

Regional Source Control Program

2019 Report

Capital Regional District | Parks & Environmental Services, Environmental Protection



Capital Regional District

625 Fisgard Street, Victoria, BC V8W 2S6

T: 250.360.3000 F: 250.360.3079

www.crd.bc.ca

December 2020

REGIONAL SOURCE CONTROL PROGRAM 2019 REPORT

EXECUTIVE SUMMARY

The Capital Regional District (CRD) Regional Source Control Program's 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 approximately 2,000 businesses through industrial wastewater discharge permits, authorizations and 11 sector-specific codes of practice. In 2019, the percentage of businesses with a rating of "overall compliance" was 95% and the percentage of mixed liquor and dewatered sludge samples that met Class A standards for metals was 100% for the 11th 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 (the ministry) about program activities and results.

From January to December 2019, 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 95%. The main activities and accomplishments of the program in 2019 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 2019

- co-chaired Source Control Community of Practice meetings, with facilitation by the BC Water & Wastewater Association
- developed and co-hosted a Source Control symposium day at the 47th Annual BC Water & Wastewater Association Conference & Trade Show in Victoria, BC
- commissioned two studies by Royal Roads University Environmental Science students (one to investigate the effect of dishwashers on the efficiency of hydromechanical grease interceptors, and the other to investigate the effluent strength of fire suppression clean-out wastewater)
- collaborated with municipal business licensing staff to share new business information for review against permitting requirements

**REGIONAL SOURCE CONTROL PROGRAM
2019 REPORT**

CONTENTS

Executive Summary	i
1.0 INTRODUCTION.....	1
2.0 BACKGROUND	1
2.1 Policies and Procedures.....	1
2.1.1 Policies Approved by the CRD Board	1
2.1.2 Operating Procedures	2
2.2 Sewage Collection Areas and Sewage Facilities	2
3.0 REGIONAL SOURCE CONTROL ACTIVITIES AND ACCOMPLISHMENTS – 2019	3
3.1 Industrial, Commercial and Institutional Liquid Waste Regulation	3
3.1.1 Regulatory Background	3
3.1.2 Waste Discharge Permits.....	4
3.1.3 Authorizations.....	5
3.1.4 Codes of Practice	5
3.1.5 Coordinated Inspections.....	8
3.1.6 Monitoring.....	8
3.2 Enforcement	12
3.2.1 Operations Regulated By Waste Discharge Permit	12
3.2.2 Operations Regulated by Authorization	13
3.2.3 Operations Regulated by Codes of Practice	14
3.3 Contaminants Management	15
3.3.1 Contaminant Characterization of Carpet Cleaning Sector	15
3.3.2 Contaminant Characterization of Microbreweries in the Fermentation Sector	16
3.3.3 Assessment of Grease Interceptor Performance	16
3.3.4 Characterization and Risk Assessment of Wastewater from Fire Suppression Systems..	16
3.4 Contaminant Reductions	17
3.4.1 Marine Outfall Contaminant Reductions	17
3.4.2 Sludge and Mixed Liquor Contaminant Reductions	19
3.5 Significant Incident Reporting.....	22
3.6 Outreach and Partnerships Initiatives	22
3.6.1 Residential Outreach.....	22
3.6.2 Business Outreach	23
3.6.3 Partnerships Initiatives	23
3.6.4 2019 Collaborations	23
3.7 Performance Measures	24
4.0 CONCLUSION	25
5.0 REFERENCES.....	27

LIST OF TABLES

Table 1 CRD Treatment Plants and Sewage Collection Areas – 2019.....2
Table 2 Annual Sewage Flows 2018-2019.....3
Table 3 Summary of Waste Discharge Permit Activity in 2019.....4
Table 4 Summary of Authorization Activity in 2019.....5
Table 5 Summary of Codes of Practice (Bylaw No. 2922).....6
Table 6 Summary of Code of Practice Activity in 2019.....7
Table 7 Summary of RSCP Monitoring Activity in 2019.....8
Table 8 Summary of Waste Discharge Permit Compliance – 2019.....13
Table 9 Code of Practice Enforcement Summary.....14
Table 10 Summary of Reported Sewer System Incidents (2019).....21
Table 11 Results of Program Performance Measures (2009-2019).....25

APPENDICES

Appendix 1 Program Priority Contaminant List (2019)
Appendix 2 Calculation Methods for Program Performance Measures
Appendix 3 CRD Regulated Industrial Categories (Currently Operating under Program Permits or Authorizations)

REGIONAL SOURCE CONTROL PROGRAM 2019 REPORT

1.0 INTRODUCTION

Source control is a waste management strategy aimed at reducing 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

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 BC Ministry of Environment and Climate Change Strategy (the ministry) and presents a summary of program activities and accomplishments for the period January to December 2019, and provides a brief account of initiatives planned for 2020.

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.

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, 2018 to September 30, 2019, are listed in Table 2.

Table 1 CRD Treatment Plants and Sewage Collection Areas – 2019

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	Township of Ganges (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 2018-2019

Participant	Estimated Annual Flow (m ³ /year)*	Percentage of Total Flows
Saanich	9,170,992	26.35
Oak Bay	2,822,595	8.11
Victoria	12,397,164	35.62
Esquimalt	1,992,251	5.72
View Royal	827,710	2.38
Colwood	1,185,159	3.41
Langford	2,509,309	7.21
Sidney	1,291,715	3.71
Central Saanich	1,358,126	3.90
North Saanich	499,706	1.44
Esquimalt First Nation	25,336	0.07
Songhees First Nation	222,220	0.64
Pauquachin First Nation	28,236	0.08
Tseycum First Nation	11,649	0.03
Institute of Ocean Sciences	5,440	0.02
Department of National Defence	141,456	0.41
Ganges Sewer	176,401	0.51
Maliview Sewer	18,374	0.05
Magic Lakes Estates Sewer	100,832	0.29
Port Renfrew Sewer	19,326	0.06
Total Flow	34,803,997	100%

Note:

*For the period October 1, 2018-September 30, 2019

3.0 REGIONAL SOURCE CONTROL ACTIVITIES AND ACCOMPLISHMENTS – 2019

Program activities and accomplishments in 2019 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 have been 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 2019, 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 late 2020.

