

Regional Source Control Program

2022 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 2023

REGIONAL SOURCE CONTROL PROGRAM 2022 REPORT

EXECUTIVE SUMMARY

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

The program regulates over 2,000 businesses through industrial wastewater discharge permits, authorizations and 11 sector-specific codes of practice. In 2022, the percentage of businesses with a rating of "overall compliance" was 92% and the percentage of mixed liquor and dewatered sludge samples that met Class A standards for metals was 100% for the 14th consecutive year.

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

From January to December 2022, the program continued to apply a "sector-by-sector" approach to code of practice inspections, focusing on the automotive (mechanical) repair, dental, dry cleaning, food services, photographic development, printing and vehicle wash sectors. Overall compliance rates for codes of practice, permitted industrial facilities and facilities operating under authorizations, were 93%. The main activities and accomplishments of the program in 2022 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 2022

- Co-chaired Source Control Community of Practice meetings, with facilitation by the BC Water & Waste Association (BCWWA).
- Co-presented to BCWWA on source control adaptations under the LWMP in response to the new Core Area Wastewater Treatment Plant (WWTP).
- Continued use of modified inspection protocols to ensure service delivery and protection of the sewer system, while following COVID-19 safety and exposure control plans during the continuation of the pandemic in early 2022.
- Continued with adjusted source control inspection goals to support McLoughlin Point WWTP (e.g., increased food service inspections to reduce fats, oils and grease loading).
- Continued fats, oils, and grease (FOG) and obstructive waste mail-outs.
- Informed the microbreweries of the updated regulatory approach in advance of amending the fermentation sector Code of Practice (CoP) and began inspections of the larger facilities.
- After consultation with the Province of British Columbia and Island Health Authority, drafted a bylaw amendment in order to allow limited types of non-infectious blood and fluids to be discharged to the sewer from medical facilities.

- Undertook further outreach to amalgam separator suppliers in advance of the Bylaw update and confirmed all major amalgam separators are ISO11143 2008 certified.
- Commissioned a study by Royal Roads University Environmental Science students to investigate microplastics in wastewater including the development of a modified bench-top laboratory analysis procedure to enumerate microplastics in wastewater.
- Collaborated with municipal business licensing staff to share new business information for review against permitting requirements.
- Participated in the Cross Connection Control Program plumbing inspector roundtable to update municipal inspectors on a new excavation dewatering form, new regulatory requirements for microbrewers, new restrictions on treatment works at height, and other common issues found during inspections.

**REGIONAL SOURCE CONTROL PROGRAM
2022 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 – 2022	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 General Bylaw	8
3.1.6 Coordinated Inspections.....	8
3.1.7 Monitoring.....	8
3.2 Enforcement	11
3.2.1 Operations Regulated by Waste Discharge Permit.....	12
3.2.2 Operations Regulated by Authorization	12
3.2.3 Operations Regulated by Codes of Practice	13
3.3 Contaminants Management	14
3.3.1 Trucked Liquid Waste.....	14
3.3.2 Contaminant Characterization of Microplastics	16
3.4 Contaminant Reductions	18
3.4.1 Marine Outfall Contaminant Reductions	18
3.4.2 Sludge and Mixed Liquor Contaminant Reductions	20
3.5 Significant Incident Reporting.....	23
3.6 Outreach and Partnerships Initiatives	23
3.6.1 Residential Outreach.....	23
3.6.2 Business Outreach	24
3.6.3 Partnership Initiatives	24
3.6.4 2022 Collaborations	25
3.7 Performance Measures	26
4.0 CONCLUSION	27
5.0 REFERENCES.....	29

LIST OF TABLES

Table 1	CRD Treatment Plants and Sewage Collection Areas	2
Table 2	Annual Sewage Flows 2021-2022	3
Table 3	Summary of Waste Discharge Permit Activity in 2022	4
Table 4	Summary of Authorization Activity in 2022	5
Table 5	Summary of Codes of Practice (Bylaw No. 2922)	6
Table 6	Summary of Code of Practice Activity in 2022	7
Table 7	Summary of RSCP Monitoring Activity in 2022	8
Table 8	Summary of Waste Discharge Permit Compliance – 2022	12
Table 9	Code of Practice Enforcement Summary	13
Table 10	Summary of Reported Sewer System Incidents (2022)	22
Table 11	Results of Program Performance Measures (2014-2022)	26

LIST OF FIGURES

Figure 1	Trucked Liquid Waste Disposal Volumes of All Waste Types	15
Figure 2	Trucked Liquid Waste Fat, Oil and Grease and Lift Station Waste Volumes	16
Figure 3	Trucked Liquid Waste Annual Catch Basin Waste Disposal Quantities	16
Figure 4	Comparison of MF counts for the four businesses compared to procedural blank (PB), Ocean Diagnostics Inc. (ODI), and the student's method (IMS)	18

APPENDICES

Appendix 1	Program Priority Contaminant List (2022)
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 2022 REPORT

1.0 INTRODUCTION

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

The goals and objectives of the CRD's Regional Source Control Program (the program) are documented in the Saanich Peninsula Liquid Waste Management Plan (1996) and the Core Area Liquid Waste Management Plan (2000). The most recent independent review of the program (SES 2022), covering the period of 2016-2020 was completed in early 2022.

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 ENV, presents a summary of program activities and accomplishments for the period January to December 2022, and highlights some initiatives planned for 2023.

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

2.0 BACKGROUND

2.1 Policies and Procedures

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

2.1.1 Policies Approved by the CRD Board

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

2.1.2 Operating Procedures

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

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

Additional health and safety procedures were implemented to prevent the spread of COVID-19 and to protect the public and workers. Beginning in 2021, a CRD Safety and Exposure Control Plan was put in place (later renamed the Communicable Disease Safety Plan) and specific Regional Source Control Program COVID-19 inspection safety protocols were developed.

2.2 Sewage Collection Areas and Sewage Facilities

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

With the addition of the McLoughlin Point Wastewater Treatment Plant in December 2020, the CRD now owns and operates seven wastewater treatment plants, as shown in Table 1. Three of these plants, McLoughlin Point, Saanich Peninsula and Ganges, receive significant industrial, commercial or institutional wastewater flows, while the remaining four are small plants receiving mostly residential flows. McLoughlin Point WWTP now receives and processes the flows from the former Clover and Macaulay treatment plants which have been converted to pump stations.

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, 2021 to September 30, 2022, are listed in Table 2.

Table 1 CRD Treatment Plants and Sewage Collection Areas

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

Table 2 Annual Sewage Flows 2021-2022

Participant	Estimated Annual Flow (m ³ /year)*	Percentage of Total Flows
Saanich	10,004,812	25.22
Oak Bay	3,534,142	8.91
Victoria	13,694,787	34.53
Esquimalt	2,534,467	6.39
View Royal	821,374	2.07
Colwood	1,176,153	2.97
Langford	3,602,221	9.08
Esquimalt Nation	30,014	0.08
Songhees First Nation	262,275	0.66
North Saanich	636,319	1.60
Central Saanich	1,531,949	3.86
Sidney	1,439,905	3.63
Pauquachin First Nation	39,977	0.10
Tseycum First Nation	16,459	0.04
Institute of Ocean Sciences	4,682	0.01
Ganges Sewer	162,256	0.41
Maliview Sewer	19,188	0.05
Magic Lakes Estates Sewer	128,350	0.32
Port Renfrew Sewer	23,344	0.06
Total Flow	39,662,672	100%

Note: *For the period October 1, 2021-September 30, 2022

3.0 REGIONAL SOURCE CONTROL ACTIVITIES AND ACCOMPLISHMENTS – 2022

Program activities and accomplishments in 2022 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 CRD sanitary sewer system source control. The bylaw specifies the various regulatory conditions under which facilities must operate if they discharge non-domestic waste into a sanitary sewer. The regulatory conditions for businesses include operation under waste discharge permits, authorizations or sector-specific codes of practice. Under the program enforcement policy, staff make reasonable efforts to resolve issues through cooperative measures. Where education proves ineffective, punitive measures are available, including tickets under the bylaw.

