

Regional Source Control Program

2017 Annual Report

Parks & Environmental Services

Environmental Protection



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REGIONAL SOURCE CONTROL PROGRAM 2017 ANNUAL REPORT

EXECUTIVE SUMMARY

Introduction

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 marine receiving environment by reducing the amount of contaminants that industries, businesses, institutions and households discharge into the district's sanitary sewer systems. Source control is widely accepted as a cost-effective and essential first step in sewage treatment in all major urban areas throughout North America.

The program regulates approximately 2,000 businesses through industrial wastewater discharge permits, authorizations and 11 sector-specific codes of practice (CoP).

2017 Program Activities

The RSCP continued to apply a "sector-by-sector" approach to CoP inspections, focusing on the mechanical, car wash, fermentation and food services sectors. Overall compliance rates for CoP, permitted industrial facilities and facilities operating under authorizations were 96% in 2017.

The main activities and accomplishments of the program in 2017 are outlined below.

Industrial, Commercial and Institutional Liquid Waste Regulation

- Sector-by-sector inspections included the mechanical, car wash, fermentation and food services sectors.
- 1,067 CoP inspections conducted.
- 767 food services operations were inspected, with an additional 170 follow-up visits for compliance and/or further support.
- 67 automotive (mechanical) repair sector, 26 vehicle wash, and 21 fermentation operation inspections were conducted.
- All permit inspections scheduled at the beginning of 2017 were completed within the year.
- Six new permits were issued (total of 41 active) and 11 new authorizations were issued (total of 92 active).

Monitoring

- Monitoring targets set for 2017 were achieved.
- On average, there were 2 scheduled audit monitoring events per permit.
- The program focused on the fermentation sector, with follow-up compliance monitoring also conducted at 1 dry cleaning facility, which had exceedances in 2016.

Enforcement

- Five tickets were issued under the CRD Ticket Information Authorization (TIA) Bylaw, all to food services operations.

Contaminants Management

- Staff continued to conduct research into emerging contaminant characterization of fermentation, particularly for microbreweries with an eye towards contaminant loadings and consistent requirements across sub-sectors.

- Staff refreshed the existing Medications Return Program in response to a request from Saanich Peninsula Wastewater Committee to explore areas to increase protection of wastewater dewatered sludge and biosolids.
- Staff commissioned a study by Royal Roads University (RRU) Environmental Science undergrads to research the effectiveness of dry cleaning treatment works used within the CRD.
- The program issued a letter to all waste discharge permit and authorization holders requesting safety data sheets of all industrial process chemicals and cleaning agents.

Contaminant Reductions

- For the 9th consecutive year, Ganges Wastewater Treatment Plant mixed liquor results met the Class A criteria for all metals, including mercury. Saanich Peninsula Wastewater Treatment Plant dewatered sludge monitoring was started in 2013 and all results up to and including 2017 have also met the Class A criteria for metals.

Significant Incident Response

- There were 6 significant incidents formally reported: 2 involving fats, oils and grease (FOG) build-ups; one involving fuel oil and another involving discoloured discharge at CRD pump stations; 1 involving a sewer overflow due to discharge from a construction site; and 1 involving suspended solids entering storm sewer from a sanitary cross-connection.

Residential Outreach

- Staff partnered with the Vancouver Island Health Authority and the Health Products Stewardship Association to launch a new campaign to increase public awareness and participation in the BC Medication Return Program. This campaign, and past initiative, maintains the region's high rate of proper disposal per capita. Approximately 11.5 tonnes of medications were collected in the region, one of the highest rates of return in BC.
- Staff developed new engagement and behaviour change tools for the Clean Green 2.0 campaign, which focuses on environmentally-safe alternatives to household cleaners.

Business Outreach

- Inspectors continued to deliver program outreach material to local businesses, including RSCP sector-based posters and guidebooks.
- Staff continue to maintain and, when necessary, update sector-based posters, guidebooks and webpages.

Initiatives

Program staff undertook the following initiatives:

- worked with municipal staff to resolve various FOG blockages in sewers.
- completed a water audit for a post-secondary institution, conducted audits for 3 small franchise/retail/office space audits, and completed detailed follow-ups for 3 previously audited facilities.
- commissioned a study by RRU Environmental Science undergrads to research the effectiveness of dry cleaning treatment works used within the CRD.
- collaborated with other CRD program and municipal staff to investigate sewer and storm discharges from the "wet-cutting" sector.
- collaborated with municipal business licensing staff to share new business information for review against permitting requirements.
- worked with BC Ministry of Environment and Climate Change Strategy (MOE) staff to ensure consistent interpretation and application of BC Hazardous Waste Regulations with RSCP permittees.

- participated in the CRD Planning & Protective Services “Linkage Committee” to explore opportunities for integrated messaging across the organization.
- developed and co-hosted a Source Control symposium at the 45th annual British Columbia Water and Wastewater Association Conference & Trade Show in Victoria, BC.

Program Planning and Development

- The program hired a consultant to review the CRD Sewer Use (Bylaw No. 2922) and suggest improvements since the last amendment in 2006. Staff will revise the Sewer Use Bylaw, which is anticipated to launch in late 2019.

Performance Measures

- The percentage of businesses with a rating of “overall compliance” was 96%.
- For the 9th consecutive year, the percentage of mixed liquor and dewatered sludge samples that met Class A standards for metals was 100%.

Wastewater Trend Assessment – Macaulay and Clover Points

- Staff retained a consultant to complete a detailed statistical assessment of the 1990-2015 wastewater data in 2017, with results confirming patterns observed in the previous trend assessment (up to and including the 2011 data). The current trend assessment found that concentrations were typically higher at Macaulay Point than Clover Point, but due to higher flows at Clover, the opposite pattern was observed for contaminant loadings.
- Metal and conventional parameters have been more frequently detected in the wastewater samples than in the past, but with metals generally exhibiting decreasing concentrations and loadings over time, and conventional parameters generally exhibiting slightly increasing concentrations and loadings. The increasing conventional parameter trend is largely attributable to water conservation measures that have been making the sewage more concentrated. Organic parameters have also generally experienced decreasing trends in detection frequency, concentrations and loadings. There were a few examples of priority pollutants that experienced increasing concentrations or loadings over the time period, but overall, the assessment provided additional evidence of stable or decreasing concentrations and loadings of contaminants in the Macaulay and Clover wastewaters.
- Program staff discussed assessment findings with internal marine monitoring staff to determine the need for additional regulatory requirements and/or educational outreach for the few contaminants that experienced increasing trends.

Wastewater Trend Assessment – Saanich Peninsula

- Trend assessment of wastewater quality indicated generally decreasing concentrations and loadings over the 2000-2015 time period, with similar trends to the previous assessment. The data indicate significant trends in detection frequency for approximately 20% of the frequently detected parameters, most notably general increases in detection frequency for metals and conventional parameters, and decreases for organic parameters.
- Increased frequency over time appears to be related to improved analytical methods; however, some elevated detection limits were observed in recent years for organic parameters (e.g., di-n-butyl phthalate). The results are incorporated into the overall marine monitoring program to evaluate contaminant trends associated with the wastewater system.

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1.0 INTRODUCTION

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

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

The program goals are as follows:

- protect the marine receiving environment adjacent to the CRD's sewage outfalls
- protect sewage facilities 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

The Core Area Liquid Waste Management Plan (LWMP) and Saanich Peninsula LWMP contain commitments to prepare an annual report on the RSCP for submission to the CRD Board and the BC Ministry of Environment and Climate Change Strategy (MOE). This annual report presents a summary of program activities and accomplishments for the period January-December 2017, and provides a brief account of initiatives planned for 2018.

Source control is a key component of effective wastewater treatment and will form 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.

