (mg/L)

Silver	BC Approved WQG = 0.5 µg/L (LTC – average over 5 samples) or 3.7 µg/L (STA)						
Winter							Average
Station 1	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	0.062	<0.05	<0.05	<0.05	<0.05	0.052
Station 2	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Station 3	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Station 4	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Ref - CB	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	0.064	<0.05	<0.05	<0.05	<0.05	0.053
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Ref - PB	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Spring							Average
Station 1	Top	0.072	<0.05	0.050	<0.05	<0.05	0.054
	Middle	0.080	<0.05	0.083	<0.05	<0.05	0.063
	Bottom	0.058	<0.05	<0.05	<0.05	<0.05	0.052
Station 2	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Station 3	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	0.090	<0.05	<0.05	<0.05	<0.05	0.058
Station 4	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	0.064	<0.05	<0.05	<0.05	<0.05	0.053
Ref - CB	Top	0.16	<0.05	<0.05	<0.05	<0.05	0.071
	Middle	0.056	<0.05	<0.05	<0.05	<0.05	0.051
	Bottom	0.084	<0.05	<0.05	<0.05	<0.05	0.057
Ref - PB	Top	0.060	<0.05	<0.05	<0.05	<0.05	0.052
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Summer							Average
Station 1	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Station 2	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	0.056	0.051
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Station 3	Top	<0.05	<0.05	<0.05	<0.05	0.11	0.062
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	0.07	0.054

Appendix C8, cont'd

Silver	BC Approved WQG = 0.5 µg/L (LTC – average over 5 samples) or 3.7 µg/L (STA)						
Station 4	Top	<0.05	<0.05	<0.05	<0.05	0.069	0.054
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	0.067	0.053
Ref - CB	Top	0.053	<0.05	<0.05	<0.05	0.054	0.051
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Ref - PB	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Autumn							**Average**
Station 1	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	0.080	0.056
Station 2	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	0.055	<0.05	<0.05	0.051
	Bottom	<0.05	<0.05	<0.05	<0.05	0.054	0.051
Station 3	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Station 4	Top	<0.05	<0.05	0.063	<0.05	<0.05	0.053
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Ref - CB	Top	<0.05	<0.05	0.074	<0.05	<0.05	0.055
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
Ref - PB	Top	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.050

Notes:
LTC – long-term chronic
Shaded cells indicate exceedance to BC WQG.
Detection limit was used in calculations of average values.

Appendix C9 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Arsenic (μg/L)

Arsenic	BC Approved LTC WQG = 12.5 μg/L (average over 5 samples)						
Winter							Average
Station 1	Top	1.57	1.77	1.76	1.44	1.57	1.62
	Middle	1.73	1.61	1.68	1.71	1.90	1.73
	Bottom	1.37	2.07	1.58	1.36	1.62	1.60
Station 2	Top	1.81	1.84	1.99	1.29	1.44	1.67
	Middle	1.50	1.48	1.88	1.54	1.53	1.59
	Bottom	1.79	1.83	2.06	1.61	1.70	1.80
Station 3	Top	1.53	1.81	1.69	1.45	1.61	1.62
	Middle	2.00	1.94	1.98	1.78	1.34	1.81
	Bottom	1.86	2.10	1.77	1.75	1.43	1.78
Station 4	Top	1.67	2.08	1.88	2.00	1.46	1.82
	Middle	0.94	2.22	1.73	2.33	1.80	1.80
	Bottom	2.29	2.03	1.80	1.73	1.53	1.88
Ref - CB	Top	1.23	1.70	1.70	1.06	1.55	1.45
	Middle	1.23	1.85	1.74	1.27	1.49	1.52
	Bottom	1.11	1.46	1.75	1.66	1.51	1.50
Ref - PB	Top	1.61	1.62	1.70	1.49	1.40	1.56
	Middle	1.62	1.58	1.59	1.59	1.57	1.59
	Bottom	2.12	1.69	2.07	1.39	1.83	1.82
Spring							Average
Station 1	Top	1.86	1.74	0.94	1.30	1.30	1.43
	Middle	1.50	1.68	1.11	1.23	1.10	1.32
	Bottom	1.28	1.78	1.13	1.83	0.87	1.38
Station 2	Top	1.82	1.22	0.93	1.14	1.46	1.31
	Middle	1.53	1.61	0.77	1.34	1.07	1.26
	Bottom	1.49	1.46	0.71	1.37	1.10	1.23
Station 3	Top	1.73	1.24	0.57	1.31	1.07	1.18
	Middle	1.73	1.41	0.56	1.48	1.10	1.26
	Bottom	2.17	1.74	0.76	1.46	1.10	1.45
Station 4	Top	1.66	1.59	0.71	1.36	1.34	1.33
	Middle	1.94	1.60	1.13	1.90	1.39	1.59
	Bottom	1.65	1.62	0.67	1.27	1.26	1.29
Ref - CB	Top	1.67	1.63	1.18	1.76	0.97	1.44
	Middle	1.71	1.67	1.14	1.26	1.40	1.44
	Bottom	1.87	1.72	1.21	1.67	1.06	1.51
Ref - PB	Top	1.72	1.66	1.03	1.51	1.34	1.45
	Middle	1.67	1.46	0.92	1.44	1.18	1.33
	Bottom	1.39	1.41	1.12	1.23	1.24	1.28
Summer							Average
Station 1	Top	1.30	1.16	1.19	1.82	2.08	1.51
	Middle	1.01	1.75	1.56	1.78	1.49	1.52
	Bottom	1.49	1.70	1.52	1.66	2.19	1.71
Station 2	Top	1.26	1.65	1.62	1.88	1.95	1.67
	Middle	1.18	1.69	1.19	1.88	1.85	1.56
	Bottom	1.21	1.46	1.11	1.39	1.58	1.35
Station 3	Top	1.65	1.57	1.46	1.65	2.07	1.68
	Middle	1.46	1.64	1.09	1.95	1.51	1.53
	Bottom	1.33	1.46	1.18	1.43	1.69	1.42
Station 4	Top	1.15	1.55	1.12	1.99	1.97	1.56
	Middle	1.10	1.71	1.21	1.79	1.86	1.53
	Bottom	1.34	1.79	1.41	1.79	1.83	1.63

Appendix C9, cont'd

Arsenic	BC Approved LTC WQG = 12.5 µg/L (average over 5 samples)						
Ref - CB	Top	1.08	1.30	0.83	1.47	1.64	1.26
	Middle	1.54	1.60	1.28	1.83	1.97	1.64
	Bottom	1.34	1.54	1.50	1.29	2.07	1.55
Ref - PB	Top	1.13	1.46	1.50	1.92	1.59	1.52
	Middle	1.54	1.34	1.26	1.84	1.85	1.57
	Bottom	1.50	1.71	1.31	1.79	1.63	1.59
Autumn							Average
Station 1	Top	1.58	1.71	1.46	1.67	1.27	1.54
	Middle	1.61	2.18	2.16	1.48	1.61	1.81
	Bottom	1.58	2.23	1.76	1.68	1.69	1.79
Station 2	Top	1.94	2.60	2.10	1.42	1.50	1.91
	Middle	1.61	2.25	1.83	1.39	1.57	1.73
	Bottom	1.74	2.35	2.09	1.69	1.28	1.83
Station 3	Top	1.89	2.58	2.02	1.51	1.33	1.87
	Middle	1.83	1.91	2.30	1.67	1.42	1.83
	Bottom	2.09	3.94	2.15	1.57	1.14	2.18
Station 4	Top	1.57	1.93	2.15	1.68	1.47	1.76
	Middle	1.32	2.24	1.40	1.86	1.37	1.64
	Bottom	1.79	2.29	2.14	1.83	1.43	1.90
Ref - CB	Top	1.34	1.88	1.70	1.48	1.18	1.51
	Middle	1.29	2.31	2.14	1.66	1.50	1.78
	Bottom	1.69	2.20	1.98	1.50	1.38	1.75
Ref - PB	Top	1.48	1.66	2.06	1.68	1.57	1.69
	Middle	1.62	2.17	1.98	1.58	1.39	1.75
	Bottom	1.54	2.13	2.22	1.39	1.54	1.76

Notes:
LTC – long-term chronic
Shaded cells indicate exceedance to BC WQG.

Appendix C10 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Boron (µg/L)

Boron	BC Approved LTC WQG = 1200 µg/L (average over 5 samples)						
Winter							Average
Station 1	Top	3220	3590	4040	3690	4240	3756
	Middle	3390	3390	4510	3930	4350	3914
	Bottom	3340	3580	4090	4030	4310	3870
Station 2	Top	3610	3630	4510	3790	4280	3964
	Middle	3330	3540	4620	3950	4370	3962
	Bottom	3280	3470	4430	3920	4320	3884
Station 3	Top	3600	3560	4160	3670	4215	3841
	Middle	3540	3590	4690	3890	4150	3972
	Bottom	3530	3620	4010	3760	4220	3828
Station 4	Top	3620	3760	4510	3840	4210	3988
	Middle	3450	3600	4510	3790	4270	3924
	Bottom	3640	3770	4750	3840	4220	4044
Ref - CB	Top	2995	3130	4390	3510	4120	3629
	Middle	3260	3350	3990	3680	4370	3730
	Bottom	3160	3410	4390	3790	4350	3820
Ref - PB	Top	3270	3480	4550	3760	4210	3854
	Middle	3130	3220	4230	3670	4290	3708
	Bottom	4040	3380	4620	3760	4220	4004
Spring							Average
Station 1	Top	4430	3940	4610	3940	3800	4144
	Middle	4460	3980	4990	3840	3890	4232
	Bottom	4480	3980	4950	3870	3890	4234
Station 2	Top	4710	3960	4690	3890	3900	4230
	Middle	4610	3950	4800	3980	3890	4246
	Bottom	4660	4230	4780	4340	3930	4388
Station 3	Top	4410	3930	4900	3810	3900	4190
	Middle	4520	4020	4920	4010	3900	4274
	Bottom	4460	4060	4990	3870	3940	4264
Station 4	Top	4540	3910	5170	3920	3890	4286
	Middle	4590	3810	5000	4070	4020	4298
	Bottom	4510	3930	4820	4100	4070	4286
Ref - CB	Top	4105	3870	5105	4010	3885	4195
	Middle	4280	3840	5130	4030	3880	4232
	Bottom	4560	3910	5130	4020	3840	4292
Ref - PB	Top	4360	3980	5080	3860	3900	4236
	Middle	4400	3960	5010	3810	3860	4208
	Bottom	4440	3870	5060	4010	3940	4264
Summer							Average
Station 1	Top	3920	3270	3360	4830	4880	4052
	Middle	3520	4180	3580	4490	4430	4040
	Bottom	3860	3920	3510	4650	4510	4090
Station 2	Top	3540	3960	3550	4690	5130	4174
	Middle	3300	4030	3500	4520	4820	4034
	Bottom	4060	3990	3380	4720	4660	4162
Station 3	Top	4010	3890	3290	4410	5470	4214
	Middle	3960	3780	3370	4700	4810	4124
	Bottom	3680	3820	3470	4740	4840	4110
Station 4	Top	3560	3760	3280	4590	4600	3958
	Middle	3700	4070	3440	4460	4840	4102
	Bottom	3480	4200	3390	4510	5150	4146

Appendix C10, cont'd

Boron	BC Approved LTC WQG = 1200 µg/L (average over 5 samples)						
Ref - CB	Top	2955	3290	2980	3885	4155	3453
	Middle	3750	3710	3380	4280	4520	3928
	Bottom	3530	3720	3510	4610	5140	4102
Ref - PB	Top	3570	3820	3430	4380	4400	3920
	Middle	3710	3590	3140	4470	4570	3896
	Bottom	3940	4000	3430	4370	4520	4052
Autumn							**Average**
Station 1	Top	5140	4230	4470	4010	3850	4340
	Middle	4750	4360	5850	3670	3830	4492
	Bottom	4800	4500	4130	3720	4140	4258
Station 2	Top	4690	4280	5320	3730	4440	4492
	Middle	4940	4420	5230	3770	3880	4448
	Bottom	4850	4380	5240	3700	3860	4406
Station 3	Top	5170	4260	4900	3540	4070	4388
	Middle	4830	4310	5800	3720	3940	4520
	Bottom	5050	8140	5900	3930	3840	5372
Station 4	Top	4510	4410	5085	3930	3830	4353
	Middle	4830	4330	4360	4020	3705	4249
	Bottom	5060	4470	5635	3850	3900	4583
Ref - CB	Top	4215	4025	4935	3610	3860	4129
	Middle	4850	4330	5820	3880	3820	4540
	Bottom	5000	4390	5570	4020	3640	4524
Ref - PB	Top	4740	3960	5410	3860	3630	4320
	Middle	4910	4160	5730	3750	3840	4478
	Bottom	5010	4130	5540	3740	3750	4434

Notes:
LTC – long-term chronic
Shaded cells indicate exceedance to BC WQG for protection of marine aquatic life.
The BC WQG for boron is above background levels in this area which are around 4.0 mg/L.

Appendix C11 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Cadmium (µg/L)

Cadmium	BC Long-Term Working WQG = 0.12 µg/L (average over 5 samples)						
Winter							Average
Station 1	Top	0.032	<0.01	0.092	0.044	0.086	0.053
	Middle	<0.01	<0.01	0.057	0.029	0.027	0.027
	Bottom	<0.01	0.01	0.0615	0.041	0.056	0.036
Station 2	Top	<0.01	<0.01	0.113	0.046	0.073	0.050
	Middle	<0.01	<0.01	0.039	0.063	0.044	0.033
	Bottom	<0.01	0.03	0.112	0.031	0.02	0.041
Station 3	Top	<0.01	0.031	0.063	0.041	0.038	0.037
	Middle	<0.01	<0.01	0.087	0.08	0.057	0.049
	Bottom	0.029	0.034	0.029	0.02	0.101	0.043
Station 4	Top	<0.01	0.01	0.194	0.061	0.069	0.069
	Middle	0.027	<0.01	0.112	0.063	0.069	0.056
	Bottom	<0.01	<0.01	0.155	0.065	0.066	0.061
Ref - CB	Top	<0.01	<0.018	0.059	0.0215	0.063	0.034
	Middle	<0.01	<0.01	0.249	0.039	0.044	0.070
	Bottom	<0.01	<0.01	0.047	0.073	0.02	0.032
Ref - PB	Top	<0.01	<0.01	0.1	0.033	0.114	0.053
	Middle	<0.01	<0.01	0.141	0.068	0.062	0.058
	Bottom	0.085	0.01	0.106	0.054	0.044	0.060
Spring							Average
Station 1	Top	0.107	0.044	0.123	0.016	0.018	0.062
	Middle	0.13	0.127	0.054	0.027	0.038	0.075
	Bottom	0.15	0.10	0.058	0.034	0.023	0.073
Station 2	Top	0.20	0.119	0.043	<0.01	0.013	0.077
	Middle	0.17	0.108	0.065	0.022	<0.01	0.075
	Bottom	0.076	0.052	0.07	0.045	0.024	0.053
Station 3	Top	0.07	0.075	0.059	0.041	0.017	0.052
	Middle	0.101	0.106	0.052	<0.01	0.019	0.058
	Bottom	0.077	0.053	0.103	<0.01	0.041	0.057
Station 4	Top	0.093	0.106	0.113	0.035	0.057	0.081
	Middle	0.018	0.103	0.038	<0.01	<0.01	0.036
	Bottom	0.061	0.053	0.031	0.012	0.047	0.041
Ref - CB	Top	0.26	0.05	0.073	0.0385	0.0285	0.090
	Middle	0.226	0.081	0.059	<0.01	0.011	0.077
	Bottom	0.211	0.109	0.056	0.037	0.038	0.090
Ref - PB	Top	0.212	0.091	0.05	0.05	0.079	0.096
	Middle	0.168	0.092	0.083	0.04	0.041	0.085
	Bottom	0.219	0.071	0.079	0.091	<0.01	0.094
Summer							Average
Station 1	Top	<0.01	0.062	<0.01	0.023	0.023	0.026
	Middle	<0.01	0.09	<0.01	0.029	0.031	0.034
	Bottom	0.019	0.067	<0.01	0.042	0.024	0.032
Station 2	Top	<0.01	0.024	<0.01	0.128	0.092	0.053
	Middle	<0.01	0.094	<0.01	0.071	0.043	0.046
	Bottom	0.027	0.082	<0.01	0.067	<0.01	0.039
Station 3	Top	0.108	0.031	<0.01	0.05	0.139	0.068
	Middle	<0.01	0.027	<0.01	0.083	0.031	0.032
	Bottom	<0.01	0.059	<0.01	0.073	<0.01	0.032
Station 4	Top	<0.01	0.045	<0.01	0.103	0.031	0.040
	Middle	<0.01	0.045	<0.01	0.012	0.087	0.033
	Bottom	<0.01	0.065	<0.01	0.066	0.087	0.048

Appendix C11, cont'd

Cadmium	BC Long-Term Working WQG = 0.12 µg/L (average over 5 samples)						
Ref - CB	Top	<0.01	0.036	<0.01	0.0925	0.0265	0.035
	Middle	<0.01	0.098	<0.01	0.039	<0.01	0.033
	Bottom	<0.01	0.043	<0.01	0.067	0.056	0.037
Ref - PB	Top	0.101	0.072	<0.01	0.063	<0.01	0.051
	Middle	0.056	0.04	<0.01	0.02	0.018	0.029
	Bottom	0.031	0.062	<0.01	0.048	0.023	0.035
Autumn							**Average**
Station 1	Top	0.117	0.067	0.039	0.103	0.057	0.077
	Middle	0.066	0.044	0.116	0.065	0.049	0.068
	Bottom	0.056	0.126	0.094	0.102	0.056	0.087
Station 2	Top	0.078	0.054	0.089	0.057	0.065	0.069
	Middle	0.096	0.09	0.041	0.065	0.053	0.069
	Bottom	0.089	0.038	0.035	0.074	0.021	0.051
Station 3	Top	0.038	0.039	0.097	0.106	0.046	0.065
	Middle	0.022	0.073	0.126	0.089	0.062	0.074
	Bottom	0.046	0.256	0.114	0.087	0.085	0.118
Station 4	Top	0.075	0.077	0.081	0.029	0.037	0.060
	Middle	0.097	0.111	0.055	0.079	0.0645	0.081
	Bottom	0.095	0.115	<0.01	0.073	0.081	0.075
Ref - CB	Top	0.0865	0.0545	0.074	0.021	0.026	0.052
	Middle	0.076	0.032	0.086	0.05	0.062	0.061
	Bottom	0.102	0.111	0.093	0.071	0.076	0.091
Ref - PB	Top	0.074	0.083	0.103	0.059	0.075	0.079
	Middle	0.069	0.08	0.046	0.057	0.091	0.069
	Bottom	0.079	0.089	0.066	0.055	0.044	0.067

Notes: Shaded cells indicate exceedance to BC WQG; Detection limit was used in the calculation of averages.

Appendix C12 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Copper (µg/L)

Copper	BC Approved WQG = 2 µg/L (LTC average over 5 samples) or 3 µg/L (STA)						
Winter							Average
Station 1	Top	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	43.1	<0.5	9.02
Station 2	Top	0.93	0.84	<0.5	<0.5	<0.5	0.65
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	0.58	0.52
Station 3	Top	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	5.25	<0.5	<0.5	0.73	<0.5	1.50
Station 4	Top	<0.5	<0.5	<0.5	0.53	<0.5	0.51
	Middle	<0.5	<0.5	<0.5	0.72	<0.5	0.54
	Bottom	<0.5	<0.5	<0.5	0.85	<0.5	0.57
Ref - CB	Top	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
Ref - PB	Top	<0.5	<0.5	<0.5	0.57	<0.5	0.51
	Middle	<0.5	<0.5	<0.5	0.75	<0.5	0.55
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	0.50
Spring							Average
Station 1	Top	<0.5	0.54	<0.5	<0.5	<0.5	0.51
	Middle	<0.5	0.58	<0.5	<0.5	<0.5	0.52
	Bottom	<0.5	<0.5	0.63	<0.5	<0.5	0.53
Station 2	Top	<0.5	<0.5	0.8	<0.5	<0.5	0.56
	Middle	<0.5	<0.5	0.58	<0.5	<0.5	0.52
	Bottom	<0.5	0.68	<0.5	<0.5	<0.5	0.54
Station 3	Top	<0.5	0.76	<0.5	<0.5	<0.5	0.55
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
Station 4	Top	<0.5	0.55	<0.5	<0.5	<0.5	0.51
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	0.55	<0.5	<0.5	<0.5	0.51
Ref - CB	Top	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Middle	<0.5	1.45	<0.5	<0.5	<0.5	0.69
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
Ref - PB	Top	<0.5	0.63	0.5	<0.5	<0.5	0.53
	Middle	<0.5	<0.5	0.55	<0.5	<0.5	0.51
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
Summer							Average
Station 1	Top	<0.5	<0.5	<0.5	<0.5	0.51	0.50
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
Station 2	Top	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	0.88	<0.5	<0.5	<0.5	0.58
Station 3	Top	<0.5	0.94	<0.5	<0.5	<0.5	0.59
	Middle	<0.5	7.15	<0.5	<0.5	<0.5	1.83
	Bottom	<0.5	1.96	<0.5	<0.5	<0.5	0.79
Station 4	Top	<0.5	1.07	<0.5	<0.5	<0.5	0.61
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50

Copper	BC Approved WQG = 2 µg/L (LTC average over 5 samples) or 3 µg/L (STA)						
Ref - CB	Top	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Middle	<0.5	0.76	<0.5	<0.5	<0.5	0.55
	Bottom	<0.5	0.93	<0.5	<0.5	<0.5	0.59
Ref - PB	Top	<0.5	0.57	<0.5	<0.5	<0.5	0.51
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	0.97	<0.5	<0.5	<0.5	0.59
Autumn							Average
Station 1	Top	<0.5	<0.5	<0.5	<0.5	12.7	2.94
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
Station 2	Top	<0.5	0.51	0.64	<0.5	<0.5	0.53
	Middle	<0.5	<0.5	<0.5	1.37	<0.5	0.67
	Bottom	<0.5	2.98	<0.5	<0.5	<0.5	1.00
Station 3	Top	<0.5	<0.5	<0.5	<0.5	<0.5	0.50
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
Station 4	Top	<0.5	1.80	<0.5	<0.5	<0.5	0.76
	Middle	<0.5	1.61	<0.5	<0.5	1.14	0.85
	Bottom	<0.5	<0.5	<0.5	<0.5	0.63	0.53
Ref - CB	Top	<0.5	<0.69	<0.5	<0.5	<0.5	0.54
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
Ref - PB	Top	<0.5	0.51	<0.5	<0.5	<0.5	0.50
	Middle	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
	Bottom	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50

Notes:
LTC – long-term chronic
STA – short-term acute
Shaded cells indicate exceedance to BC WQG, Detection limit was used in calculations of average values.

Appendix C13 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Lead (µg/L)

Lead	BC Approved WQG = 2 µg/L (LTC – average of 5 sample) or 140 µg/L (STA)						
Winter							Average
Station 1	Top	<0.05	1.22	0.186	0.195	<0.05	0.34
	Middle	<0.05	<0.05	<0.05	0.659	0.564	0.27
	Bottom	<0.05	0.151	0.075	0.262	8.35	1.78
Station 2	Top	<0.05	<0.05	<0.05	0.119	<0.05	0.06
	Middle	<0.05	<0.05	<0.05	0.083	0.054	0.06
	Bottom	<0.05	<0.05	0.182	2.03	<0.05	0.47
Station 3	Top	<0.05	0.171	0.596	0.401	0.1235	0.27
	Middle	<0.05	<0.05	<0.05	<0.05	0.287	0.10
	Bottom	<0.05	<0.05	0.298	0.623	<0.05	0.21
Station 4	Top	<0.05	0.408	0.225	0.188	0.109	0.20
	Middle	<0.05	0.218	0.239	1.85	1.21	0.71
	Bottom	0.061	<0.05	0.227	3.04	0.381	0.75
Ref - CB	Top	0.196	<0.05	1.01	0.20	0.332	0.36
	Middle	<0.05	0.133	0.223	0.634	0.214	0.25
	Bottom	<0.05	<0.05	0.172	0.264	<0.05	0.12
Ref - PB	Top	<0.05	<0.05	<0.05	0.161	0.071	0.08
	Middle	<0.05	<0.05	0.059	0.485	<0.05	0.14
	Bottom	<0.05	<0.05	0.111	0.637	0.158	0.20
Spring							Average
Station 1	Top	0.405	1.51	0.116	<0.05	<0.05	0.43
	Middle	0.422	0.981	0.122	<0.05	<0.05	0.33
	Bottom	7.33	1.11	0.227	0.109	<0.05	1.77
Station 2	Top	7.06	4.1	0.176	<0.05	<0.05	2.29
	Middle	0.49	2.42	0.421	0.265	<0.05	0.73
	Bottom	0.685	2.44	<0.05	0.562	0.811	0.91
Station 3	Top	1.82	2.04	<0.05	<0.05	<0.05	0.80
	Middle	0.301	5.75	0.706	0.113	<0.05	1.38
	Bottom	0.55	6.46	0.136	0.319	<0.05	1.50
Station 4	Top	0.216	1.81	0.7	1.57	<0.05	0.87
	Middle	0.288	2.7	0.114	0.896	<0.05	0.81
	Bottom	0.873	1.23	0.367	0.123	<0.05	0.53
Ref - CB	Top	1.05	2.4	0.20	0.51	0.53	0.93
	Middle	0.215	1.96	0.24	0.12	<0.05	0.52
	Bottom	0.38	0.585	<0.05	0.078	<0.05	0.23
Ref - PB	Top	0.511	3.3	0.568	<0.05	3.73	1.63
	Middle	1.59	0.682	0.595	<0.05	0.14	0.61
	Bottom	15.5	1.46	<0.05	0.235	<0.05	3.46
Summer							Average
Station 1	Top	<0.05	1.34	<0.05	<0.05	<0.05	0.31
	Middle	<0.05	0.578	1.43	<0.05	<0.05	0.43
	Bottom	0.434	<0.05	<0.05	<0.05	0.155	0.15
Station 2	Top	<0.05	0.233	2.07	<0.05	<0.05	0.49
	Middle	<0.05	<0.05	0.144	<0.05	<0.05	0.07
	Bottom	<0.05	0.334	1.2	0.074	<0.05	0.34
Station 3	Top	0.179	<0.05	<0.05	<0.05	0.054	0.08
	Middle	<0.05	0.276	0.735	<0.05	0.079	0.24
	Bottom	<0.05	0.227	<0.05	<0.05	<0.05	0.09
Station 4	Top	<0.05	8.3	0.122	<0.05	<0.05	1.71
	Middle	<0.05	<0.05	0.202	<0.05	0.062	0.08
	Bottom	<0.05	0.06	1.46	<0.05	2.37	0.80

Appendix C13, cont'd

Lead	BC Approved WQG = 2 µg/L (LTC – average of 5 sample) or 140 µg/L (STA)						
Ref - CB	Top	<0.05	0.0925	0.7675	<0.05	<0.05	0.20
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Bottom	<0.05	0.691	<0.05	<0.05	0.086	0.19
Ref - PB	Top	<0.05	<0.05	0.254	0.55	<0.05	0.19
	Middle	<0.05	<0.05	0.487	<0.05	<0.05	0.14
	Bottom	<0.05	0.067	0.399	<0.05	<0.05	0.12
Autumn							**Average**
Station 1	Top	<0.05	<0.05	<0.05	0.084	0.06	0.060
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	0.050
	Bottom	<0.05	0.085	<0.05	<0.05	0.13	0.070
Station 2	Top	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Middle	<0.05	<0.05	0.053	0.082	<0.05	0.060
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Station 3	Top	0.563	<0.05	<0.05	<0.05	<0.05	0.15
	Middle	2.81	<0.05	<0.05	<0.05	<0.05	0.60
	Bottom	0.163	<0.05	<0.05	<0.05	<0.05	0.070
Station 4	Top	<0.05	<0.05	<0.05	0.105	0.096	0.070
	Middle	<0.05	<0.05	<0.05	0.446	<0.05	0.13
	Bottom	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Ref - CB	Top	<0.05	<0.05	<0.05	1.425	<0.05	0.33
	Middle	0.055	<0.05	<0.05	0.175	<0.05	0.08
	Bottom	<0.05	<0.05	<0.05	0.978	<0.05	0.24
Ref - PB	Top	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Middle	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Bottom	0.085	<0.05	<0.05	0.084	0.085	0.070

Notes:
STA – short-term acute
Shaded cells indicate exceedance to BC WQG
Detection limit was used in calculations of average values.