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 m³/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 2019.

Table 3 Summary of Waste Discharge Permit Activity in 2019

Waste Discharge Permit Activity	2019
Permits active (at year end)	43
New permits issued	6
Permits closed	7
Permits amended	6
Permit site inspections (including evaluations for new permits)	84

At the end of 2019, there were 43 active waste discharge permits being managed by staff. The majority of these permits were ongoing, with no expiry date. Six new temporary permits were issued: three for short-term discharges of cruise ship grey and black wastewater to sanitary sewer; two for excavation dewatering that were still active at the end of 2019, but will be closed in 2020, and one facility that was closed in 2017 was re-opened under a new permit. The three cruise ship permits were closed by the end of the year, as well as three excavation dewatering permits from 2018. One microbrewery permit was downgraded to an authorization.

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.

All permit inspections scheduled at the beginning of 2019 were completed within the year. Throughout 2019, inspection staff continued their permit confirmation process, which is an on-going 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 2019.

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 2019

Authorization Activity	2019
Authorizations active (at year end)	97
New authorizations issued	9
Authorizations closed or transferred to codes or permits	13
Authorizations amended	4
Authorization site inspections (including evaluations for new authorizations)	81

At the end of 2019, there were 97 active waste discharge authorizations being managed. The majority of these were ongoing, with no expiry date. Nine 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 microbrewery was transferred from a permit to authorization, and four minor dewatering operations. Thirteen authorizations were closed or transferred to codes.

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:

¹Code amended December 2001 and March 2003

²Code amended December 2003

3.1.4.2 Code of Practice Inspection Summary – 2019

In 2019, 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, sometimes at the cost of multiple visits to the same establishment.

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 2019. 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 (1,328 in 2019) includes first (or primary) inspections within an inspection cycle and repeat (or follow-up) inspections to confirm compliance status of 1,106 businesses.

Table 6 Summary of Code of Practice Activity in 2019

Code of Practice (Est. Sector Size – 2019)	% of Sector Inspected in 2019
Automotive Repair (192)	91%
Carpet Cleaning (44)	100%
Dental (117)	11%
Dry Cleaning (11)	100%
Fermentation (18)	19%
Food Services (1323)	71%
Laboratory (26)	100%
Photographic Imaging (52)	27%
Printing (21)	20%
Recreation Facility (0*)	N/A
Vehicle Wash (37)	73%

Note:

*All existing recreation facilities previously regulated under a code of practice were moved to individual authorizations in 2016.

The “sector-by-sector” review process includes inspecting all the 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 2019 were automotive (mechanical) repair, carpet cleaning, dry cleaning, laboratory, printing, photographic imaging and vehicle wash. Other sectors were visited only for “follow-up” inspections. Both discharging and non-discharging businesses (i.e., sending business waste for off-site treatment or operating as a storefront) in these sectors were inspected, except for the printing and photographic imaging sectors for which 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 (annually). 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 in 2018, an investigation to collect additional data to better characterize wastewater strength from microbreweries operating under the code of practice initiated in 2019. Due to issues in locating suitable sites and accessibility complications, the project was extended into 2020.

The CRD sponsored two student projects with the Royal Roads University Environmental Science Program. One to investigate the effect of dishwashers on the efficiency of hydromechanical grease interceptors (section 3.3.3), and the other to investigate the effluent strength of fire suppression clean-out wastewater (section 3.3.4). The only other research on the effect of dishwashers on grease interceptors conducted in North America was limited to gravity grease interceptors, an outdated technology that is no longer industry standard. Fire suppression wastewater was identified by CRD staff as an unknown risk that required some investigation.

Rigorous food service inspections are performed every year, due the sector's large size (1,427 regulated businesses) and potential to impact sewer infrastructure through grease blockages. In 2019, 845 food service businesses were inspected, with 170 repeat inspections required to address non-compliance issues. The majority of those repeat inspections focused on assisting the facility to comply with regulatory requirements, such as proper maintenance of existing grease interceptors.

A sector sweep of the carpet cleaning facilities was initiated to confirm findings of a sweep conducted in 2015 and to inform the upcoming Bylaw amendment. Due to the mobile nature of this business, inspections were difficult to arrange. Code requirements are beyond industry standard and both sector reviews found little correlation between treatment and a reduction in effluent strength. It was recommended the sector be moved to operate under a best management practices model.

3.1.5 Coordinated Inspections

3.1.5.1 Coordinated Significant Incident Responses

There were eight significant incidents formally reported in 2019. Six were involving build-up of fat, oil and grease, one was involving the disposal firefighting wastewater, and one was in response to an overflow at a pump station. Further details of each incident can be found in Table 10.

3.1.6 Monitoring

Staff carried out the following types of monitoring in 2019: permit compliance, authorization compliance, code of practice, assessment monitoring, key manhole monitoring, significant incidents, and a miscellaneous sampling project. All wastewater samples collected in 2019 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 2019. Sampling instances (middle column) are the total number of samples taken and managed from collection to data entry. This number includes any field replicate samples and multiple samples taken from the same site throughout the year. The number of sampling stations (far right column) tallies the number of physical sampling locations visited throughout the year. Stations may be sampled multiple times.

Table 7 Summary of RSCP Monitoring Activity in 2019

Monitoring Events	Total Sampling Instances in 2019	Number of Sampling Stations in 2019
Permit compliance	82	32*
Authorization compliance	38	23
Code of Practice	27	20
Key manhole	23	8**
Assessment monitoring	5	2
Miscellaneous sampling project	2	1
Significant incidents	3	2
Saanich Peninsula Plant influent	8	1
Saanich Peninsula Plant dewatered sludge	12	1
Ganges influent	1	1
Ganges mixed liquor	14	1

Notes:

*Permit compliance stations included three temporary discharge permits for construction excavation dewatering.