2.0 BACKGROUND

2.1 Policies and Procedures

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

2.1.1 Policies Approved by the CRD Board

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

2.1.2 Operating Procedures

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

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

2.2 Sewage Collection Areas and Sewage Facilities

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

The CRD owns and operates 8 wastewater treatment plants, as shown in Table 1. Four of these plants—Macaulay Point, Clover Point, Saanich Peninsula and Ganges—receive significant industrial, commercial or institutional wastewater flows, while the remaining 4 are small plants receiving mostly residential flows.

The sewage flows into each treatment plant are reported in the annual compliance monitoring reports for CRD sewage outfalls.

The 10 CRD municipalities, 3 electoral areas and 6 other participating areas with sanitary sewers were regulated under the RSCP in 2017. Estimated annual sewage flows contributed by each participating area, over the period October 1, 2016-September 30, 2017, are listed in Table 2.

Table 1 CRD Treatment Plants and Sewage Collection Areas – 2017

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

Table 2 Annual Sewage Flows 2016-2017

Participant	Estimated Annual Flow (m ³ /year)*	Percentage of Total Flows
Saanich	9,519,763	26.68
Oak Bay	3,026,216	8.48
Victoria	12,523,977	35.10
Esquimalt	2,217,351	6.21
View Royal	847,419	2.38
Colwood	1,117,514	3.13
Langford	2,313,223	6.48
Sidney	1,462,104	4.10
Central Saanich	1,402,683	3.93
North Saanich	490,948	1.38
Esquimalt First Nation	17,818	0.05
Songhees First Nation	231,025	0.65
Pauquachin First Nation	35,511	0.10
Tseycum First Nation	11,509	0.03
Institute of Ocean Sciences	3,067	0.01
Department of National Defence	154,538	0.43
Ganges Sewer	159,549	0.45
Maliview Sewer	18,123	0.05
Magic Lakes Estates Sewer	103,868	0.29
Port Renfrew Sewer	22,861	0.06
Total Flow	35,679,068	99.99%

Note:

*Yearly flows cover the period October 1, 2016-September 30, 2017

3.0 REGIONAL SOURCE CONTROL ACTIVITIES AND ACCOMPLISHMENTS – 2017

RSCP activities and accomplishments in 2017 are discussed under the following broad groups of activities:

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

3.1 Industrial, Commercial and Institutional Liquid Waste Regulation

3.1.1 Regulatory Background

The Sewer Use Bylaw (CRD Bylaw No. 2922) serves as the main regulatory instrument for source control within CRD sanitary sewer systems. The bylaw specifies the various regulatory conditions under which facilities must operate if they discharge non-domestic waste into a sanitary sewer. The regulatory conditions for businesses include operation under waste discharge permits, authorizations or sector-specific Codes of Practice (CoP). Under the RSCP 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 RSCP focused primarily on identifying, inspecting, assessing and permitting larger industrial facilities, and preparing authorizations for smaller commercial and institutional dischargers operating within the district. 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 CoP, 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 district. The first regulatory CoP, 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 CoP 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 CoP, see Section 3.1.4.

The Sewer Use Bylaw and its associated policies and procedures have been amended periodically during the first 12 years of the program, largely to accommodate adoption of CoP, but also to add new restricted waste limits and a structure for cost recovery. In 2016, staff began the process of assessing and reviewing the Sewer Use Bylaw to ensure it continues to provide an adequate level of protection.

3.1.2 Waste Discharge Permits

Waste discharge permits are site-specific regulatory documents, issued to businesses or institutions under the CRD Sewer Use Bylaw, that outline requirements for wastewater pre-treatment, effluent quality, monitoring and reporting. Waste discharge permits are issued to facilities or operations that discharge significant non-domestic wastewater flows (greater than 10 m³/day) or wastewater containing high loads of restricted wastes or specified chemical contaminants into the sanitary sewer. Table 3 provides a summary of waste discharge permit activity in 2017.

Table 3 Summary of Waste Discharge Permit Activity in 2017

Waste Discharge Permit Activity	2017
Permits active (at year end)	41
New permits issued	6
Permits closed	9
Permits amended	5
Permit site inspections (including evaluations for new permits)	75

At the end of 2017, there were 41 active waste discharge permits being managed by RSCP staff. The majority of these permits were ongoing, with no expiry date. Six new temporary permits were issued: 3 for short-term discharges of cruise ship grey and black wastewater to sanitary sewer; 1 of which expired unused, and 3 for excavation dewatering.

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

All permit inspections scheduled at the beginning of 2017 were completed within the year. Throughout 2017, inspection staff continued their permit confirmation process, which will likely take several years to complete. 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 CoP 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 by RSCP staff 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 2017.

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

Table 4 Summary of Authorization Activity in 2017

Authorization Activity	2017
Authorizations active (at year end)	92
New authorizations issued	11
Authorizations closed or transferred to codes or permits	8
Authorizations amended	7
Authorization site inspections (including evaluations for new authorizations)	76

At the end of 2017, there were 92 active waste discharge authorizations being managed by RSCP staff. The majority of these were ongoing, with no expiry date. Eleven new authorizations were issued over the year: 2 for short-term discharges of wastewater created during the installation of cure-in-place lining for municipal water pipelines, 2 food production facilities, 1 recreation facility, 1 printing facility with alternative treatment works, 1 ship and boat waste facility, 1 stone cutting facility, 1 kitchen equipment cleaning company, 1 temporary permit for the discharge of recalled product, and 1 aviation wash treatment facility.

3.1.4 Codes of Practice

3.1.4.1 Background

The CRD has made commitments in the Core Area LWMP and Saanich Peninsula LWMP to the development and implementation of CoP to regulate non-domestic waste discharges from commercial and institutional sectors to the district's sanitary sewers. The RSCP defines CoP as "regulatory documents containing mandatory sanitary sewer discharge standards for specific industrial, institutional or commercial sectors." Table 5 lists the 11 CoP in effect.

CoP 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. RSCP 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 RSCP Codes of Practice (Bylaw No. 2922)

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

Notes:

1 Code amended December 2001 and March 2003

2 Code amended December 2003

3.1.4.2 Code of Practice Inspection Summary – 2017

In 2017, the RSCP continued to emphasize customer service and support as part of CoP inspections, in addition to ensuring compliance with the CoP requirements. This involves making every effort to educate regulated operations, provide guidance, and in some cases feedback through lab analysis of effluent quality, sometimes at the cost of multiple visits to the same establishment.

Five inspectors conduct the CoP inspections, in addition to managing the RSCP 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 CoP inspection activity in 2017. 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 (1,067 in 2017) includes first (or primary) inspections within an inspection cycle and repeat (or follow-up) inspections to confirm compliance status.

Table 6 Summary of Code of Practice Activity in 2017

Code of Practice (Est. Sector Size – 2017)	% of Sector Inspected in 2017
Automotive Repair (202)	33%
Carpet Cleaning (34)	9%
Dental (124)	0.8%
Dry Cleaning (7)	14%
Fermentation (21)	100%
Food Services (1225)	77%
Laboratory (22)	18%
Photographic Imaging (67)	8%
Printing (21)	10%
Recreation Facility (na**)	na
Vehicle Wash (38)	68%

Notes:

*Includes both primary and repeat inspections. Some inspections were conducted on facilities that were deemed, through the inspection to have “no regulated waste”. In that case, the facility would not be included in the sector size estimate, but the inspection would be counted.

**All existing recreation facilities previously regulated under CoP were moved to individual authorizations in 2016.

The “sector-by-sector” review process includes inspecting all the businesses due for an inspection in each sector for baseline compliance, reviewing the CoP for any necessary amendments or updates, and updating data for new and/or newly sewered facilities. Sectors of focus in 2017 were automotive (mechanical) repair, vehicle wash, fermentation, and food services. Other sectors were visited only for “follow-up” inspections.

The inspection team utilized program spatial tools for planning the inspections in broad geographic areas, working each sub-region as a team. The businesses inspected were comprised of those within the existing Cross Connection and Regional Source Control Information Management System (CRIMS) database, and also facilities identified through an online search, cross-referencing the CRD Cross Connection Control (CCC) Program and a BC Assessment code query.