Appendix C14 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Manganese (µg/L)

Manganese	BC Working Long-Term WQG = 100 µg/L (average over 5 samples)						
Winter							Average
Station 1	Top	1.55	0.86	0.83	0.51	1.10	0.97
	Middle	1.12	2.43	0.75	0.81	1.30	1.28
	Bottom	1.41	0.93	1.18	0.92	1.53	1.19
Station 2	Top	1.14	1.36	1.16	0.65	1.27	1.12
	Middle	1.67	1.04	0.98	0.96	1.47	1.22
	Bottom	1.39	1.19	0.84	0.40	0.92	0.95
Station 3	Top	1.40	0.57	0.85	0.38	0.79	0.80
	Middle	0.98	0.51	0.97	1.05	1.28	0.96
	Bottom	1.77	1.12	0.73	0.54	1.40	1.11
Station 4	Top	1.44	0.66	0.89	0.20	1.45	0.93
	Middle	1.56	0.46	0.74	0.76	1.85	1.07
	Bottom	1.05	0.58	1.28	0.34	1.80	1.01
Ref - CB	Top	0.83	0.75	1.32	0.25	1.02	0.83
	Middle	1.60	0.95	0.96	0.46	5.31	1.86
	Bottom	0.64	1.37	1.60	0.51	1.38	1.10
Ref - PB	Top	1.11	0.92	0.88	0.20	1.04	0.83
	Middle	1.18	0.80	1.00	1.15	2.50	1.33
	Bottom	1.88	1.34	1.19	1.05	3.02	1.70
Spring							Average
Station 1	Top	0.67	0.95	0.96	0.99	0.20	0.75
	Middle	0.99	1.31	1.58	0.43	2.28	1.32
	Bottom	0.78	1.10	1.51	1.49	2.26	1.43
Station 2	Top	0.64	1.22	0.95	0.56	0.20	0.71
	Middle	0.49	1.45	1.11	0.61	0.20	0.77
	Bottom	0.82	1.28	1.05	0.91	0.20	0.85
Station 3	Top	1.14	1.04	0.95	0.89	0.20	0.84
	Middle	0.61	1.05	0.83	0.68	0.20	0.67
	Bottom	0.62	0.87	0.64	0.57	0.20	0.58
Station 4	Top	0.67	0.99	1.22	1.21	0.20	0.86
	Middle	0.48	1.40	1.11	0.97	0.20	0.83
	Bottom	0.34	0.99	0.58	1.42	0.20	0.71
Ref - CB	Top	0.78	1.20	1.37	0.95	0.20	0.90
	Middle	1.29	4.82	1.40	0.90	0.20	1.72
	Bottom	0.90	1.75	1.09	1.23	1.74	1.34
Ref - PB	Top	0.77	1.06	1.38	0.94	0.20	0.87
	Middle	0.64	0.72	1.78	0.38	0.20	0.74
	Bottom	1.02	1.12	0.69	0.53	0.20	0.71
Summer							Average
Station 1	Top	0.73	1.38	0.42	2.37	2.39	1.46
	Middle	0.24	2.36	0.20	1.49	2.63	1.38
	Bottom	0.92	3.11	0.20	1.52	2.44	1.64
Station 2	Top	0.75	1.96	0.59	1.19	1.90	1.28
	Middle	0.46	1.98	1.04	1.69	2.77	1.59
	Bottom	1.06	2.19	0.20	2.38	2.87	1.74
Station 3	Top	0.85	1.94	0.50	1.70	2.24	1.45
	Middle	1.38	1.86	0.20	1.94	2.37	1.55
	Bottom	1.02	2.89	0.59	1.46	1.98	1.59
Station 4	Top	0.39	2.09	0.37	1.54	2.61	1.40
	Middle	1.00	1.63	0.24	1.79	2.35	1.40
	Bottom	0.75	1.90	0.59	1.96	2.58	1.56

Appendix C14, cont'd

Manganese	BC Working Long-Term WQG = 100 µg/L (average over 5 samples)						
Ref - CB	Top	0.73	1.66	0.23	1.72	2.36	1.34
	Middle	1.33	1.77	0.48	1.84	2.37	1.56
	Bottom	0.20	1.70	0.20	1.53	2.34	1.19
Ref - PB	Top	0.84	1.52	0.20	1.85	2.09	1.30
	Middle	0.52	1.86	0.62	2.36	2.08	1.49
	Bottom	0.76	2.07	0.20	2.30	1.98	1.46
Autumn							Average
Station 1	Top	1.82	1.70	2.42	1.98	2.80	2.14
	Middle	2.62	2.45	2.60	2.32	1.86	2.37
	Bottom	2.07	9.07	1.84	1.95	3.01	3.59
Station 2	Top	1.75	3.08	1.85	2.00	1.95	2.13
	Middle	2.14	2.27	2.35	2.00	1.85	2.12
	Bottom	1.80	2.38	2.51	2.15	2.51	2.27
Station 3	Top	1.83	2.11	2.14	2.13	1.87	2.02
	Middle	1.82	1.99	2.41	2.31	1.87	2.08
	Bottom	1.99	3.84	2.62	2.34	1.76	2.51
Station 4	Top	1.56	7.46	1.76	1.94	2.16	2.98
	Middle	1.66	2.35	1.89	1.84	1.84	1.92
	Bottom	1.99	2.18	2.35	2.13	2.19	2.17
Ref - CB	Top	1.73	2.15	2.18	1.95	2.86	2.17
	Middle	1.50	1.81	2.91	3.36	2.25	2.37
	Bottom	1.24	1.53	2.64	2.89	2.02	2.06
Ref - PB	Top	1.80	2.05	2.34	2.25	1.92	2.07
	Middle	1.73	1.84	2.79	2.01	1.91	2.06
	Bottom	2.49	1.62	2.45	2.10	2.17	2.17

Notes:
Shaded cells indicate exceedance to BC WQG.

Appendix C15 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Nickel (µg/L)

Nickel	BC Working WQG = 8.3 µg/L (average over 5 samples)						
Winter							Average
Station 1	Top	<0.2	<0.2	0.22	<0.2	0.63	0.29
	Middle	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20
	Bottom	<0.2	<0.2	<0.235	29.7	0.39	6.15
Station 2	Top	10.5	2.91	0.2	<0.2	0.69	2.90
	Middle	<0.2	<0.2	<0.2	0.84	<0.2	0.33
	Bottom	<0.2	0.23	0.35	<0.2	0.43	0.28
Station 3	Top	0.79	<0.2	<0.2	<0.2	<0.245	0.33
	Middle	1.34	<0.2	<0.2	<0.2	<0.2	0.43
	Bottom	<0.2	<0.2	0.3	<0.2	0.38	0.26
Station 4	Top	<0.2	<0.2	0.25	<0.2	1.21	0.41
	Middle	<0.2	<0.2	0.51	<0.2	<0.2	0.26
	Bottom	0.86	<0.2	<0.2	<0.2	0.87	0.47
Ref - CB	Top	<0.2	<0.2	0.27	<0.245	0.44	0.27
	Middle	<0.2	<0.2	0.43	<0.2	0.57	0.32
	Bottom	<0.2	<0.2	<0.2	0.86	0.26	0.34
Ref - PB	Top	0.26	<0.2	0.38	0.74	0.32	0.38
	Middle	<0.2	0.31	<0.2	<0.2	0.53	0.29
	Bottom	<0.2	<0.2	0.39	<0.2	0.4	0.28
Spring							Average
Station 1	Top	<0.2	0.45	0.27	<0.2	<0.2	0.26
	Middle	<0.2	0.66	0.48	<0.2	11.6	2.63
	Bottom	0.7	0.93	0.52	<0.2	7.27	1.92
Station 2	Top	0.29	0.4	<0.2	<0.2	<0.2	0.26
	Middle	<0.2	0.42	0.23	<0.2	<0.2	0.25
	Bottom	<0.2	0.62	0.3	<0.2	<0.2	0.30
Station 3	Top	<0.2	0.77	0.46	<0.2	<0.2	0.37
	Middle	2.78	0.75	0.21	<0.2	<0.2	0.83
	Bottom	<0.2	0.5	<0.2	<0.2	<0.2	0.26
Station 4	Top	<0.2	0.27	<0.2	<0.2	<0.2	0.21
	Middle	<0.2	0.87	3.76	<0.2	<0.2	1.05
	Bottom	0.61	0.73	0.38	<0.2	<0.2	0.42
Ref - CB	Top	<0.2	0.42	0.545	<0.2	<0.2	0.31
	Middle	<0.2	1.52	0.31	0.79	<0.2	0.60
	Bottom	<0.2	0.63	0.25	<0.2	9	2.06
Ref - PB	Top	<0.2	1.2	0.26	<0.2	<0.2	0.41
	Middle	0.29	0.43	0.41	<0.2	<0.2	0.31
	Bottom	1.97	0.59	<0.2	0.25	<0.2	0.64
Summer							Average
Station 1	Top	0.46	0.41	3.35	<0.2	1.52	1.19
	Middle	0.43	0.48	<0.2	<0.2	0.8	0.42
	Bottom	0.34	0.55	<0.2	0.25	0.79	0.43
Station 2	Top	0.52	0.45	1.64	2.72	0.37	1.14
	Middle	0.41	0.34	0.81	<0.2	1.11	0.57
	Bottom	0.41	1.08	1.15	<0.2	1.26	0.82
Station 3	Top	0.53	0.34	<0.2	<0.2	0.53	0.36
	Middle	<0.2	1.8	0.46	0.35	0.82	0.73
	Bottom	0.34	0.98	<0.2	<0.2	0.59	0.46
Station 4	Top	<0.2	1.11	1.26	<0.2	0.55	0.66
	Middle	0.37	0.4	0.87	<0.2	2.16	0.80
	Bottom	0.26	0.4	<0.2	<0.2	0.62	0.34

Nickel	BC Working WQG = 8.3 µg/L (average over 5 samples)						
Ref - CB	Top	0.48	0.385	<0.2	<0.2	1.25	0.50
	Middle	0.53	0.72	<0.2	<0.2	0.71	0.47
	Bottom	0.31	0.73	<0.2	<0.2	0.85	0.46
Ref - PB	Top	0.57	0.41	0.75	<0.2	0.56	0.50
	Middle	0.42	0.24	0.53	0.33	0.89	0.48
	Bottom	0.36	0.75	<0.2	<0.2	0.9	0.48
	Autumn						**Average**
Station 1	Top	0.45	<0.2	<0.2	0.72	0.38	0.39
	Middle	0.53	0.51	<0.2	0.21	0.36	0.36
	Bottom	0.78	0.56	0.28	0.25	0.44	0.46
Station 2	Top	0.66	1.36	<0.2	<0.2	0.33	0.55
	Middle	1.18	0.63	<0.2	0.94	0.47	0.68
	Bottom	0.56	0.4	<0.2	0.54	0.66	0.47
Station 3	Top	0.44	1.11	<0.2	0.53	<0.2	0.50
	Middle	0.69	0.33	<0.2	0.35	1.5	0.61
	Bottom	0.53	1.19	<0.2	0.42	1.69	0.81
Station 4	Top	0.44	1.11	<0.225	0.35	1.03	0.63
	Middle	0.41	1.6	<0.2	0.38	0.49	0.62
	Bottom	1.08	0.41	0.23	0.76	0.45	0.59
Ref - CB	Top	0.34	1.26	<0.2	0.41	1.21	0.68
	Middle	4.12	0.65	<0.2	1.74	0.24	1.39
	Bottom	1.5	16.7	<0.2	0.41	0.54	3.87
Ref - PB	Top	0.71	0.48	<0.2	0.27	0.84	0.50
	Middle	0.68	0.49	<0.2	0.41	<0.2	0.40
	Bottom	0.49	0.35	<0.2	0.57	0.58	0.44

Notes:
Shaded cells indicate exceedance to BC WQG.

Appendix C16 McLoughlin Point IDZ Results - 5 Sampling Events in 30 Days – Zinc (µg/L)

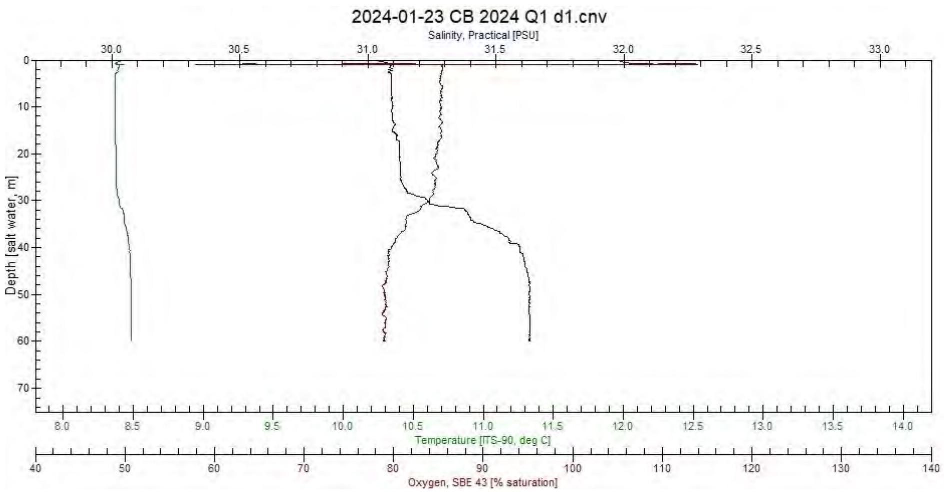
Zinc	BC Approved WQG = 10 µg/L (average over 5 samples) or 55 µg/L (max)						
Winter							Average
Station 1	Top	6.2	<3.00	<3.00	<3.00	<3.00	3.64
	Middle	<3.00	<3.00	<3.00	3.4	<3.00	3.08
	Bottom	<3.00	<3.00	<3.00	5.6	<3.00	3.52
Station 2	Top	<3.00	8.5	<3.00	3.3	<3.00	4.16
	Middle	<3.00	<3.00	<3.00	3.2	<3.00	3.04
	Bottom	3.7	<3.00	<3.00	<3.00	<3.00	3.14
Station 3	Top	16	<3.00	<3.00	<3.00	<3.00	5.60
	Middle	6.6	<3.00	<3.00	<3.00	<3.00	3.72
	Bottom	<3.00	<3.00	<3.00	<3.00	5.9	3.58
Station 4	Top	8.4	<3.00	<3.00	<3.00	<3.00	4.08
	Middle	<3.00	<3.00	<3.00	5.2	6.1	4.06
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Ref - CB	Top	<3.00	<3.5	<3.00	<3.00	<3.00	3.10
	Middle	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Ref - PB	Top	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	<3.00	3.2	<3.00	3.04
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Spring							Average
Station 1	Top	98.5	5.7	<3.00	<3.00	<3.00	22.64
	Middle	<3.00	3.6	<3.00	<3.00	<3.00	3.12
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Station 2	Top	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Station 3	Top	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	3.2	<3.00	<3.00	3.04
	Bottom	<3.00	<3.00	3.3	<3.00	<3.00	3.06
Station 4	Top	<3.00	<3.00	<3	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	3.2	<3.00	<3.00	3.04
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Ref - CB	Top	<3.00	<3.1	<3.00	<3.00	<3.00	3.02
	Middle	<3.00	7.9	<3.00	<3.00	<3.00	3.98
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Ref - PB	Top	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Summer							Average
Station 1	Top	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Bottom	4.3	<3.00	<3.00	<3.00	<3.00	3.26
Station 2	Top	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	4.6	4.6	<3.00	3.64
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
Station 3	Top	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Bottom	<3.00	5.6	<3.00	<3.00	<3.00	3.52
Station 4	Top	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Middle	<3.00	<3.00	<3.00	<3.00	<3.00	3.00
	Bottom	<3.00	<3.00	<3.00	<3.00	<3.00	3.00

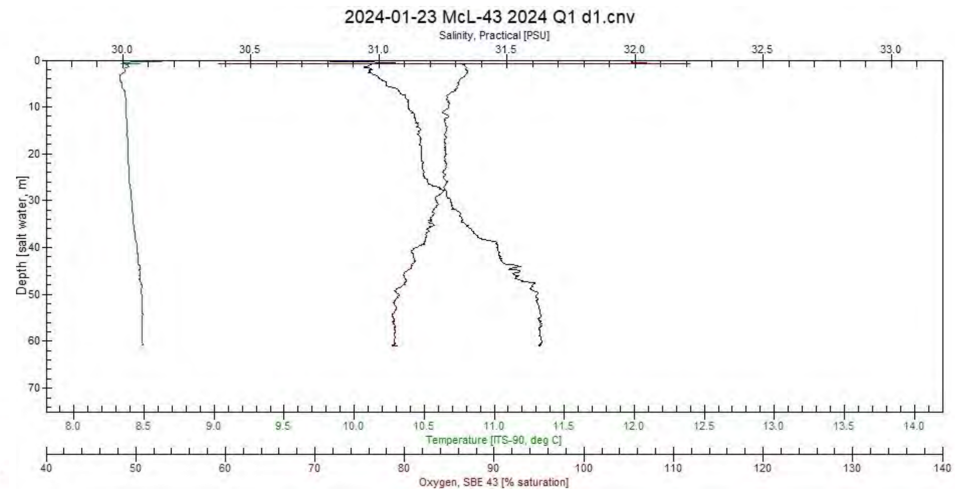
Appendix C16, cont'd

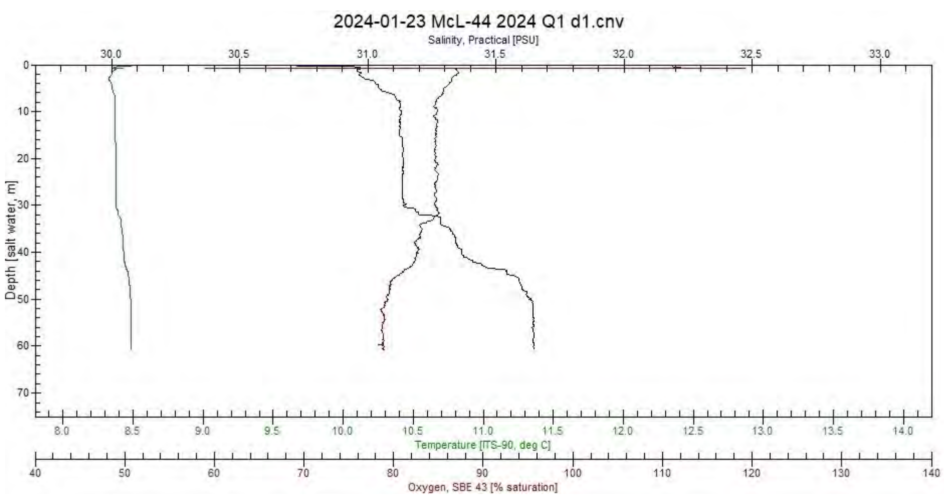
Zinc	BC Approved WQG = 10 µg/L (average over 5 samples) or 55 µg/L (max)						
Ref - CB	Top	6.65	8.45	<3.00	<3.00	<3.00	4.82
	Middle	5.8	11	4.2	<3	<3.00	5.40
	Bottom	6.2	9.8	<3.00	<3.00	6	5.60
Ref - PB	Top	4.5	<3.00	<3.00	<3.00	<3.00	3.30
	Middle	<3.00	<3.00	<3.00	<3.00	3.5	3.10
	Bottom	4.6	4.4	<3.00	<3.00	<3.00	3.60
		Autumn					Average
Station 1	Top	16.6	<3.00	<3.00	37.4	13.5	14.70
	Middle	30	9.3	<3.00	<3.00	15.3	12.12
	Bottom	3.2	6	<3.00	<3.00	51.7	13.38
Station 2	Top	6.6	<3.00	<3.00	<3.00	3.6	3.84
	Middle	14	16.5	<3.00	<3.00	<3.00	7.90
	Bottom	7.4	4.8	<3.00	<3.00	<3.00	4.24
Station 3	Top	<3.00	<3.00	<3.00	31.4	79.2	23.92
	Middle	14.2	8.7	<3.00	<3.00	36.5	13.08
	Bottom	5.8	5.4	<3.00	<3.00	<3.00	4.04
Station 4	Top	<3.00	8.8	<3.00	<3.00	56	14.76
	Middle	34.4	16.9	<3.00	<3.00	4.85	12.43
	Bottom	10.6	5.3	<3.00	<3.00	<3.00	4.98
Ref - CB	Top	8.05	18.8	<3.00	<3.00	36.6	13.89
	Middle	13.1	9.1	15.9	<3.00	<3.00	8.82
	Bottom	29.6	12.8	8.6	11.8	3.6	13.28
Ref - PB	Top	12.6	6	<3.00	12	<3.00	7.32
	Middle	18.8	20.3	<3.00	17.8	<3.00	12.58
	Bottom	14	7	<3.00	23.4	4.7	10.42

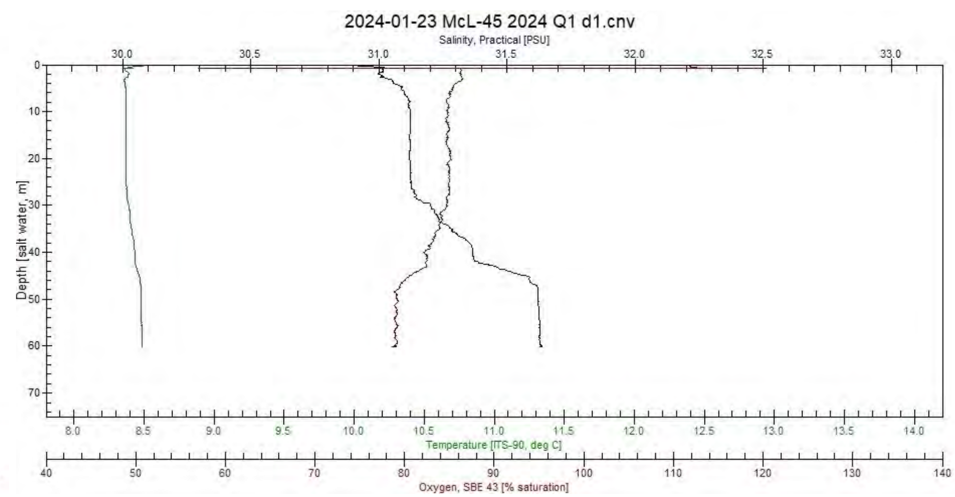
Notes:
Shaded cells indicate exceedance to BC WQG.
Detection limit was used in calculations of average values.

Appendix C17 CTD Plots

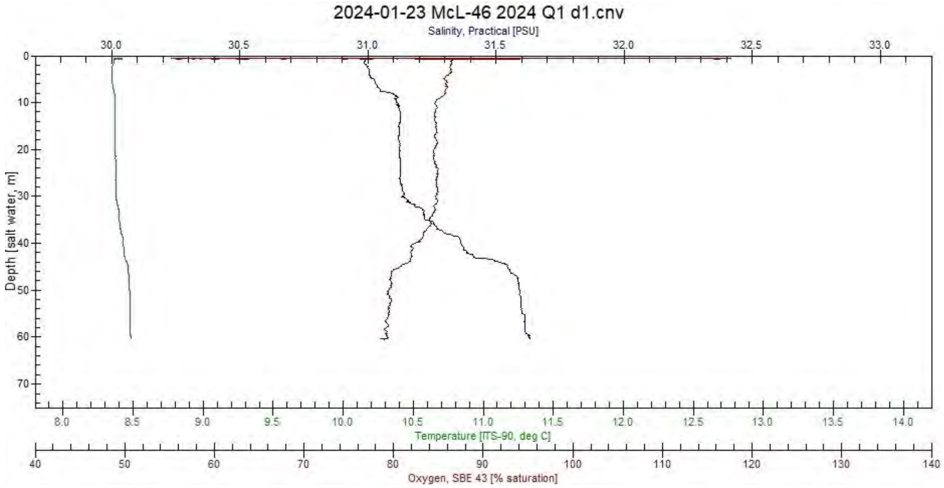


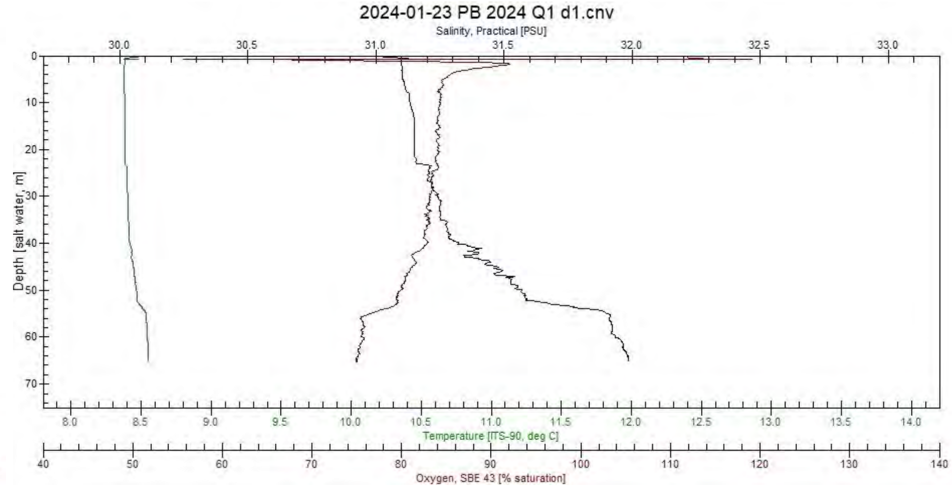


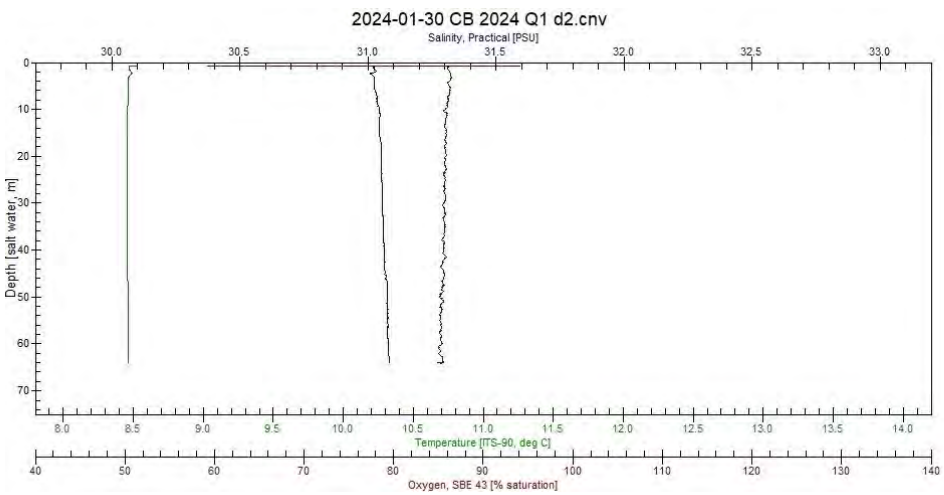


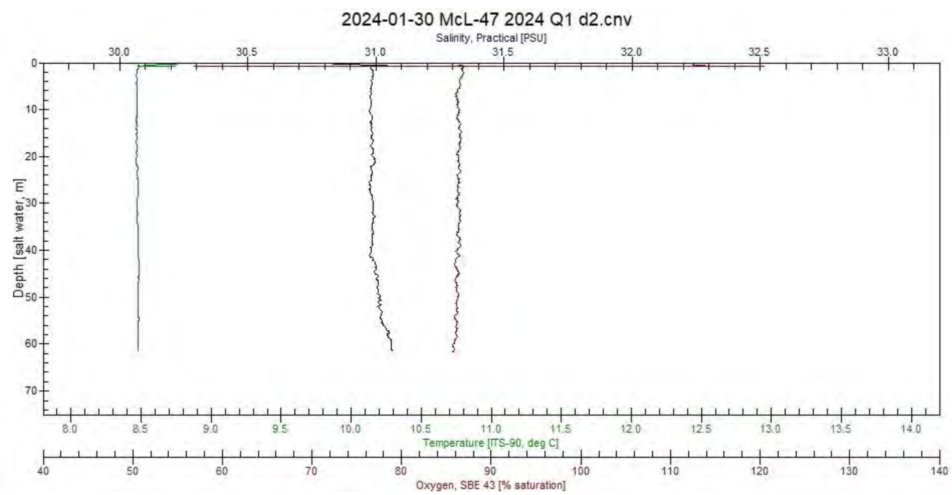


Appendix C17 Cont'd









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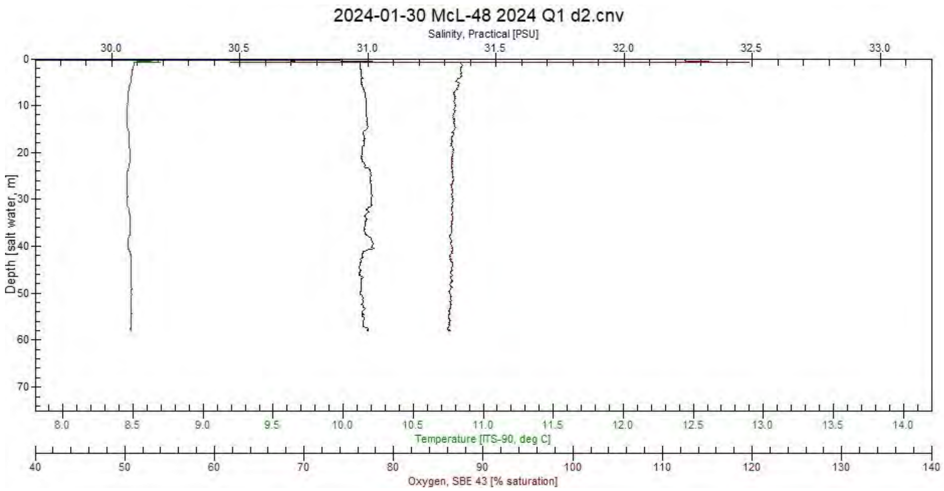