**Key manhole stations include two new stations in 2019 for the enhanced key manhole pilot project.

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 2019 was two. The goal of collecting audit samples from each permitted site twice per year was achieved at all but three permit sites. Two of these sites were temporary discharge permits for construction excavation dewatering and terminated partway through the year. The third site is a new permit with various treatment works issues, which prevented them from discharging to the sanitary sewer. This site is utilizing off-site waste management until further notice.

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. The majority of all audit results obtained in 2019 were not significantly different from self-monitoring results reported from the same site. This indicated that most of 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-three businesses operating under authorizations were monitored in 2019, 21 of which have self-monitoring requirements. Four of the businesses were sampled multiple times. One of the businesses was sampled a second time to follow up with initially high sample results. One business adopted changes to treatment works and was sampled three times to establish a baseline for their sample results. The remaining two sites were new businesses and were sampled three times to establish a baseline for their sample results.

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 2019 were in compliance with Sewer Use Bylaw restricted waste limits. Six authorizations were in progress as discussed in Section 3.2.2.

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 new 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 usually achieved by installing the required, properly-sized treatment works, regular maintenance of the treatment works and record keeping.

Three of the 11 regulated sectors were planned for monitoring in 2019: dental operations, carpet cleaning and laboratories. However, two of these sectors (dental operations and laboratories) were challenging or impossible to collect samples from. Dental operations treatment works are sealed and under vacuum with no monitoring points installed. Staff were not able to safely open this closed system for sample collection. Laboratory treatment works posed similar challenges and staff were not able to collect sample except for one facility.

Follow-up inspection and monitoring was conducted at one automotive repair facility with one sample collected, and at three dry cleaning facilities with six samples collected.

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.

Prior to authorizing the discharge from microbreweries, it was decided that a pilot study be conducted to determine the feasibility of flow monitoring at those facilities. Flow monitoring is a crucial component of calculating loadings from this sub-sector. The continuation of the review of the fermentation sector is discussed in greater detail in Section 3.3.

CARPET CLEANING

In 2019, staff undertook a sampling sweep of the carpet cleaning sector. Samples were collected from 11 companies, wastewater was mainly from various residential cleaning jobs, one was a clean-up following a sewer back-up at a commercial location. All samples were analyzed for conventional contaminants (pH, chemical oxygen demand, total suspended solids) and inorganic contaminants (metals, including mercury). The first seven samples were analyzed for organic contaminants [benzenes, toluene, ethylbenzene and xylene, but when all results were well below permit limits and most were non-detectable, sampling for organic contaminants was discontinued. The results are summarized below:

Conventional Contaminants

- Chemical oxygen demand: eight samples were above the Bylaw limit of 1,000 mg/L, but this sector is exempt from that requirement.
- Total suspended solids: This sector has an extended limit of 1,000 mg/L for total suspended solids. Four samples exceeded that limit (ranging from 1,300 mg/L to 2,780 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: Four samples exceeded the limit of 1 mg/L, the highest value was 2.94 mg/L.
- Zinc: One sample had a minor exceedance of the 3 mg/L limit.

The level of filtration did not correlate well with compliance, similar to the sampling results from a sector sweep conducted in 2015.

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.

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 will be commissioned in 2020, as well as the other CRD treatment facilities across the region. One enhanced sample was collected in 2019 with more scheduled in 2020.

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.

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 2019 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, April, July and October. There were no exceedances of Sewer Use Bylaw restricted waste limits at these sites in 2019.

DEPARTMENT OF NATIONAL DEFENCE SITES

In 2019, staff sampled a key manhole at the Lang Cove pump station, serving the Department of National Defence Dockyard area in January, April, July and October, and at the Department of National Defence Colwood pump station in April and October.

Two slight exceedances were recorded for Department of National Defence Dockyard; total suspended solids (360 mg/L) exceeded in April and biochemical oxygen demand (510 mg/L) exceeded in October. Department of National Defence Colwood pump station returned one exceedance of Sewer Use Bylaw restricted waste limits in April for polycyclic aromatic hydrocarbons (0.17 mg/L).

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.

ENHANCED KEY MANHOLE SITE

As part of the new enhanced key manhole monitoring, a sample was collected in Keating Industrial Park (Central Saanich) in July. The Keating site returned three slight exceedances of Sewer Use Bylaw restricted waste limits in July of 2019 for total suspended solids (456 mg/L), biochemical oxygen demand (540 mg/L) and chemical oxygen demand (1080 mg/L).

3.1.6.5 Saanich Peninsula Wastewater Treatment Plant Influent and Dewatered Sludge Monitoring

Four composite samples of Saanich Peninsula plant influent are collected annually 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 2019, due to shortage of staff time and composite sampling equipment, only single composite samples were collected. Triplicate sampling will resume in 2020.

Twelve composite dewatered sludge samples were collected by CRD staff for analysis in 2019. 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.

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 2019 was submitted for priority pollutant analysis.

In 2019, 12 mixed liquor (treatment plant wastewater mixed with activated sludge) samples were collected for analysis. Grab samples were collected on a monthly basis (with a field replicate taken in February and September). Samples were submitted for moisture and metals analysis.

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 43 active waste discharge permits in place at the end of 2019, 25 sites were in “full compliance” with their permits and the Sewer Use Bylaw. One permit was at “staff assessment”, one site was classified as “discharger under review”, and 17 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 – 2019

Enforcement Level	Number of Permits
Full Compliance	25
Step 1	9
Step 2	7
Step 3	1
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. Further non-compliance incidents 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 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.