Starting in 2016, dischargers operating treatment works on site were inspected annually or biennially: automotive (annually), dental (biennially) and dry cleaning sectors (annually starting in 2018). This change was based on risk associated with priority contaminants. The non-discharging businesses in these sectors (i.e., sending business waste for off-site treatment or operating as a storefront) will be inspected every 3-5 years.

Expanding on the work characterizing distillery wastewater in 2016, a review of the remainder of the sub-sectors of the fermentation sector was completed. Wastewater strength from u-brews and microbreweries operating under the CoP and breweries operating under permit were compared.

The RSCP sponsored a student project with the RRU Environmental Science Program to investigate operational effectiveness of commonly used dry cleaning wastewater treatment units. The research showed a key element in improving the performance of tetrachloroethylene (PERC) capture and re-use, and will serve to inform businesses in better waste management practices.

Rigorous food service inspections are a constant every year, due the sector's large size (>1,200 regulated businesses) and potential to impact sewer infrastructure through grease blockages. Of the 937 inspections conducted, 170 were repeat inspections. The majority of those repeat inspections focused on assisting the facility to comply with regulatory requirements, such as proper maintenance of existing grease interceptors (GI).

In response to a gap in understanding of the new definition of confined spaces, a consultant was hired to do a hazard assessment of GI located in crawl spaces and small basements throughout the CRD. Sites were categorized and low or moderate hazards and staff were trained in proper WorkSafeBC procedures for entry.

3.1.5 Coordinated Inspections

3.1.5.1 Coordinated Significant Incident Responses

There were 6 significant incidents formally reported: 2 involving fats, oils and grease (FOG) build-up, 1 involving fuel oil and another involving discoloured discharge at CRD pump stations, 1 involving a sewer overflow due to discharge from a construction site, and 1 involving suspended solids entering storm sewer from a sanitary cross-connection.

3.1.6 Monitoring

RSCP staff carried out the following types of monitoring in 2017: permit compliance, authorization compliance, CoP and key manhole monitoring. All wastewater samples collected in 2017 were analyzed by a contract laboratory using standard analytical procedures specified in the RSCP Sampling and Analysis Procedure Manual. Monitoring of dewatered sludge produced at the Saanich Peninsula Waste Water Treatment Plant (SPWWTP) commenced in March 2013. Table 7 provides a summary of RSCP monitoring activity in 2017.

Table 7 Summary of RSCP Monitoring Activity in 2017

Monitoring Events	2017
Permit compliance	61
Authorization compliance	22
Code of practice	8
Key manhole	19
SPWWTP influent	8
SPWWTP dewatered sludge	12
Ganges influent	1
Ganges mixed liquor	12

3.1.6.1 Permit Compliance Monitoring

Businesses operating under waste discharge permits are required to carry out self-monitoring of their wastewater for a range of parameters on a specified regular basis. This data is normally submitted to RSCP staff on a monthly or quarterly basis for compliance assessment. An important component of the RSCP 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. RSCP 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 2017 was 2. The goal of collecting audit samples from each permitted site twice per year was achieved at all but 1 permit site (due to ongoing issues with the site's communication of its activities to RSCP staff). Two permit sites were sampled 3 times, due to their enforcement status as discharger under review (DUR). One permit site was sampled 4 times, due to unusual fluctuating results in their effluent quality.

The environmental science officer responsible for managing a specific permit reviews the data submitted by the permittee. If a significant difference is detected between permittee self-monitoring results and RSCP audit results, the permittee is contacted and an investigation into the discrepancy is initiated.

The majority of all audit results obtained in 2017 were not significantly different from self-monitoring results reported from the same site. This indicated that most of the self-monitoring results being submitted by permittees had been collected and analyzed in an appropriate manner, as required by each permit.

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

3.1.6.2 Authorization Compliance Monitoring

Monitoring was carried out in 2017 at 19 businesses operating under authorizations with self-monitoring requirements, with 3 follow-up visits conducted at 2 business with initially high sample results. The RSCP monitoring provides, at minimum, an annual check on the quality of effluent being discharged by businesses known to have reported restricted waste generation or handling on site. The results of this monitoring indicated that discharges from authorizations in 2017 were generally in compliance with Sewer Use Bylaw restricted waste limits.

3.1.6.3 Code of Practice Monitoring

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

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

Businesses operating under CoP are not required to sample their own wastewater and report results to the RSCP. Compliance with a CoP is usually achieved by installing the required properly-sized treatment works, carrying out regular maintenance and record keeping.

In 2017, CoP monitoring was carried out on 1 of the 11 regulated sectors; fermentation. Follow-up inspections and monitoring were also conducted at 1 dry cleaning facility that had exceedances in 2016, as recommended in the *Regional Source Control Program 2016 Annual Report*.

- **Fermentation**

In 2017, a review of the fermentation CoP was initiated and 21 sites were inspected. Of these sites, samples were taken from 6 facilities. All 6 facilities were microbreweries, chosen based on their production volumes and the lack of historical data.

Composite samples were collected from each facility over the course of 1 normal production day. The goal was to collect a composite sample that was representative of what goes to sanitary sewer from a microbrewery on an average day.

Samples were analyzed for biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), pH and temperature. Chemical analytical results were evaluated against Schedule "B" Restricted Waste Criteria established in the CRD Sewer Use Bylaw (Bylaw No. 2922), and allowable concentrations granted to breweries that are under permit, which are 1,800 mg/L and 2,500 mg/L for BOD and COD, respectively, hence referred to as the 'limits'.

All facilities were in compliance for maintaining their treatment works under the CoP; however, only 1 of the 6 sites had analytical COD results below the bylaw limit and zero facilities had analytical BOD results below the bylaw limit. Four of the facilities were able to meet the bylaw limit for TSS and 2 facilities were able to meet the bylaw limits for the pH range of 5.5-12, all other sites had pH results below 5.5.

While the flows were much higher for permitted facilities, wastewater strength was significantly lower than for microbreweries. It was acknowledged that for some permitted facilities, years of monthly data was available while only 1 or 2 sets of sample results were available for each microbrewery. It was recommended that all microbrewery facilities should be regulated under authorizations to collect adequate data for determining when wastewater strength and volume triggers for permits are reached. The review of the fermentation sector is discussed in greater detail in Section 3.3.

3.1.6.4 Key Manhole Monitoring

Key manhole monitoring is carried out to monitor for contaminants originating from sources within wide sanitary sewer collection areas. This includes monitoring at 2 residential sites and 2 DND sites within the Macaulay Point and Clover Point collection areas. It also includes 1 residential site and 1 Victoria International Airport site within the SPWWTP collection area.

- **Residential Sites**

Residential (or domestic) key manhole monitoring has been carried out by RSCP 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 2017 residential sampling program included sampling events at Dean Park (North Saanich), Harling Point pump station (Oak Bay) and Lang Cove pump station (Esquimalt) in January, April, July and October. All events included sampling and analysis for a wide range of parameters, including priority contaminants. There were 2 exceedances of Sewer Use Bylaw restricted waste limits at the Harling Point pump station. In April, there was a TSS result of 636 mg/L, and in October there was a sulfide result of 1.03 mg/L.

- **DND Sites**

In 2017, key manhole sampling was carried out at the Esquimalt pump station, serving the DND Dockyard area in April, July and October, and at the DND Colwood pump station in March and October. In 2017, there were 4 exceedances of the Sewer Use Bylaw restricted waste limits. At DND Dockyard, TSS was in exceedance of the limits in April and July with results of 820 mg/L and 444 mg/L, respectively. Chloride was also in exceedance of the limits at DND Dockyard in July with a result of

2,400 mg/L. DND Colwood had 1 exceedance of total polycyclic aromatic hydrocarbon (PAH) with a result of 0.11 mg/L in April.

- **SPWWTP Collection Area Sites**

Monitoring at the Airport #5 site was continued and samples were collected in March and October. All parameters were within Sewer Use Bylaw restricted waste limits.