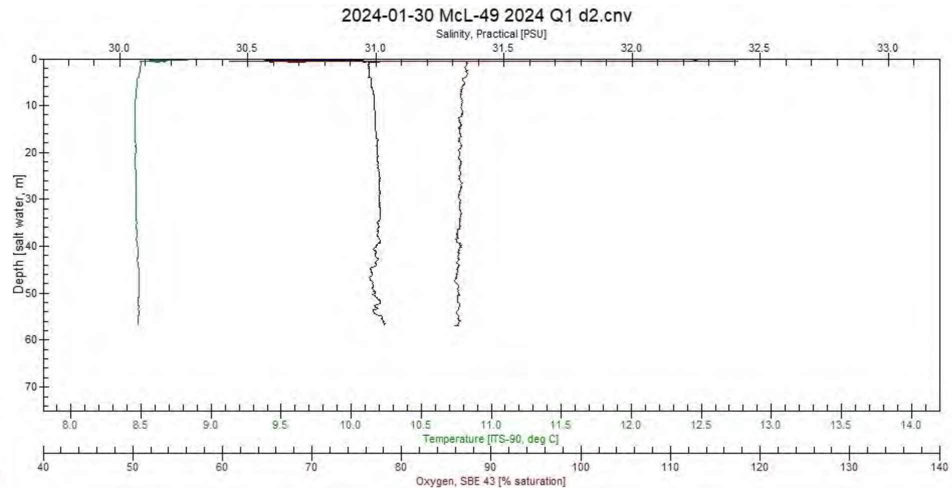

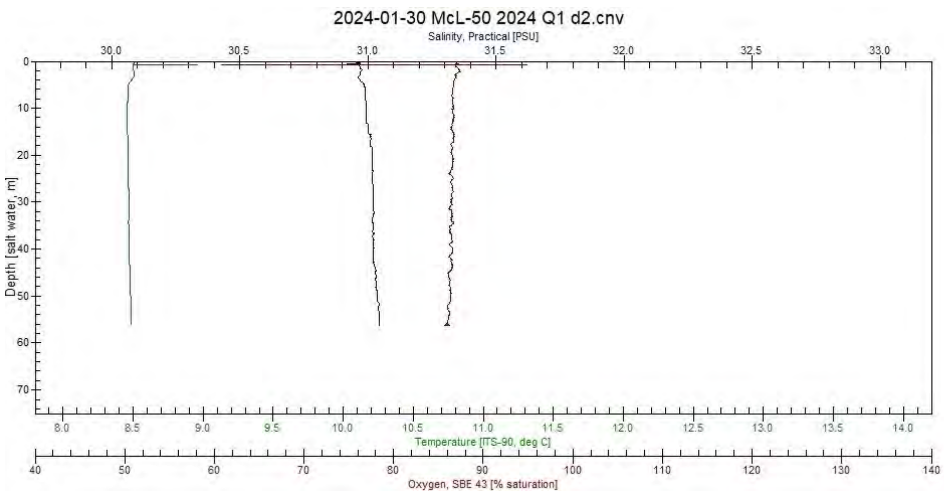

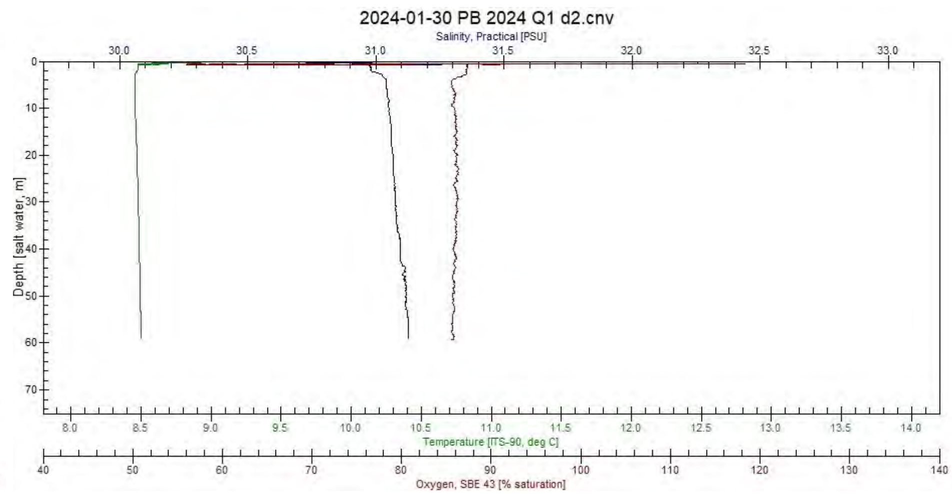

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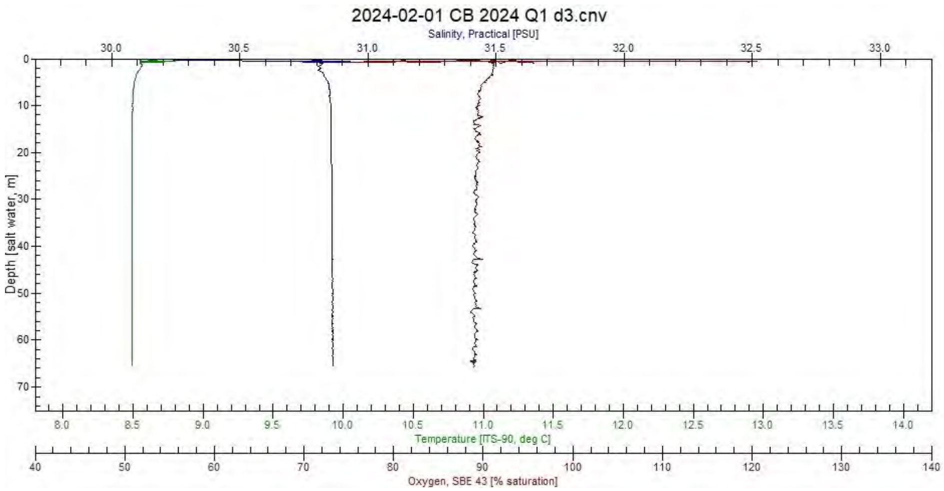

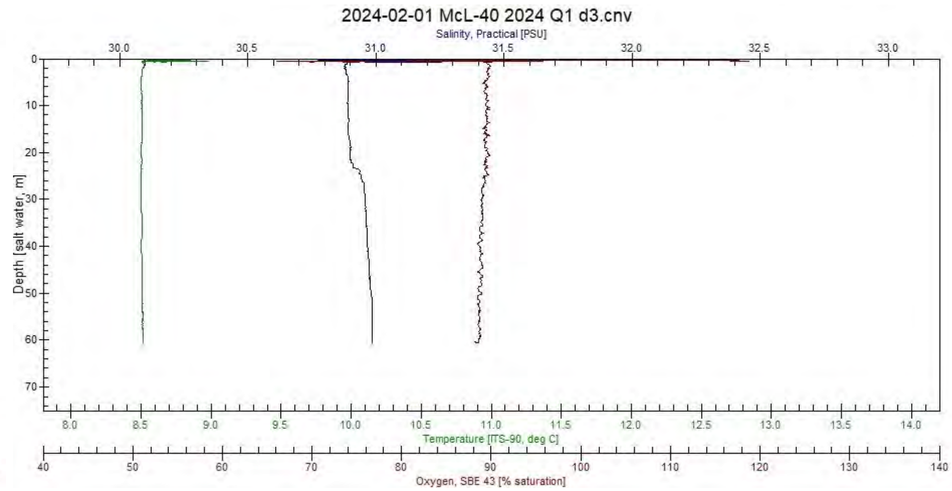

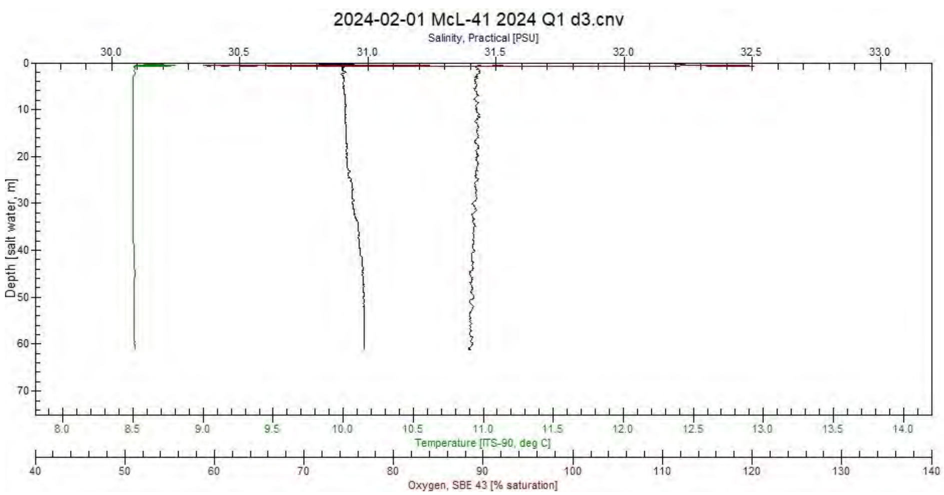

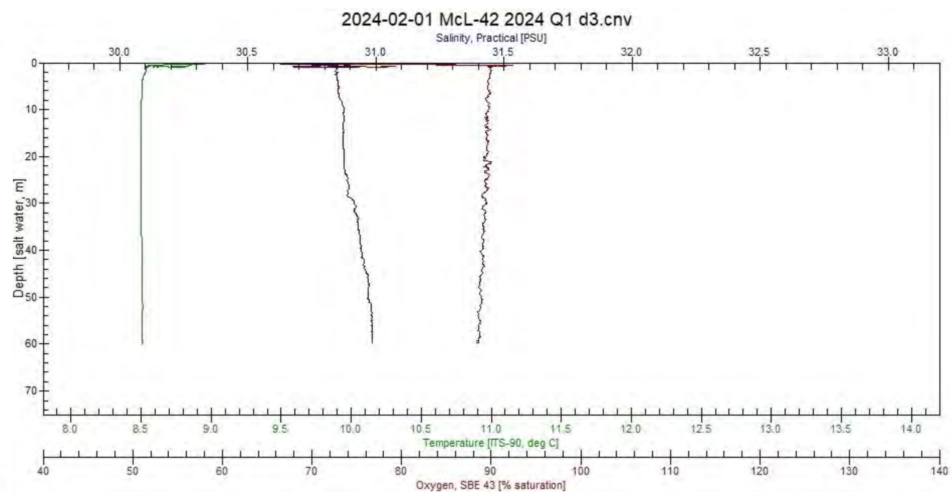

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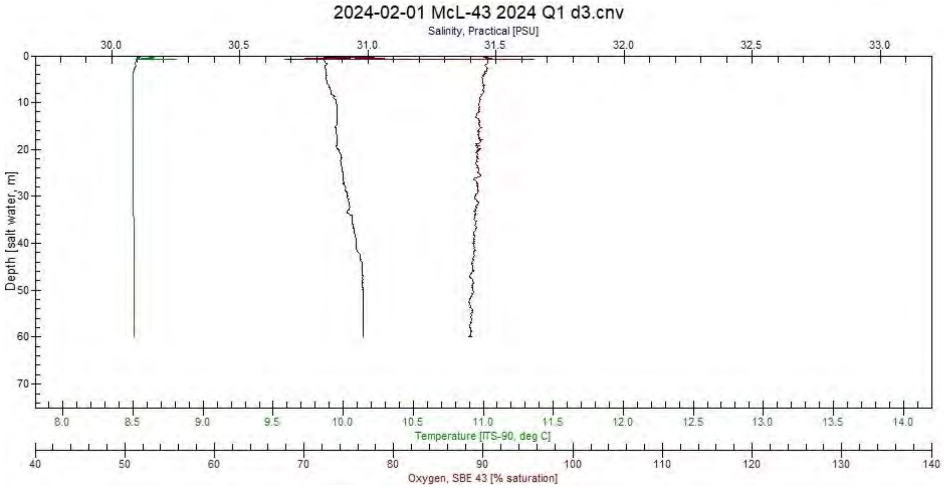

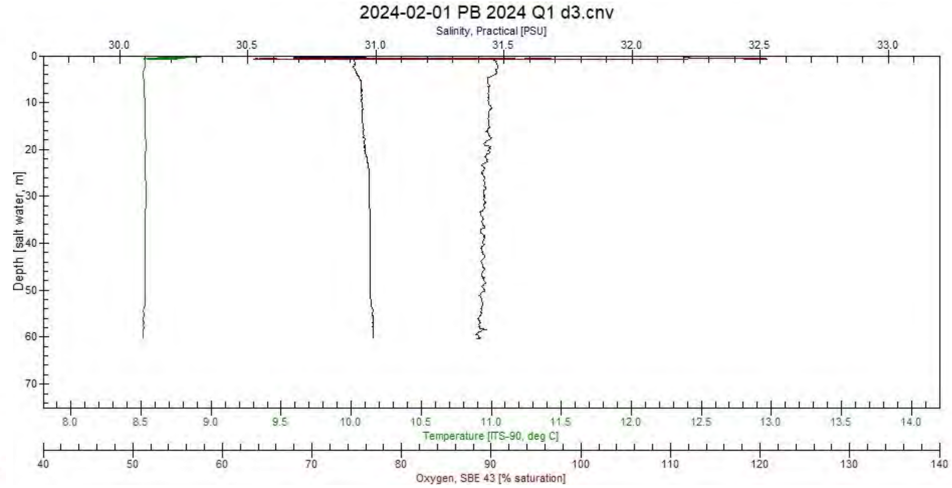

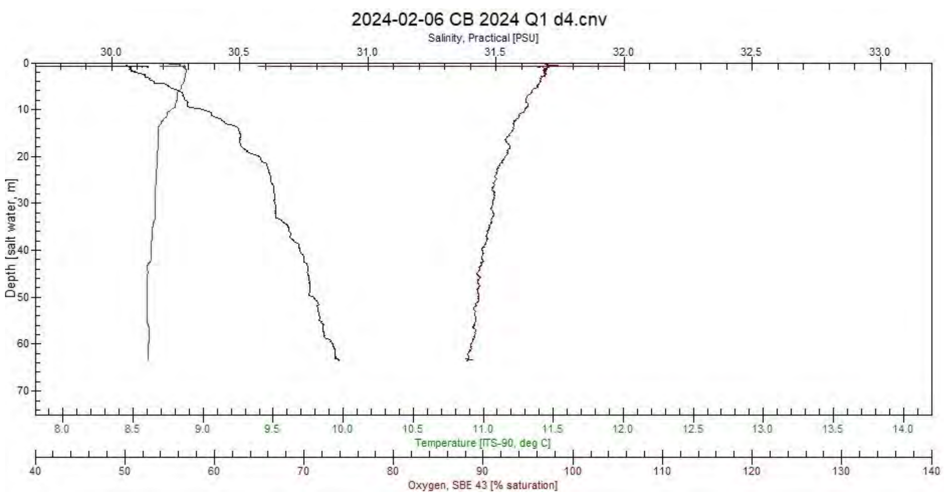

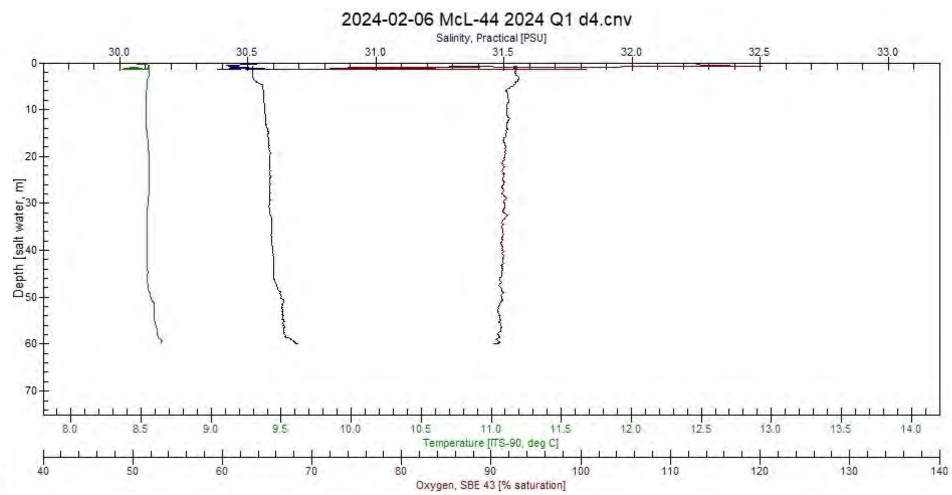

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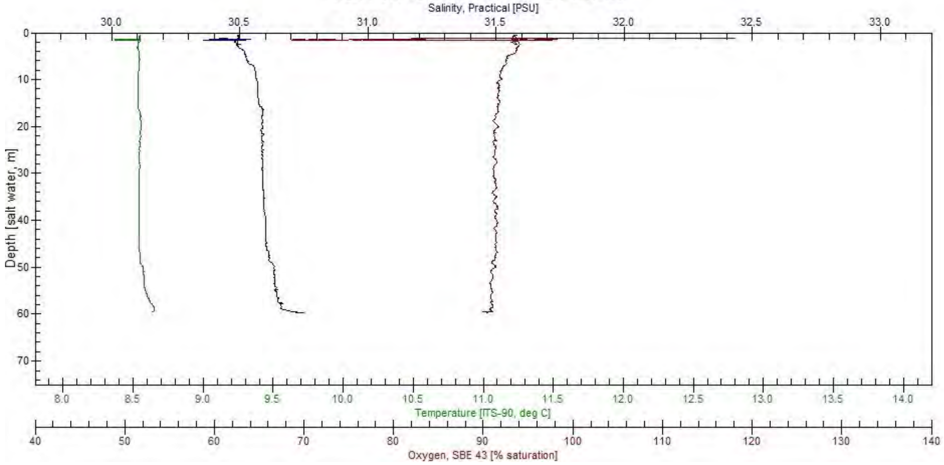

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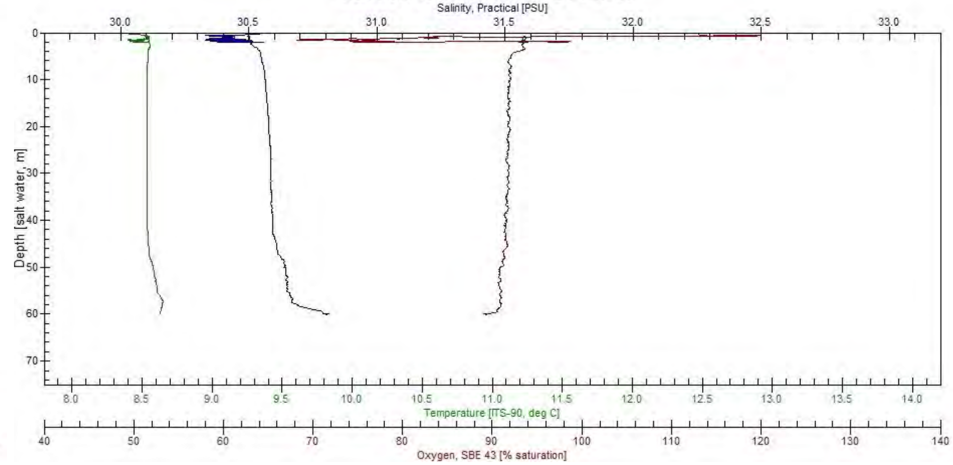

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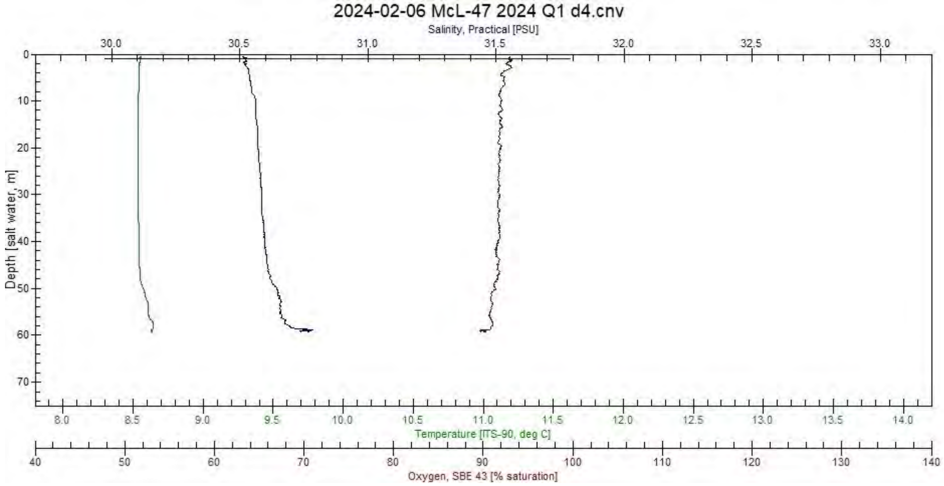

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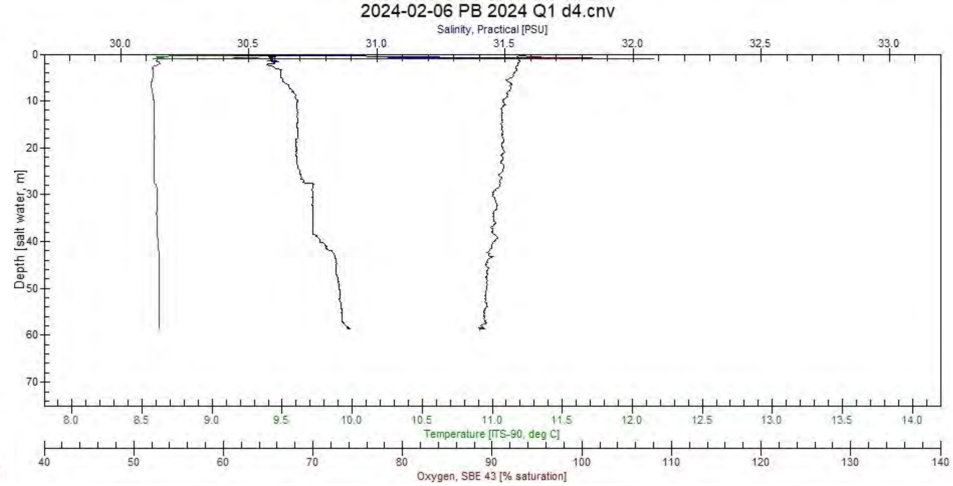

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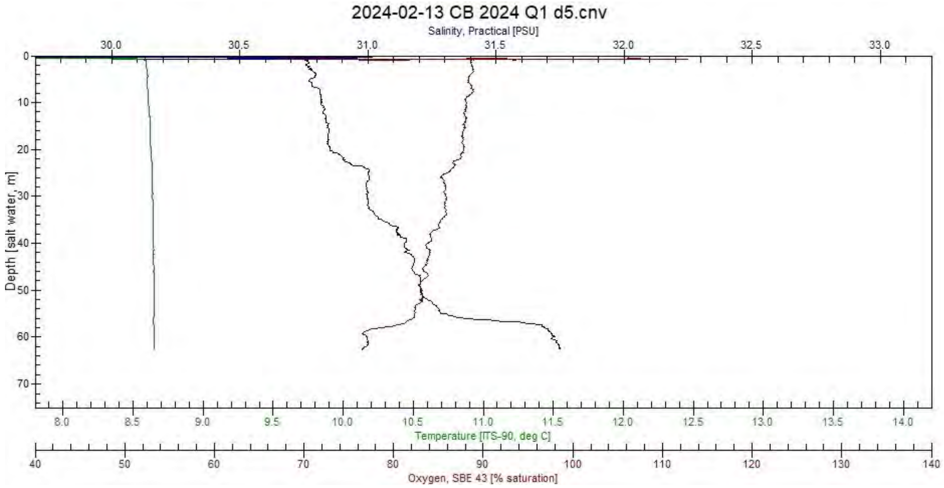