Following adoption of the Sewer Use Bylaw in August 1994, the program focused primarily on identifying, inspecting, assessing and permitting larger industrial facilities, and preparing authorizations for smaller commercial and institutional dischargers operating within the CRD. This process was largely completed over the period 1995-1998. Waste discharge permits require ongoing management, inspection and periodic amendment to accommodate changes in site-specific processes, practices and discharge conditions. New

businesses continue to be assessed for operation under permits or authorizations each year. For further information on permits and authorizations, see sections 3.1.2 and 3.1.3.

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

The Sewer Use Bylaw and its associated policies and procedures were amended periodically during the first 12 years of the program, largely to accommodate adoption of codes of practice, and also to add new restricted waste limits and a structure for cost recovery. In 2022, 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 were completed in 2022, were approved in early 2023, and will be consolidated into the bylaw in 2023.

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, which 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 2022.

Table 3 Summary of Waste Discharge Permit Activity in 2022

Waste Discharge Permit Activity	2022
Permits active (at year end)	34
New permits issued	2
Permits closed	1
Permits amended	12
Permit site inspections (including evaluations for new permits)	61

At the end of 2022, there were 35 active waste discharge permits being managed by staff. The majority of these permits were ongoing, with no expiry date. One new temporary excavation dewatering permit was issued and one wet cutting facility grew from an authorization to a permit in 2022. Unlike previous years, there were no new cruise ship discharge permits. One landfill permit was closed because the landfill had reached capacity and closed. Another temporary excavation dewatering permit that was issued in 2021 was closed in 2022 due to completion of the project.

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

Most permit inspections scheduled at the beginning of 2022 were completed within the year. Three permits did not discharge and so were not inspected. Throughout 2022, inspection staff continued their permit confirmation process, which is an ongoing activity. This includes conducting investigations into potential new non-domestic waste discharge permits or authorizations in known hot spots within the region (e.g., industrial parks), or those identified through municipal engineering department contacts or business licensing staff.

3.1.3 Authorizations

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

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

Inspections are carried out on a periodic basis with an emphasis on those authorizations, which had previously been regulated under permits or those, which include operations discharging priority contaminants. Table 4 summarizes authorization activity in 2022.

In 2016, all 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 was removed from Sewer Use Bylaw No. 2922 in the recent amendment.

Table 4 Summary of Authorization Activity in 2022

Authorization Activity	2022
Authorizations active (at year end)	99
New authorizations issued	9
Authorizations closed or transferred to codes or permits	7
Authorizations amended	7
Authorization site inspections (including evaluations for new authorizations)	81

At the end of 2022, there were 99 active waste discharge authorizations being managed. The majority of these were ongoing, with no expiry date. Nine new authorizations were issued over the year: two for short-term discharges of wastewater created during the installation of cure-in-place lining for municipal water pipelines, one for a new municipal odour mitigation dosing facility, one for a new ship and boat waste facility, one for a dialysis unit, one for a new powder coating facility, two for wet-cutting operations, and one for a facility formally discharging equipment wash-down to storm which was moved to sanitary. The two short-term authorizations expired, one vehicle wash facility with alternative treatment works ceased discharge to sewer, and one warehouse changed practices and no longer discharged prohibited wastes.

A review of all authorizations that include monitoring and sampling requirements was initiated near the end of 2022. The goal of the review was to ensure consistent and fair requirements across similar facilities which resulted in several amendments. Some amendments were completed in 2021, while the remainder were completed in 2022.

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 for 2022. All the facilities under the recreation code have been issued authorizations and the code was removed in a 2023 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 – 2022

In 2022, the CRD continued to emphasize customer service and support as part of code of practice inspections, in addition to ensuring compliance with code requirements. This involves making every effort to educate regulated operations, provide guidance, and in some cases feedback through laboratory analysis of effluent quality and multiple visits to the same establishment.

Five full-time inspector positions 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 2022. 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 (1,394 in 2022) includes first (or primary) inspections within an inspection cycle. An additional 143 repeat (or follow-up) inspections were conducted to confirm the compliance status of 2,138 businesses.

Table 6 Summary of Code of Practice Activity in 2022

Code of Practice (Est. Sector Size – 2022)	% of Sector Inspected in 2022
Automotive Repair (213)	33%
Carpet Cleaning (29)	0%
Dental (136)	100%
Dry Cleaning (7)	100%
Fermentation (20)	35%
Food Services (1,573)	70%
Laboratory (58)	16%
Photographic Imaging (22)	50%
Printing (30)	53%
Vehicle Wash (50)	62%

The sector-by-sector review process includes inspecting businesses due for an inspection in each sector for baseline compliance, reviewing the code of practice for any necessary amendments or updates, and updating data for new and/or newly sewer facilities. Sectors of focus in 2022 were automotive (mechanical) repair, dental, dry cleaning, food services (half of all facilities), photographic development, printing and vehicle wash sectors. Both discharging and non-discharging businesses (those sending business waste for off-site treatment, operating as a storefront, or not producing regulated wastes) in the food services, dental, dry cleaning, photographic development, printing and vehicle wash sectors were inspected, while in the automotive sector, 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 regional source control information management system database, and facilities identified through an online search, drive-through of the area, cross-referencing other CRD databases, BC Assessment code query, and new municipal business licenses.

Starting in 2016, dischargers operating treatment works onsite were inspected on a schedule based on risk associated with priority contaminants: automotive and vehicle wash (annually), dental (biennially), dry cleaning (annually starting in 2018), and laboratory (biennially). The non-discharging businesses in these sectors (i.e., sending business waste for off-site treatment or operating as a storefront) are inspected every three to five years. The carpet cleaning and fermentation sectors are inspected every five years. Based on risk, photographic imaging and printing sectors were inspected every three years, but in 2022 it was decided they should be inspected every two years for optimal scheduling.

Rigorous food service inspections are performed every year due the sector's large size (1,573 regulated businesses) and potential to impact sewer infrastructure through grease blockages. In 2022, 792 food service businesses were inspected, with 314 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 contaminant characterization of the microbrewery sector finalized in 2020 recommended that microbreweries be managed under authorizations to facilitate the collection of more substantial contaminant concentration and flow data. Wastewater from fermentation operations alters the pH in the sewer system and contains total suspended solids and chemical oxygen demand (COD) that, in high concentrations can impact sanitary sewer infrastructure, aquatic life and the environment. Authorization requirements, including self-monitoring and reporting will be scaled based on the facility's annual production of saleable product.

In 2021, details for the new approach for microbreweries were finalized including installation of an approved monitoring point and minimum composite sampling requirements for facilities that produce over 250 hL per year, flow monitoring for facilities that produce over 1000 hL per year, and keeping records for pH, off-spec product disposal and production volumes for all facilities. A letter informing facilities of the new

approach, asking for preliminary information and requesting to schedule site visits occurred in 2021. Site visits starting with the larger microbreweries to assist them with the transition and to collect data required to write the authorizations began in 2022 and will continue throughout 2023.

3.1.5 General Bylaw

In addition to permits, authorization and codes, the sewer use bylaw specifies various regulatory conditions under which recreational vehicle waste, ship and boat waste and kitchen equipment cleaning facilities must operate if they discharge non-domestic waste into a sanitary sewer. While recreational vehicle and ship and boat waste facilities have historically been managed under authorizations, kitchen equipment cleaning facilities have primarily used offsite waste management and so have not required further regulation.