3.1.6.5 SPWWTP Influent and Dewatered Sludge Monitoring

Monthly grab samples (for metals analysis) and 4 composites (for metals and priority pollutant analysis) of SPWWTP influent were collected annually by RSCP staff in past years. Monthly grab sampling was discontinued in June 2007, following a consultant's review of the plant's influent/effluent sampling program. The monthly grab samples were replaced by quarterly triplicate composite sampling (on 3 consecutive days) beginning in April 2008. This triplicate composite sampling is conducted by CRD Marine Monitoring Programs staff in January, April, July and October, on behalf of the RSCP.

Golder Associates Ltd., (2013), recommended that SPWWTP monitoring could be reduced to biannual triplicate 24-hour composite sampling with single 24-hour composites collected in the remaining 2 quarters. As a result, there were 2 triplicate influent sampling events carried out by Marine Monitoring Programs staff at SPWWTP in 2017, those scheduled in January and July. Single 24-hour composite samples were collected in April and October.

Twelve composite dewatered sludge samples were collected by CRD SPWWTP Operations staff for analysis in 2017. Daily samples were combined into weekly composites, which were submitted for moisture, metals and weak acid dissociable (WAD) cyanide analysis on a monthly basis, with a field duplicate submitted in February and September.

3.1.6.6 GWWTP Influent and Mixed Liquor Monitoring

As in past years, a single (grab or composite) sample of influent was collected at the Ganges Waste Water Treatment Plant (GWWTP). The 24-hour composite sample collected in July 2017 was submitted for priority pollutant analysis.

In 2017, 12 mixed liquor (treatment plant wastewater mixed with activated sludge) samples were collected by GWWTP Operations staff for analysis. Grab samples were collected on a monthly basis (with a field replicate taken in February and September). Samples were submitted for moisture and metals analysis.

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

3.2 Enforcement

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

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

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

3.2.1 Operations Regulated By Waste Discharge Permit

Of the 41 active waste discharge permits in place at the end of 2017, 28 sites were in “full compliance” with their permits and the Sewer Use Bylaw. One permit was at “staff assessment”, 1 site was classified as a DUR and 7 sites were considered to be “in progress”, but still in compliance with their permits under the enforcement policy. The enforcement levels and numbers of permits at each level are summarized in Table 8.

Table 8 Summary of Waste Discharge Permit Compliance – 2017

Enforcement Level	Number of Permits
Full Compliance	28
Step 1	2
Step 2	4
Step 3	2
Staff Assessment	1
Discharger Under Review (non-compliant)	1

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

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

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

Four permit sites classified above Step 3 were subject to assessment by RSCP staff in 2017. These sites included:

- A septage disposal facility was escalated to DUR level for sulfide exceedances in 2015 and remained there throughout 2017. The permittee submitted a detailed compliance plan, which was accepted by RSCP staff. Exceedances continued and in October 2017, the facility was informed they would be issued tickets for continued infractions. Treatment was increased in December 2017 and results appeared to improve. The facility remained under DUR through the end of 2017, as RSCP staff continued to monitor the effectiveness of changes to practices and treatment upgrades.
- A municipal public works facility was escalated to ‘Staff Assessment’ level in 2016 for failing to operate their authorized equipment works, sample wastewater in accordance with authorized procedures and keep required records. They remained under ‘Staff Assessment’ until a report was received in January 2017 outlining improved sampling procedures. Subsequent inspections showed improvement in monitoring and maintenance procedures.

- A food processing facility was under 'Staff Assessment' due to repeated biological oxygen demand (BOD) exceedances. Personnel changes, equipment malfunctions and maintenance issues appeared to be the cause of the exceedances. The facility is working on improving their policies and procedures in order to reduce their effluent strength.
- A microbrewery had ongoing issues with failing to report in 2017. Since the permit was issued in April of 2016, there were repeated issues of missing self-monitoring samples and reports. Through the enforcement of this offense, staff became aware that the TIA did not include specific penalties related to sampling and reporting for permits and authorizations. Bylaw No. 2922 was amended in January 2018 to address this (sections 3.6 and 3.7 were added). The TIA Bylaw (Bylaw No. 1990) was also amended to include associated fines of \$1,000 for permits and \$500 for authorizations.

No charges were laid against waste discharge permit holders under the Sewer Use Bylaw during 2017.

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.

At the end of 2017, 87 of 92 inspected businesses were in full compliance with their authorizations, 3 were at a Step 1, 1 was at Step 2, and 1 authorization was under 'Staff Assessment'. There were 82 inspections carried out at sites operating under authorizations in 2017.

An aircraft wash treatment facility was classified under 'Staff Assessment' in April 2017, as a result of maximum daily flow exceedances. Communication was increased and a compliance plan was received in April 2017. It is expected construction will be completed in 2018 to correct the issue.

The overall compliance level ("full compliance" or "in progress") for the total 92 authorizations active at the end of 2017 was 90%.

3.2.3 Operations Regulated by Codes of Practice

The stepwise approach to achieve compliance is applied to all CoP 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 DUR level and above are classified as being in "non-compliance" with the code. A summary of the CoP enforcement results for inspections carried out from the implementation date of each code to 2017 is presented in Table 9.

Table 9 Code of Practice Enforcement Summary – From Implementation Date to End of 2017

Code of Practice	% Full Compliance ¹	% In Progress ²	% Non-Compliance ³ (DUR)
Automotive Repair	95%	3%	0
Carpet Cleaning	97%	3%	0
Dental	93%	6%	0
Dry Cleaning	71%	29%	0
Fermentation	100%	0%	0
Food Services	94%	4%	0.4%
Laboratory	64%	23%	0
Photographic Imaging	99%	0%	0
Printing	95%	5%	0
Vehicle Wash	71%	13%	0

Notes:

- 1 Percentage of active operations, regulated within the sector and in compliance with all requirements of the code at the last inspection – including sites with required treatment works and those using off site waste management.
- 2 Percentage of active operations, regulated within the sector classified at Step 1, 2 or 3 of the enforcement policy at the last inspection date.
- 3 Percentage of active operations, regulated within the sector classified as DUR at the last inspection date.
- 4 Some of the totals do not add up to 100%, when some regulated businesses within a sector have not yet been assessed.

Most CoP enforcement actions to date have been associated with implementation of the food services code, which regulates one of the largest business sectors in the district. This sector has been very cooperative during application of the escalating approach to enforcement, and approximately 4% of food services operations inspected were considered to be “in progress”, with 0.3% being classified as DUR. The main non-compliance issues continue to be failure to maintain GI and failure to install properly sized GI.

There were 5 tickets issued under the CRD TIA Bylaw to food services operations in 2017, all were paid.

The dry cleaning sector continued to have 29% of the facilities “in progress”, which equates to 2 of the 7 regulated facilities. A decision was made in 2016 to increase inspections in this sector to biennially to ensure proper PERC management and/or disposal. In 2017, RSCP commissioned a student project to investigate best practices for PERC treatment. The study is discussed further in Section 3.3.

The automotive (mechanical) sector had 3% of the facilities “in progress” in 2017, which equates to 7 of the 202 regulated facilities. In 2015, a ‘sector-by-sector’ approach expanded the definition of automotive to include all types of mechanical repair. Approximately 2% of the sector include facilities identified as possible dischargers under the code, but are still awaiting confirmation. These were identified through the 2015 sweep or more recently through other means, such as the municipal business license sharing process.

The vehicle wash sector had 13% of the facilities “in progress” in 2017, which equates to 5 of the 38 regulated facilities.

The fermentation sector had 100% compliance in 2017. In light of the growth of this sector, a complete review was initiated in 2017 to ensure regulations are consistently and fairly applied. The review is discussed in greater detail below.

In 2017, 96% of facilities regulated under RSCP CoP, permits and authorizations achieved overall compliance.