One permit site classified above Step 3 was subject to assessment by program staff and one permit site remained under “discharger under review” in 2019. These sites included:

- A septage disposal facility was escalated to “discharger under review” level for sulfide exceedances in 2015 and remained until October 2018. The permittee submitted a detailed compliance plan in late 2017, which was accepted by CRD staff. Treatment was increased in December 2017 and results improved. Following a period of monitoring to confirm the effectiveness of the changes, the facility's permit was amended in October 2018 and they were restored to compliant status. However, due to chemical oxygen demand exceedances, they were escalated to “discharger under review” level again in November 2018. CRD staff are still working with the permittee to determine the cause of those exceedances and develop an acceptable compliance plan.
- A permitted shipyard was escalated to Step 3 levels for tributyl-tin issues. 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 COVID-19. Analytical results in early 2020 show marked improvement and CRD staff continue to work with the facility to ensure the decrease in wastewater strength continues, despite seasonal variations.

No charges were laid against waste discharge permit holders under the Sewer Use Bylaw during 2019.

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 85 inspections carried out at sites operating under authorizations in 2019. At the end of 2019, 87 of 97 inspected businesses were in full compliance with their authorizations, three were at a Step 1, two were at Step 2, one was at Step 3, and one composting facility was “under staff assessment” for high strength organics in their wastewater.

The overall compliance level for the total 97 authorizations active at the end of 2019 was 93%.

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 2018 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	1	7	0
Carpet Cleaning	85	6	9	0
Dental	92	3	4	0.8
Dry Cleaning	89	0	11	0
Fermentation	86	14	0	0
Food Services	93	2	5.5	0.2
Laboratory	95	3	3	0
Photographic Imaging	96	4	0	0
Printing	96	4	0	0
Vehicle Wash	67.5	5	27.5	0

Notes:

¹Percentage 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.

²Percentage 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.

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

⁴Percentage 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 5.5% of food services operations inspected were considered to be “in progress”, with 0.2% being 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 16 tickets issued by the CRD to food services operations in 2019, three were waived upon installation of the required treatment works (a filing fee was paid) or removal of grease-bearing fixtures, and 12 were paid. Additionally, one ticket remains outstanding and one outstanding ticket from 2018 was paid.

The automotive (mechanical) sector had 7% of the facilities “in progress” in 2019, which equates to 12 of the 171 regulated facilities. In 2015, a sector-by-sector approach expanded the definition of automotive to include all types of mechanical repair. Approximately 1% of the sector includes facilities identified as possible dischargers under the code, but are still awaiting confirmation. These were primarily identified through the municipal business licence sharing process.

The carpet cleaning sector had 90% of the facilities in overall compliance and 9% “in progress”, which equates to three of the 33 regulated facilities and 6% of the facilities could not be assessed. Due to the mobile nature of this sector, arranging site visits and ensuring compliance with treatment works regulations proved difficult. A summary of analytical findings during this year’s sector review are discussed above in Section 3.1.6.3 and recommendations are discussed further below.

The dry cleaning sector overall compliance was 89% with 11% of the facilities “in progress”, which equates to one of the nine discharging facilities. 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. In 2017, the CRD commissioned a Royal Roads University student project to investigate best practices for solvent treatment. The study highlighted the importance of following the manufacturer’s recommendations for maintenance and media replacement.

The laboratory sector had 97.5% overall compliance and 3% of the facilities “in progress”. This is a marked improvement over the last full sector sweep done in 2015, which found 18% of the facilities “in progress”.

The vehicle wash sector had 27.5% of the facilities “in progress” in 2019, which equates to 11 of the 40 regulated facilities. The majority of compliance issues were because of a lack of records.

In 2019, 95% 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 2019 are outlined below.

3.3.1 Contaminant Characterization of Carpet Cleaning Sector

A sector sweep of the carpet cleaning facilities was initiated to confirm findings of a sweep conducted in 2015 and to inform the upcoming Bylaw amendment. The Code of Practice for Carpet Cleaning Operations requires pre-treatment of wastewater using a 0.25-mm mesh filter prior to discharge, weekly inspections and record keeping. This sector has an extended limit of 1,000 mg/L for total suspended solids and is exempt from the chemical oxygen demand limit in Schedule “B” of Bylaw No. 2922.

Nineteen in-person inspections were conducted and 22 were modified inspections via phone call and email. Four of the businesses contacted where closed, one was not connected to the sanitary sewer system, and one was a subsidiary of an existing facility. Those six facilities were excluded from sector counts in this report.

Effluent samples were taken during 11 site visits. Four samples exceeded the 1,000 mg/L limit for total suspended solids, three exceeded the 1.0 mg/L limit for copper, and one exceeded the 3.0 mg/L limit for zinc. Analytical results are discussed in more detail in Section 3.1.6.3. The review found a lack of correlation between filtration and effluent quality, confirming the findings of the 2015 sector sweep.

Of the in-person inspections, 16 were considered to be in compliance with the bylaw and three were recorded at Step 1 for having a filter that was too coarse. The filter required in the code is no longer easily purchased by operators and is above industry standard. Operators are left to devise their own creative solution to filter to 0.25 mm.

Due to the mobile nature of this business, inspections were difficult to arrange. Code requirements are beyond industry standard and both sector reviews found little correlation between treatment and a reduction in effluent strength. It was recommended the sector be moved to operate under a best management practices model, similar to Metro Vancouver.

3.3.2 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, wastewater strength was significantly lower than for microbreweries. It was acknowledged that for some permitted facilities, years of monthly data was available, while only one or two samples were collected for each microbrewery. It was recommended that additional data on microbreweries be collected. A pilot study to collect additional data, as well as install flow monitoring devices, was initiated in 2018. Flow monitoring is a crucial component of calculating loadings from this sub-sector.

3.3.3 Assessment of Grease Interceptor Performance

In 2019, the CRD commissioned a study by Royal Roads University environmental science students to assess the effect of dishwashers on the efficiency of hydromechanical grease interceptors.