A review of these facilities was conducted in 2021 and found that two facilities out of seven were discharging in contravention of Section 2.12 of the bylaw. One of the two facilities underwent further inspection and investigation in 2022 and an authorization was issued. The remaining facility was found to no longer be operating.

3.1.6 Coordinated Inspections

3.1.6.1 Coordinated Significant Incident Responses

There were five significant incidents formally reported in 2022, and one incident reported in 2021 that received further investigation and follow-up. Three involved a build-up of fat, oil and grease reported by CRD or municipal staff, two were incidents involving obstructive wastes reported by CRD or municipal staff, and one was a public concern about a potentially unauthorized discharge. Further details of each incident can be found in Table 10.

3.1.7 Monitoring

Staff carried out the following types of monitoring in 2022: permit compliance, authorization compliance, code of practice, and key manhole monitoring. All wastewater samples collected in 2022 were analyzed by a contract laboratory using standard analytical procedures specified in the RSCP Sampling and Analysis Procedure Manual.

Table 7 provides a summary of monitoring activity in 2022. Sampling instances (are the total number of samples taken and managed from collection to data entry. This number includes field replicate samples and multiple samples taken from the same site throughout the year.

Table 7 Summary of RSCP Monitoring Activity in 2022

Monitoring Events	Total Sampling Instances in 2022
Permit compliance	59
Authorization compliance	40
Code of Practice	8
Key manhole	20
Assessment monitoring	1
Miscellaneous sampling project	7
Significant incidents	1
Source Control Storm Water Monitoring	0
Saanich Peninsula WWTP influent	12
Saanich Peninsula WWTP dewatered sludge	12
Ganges influent	12
Ganges mixed liquor	12

3.1.7.1 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 the CRD 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 2022 was two. The goal of collecting audit samples from each permitted site twice per year was achieved at all sites, except for one site due a facility shutdown.

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 2022 were not significantly different from self-monitoring results reported from the same site. This indicated that the majority of 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.

3.1.7.2 Authorization Compliance Monitoring

Thirty-one businesses operating under authorizations were monitored in 2022, 20 of which have self-monitoring requirements. One business continued with the monthly auditing schedule from 2021, as they were an entirely new industry integrated within the CRD sewage system. This business is moving to quarterly sampling for 2023.

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 onsite. The results of this monitoring indicated that the majority of discharges from authorizations in 2022 were in compliance with Sewer Use Bylaw restricted waste limits.

3.1.7.3 Code of Practice Monitoring

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

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

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

There were no additional sector reviews conducted in 2022. While some dental and printing sector final samples were collected, results were discussed in the 2021 report.

3.1.7.4 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 was commissioned in December 2020, as well as the other CRD treatment facilities across the region. The next round of this sampling will begin in 2024 and a trend analysis will be done on the two datasets.

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 2022 residential sampling program included sampling events at Dean Park (North Saanich), and Harling Point pump station (Oak Bay) in January, April, July and October. There were no exceedances of Sewer Use Bylaw restricted waste limits in 2022.

DEPARTMENT OF NATIONAL DEFENCE SITES

In 2022, 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. Two samples were collected at the Department of National Defence Colwood pump station in April and October; however, the April sample was incomplete due to technical difficulties with equipment and staffing limitations onsite that prohibited rescheduling. All parameters were within Sewer Use Bylaw restricted waste limits.

SAANICH PENINSULA WASTEWATER TREATMENT PLANT COLLECTION AREA SITES

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

3.1.7.5 Saanich Peninsula Wastewater Treatment Plant Influent and Dewatered Sludge Monitoring

Every year, four composite samples of Saanich Peninsula Wastewater Treatment Plant influent are collected each quarter by CRD staff for metals and priority pollutant analysis. In 2022, 24-hour composite sampling occurred in January, April, July and October.

Twelve composite dewatered sludge samples were also collected by CRD staff for analysis in 2022, as well as one field replication sample. Daily samples were combined into weekly composites, which were submitted for moisture, metals and weak acid dissociable cyanide analysis on a monthly basis. The results are discussed in Section 3.4.2.

3.1.7.6 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 2022 was submitted for priority pollutant analysis.

In 2022, ongoing sampling for compliance monitoring occurred and twelve mixed liquor (treatment plant wastewater mixed with activated sludge) samples were collected for analysis. Grab samples were collected monthly and were submitted for moisture and metals analysis. The results are discussed in Section 3.4.2.

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

3.2 Enforcement

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.

The CRD has adopted a stepwise approach to enforcement of the Sewer Use Bylaw, as outlined in the program enforcement policy. This policy classifies offences, outlines enforcement steps and includes the 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.

Minor first infractions result in a Step 1 enforcement status. This step is typically triggered by a routine inspection finding or a missed reporting requirement and involves a written letter that alerts a discharger to an infraction. In general, the impact of this stage is not significant, and it is often quickly resolved through education and guidance with the discharger.

Step 2 is triggered by a major first infraction or a second repeated minor infraction. Letters issued under this step are more strongly worded than Step 1, including a reminder of potential escalation by actions such as ticketing and may direct the discharger to submit a preliminary investigation report. CRD staff will also perform a more detailed inspection and undertake follow-up communication.

Step 3 is also called Staff Assessment and is an escalation of Step 2, typically resulting from third infractions, as well as from bylaw violations (more serious offenses than infractions). At this point, a Deputy Sewage Control Manager is involved to review the actions during the previous enforcement steps and to review staff recommendations for further enforcement. Depending on the offense, dischargers are either ticketed or required to submit a written report detailing the circumstances causing the violation and options for resolution. Inspection staff will perform a detailed review of collected data, perform an impact assessment of continued non-compliance, and conduct follow-up inspections.

During Staff Assessment, permitted and authorized facilities may be subject to increased inspection or monitoring frequency and meetings to discuss remedial actions. Failure to meet commitments and requirements can result in elevation from Step 3 to Discharger Under Review (DUR) status.

Operations having DUR status must prepare and submit a detailed compliance plan for approval by a Deputy Sewage Control Manager. A 90-day period is typically allowed for the preparation of this plan. This period allows a discharger to hire a consultant to help determine appropriate actions to achieve compliance. Progress meetings are held with the discharger after 30 and 60 days to measure progress, fully communicate the intent of any requirements, and clarify any outstanding issues. A compliance plan, once approved by a Deputy Sewage Control Manager, becomes a compliance program that, if followed, will result in the discharger becoming compliant with the Sewer Use Bylaw.

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.

The CRD Ticket Information Authorization Bylaw contains a list of fines that have been set for specific offences under the Sewer Use Bylaw and its associated codes of practice. These fines were last reviewed in January 2018.

3.2.1 Operations Regulated by Waste Discharge Permit

Of the 34 active waste discharge permits in place at the end of 2022, 21 sites were in “full compliance” with their permits and the Sewer Use Bylaw. Three permits were at “staff assessment”, one site remained at “discharger under review”, and 12 sites were “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 – 2022

Enforcement Level	Number of Permits
Full Compliance	21
Step 1	6
Step 2	3
Step 3	3
Discharger Under Review	1

Three permit sites classified at Step 3 remained under staff assessment by program staff and one permit site remained under Discharger Under Review status in 2022. These sites included:

- A septage disposal facility was escalated to DUR level for sulphide exceedances in 2015 and remained as DUR until October 2018. Staff worked with the facility until they regained compliance in October 2018. However, due to continued chemical oxygen demand exceedances, they were escalated to DUR level again in November 2018. The permittee submitted a compliance plan detailing improved maintenance and repairs in August 2020 and substantial improvements in effluent quality were observed. Effluent strength continued to be improved through 2021 but issues arose in 2022. CRD staff continue to work with the facility to ensure improvements identified in the compliance plan are completed.
- A permitted brewery was escalated to Step 3 for biochemical oxygen demand and chemical oxygen demand in 2020. A written report was submitted with plans to repair equipment, increase maintenance and implement new procedures to reduce waste product going to the sanitary sewer. Some projects were put on hold due to COVID-19 and the plans were finally completed in late 2021. Significant reductions in wastewater strength were observed through 2022 and their permit was amended bringing them into compliance in early 2023.
- A commercial laundry facility was escalated to Step 3 levels for COD in the third quarter of 2022. A written report was received in late 2022 with plans to adjust maintenance and work procedures. Recent results show improvement and staff continue to monitor to confirm reduced effluent strength is maintained.
- A public works yard was escalated to Step 3 levels for sulphide in the last quarter of 2022. A written report was received in early 2023 with plans to adjust maintenance and work procedures.