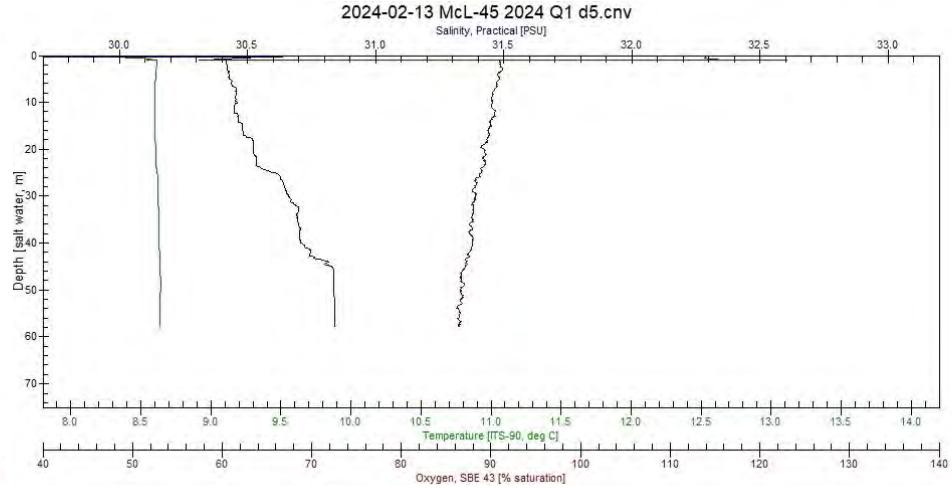

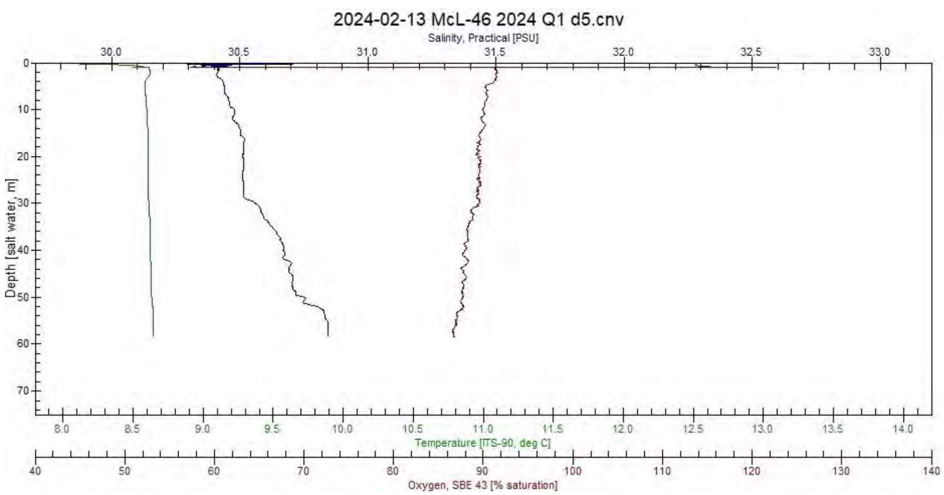

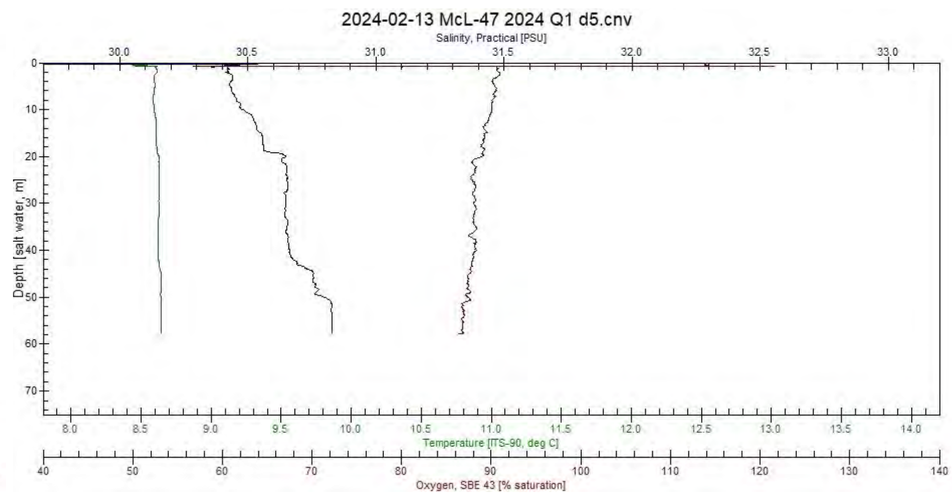

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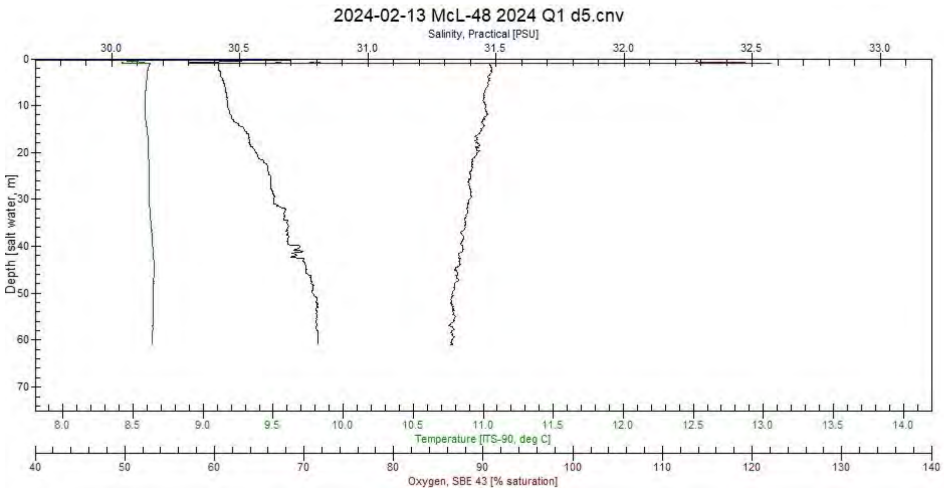

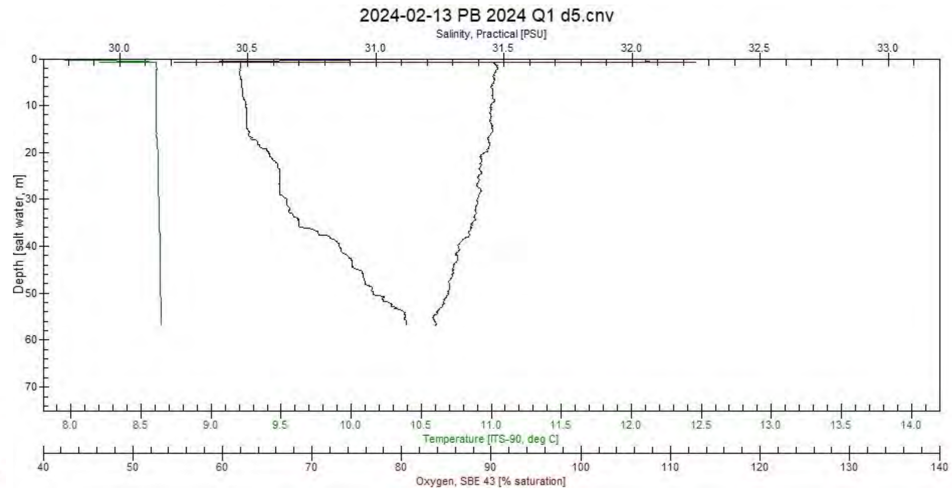

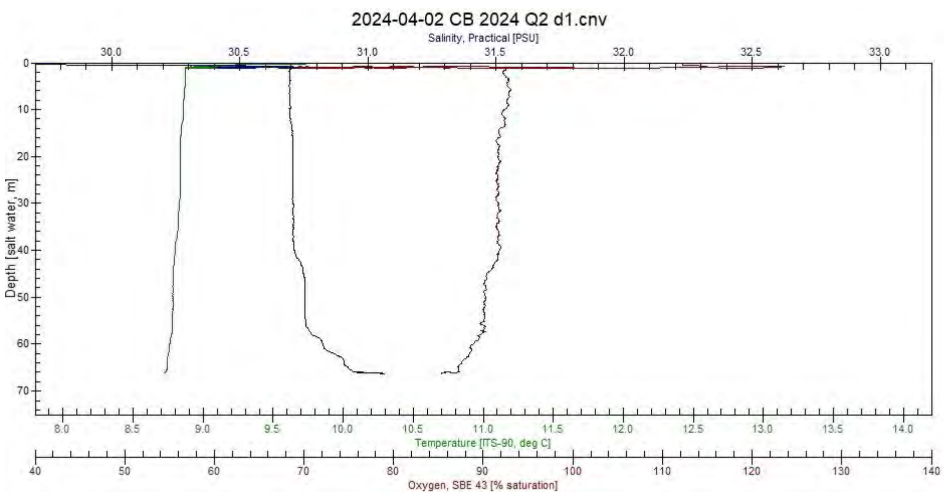

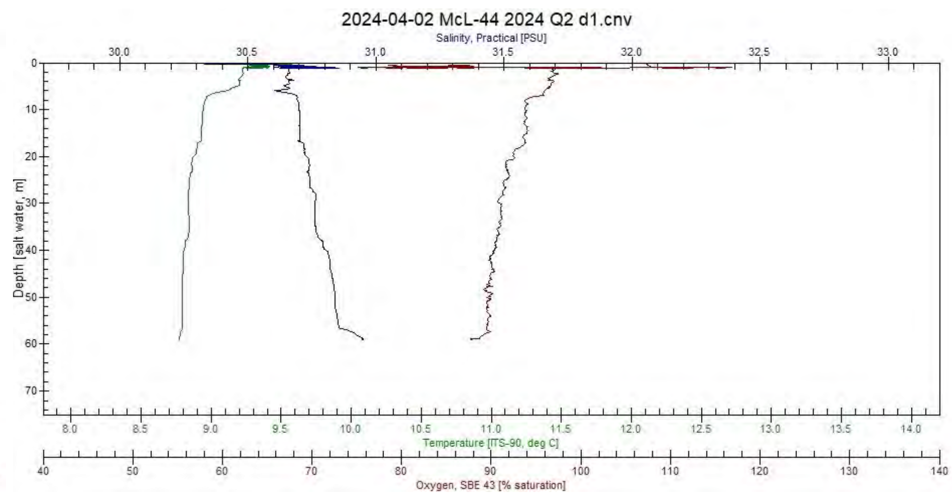

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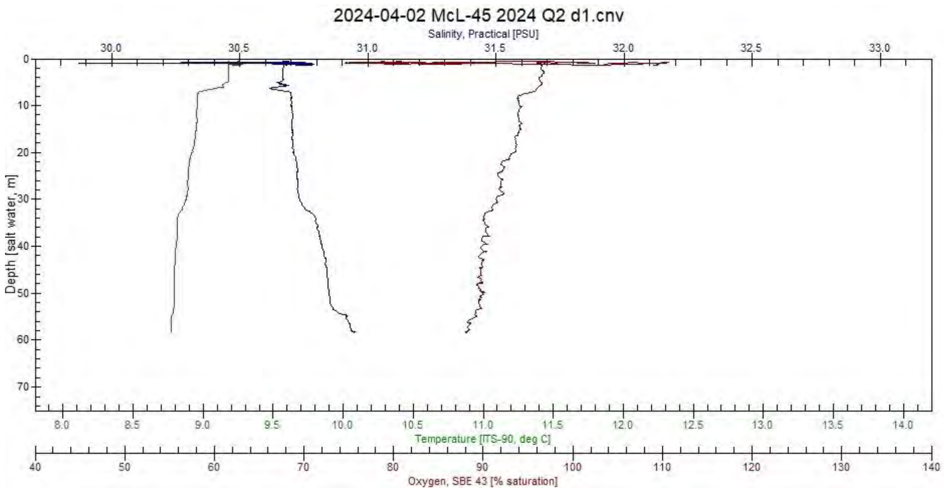

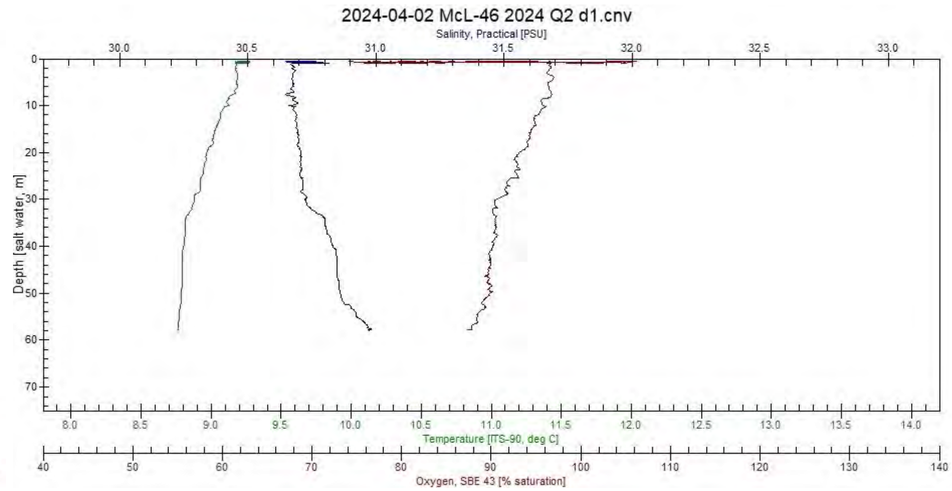

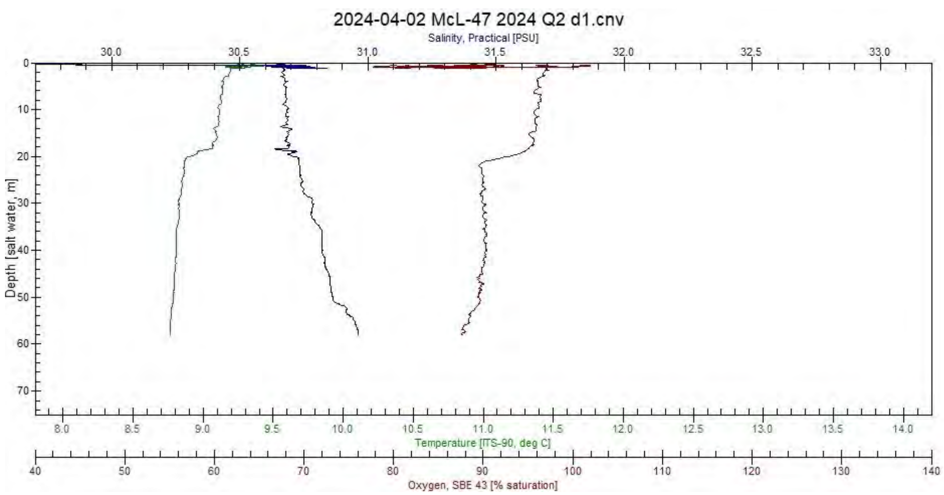

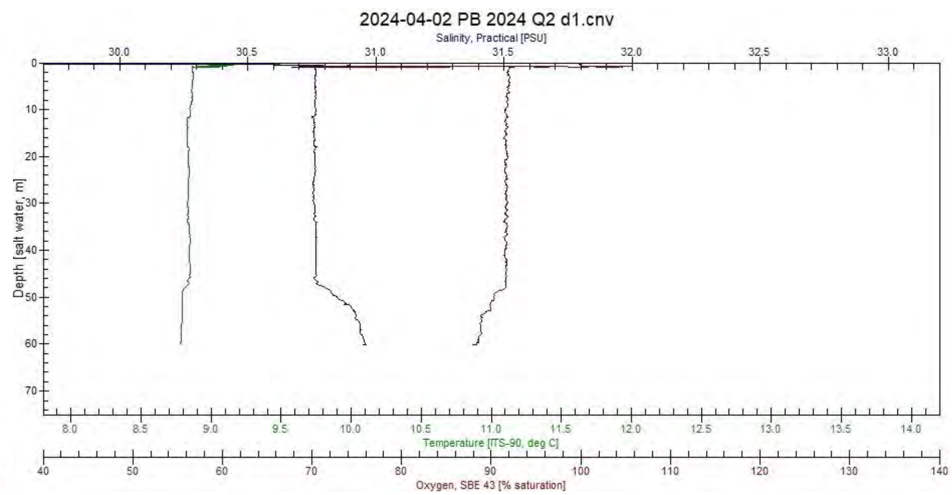

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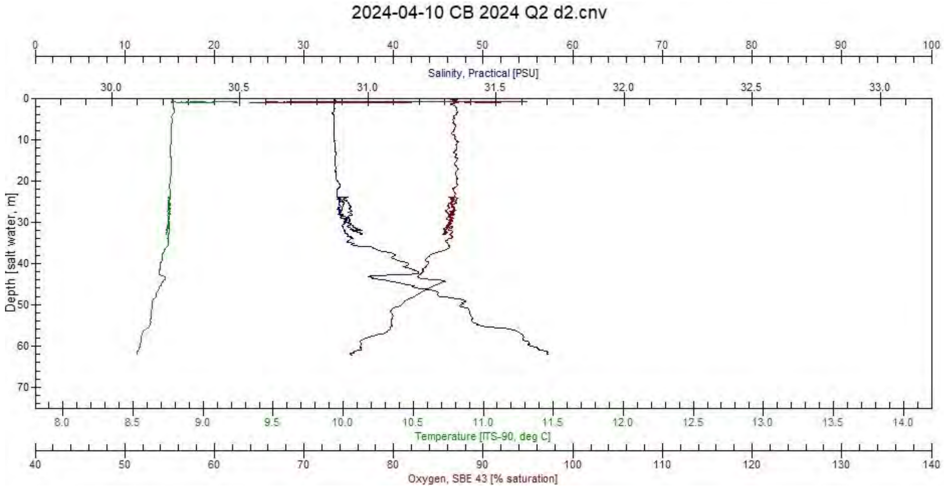

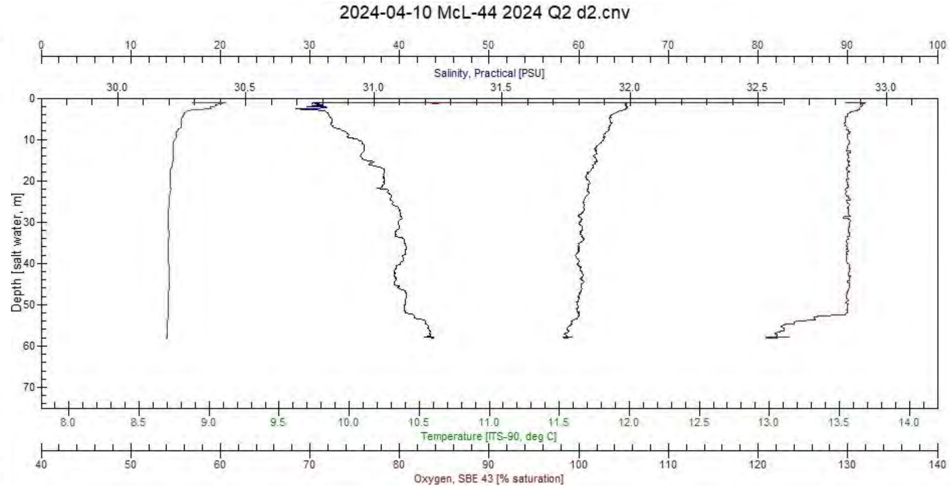

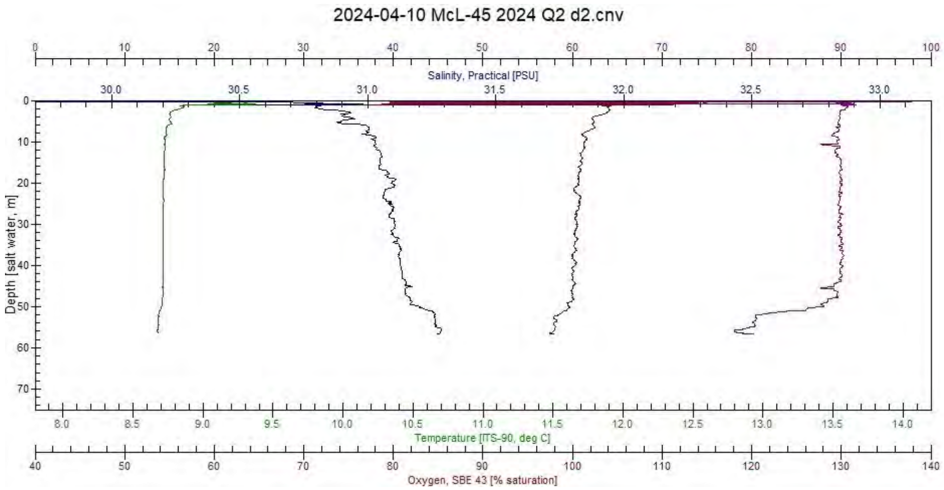

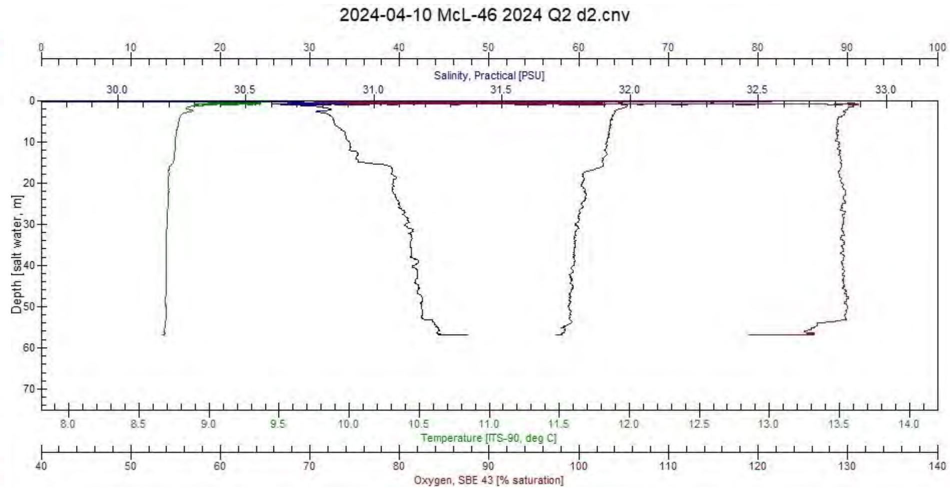

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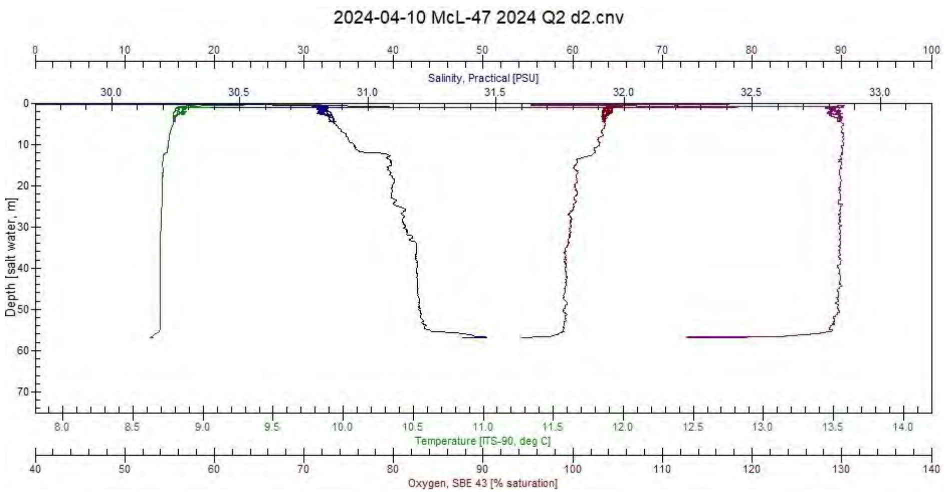

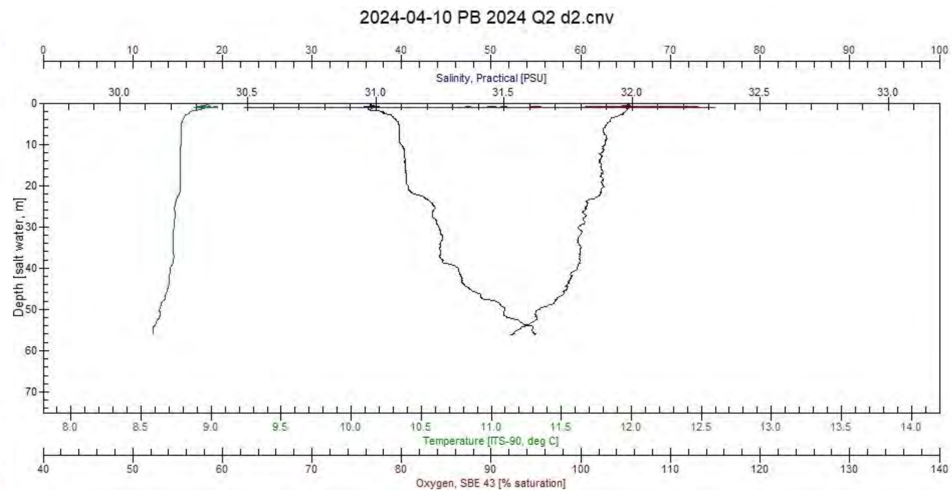

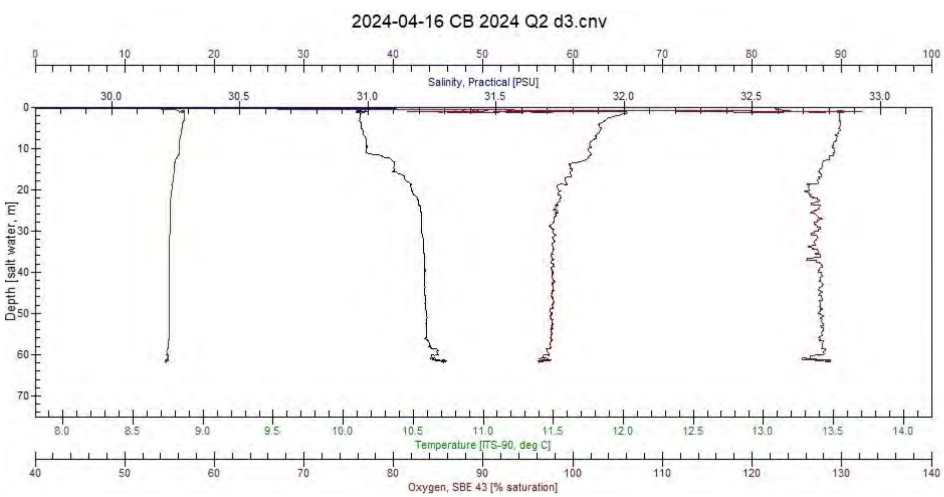

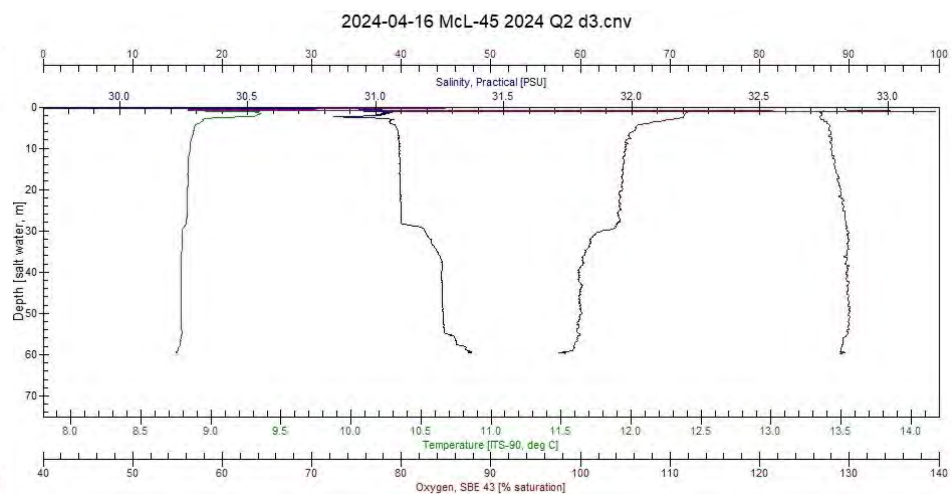

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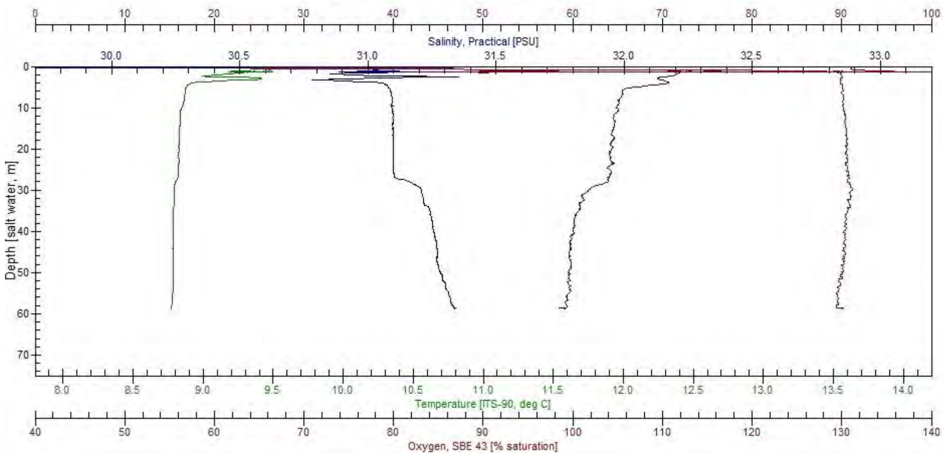

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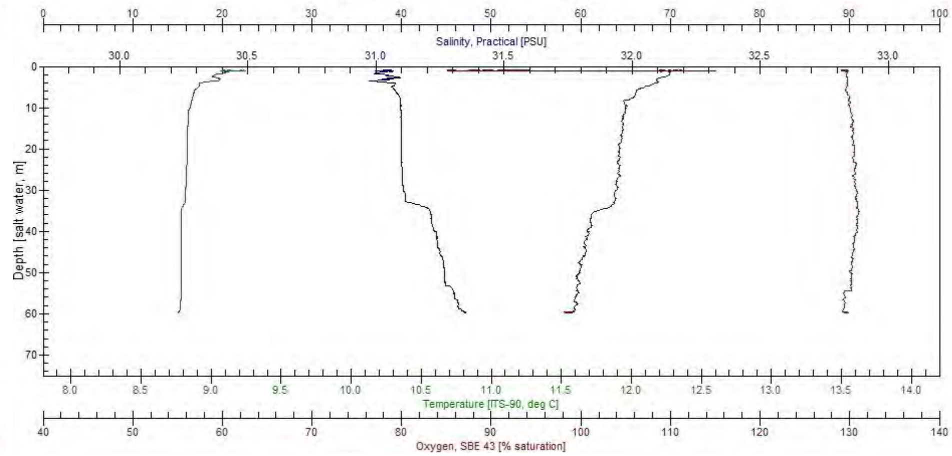

