Regional Source Control Program

2020 Report

Capital Regional District | Parks & Environmental Services, Environmental Protection

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REGIONAL SOURCE CONTROL PROGRAM
2020 REPORT

EXECUTIVE SUMMARY

The Capital Regional District (CRD) Regional Source Control Program's (RCSP) goals are to protect sewage collection and treatment facilities, public health and safety, and the receiving marine environment by reducing the amount of contaminants that industries, businesses, institutions and households discharge into the CRD's sanitary sewer systems. Source control is widely accepted as a cost-effective and essential first step in sewage treatment in all major urban areas throughout North America.

The program regulates over 2,000 businesses through industrial wastewater discharge permits, authorizations and 11 sector-specific codes of practice. In 2020, the percentage of businesses with a rating of "overall compliance" was 93% and the percentage of mixed liquor and dewatered sludge samples that met Class A standards for metals was 100% for the 12th consecutive year.

The CRD undertakes monitoring and regulating as outlined in the Core Area and Saanich Peninsula liquid waste management plans and reports annually to the BC Ministry of Environment and Climate Change Strategy (ENV) about program activities and results.

From January to December 2020, the program continued to apply a "sector-by-sector" approach to code of practice inspections, focusing on the dry cleaning, dental, automotive, vehicle wash and food services sectors. Overall compliance rates for codes of practice, permitted industrial facilities and facilities operating under authorizations, were 93%. The main activities and accomplishments of the program in 2020 include:

- industrial, commercial and institutional liquid waste regulation
- monitoring
- enforcement
- contaminants management and reductions
- significant incident response
- residential and business outreach
- program and planning development

Additional Initiatives in 2020

- Co-chaired Source Control Community of Practice meetings, with facilitation by the BC Water & Wastewater Association.
- Modified inspection protocols to ensure service delivery and protection of the sewer system, while following COVID-19 safety and exposure control plans during the pandemic.
- Stakeholder engagement for the food services sector.
- Investigation of portable fats, oils and grease interceptor monitoring devices.
- "Ghost" kitchen investigations. These are non-restaurant kitchens that often do not register with the RSCP.
- As part of a focus to maintain low levels of mercury in wastewater, interviewed some business sectors not captured by the dental code of practice to confirm they did not use amalgam.
- Commissioned two studies by Royal Roads University Environmental Science students. One to continue the investigation of the effect of dishwashers on the efficiency of hydromechanical grease interceptors and one to investigate treatment options for high strength wastewater discharges.
- Collaborated with municipal business licensing staff to share new business information for review against permitting requirements.

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1.0 INTRODUCTION

Source control is the first step in wastewater treatment. It is a waste management strategy that reduces the amount of contaminants that industries, businesses, institutions and households discharge to sewers. In 1993, the Capital Regional District (CRD) committed to the development and implementation of a region-wide source control program and adoption of a Sewer Use Bylaw (Bylaw No. 2922) under the *BC Environmental Management Act*. The bylaw is the main regulatory instrument for source control in sanitary sewer systems, creating a level playing field for businesses and institutions throughout the CRD. The program also develops fact sheets, provides technical guidance and promotes best management practices.

The goals and objectives of the CRD's Regional Source Control Program (the program) are documented in the Saanich Peninsula Liquid Waste Management Plan (1996) and the Core Area Liquid Waste Management Plan (2000). The most recent independent review of the program was completed in June 2015 (KWL 2015), and the next review will be undertaken in 2021.

Source control is a key component of effective wastewater treatment and is an integral part of the core area wastewater treatment strategy moving forward. The current program meets or exceeds Canadian best practices for source control and the CRD is a nationally recognized leader in this field.

The program goals are as follows:

- protect the marine receiving environment adjacent to the CRD's sewage outfalls
- protect sewage infrastructure belonging to the CRD and its member municipalities
- protect the health and safety of sewage workers and the general public
- protect the quality of sewage sludge and biosolids
- protect treatment plants against upsets
- consistently apply the program for all users of CRD sewage facilities

During the COVID-19 pandemic, staff met their goal to maintain a normal level of service, while ensuring the health and safety of inspectors and acting as responsible community members by observing the recommendations of the BC Centre for Disease Control, Provincial Health Officer, Government of Canada, and the scientific and health care community by following strict sanitizing protocols and minimizing contact with other people as much as possible.

Procedures were modified such that inspections and other regulatory compliance interaction with businesses were done remotely when higher levels of pandemic response required it and in-person when the situation allowed. In this way, the program maintained contact with businesses and let them know that source control was still an important priority and regulatory requirement. Compliance was maintained with minor allowances in some cases where a business may have been closed for periods of time, for example.

This report meets the CRD's commitments in the Core Area and Saanich Peninsula liquid waste management plans to prepare an annual report on the program for submission to ENV, presents a summary of program activities and accomplishments for the period January to December 2020, and highlights some initiatives planned for 2021.

The information in this report is used by CRD staff to evaluate the performance and future direction of source control program activities and by municipal staff to understand trends in discharge of contaminants from residential and business sources.

2.0 BACKGROUND

2.1 Policies and Procedures

The following policies and procedures are used to provide guidance and ensure fair and consistent application of the CRD Sewer Use Bylaw and associated enforcement, cost recovery and monitoring activities.

2.1.1 Policies Approved by the CRD Board

- Regional Source Control Program Enforcement Policy
- Regional Source Control Program Fees and Charges Policy
- Sewer Use Bylaw Process of Review
- Regional Source Control Program Code of Practice Management Policy – Food Services

2.1.2 Operating Procedures

- Sampling and Analysis Procedure Manual
- Analytical Result Reporting Procedure
- Non-domestic Waste Discharge Reporting Procedure
- Significant Incident Reporting Procedure
- Procedure for Managing Contaminated Water Produced During Firefighting Operations in the CRD

The policies and procedures are periodically updated to reflect changes within the program.

Additional health and safety procedures were implemented to prevent the spread of COVID-19 and to protect the public and workers. A CRD Safety and Exposure Control Plan was put in place (later renamed the Communicable Disease Safety Plan) and Regional Source Control Program COVID-19 inspection safety protocols were developed.

2.2 Sewage Collection Areas and Sewage Facilities

The CRD Sewer Use Bylaw applies to any discharge of non-domestic waste into a sewer that is connected to a sewage facility operated by the CRD. The program is designed to ensure that the bylaw and its associated policies and procedures are applied consistently within the separate collection areas for these sewage facilities.

The CRD owns and operates eight wastewater treatment plants, as shown in Table 1. Four of these plants—Macaulay Point, Clover Point, Saanich Peninsula and Ganges—receive significant industrial, commercial or institutional wastewater flows, while the remaining four are small plants receiving mostly residential flows.

The sewage flows into each treatment plant are reported in the annual compliance monitoring reports for CRD sewage outfalls. Estimated annual sewage flows contributed by each participating area, over the period October 1, 2019 to September 30, 2020, are listed in Table 2.

Table 1 CRD Treatment Plants and Sewage Collection Areas

CRD Sewage Treatment Plant	Sewage Collection Areas
Macaulay Point	Victoria (west), Esquimalt, Saanich (west), View Royal, Colwood, Langford, Department of National Defence, Esquimalt First Nation, Songhees First Nation
Clover Point	Victoria (east), Oak Bay, Saanich (east)
Saanich Peninsula	Sidney, Central Saanich, North Saanich, Pauquachin First Nation, Tseycum First Nation, Institute of Ocean Sciences
Ganges	Ganges Village (Salt Spring Island Electoral Area)
Maliview	Maliview area (Salt Spring Island Electoral Area)
Schooner Way	Buck Lake area (Southern Gulf Islands Electoral Area)
Canon Crescent	Magic Lake Estates (Southern Gulf Islands Electoral Area)
Port Renfrew	Port Renfrew (Juan de Fuca Electoral Area)

Table 2 Annual Sewage Flows 2019-2020

Participant	Estimated Annual Flow (m^3/year)*	Percentage of Total Flows
Saanich	9,670,079	26.3
Oak Bay	3,069,465	8.4
Victoria	12,913,159	35.2
Esquimalt	2,204,366	6.0
View Royal	865,716	2.4
Colwood	1,235,991	3.4
Langford	2,872,068	7.8
Esquimalt First Nation	25,336	< 0.1
Songhees First Nation	224,030	0.6
Department of National Defence	133,506	0.4
North Saanich	502,860	1.4
Central Saanich	1,379,908	3.8
Sidney	1,303,450	3.6
Pauquachin First Nation	27,618	< 0.1
Tseycum First Nation	11,993	< 0.1
Institute of Ocean Sciences	4,083	< 0.1
Ganges Sewer	155,257	0.4
Maliview Sewer	18,841	< 0.1
Magic Lakes Estates Sewer	100,832	0.3
Port Renfrew Sewer	19,380	< 0.1
Total Flow	**36,737,936**	**100%**

Note: *For the period October 1, 2019-September 30, 2020

3.0 REGIONAL SOURCE CONTROL ACTIVITIES AND ACCOMPLISHMENTS – 2020

Program activities and accomplishments in 2020 are discussed under the following broad groups of activities:

- industrial, commercial and institutional liquid waste regulation
- enforcement
- contaminants management
- contaminant reductions
- significant incident reporting
- outreach
- data management
- revenue and expenditures
- planning and development
- performance measures

3.1 Industrial, Commercial and Institutional Liquid Waste Regulation

3.1.1 Regulatory Background

The Sewer Use Bylaw (CRD Bylaw No. 2922) serves as the main regulatory instrument for source control within CRD sanitary sewer systems. The bylaw specifies the various regulatory conditions under which facilities must operate if they discharge non-domestic waste into a sanitary sewer. The regulatory conditions for businesses include operation under waste discharge permits, authorizations or sector-specific codes of practice. Under the program enforcement policy, staff make reasonable efforts to resolve issues through cooperative measures. Where education proves ineffective, punitive measures are available, including tickets under the bylaw.

Following adoption of the Sewer Use Bylaw in August 1994, the program focused primarily on identifying, inspecting, assessing and permitting larger industrial facilities, and preparing authorizations for smaller commercial and institutional dischargers operating within the CRD. This process was largely completed over the period 1995-1998. Waste discharge permits require ongoing management, inspection and periodic amendment to accommodate changes in site-specific processes, practices and discharge conditions. New businesses continue to be assessed for operation under permits or authorizations each year. For further information on permits and authorizations, see sections 3.1.2 and 3.1.3.

In 1998, the focus of the program shifted toward development, adoption and implementation of codes of practice each as a separate schedule in the Sewer Use Bylaw, which regulate discharges from larger numbers of smaller commercial and institutional facilities operating in the CRD. The first regulatory codes of practice, considered unique in North America, were adopted in 1999 and inspections and enforcement for these codes commenced the following year. By the end of 2003, 11 codes of practice had been adopted. All codes were developed using extensive stakeholder involvement to help ensure their practicality and acceptance within each sector. For further information on codes of practice, see Section 3.1.4.

The Sewer Use Bylaw and its associated policies and procedures were amended periodically during the first 12 years of the program, largely to accommodate adoption of codes of practice, but also to add new restricted waste limits and a structure for cost recovery. In 2020, staff continued the process of assessing and reviewing the Sewer Use Bylaw to ensure it continues to provide an adequate level of protection. Updates to the bylaw are expected in early 2022.

3.1.2 Waste Discharge Permits

Waste discharge permits are site-specific regulatory documents, issued to businesses or institutions under the CRD Sewer Use Bylaw, that outline requirements for wastewater pre-treatment, effluent quality, monitoring and reporting. Waste discharge permits are issued to facilities or operations that discharge significant non-domestic wastewater flows (greater than 10 m^3/day) or wastewater containing high loads of restricted wastes or specified chemical contaminants into the sanitary sewer. Table 3 provides a summary of waste discharge permit activity in 2020.