3.3 Contaminants Management

Contaminants management builds on the program's successful regulatory approach, but involves a shift in focus towards avoidance, elimination or substitution of polluting products, processes or materials in order to make reductions in specific priority contaminants that have proven difficult to control or treat. Contaminants management projects initiated or completed in 2017 are outlined below.

3.3.1 Contaminant Characterization of Microbreweries in the Fermentation Sector

The number of alcohol distillery businesses in BC is rising in part due to significant transformation in provincial liquor laws in 2013, enabling businesses to operate under a craft designation. The growth rate of new craft distillery operations in BC between 2012 and 2015 was 182% (or 60% annually).

RSCP regulated breweries have recently been observed integrating distillery equipment into their existing production operations. In addition, the region is seeing a growing presence of stand-alone craft distillery enterprises. The distillation sector was reviewed in 2016, and a review of the remainder of the sector was conducted in 2017, as part of a project to evaluate regulation based on contaminant loadings and more consistent requirements across sub-sectors.

Annual production data and effluent samples were collected, where possible, to better understand how wastewater strength varies between different facilities within the fermentation sector. Understanding the contribution of each fermentation facility and sub-sector is crucial to identify where pollution control targets are not being met, or where programs, prescriptions and regulatory effort should be improved and focused to help achieve RSCP objectives.

The fermentation industry has been well documented to produce large wastewater volumes with relatively high concentrations of COD, BOD, TSS and low pH.

In recent years, the Pacific Northwest has seen a similar rapid growth in the number of breweries, distilleries and other fermentation operations. In addition to the loadings review, a brief comparison of regulatory approaches used by other jurisdictions in the Pacific Northwest was included in the report.

In the CRD, there are 26 fermentation facilities, 5 of which are regulated under permit, 13 u-brews that use pre-fabricated kits and concentrates, and 8 microbreweries under the Code of Practice for Fermentation Operations.

A review of historical monitoring data of the permitted breweries showed BOD and COD results ranging from 500-1,250 mg/L and 800-2,000 mg/L, respectively. TSS ranged between approximately 25-100 mg/L. Annual wastewater flows were 7,000-15,000 m³.

Sampling data from 2015 and 2017 for 6 of the 8 microbreweries was summarized, and results showed BOD and COD results ranging from approximately 2,500-20,000 mg/L and 4,000-36,000 mg/L, respectively. TSS ranged between approximately 100-1,700 mg/L. Annual wastewater flows were 300-2,250 m³.

Sampling at u-brew facilities was not feasible, but it was estimated that annual flows ranged between 1-8 m³. Loadings would be negligible for this sub-sector. There were no vintners, cideries or wineries discharging to sanitary sewer at the time of the review.

While the flows were much higher for permitted facilities, wastewater strength was significantly lower than for microbreweries. It was acknowledged that for some permitted facilities, years of monthly data was available while only 1 or 2 samples were collected for each microbrewery. It was recommended that all microbrewery facilities should be regulated under an authorization to collect adequate data for determining when wastewater strength and volume triggers for permits are reached.

3.3.2 BC Medications Return Program Campaign

At a 2016 Saanich Peninsula Wastewater Commission meeting, RSCP staff were asked what more could be done through source control to increase protection of wastewater dewatered sludge and biosolids produced at the treatment plant. The RSCP 4-year plan (2016-2019) included enhancement of initiatives and outreach to achieve further reduction of emerging contaminants throughout the region. In December 2016, an outline of a regional plan was developed and an information report was sent to the Environmental Sustainability Committee in January 2017 and subsequently to the Core Area Liquid Waste Management Committee and CRD Board in March.

RSCP staff, in cooperation with Island Health and the Health Product Stewardship Association, held a campaign and media event to launch the program at a local pharmacy in April 2017. The media event was covered by print, radio and television. The campaign included print and social media ads, social marketing tools, videos and outreach booths at pharmacies throughout the region.

3.3.3 Investigation into the Operational Effectiveness of a Commonly Used Dry Cleaning Wastewater Treatment Unit

Monitoring results from the 2016 dry cleaning sector sweep showed that 80% of the discharging facilities exceeded the CoP tetrachloroethylene discharge limit of 100 µg/L. RSCP commissioned a study by RRU Environmental Science students to research the effectiveness of treatment works used in the dry cleaning sector within the CRD. The research showed a key element in improving the performance of a typical tetrachloroethylene (PERC)-contaminated wastewater treatment unit, and will serve to inform businesses in better waste management practices.

Two operations within the CRD were observed to understand their practices and disposal methods and a literature review was conducted to gather background information. Three benchtop experiments were designed to determine factors that might influence the operational effectiveness of the wastewater treatment unit.

A Pure Water 22 unit produced by Union Systems, vapour and liquid phase activated carbon, and dry cleaning wastewater were obtained from a local dry cleaner. All samples were sent to AGAT Laboratories and analyzed for PERC concentration. The first experiment tested carbon effectiveness, and the hypothesis that manufacturer recommended liquid phase activated carbon is more efficient at removing PERC from wastewater than vapour phase activated carbon. The second experiment was a “settling test”, which was designed to determine whether PERC concentrations in the wastewater would decrease if allowed to settle. The third experiment was designed to determine what volume the unit could process before breakthrough was reached.

The carbon efficiency test showed a significant difference between the 2 types of activated carbon on the absorbance of PERC (p -value = 0.000104). The initial concentration of the PERC effluent was 155,000 µg/L, the treated concentrations of liquid and vapour phase carbons were 46 µg/L and 37,700 µg/L, respectively. This test showed that the manufacturer’s recommendation to use liquid phase rather than vapour phase carbon is valid.

The settling experiment showed a moderate (8%) difference in PERC concentration from the agitated initial sample (120,000 µg/L) to the sample that was settled for 27 hours (110,000 µg/L). Allowing the wastewater to settle prior to loading may extend the life of the liquid phase carbon used. It was noted that the single dry cleaning operator who did not exceed the limit allowed wastewater to settle for 1-2 weeks before treatment.

The breakthrough experiment resulted in 643.5 L of wastewater being treated in the unit, which indicated that “breakthrough” had not yet been reached. An interesting note is that 2 data points are above the limit and occurred without sustained breakthrough, likely due to the students still becoming familiar with the operation of the unit or indicating that the carbon filter was beginning to lose effectiveness.

The report recommended a detailed standard operating procedure, which included purging, timing and detailed instructions for carbon changes, cleaning procedures, and further monitoring of the dry cleaning sector by RSCP staff.

3.4 Contaminant Reductions

3.4.1 Marine Outfall Contaminant Reductions

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

3.4.1.1 Core Area Outfall Effluent

CRD Marine Monitoring Programs staff regularly monitor effluent quality at the Macaulay and Clover points outfalls for a wide range of substances. The most recent effluent trend analysis was undertaken in 2017. This report provided a statistical assessment of wastewater trends at Clover and Macaulay points outfalls over the period 1990-2015. The findings of this report for Clover and Macaulay points over the 25-year period of record included the following:

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

Approximately 70% of the frequently detected routine analysis parameters and 27% of the frequently detected high-resolution analysis parameters had significantly different concentrations between the 2 outfalls. For the majority of these parameters, concentrations measured in the Macaulay Point outfall were greater than those measured in the Clover Point outfall. However, the higher flows of wastewater at Clover Point, relative to Macaulay Point, outweighed the concentration differences and resulted in higher constituent loadings (discharged mass per unit time) at Clover Point.

Statistically significant temporal trends in concentrations were identified for approximately 90% of the frequently detected standard analysis parameters and 39% of the frequently detected high-resolution analysis parameters in the wastewater streams of the Macaulay and Clover points outfalls. The total concentrations of cadmium, chromium, copper, lead, mercury, nickel and zinc all exhibited significant negative trends over the time period assessed. Priority substances generally exhibited significant negative trends (or no significant trend), with the exception of 2 PAH (acenaphthene and fluoranthene) that exhibited annual percent changes ranging from +2.6% to +3.1%.