The only other known study on the effect of dishwashers on grease interceptors conducted in North America was limited to gravity grease interceptors (WERF, 2008), an outdated technology that is no longer industry standard. Several jurisdictions do not require dishwashers to be connected to grease interceptors, based on the finding that hot water causes fats, oils and grease to bypass grease interceptors, however, no hydromechanical grease interceptors were tested in the study.

In order to determine the effects of temperature on the efficiency of a hydromechanical grease interceptor, trials were run at a low, medium and high temperature of 15°C, 35°C, and 55°C. The first set of trials (10 for each temperature) were then used as a control to test the effects that adding detergent, sanitizer and a combination of detergent and sanitizer would have on the efficiency.

The initial volume of fats, oils and grease added, and the volume recovered, was used to calculate the efficiency of the grease interceptor under each trial set of conditions and results were analyzed. Temperature did not have a statistically significant effect on the efficiency of the interceptor. A slight improvement in efficiency was noted at 35°C, but was not significant. The addition of sanitizer alone improved the efficiency of the interceptor, with the most significant improvement at 15°C. The addition of detergent significantly reduced the efficiency, as did sanitizer and detergent together at all temperatures. The addition of detergents decreased the efficiency by 41%, and sanitizer and detergent combined decreased efficiency by 43% compared to the temperature-only trials.

The Plumbing and Drainage Institute (PDI-G101) standard requires grease interceptors to conform to an average efficiency of 90% or more; however, this study implies that grease interceptors connected to dishwashers are running at a significantly decreased efficiency of 54%. If nearly half of the fats, oils and grease is being released from the interceptor, it could be a significant contributor to fats, oils and grease issues within the regional district.

High temperature industrial dishwashers operate at minimum temperatures of 82°C, which was beyond the scope of this project. The report recommended further testing should be conducted with a wider range of temperatures, since equipment limitations only allowed a maximum of 55°C to be tested.

3.3.4 Characterization and Risk Assessment of Wastewater from Fire Suppression Systems

In 2019, the CRD commissioned a study by Royal Roads University environmental science students to determine the potential impacts of wastewater discharge from fire suppression systems to municipal infrastructure and the receiving environment.

Interviews were conducted with six businesses throughout the fire suppression industry to investigate current industry practices. Additionally, a quantitative assessment to determine a total estimated release volume from a hypothetical event of simultaneous discharge from all systems in the City of Victoria was conducted.

Two samples of fire suppression system wastewater were collected from the Millward Building on the Royal Roads University campus, analyzed by a certified laboratory and compared against restricted waste limits. Additionally, a qualitative risk assessment matrix was used to evaluate potential adverse effects of allowing untreated discharge to enter the stormwater or sanitary sewer systems.

Fire suppression systems in most residential and commercial buildings typically use water-based fire suppression, which is designed to use only water as the primary extinguishing agent. The study suggests that the most common chemical additives used in systems are phosphate-based corrosion inhibitors, which possess antimicrobial, flame-retardant, and corrosion-inhibiting properties. Considering the infrequent maintenance of systems, and the dilution factor of the discharge into the marine environment, the potential for eutrophication resulting from phosphate-based additives is likely negligible.

The study found that there is minimal risk associated with both the potential volume of and the chemical composition of wastewater generated from fire suppression system maintenance. The analysis of wastewater samples indicated that the wastewater meets the applicable regulatory criteria for disposal in the sanitary and storm sewer systems.

It was recommended further that studies should incorporate other types of fire suppression systems, such as dry-pipe sprinkler systems, including those that use foam-based fire retardants.

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

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. This 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 included the following:

A total of 91 routine analysis parameters were assessed as “frequently detected” for effluent trend analyses. Significant trends in detection frequency over time were observed for approximately 20% of the frequently detected parameters. Among the significant trends, increases in detection frequency were generally observed for metals and conventional parameters, and decreases were generally observed for organic parameters. Increased detection frequency over time appears to be related to improved analytical methods (reduced detection limits for several parameters), rather than to systematic increases in concentrations. However, some elevated detection limits were observed in recent years for organic parameters (e.g., di-n-butyl phthalate).

Approximately 70% of the frequently detected routine analysis parameters and 27% of the frequently detected high-resolution analysis parameters had significantly different concentrations between the two outfalls. For the majority of these parameters, concentrations measured in the Macaulay Point outfall were greater than those measured in the Clover Point outfall. However, the higher flows of wastewater at Clover Point, relative to Macaulay Point, outweighed the concentration differences and resulted in higher constituent loadings (discharged mass per unit time) at Clover Point.

Statistically significant temporal trends in concentrations were identified for approximately 90% of the frequently detected standard analysis parameters and 39% of the frequently detected high-resolution analysis parameters in the wastewater streams of the Macaulay Point and Clover Point outfalls. The total concentrations of cadmium, chromium, copper, lead, mercury, nickel and zinc all exhibited significant negative trends over the time period assessed. Priority substances generally exhibited significant negative trends (or no significant trend), with the exception of two polycyclic aromatic hydrocarbons (acenaphthene and fluoranthene) that exhibited annual percent changes ranging from +2.6% to +3.1%.

Statistically significant trends in loadings over time were observed in approximately 85% of the frequently detected standard analysis parameters. Statistically significant trends in loadings over time were observed in 50% of the frequently detected high-resolution analysis parameters. Temporal trends in loadings were similar to those in concentrations among contaminant groups, reflecting a tendency toward reductions over time.

Overall, the trend results for priority substances evaluated in previous Golder studies (Golder, 2006, 2009, 2013b) were confirmed in the current assessment. Few discrepancies were observed between the current assessment and the previous two Golder trend assessments (Golder 2009a, 2013); the changes observed in the most recent evaluation were toward additional evidence of stable or decreasing concentrations and loadings of substances in the wastewater stream.