Table 3 Summary of Waste Discharge Permit Activity in 2020

Waste Discharge Permit Activity	2020
Permits active (at year end)	37
New permits issued	1
Permits closed	4
Permits amended	8
Permit site inspections (including evaluations for new permits)	69

At the end of 2020, there were 37 active waste discharge permits being managed by staff. The majority of these permits were ongoing, with no expiry date. One new permit was issued for a facility that was closed in 2017 and was re-opened under a new permit. Unlike previous years, there were no new excavation dewatering nor cruise ship permits. Four excavation dewatering permits that were issued in 2019 were closed in 2020.

Permit management activity includes reviewing discharger self-monitoring reports on a monthly or quarterly basis, preparation of compliance letters, meetings and regular phone contact with permittees and site inspections. Permit managers are also responsible for comparing CRD audit sampling data to permittee self-monitoring data and submitting permit fee billing information to CRD Finance.

Most permit inspections scheduled at the beginning of 2020 were completed within the year. One temporary excavation dewatering permit closed partway through the year, one new permit did not discharge, and one permit with a high compliance level and reduced operations due to COVID-19 was only inspected once. In consideration of COVID-19 safety concerns, the program was considerate of a facility's reluctance to allow staff on site for a physical inspection. In those cases, a virtual site inspection was conducted instead using email, telephone and/or video-chat where possible. Throughout 2020, inspection staff continued their permit confirmation process, which is an ongoing activity. This includes conducting investigations into potential new non-domestic waste discharge permits or authorizations in known "hot spots" within the region (e.g., industrial parks), or those identified through municipal engineering department contacts or business licensing staff.

3.1.3 Authorizations

Letters of authorization are issued under the Sewer Use Bylaw in cases where overall contaminant loads to sanitary sewer are low or where discharges are predicted to have a minimal impact on collection and treatment systems and/or the receiving environment. Authorizations contain site-specific discharge requirements and best management practices designed to decrease the impact of the discharge or limit the potential for illegal discharges. They are normally issued without expiry dates. Some authorizations have self-monitoring and/or reporting requirements.

Authorizations are commonly issued to regulate unusual discharges or discharges from small groups of similar operations, such as ship and boat waste facilities, funeral homes, and sani-dumps. They can also be issued to businesses where a code of practice is either planned or under development, or where requirements differ from those specified in a code (e.g., an alternative treatment technology, such as an automatic grease recovery device in a food services business, rather than a grease interceptor).

Inspections are carried out on a periodic basis with an emphasis on those authorizations, which had previously been regulated under permits or those, which include operations discharging priority contaminants. Table 4 summarizes authorization activity in 2020.

In 2016, all of the recreation facilities that were previously regulated under the Code of Practice for Recreation Facility Operations were moved to authorization. This move was due to the high variety of discharge practices occurring and this code will, therefore, be repealed from Sewer Use Bylaw No. 2922 in the next amendment.

Table 4 Summary of Authorization Activity in 2020

Authorization Activity	2020
Authorizations active (at year end)	89
New authorizations issued	6
Authorizations closed or transferred to codes or permits	5
Authorizations amended	10
Authorization site inspections (including evaluations for new authorizations)	56

At the end of 2020, there were 89 active waste discharge authorizations being managed. The majority of these were ongoing, with no expiry date. Six new authorizations were issued over the year: four for short-term discharges of wastewater created during the installation of cure-in-place lining for municipal water pipelines, one minor dewatering operation, and one temporary authorization for a biosolids treatment facility. Five authorizations expired and were closed in 2020.

3.1.4 Codes of Practice

3.1.4.1 Background

The CRD has made commitments in the Core Area and Saanich Peninsula liquid waste management plans to the development and implementation of codes of practice to regulate non-domestic waste discharges from commercial and institutional sectors to the CRD's sanitary sewers. The program defines codes of practice as "regulatory documents containing mandatory sanitary sewer discharge standards for specific industrial, institutional or commercial sectors". Table 5 lists the 11 codes of practice in effect. All the facilities under the recreation code have been issued authorizations and the code will be removed in the upcoming bylaw amendment.

Codes of practice include mandatory requirements for waste treatment, inspection, maintenance and record keeping for businesses and institutions discharging non-domestic wastes to sanitary sewer. They are believed to be among the first of their type to be adopted in North America. Staff have prepared plain language guidebooks for each code sector explaining the applicable regulations and providing best management practices to help businesses achieve compliance and improve environmental performance. These guidebooks are also accessible through the program's webpage.

Table 5 Summary of Codes of Practice (Bylaw No. 2922)

Code of Practice	Adoption Date
Food Services Operations	November 24, 1999[1]
Dry Cleaning Operations	November 24, 1999[2]
Photographic Imaging Operations	November 24, 1999
Dental Operations	November 22, 2000
Automotive Repair Operations	December 12, 2001[2]
Vehicle Wash Operations	December 12, 2001[2]
Carpet Cleaning Operations	December 11, 2002
Fermentation Operations	December 11, 2002
Printing Operations	December 11, 2002
Laboratory Operations	December 10, 2003
Recreation Facility Operations	December 10, 2003

Notes:
[1]Code amended December 2001 and March 2003
[2]Code amended December 2003

3.1.4.2 Code of Practice Inspection Summary – 2020

In 2020, the CRD continued to emphasize customer service and support as part of code of practice inspections, in addition to ensuring compliance with the code of practice requirements. This involves making every effort to educate regulated operations, provide guidance, and in some cases feedback through lab analysis of effluent quality and multiple visits to the same establishment.

In response to the pandemic, the inspection work plan was rescheduled and reprioritized based on which facilities are operating, loadings concentration (level of flow and contaminants of concern) and associated risk to infrastructure and environment. Courtesy phone calls were made to determine if businesses were operating, remind them of the importance of maintaining their treatment works, and inform them of service provider staffing issues or shut-downs. Inspections were then prioritized based on the risk assessment and findings from the phone calls.

Five full-time equivalent inspectors conduct the code of practice inspections, in addition to managing the permits and authorizations. During front-line interactions with businesses, the inspectors can also provide auditing and reporting services for other CRD programs, technical services for other Parks & Environmental Services projects or programs, as required, and participate in the development and implementation of outreach initiatives.

Table 6 provides a summary of code of practice inspection activity in 2020. The sector estimates shown in the table are the numbers of active operations estimated within each sector at the beginning of each year. The total number of site inspections (1,453 in 2020) includes first (or primary) inspections within an inspection cycle and repeat (or follow-up) inspections to confirm compliance status of 2,091 businesses.

Table 6 Summary of Code of Practice Activity in 2020

Code of Practice (Est. Sector Size – 2020)	% of Sector Inspected in 2020
Automotive Repair (191)	45%
Carpet Cleaning (30)	0%
Dental (144)	97%
Dry Cleaning (12)	100%
Fermentation (21)	0%
Food Services (1,543)	74%
Laboratory (36)	22%
Photographic Imaging (48)	31%
Printing (22)	64%
Vehicle Wash (44)	84%

The “sector-by-sector” review process includes inspecting businesses due for an inspection in each sector for baseline compliance, reviewing the code of practice for any necessary amendments or updates, and updating data for new and/or newly sewered facilities. Sectors of focus in 2020 were automotive (mechanical) repair, dental, dry cleaning, printing, and vehicle wash. In addition, revised protocols for the food service sector resulted in higher than usual repeat inspection numbers. Other sectors were visited only for follow-up inspections. Both discharging and non-discharging businesses (those sending business waste for off-site treatment or operating as a storefront) in the food and dental sectors were inspected, while in the automotive, dry cleaning, printing, and vehicle wash sectors, only dischargers were inspected.

Each inspector in the inspection team is assigned a geographic area and inspects the majority of the codes in their area. Some codes are part of a sector sweep or more detailed investigation, which may be conducted by one ‘code expert’, for example carpet cleaning and fermentation. The businesses inspected were comprised of those within the existing cross connection and regional source control information management system database, and also facilities identified through an online search, drive-through of the area, cross-referencing the Cross Connection Control Program database, BC Assessment code query, and new municipal business licenses.

Starting in 2016, dischargers operating treatment works on site were inspected on a schedule based on risk associated with priority contaminants: automotive and vehicle wash (annually), dental (biennially), dry cleaning (annually starting in 2018), and laboratory (biennially). The non-discharging businesses in these sectors (i.e., sending business waste for off-site treatment or operating as a storefront) are inspected every three to five years. The carpet cleaning and fermentation sectors are inspected each five years and the printing and photographic imaging sectors are inspected each three years.

Expanding on the work characterizing distillery wastewater in 2016 and the review of the remainder of the sub-sectors of the fermentation code in 2018, an investigation to collect additional data for better characterization of wastewater strength from microbreweries operating under a code of practice was initiated in 2019. Due to issues in locating suitable sites and accessibility complications, the project was extended into 2020.

Rigorous food service inspections are performed every year due the sector's large size (1,543 regulated businesses) and potential to impact sewer infrastructure through grease blockages. In 2020, 765 food service businesses were inspected, with 381 repeat inspections required to address non-compliance issues and provide education and support through the pandemic. The majority of those repeat inspections focused on assisting the facility to comply with regulatory requirements, such as proper maintenance of existing grease interceptors.

Several samples were collected from printing facilities to determine effectiveness of various levels of treatment occurring in the sector. Due to the shift in the make-up of businesses in this sector from traditional paper printing to primarily screen printing operations, code requirements may not be applicable in all situations. Sampling will continue in 2021 after the completion of a more detailed sector review.

The CRD sponsored two student projects with the Royal Roads University Environmental Science Program. One project was intended to build on the previous year's study on the effect of dishwashers on the efficiency of hydromechanical grease interceptors. The initial scope was to determine the effects of high temperature water (85-95 ºC), specifically. Due to the worldwide pandemic of COVID-19, students did not have access to laboratory space and instead focused on a literature review and potential experimental design to aid future projects. Findings are discussed in Section 3.3.4.

The second Royal Roads University student project researched the current and potential pre-treatment options for high-strength wastewater, focusing on two industries within the regional district, breweries and organic waste handlers. A literature review of five different treatment technologies was conducted, all of which were recommended as options to reduce effluent strength. Findings and recommendations from this study are discussed in Section 3.3.5.

3.1.5 Coordinated Inspections

3.1.5.1 Coordinated Significant Incident Responses

There were four significant incidents formally reported in 2020, and one incident reported in 2019 that received further investigation. Four involved a build-up of fat, oil and grease, reported by CRD or municipal staff and one was due to dye or colouring material reported by CRD staff. Further details of each incident can be found in Table 10.

3.1.6 Monitoring

Staff carried out the following types of monitoring in 2020: permit compliance, authorization compliance, code of practice, assessment monitoring, key manhole monitoring, and two miscellaneous sampling projects. All wastewater samples collected in 2020 were analyzed by a contract laboratory using standard analytical procedures specified in the program Sampling and Analysis Procedure Manual.

Table 7 provides a summary of monitoring activity in 2020. Sampling instances (middle column) are the total number of samples taken and managed from collection to data entry. This number includes field replicate samples and multiple samples taken from the same site throughout the year. The number of sampling stations (right column) tallies the number of physical sampling locations visited throughout the year. Each station may be sampled multiple times.

Table 7 Summary of RSCP Monitoring Activity in 2020

Monitoring Events	Total Sampling Instances in 2020	Number of Sampling Stations in 2020
Permit compliance	74	30
Authorization compliance	31	20
Code of Practice	16	10
Key manhole	14	6
Assessment monitoring	7	5
Miscellaneous sampling project	21	6
Significant incidents	0	0
Saanich Peninsula Plant influent	12	1
Saanich Peninsula Plant dewatered sludge	12	1
Ganges influent	12	1
Ganges mixed liquor	11	1

3.1.6.1 Permit Compliance Monitoring

Businesses operating under waste discharge permits are required to carry out self-monitoring of their wastewater for a range of parameters on a specified regular basis. This data is normally submitted to staff on a monthly or quarterly basis for compliance assessment. An important component of the program is the collection and analysis of audit samples from each permitted site twice per year. This is done to verify compliance and confirm that the self-monitoring data being submitted are representative of discharges from each permitted site. Staff normally collect these samples throughout the year, following a pre-arranged schedule. Additional sampling events are carried out as necessary on suspected problem discharges from permitted sites.