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

Overall, the trend results for priority substances evaluated in previous Golder studies (Golder, 2006, 2009, 2013b) were confirmed in the current assessment. Few discrepancies were observed between the current assessment and the previous 2 Golder trend assessments (Golder 2009a, 2013); the changes observed in the most recent evaluation were toward additional evidence of stable or decreasing concentrations and loadings of substances in the wastewater stream.

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

These results will be discussed with the Marine Monitoring Program to assess opportunities to reduce input of these contaminants to the sewage system.

Further information about core area effluent quality in 2017 can be found in the *Macaulay and Clover Points Wastewater and Marine Environment Program 2017 Annual Report*.

3.4.1.2 Saanich Peninsula Wastewater Treatment Plant Influent and Effluent

Influent and effluent data has been collected at the SPWWTP since the plant commenced operation in 2000. The first summary of trends in these data was reported in Hatfield Consultants Ltd, 2005. Golder Associates Ltd., 2009a included a statistical assessment of wastewater influent and effluent trends at the SPWWTP over the period 2000-2008. Golder Associates Ltd., 2017 provided an update of trends to 2015. The findings of this report over the 14-year period of record at the SPWWTP included the following:

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

Further information about SPWWTP influent and effluent quality in 2017 can be found in the *Saanich Peninsula Treatment Plant Wastewater and Marine Environment Program 2017 Annual Report*.

3.4.2 Sludge and Mixed Liquor Contaminant Reductions

Another important objective of the RSCP is the protection of sewage treatment plant sludge and mixed liquor quality.

Lime and heat-treated biosolids produced at the SPWWTP were monitored for a range of metals and other substances on a regular basis since the plant was commissioned in 2000. This monitoring ended in April 2011 following CRD Board direction to cease land application of biosolids. Monitoring of dewatered sludge produced at the SPWWTP commenced in March 2013 and continued in 2017. Monitoring of the mixed liquor produced at the smaller GWWTP began in 1994 and continued in 2017.

3.4.2.1 Saanich Peninsula Wastewater Treatment Plant Sludge

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

A SPWWTP 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.

The results for metals and WAD cyanide in SPWWTP dewatered sludge are presented in Figure 1. Mercury levels have been consistently well below the maximum acceptable concentration for Class A Biosolids (MAC) in the last 5 years of production.

WAD cyanide, first monitored in 2013 to confirm increasing trends in SPWWTP influent, shows a slight rise to a high point in June 2014 and again in December 2015 and January 2016. Silver results were elevated in two samples in 2017. No cause could be determined and a check of influent and effluent samples taken at different times during the year by the Marine Monitoring Program show no indications of elevated silver in the liquid stream. There is, however, no criterion for these 2 parameters in biosolids to use as a benchmark for evaluating the impact of these observations.

Cadmium and molybdenum levels in SPWWTP dewatered sludge generally continued at levels similar to biosolids in the last few years of production. Results were all below the respective biosolids criteria. The levels of the electroplating metals chromium and nickel appear to be closely correlated with one another, possibly suggesting a common source on the Peninsula, where there are 2 electroplating operations under permit. In addition, the August 2014 result for both metals shows a return to levels last seen in biosolids in the period before 2007.

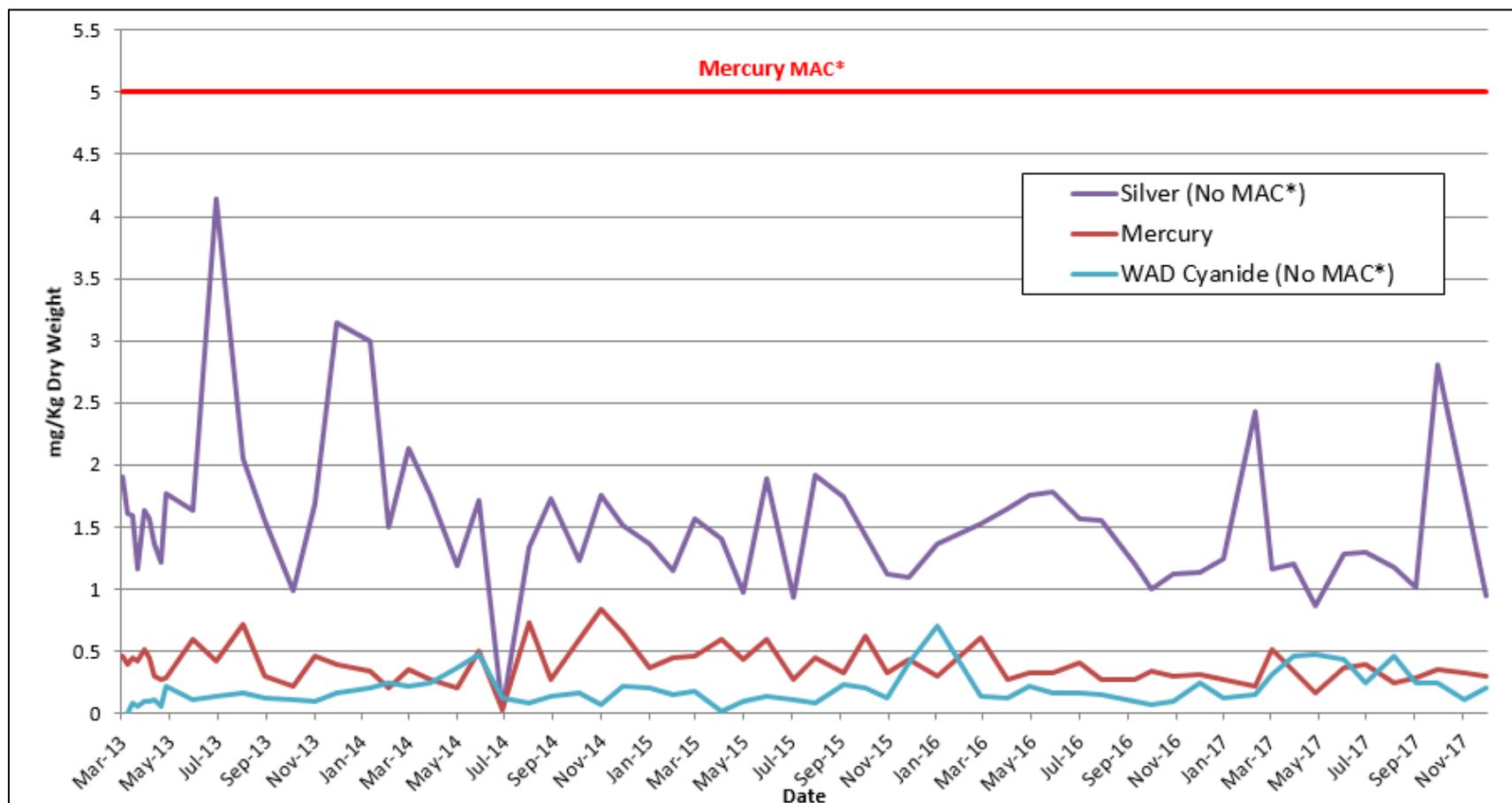
3.4.2.2 Ganges Wastewater Treatment Plant Mixed Liquor

The GWWTP 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 GWWTP 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 (see Figure 3). Implementation of the dental and photo imaging CoP is thought to be the main reason for the reductions in mercury and silver concentrations at the GWWTP. Continued enforcement of the CoP, and a shift to digital imaging, is likely contributing to the continued lower levels of these metals.