No charges were laid against waste discharge permit holders under the Sewer Use Bylaw during 2022.

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 81 inspections carried out at sites operating under authorizations in 2022. At the end of 2022, 83 of the total 99 businesses were in full compliance with their authorizations, 6 were at a Step 1, 5 were at Step 2, and 3 were at Step 3. One was a composting facility with continued high-strength organics in

their wastewater, however, levels continue to improve over the previous years and an amendment is pending to move them off of staff assessment status. The other was a ferry pump station under review for excess sulphide. A completely new aeration system was installed in the tank in 2023 and staff continue to monitor to ensure the new system is effective. A helicopter hanger was under staff assessment for both sulphide and COD. Increased maintenance has improved levels of both contaminants and staff continue to monitor to confirm compliant levels are sustained.

The overall compliance level for the total 99 authorizations active at the end of 2022 was 84%.

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 are classified as being in “non-compliance” with the code. A summary of the code of practice enforcement results for inspections carried out in 2022 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	89	9	3	0
Carpet Cleaning	86	3	10	0
Dental	88	4	9	1
Dry Cleaning	100	0	0	0
Fermentation	60	35	5	0
Food Services	89	4	8	0
Laboratory	98	0	2	0
Photographic Imaging	91	9	5	0
Printing	90	0	10	0
Vehicle Wash	78	16	6	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 8% of food services operations inspected were considered to be “in progress”, with no facilities classified as “discharger under review”. The main non-compliance issues continue to be failure to maintain a grease interceptor and failure to install a properly sized interceptor.

There were 13 tickets issued by the CRD to food services operations in 2022, two were waived upon demonstration of completing the requirements, one was cancelled when the business closed, and one was cancelled due to a change in ownership. Seven were paid and two tickets are still in the collections process.

The automotive (mechanical) sector had 89% of the facilities in full compliance and 3% of the facilities “in progress” in 2022, which equates to six of the 213 regulated facilities, mainly for lack of records. 9% of the facilities had not been assessed before year-end.

The dental sector had 88% of the facilities were in full compliance and 9% “in progress”, which equates to 12 of the 136 regulated facilities. Eight of the 12 were at Step 1 for records management, three facilities were behind in their maintenance and one facility was under discharger review for incorrectly installed treatment works. Five facilities needed further investigation to confirm compliance (4%) so were not assessed before year end.

In the dry-cleaning sector, full compliance was 100% with no facilities “not assessed”. At the end of 2022, only two facilities were discharging using treatment works, with the remaining opting for offsite waste management. As with the automotive sector, inspections of the small number of dischargers in this sector are now completed annually to ensure proper solvent management and/or disposal.

Total compliance for the food services sector was not as high as previous years, only 89%, however, overall compliance remained high at 92%. The increased focus on this sector is also a factor in the compliance levels. The majority of the 8% facilities “in progress” were due to excess grease. A total of 4% of facilities were marked not assessed while waiting for construction or renovations to be completed or were not accessible at the time of inspection.

Photographic development and printing are both shrinking sectors due to the move to digital processes for x-rays, photos and printing processes. Work is being done to clean up records to confirm no regulated waste status. Both sectors saw high total compliance, at 91% and 90% respectively. One out of the 22 facilities in the photographic sector and 3 of the facilities out of 30 in the printing sector were in progress at the end of 2022.

The vehicle wash sector overall compliance dropped compared to the previous year, reaching only 78% full compliance. 6% of the facilities were “in progress”, which equates to only 3 of the 50 regulated facilities. Eight facilities or 16% were not assessed due to still being under construction or otherwise not being fully investigated before year-end.

In 2022, 92% 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 2022 are outlined below.

3.3.1 Trucked Liquid Waste

In 2020, the CRD's Trucked Liquid Waste service was transferred to the Regional Source Control Program. This service complements the program's efforts by coordinating the collection and disposal of trucked liquid waste. This type of waste represents the resulting source control diversion of non-domestic liquid waste that is prohibited from discharge to sanitary sewer or stormwater systems and must be transported by truck to a permitted disposal facility. Types and sources of wastes managed range from stormwater catch basins, car washes, and restaurant grease interceptors to pit toilets as well as septage from recreational boats and commercial ships.

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

Advertisements

Staff continued to update web-based information and respond to trucked liquid waste inquiries during this time and monitored effectiveness of the program.

Performance Measures

Performance of trucked liquid waste programs is assessed through annual waste disposal volumes. Trends in trucked liquid waste quantities deposited at regional facilities are used as a key performance indicator of the program's success. In general, increasing disposal volumes among waste type show a positive trend and indicate that waste is being properly disposed of at treatment facilities. However, decreasing volumes can also indicate positive performance measures as well. For example, decreasing volumes associated with municipal lift station pump-outs can be linked with priority objectives of source control initiatives such as reduction of residential obstructive waste as well as diversion and recycling of fats, oils, and grease from households and restaurants.

Data available from public and private trucked liquid waste disposal facilities are assessed annually. However, an unknown volume of waste is disposed of at out-of-region facilities and those volumes are not available for assessment. Waste received at local septage/trucked liquid waste disposal facilities were reviewed in 2022 and this data contributes to inform regional planning efforts and outreach activities.

Overall waste volumes (Figure 1) disposed and treated in 2022 are slightly lower than the previous three years. Disposal of fats, oils, and grease (FOG) primarily from restaurants (Figure 2) is gradually increasing to normal levels after a sharp decline during the COVID-19 pandemic. Waste from sanitary sewer lift stations (Figure 2) has shown a decreasing trend over the last five years indicating a reduced impact to infrastructure and associated maintenance costs due to a decrease in blockages. Catch basin wastes (Figure 3) increased slightly in 2022 showing a continuing trend upwards indicating improving municipal maintenance activities which protect stormwater and the nearshore marine environment.