The average number of scheduled audit events per permit in 2020 was two. The goal of collecting audit samples from each permitted site twice per year was achieved at all but five permit sites where sampling was cancelled to respect the site operator's request to restrict non-essential visitors during the COVID-19 pandemic.

Staff responsible for managing a specific permit review the data submitted by the permittee. If a significant difference is detected between permittee self-monitoring results and CRD audit results, the permittee is contacted and an investigation into the discrepancy is initiated. All audit results obtained in 2020 were not significantly different from self-monitoring results reported from the same site. This indicated that the self-monitoring results being submitted by permittees had been collected and analyzed in an appropriate manner, as required by each permit.

Since CRD audit monitoring is carried out in accordance with strict quality assurance procedures, it provides reliable information when calculating characteristic contaminant levels or loads for a particular industry or business type. This information is useful for planning purposes in specified collection areas.

3.1.6.2 Authorization Compliance Monitoring

Twenty-five businesses operating under authorizations were monitored in 2020, 15 of which have self-monitoring requirements. One business was visited twice to follow-up on a low pH reading.

The CRD monitoring provides, at minimum, an annual check on the quality of effluent being discharged by businesses known to have reported restricted waste generation or handling on site. The results of this monitoring indicated that the majority of discharges from authorizations in 2020 were in compliance with Sewer Use Bylaw restricted waste limits.

3.1.6.3 Code of Practice Monitoring

A sector-focused approach to code of practice monitoring was implemented in January 2012. The approach involves focusing on fewer sectors per year, but inspecting and sampling the entire sector, where possible. This focused monitoring is coordinated with inspections, in order to address any compliance issues, which may influence monitoring results.

The monitoring approach generates a comprehensive overview of the composition of the wastewater within each sector and provides information on the effectiveness of specified treatment works reducing contaminant loads. The data generated also assists businesses in meeting the restricted waste criteria defined in the CRD Sewer Use Bylaw (Bylaw No. 2922).

There are no wastewater self-monitoring and reporting requirements for businesses operating under code of practice. Code of practice compliance is achieved by installing the required, properly sized treatment works, regular maintenance of the treatment works and record keeping.

Dental and printing sectors were selected for monitoring in 2020. One final sample was collected for the fermentation sector review, and follow-up inspection and monitoring was conducted at one dry cleaning facility and three automotive repair facilities.

DENTAL

Sampling was initiated in June from three key collection points downstream of buildings that had been identified through mapping as containing a high concentration of dental facilities. Due to the pandemic lockdown, the majority of the facilities were closed, which enabled the program to collect samples with little to no dental activities taking place. A second round of sampling was conducted when businesses re-opened in October.

Samples were collected from three manholes, wastewater from these sites also contained domestic waste from the catchment area. All samples were analyzed for metals, including mercury. The results showed levels below Sewer Use Bylaw restricted waste limits and are summarized below:

- First round: Samples ranged from non-detect to 0.0002 mg/L for mercury
- Second round: Samples ranged from 0.2×10^{-5} mg/L to 0.0002 mg/L for mercury

All other metals were well below Bylaw limits. A third round of sampling is planned in 2021, which should represent post-pandemic normal operations. The review is discussed in greater detail in Section 3.3.

PRINTING

Due to changes in availability of service providers for the trade waste interceptors, required in the Code of Practice for Printing Operations, facilities have fallen behind in maintenance or started to design their own treatment works. In order to encourage more frequent maintenance and ensure compliance of modified treatment works, samples were collected from five discharging facilities in 2020.

All samples were analyzed for conventional contaminants, volatile organic compounds, and inorganic contaminants (metals). The results are summarized below:

Conventional Contaminants

- Chemical oxygen demand: three samples were above the Bylaw limit of 1,000 mg/L, but facilities operating under this Code are exempt from that requirement
- Total suspended solids: two samples exceeded the Bylaw limit of 350 mg/L (430 mg/L and 1,800 mg/L)
- Mineral Oil and Grease: one sample slightly exceeded the Bylaw limit of 15 mg/L

Organic Contaminants

- Analysis of volatile organic compounds (benzene, toluene, ethylbenzene and xylene) showed all samples within the Bylaw limit, with most samples having non-detectable results

Inorganic Contaminants

- Copper: one sample exceeded the limit of 1 mg/L, at 2.98 mg/L
- Selenium: one sample exceeded the limit of 0.3 mg/L, at 5.3 mg/L

FERMENTATION

In 2018, staff initiated a review of the Fermentation Code of Practice where 21 sites were inspected and six were sampled. For most permitted facilities, years of monthly data was available; however, only one or two sets of sample results were available for each microbrewery. A project was initiated to collect additional data on microbreweries in 2019 and 2020 to develop a more representative picture of wastewater strength and volumes from these facilities. A pilot study was conducted to determine the feasibility of flow monitoring at those facilities. Flow monitoring is a crucial component of calculating loadings from this sub-sector.

A total of six samples from two microbreweries were collected. All samples were analyzed for conventional contaminants and detailed flow data was collected for a period of seven months. The results were compared against typical permitted brewery extended limits where applicable and are summarized below:

Conventional Contaminants

- Biochemical oxygen demand: all six samples exceeded the extended limit of 1,800 mg/L (ranging from 2,000 mg/L to 7,000 mg/L)
- Chemical oxygen demand: all six samples were above the extended limit of 2,500 mg/L (ranging from 4,720 mg/L to 17,400 mg/L)
- Total suspended solids: both samples from the first site were in compliance with the Bylaw limit. All four samples from the second site exceeded the Bylaw limit of 350 mg/L (ranging from 400 mg/L to 1,012 mg/L)

Flow

- Monthly flow: both sites had flows below the permit trigger of 300 m^3 per month (ranging from 11.1 m^3 to 68.8 m^3)

Discussion of the microbrewery pilot study results can be found in greater detail in Section 3.3.

3.1.6.4 Key Manhole Monitoring

Key manhole monitoring is carried out to monitor for contaminants originating from sources within wide sanitary sewer collection areas. This includes monitoring at two residential sites and two Department of National Defence sites within the Macaulay Point and Clover Point collection areas. It also includes one residential site and one Victoria International Airport site within the Saanich Peninsula Wastewater Treatment Plant collection area.

Key manhole sampling results either met Sewer Use Bylaw restricted waste limits or exceeded limits slightly during one single sampling event at a particular location. The locations with exceedances will receive increased source control inspection effort in future years in order to work with businesses to better manage their discharge quality.

The program was enhanced to capture a wider range of parameters at more locations on a four-year cycle, in order to better understand trends in contaminants from various land use types and collect data to evaluate program efforts against the operational needs of the McLoughlin Point Wastewater Treatment Plant, which was commissioned in December 2020, as well as the other CRD treatment facilities across the region. Enhanced sampling, which was scheduled in 2020, was delayed due to COVID-19 pandemic. Many

businesses stopped operating, others operated with modified hours and/or services, tourism and post-secondary student populations were significantly reduced, and residential sewer use patterns changed significantly as a result of pandemic restrictions. It was deemed that any additional enhanced key manhole sampling results would not represent normal patterns. Therefore, enhanced key manhole sampling was postponed until the end of the pandemic.

RESIDENTIAL SITES

Residential (or domestic) key manhole monitoring has been carried out by CRD staff since 1996. This sampling has provided information on background levels of typical contaminants found in residential wastewater and the data has been used to predict contaminant loads from domestic sources for planning purposes.

The 2020 residential sampling program included sampling events at Dean Park (North Saanich), Harling Point pump station (Oak Bay) and Lang Cove pump station (Esquimalt) in January, July and October. The sample in April was cancelled due to the sewer use pattern alterations as a results of the first wave of the COVID-19 pandemic. There were no exceedances of Sewer Use Bylaw restricted waste limits in 2020.

DEPARTMENT OF NATIONAL DEFENCE SITES

In 2020, staff sampled a key manhole at the Lang Cove pump station, serving the Department of National Defence Dockyard area in January, July and October. The sample in April was cancelled due to the sewer use pattern alterations as a result of the first wave of the COVID-19 pandemic. One sample was collected at the Department of National Defence Colwood pump station in October.

One exceedance was recorded in 2020:

- Department of National Defence Dockyard total PAH (2.7 mg/L) exceeded in July

SAANICH PENINSULA WASTEWATER TREATMENT PLANT COLLECTION AREA SITES

Samples were collected in April, July and October at Victoria International Airport site. All parameters were within Sewer Use Bylaw restricted waste limits.

3.1.6.5 Saanich Peninsula Wastewater Treatment Plant Influent and Dewatered Sludge Monitoring

Every year, four composite samples of Saanich Peninsula plant influent are collected each quarter by CRD staff for metals and priority pollutant analysis. Typically, triplicate composite sampling occurs in January and July, and single composite sampling occurs in April and October. In 2020, a triplicate sample was collected in July. However, due to shortage of staff time, only a duplicate sample was collected in January.

Twelve composite dewatered sludge samples were collected by CRD staff for analysis in 2020. Daily samples were combined into weekly composites, which were submitted for moisture, metals and weak acid dissociable cyanide analysis on a monthly basis, with a field duplicate submitted in February and September. The results are discussed in Section 3.4.2.

3.1.6.6 Ganges Wastewater Treatment Plant Influent and Mixed Liquor Monitoring

As in past years, a single (grab or composite) sample of influent was collected at the Ganges Wastewater Treatment Plant. The 24-hour composite sample collected in July 2020 was submitted for priority pollutant analysis.

In 2020, 12 mixed liquor (treatment plant wastewater mixed with activated sludge) samples were collected for analysis. Grab samples were collected monthly and were submitted for moisture and metals analysis. The results are discussed in Section 3.4.2.

The data are used to identify contaminants of concern, provide ongoing information on contaminant variability, loads and trends at the treatment plants, and provide input to planning initiatives.

3.2 Enforcement

The CRD has adopted a stepwise approach to enforcement of the Sewer Use Bylaw, as outlined in the program enforcement policy. This enforcement policy classifies offences, outlines enforcement steps and includes use of cooperative measures, such as increased communication, education and monitoring, to resolve issues of non-compliance. The policy was originally approved by the CRD Board in February 1997, and was last amended in November 2006.

The CRD Ticket Information Authorization Bylaw contains fines (tickets) that have been set for specific offences under the Sewer Use Bylaw and its associated code of practice. These fines were last amended in January 2018.

Enforcement activities are directed at ensuring or restoring discharger compliance with the terms and conditions of the Sewer Use Bylaw, waste discharge permits, authorizations and code of practice. Enforcement action is applied in an escalating manner that is reasonable, fair, consistent and impartial. Warnings, tickets, orders and fines are issued, as necessary, in cases of continuing non-compliance.

3.2.1 Operations Regulated By Waste Discharge Permit

Of the 37 active waste discharge permits in place at the end of 2020, 24 sites were in “full compliance” with their permits and the Sewer Use Bylaw. Two permits were at “staff assessment”, one site was classified as “discharger under review”, and 12 sites were considered to be “in progress” but still in compliance with their permits under the enforcement policy. The enforcement levels and numbers of permits at each level are summarized in Table 8.

Table 8 Summary of Waste Discharge Permit Compliance – 2020

Enforcement Level	Number of Permits
Full Compliance	24
Step 1	8
Step 2	2
Step 3	2
Discharger Under Review (non-compliant)	1

Above Step 3, a significant escalation of enforcement action occurs, including notification of compliance status by letter, increased inspection or monitoring frequency, staff assessment of treatment works or procedures and scheduling of meetings to discuss remedial actions. Commitments and requirements agreed to at these meetings are confirmed in a follow-up letter to the permittee. Failure to meet these commitments and requirements can result in elevation from staff assessment to “discharger under review” status. Dischargers at the “discharger under review” level or above are considered to be non-compliant with their permits.