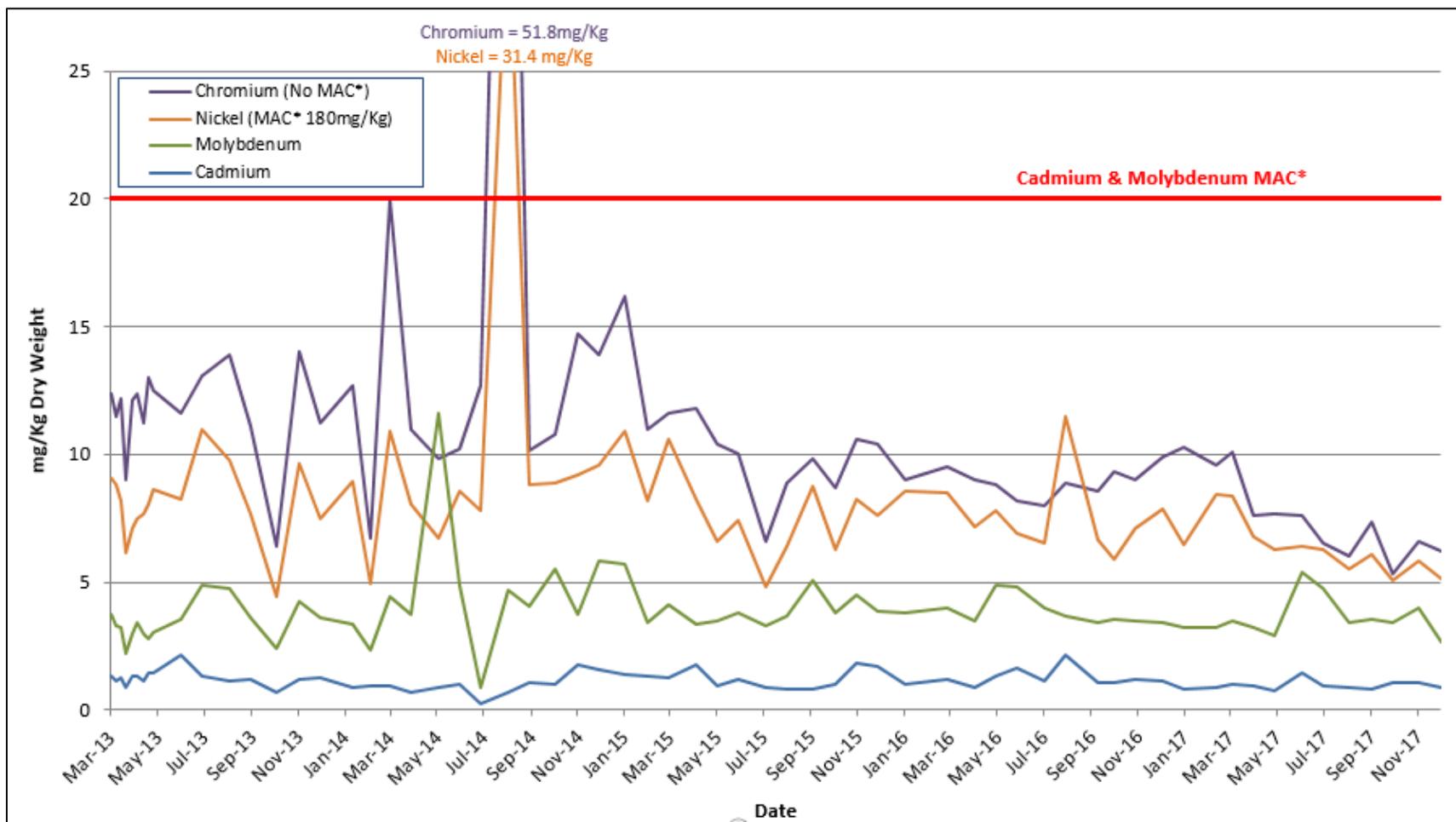
Figure 4 illustrates the decrease in historic levels of cadmium and molybdenum in GWWTP mixed liquor over time. Prior to 2008, molybdenum levels were high and variable, sometimes exceeding the Class A criterion. This may have been due to the use of molybdate corrosion inhibitors in heating and cooling 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.

Figure 1 Mercury, Silver and Cyanide in SPWWTP Dewatered Sludge (2013-2017)



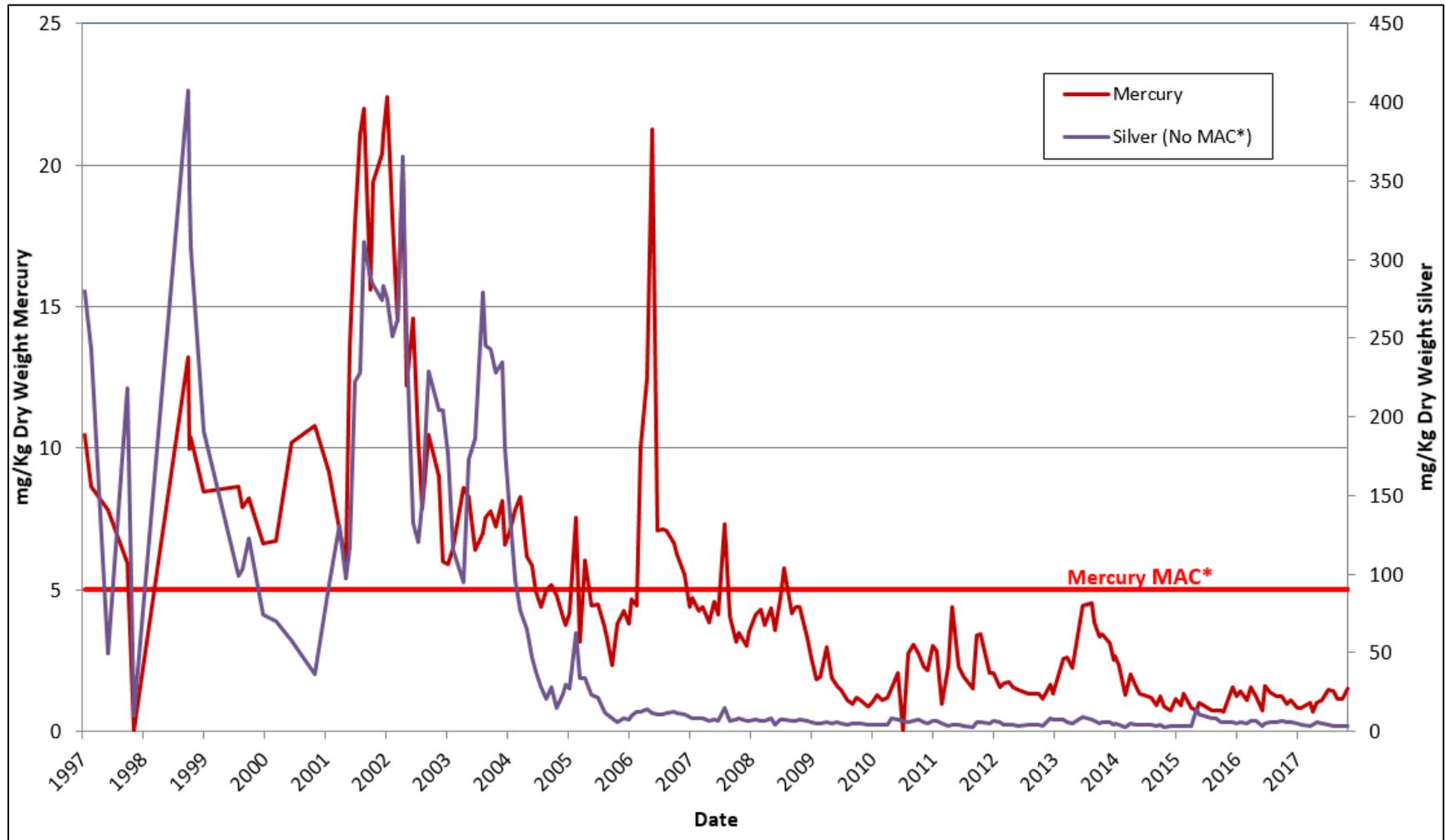
*MAC = Maximum Acceptable Concentration for Class A Biosolids

Figure 2 Chromium, Nickel, Cadmium and Molybdenum in SPWWTP Dewatered Sludge (2013-2017)