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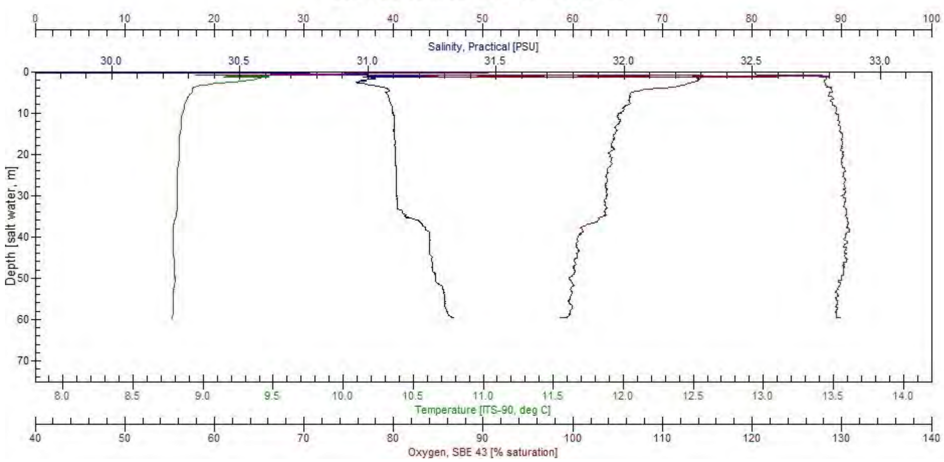

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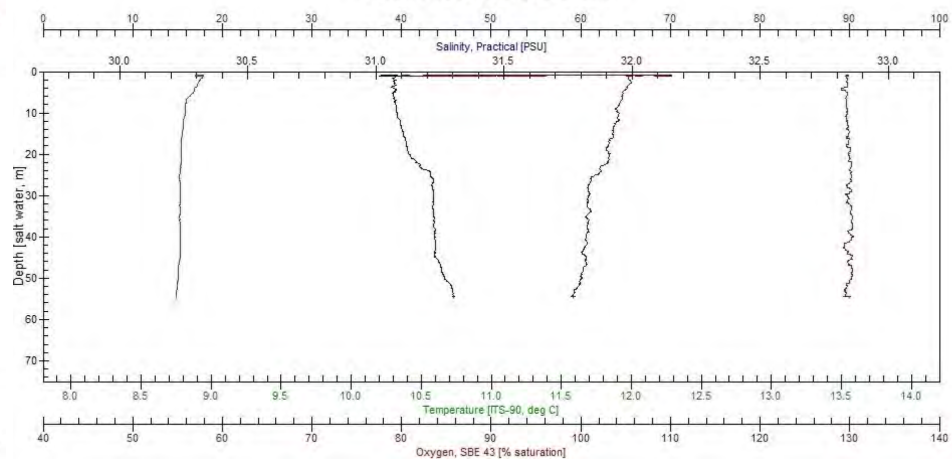

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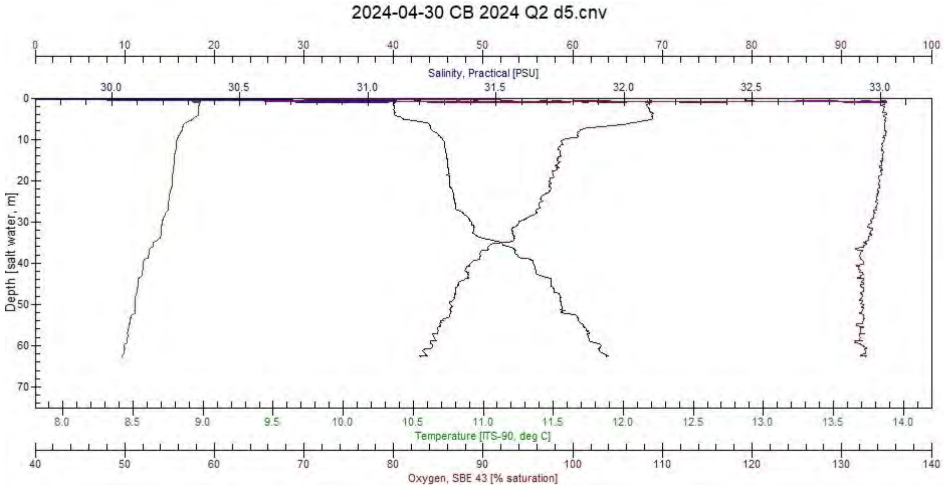

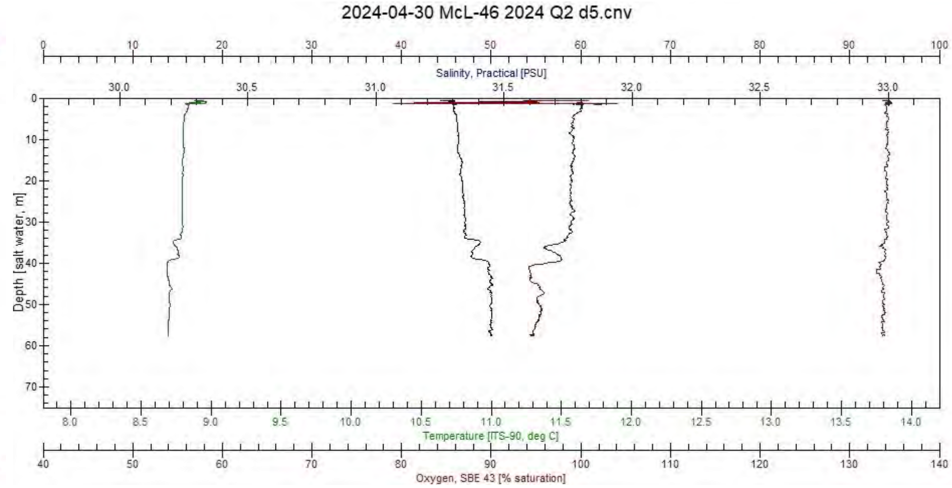

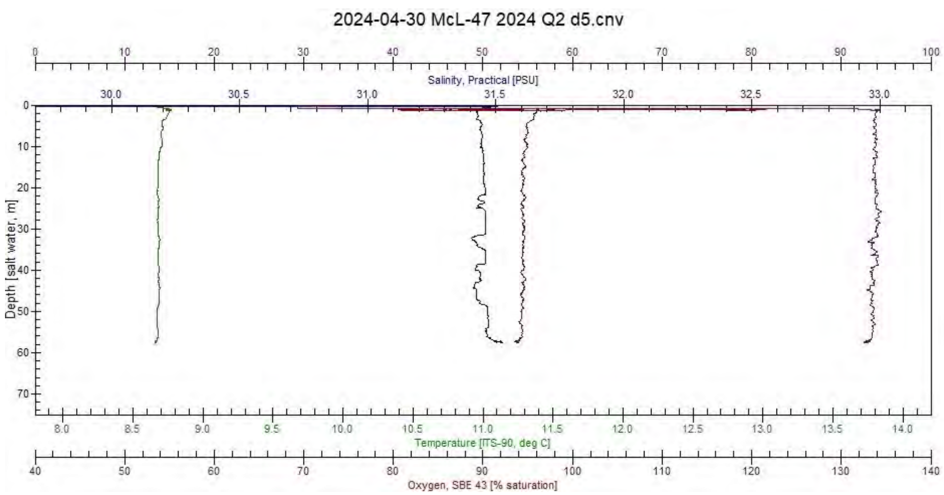

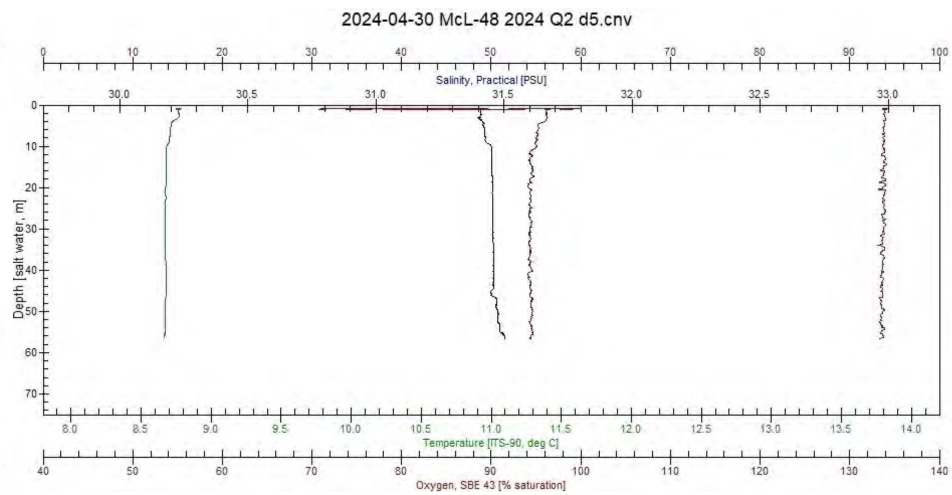

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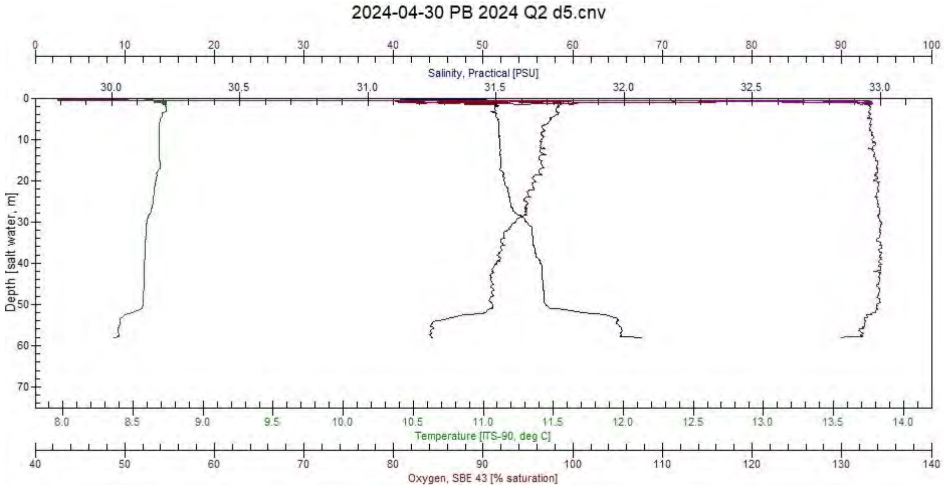

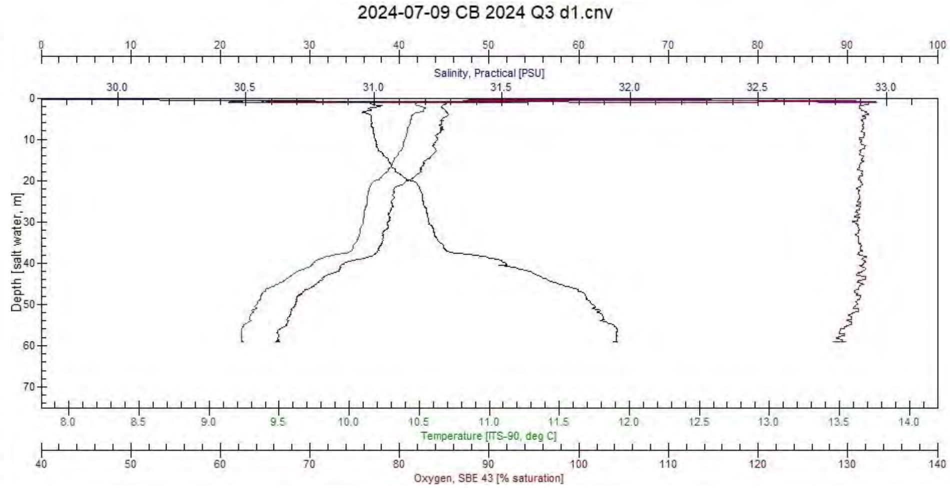

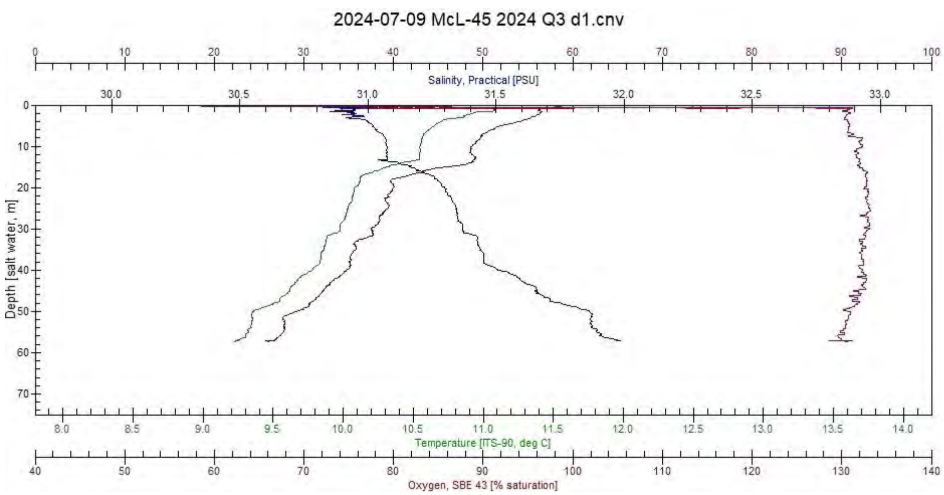

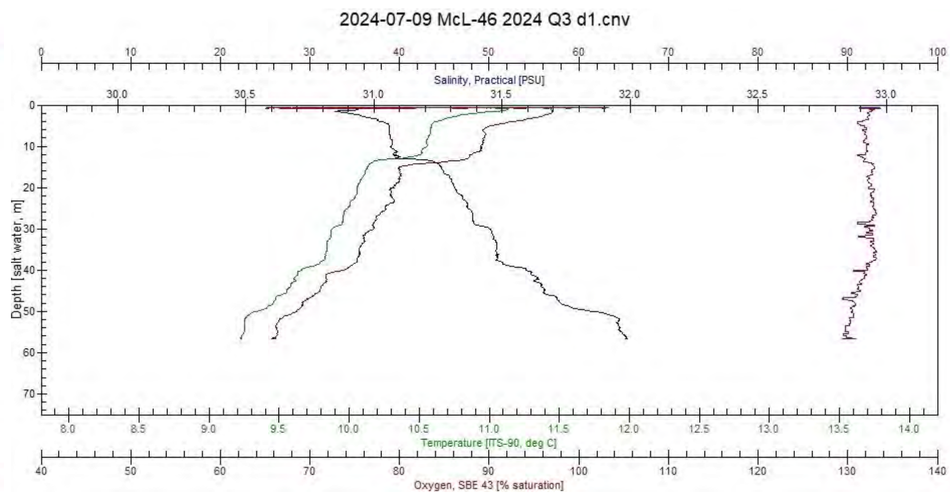

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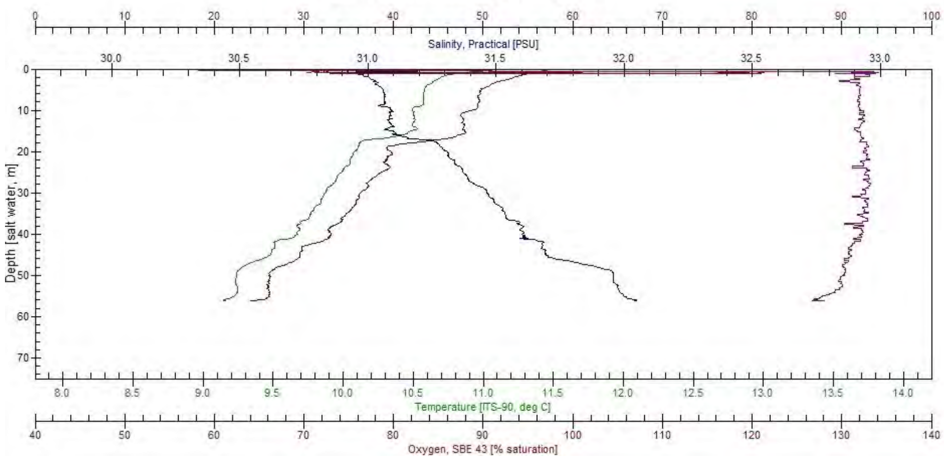

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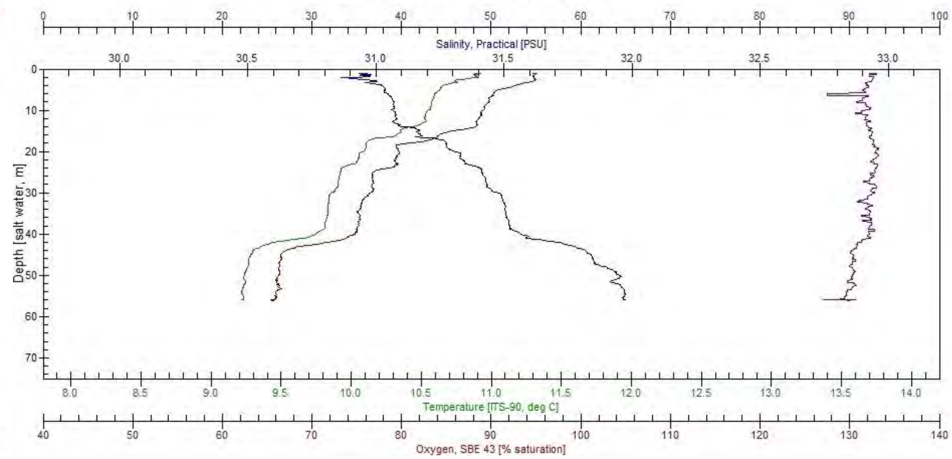

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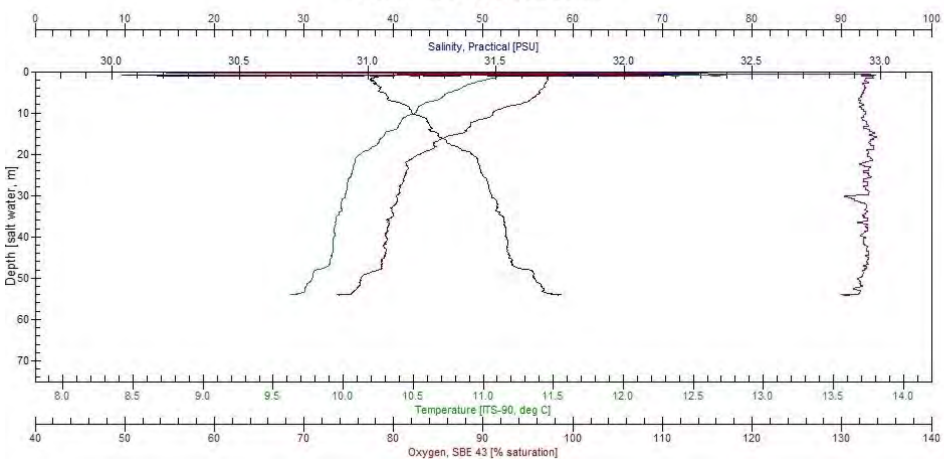

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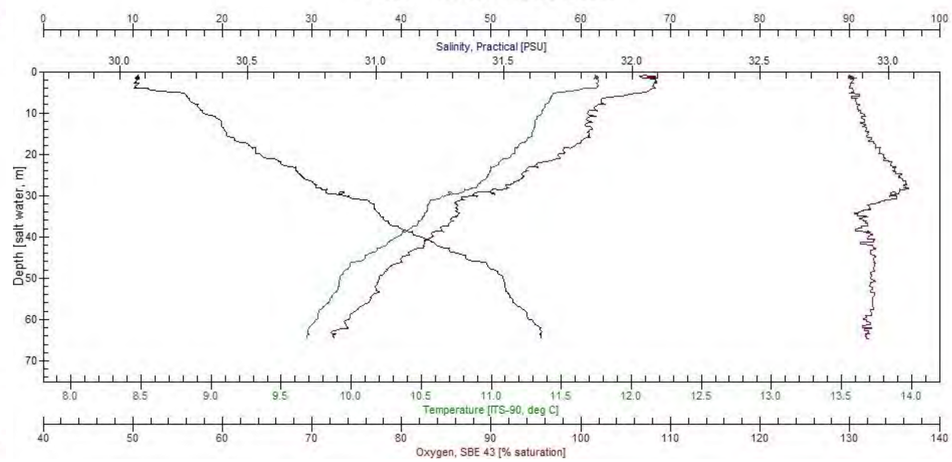

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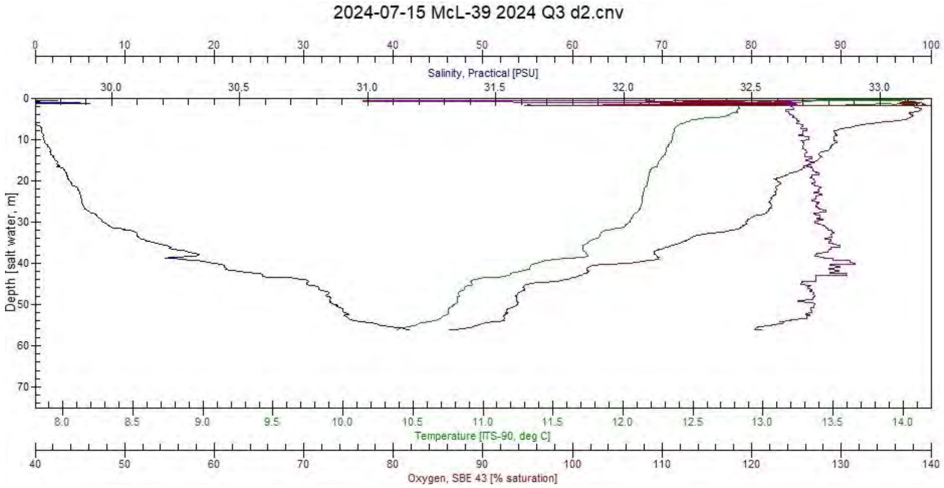

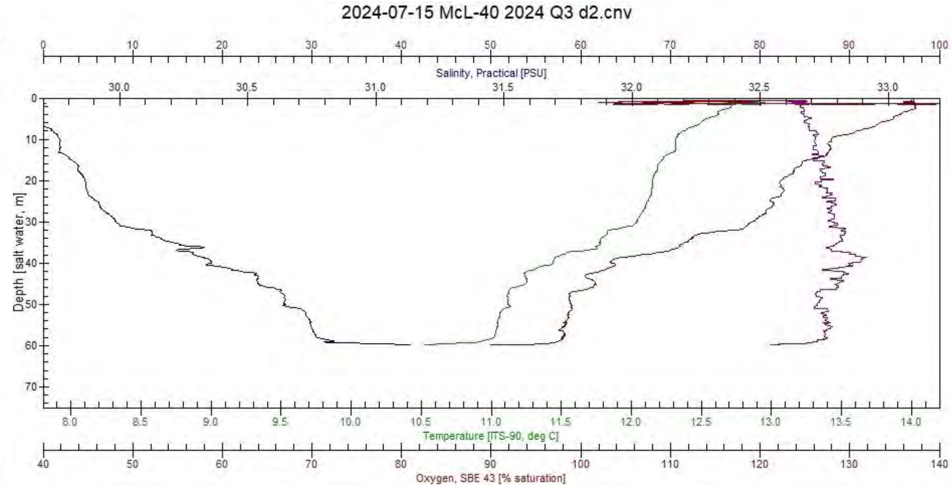

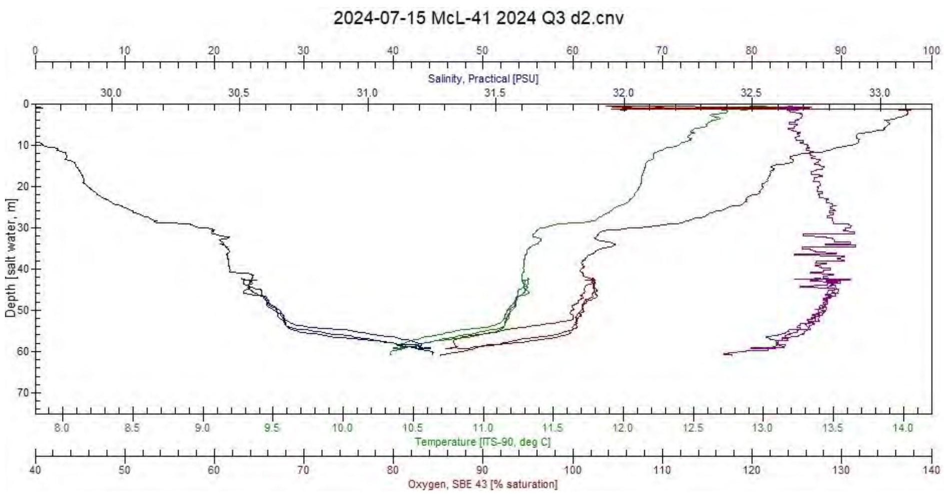

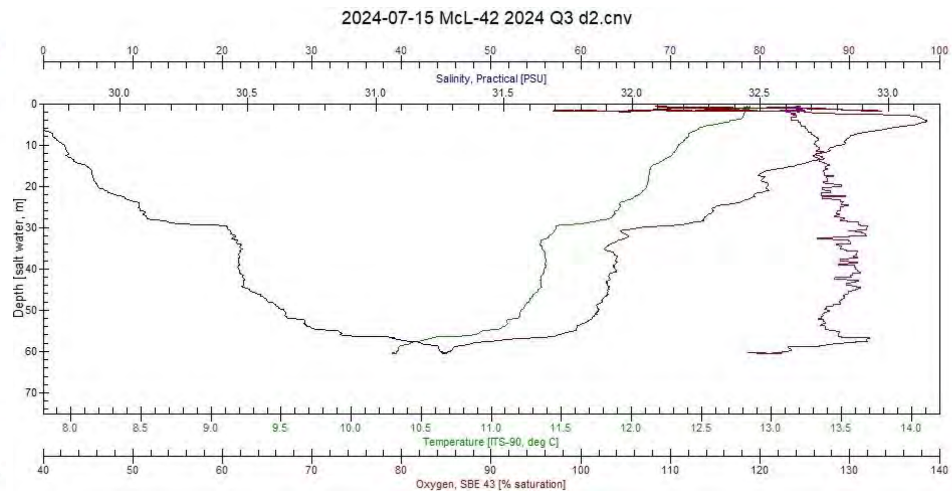

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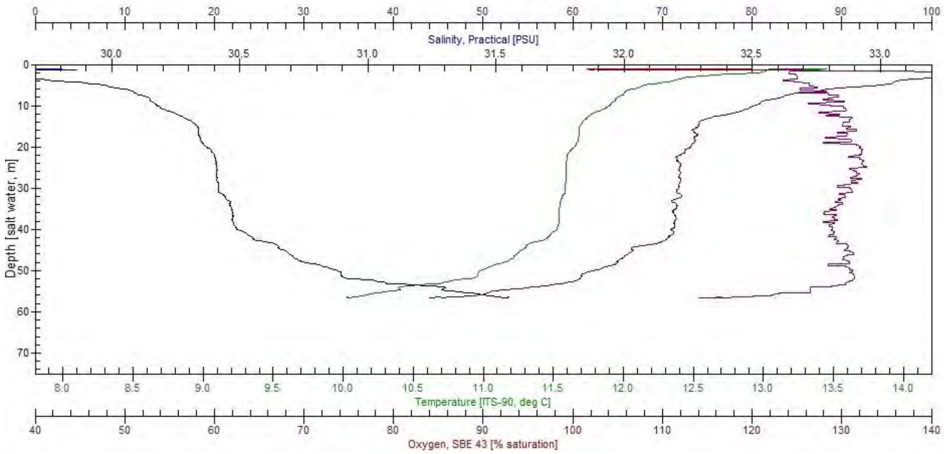

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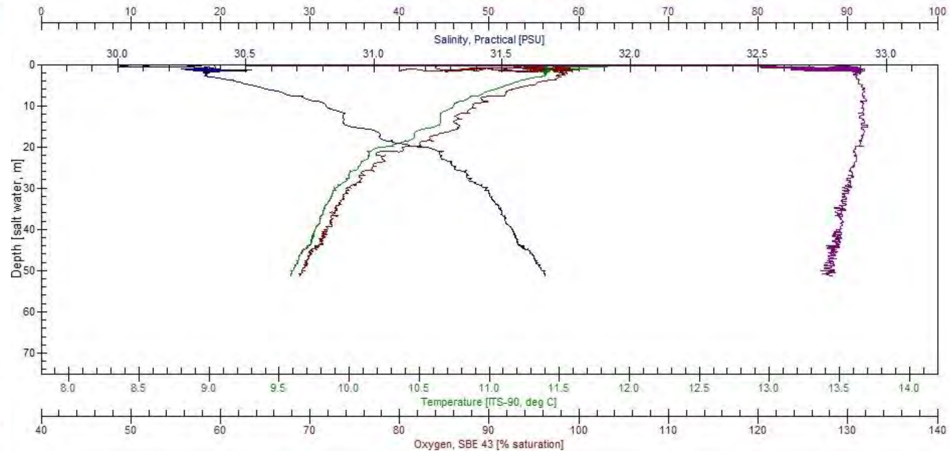