Operations having “discharger under review” status must prepare and submit a detailed compliance plan for approval by the deputy sewage control manager. A 90-day period is typically allowed for the preparation of this plan. This period allows a discharger to hire a consultant to help determine appropriate actions to achieve compliance. Progress meetings are held with the discharger after 30 and 60 days to measure progress, fully communicate the intent of any requirements, and clarify any outstanding issues. A compliance plan, once approved by the deputy sewage control manager, becomes a compliance program that usually forms part of the discharger's waste discharge permit through an amendment.

If no acceptable compliance plan is received within the 90-day period, an order may be issued under the *Environmental Management Act* to set conditions for discharge, or a lawyer's letter is issued. Failure to comply with an order or a lawyer's letter will result in consideration of legal action.

Two permit sites classified above Step 3 were subject to assessment by program staff and one permit site remained under “discharger under review” in 2020. These sites included:

- A septage disposal facility was escalated to “discharger under review” level for sulfide exceedances in 2015, and remained until October 2018. Staff worked with the facility until they regained compliance in October 2018. However, due to continued chemical oxygen demand exceedances, they were escalated to “discharger under review” level again in November 2018. The permittee submitted a compliance plan detailing improved maintenance and repairs in August 2020 and substantial improvements in effluent quality were observed. CRD staff continue to collect data and evaluate the effectiveness of the plan components through seasonal variations.
- A permitted shipyard was escalated to Step 3 levels for tributyl-tin issues in 2019. A written report was submitted with plans to adjust maintenance and work procedures, as well as upgrade treatment works in July 2019. Maintenance and work procedures were effectively improved, however, delivery of the required treatment works equipment was delayed due to unavailability of contractors due to COVID-19. Analytical results in 2020 showed marked improvement and CRD staff continue to work with the facility to ensure the decrease in wastewater strength continues despite seasonal variations.
- A permitted brewery was escalated to Step 3 for biochemical oxygen demand and chemical oxygen demand in 2020. A written report was submitted with plans to repair equipment, increase maintenance and implement new procedures to reduce waste product going to drain. Some projects were put on hold due to COVID-19 and CRD staff continue to work with the facility to ensure continued action to reduce wastewater strength.

No charges were laid against waste discharge permit holders under the Sewer Use Bylaw during 2020.

3.2.2 Operations Regulated by Authorization

A small group of the total number of authorizations issued is scheduled for inspection each year, based on the types of contaminants regulated, the contaminant levels, discharge volumes and the overall impact of discharges from these operations. Discharges from authorizations are considered to have a relatively minor impact in comparison to discharges from permitted facilities.

There were 56 inspections carried out at sites operating under authorizations in 2020. At the end of 2020, 77 of 89 inspected businesses were in full compliance with their authorizations, five were at a Step 1, three were at Step 2, and two were at Step 3 and “under staff assessment”. One of which was a composting facility with continued high-strength organics in their wastewater however, levels had improved over the previous year. The other was a ferry pump station under review for excess sulphides. Increased maintenance and aeration in the tank reduced effluent strength in the latter half of 2020 and staff continue to monitor to ensure levels remain low.

The overall compliance level for the total 89 authorizations active at the end of 2020 was 92%.

3.2.3 Operations Regulated by Codes of Practice

The stepwise approach to achieve compliance is applied to all code of practice sectors in a similar way to dischargers operating under permits or authorizations, as outlined in the enforcement policy. Dischargers are classified as being in “full compliance” if they have been inspected and no unsatisfactory issues are identified. Dischargers having committed offences, up to and including Step 3, are classified as being “in progress” and those at the “discharger under review” level and above are classified as being in “non-compliance” with the code. A summary of the code of practice enforcement results for inspections carried out from the implementation date of each code to 2020 is presented in Table 9.

Table 9 Code of Practice Enforcement Summary

Code of Practice	% Full Compliance[1] (%)	% Not Assessed[2] (%)	% In Progress[3] (%)	% Non-Compliance[4] (DUR) (%)
Automotive Repair	93	5	3	0
Carpet Cleaning	83	7	10	0
Dental	96	3	2	1
Dry Cleaning	92	8	0	0
Fermentation	86	14	0	0
Food Services	90	6	5	0
Laboratory	94	3	3	0
Photographic Imaging	96	2	2	0
Printing	68	0	32	0
Vehicle Wash	82	9	9	0

Notes:

[1]Percentage of active operations, regulated within the sector and in compliance with all requirements of the code at the last inspection, including sites with required treatment works and those using off-site waste management.

[2]Percentage of active operations, regulated within the sector classified as not assessed, typically those identified through business licence sharing agreements near the end of the year.

[3]Percentage of active operations, regulated within the sector classified at not yet assessed, Step 1, 2 or 3 of the enforcement policy at the last inspection date.

[4]Percentage of active operations, regulated within the sector classified as "discharger under review" at the last inspection date.

Most code of practice enforcement actions to date have been associated with implementation of the food services code, which regulates one of the largest business sectors in the CRD. This sector has been very cooperative during application of the escalating approach to enforcement, and approximately 5% of food services operations inspected were considered to be "in progress", with no facilities classified as "discharger under review". The main non-compliance issues continue to be failure to maintain a grease interceptor and failure to install a properly sized interceptor.

There were two tickets issued by the CRD to food services operations in 2020, one was waived upon demonstration of increased maintenance, and one was paid.

The automotive (mechanical) sector had 95% of the facilities in overall compliance and 3% of the facilities "in progress" in 2020, which equates to five of the 191 regulated facilities, mainly for lack of records. Five percent of the facilities had not been assessed before year-end. A review of sampling conducted over the past several years is underway for 2021 and findings will be discussed in next year's report.

In the dry cleaning sector overall compliance was 92% with 8% of the facilities "not assessed", which equates to one of the 12 regulated facilities. Only three facilities are now discharging using treatment works, with the remaining opting for off-site waste management. As with the automotive sector, inspections of the small number of dischargers in this sector are now completed annually to ensure proper solvent management and/or disposal.

The dental sector had 97% of the facilities in overall compliance and 2% "in progress", which equates to three of the 144 regulated facilities. Three percent of the facilities could not be assessed. A study of contaminant levels downstream of three major dental buildings was initiated in 2020 and preliminary results are discussed below.

The food sector is the largest sector, and grew by 8% since 2019. Total compliance for this sector was not as high as previous years, only 90%, however, overall compliance remained high at 93%. The majority of the 5% facilities "in progress" were due to records management. A relatively high portion of facilities (6%) were not accessible since many were temporarily closed during COVID.

The printing sector had 32% of the facilities “in progress” in 2020, which equates to seven of the 22 regulated facilities. A sector sweep was initiated in 2020 with increased analytical samples being collected due to changes in availability of interceptor service. Preliminary results are discussed below.

The vehicle wash sector improved compared to the previous year reaching 91% overall compliance. Nine percent of the facilities were “in progress”, which equates to four of the 44 regulated facilities. The majority of compliance issues were because of a lack of records.

In 2020, 93% of facilities regulated under program codes of practice, permits and authorizations achieved overall compliance.

3.3 Contaminants Management

Contaminants management builds on the program's successful regulatory approach to make reductions in specific priority contaminants that have proven difficult to control or treat. This involves a focus towards avoidance, elimination or substitution of polluting products, processes or materials. Contaminants management projects initiated or completed in 2020 are outlined below.

3.3.1 Trucked Liquid Waste

In 2020, the CRD’s Trucked Liquid Waste service was transferred to the Regional Source Control Program. This service complements the program’s efforts by coordinating the collection and disposal of trucked liquid waste. This type of waste represents the resulting source control diversion of non-domestic liquid waste that is prohibited from discharge to sanitary sewer or stormwater systems and must be transported by truck to a disposal facility. Examples include liquid waste from catch basins, grease interceptors and oil/water separators.

The program goals are achieved primarily through outreach and education. A web-based service provider directory is maintained by staff to allow waste generators to find hauling and disposal options for many different types of trucked liquid waste.

Advertisements

Due to changed messaging priorities under the COVID-19 pandemic, the program did not deliver media campaigns for trucked liquid waste in 2020. Staff continued to update web-based information and respond to trucked liquid waste inquiries during this time and monitored effectiveness of the program. The advertisement campaigns and media were refreshed in 2020 and will re-launched in 2021.

Performance Measures

Performance of trucked liquid waste programs is assessed through annual waste disposal volumes.

Data available from public and private trucked liquid waste disposal facilities are assessed annually. However, an unknown volume of waste is disposed of at out-of-region facilities and those volumes are not available for assessment. Waste received at the Hartland landfill and a local septage/trucked liquid waste disposal facility were reviewed in 2020 for trends, and this data contributes to regional planning efforts and outreach activities.

Increasing trends in trucked liquid waste quantities deposited at regional facilities are used as a key performance indicator of the program’s success. Catch basin quantities received at regional facilities were lower in 2020 and at a similar level as 2018. There is not enough data to assign this reduction as an effect of COVID-19 pandemic business changes. This trend will be evaluated in 2021 after seeing a second year of pandemic data.

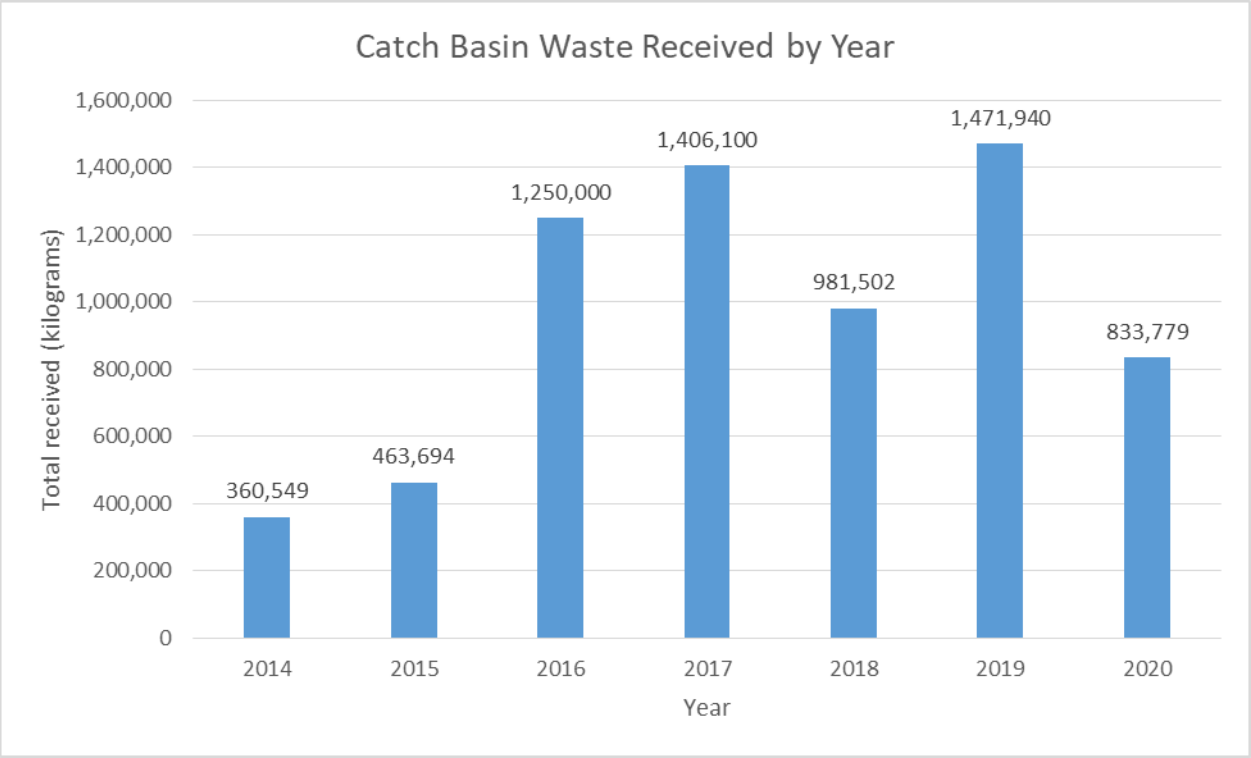

Figure 1 Trucked Liquid Waste Annual Catch Basin Waste Disposal Volumes

3.3.2 Contaminant Characterization of the Dental Sector

A sector sweep incorporating sampling of dental facilities was last conducted in 2010. At that time, it was determined that difficulties surrounding collecting a sample at dental facilities were insurmountable. Sampling of wastewater further downstream and the marine discharge showed low mercury levels and the sector has long had high overall compliance rate, which has historically supported a low priority for this sampling.