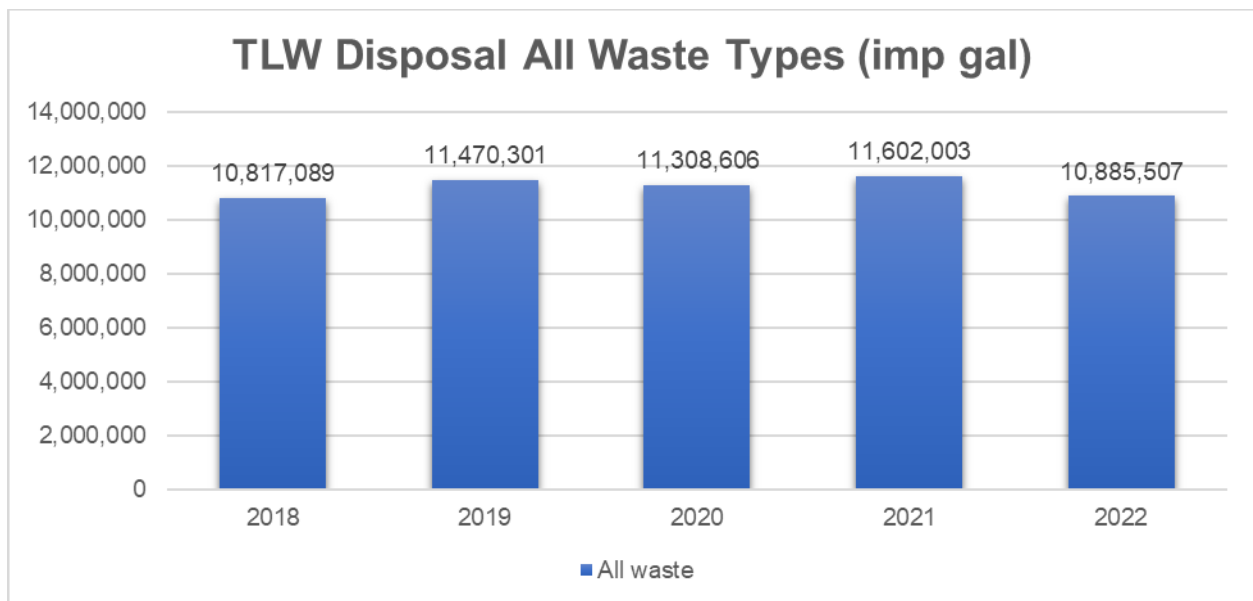


Figure 1 **Trucked Liquid Waste Disposal Volumes of All Waste Types**

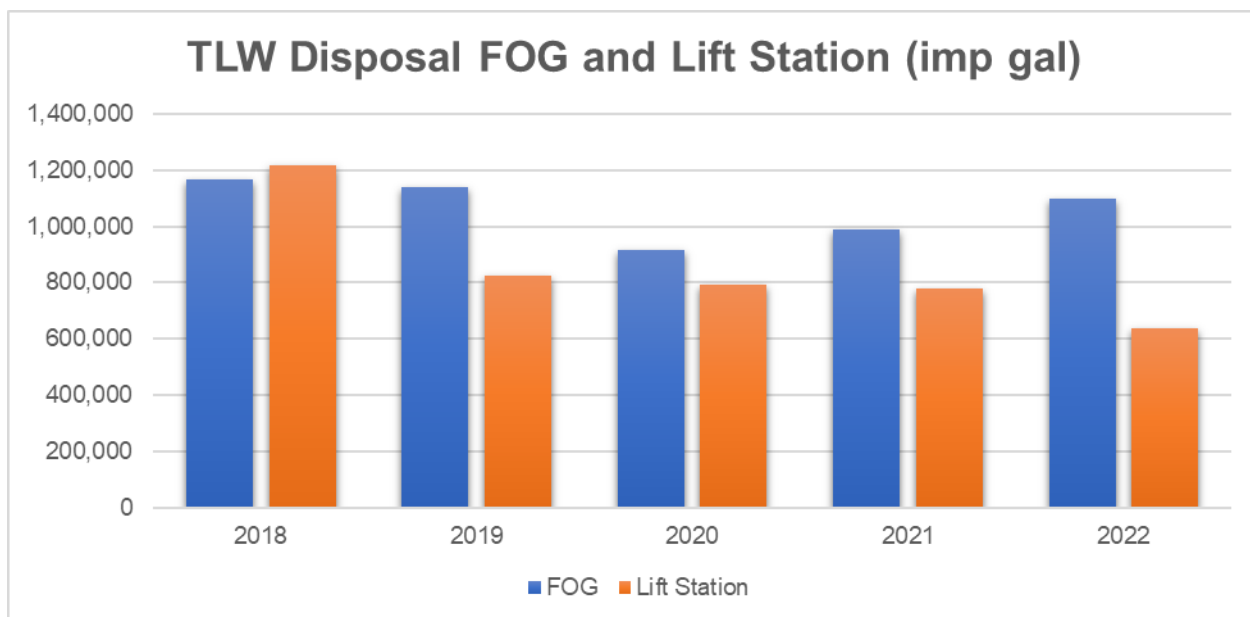


Figure 2 Trucked Liquid Waste Fat, Oil and Grease and Lift Station Waste Volumes



Note: Totals include quantities from different sources and may be reported by volume or by weight. Catch basin waste is highly variable therefore density is assumed to be 8.7 kg per imperial gallon for comparison between years.

Figure 3 Trucked Liquid Waste Annual Catch Basin Waste Disposal Quantities

3.3.2 Contaminant Characterization of Microplastics

The CRD commissioned a study by Royal Roads University (RRU) Environmental Science students which was done in collaboration with the Ocean Wise Plastics Lab, and Ocean Diagnostic Inc. The project was intended to research common sources, environmental impacts and mitigation technologies for microplastics in wastewater. There are few commercial labs currently performing testing for microplastics (MP), and a standard method has not been developed. Because research on microplastics is still experimental, testing

is expensive. Due to these barriers, the students also proposed using a bench-top test that can be performed at low cost with minimal equipment.

There are five distinct types of MPs released into the environment via anthropogenic sources: polyethylene, polypropylene, polyester, polyvinyl chloride, and nylon. Each type exhibits its own particular chemical characteristics. The term “microplastic” is used to describe a particle of plastic that measures under five millimetres in length.

Microplastics can adsorb harmful organic contaminants, for example, polycyclic aromatic hydrocarbons (PAHs) as well as inorganic contaminants, such as heavy metals, and then act as a transportation vessel for these contaminants. Ingestion by marine life can cause both physical harm including internal abrasions and blockages, and chemical toxicity that can disrupt reproductive systems, stunt growth, diminish appetite, and cause tissue inflammation and liver damage.

Based on current studies, it is estimated that the distribution of microplastics globally is approximately 52% on land and 48% in the ocean. Of those in the ocean, microplastics lighter than seawater, such as polypropylene, will float and disperse widely, whereas those such as acrylic that are denser than seawater settle in the deep-sea sediments and ultimately into the food chain. Approximately 90% of microplastics on beaches around the world have been found to be microfibers (MF).

A study by the Ocean Wise Diagnostics plastics laboratory, Ocean Diagnostics Inc. (ODI) estimated that 70% of microplastics entering a wastewater treatment plant in Metro-Vancouver were MF, therefore the RRU project narrowed the scope to analysis of MF.

The project trialed a modified laboratory analysis procedure to enumerate microplastics in wastewater based on the method used in a study by ODI involving liquid-to-liquid extraction. The students modified the technique to use filter papers which were readily available to them and called their method the Oil Separation & Count Method (OSCM).

When identifying MPs, it is important to be aware of characteristics of non-plastic fibres such as cellulose, hair, modified cotton, and animal protein commonly seen on processed filters. Properties of non-plastic MFs can be identified due to cellular or organic structures, spiral shapes, frayed ends, uneven width throughout the fibre, as well as translucent, and non-homogeneous colour throughout. Due to the variability in fibre characteristics, the students and ODI chose to exclude clear or translucent MFs from all counts, as these MFs were impossible to confirm as either plastic or non-plastic with visual identification.

Wastewater samples were submitted to ODI who performed high-definition analysis which involved quantifying microscopic results down to 10 µm particle size including MF, and the characterization of a subset of MF using spectroscopy to classify them by polymer type. Machine learning WiRE software (version 4.4.0.6908) was used to identify the MFs present.

Laundry of synthetic textiles, such as polyester, neoprene, acrylic, and nylon, is widely recognized as a leading contributor of MP fibres in wastewater. Wastewater samples from four businesses were used for analysis by the students and by ODI. Three of the businesses were industrial laundry facilities, and the fourth business was a solid waste management company specializing in compost processing (C4).