Of the high-resolution parameters, statistically significant decreases in concentrations over time were observed for nonylphenols (-24% to -36%), polybrominated diphenyl ethers (-5.3% to -10.1%), and several organochlorine pesticides (annual percent change ranged from -2.9% for alpha chlordane to -18.5% for lindane). Of the organochlorine pesticides, only beta-endosulfan increased with time (+5.3%). Polychlorinated biphenyl did not exhibit statistically significant trends in concentrations over time.

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.

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 is 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 2019 can be found in the *Core Area Wastewater Facilities Environmental Monitoring Program 2019 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 included the following:

Trends in influent and effluent composition were similar for most of the frequently detected parameters. Significant temporal trends were identified for approximately 60% of the frequently detected parameters in the wastewater composite samples. Trends were generally negative (decreasing) for priority substances and for most of the metals. Weak acid dissociable cyanide, manganese and total polycyclic aromatic hydrocarbon increased in either influent or effluent or in effluent only. Similarly, some metals (barium, calcium, dissolved copper, dissolved iron and potassium), as well as diethyl phthalate, increased in either both wastewater streams or in effluent only. The number of significant trends in the current assessment was similar to the previous trend assessment (approximately 66%; Golder, 2013). Results from this study are discussed with the CRD's Environmental Monitoring Program to assess opportunities to reduce input of these contaminants that are increasing to the Saanich Peninsula treatment plant system.

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.

A simple comparison between sampling results in 2014 and 2019 mirrors the findings at Macaulay Point and Clover Point outfalls, with large decreases in two compounds associated with anti-bacterial soaps. Triclocarban decreased by 89.1% and triclosan decreased by 66.0%. This is expected with the phasing-out of these compounds in personal care products.

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

Further information about plant influent and effluent quality in 2019 can be found in the *Saanich Peninsula Treatment Plant Wastewater and Marine Environment Program 2019 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 and mixed liquor quality.

Lime and heat-treated biosolids produced at the Saanich Peninsula wastewater treatment plant were monitored for a range of metals and other substances on a regular basis, since the plant was commissioned in 2000. This monitoring ended in April 2011, following CRD Board direction to cease land application of biosolids. Monitoring of dewatered sludge produced at the plant commenced in March 2013 and continued in 2019. Monitoring of the mixed liquor produced at the smaller Ganges wastewater treatment plant began in 1994 and continued in 2019.

3.4.2.1 Saanich Peninsula Wastewater Treatment Plant Sludge

Following CRD Board direction to cease land application of biosolids, the plant produced only dewatered sludge after April 7, 2011. This sludge was not sampled or analyzed prior to disposal at Hartland Landfill as a controlled waste throughout the period April 2011 to February 2013.

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, showed peaks in 2018 and 2019. This trend will be investigated in future source control inspections. Silver results were elevated in two samples in 2017, but back to normal in 2018. No cause could be determined and a check of influent and effluent samples taken at different times during the year by the CRD's Environmental Monitoring Program showed no indications of elevated silver in the liquid stream. There is, however, no criterion for these two parameters in biosolids to use as a benchmark for evaluating the impact of these observations.

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 the electroplating metals, chromium and nickel, appear to be closely correlated with one another, possibly suggesting a common source on the Peninsula, where there are two electroplating operations under permit.

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 (2019)

Contaminant	Nature of Incident	Potential Impact	Incident Follow-up
Fire Water Disposal	CRD staff assessed wastewater discharge or disposal options of the wastewater generated from the Victoria Plaza Hotel fire – May 2019	Potential for overflows, due to high volume discharge, pollution to marine receiving environment	<ul style="list-style-type: none"> • Access to investigate was delayed, due to structural safety concerns • When staff entered, all wastewater had dissipated, potentially through at least two sanitary sewer floor drains that were identified, as well as run-off to storm
Fats, Oils and Grease	Fats, oils and grease buildup in a sewer lateral in lower Cook Street Village – December 2019	Grease blockages can lead to overflows in municipal sewer pipes and mains –maintenance and health concerns	<ul style="list-style-type: none"> • CRD staff followed up with inspections of seven food service facilities identified in the catchment • No non-compliance issues were identified • City camera surveys further upstream in the catchment identified the primary source of fats, oils and grease contributing to the blockage were private residences and multi-unit residential buildings
	A member of the public reported a grease trap overflow on Fort Street – December 2019		<ul style="list-style-type: none"> • Staff followed up with inspections of the facility. No non-compliance issues were identified, however, the facility had drainage issues and conducted drain cleaning, grease trap pump-out, and a grease interceptor integrity inspection • A follow-up inspection confirmed no further issues
	City of Victoria staff reported fats, oils and grease buildup in a main downstream of several restaurants on lower Burnside – January 2019		<ul style="list-style-type: none"> • Staff followed up with inspections of six food service facilities identified in the catchment • No non-compliance issues were identified • Based on records of previous facilities, it was determined that likely the grease build-up was historical
	District of Saanich staff reported fats, oils and grease buildup in a main in the area around Shelbourne Plaza – March 2019		<ul style="list-style-type: none"> • Staff followed up with inspections of 13 food service facilities identified in the catchment • No non-compliance issues were identified • Historical investigations of this area have also occurred and two of the facilities have since replaced their grease interceptors
	View Royal staff reported ongoing fats, oils and grease buildup at Hallowell sanitary sewer pump station – September 2019		<ul style="list-style-type: none"> • Staff followed up with inspections of five food service facilities and a permitted food production facility identified in the catchment • Two of the five facilities had minor issues and have since been brought into compliance • The food production facility will be investigated further to ensure all grease-bearing fixtures are connected to treatment works • A high density of multi-unit residential housing in the area could also be responsible for the buildup
	City of Victoria staff reported fats, oils and grease buildup in a sewer main on Courtney Street – July 2019		<ul style="list-style-type: none"> • Staff followed up with inspections of seven food service facilities identified in the catchment • No non-compliance issues were identified • The accumulation was likely due to a high density of multi-unit residential housing in the area
Turgoose Pump Station Overflow	CRD Operations staff reported high level alarms culminating in an overflow at Turgoose – September 2019	Pollution to marine receiving environment, public health and safety	<ul style="list-style-type: none"> • Analytical findings were consistent with an unauthorized discharge of catch basin liquid waste through an upstream manhole • However, heavy rainfall during the event washed away any potential evidence to determine the location or identify responsible parties for the discharge

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 2019 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 2019.