However, a modified sector sweep of select dental facilities was initiated to confirm those assumptions. Initially, a small group of dental offices were visited as a joint inspection with the sample technician and an inspector. Sampling was unsuccessful, since monitoring points had not been installed and accessing the wastewater would require plumbing modifications.

Sampling was initiated in June from three key collection points downstream of buildings that had been identified as containing a high concentration of dental facilities. Due to the pandemic lockdown, the majority of the facilities were closed, which enabled the program to collect samples that would provide background levels. A second round of sampling was conducted when businesses re-opened in October and a third round is planned in 2021, which should represent normal operations.

The Code of Practice for Dental Operations requires pre-treatment of wastewater using an amalgam separator, regular maintenance and record keeping. If discharging greater than 2 mg/L of mercury, the facility must replace the amalgam separator's collecting container.

All samples were well below the 0.02 mg/L Bylaw 2922 Schedule "B" limit for mercury, with the results from the second round on average being lower than the first. Analytical results are discussed in more detail in Section 3.1.6.3.

Conclusions from the review will be confirmed following the third and final round of sampling in 2021.

3.3.3 Contaminant Characterization of Microbreweries in the Fermentation Sector

The number of alcohol distillery businesses in BC is rising in part due to significant transformation in provincial liquor laws in 2013, enabling businesses to operate under a craft designation. The region is seeing a growing presence of stand-alone craft distillery enterprises. The distillation sector was reviewed in 2016, and a review of the remainder of the sector was conducted in 2017, as part of a project to evaluate regulation based on contaminant loadings and more consistent requirements across subsectors.

While the flows were much higher for permitted facilities, their wastewater strength was significantly lower than for microbreweries. It was acknowledged that for some permitted facilities, years of monthly data had been collected, while only one or two samples were collected for each microbrewery and no flow data was available. It was recommended that additional data be collected to enable calculation of loadings for this sub-sector.

At the time of this review, there were five fermentation facilities regulated under permit, one authorized facility, 11 microbreweries under the Code of Practice for Fermentation Operations, two brewery u-brews, and several u-vints that use pre-fabricated kits and concentrates. Additionally, there is one microbrewery currently under construction.

A consultant was contracted and installation of flow monitoring equipment occurred in September 2019 at two sites that were compatible with the flow monitoring equipment. Initially, three sites were identified as suitable to be part of the pilot, but only two businesses agreed to participate.

The consultant was contracted for a period of eight months, with CRD staff collecting composite samples once per month during a regular brewing day. Unfortunately, due to COVID-19 the CRD technician was not allowed on site to collect samples and so the decision was made to remove the flow monitoring equipment in March 2020 rather than try to extend the program. Additionally, access to allow sampling was problematic at one of the sites and, therefore, only two samples were collected, while four samples were collected at the second site. A total of seven months of flow data was collected.

Contaminant loadings based on averaged monthly flows and sampling data were as follows:

- Biochemical oxygen demand: 287 kg/y at the first site and 1,889 kg/yr at the second site (for comparison, permitted brewery loadings ranged from 5,044 kg/y to 19,526 kg/y)
- Chemical oxygen demand: 784 kg/y at the first site and 3,662 kg/yr at the second site (permitted brewery loadings ranged from 7,918 kg/y to 33,741 kg/y)
- Total Suspended Solids: 11.5 kg/y at the first site and 218 kg/yr at the second site (permitted brewery loadings ranged from 244 kg/y to 687 kg/y)

While conventional contaminant results exceeded the typical extended limits at permitted breweries, the discharge monthly flow volumes were much lower than previously estimated. Predicted loadings based on a number of assumptions made in the 2018 memo were much higher than what was seen from the data collected from both sites in 2020.

It was recommended that microbreweries be managed under authorizations to facilitate the collection of more substantial contaminant concentration and flow data. Authorization requirements, including self-monitoring and reporting will be scaled based on the facility's annual production of saleable product. This approach will ensure a fair and reasonable approach to managing this variable-strength waste sector.

3.3.4 Contaminant Characterization of the Printing Sector

The nature of the printing sector has changed considerably since the code was adopted in 2002. Local newspaper and other paper printing business have all converted to digital printing or contract printing to larger facilities out of the region. The printing facilities that remain are primarily screen printing operations. Most of these facilities have existing treatment works, but two new facilities have opened and have been unable to install the trade waste interceptor mandated by the Bylaw due to changes in service providers.

Seventeen facilities were inspected during the sector sweep in 2020. One facility was closed, and five were digital or storefronts only. Those five facilities were excluded from sector counts in this report. Four facilities used offsite waste management and seven facilities discharged their wastewater to sanitary sewer. Of the seven dischargers, five facilities were sampled in 2020.

Chemicals used in the printing sector have changed over time; in the early 2000s solvents such as Varsol were much more widely used. Modern fixers and dyes are water-based and largely biodegradable. The majority of acrylic paints do not use metals in their colour formulas. Sampling results similarly show that volatile organic carbons are low to non-detect, but that chemical oxygen demand, total suspended solids, and occasionally metals, can still be an issue.

One facility, which had failed to install treatment works, decided to sell their screen printing equipment and focus on digital printing instead. Staff continue to conduct follow-up inspections and sampling with the remaining facilities to ensure proper maintenance of treatment works and that the discharges meet Bylaw limits.

3.3.5 Assessment of Grease Interceptor Performance

The CRD commissioned a study by Royal Roads University Environmental Science students. The project was intended to build on the previous year's study on the effect of dishwashers on the efficiency of hydromechanical grease interceptors. The initial scope was to determine the effects of high temperature water (85-95 ºC), specifically. Due to the COVID-19 pandemic, students did not have access to laboratory space but instead focused on a literature review and a detailed experimental design to aid future students working on this topic.

Recommendations included using a high-temperature dishwasher rather than simulating high temperature discharge on the bench, careful design of trials at various temperatures and fats, oils and grease loading levels, and a suggestion to observe settling times.

3.3.6 Management Options for High-Strength Wastewater

The second study by Royal Roads University Environmental Science students that was commissioned by the CRD researched the current and potential pre-treatment options for high strength wastewater. The project focused on two industries within the regional district, microbreweries and organic waste handlers.

The study found five potential treatment options, which may be effective in lowering the strength of wastewater coming from microbreweries and organic waste handlers. These are: electrochemical oxidation, enhanced dissolved air flotation device, anaerobic membrane bioreactors, ultraviolet and oxidation remediation and clay-polymer nanocomposites.

The implementation of any one of these technologies will almost certainly be effective in addressing the parameters of concern, which include biochemical oxygen demand, chemical oxygen demand, total suspended solids and pH. However, by being based purely on a literature review, these methods will likely need some adjustments and further investigation before they can be applied to businesses within the CRD.

Recommendations for a future Royal Roads University project include interviewing other jurisdictions where these treatment technologies are in place, testing the effectiveness in a lab setting, and conducting a cost-benefit analysis.

3.4 Contaminant Reductions

3.4.1 Marine Outfall Contaminant Reductions

One of the main objectives of the program is protection of the marine receiving environment. A specific goal associated with this objective, included in both the Core Area and Saanich Peninsula liquid waste management plans, is "to maintain or reduce effluent contaminant loadings to the receiving environment".

3.4.1.1 Core Area Outfall Effluent

In 2020, significant upgrades took place at the Macaulay and Clover pump stations to redirect flows to the new McLoughlin Point Wastewater Treatment Plant. Construction activities and COVID-19 concerns led to loss of access to Macaulay and Clover sampling points.

The CRD Environmental Monitoring Program relocated their sampling locations upstream to locations that are not representative for source control program performance analysis. The temporary locations did not include inputs from key source control areas, such as the downtown core with a high concentration of businesses. In addition, one of the temporary sampling locations was relocated part way thorough 2020. Because of the sampling location and protocol deviations, all 2020 Macaulay and Clover wastewater results are not directly comparable to previous years.

CRD staff regularly monitor effluent quality at the Macaulay Point and Clover Point outfalls for a wide range of substances. The most recent effluent trend analysis was undertaken in 2017. That report provided a statistical assessment of wastewater trends at Clover Point and Macaulay Point outfalls over the period 1990-2015. The findings of this report for Clover and Macaulay points over the 25-year period of record were discussed in previous Regional Source Control Program annual reports and the next trend analysis will be discussed in this section when complete.

Total oil and grease is of particular interest to the program due to both the impacts to effluent quality and blockages in sewage infrastructure. The 2017 trend analysis showed a decreasing concentration over time. The program gives a high priority towards efforts to work with businesses and to educate the public about the source control of fats, oils and grease.

Pharmaceuticals and personal care product monitoring began mid-way through the trend analysis period in 2014, and a full trend analysis of pharmaceuticals and personal care product data will be part of the next study in approximately four years.

A simple comparison between sampling results in 2014 and 2019 for both Macaulay Point and Clover Point outfalls shows large decreases in two compounds associated with anti-bacterial soaps. At both outfalls, triclocarban decreased by >82% and triclosan decreased by >55%. This is expected with the phasing-out of these compounds in personal care products.

Of the indicator pharmaceuticals analyzed, there was no clear trend between 2014 and 2017.

These results are used to assess opportunities to reduce input of these contaminants to the sewage system. Further information about core area effluent quality in 2020 can be found in the *Core Area Wastewater Facilities Environmental Monitoring Program 2020 Report* available on the CRD website.

3.4.1.2 Saanich Peninsula Wastewater Treatment Plant Influent and Effluent

Influent and effluent data has been collected at the plant, since the plant commenced operation in 2000. The first summary of trends in these data was reported in Hatfield Consultants Ltd, 2005. Golder Associates Ltd., 2009a included a statistical assessment of wastewater influent and effluent trends at the plant over the period 2000-2008. Golder Associates Ltd., 2017 provided an update of trends to 2015. The findings of this report over the 14-year period of record at the plant were discussed in previous Regional Source Control Program annual reports and the next trend analysis will be discussed in this section when complete.

Total oil and grease is of particular interest to the program due to both the impacts to effluent quality and blockages in sewage infrastructure. The 2017 trend analysis showed a decreasing concentration over time. The program gives a high priority towards efforts to work with businesses and to educate the public about the source control of fats, oils and grease.

Pharmaceuticals and personal care product monitoring began mid-way through the trend analysis period in 2014, and a full trend analysis of pharmaceuticals and personal care product data will be part of the next study in approximately five years.

In last year's report, a simple comparison between sampling results in 2014 and 2019 showed large decreases in two compounds associated with anti-bacterial soaps. This trend continued in 2020 with triclocarban decreased by 94% (was 89% in 2019) and triclosan decreased by 90% (was 66% in 2019). This is expected with the phasing-out of these compounds in personal care products.

Of the indicator pharmaceuticals compared between 2014 and 2020, there is a trend of decreasing concentration of seven of nine analyzed pharmaceuticals. Two of the nine pharmaceuticals are consistently low or not detected. This is encouraging, as pharmacies were not accepting medication returns for most of 2020 due to COVID-19 protocols. It is hoped that previous years' Medication Return campaign messaging has had a lasting effect on resident behaviour regarding the flushing of unwanted medication.