Despite the exclusion of clear or translucent MFs, an issue with the analysis is that there can be little to no visual difference between anthropogenic cotton fibres and MFs. Indeed, laboratory analysis by ODI found 51.5% of fibres were indeterminate, 9.3% were natural anthropogenic fibres and 39.2% of observed fibers were confirmed as MF. Another issue identified with analyzing wastewater samples is that high sediment loads were a potential source of error, clogging the filter and clouding the visual field making enumeration difficult. The students suggested that adding an additional round of extraction could help remove the grit but could also cause MF loss.

Despite these challenges, the OSCM performed within what can be considered reasonable precision and reasonable accuracy. A 2-way analysis of variance (ANOVA) test found that a comparison between the student's data and the external lab analysis was not significantly different ($\alpha=0.05$) after applying the

relevant adjustment factors. Additionally, there was agreement that the analyzed Laundry and Compost facilities emitted quantities of MFs that were in line with estimates created using literature review and business surveys.

As shown below (Figure 4), of the three laundry facilities (L1, L2 and L3) the student analysis predicts L3 to have the highest MF emissions at 11249 MPF/L whereas ODI analysis predicts L1 to have the highest MPF emissions at 9248 MPF/L.

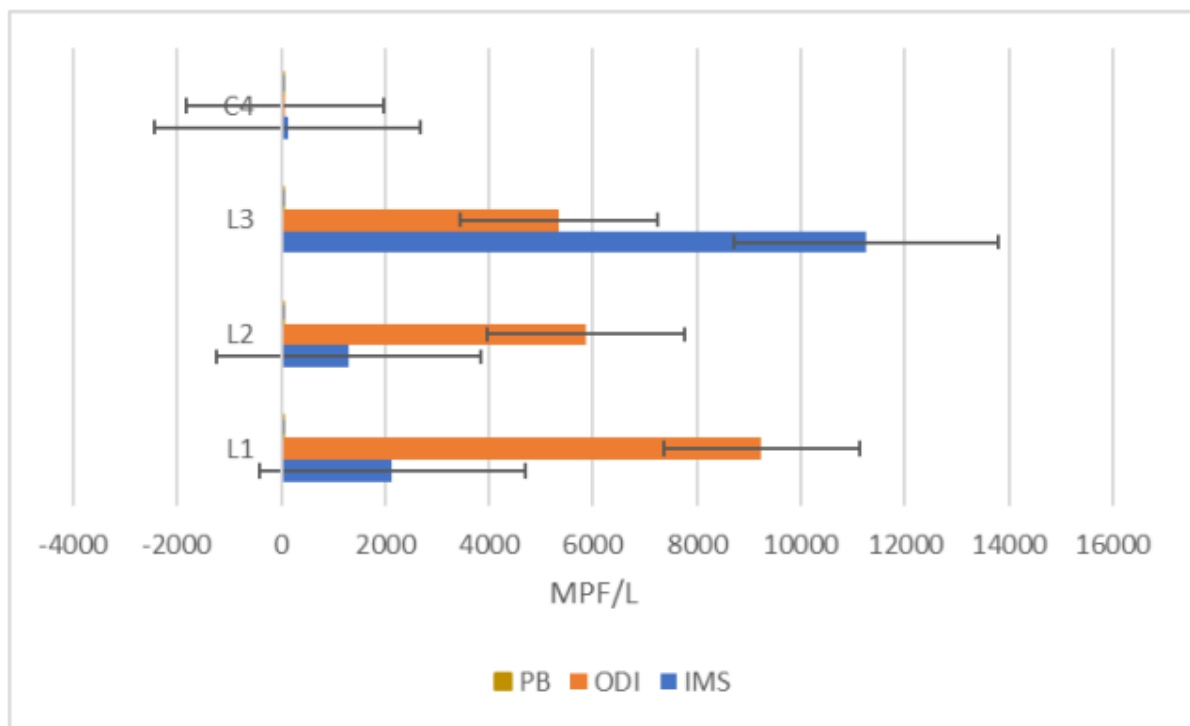


Figure 4 Comparison of MF counts for the four businesses compared to procedural blank (PB), Ocean Diagnostics Inc. (ODI), and the student's method (IMS).

The study showed some promise using the adapted OSCM as a potential affordable approach for the CRD to produce in-house estimates of MF emissions from industrial, commercial and institutional (ICI) sources. However, best practice for accurate enumeration must include spectroscopy or imaging technology to distinguish between natural, anthropogenic, and plastic fibres. Laser Direct Infrared (LDIR) technology uses a quantum cascade laser coupled with rapidly scanning optics, shortening analysis time as the entire filter can be inserted into the machine for MP chemical characterization and enumeration, as opposed to individually placing unknown particles into a common Fourier transform infrared machine.

3.4 Contaminant Reductions

3.4.1 Marine Outfall Contaminant Reductions

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

3.4.1.1 Core Area Outfall Effluent

In 2020, significant upgrades took place at the Macaulay and Clover Point pump stations to redirect flows to the new McLoughlin Point Wastewater Treatment Plant.

The CRD Environmental Monitoring Program relocated their sampling location from the pump stations upstream to the new treatment plant. Because of issues with the sample location and inconsistent sample collection, 2021 McLoughlin Point wastewater results are not directly comparable to previous years.

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

Total oil and grease is of particular interest to the program due to both the impacts to effluent quality and blockages in sewage infrastructure. The 2017 trend analysis showed a decreasing concentration over time. 2019 and 2020 data are unsuitable for trend analysis, but an assessment of the 2021 and 2022 data shows the decreasing trend is continuing. 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 three years.

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

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

These results are used to assess opportunities to reduce input of these contaminants to the sewage system. Further information about core area effluent quality in 2022 can be found in the *Core Area Wastewater Facilities Environmental Monitoring Program 2022 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 the Hatfield Consultants Ltd, 2005 report. The Golder Associates Ltd., 2009a report included a statistical assessment of wastewater influent and effluent trends at the plant over the period 2000-2008. The Golder Associates Ltd., 2017 report provided an update of trends to 2015. The findings of this report over the 14-year period of record at the plant were discussed in previous Regional Source Control Program annual reports and the next trend analysis will be discussed in this section when complete.

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

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

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

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

Further information about plant influent and effluent quality in 2022 can be found in the *Saanich Peninsula Treatment Plant Wastewater and Marine Environment Program 2022 Report* available on the CRD website.

3.4.2 Sludge and Mixed Liquor Contaminant Reductions

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

Monitoring of dewatered sludge produced at the Saanich Peninsula Wastewater Treatment Plant commenced in March 2013 and continued in 2022. Monitoring of the mixed liquor produced at the smaller Ganges Wastewater Treatment Plant began in 1994 and continued in 2022.

Prior to the construction of the McLoughlin Wastewater Treatment Plant in 2021, these analyses were not performed in the Core Area due to primary screening not producing sludge. It is anticipated that solids from the plant will be analyzed similarly to the Saanich Peninsula WWTP for the 2023 report.