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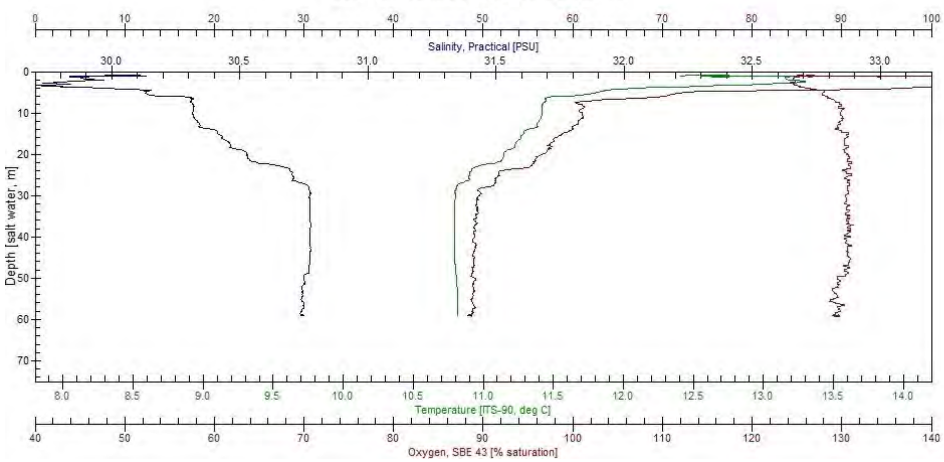

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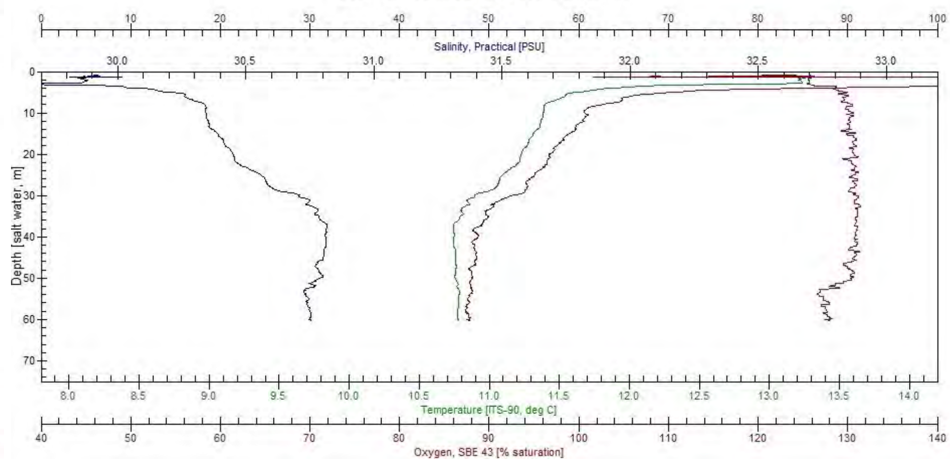

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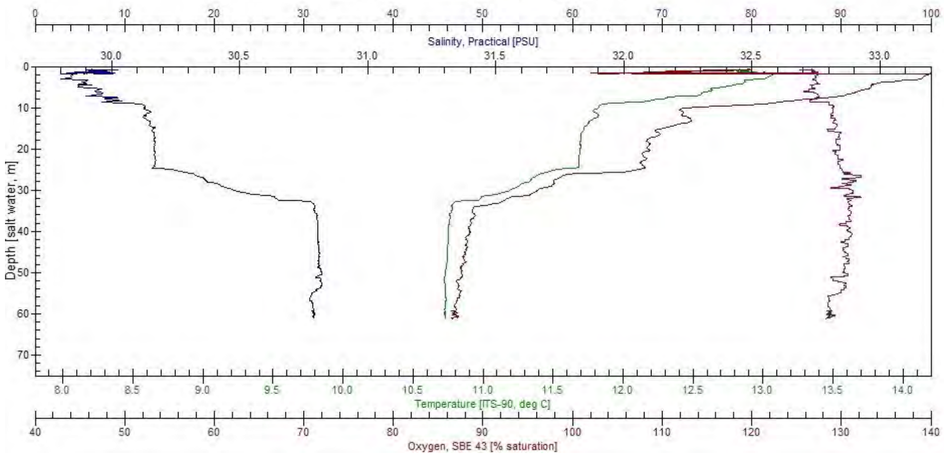

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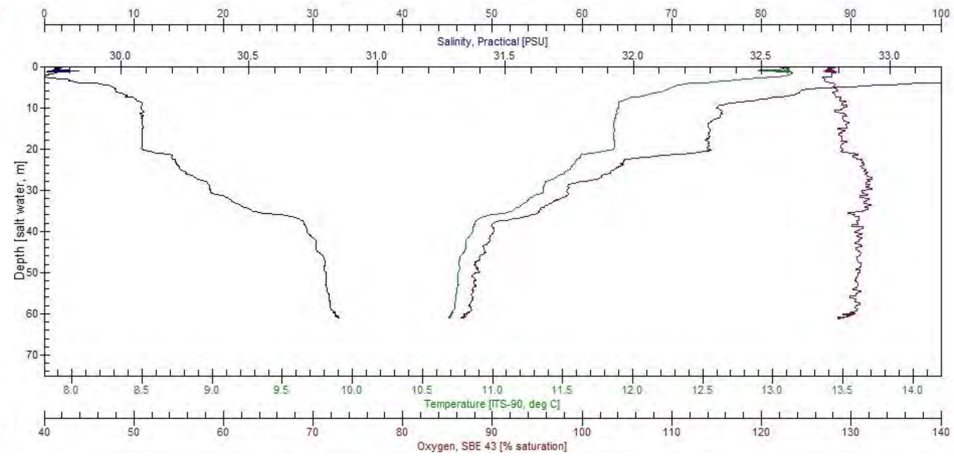

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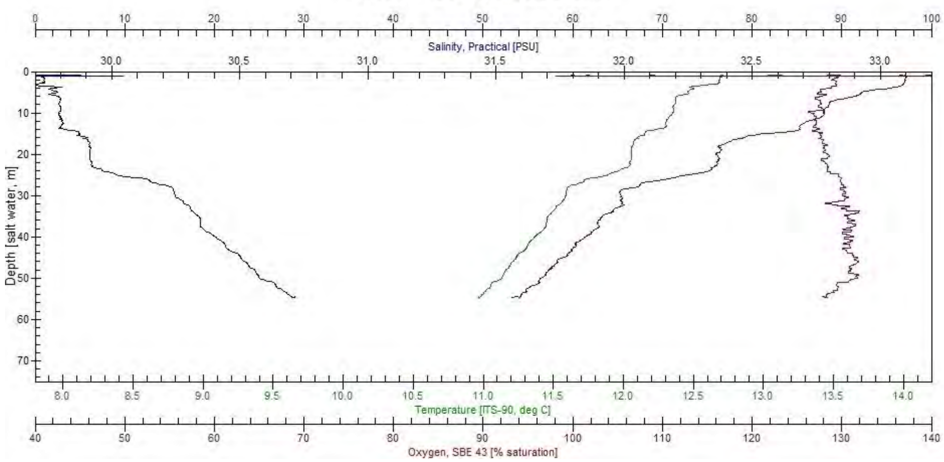

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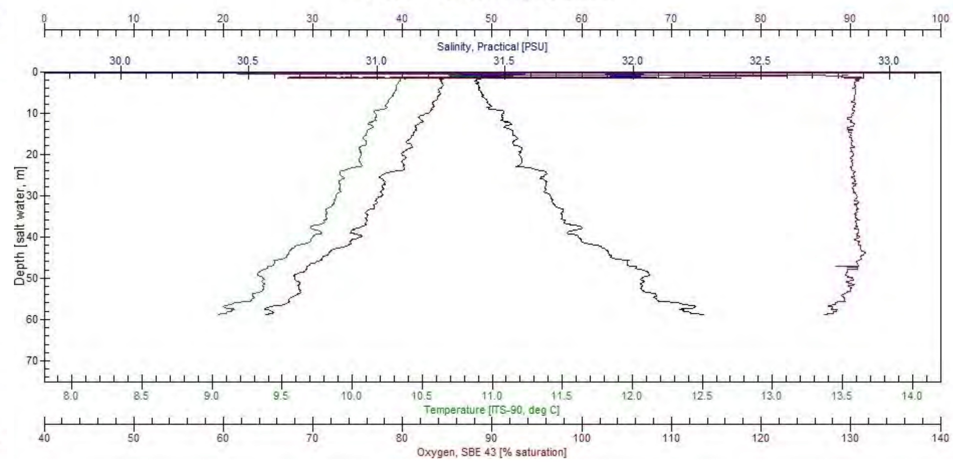

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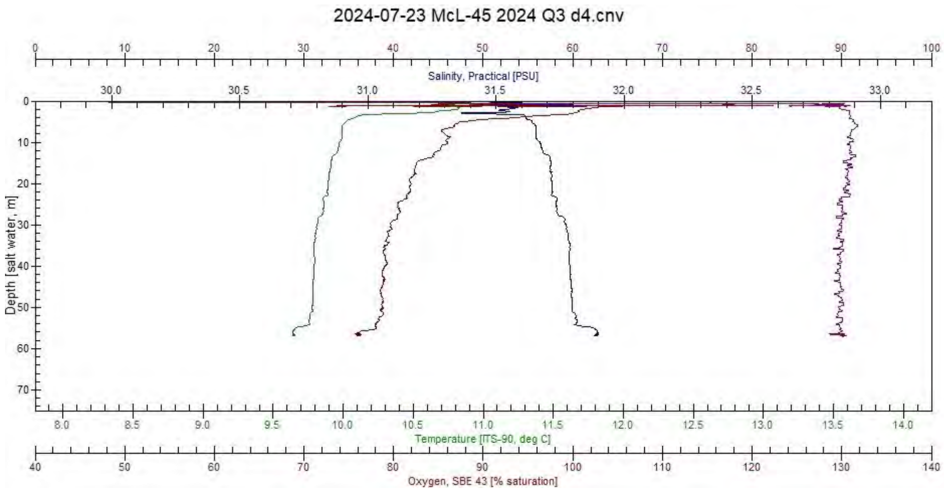

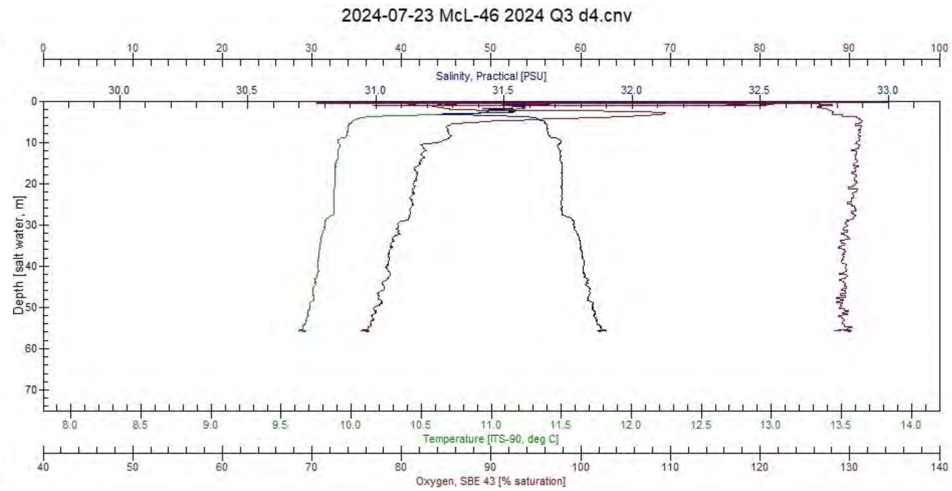

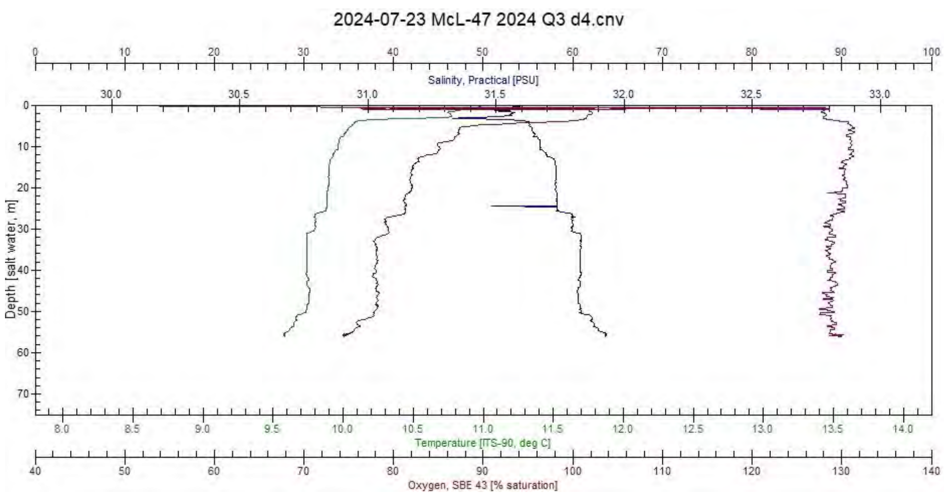

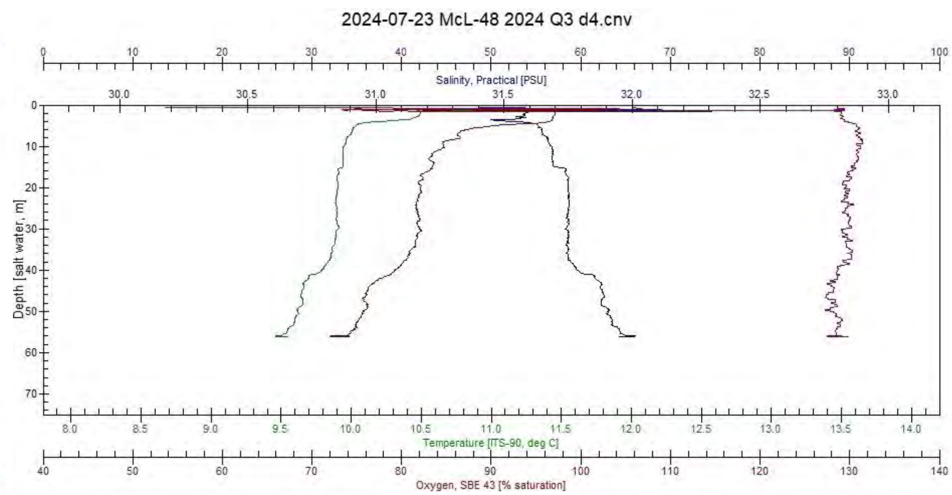

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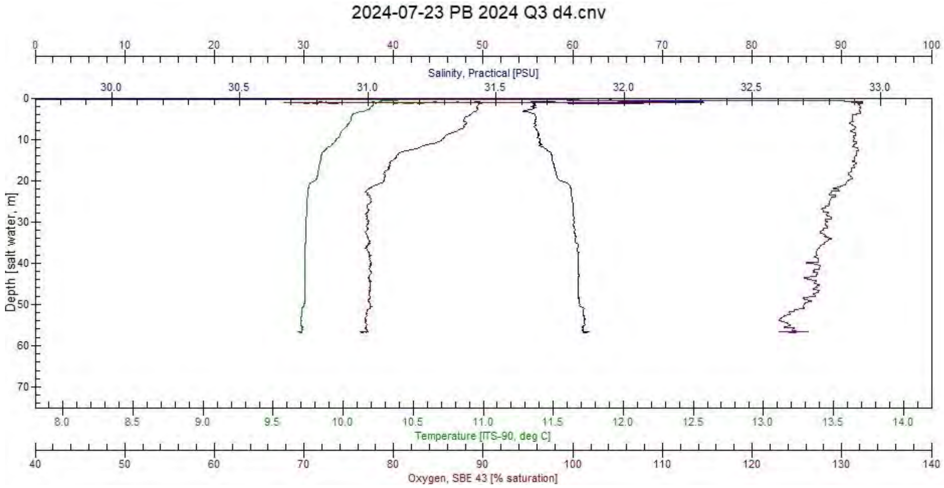

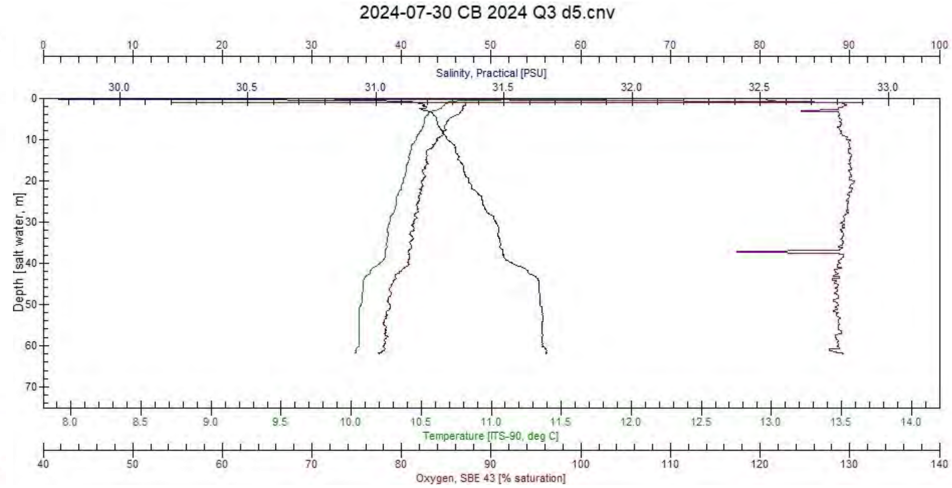

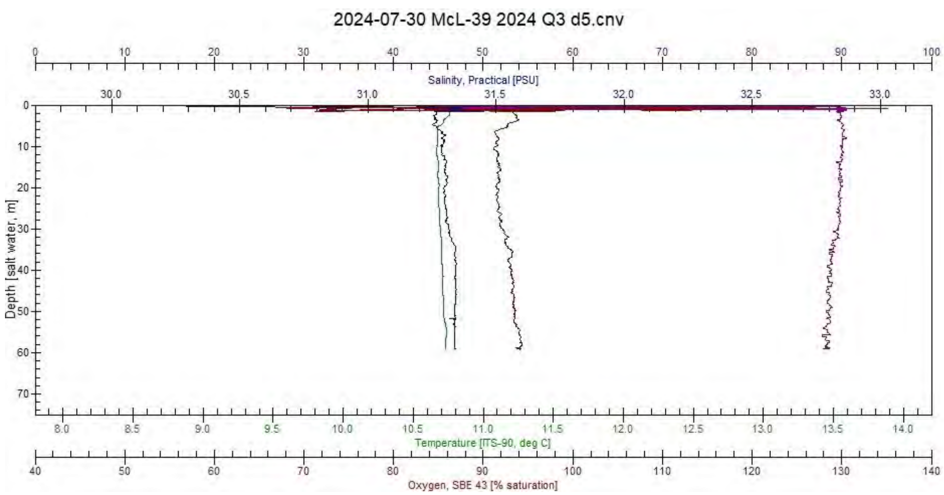

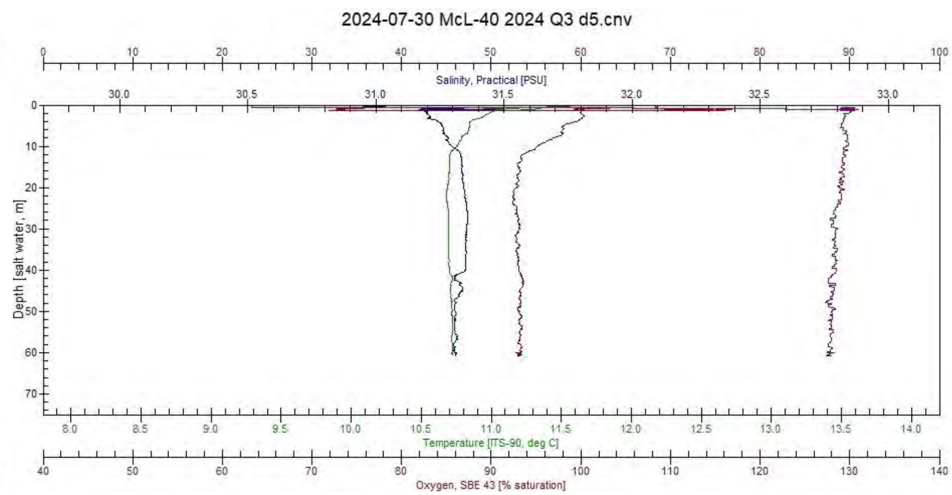

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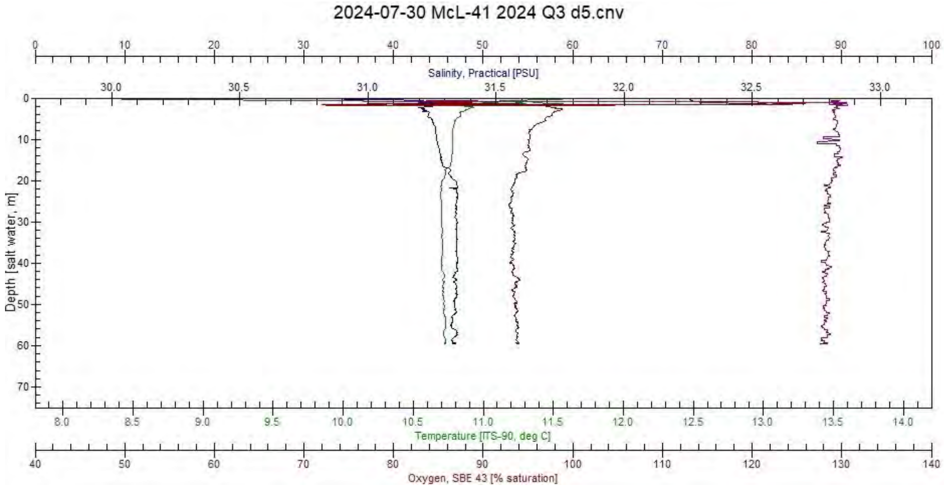

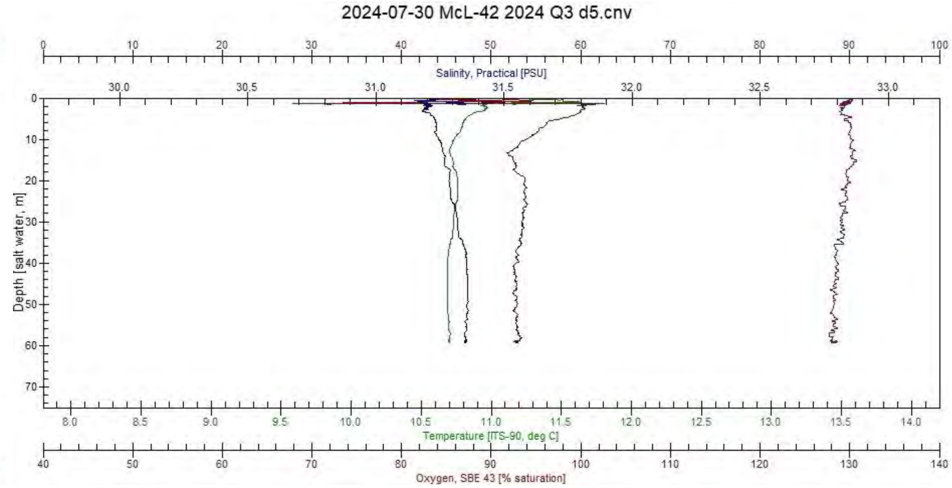

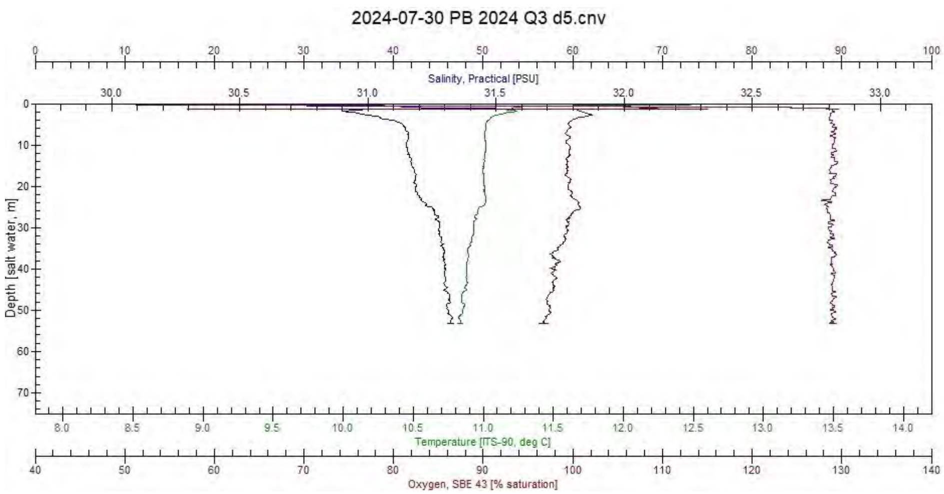

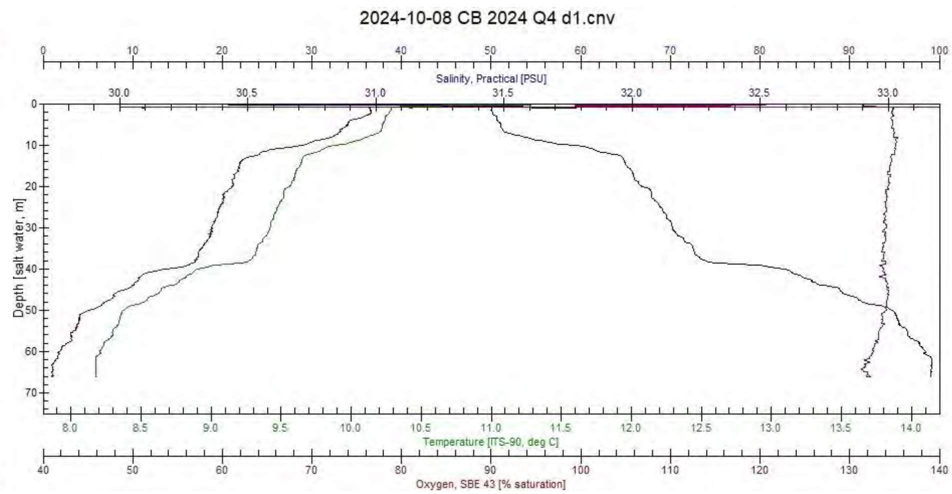

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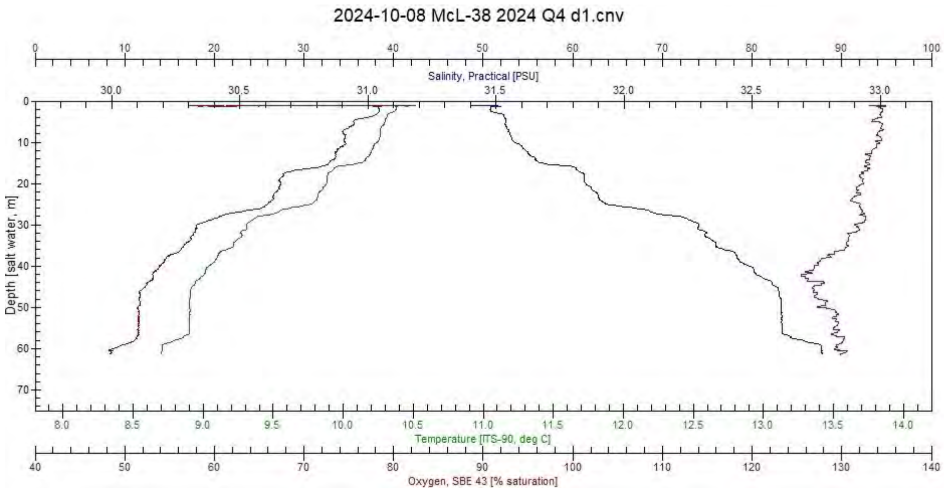