Further information about plant influent and effluent quality in 2020 can be found in the *Saanich Peninsula Treatment Plant Wastewater and Marine Environment Program 2020 Report* available on the CRD website.

3.4.2 Sludge and Mixed Liquor Contaminant Reductions

Another important objective of the program is the protection of sewage treatment plant sludge quality.

Monitoring of dewatered sludge produced at the Saanich Peninsula Wastewater Treatment Plant commenced in March 2013, and continued in 2020. Monitoring of the mixed liquor produced at the smaller Ganges Wastewater Treatment Plant began in 1994, and continued in 2020.

Prior to the construction of the McLaughlin Wastewater Treatment Plant in 2020 these analyses were not performed in the Core Area due to primary screening not producing sludge. It is anticipated that solids from the plant will be analyzed similarly to Saanich Peninsula once the plant is fully commissioned.

3.4.2.1 Saanich Peninsula Wastewater Treatment Plant Sludge

A dewatered sludge monitoring plan was developed and implemented in March 2013. The dewatered sludge is not a biosolids product, as defined by the *Organic Matter Recycling Regulation*. The sludge is sampled and is assessed using the Class A biosolids quality criteria for comparison purposes to evaluate overall metal concentrations and end-product quality. This monitoring is not intended to characterize the material as a biosolids product.

Mercury levels have been consistently well below the maximum acceptable concentration for Class A biosolids in the last five years of production. Weak acid dissociable cyanide, first monitored in 2013 to confirm increasing trends in Saanich Peninsula Wastewater Treatment Plant influent has remained low, as have silver levels.

Cadmium and molybdenum levels in plant dewatered sludge generally continued at levels similar to biosolids in the last few years of production. Results were all below the respective biosolids criteria. The levels of two electroplating metals, chromium and nickel, appear to be closely correlated with one another, as would be expected, as they are both used in the electroplating process at two facilities in the catchment area.

Previous reports flagged occasional exceedances for mercury, silver and weak acid dissociable cyanide in the last few years. CRD's Environmental Monitoring and Regional Source Control programs investigated these and did not find clear trends or sources upstream in the sewage infrastructure. A review of data revealed that the peaks were the result of samples that had very different laboratory detection limits than past years and the data analysis technique of calculating averages with non-detected parameters assigned a value of 0.5 times the detection limit. For source control analysis, treating non-detected results as "zero" gives a more useful benchmark to assess program performance and not accidentally flag parameters of concern.

3.4.2.2 Ganges Wastewater Treatment Plant Mixed Liquor

The Ganges Wastewater Treatment Plant process produces a mixed liquor product, not a biosolids product, as defined by the *Organic Matter Recycling Regulation*. The mixed liquor is sampled and is assessed using the Class A biosolids quality criteria for comparison purposes to evaluate overall metal concentrations and end-product quality. This monitoring is not intended to characterize the material as a biosolids product. The plant mixed liquor has met Class A quality criteria for all parameters, except mercury (and occasionally molybdenum, once for cadmium), since monitoring began in 1994.

Mercury and silver levels in Ganges mixed liquor show an overall trend is toward lower levels for both metals. Implementation of the dental and photo imaging codes of practice is thought to be the main reason for the reductions in mercury and silver concentrations at the plant. Continued enforcement of the codes of practice, and a shift to digital imaging, is likely contributing to the continued lower levels of these metals.

There has been a decrease in the levels of cadmium and molybdenum in plant mixed liquor over time. Prior to 2008, molybdenum levels were high and variable, sometimes exceeding the Class A criterion. This may have been due to the use of molybdate corrosion inhibitors in heating and cooling systems within the collection area. More recent levels suggest that there may have been a change to molybdate-free products in at least some situations.

Table 10 Summary of Reported Sewer System Incidents (2020)

Contaminant	Nature of Incident	Potential Impact	Incident Follow-up
Fats, Oils and Grease	Continuation of investigation of fats, oils and grease buildup at Hallowell sanitary sewer pump station in View Royal – Initially reported September 2019	Grease blockages can lead to overflows in municipal sewer pipes and mains – maintenance and health concerns	• Further investigation revealed high density of multi-unit residential housing in the area was contributing to the buildup • Further confirmation was difficult since the lines passed onto strata property • Targeted residential mail-out letters will be sent to residences in 2021
	CRD Operations staff reported fats, oils and grease buildup in the Harbour House and Manson pump stations located on Salt Spring Island – June 2020		• Staff followed up with inspections of nine food service facilities identified in the catchments • Six facilities were identified as having non-compliance issues • CRD RSCP staff conducted follow-up inspections with escalating enforcement • Staff will continue to conduct follow-ups to until satisfactory maintenance is achieved for each facility
	District of Saanich staff reported fats, oils and grease buildup in a main in the area near the McKenzie Avenue/Shelbourne Road intersection – July 2020		• Since the catchment was large, staff prioritized inspections based on higher risk of non-compliance. Eight food service facilities were identified for follow-up • Four instances of non-compliance issues were identified due to lack of maintenance • Staff continued to conduct follow-up inspections until the issue was resolved
Dyes or Coloured Material	Salt Spring Operations staff reported pink influent at Ganges Wastewater Treatment Plant – November 2020	Dyes and colouring material are classified as restricted wastes and could be indicative of hazardous conditions	• Operations staff identified the source as a local hardware store disposing of dye used for paint tinting. • RSCP staff performed a follow-up educational visit to remind the business of proper liquid waste disposal practices

3.5 Significant Incident Reporting

CRD and municipal engineering staff communicate periodically regarding sanitary sewer wastewater quality problems, suspicious discharges or significant incidents leading to contamination of the CRD's collection and treatment systems. A Significant Incident Report form was initially developed in 2000 to record operational problems within all trunk sewers and treatment plants operated by the CRD. The report form and response procedure was reviewed in 2013, following an incident involving a spill of Bunker "C" fuel oil into the CRD's Lang Cove pump station, and a new significant incident response procedure was developed by CRD staff for implementation in 2014. Staff develop detailed sewer catchment area maps, as needed, to support potential investigations.

Table 10 provides a summary of incidents reported in 2020 that impacted, or had the potential to impact, the environment, sewerage works, sewage treatment facilities or public health and safety. Notes on incident follow-up were summarized from CRD significant incident reports, municipal grease reports, complaint forms, memos, emails, conversation records and other notes on file. There were no incidents reported that affected the operation of CRD sewage treatment plants in 2020.

3.6 Outreach and Partnerships Initiatives

Staff continued to develop and maintain program-specific outreach and education messaging throughout 2020. Where appropriate, source control messaging was also integrated with other initiatives, campaigns and community outreach events held throughout the year, across the region. New campaigns are under development to promote source control actions, in order to protect wastewater quality and operation of existing sewage infrastructure and the new McLoughlin Point Wastewater Treatment Plant.

Key source control initiatives and campaigns for 2020 are summarized below under separate sections for residential and business outreach, education and the CRD website.

3.6.1 Residential Outreach

RSCP produced a "What You Put Down the Drain Matters!" brochure in 2020 that is intended to address survey results that indicated that 92% of the public believe that source control practices will not be relevant and that new tertiary treatment will deal with whatever is put down the toilet or sink. This messaging both addresses the fact that tertiary treatment does not remove all contaminants and that contaminants are often removed into the biosolids (leading to quality concerns of that resource) as well as the fact that the other seven secondary sewage treatment plants in the CRD were previously and continue to treat sewage.

This campaign highlighted how wastewater treatment works in the region, as well as what businesses and residents can do to protect wastewater infrastructure and how to reduce/dispose of medications, obstructive waste, microplastics and chemicals.

Fats, oils and grease and unflushable waste received attention in 2020 as infrastructure maintenance frequencies have been increasing in some parts of the region. In response to a written warning letter from Environment Canada and Climate Change issued for the Maliview Wastewater System, a new approach was tested in late 2020 where letters were mailed directly to residents in the Salt Spring Island Maliview catchment. The letters informed residents of issues at the pump station serving their neighbourhood, the potential financial implications to their sewer rates and best practices to reduce the strain on the treatment plant, including to only to flush the "three Ps" (pee, poo and toilet paper). This messaging was not successful, but RSCP then used the approach in other areas (during production of this report in early 2021) with much better success.

A particularly strong partnership was developed with View Royal and Colwood at the end of 2020. CRD and municipal staff investigated catchments together and identified several residential pump stations requiring a focused approach involving direct mailing to residents encouraging proper disposal of waste (such as fats, oils and grease, wipes and dental floss), and to flush only the "three Ps". Initial improvements (reported during production of this report in early 2021) in maintenance frequency reported by View Royal

and Colwood was encouraging and this work will continue into 2021. An analysis of this project will be reported in the 2021 program report.

The CRD has promoted medication return annually as a strategy to keep pharmaceuticals out of the wastewater stream. As pharmacies were not accepting medication returns in 2020 due to COVID-19 protocols, it was hoped that residents are storing their medications for drop-off when the program is started again. Continuing downward trends in indicator pharmaceuticals in wastewater suggests that previous years' Medication Return campaign messaging has had a lasting effect on resident behaviour regarding the flushing of unwanted medication. This program will be re-initiated when pharmacies accept medication drop-off again.

3.6.2 Business Outreach

Program inspectors continued to be the front line staff delivering outreach messaging to local businesses. Outreach included distribution of sector-based posters and guidebooks. These tools are updated periodically based on feedback from businesses and results of inspections. In addition, inspectors worked with business owners to highlight the benefits associated with protection against cross connections (protection of public health), water conservation (potential cost savings), solid waste diversion best management practices and other CRD initiatives.

Staff updated business and sector-specific webpages for the CRD website in 2020. Brochures and posters were identified for review in 2021.

3.6.3 Partnerships Initiatives

Since its inception, the CRD has worked with many agencies to expand program reach and effectiveness, improve services and resolve problems of mutual concern. These agencies have included ENV, federal agencies, such as the Department of National Defence and Public Services and Procurement Canada (formerly Public Works and Government Services Canada), regional districts, municipalities, Island Health and local academic institutions.

In 2020, there were continued collaborative efforts between staff and external partners to provide augmented inspection services and superior customer service, and to promote high environmental performance within businesses.

Some examples of both internal and external collaborative partnerships initiatives undertaken in 2020 are outlined below.

3.6.4 2020 Collaborations

In 2020, CRD staff undertook the following collaborative activities:

- Commissioned two studies by Royal Roads University environmental science students. One to investigate the effect of high temperature on the efficiency of hydromechanical grease interceptors and a second to investigate options for treating high-strength wastewater. Due to COVID-19, laboratory work was cancelled and both studies were limited to literature reviews.
- Continued to leverage the CRD's standing as one of the oldest and most comprehensive source control programs in Canada to share information and promote the development of source control programs throughout BC and Alberta, while co-hosting the Source Control Community of Practice, in partnership with the BC Water and Waste Association.
- Shared metrics and other program information with Alberta Capital Region Wastewater Commission to offer suggestions for reasonable inspection schedules to help improve their program.
- Continued to work with Island Health staff and other CRD program staff, including Cross Connection Control and Onsite Wastewater Management, to share information, maintaining the strong partnership between the program and Island Health inspectors.

- Continued the Business Licensing Municipal Working Group to share new businesses licence information for CRD inspection and permitting purposes (seven municipalities established information sharing procedures, and negotiations continue with three remaining municipalities).
- Continued to undertake odour monitoring in the Lang Cove catchment area to ascertain sulfide sources with a number of permits.

3.6.4.1 Island Health Collaboration

Staff continued to work with Island Health inspectors, sharing information on difficult food service establishments, planning co-inspections, where necessary, and dealing with food carts.