3.4.2.1 Saanich Peninsula Wastewater Treatment Plant Sludge

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

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

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

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

3.4.2.2 Ganges Wastewater Treatment Plant Mixed Liquor

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

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

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

Table 10 Summary of Reported Sewer System Incidents (2022)

Contaminant	Nature of Incident	Potential Impact	Incident Follow-up
Fats, Oils and Grease (FOG)	Continuation of investigation of fats, oils and grease buildup at the Greater Victoria Harbour Authority lift station on Broughton and Wharf – Initially reported October 2021.	Grease blockages can lead to overflows in municipal sewer pipes and mains – maintenance and health concerns.	• A single food services facility is connected to the below-grade system. • A detailed investigation determined the facility was consistently compliant, however, unlike all other food service facilities, wastewater did not flow by gravity from the fixtures to the grease interceptor nor from the grease interceptor to the sanitary sewer. • Pumps caused the FOG to emulsify and bypass the grease interceptor. • Staff recommended significant improvements to the plumbing system in the long-term and increased maintenance in the meantime.
	District of Central Saanich public works staff reported FOG build-up in the Silverdale Pump Station on West Saanich Road – March 2022.		• Staff followed up with inspections of six food service facilities identified in the catchment. • One facility was identified as having non-compliance issues. • Staff conducted follow-up inspections to bring the facility into compliance, however, no significant improvement was observed by Central Saanich staff. • Staff conducted additional follow-up inspections and increased the clean-out frequency of the first food service facility and identified a second facility with potential issues which were corrected. • It was also noted that the catchment included approximately 50 residential properties, targeted residential mail-outs were sent out in July 2022. • Central Saanich staff reported no further build-up in August 2022.
	City of Victoria staff reported a blockage in a lateral located on lower Yates Street – August 2022.		• Staff followed up with inspections of the one food service facility connected to the lateral. • The facility was compliant and it was deemed that historical non-compliance caused the blockage.
Obstructive wastes	Central Saanich Engineering staff reported a blockage in a lateral on Mt Newton Crossroad – initially reported November 2021.	Obstructive wastes can lead to blockages and overflows – maintenance and health concerns.	• Staff worked with Central Saanich to narrow down the catchment area and identified a single restaurant. • The facility was inspected several times throughout 2022 and into 2023 to ensure compliance was achieved and maintained. • Central Saanich reported no further build-up has since been observed.
	CRD Operations staff found approx. 2.75 m ³ of a sand silty clay in the wetwell at Lang Cove Pump Station – June 2022.		• Staff investigation determined the material came from the flume that carries wastewater combined from Department of National Defence (DND) Naden and the Public Services and Procurement Canada (PSPC) Esquimalt Graving Dock sites. • No unusual events were reported in response to staff enquires to both sites, although an expansion of the PSPC graving dock was underway with a wastewater management system in place. No operation problems or bypasses were reported.

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 2022 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 2022.

3.6 Outreach and Partnerships Initiatives

Staff continued to develop and maintain program-specific outreach and education messaging throughout 2021. 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 2022 are summarized below under separate sections for residential and business outreach, education and the CRD website.

3.6.1 Residential Outreach

General outreach initiatives

CRD staff produced a "What You Put Down the Drain Matters!" brochure in 2020 that is intended to address survey results indicating that 92% of the public believe the new tertiary treatment will deal with whatever is put down the toilet or sink making source control practices irrelevant. Outreach initiatives continued in 2021 and 2022 with the goal of educating the public that tertiary treatment does not remove all contaminants and that contaminants are often removed into the biosolids (leading to quality concerns of that resource). Initiatives also highlighted that other sewage treatment plants in the CRD were previously protected by source control and continued to treat sewage.

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

Other campaigns that contained source control messaging in 2022 were "Live Green in the Bathroom" (obstructive waste and chemicals), "Wipe Out" (a video about not flushing bathroom wipes down the toilet) and several other mentions of proper disposal of fats, oils and grease in other campaigns.

Targeted mailouts

Fats, oils and grease and unflushable waste received attention in 2020 as infrastructure maintenance frequencies have been increasing in some parts of the region. A new approach was tested in late 2020 where letters were mailed directly to residents in one small sewer catchment. The letters informed residents of issues at the pump station serving their neighbourhood, the potential financial implications to their sewer rates and best practices to reduce the strain on the treatment plant, including to only to flush the "three Ps" (pee, poo and toilet paper). This messaging was not successful, but staff then used the approach for two more catchments in early 2021 which did resolve the issues at both pump stations.

In 2022, CRD and municipal staff investigated catchments together and identified several residential pump stations requiring a focused approach involving direct mailing to residents encouraging proper disposal of waste (such as fats, oils and grease, wipes and dental floss), and to flush only the “three Ps”.

A total of 1,405 letters were mailed directly to residents residing in seven catchments in Colwood, View Royal, Esquimalt, Victoria and Central Saanich that were identified as having blockage and increasing maintenance issues. Four of the seven catchments showed a marked improvement, one showed improvement but municipal staff are monitoring to confirm results and two catchments showed no improvement. Follow-up letters thanking the residents in the catchments that showed improvements were sent in 2022 and a second reminder letter was sent to the two that needed further improvement. In some cases, maintenance required by municipal staff changed from as frequent as weekly to no maintenance required as last reported in mid-2022.

Medication Return Program

The CRD has promoted medication return annually as a strategy to keep pharmaceuticals out of the wastewater stream. In past years, the CRD was in the top three regional districts for per capita medication return rates.

As pharmacies were not accepting medication returns in 2020 due to COVID-19 protocols, it was hoped that residents were storing their medications for drop-off when the program was started again. Continuing downward trends in indicator pharmaceuticals in wastewater suggests that previous years' Medication Return campaign messaging has had a lasting effect on resident behaviour regarding the flushing of unwanted medication, however, medication return data collected by the Health Stewardship Products Association showed that in 2022, the CRD's per capita return rate was ranked seventh among BC regional districts.

Messaging for this program was re-initiated at the end of 2022 and early 2023 with letters to over 100 pharmacies that participate in the program to encourage them to display a new poster and hand out free collection bags as a refresher prompt for the program. In addition, the campaign messaging shifted to recommend that residents can return their medications in normal zip-close bags and the CRD will phase out use of campaign-specific plastic bags. Where appropriate, medication return messages will be incorporated into other general household education campaigns.

3.6.2 Business Outreach

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

Staff updated business and sector-specific webpages for the CRD website in 2022. Brochures and posters were reviewed in 2022 and those needing new material will be updated in 2023.

3.6.3 Partnership Initiatives

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

In 2022, there were continued collaborative efforts between staff and external partners to provide augmented inspection services, superior customer service, and to promote high environmental performance within businesses.

Some examples of both internal and external collaborative partnerships initiatives undertaken in 2022 are outlined below.

3.6.4 2022 Collaborations

In 2022, CRD staff undertook the following collaborative activities:

- 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.
- Commissioned a study by Royal Roads University Environmental Science students to investigate microplastics.
- Shared techniques for identifying potential new discharging businesses for compliance with the City of Chilliwack to offer suggestions for best approaches to help improve their program.
- Participated in the Cross Connection Control's Municipal Plumbing Inspector Roundtable to discuss common and new issues seen during inspections and to highlight significant investigations and targeted residential mail-outs.
- 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).

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 mobile food facilities.

Island Health administrative staff continued their information sharing efforts in 2022, 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 2022.

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 supported a student research project by Royal Roads University Environmental Science students to determine the effectiveness of microplastic analysis on commercial laundry waste. Results are discussed above in Section 3.3.2.

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 licenses 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 contact CRD staff directly 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 2022, CRD staff worked with municipal staff to resolve various fats, oils and grease blockages in sewers. Municipal staff continued to provide plumbing and building information, flow data and other information to CRD staff to assist in the preparation of permits, authorizations and code of practice treatment works installations.

A particularly strong partnership was developed with View Royal and Colwood at the end of 2020. CRD and municipal staff investigated catchments together and identified several residential pump stations requiring a focused approach involving direct mailing to residents encouraging proper disposal of waste (such as fats, oils and grease, wipes and dental floss) and only to flush the “three Ps” (pee, poo and toilet paper). Initial improvements in maintenance frequency reported by View Royal and Colwood was encouraging, and this work continued into 2022. Results are discussed above in Section 3.6.1.

CRD staff met with City of Victoria staff to discuss how CRD inspectors could support the City’s efforts to regulate business stormwater discharges. A preliminary plan for this work was established pending the City of Victoria hiring a new stormwater enforcement officer.

3.7 Performance Measures

Three program performance measures are used to assess RSCP performance:

- Overall compliance with the CRD Sewer Use Bylaw. The method of calculating each performance measure is described in Appendix 2.
- 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).