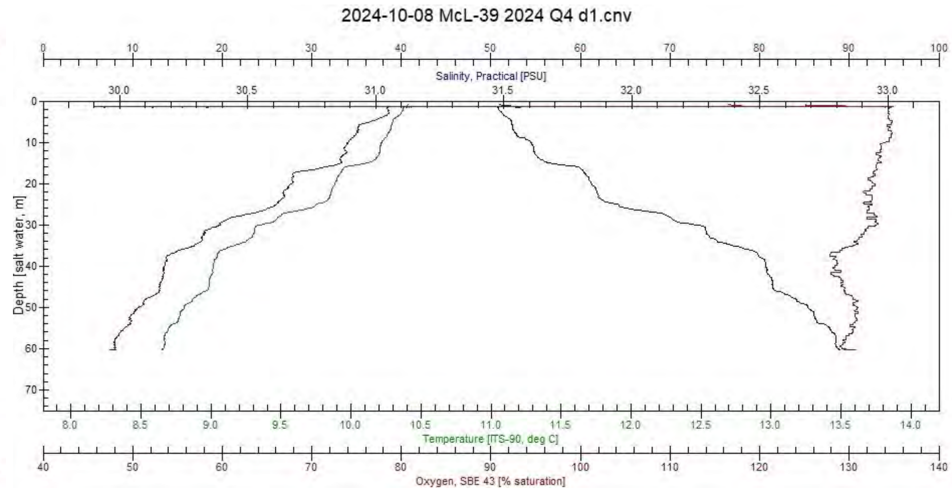

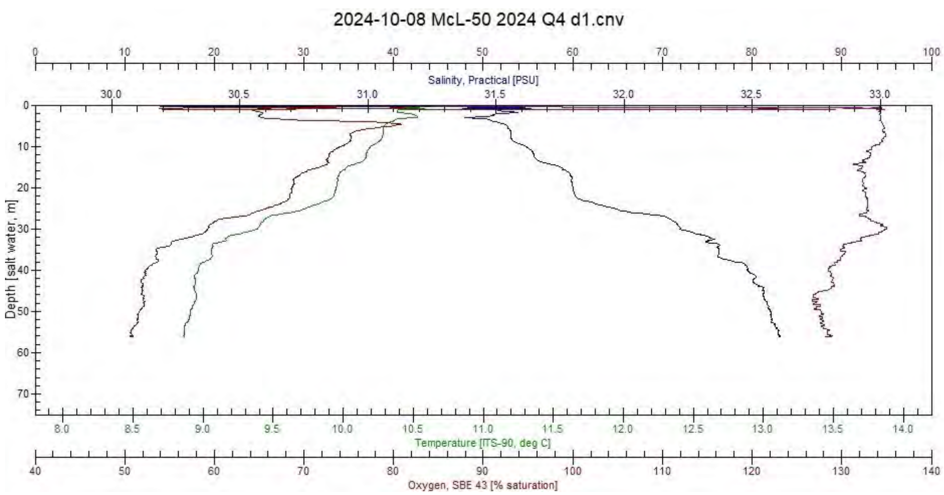

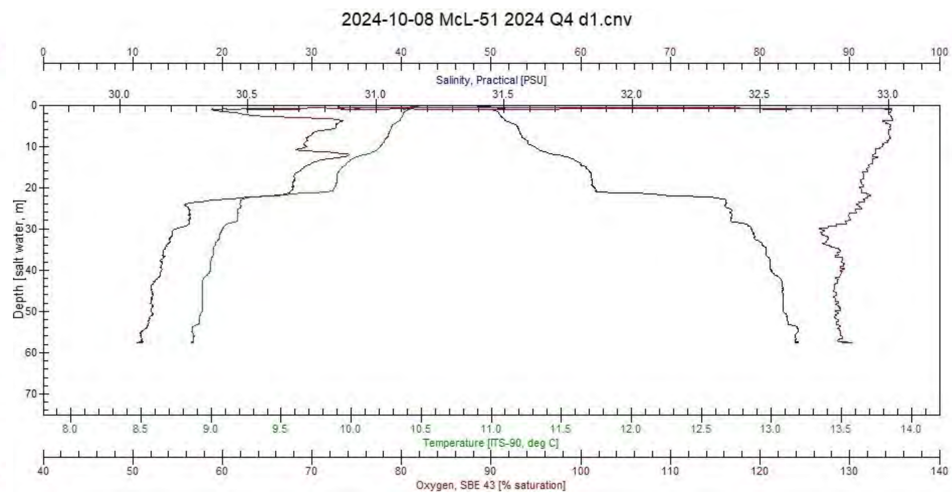

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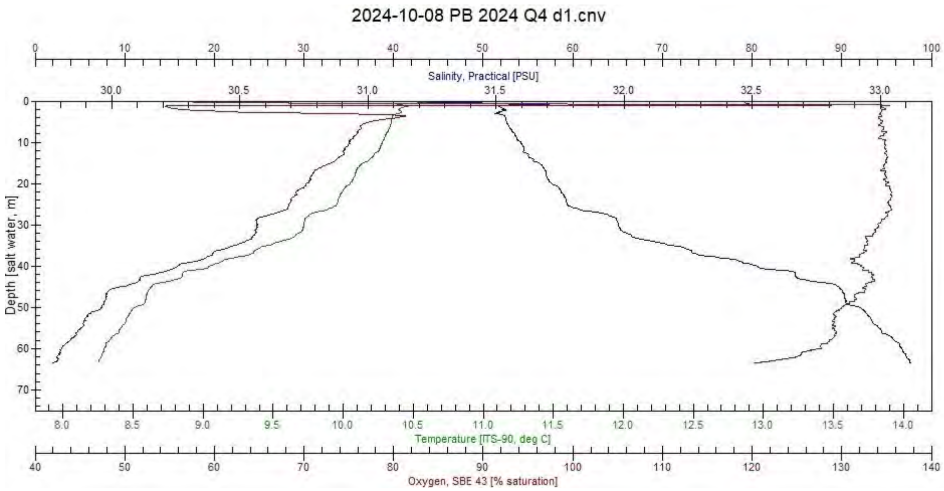

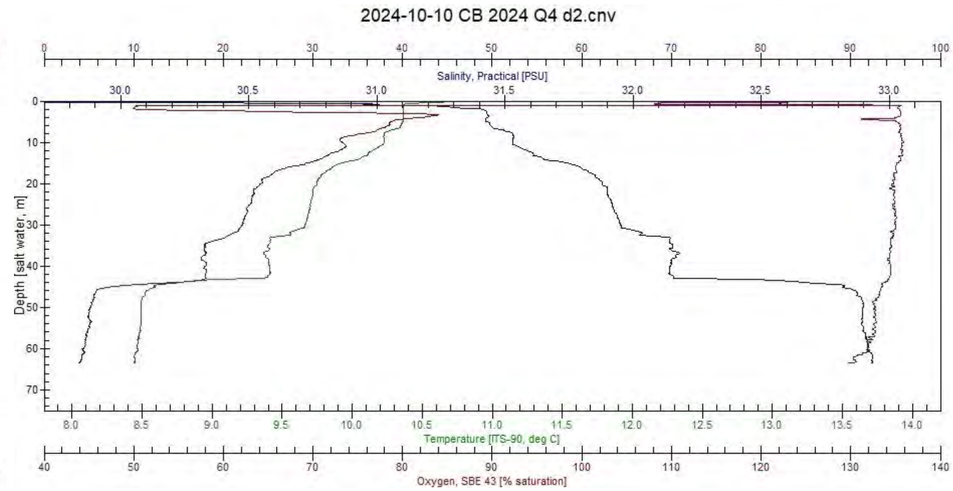

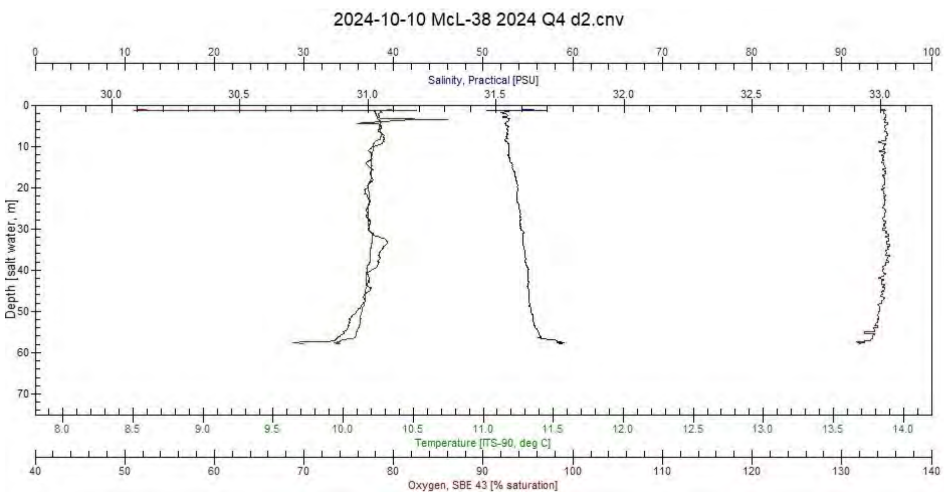

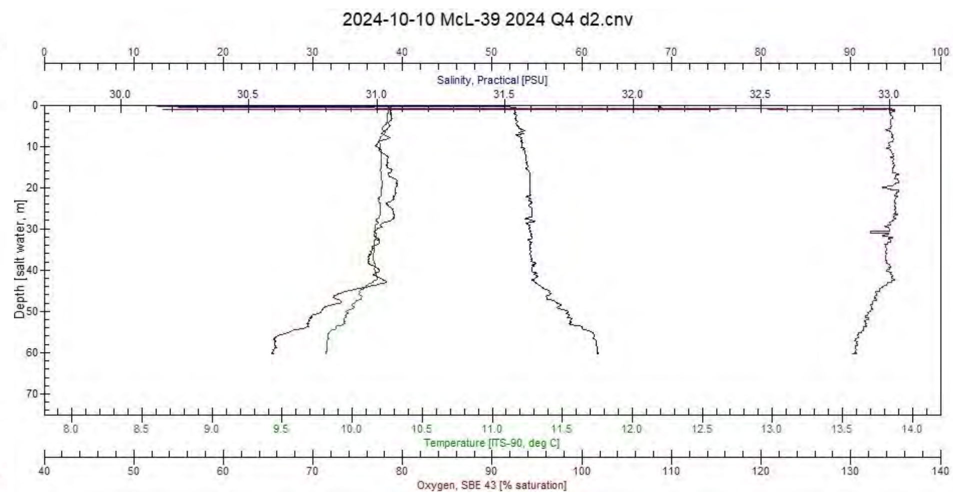

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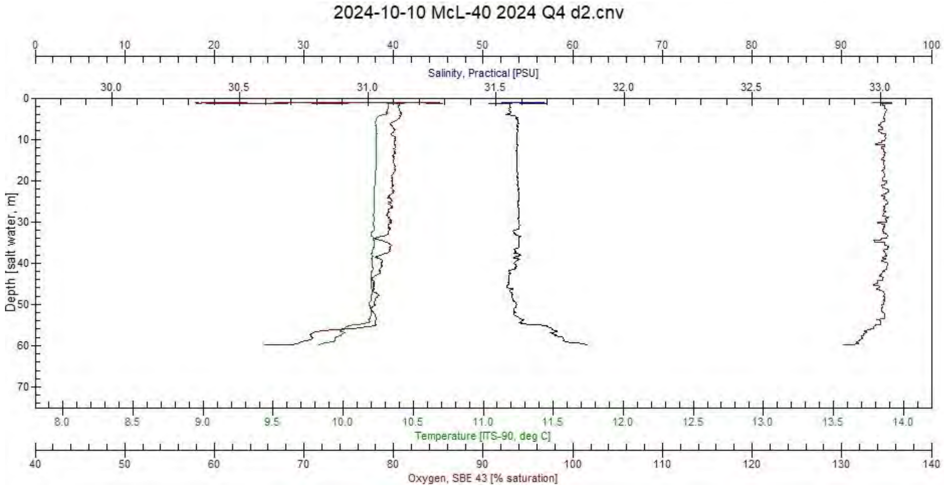

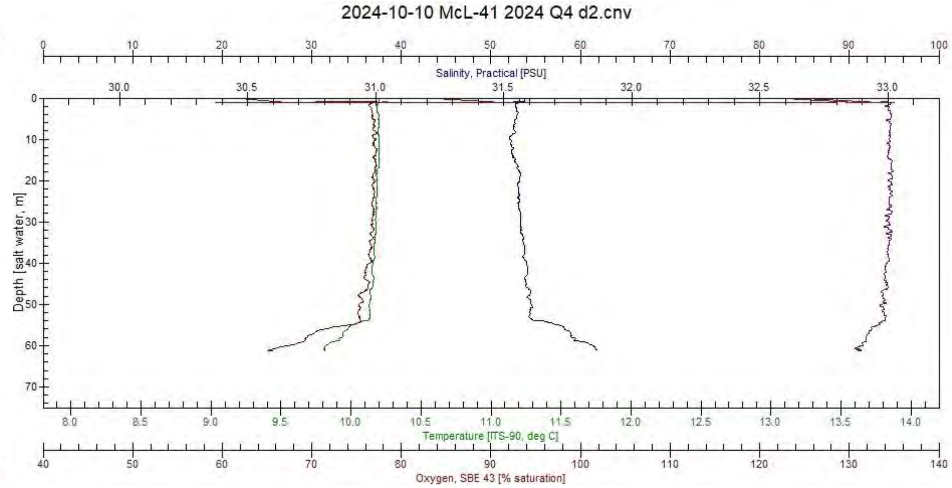

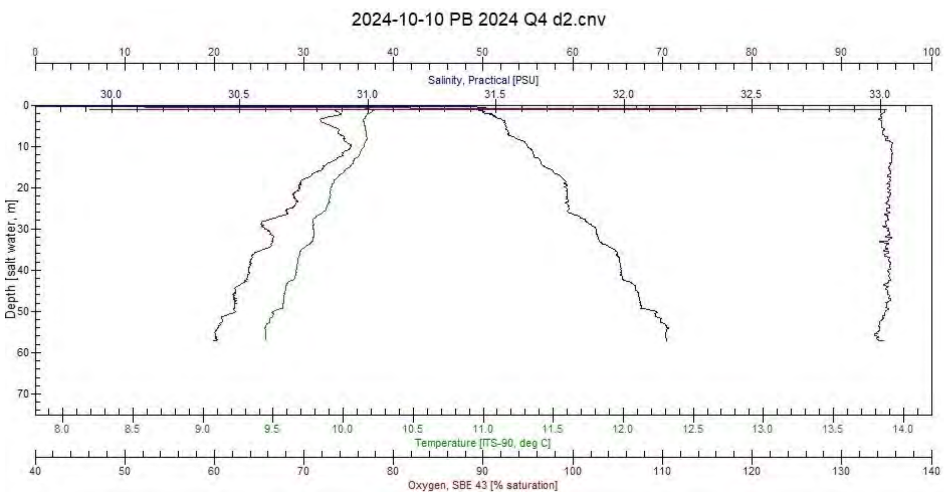

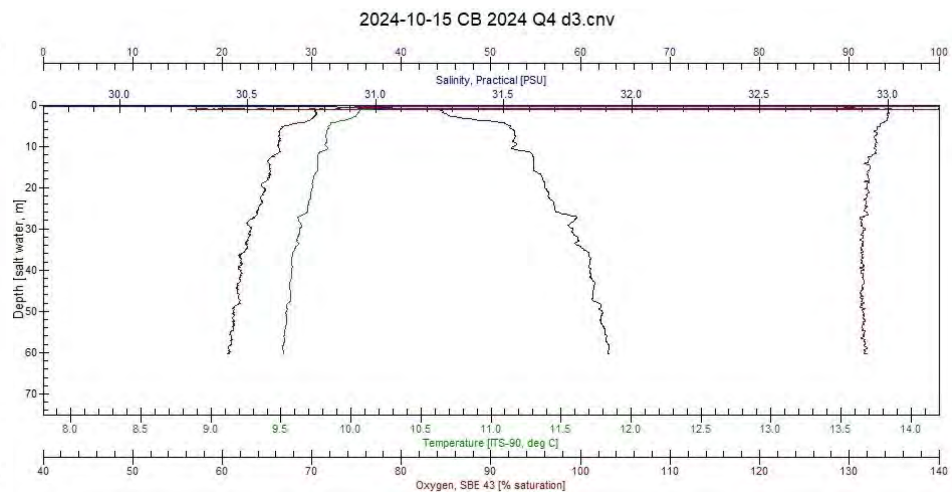

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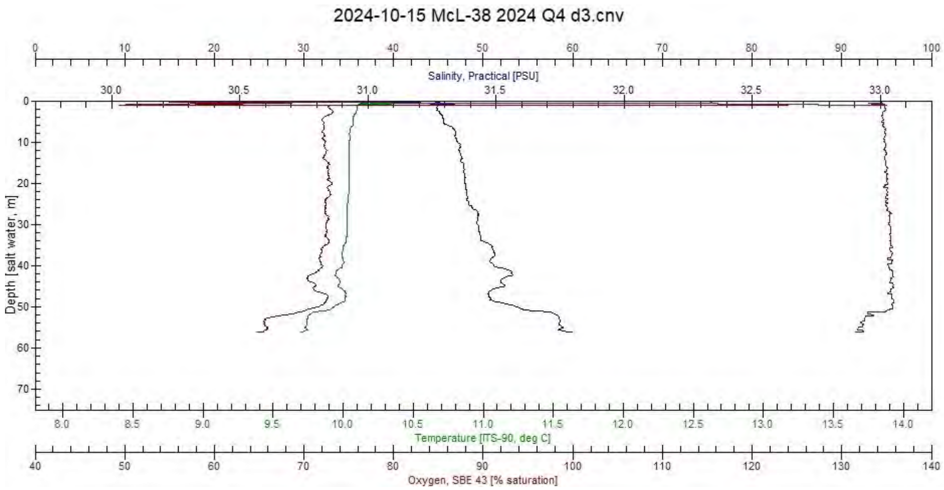

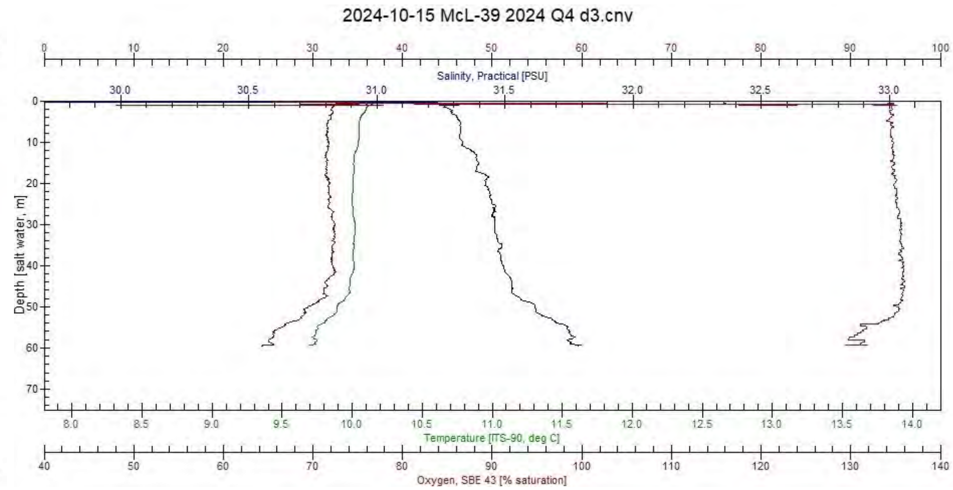

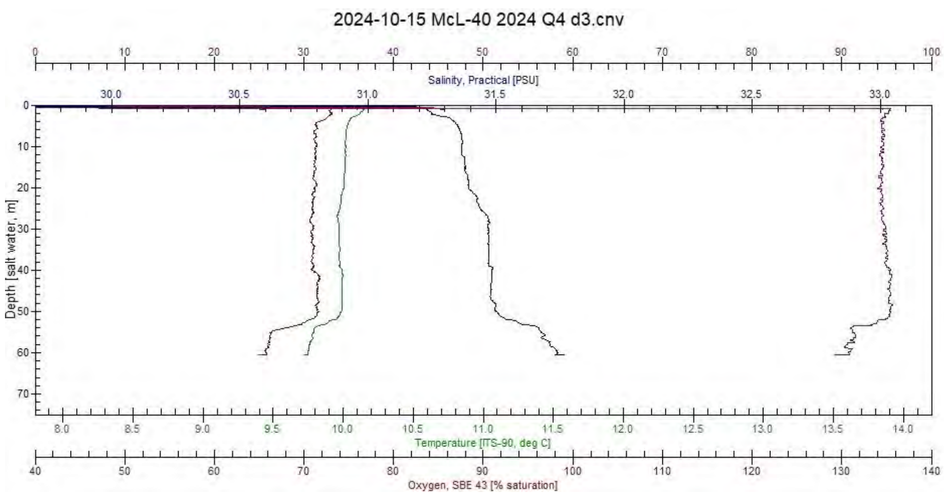

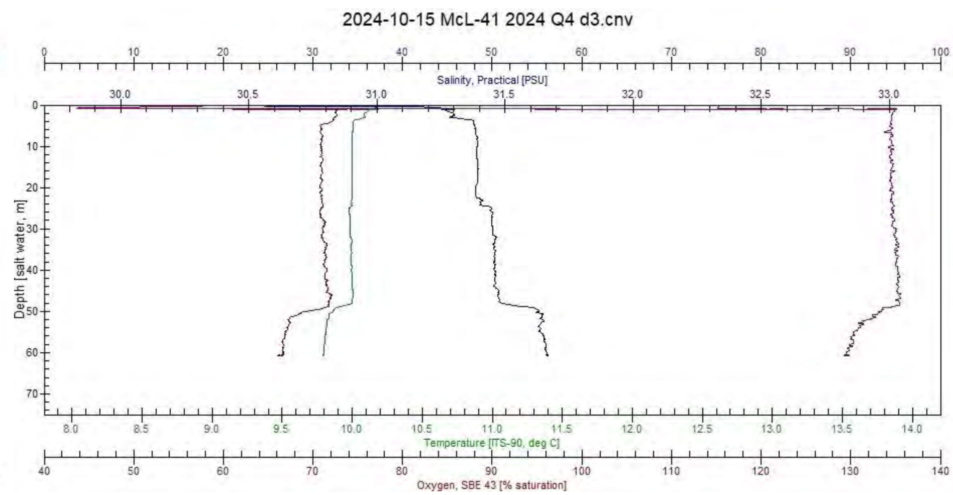

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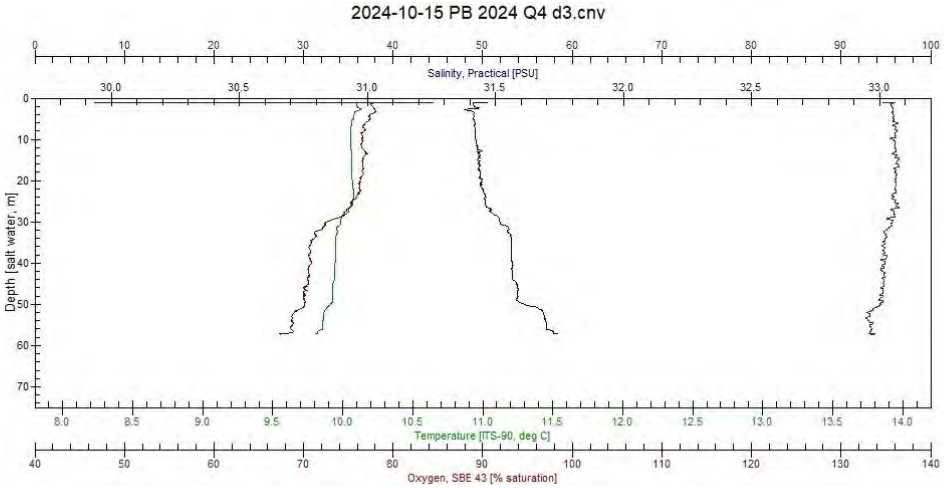

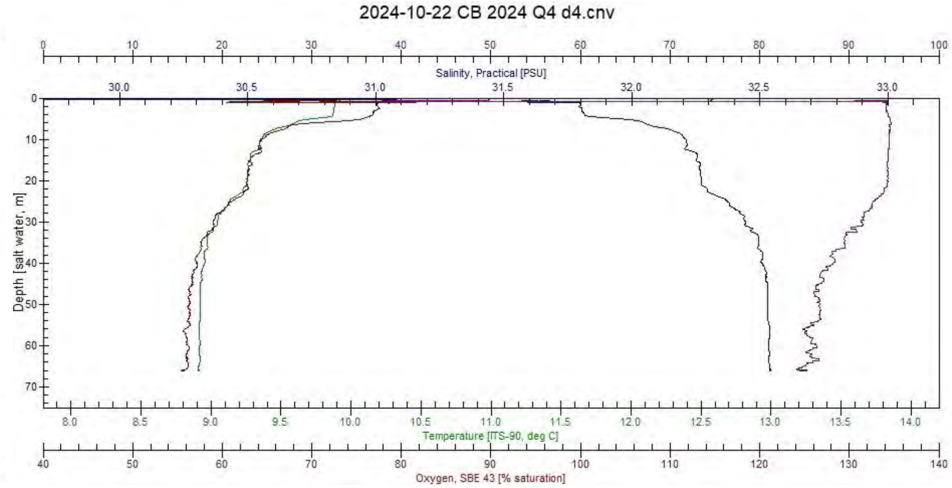

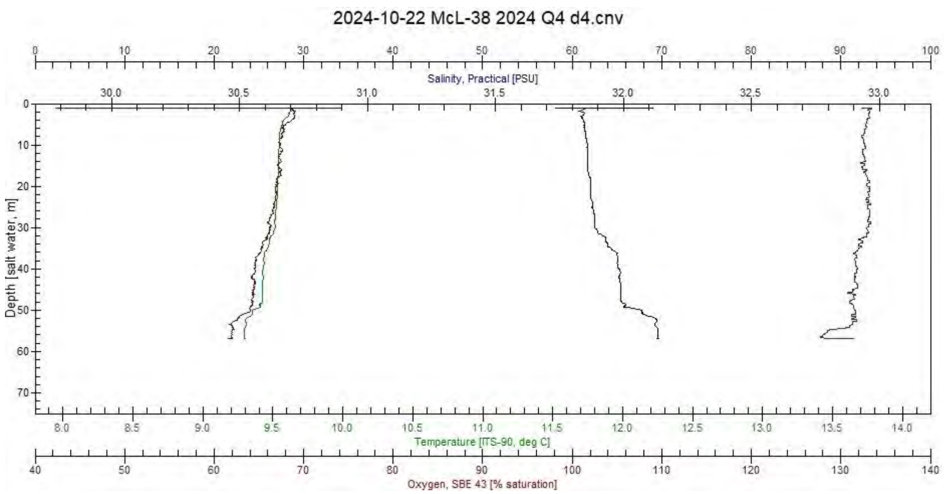

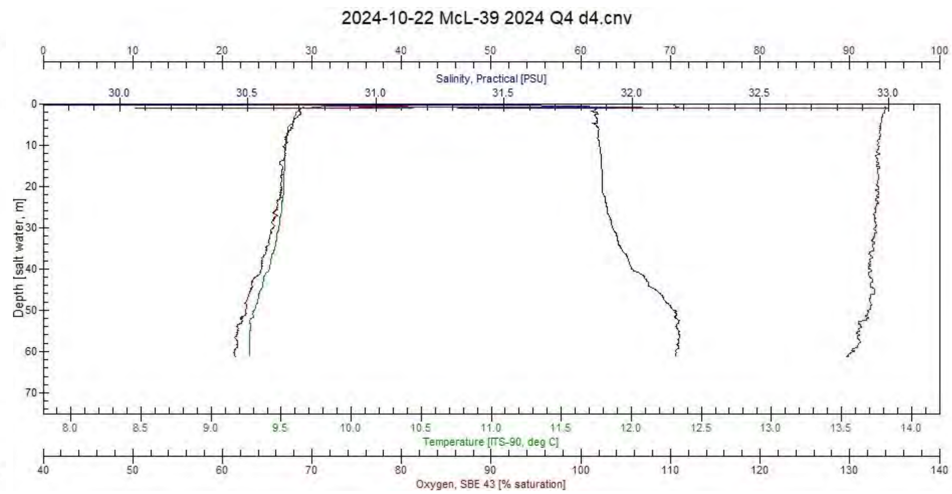

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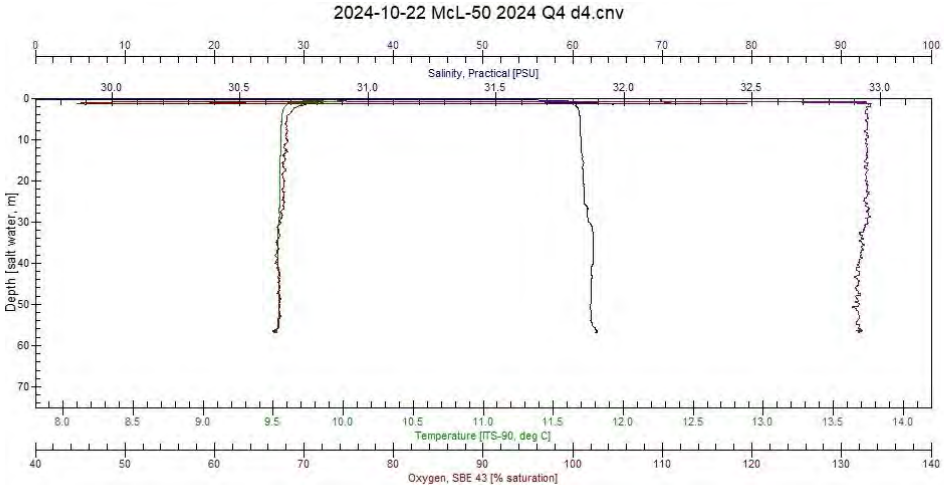