Island Health administrative staff continued their information sharing efforts in 2020, forwarding Application for Food Facility forms to the CRD. The forms provide contact and operating details for new food service businesses, enabling CRD staff to work with new applicants more proactively, and dramatically improving the accuracy of program business data.

3.6.4.2 Collaboration with Academic Institutions

The CRD also developed various partnerships with educational institutions in 2020.

A CRD inspector presented a workshop to Camosun College environmental technology students, covering overviews of regional government, regional wastewater management and source control practices.

The CRD commissioned two studies by Royal Roads University environmental science students, one as a follow-up to the previous year's investigation into hydromechanical grease interceptors and one to investigate treatment of high-strength wastewater discharges. However, due to COVID, for both studies, the scope was significantly reduced.

3.6.4.3 Municipal Collaboration

Since 1999, municipal staff have been encouraged to issue Waste Discharge Assessment forms to persons applying for new building licences or new sewer connections for businesses that have the potential to discharge non-domestic waste to sewer. Completed forms are forwarded by the municipality to the CRD for evaluation. In addition, businesses or plumbers contracted to perform upgrades at code of practice operations directly contact CRD staff regarding code of practice requirements. Letters copied to municipal plumbing or licensing contacts are sent directly to code of practice operations outlining specific requirements and providing information.

In 2020, CRD staff worked with municipal staff to resolve various fats, oils and grease blockages in sewers. Municipal staff continued to provide plumbing and building information, flow data and other information to CRD staff to assist in the preparation of permits, authorizations and code of practice treatment works installations.

A particularly strong partnership was developed with View Royal and Colwood at the end of 2020. CRD and municipal staff investigated catchments together and identified several residential pump stations requiring a focused approach involving direct mailing to residents encouraging proper disposal of waste (such as fats, oils and grease, wipes and dental floss) and only to flush the "three Ps" (pee, poo and toilet paper). Initial improvements in maintenance frequency reported by View Royal and Colwood was encouraging and this work will continue into 2021. An analysis of this project will be reported in the 2021 program report.

3.7 Performance Measures

Three program performance measures are used to assess RSCP performance:

- Percentage of regulated businesses with proper waste treatment installed (this measure is associated with the program objective of consistent application of the program for all users of CRD sewage facilities).

- Percentage of priority contaminants showing no increase in loads to the core area environment (this measure is associated with the program objective of protecting the marine environment adjacent to the CRD's sewage outfalls).
- Percentage of biosolids and sludge samples that meet Class A standards for metals (this measure is associated with the program objective of protecting the quality of sewage sludge and biosolids).

"Overall Compliance" was established in 2014 to replace "Percentage of regulated businesses with proper waste treatment installed". The method of calculating each performance measure is described in Appendix 2.

Table 11 Results of Program Performance Measures (2011-2020)

Performance Measure	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Proper waste treatment[1]	97	90	97	--						
Overall compliance[2]	--			95	97	98	96	93	95	93
Priority contaminants[3]	94	--	--	--	--	92	--	--	--	-
Biosolids and sludge[4]	100	100	100	100	100	100	100	100	100	100

Notes:
[1]Percentage of regulated businesses with proper waste treatment installed.
[2]Overall Compliance replaced "Proper waste treatment" as of 2014.
[3]Percentage of priority contaminants showing no increase in loads to the core area environment (preliminary result from draft report). Study performed every three-five years.
[4]Percentage of biosolids and sludge samples that meet Class A standards for metals.

"Proper waste treatment" was modified in 2014 to "Overall Compliance", as a better indicator of effective contaminants diversion. An enforcement status of "Compliant" or "Step 1" indicates proper treatment works or that an acceptable performance-based treatment arrangement has been made, though not necessarily compliant with what is prescribed in the codes of practice. Further, a "Compliant" or "Step 1" enforcement status assumes that the treatment works are being properly maintained. All treatment systems are rendered ineffective if they are not maintained, thus as a compliance indicator, this is much more accurate in representing how well waste is being managed.

"Priority Contaminants" is based on the "yearly trend" in loads at both Macaulay Point and Clover Point outfalls for 36 priority contaminants, as documented in the most recent trend assessment report (Golder Associates Ltd, 2017). Long-term analysis of effluent trends for the core area outfalls is only undertaken every three-five years. The most recent analysis, including data from 1990-2015, was received in 2017.

"Biosolids and Sludge" has shown some variability in the early years, largely due to the mixed liquor metals results from the Ganges Wastewater Treatment Plant exceeding Class A criteria for biosolids. However, in 2020, for the 13th consecutive year, the plant mixed liquor results met the Class A criteria for all metals, including mercury. Saanich Peninsula plant dewatered sludge monitoring commenced in March 2013. All of these results also met the Class A criteria for metals. The combined results from the two plants provided an overall 100% rating for this performance measure in 2020.

4.0 CONCLUSION

This report meets the CRD's commitments in the Core Area and Saanich Peninsula liquid waste management plans to prepare an annual report on the program for submission to the provincial government. The information in this report is used by CRD staff to evaluate the performance and future direction of source control program activities and by municipal staff to understand trends in discharge of contaminants from residential and business sources.

The CRD continued to work towards its goals to protect sewage collection and treatment facilities, public health and safety, and the marine receiving environment, by reducing the amount of contaminants that industries, businesses, institutions and households discharge into the CRD's sanitary sewer systems. The program regulated approximately 2,200 businesses through industrial wastewater discharge permits, authorizations and sector-specific codes of practice.

Increasing trends in trucked liquid waste quantities deposited at regional facilities are used as a key performance indicator of the program's success. Catch basin quantities received at regional facilities were lower in 2020 and at a similar level as 2018. This trend will be evaluated in 2021.

A total of 2,091 code of practice inspections were conducted over the year. Semi-annual inspections of the 37 active permits, and annual inspections of the 89 active industrial, commercial and institutional authorizations, were completed. One new permit and six new authorizations for a variety of business types and terms were issued. Four significant incidents reported in 2020 and one reported in 2019 in regional and municipal sewers were investigated in 2020, and only one ticket was issued to a non-compliant food services operation. The overall compliance rate, including facilities operating under code of practice, authorization and permit was 93% in 2020.

Ganges Wastewater Treatment Plant mixed liquor results met the Class A biosolids criteria for all metals, including mercury. Saanich Peninsula Wastewater Treatment Plant dewatered sludge results also met the Class A criteria for metals.

Most monitoring targets set for 2020 were achieved, despite the challenges of the COVID-19 pandemic. In addition, sampling was initiated at five facilities in the printing sector to support a sector review. Sampling was also conducted at select fermentation facilities. The results assisted staff in characterization of fermentation wastewater, particularly for microbreweries with an eye towards contaminant loadings and consistent requirements across sub-sectors.

The CRD also reduces inputs of contaminants into the sewer system with numerous non-regulatory tools, which leads to the reduction of contaminants to the environment. Significant activities throughout the year included:

- Continued promoting new engagement and behaviour change tools with the "What You Put Down the Drain Matters!" campaign.
- Creation of a standardized direct mail out to residents in service areas with high obstructive waste maintenance requirements.

In 2021, the program will be working on several initiatives, including:

- Continuing the enhanced key manhole study to capture a wide range of parameters in sewage at several locations in order to better understand trends in contaminants from various land use types and collect data to evaluate program efforts against the operational needs of the McLoughlin Point Wastewater Treatment Plant, as well as the other CRD treatment facilities across the region.
- Evaluating emerging business sectors in order to set appropriate regulations and discharge limits for their unique flow and waste strength characteristics.
- Continuing to update web and print resources for the education of businesses and residents.
- Delivering educational campaigns to promote source control actions in order to protect wastewater quality and operation of existing sewage infrastructure and the new McLoughlin Point Wastewater Treatment Plant.

5.0 REFERENCES

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APPENDIX 1

Program Priority Contaminant List (2020)

TOTAL METALS
arsenic (As)
cadmium (Cd)
chromium (Cr)
cobalt (Co)
copper (Cu)
lead (Pb)
manganese (Mn)
mercury (Hg)
molybdenum (Mo)
nickel (Ni)
selenium (Se)
silver (Ag)
zinc (Zn)
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
Total PAH
Low molecular weight PAH
naphthalene
acenaphthylene
acenaphthene
fluorene
phenanthrene
anthracene
fluoranthene
High molecular weight PAH
pyrene
benzo(a)anthracene
chrysene
benzo(b)fluoranthene
benzo(k)fluoranthene
benzo(a)pyrene
dibenzo(a,h)anthracene
indeno(1,2,3-cd)pyrene
benzo(g,h,i)perylene
Phthalates
bis(2 ethylhexl)phthalate
di-n-butyl phthalate
MISCELLANEOUS
1,4-dichlorobenzene
Cyanide - weak acid dissociable (WAD)
Cyanide - strong acid dissociable (SAD)
phenol
total oil and grease

APPENDIX 2

Calculation Methods for Regional Source Control Program Performance Measures

The following methods are used to calculate the four CRD performance measures referred to in Section 3.7.

Performance Measure #1:

Percentage of regulated businesses with proper waste treatment installed

As of 2014, this performance measure has now been replaced with "overall compliance". "Number of regulated business with proper waste treatment installed" was, in earlier program years, a significant marker of program influence. As new codes of practice were being introduced to the region, it was important to measure how many (and how quickly) businesses were adopting proper wastewater treatment systems. It is the belief of CRD staff that a shift to "overall compliance" is now a better indicator of effective contaminants diversion due to:

- **Consistent high compliance with proper treatment works installed:** Inspection history shows that, as a baseline, almost all regulated facilities are operating with proper waste treatment.
- **Performance-based compliance site-specific practices:** Alternative arrangements in practices or technologies, which might deviate from what is prescribed in a code, may be effectively treating the waste. For example, there are several automotive facilities with (technically) under-sized oil/water separators, who are supplementing their systems with oil coalescing plates, analyzing the wastewater effluent and being monitored through an authorization to ensure that the systems are not bypassing hydrocarbons or in excess of other restricted waste limits.
- **Treatment works maintenance:** The top enforcement issue amongst regulated facilities is proper maintenance of treatment works. All treatment work systems are rendered ineffective if they are not maintained, thus, as a compliance indicator, this is much more accurate representation of proper contaminants diversion. A facility not maintaining a system will receive a major infraction (Step 2) compliance status.
- **Working with facilities with inadequate or no treatment works:** On the rare occasion where a facility is found to have no treatment works on site, staff work swiftly with the business towards adopting an effective system. When there is resistance to working proactively with staff, enforcement actions escalate quickly, typically resulting in positive action from the facility. When inspected treatment works are viewed as ineffective[1], the inspector will work with the business to improve treatment performance through either an upgraded system that meets CRD requirements; authorizing modifications to the existing system to meet or beat base performance requirements; or assisting the business in modifying their practices to eliminate the need for on-site treatment works[2].

Performance Measure #2

Percentage of priority contaminants showing no increase in loads to the core area environment

This measure is associated with the CRD objective of protecting the marine environment adjacent to the CRD's sewage outfalls.

[1] (e.g., under capacity, in poor repair, or not undergone base standard certification)
[2] (e.g., an automotive shop disconnecting their floor drains and using off-site treatment services exclusively)

The CRD has collected samples of wastewater from the Macaulay Point and Clover Point outfalls, since 1988. Wastewater samples have been analyzed for over 200 parameters, including priority substances and conventional parameters. Statistical analyses have been conducted periodically in the past to evaluate long-term trends in concentrations and loads of these substances in wastewater. The most recent trend assessment (Golder Associates Ltd., 2018), utilizing data from the period 1990-2015, updates the previous assessment (Golder Associates Ltd., 2013).

In 2008, the CRD prepared a list of core area priority contaminants, based on information provided by CRD's Environmental Monitoring Program and other sources. The following table shows the current list of 39 program priority contaminants (Appendix 1 of this report). Most of these contaminants have been targeted for reduction by the program, either through regulation or outreach, or a combination of initiatives.