Table 11 Results of Program Performance Measures (2014-2022)

Performance Measure	2014	2015	2016	2017	2018	2019	2020	2021	2022
Overall compliance ¹	95	97	98	96	93	95	93	93	92
Priority contaminants ²	--	--	92	--	--	97	--	--	--
Biosolids and sludge ³	100	100	100	100	100	100	100	100	100

Notes:

¹Overall Compliance replaced “Proper waste treatment” as of 2014.

²Percentage of priority contaminants showing no increase in loads to the core area environment (preliminary result from draft report). Study performed every three to five years.

³Percentage 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 trend assessment reports. Long-term analysis of effluent trends for the core area outfalls is only undertaken every three to five years.

“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 2022, for the 14th consecutive year, the plant mixed liquor results met the Class A criteria for all metals, including mercury. Saanich Peninsula WWTP 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 2022.

4.0 CONCLUSION

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

The CRD continued to work towards its goals to protect sewage collection and treatment facilities, public health and safety, and the marine receiving environment, by reducing the amount of contaminants that industries, businesses, institutions and households discharge into the CRD’s sanitary sewer systems. The program regulated approximately 2,100 businesses through industrial wastewater discharge permits, authorizations and sector-specific codes of practice.

Increasing trends in trucked liquid waste quantities deposited at regional facilities are used as a key performance indicator of the program’s success. Catch basin quantities received at regional facilities increased slightly in 2022. This trend will continue to be evaluated in 2023 to ensure the continued protection of stormwater and the nearshore marine environment.

A total of 1,394 code of practice inspections were conducted over the year. Semi-annual inspections of the 34 active permits, and annual inspections of most of the 99 active industrial, commercial and institutional authorizations, were completed. One new permit and nine new authorizations for a variety of business types and terms were issued. Five significant incidents reported in regional and municipal sewers were investigated or continued to be investigated in 2022, and 13 tickets were issued to non-compliant food services operations. The overall compliance rate, including facilities operating under code of practice, authorization and permit was 92% in 2022.

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

Most monitoring targets set for 2022 were achieved. In addition, new businesses and commercial sites were introduced to RSCP sampling for compliance monitoring.

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

- Continued promoting new engagement and behaviour change tools with the “What You Put Down the Drain Matters!” campaign with messaging to discourage the disposal of fats, oils and grease into the sewer.
- “Live Green in the Bathroom” and other campaigns to inform residents about cleaning and personal care products that are not suitable for flushing down the toilet.
- Continuation of a standardized direct mail out program to residents in service areas with high obstructive waste maintenance requirements.

- Refreshed Medication Return messaging to remind residents to return unwanted medications to pharmacies for proper disposal.

In 2023, the program will be working on several initiatives, including:

- Final approvals and implementation of the first major update to the Sewer Use Bylaw since 2006.
- Evaluating emerging business sectors in order to set appropriate regulations and discharge limits for their unique flow and waste strength characteristics.
- Continuing to update web and print resources for the education of businesses and residents.
- Delivering educational campaigns to promote source control actions in order to protect wastewater quality and operation of existing sewage infrastructure and the new McLoughlin Point Wastewater Treatment Plant.

5.0 REFERENCES

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.

Hatfield Consultants Ltd., 2021. Macaulay and Clover Point Outfalls Wastewater and Marine Environment Program Comprehensive Review (2011-2019), January 2021.

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.

Source EnviroSolutions (SES), 2022. Five-Year Review of the CRD Regional Source Control Program (2016-2020). Report prepared for the CRD by Source EnviroSolutions, July 2022.

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

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 three CRD performance measures referred to in Section 3.7.

Performance Measure #1:

Overall compliance

This performance measure, replacing “Number of facilities with proper waste treatment” includes 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

The first step in estimating overall compliance is establishing the individual code of practice sector sizes. All facilities recorded in the RSCP database are reviewed to assess if they are still actively discharging to the CRD sewer system. For example, businesses that have transitioned to off-site waste disposal are no longer regulatable under the Sewer Use Bylaw. 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 2022

Code of Practice	Est. Sector Size (2022)
Automotive Repair	213
Carpet Cleaning	29
Dental	136
Dry Cleaning	7
Fermentation	20
Food Services	1,573
Laboratory	58
Photographic Imaging	22
Printing	30
Recreation Facility	na*
Vehicle Wash	50
Total CoP Operations	2,138
Total Active Permits	34
Total Active Authorizations	99
Total Regulated Facilities	2,271

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 2022. Facilities with “compliant” or “Step 1” status are considered “overall compliant” Overall compliance since full implementation of code of practice are presented in the table at the end of this appendix.

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).

In 2008, the CRD prepared a list of core area priority contaminants, based on information provided by the CRD's Environmental Monitoring Program and other sources. The above table shows the current list of 36 program priority contaminants (Appendix 1). 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 36 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 36 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, 2016, Cycle 1 (2011-2015) and Cycle 2 (2016-2019), based on information provided in the Golder Associates Ltd, 2017 and Hatfield 2021 reports. Starting in 2011, the Environmental Monitoring Program (EMP) began to analyze contaminant trends over shorter cycles than previous analyses that considered trends over data sets back to 1990. Therefore, the timeframes for this performance measure have changed and include the two cycles reported to date.

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" or "could not be calculated".

RSCP Priority Contaminant	Yearly Trend Core Area Loads					
	(1990-2005)	(1990-2008)	(1990-2011)	(1990-2016)	Cycle 1 (2011-2015)	Cycle 2 (2016-2019)
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)		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)	Cycle 1 (2011-2015)	Cycle 2 (2016-2019)
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	0	1
% of 36 Priority Contaminants	92%	78%	94%	92%	100%	97%

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 the CRD Board direction to cease land application of biosolids, the Saanich Peninsula WWTP 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 – 2022

The following table illustrates how performance measure #3 is calculated for 2022.

Treatment Plant	# Samples (2022)¹	# Compliant (2022)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 2022 was 100%.

Overall Compliance for 2022

Codes	Sector Size	# Insp 2022	% Insp	Total Comp	Comp %	In Prog	In Prog %	Step 1	# Overall Compliant (Compliant Or Step 1)	% Overall Compliant	DUR	DUR %
Automotive	213	71	33.3%	190	89.2%	6	2.8%	4	194	91.1%	0	0.0%
Carpet	29	0	0.0%	25	86.2%	3	10.3%	3	28	96.6%	0	0.0%
Dental	136	136	100.0%	119	87.5%	12	8.8%	8	127	93.4%	1	0.7%
Dry Cleaning	7	7	100.0%	7	100.0%	0	0.0%	0	7	100.0%	0	0.0%
Fermentation	20	7	35.0%	12	60.0%	1	5.0%	1	13	65.0%	0	0.0%
Food	1573	1106	70.3%	1394	88.6%	124	7.9%	55	1449	92.1%	0	0.0%
Labs	58	9	15.5%	57	98.3%	1	1.7%	1	58	100.0%	0	0.0%
Photo	22	11	50.0%	20	90.9%	1	4.5%	1	21	95.5%	0	0.0%
Printing	30	16	53.3%	27	90.0%	3	10.0%	2	29	96.7%	0	0.0%
Recreation*	-				-		-		-	-	-	-
Vehicle Wash	50	31	62.0%	39	78.0%	3	6.0%	1	40	80.0%	0	0.0%
Total	2138	1394	65.2%	1890	88.4%	154	7.2%	76	1966	92.0%	1	0.7%
Authorizations	99	81	81.8%	83	83.8%	14	14.1%	6	82	82.8%	0	0.0%
Permits	34	61	89.7%	21	61.8%	12	35.3%	6	32	94.1%	1	2.9%
All Totals	2271	1536	67.6%	1994	87.8%	180	7.9%	88	2080	91.6%	2	0.09%

Notes:

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

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

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