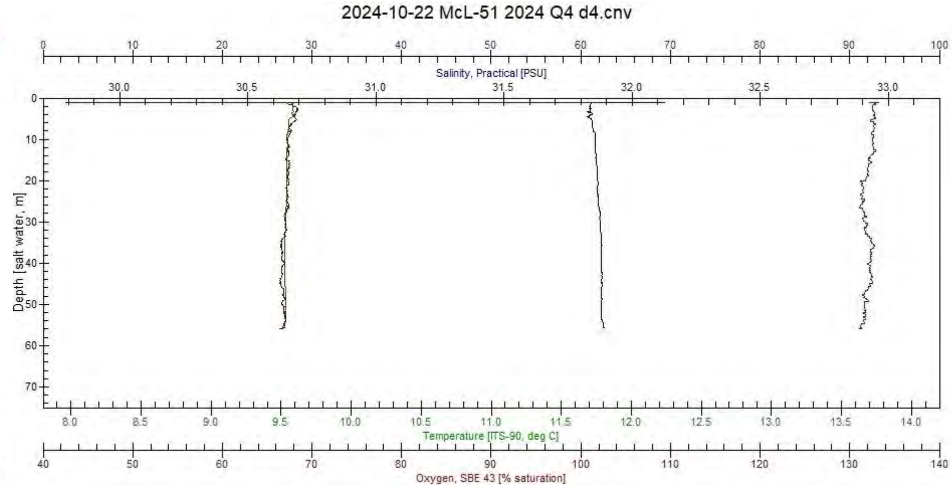

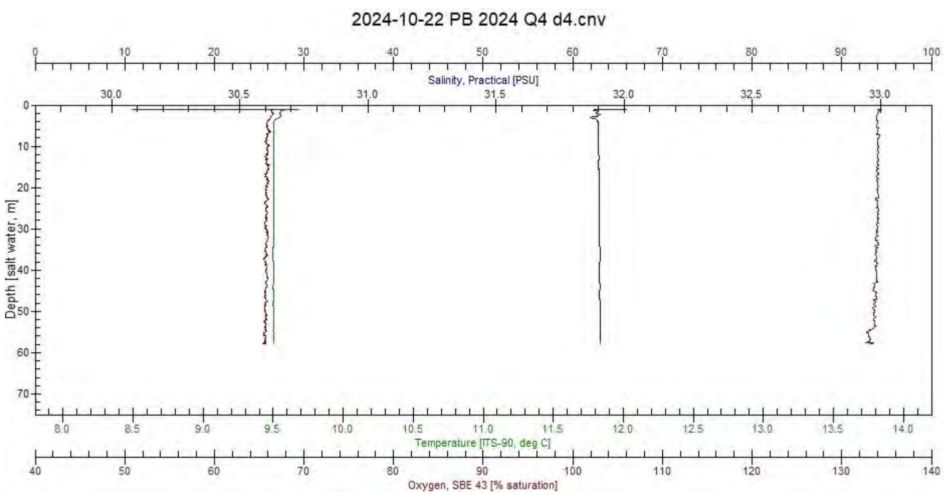

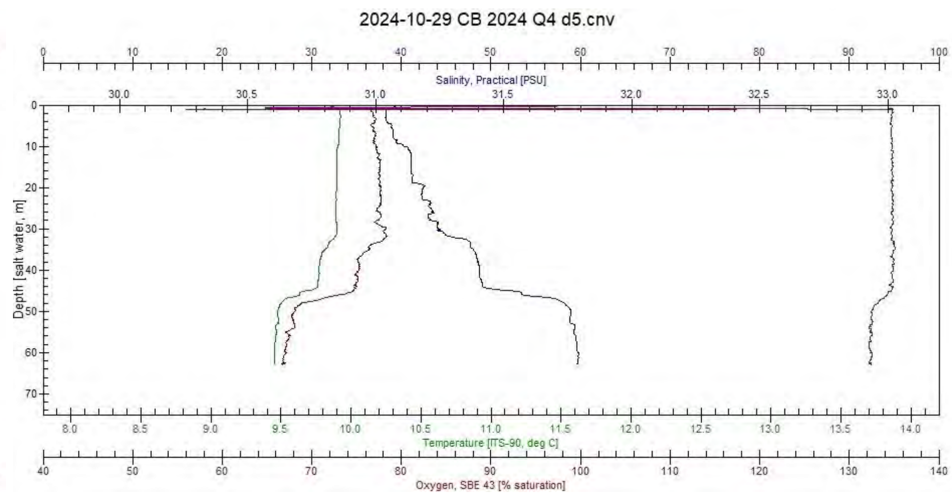

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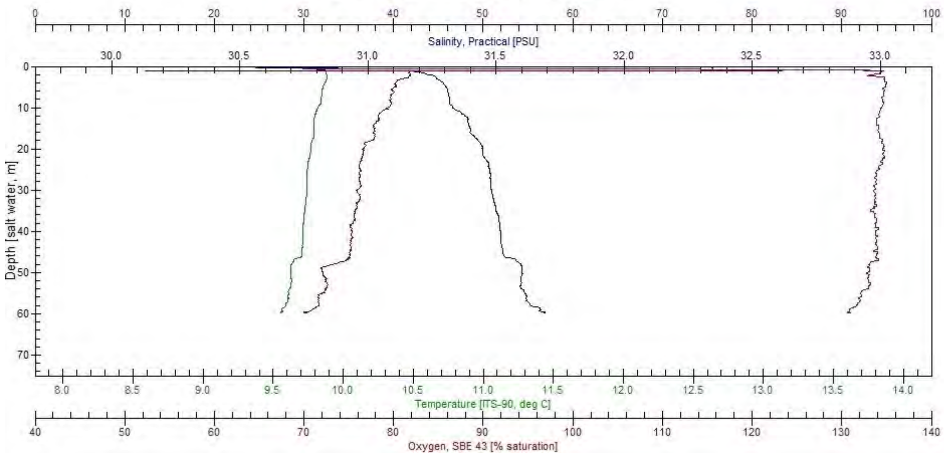
2024-10-29 McL-40 2024 Q4 d5.cnv



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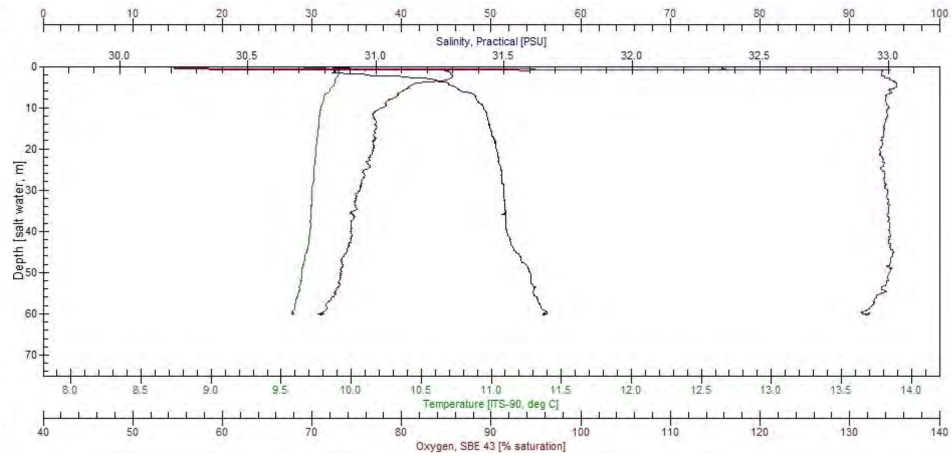

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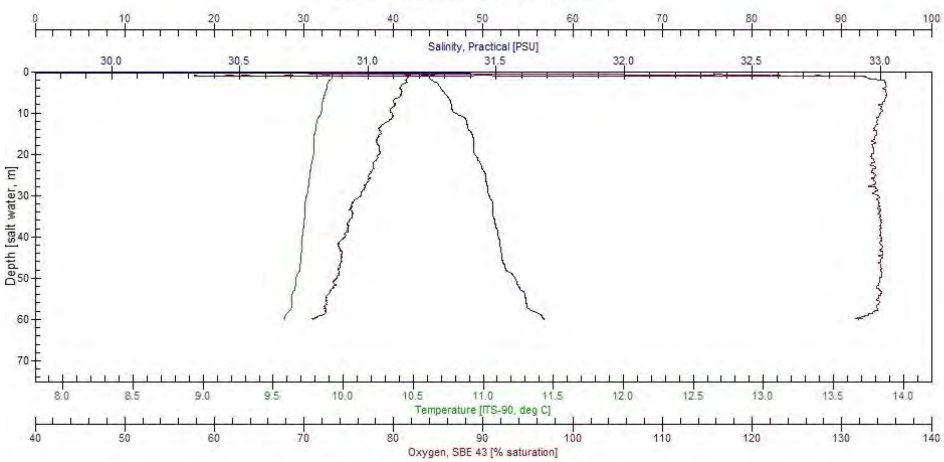

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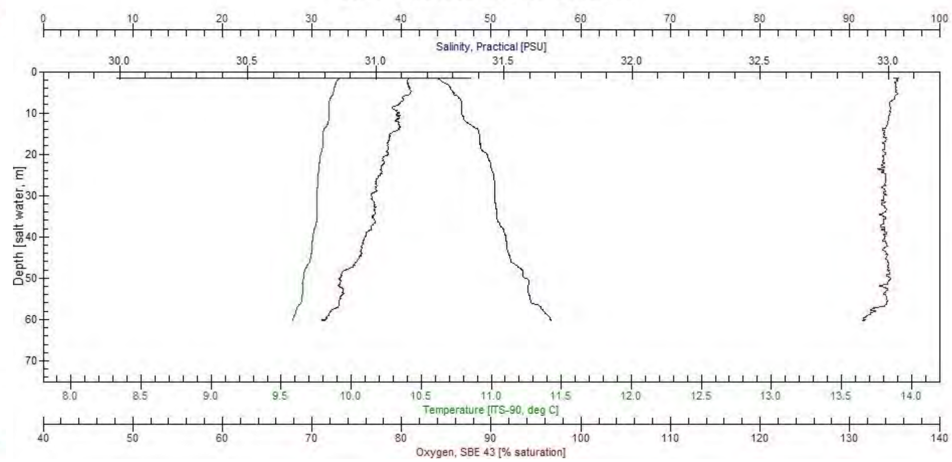
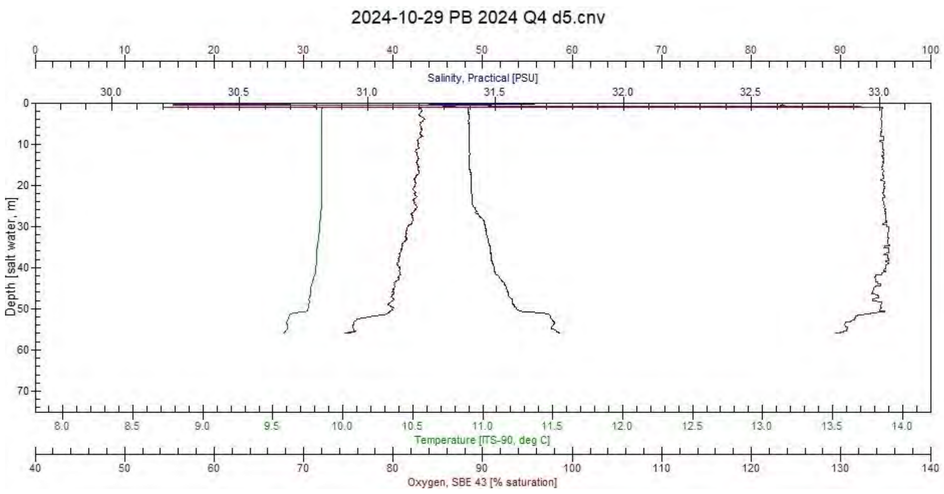


Appendix C17 Cont'd



APPENDIX D
2024 SHORELINE, OVERFLOW AND BYPASS MONITORING

CRD - Parks & Environmental Services - Environmental Engineering - Mar 16, 2020 - Technologist: srujancich - Map Document: EmergencyOverflowSampSites2020.mxd

CRD
Making a difference...together

Metres
0 50 100 200 300

Projection: UTM ZONE 10N NAD 83

Important: This map is for general information purposes only. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy or completeness of this map or the suitability of the map for any purpose. This map is not for navigation. The CRD will not be liable for any damage, loss or injury resulting from the use of the map or information on the map and the map may be changed by the CRD at any time.

Emergency Overflow Sampling Site
!! Denotes potentially unsafe access during certain conditions

Stormwater Discharge Location

End of Pipe/Manhole, High Impact
End of Pipe, High Impact
End of Pipe, Low Impact
Manhole, High Impact
Manhole, Low Impact
Marine, High Impact
Marine, Low Impact
Upstream, High Impact
CRD Pump Station
Sanitary Emergency Overflow Outfall
Sanitary Outfall
Stream/Ditch
Stormwater Culvert/Drain Pipe
Lake/Pond/Reservoir/Storage Basin
Lot Line

EMERGENCY OVERFLOW SAMPLING SITES
CLOVER

Making a difference...together

Metres
0 50 100 200 300

Projection: UTM ZONE 10N NAD 83

- Emergency Overflow Sampling Site
- !! Denotes potentially unsafe access during certain conditions

Stormwater Discharge Location
- End of Pipe/Manhole, High Impact
- End of Pipe, High Impact
- End of Pipe, Low Impact
- Manhole, High Impact
- Manhole, Low Impact
- Marine, High Impact
- Marine, Low Impact
- Upstream, High Impact
- CRD Pump Station
- Sanitary Emergency Overflow Outfall
- Sanitary Outfall
- Stream/Ditch
- Stormwater Culvert/Drain Pipe
- Lake/Pond/Reservoir/Storage Basin
- Lot Line

EMERGENCY OVERFLOW SAMPLING SITES
MACAULAY

CRD - Parks & Environmental Services - Environmental Engineering - Mar 16, 2020 - Technologist: srujancich - Map Document: EmergencyOverflowSampSites2020.mxd

CRD - Parks & Environmental Services - Environmental Engineering - Apr 16, 2020 - Technologist: sruljancich - Map Document: EmergencyOverflowSampSites2020.mxd

Making a difference...together

Metres: 0, 25, 50, 100

Projection: UTM ZONE 10N NAD 83

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Stormwater Discharge Location

- End of Pipe/Manhole, High Impact
- End of Pipe, High Impact
- End of Pipe, Low Impact
- Manhole, High Impact
- Manhole, Low Impact
- Marine, High Impact
- Marine, Low Impact
- Upstream, High Impact
- PS CRD Pump Station
- Sanitary Emergency Overflow Outfall
- Sanitary Outfall
- Stream/Ditch
- Stormwater Culvert/Drain Pipe
- Lake/Pond/Reservoir/Storage Basin
- Lot Line

EMERGENCY OVERFLOW SAMPLING SITES
MCMICKING

Metres
0 50 100 200 300
Projection: UTM ZONE 10N NAD 83

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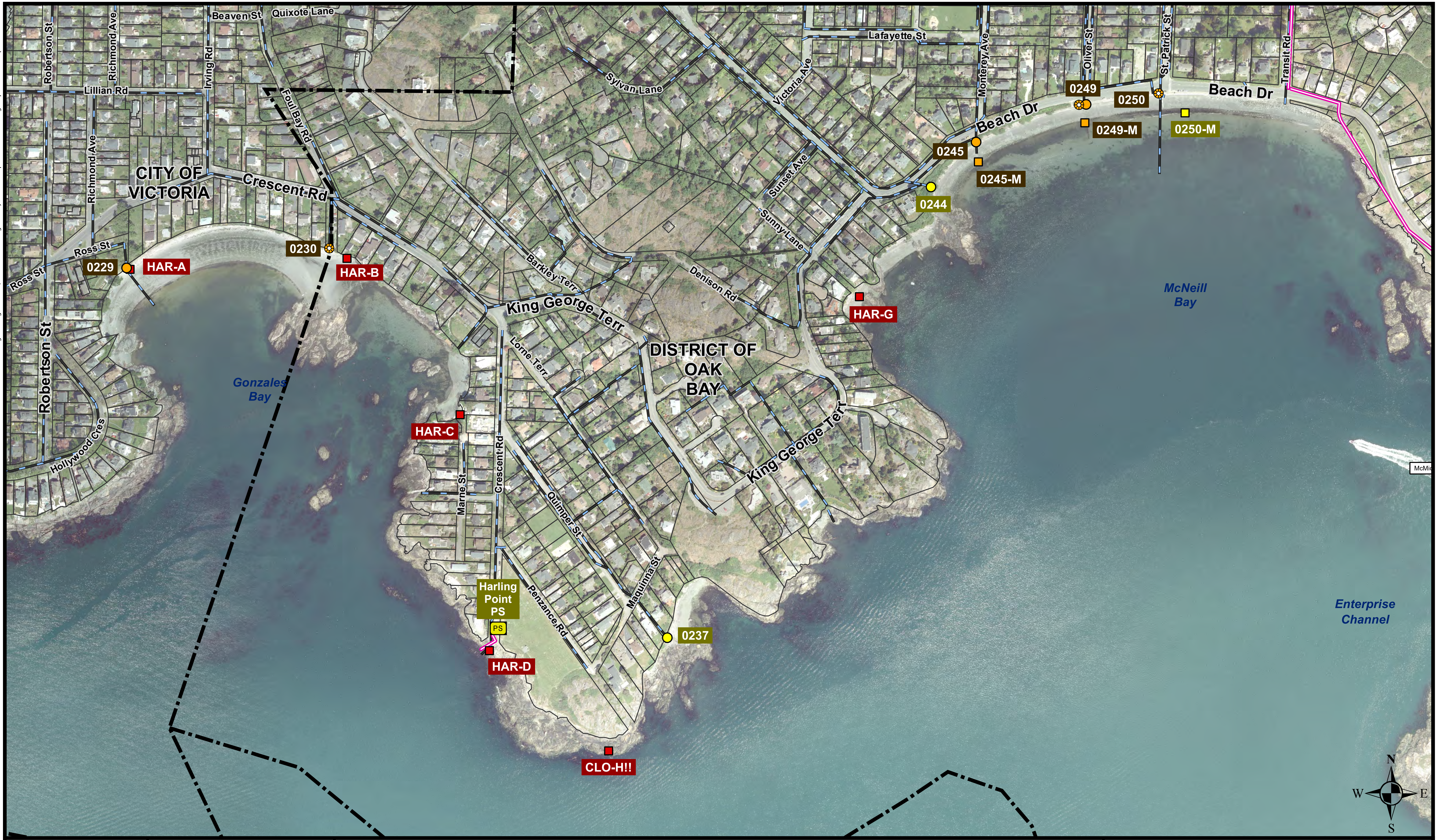
- End of Pipe, High Impact
- End of Pipe, Low Impact
- Manhole, High Impact
- Manhole, Low Impact
- Marine, High Impact
- Marine, Low Impact
- Upstream, High Impact
- PS CRD Pump Station
- Sanitary Emergency Overflow Outfall
- Sanitary Outfall
- Stream/Ditch
- Stormwater Culvert/Drain Pipe
- Lake/Pond/Reservoir/Storage Basin
- Lot Line

EMERGENCY OVERFLOW SAMPLING SITES
HUMBER & RUTLAND



Metres
0 25 50 100 150

Projection: UTM ZONE 10N NAD 83

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- End of Pipe, Low Impact
- Manhole, High Impact
- Manhole, Low Impact
- Marine, High Impact
- Marine, Low Impact
- Upstream, High Impact
- CRD Pump Station
- Sanitary Emergency Overflow Outfall
- Sanitary Outfall
- Stream/Ditch
- Stormwater Culvert/Drain Pipe
- Lake/Pond/Reservoir/Storage Basin
- Lot Line

EMERGENCY OVERFLOW SAMPLING SITES
HARLING

CRD - Parks & Environmental Services - Environmental Engineering - Mar 16, 2020 - Technologist: ssujancich - Map Document: EmergencyOverflowSampSites2020.mxd

EMERGENCY OVERFLOW SAMPLING SITES
FINNERTY

Making a difference...together

0 25 50 100 150 Metres

Projection: UTM ZONE 10N NAD 83

Emergency Overflow Sampling Site
!! Denotes potentially unsafe access during certain conditions

Stormwater Discharge Location

- End of Pipe/Manhole, High Impact
- End of Pipe, High Impact
- End of Pipe, Low Impact
- Manhole, High Impact
- Manhole, Low Impact
- Marine, High Impact
- Marine, Low Impact
- Upstream, High Impact

- PS CRD Pump Station
- Sanitary Emergency Overflow Outfall
- Sanitary Outfall
- Stream/Ditch
- Stormwater Culvert/Drain Pipe
- Lake/Pond/Reservoir/Storage Basin
- Lot Line

CRD
Making a difference...together

Metres
0 25 50 100
Projection: UTM ZONE 10N NAD 83

- Emergency Overflow Sampling Site
- !! Denotes potentially unsafe access during certain conditions

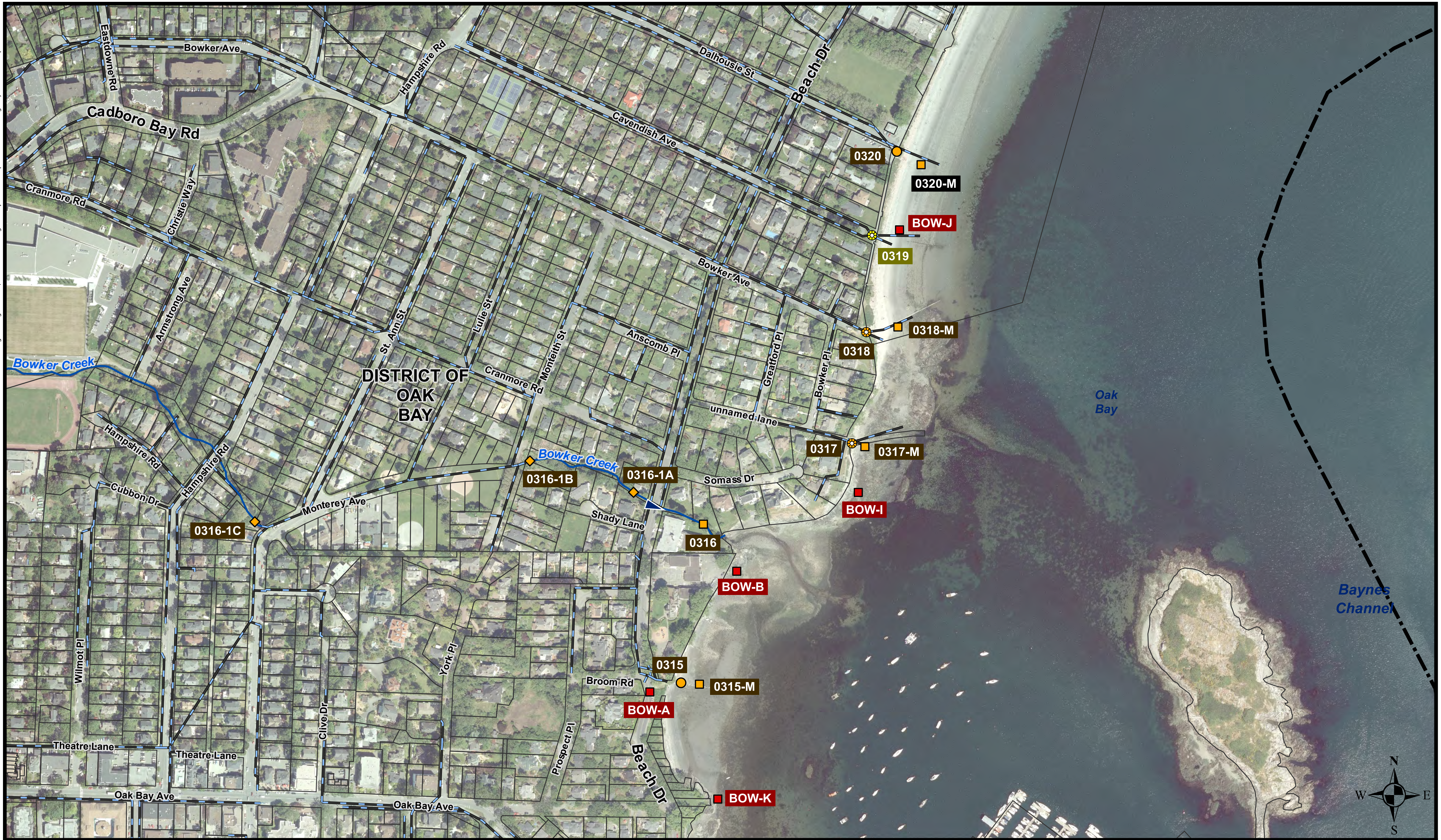
Stormwater Discharge Location

- End of Pipe/Manhole, High Impact
- End of Pipe, High Impact
- End of Pipe, Low Impact
- Manhole, High Impact
- Manhole, Low Impact
- Marine, High Impact
- Marine, Low Impact
- Upstream, High Impact
- PS CRD Pump Station
- Sanitary Emergency Overflow Outfall
- Sanitary Outfall
- Stream/Ditch
- Stormwater Culvert/Drain Pipe
- Lake/Pond/Reservoir/Storage Basin
- Lot Line

EMERGENCY OVERFLOW SAMPLING SITES
BROOM ROAD

CRD - Parks & Environmental Services - Environmental Engineering - Mar 16, 2020 - Technologist: srdjancich - Map Document: EmergencyOverflowSampSites2020.mxd

CRD - Parks & Environmental Services - Environmental Engineering - Mar 16, 2020 - Technologist: srujancich - Map Document: EmergencyOverflowSampSites2020.mxd



Making a difference...together

Metres

0 25 50 100 150

Projection: UTM ZONE 10N NAD 83

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Emergency Overflow Sampling Site
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Stormwater Discharge Location

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- End of Pipe, High Impact
- End of Pipe, Low Impact
- Manhole, High Impact
- Manhole, Low Impact
- Marine, High Impact
- Marine, Low Impact
- Upstream, High Impact

PS CRD Pump Station
Sanitary Emergency Overflow Outfall
Sanitary Outfall

Stream/Ditch
Stormwater Culvert/Drain Pipe
Lake/Pond/Reservoir/Storage Basin
Lot Line

EMERGENCY OVERFLOW SAMPLING SITES
BOWKER

APPENDIX E

SEAFLOOR MONITORING DATA

Appendix E Seafloor Monitoring Data

Seafloor monitoring data including sediment chemistry, sediment toxicity and sediment benthic invertebrate assemblages had not been received at the time of this report. This data will be presented in an addendum planned for early 2026.