Performance measure #2 is based on the "yearly trend" in loads at both Macaulay Point and Clover Point outfalls for the above 39 priority contaminants, as documented in the most recent trend analysis report. All program priority contaminants showing either a decrease or "no significant trend" in loads at either Macaulay Point or Clover Point outfalls are identified and reported as a percentage of the 39 listed priority contaminants. Note that trends for "total" metals, not "dissolved", are used in the calculation. For polycyclic aromatic hydrocarbon, trends for individual polycyclic aromatic hydrocarbon, low molecular weight polycyclic aromatic hydrocarbon, high molecular weight polycyclic aromatic hydrocarbon and total polycyclic aromatic hydrocarbon are used in the calculation.

Performance Measure Calculation

The following table shows how performance measure #2 was calculated for 2005, 2008, 2011 and 2016, based on information provided in Golder Associates Ltd. Note: Only the contaminants for which a significant increasing trend was reported are shown—all other contaminants showed either a "significant decrease", no "significant trend" (ns) or "could not be calculated" (nc).

RSCP Priority Contaminant	Yearly Trend Core Area Loads			
	(1990-2005)	(1990-2008)	(1990-2011)	(1990-2016)
TOTAL METALS				
arsenic (As)		Increase		
cadmium (Cd)				
cobalt (Co)			Increase (MAC)	
chromium (Cr)				
copper (Cu)				
lead (Pb)				
molybdenum (Mo)	Increase (CLO)	Increase (MAC)		
manganese (Mn)				
mercury (Hg)				
nickel (Ni)				
selenium (Se)		Increase		
silver (Ag)				
zinc (Zn)				
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)				
Low molecular weight PAH				
naphthalene				
acenaphthylene				
acenaphthene		Increase		Increase (MAC)
fluorene				Increase (MAC)
phenanthrene				
anthracene				
fluoranthene		Increase		
High molecular weight PAH	Increase	Increase		
pyrene				
benzo(a)anthracene				
chrysene				
benzo(b)fluoranthene				
benzo(k)fluoranthene				
benzo(a)pyrene				
dibenzo(a,h)anthracene				
indeno(1,2,3-cd)pyrene				
benzo(g,h,i)perylene				

RSCP Priority Contaminant	Yearly Trend Core Area Loads			
	(1990-2005)	(1990-2008)	(1990-2011)	(1990-2016)
Total PAH		Increase (MAC)		
Phthalates				
bis(2 ethylhexl)phthalate	Increase	Increase (MAC)		
di-n-butyl phthalate				
Miscellaneous				
1,4-dichlorobenzene				
phenol				
total oil and grease				
Cyanide - WAD			Increase (CLO)	Increase (CLO + MAC)
Cyanide - SAD				
Total # Increase	**3**	**8**	**2**	**3**
Total # Decrease or "ns"	**33**	**28**	**34**	**33**
% of 36 Priority Contaminants	**92%**	**78%**	**94%**	**92%**

Performance Measure #3

Percentage of biosolids and sludge samples that meet Class A standards for metals

Performance measure #3 is linked to the CRD objective of protecting the quality of sewage sludge and biosolids.

Composite samples of biosolids produced at the Saanich Peninsula Wastewater Treatment Plant were analyzed on a regular basis during periods of production from May 2000 to April 2011. Samples were analyzed for metals, moisture, pH, nutrients and microorganisms. Analytical results for metals were assessed using Class A biosolids standards, as specified in Canadian Food Inspection Agency Trade memorandum T-4-93 Table II (see below).

Following CRD Board direction to cease land application of biosolids, the Saanich Peninsula plant has produced only dewatered sludge since April 2011. The dewatered sludge was landfilled as controlled waste throughout 2012, without routine sampling and analysis. Consequently, there was no 2012 plant dewatered sludge data available for input to this performance measure. Plant dewatered sludge monitoring commenced in March 2013.

Class A Biosolids Standards, Maximum Acceptable Metal Concentrations*

Metal	Concentration (mg/Kg dry weight)
Arsenic	75
Cadmium	20
Cobalt	150
Mercury	5
Molybdenum	20
Nickel	180
Lead	500
Selenium	14
Zinc	1,850

Note:
*From: Canadian Food Inspection Agency Trade memorandum T-4-93 Table II

The Ganges Wastewater Treatment Plant produces a mixed liquor product, and the Saanich Peninsula Wastewater Treatment Plant produces dewatered sludge. Neither of these are biosolids products by definition. Grab samples of Ganges plant mixed liquor are analyzed for metals and moisture on a monthly basis. Composite samples of Saanich Peninsula plant dewatered sludge are submitted for metals cyanide and moisture analysis initially on a weekly and finally on a monthly basis. The results are assessed using the Class A biosolids standards referred to above.

The performance measure is calculated using the ratio of the annual number of samples of both dewatered sludge and mixed liquor that were compliant with Class A standards and the total annual number of samples collected and analyzed—expressed as a percentage.

Performance Measure Calculation – 2020

The following table illustrates how performance measure #3 is calculated for 2020.

Treatment Plant	# Samples (2020)[1]	# Compliant (2020)[2]
Ganges Plant (Mixed Liquor)	12	12
Saanich Peninsula Plant (Dewatered Sludge)	12	12
Totals	**24**	**24**
Percentage Compliant		**100%**

Notes:

[1]the number of dates on which discrete samples were submitted for analysis.

[2]the number of samples with results that were fully compliant with Class A biosolids standards for nine metals. Results for any field duplicates taken on the same date are averaged. If the standards are exceeded for one or more of the nine metals, a "failure" is recorded for the entire sample.

The overall percentage of biosolids and sludge samples that met Class A standards for metals in 2020 was 100%.

RSCP Performance Measure #4

"Overall compliance"

This new performance measure, replacing "Number of facilities with proper waste treatment" would include facilities regulated through permits, authorizations or codes of practice receiving either a "compliance" or "Step 1" inspection status. A "Step 1" compliance status is indicative of a "first infraction" e.g., a late permit report, or failure to keep records, as required. A single infraction does not have a significant impact on the program. Any facility without proper treatment works or not maintaining treatment works would be given a "Step 2" ("first major infraction" or higher level of enforcement depending on the situation).

Performance Measure Calculation – 2020

The first step in estimating overall compliance is establishing the individual code of practice sector size. All of the facilities within each code of practice data set are assessed and screened on the following criteria:

- Repeat inspections removed
- Not Connected to Regional Sewers discharge types removed
- Storm Drain discharge types removed
- Facilities with no inspection dates removed
- Unknown Discharge Type discharge types removed
- Closed Facilities removed
- Unknown Discharger Types discharge types removed
- Operating Under Another Regulatory type discharge types removed
- Operation Under Construction discharge types removed
- Facilities operating under an authorization removed
- Groundwater Discharger discharge types removed

It should be noted that the screened facilities are not assumed to permanently exist in that state, and are revisited for updates through "newly sewered facility", mapping updates and/or site contact to determine if practices have changed. Sector sizes for permitted and authorized facilities are simply based on number of active permits/authorizations at that time.

Summary of Code of Practice/Permit/Authorization Sector Sizes in 2020

Code of Practice	Est. Sector Size (2020)
Automotive Repair	191
Carpet Cleaning	30
Dental	144
Dry Cleaning	12
Fermentation	21
Food Services	1,543
Laboratory	36
Photographic Imaging	48
Printing	22
Recreation Facility	na*
Vehicle Wash	44
Total CoP Operations	**2,091**
Total Active Permits	37
Total Active Authorizations	89
Total Regulated Facilities	**2,217**

Notes:
*Recreation facilities previously regulated under the code of practice have all been transferred over to individual authorizations.

With the established code of practice sector sizes and number of permitted/authorized facilities, number of "overall compliant" facilities within each data set are established using the last compliance status of 2020. Facilities with "compliant" or "Step 1" status are considered "overall compliant", i.e., minor infractions, but assumed treatment works and associated maintenance. Overall compliance since full implementation of code of practice are presented in the following table.

Progress on Overall Compliance for 2020 since Adapting New Success Measures

Codes	Sector Size	# Insp 2020	% Insp	Total Comp	Comp %	In Prog	In Prog %	Step 1	# Overall Compliant (Compliant Or Step 1)	% Overall Compliant	DUR	DUR %
Automotive	191	85	44.5%	177	92.67%	5	2.62%	5	182	95.29%	0	0.00%
Carpet	30	0	0.0%	25	83.33%	3	10.00%	3	28	93.33%	0	0.00%
Dental	144	140	97.2%	138	95.83%	3	2.08%	2	140	97.22%	1	0.69%
Dry Cleaning	12	8	66.7%	11	91.67%	0	0.00%	0	11	91.67%	0	0.00%
Fermentation	21	0	0.0%	18	85.71%	0	0.00%	0	18	85.71%	0	0.00%
Food	1543	1,146	74.3%	1,381	89.50%	83	5.38%	48	1,429	92.61%	0	0.00%
Labs	36	8	22.2%	34	94.44%	1	2.78%	1	35	97.22%	0	0.00%
Photo	48	15	31.3%	46	95.83%	1	2.08%	1	47	97.92%	0	0.00%
Printing	22	14	63.6%	15	68.18%	7	31.82%	3	18	81.82%	0	0.00%
Recreation*	-				-		-		-	-	-	-
Vehicle Wash	44	37	84.1%	36	81.82%	4	9.09%	4	40	90.91%	0	0.00%
Total	**2,091**	**1,453**	**69.5%**	**1,881**	**89.96%**	**107**	**5.12%**	**67**	**1,948**	**93.16%**	**1**	**0.69%**
Authorizations	89	56	62.9%	77	86.52%	10	11.24%	5	82	92.13%	0	0.00%
Permits	37	69	93.2%	24	64.86%	12	32.43%	8	32	86.49%	1	2.70%
All Totals	**2,217**	**1,578**	**71.2%**	**1,982**	**89.40%**	**129**	**5.82%**	**80**	**2,062**	**93.01%**	**2**	**0.09%**

Notes:
*Recreation facilities previously regulated under the CoP have all been transferred over to individual authorizations.

APPENDIX 3
CRD Regulated Industrial Categories
(Currently Operating under Program Permits or Authorizations)

Business Type	Typical Contaminants Of Concern	Typical Pre-Treatment Installed
Breweries	solids, organics, pH	solids diversion, filtration, pH adjustment
Chemical Manufacturing	pH, toxic metals, solvents	process control, waste neutralization, off-site waste management
Food Processing	fats, oils and grease, solids, organics	solids separation, grease interceptor, neutralization, dissolved air flotation
Groundwater Remediation	mineral oil and grease, toxic metals, toxic organics, solids, sulphides	settling, filtration, sulphide reduction, adsorption
Hazardous Waste Treatment	mineral oil and grease, toxic organics, sulphides, solids, solvents	filtration, oil/water separation, chemical oxidation, aeration, precipitation, flocculation, adsorption, sulphide reduction
Hospitals	fats, oils and grease, solids, organics, solvents, pH	solids separation, grease interceptor, off-site waste management, absorption
Industrial Laundries	fats (and mineral), oils and grease, solids, organics	grease interceptor, filtration, oil skimmers
Metal Platers	toxic metals, cyanide, solvents, pH	process control, metals adsorption, off-site waste management
Organic Waste Treatment	fats, oils and grease, metals, solids, pH, sulphides	dewatering, grease interceptor, bio-reactors, sulphide reduction, dissolved air flotation
Recreation Facilities	pH, chloride, high volume	pH and chloride adjustment, attenuation
Ship Repair	mineral oil and grease, solvents, toxic metals, toxic organics, solids	settling, flocculation, filtration, electrocoagulation
Street Waste Treatment	fuel, toxic metals, mineral oil and grease, organics, solids	filtration, settling, oil/water separation
Transportation	mineral oil and grease, fuel, solids, de-icing fluid	neutralization, oil/water separation, dissolved air flotation
Wet-Cutting	suspended solids	solids separation, settling