3.6 Outreach and Partnerships Initiatives

Staff continued to develop and maintain program-specific outreach and education messaging throughout 2019. 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 2019 are summarized below under separate sections for residential and business outreach, education and the CRD website.

3.6.1 Residential Outreach

In 2019, staff continued a focus on addressing survey results that indicated that 92% of the public believe that source control practices will not be relevant with wastewater treatment. This included promotion of the proper disposal of household hazardous waste and the use of alternative cleaners that have less impact on the sewer system and the receiving environment. Three YouTube videos were created and used for social media. Engagement tools, including five new recipes for alternative cleaners, were created and included a revised Clean Green Cook Book.

Staff also worked on the development of new campaign material for release in 2020 to support source control strategies for: obstructive waste (fats, oils and grease and non-flushable items) and new site-specific messaging for catchment areas with sewage infrastructure issues.

The capital region, through continued presence and past initiatives, maintained a high medication return rate in 2019 and approximately 11.7 tonnes of medications were collected in the region. In BC, only Metro Vancouver returned a higher volume, however, other regions had a higher per capita return rate, with the capital region falling from first to fifth place.



Figure 1 Clean Green Display

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 redeveloped, created and launched new business and sector-specific webpages for the CRD website in 2018, and this work continued through 2019

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 the Ministry of Environment and Climate Change Strategy, federal agencies, such as the Department of National Defence and Public Works and Government Services Canada, regional districts, municipalities, Island Health and local academic institutions.

In 2019, 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 2019 are outlined below.

3.6.4 2019 Collaborations

In 2019, CRD staff undertook the following collaborative activities:

- commissioned two studies by Royal Roads University environmental science students (one to investigate the effect of dishwashers on the efficiency of hydromechanical grease interceptors, and the other to assess the wastewater characteristics of fire suppression system clean-outs)
- 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
- developed and co-hosted a Source Control symposium day at the 47th Annual BC Water & Wastewater Association Conference & Trade Show in Victoria, BC
- 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 2019, 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 2019.

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 to investigate the effect of dishwashers on the efficiency of hydromechanical grease interceptors and the other to assess the wastewater characteristics of fire suppression system clean-outs.

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 2019, 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.

CRD staff also continued to attend Vancouver Island Plumbing Code Committee meetings. This is an opportunity to improve personal relationships with municipal plumbing inspectors, provide regulatory updates and problem solve with issues that affect both municipal and regional inspectors.

3.7 Performance Measures

Three program performance measures were developed over the period 2004-2006. These measures have been incorporated in program budgets since 2007 and were included in the scope of the five-year review undertaken in 2009. The performance measures are as follows:

- 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 (2009-2019)

Performance Measure	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Proper waste treatment ¹	95	96	97	90	97						
Overall Compliance ²						95	97	98	96	93	95
Priority Contaminants ³	--	--	94	--	--	--	--	92	--	--	--
Biosolids and Sludge ⁴	100	100	100	100	100	100	100	100	100	100	100

Notes:

¹Percentage of regulated businesses with proper waste treatment installed.

²Overall Compliance replaced “Proper waste treatment” as of 2014.

³Percentage of priority contaminants showing no increase in loads to the core area environment (preliminary result from draft report). Study performed every three-five years.

⁴Percentage 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 2019, for the 11th 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 2019.

4.0 CONCLUSION

This report meets the CRD’s commitments in the Core Area and Saanich Peninsula liquid waste management plan 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 2,000 businesses through industrial wastewater discharge permits, authorizations and sector-specific codes of practice.

A total of 1,328 code of practice inspections were conducted over the year. Semi-annual inspections of the 43 active permits, and annual inspections of the 97 active industrial, commercial and institutional authorizations, were completed. Six new short-term permits and nine new authorizations for a variety of business types and terms were issued. Eight significant incidents reported in regional and municipal sewers were investigated in 2019, and 16 tickets were issued to non-compliant food services operations. The overall compliance rate, including facilities operating under code of practice, authorization and permit was 95% in 2019.

Ganges wastewater treatment plant mixed liquor results met the Class A biosolids criteria for all metals, including mercury, for the 11th consecutive year. Saanich Peninsula wastewater treatment plant dewatered sludge results also met the Class A criteria for metals.

Monitoring targets set for 2019 were achieved. In addition, sampling continued at six facilities in the fermentation sector to support a sector review. The review 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:

- refreshing the existing BC Medications Return Program and partnering with Island Health and the Health Products Stewardship Association to launch a new campaign to increase public awareness and participation in the program (approximately 11.7 tonnes of medications were collected in the region, the second highest volume of return in BC)
- commissioned two studies by Royal Roads University environmental science students (one to investigate the effect of dishwashers on the efficiency of hydromechanical grease interceptors, and the other to assess the wastewater characteristics of fire suppression system clean-outs)
- continued promoting new engagement and behaviour change tools for the Clean Green 2.0 campaign, which focuses on environmentally-safe alternatives to household cleaners
- developed and co-hosted a Source Control symposium at the 47th Annual BC Water & Wastewater Association Conference & Trade Show in Victoria, BC

In 2020, the program will be working on several initiatives including:

- completing stakeholder engagement for amendments to the CRD Sewer Use Bylaw
- 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, such as microbreweries, 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

- CFIA, 1997. Canadian Food Inspection Agency Trade memorandum T-4-93, Standards for Metals in Fertilizers and Supplements. September 1997.
- Ecofish Research Ltd., 2014. Source Control Strategies for Triclosan and Nonylphenols. Report prepared for the CRD by Ecofish Research Ltd., April 2014.
- Golder Associates Ltd., 2006. Trend Assessment for Substances in Macaulay Point and Clover Point Wastewater (1990-2005). Prepared for the CRD by Golder Associates Ltd., September 2006. Report Number 05-1421-035.
- Golder Associates Ltd., 2009a. Trend Assessment for Substances in Macaulay Point and Clover Point Wastewaters and the Saanich Peninsula Wastewaters and Biosolids. Report prepared for the CRD by Golder Associates Ltd., November 2009. Report Number 08-1421-0105.
- Golder Associates Ltd., 2013. 2011 Trend Assessment for Substances in Macaulay Point and Clover Point Wastewater and the Saanich Peninsula Wastewater and Biosolids. Report prepared for the CRD by Golder Associates Ltd., April 2013. Report Number 11-1421-0050.
- Golder Associates Ltd., 2017. 2017 Trend Assessment for Substances in Macaulay Point and Clover Point Wastewater, Saanich Peninsula Wastewater and Biosolids, and Ganges Wastewater and Mixed Liquor. Draft Report prepared for the Capital Regional District Scientific Programs Division, Victoria, BC.
- Hatfield Consultants Ltd., 2005. Saanich Peninsula Wastewater Treatment Plant Data Analysis. Report prepared for the CRD by Hatfield Consultants Ltd., December 2005.
- KWL, 2015. Five-Year Review of the CRD's Source Control Program (2009-2013). Report prepared for the CRD by Kerr Wood Leidal Associates, June 2015.
- Morrison Hershfield, 2010. CRD Regional Source Control Program—Five-Year Review (2004-2008). Report prepared for the CRD by Morrison Hershfield, March 2010.
- PLA, 2002. CRD Clover and Macaulay Point Wastewater Outfalls: 1988-2000 Effluent Quality and Quantity. Report prepared for the CRD by Paine, Ledge and Associates, August 2002.
- PLA, 2004. Trend Analysis of Selected Substances in the Clover and Macaulay Point Effluents, 1996-2003. Report prepared for the CRD by Paine, Ledge and Associates, 2004.
- WERF, 2008. Water Environment Research Foundation, 03-CTS-16TA. Assessment of Grease Interceptor Performance (Supplemental Report to 03-CTS-16T), 2008.

APPENDIX 1

Program Priority Contaminant List (2019)

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 ethylhexyl)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 ineffective¹, 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 works².

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.

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).

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)

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 ethylhexyl)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 – 2019

The following table illustrates how performance measure #3 is calculated for 2019.

Treatment Plant	# Samples (2019)¹	# Compliant (2019)²
Ganges Plant (Mixed Liquor)	12	12
Saanich Peninsula Plant (Dewatered Sludge)	12	12
Totals	24	24
Percentage Compliant		100%

Notes:

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

²the 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 2019 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 – 2019

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
- No Regulated Waste discharge types removed for most sectors
- Not Connected to Regional Sewers discharge types removed
- Storm Drain Discharge 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 2019

Code of Practice	Est. Sector Size (2019)
Automotive Repair	171
Carpet Cleaning	33
Dental	125
Dry Cleaning	9
Fermentation	21
Food Services	1,427
Laboratory	37
Photographic Imaging	55
Printing	24
Recreation Facility	na*
Vehicle Wash	40
Total CoP Operations	1,841
Total Active Permits	42
Total Active Authorizations	94
Total Regulated Facilities	1,977

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 2019. 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 2019 since Adapting New Success Measures

CODES	Sector Size	# Insp 2019	% Insp	Total Comp	Comp %	In Prog	In Prog %	Step 1	# Overall Compliant (Compliant or Step 1)	% Overall Compliant	DUR	DUR %
Automotive	171	156	91.2%	159	92.98%	12	7.02%	11	170	99.42%	0	0.00%
Carpet	33	33	100.0%	28	84.85%	3	9.09%	2	30	90.91%	0	0.00%
Dental	125	14	11.2%	115	92.00%	5	4.00%	5	120	96.00%	1	0.80%
Dry Cleaning	9	13	100.0%	8	88.89%	1	11.11%	0	8	88.89%	0	0.00%
Fermentation	21	4	19.0%	18	85.71%	0	0.00%	0	18	85.71%	0	0.00%
Food	1,427	1,015	71.1%	1,330	93.20%	78	5.47%	37	1,367	95.80%	3	0.21%
Labs	37	44	100.0%	35	94.59%	1	2.70%	1	36	97.30%	0	0.00%
Photo	55	15	27.3%	53	96.36%	0	0.00%	0	53	96.36%	0	0.00%
Printing	24	5	20.8%	23	95.83%	0	0.00%	0	23	95.83%	0	0.00%
Recreation*	-	-	-	-	-	-	-	-	-	-	-	-
Vehicle Wash	40	29	72.5%	27	67.50%	11	27.50%	9	36	90.00%	0	0.00%
Total	1,942	1,328	68.4%	1,796	92.48%	111	5.72%	65	1,861	95.83%	4	1.01%
Authorizations	97	85	87.6%	87	89.69%	6	6.19%	3	90	92.78%	0	0.00%
Permits	43	84	100.0%	25	58.14%	17	39.53%	9	34	79.07%	1	2.33%
All Totals	2,082	1,497	71.9%	1,908	91.64%	134	6.44%	77	1,985	95.34%	5	0.24%

Notes:

**Recreation facilities previously regulated under the code of practice 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, oil 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, oil and grease, solids, organics, solvents, pH	solids separation, grease interceptor, off-site waste management, absorption
Industrial Laundries	fats (and mineral) oil 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, oil 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