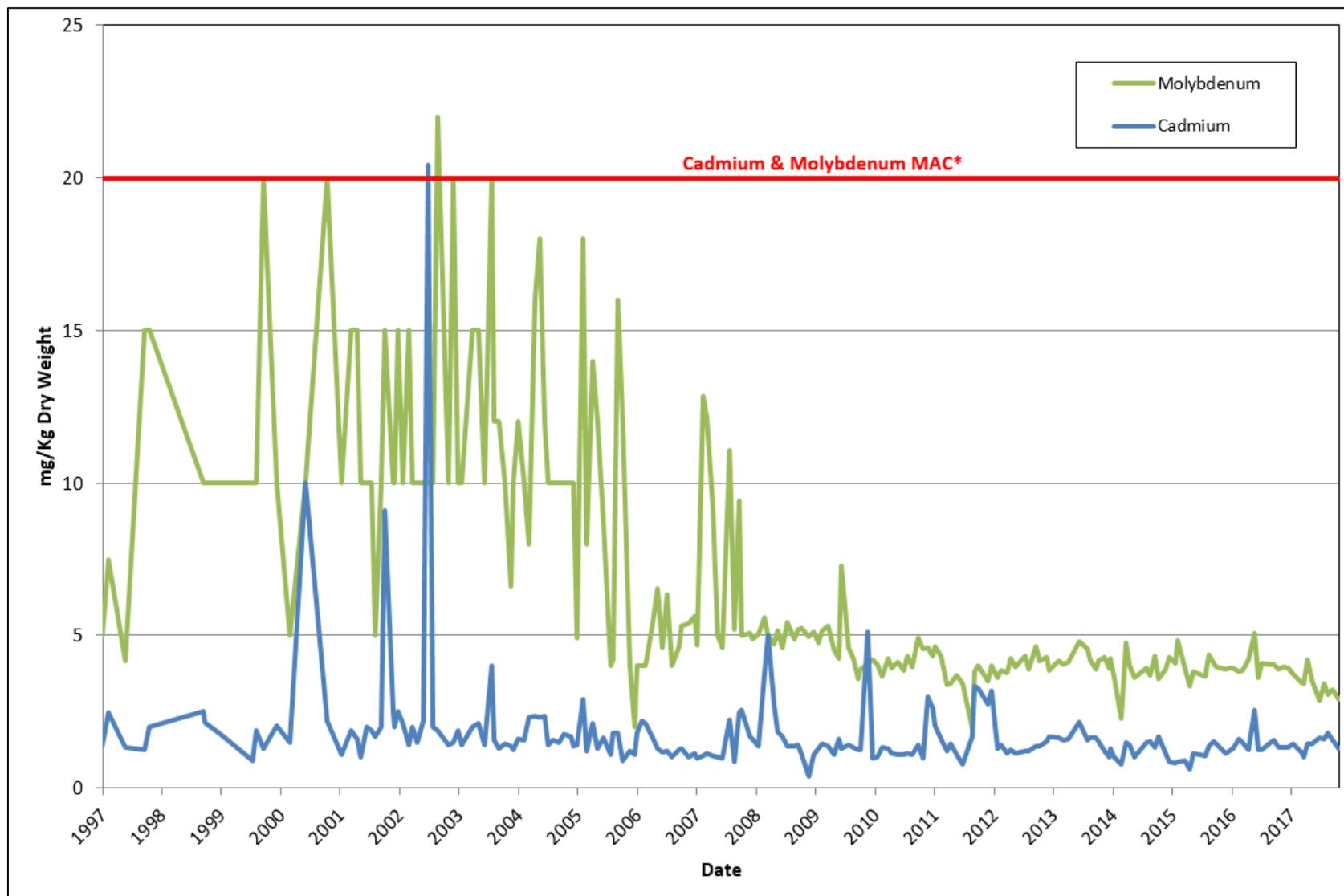
*MAC = Maximum Acceptable Concentration for Class A Biosolids

Figure 3 Mercury and Silver in GWWTP Mixed Liquor (1999-2017)



*MAC = Maximum Acceptable Concentration for Class A Biosolids

Figure 4 Cadmium and Molybdenum in GWWTP Mixed Liquor (1999-2017)



*MAC = Maximum Acceptable Concentration for Class A Biosolids

Table 10 Summary of Reported Sewer System Incidents (2017)

Contaminant	Nature of Incident	Potential Impact	Incident Follow-up
Road construction project	A local resident reported a sewer overflow incident – February 2017	Pollution to marine receiving environment, public health and safety	RSCP staff coordinated with Saanich municipal staff to attend the scene. A transportation construction project’s stormwater treatment system was overwhelmed with heavy rainfall and they began pumping excess to sewer, which caused manhole surcharges. The contractor was responsible for cleanup and was issued enforcement letters from both Saanich and CRD.
Fats, Oils and Grease	District of Saanich staff reported FOG buildup in a sewer lateral downstream of 1 Saanich restaurant – May 2017	Grease blockages can lead to overflows in municipal sewer pipes and mains –maintenance and health concerns	RSCP staff followed up with inspections of the restaurant locations and found fixtures not connected to the grease interceptor. Owners were advised of results and follow-up inspections confirmed remedial actions were taken.
Trent Pump Station	CRD Operations staff reported a strong hydrocarbon odour at the Trent Street pump station – July 2017	Pollution to marine receiving environment, public health and safety	RSCP staff carried out an investigation, including sampling and chromatogram analysis of several key manholes in the upstream catchment area. The material in the wet well was identified as weathered diesel, but was not identified in the 5 upstream samples. No source was found.
Hartland Leachate	CRD Operations staff reported discoloured discharge flowing through the Macaulay pump station – August 2017	High total dissolved solids exceeded the Federal Transitional Authorization Limit for CRD	RSCP staff coordinated with CRD Operations and CRD GeoEnvironmental staff to share information and discover the source of the material. During routine operations, organic material entered the pumps between the lagoons at Harland Landfill. Leachate samples met permit limits, but pump station total dissolved solids levels were high. In future, additional staff will monitor pumping to ensure excessive organic material does not enter the sewer.
Fats, Oils and Grease (Shelbourne and Cedar Hill X)	District of Saanich staff reported high levels of FOG in sanitary sewer mains – August 2017	Grease blockages can lead to overflows in municipal sewer pipes and mains – maintenance and health concerns	RSCP staff carried out 37 inspections of food service facilities in the area and found 6 facilities with minor infractions, 1 with compliance actions already in progress, and 2 in non-compliance. Most have since been brought into compliance, but some follow-ups continue.
Suspended Solids (Cecelia Creek)	City of Victoria staff reported suspended solids in storm sewers discharging to Cecelia Creek – August 2017	Pollution to marine receiving environment	RSCP staff collaborated with municipal staff to identify the source, a cross connection from a permitted wet-cutting facility. Municipal staff corrected the infrastructure issue and RSCP staff continued to work with the permitted facility in 2018 to reduce wastewater strength into sanitary sewer, ensuring Bylaw limits are met.

3.5 Significant Incident Reporting

CRD Operations and municipal engineering department staff communicate periodically with RSCP staff regarding sanitary sewer wastewater quality problems, suspicious discharges or significant incidents leading to contamination of the district'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 RSCP staff for implementation in 2014. In 2016, staff continued to develop detailed sewer catchment area maps, and most recently for the Craigflower catchment.

Table 10 provides a summary of incidents reported in 2017 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, e-mails, conversation records and other notes on file. There were no incidents reported which affected the operation of CRD sewage treatment plants in 2017.

3.6 Outreach and Partnerships Initiatives

RSCP staff continued to develop and maintain program-specific outreach and education messaging throughout 2017. Where appropriate, source control messaging was also integrated with other initiatives, campaigns and community outreach events held throughout the year, across the region.

Key source control initiatives and campaigns for 2017 are summarized below under separate sections for residential and business outreach, education and the RSCP website.

3.6.1 Residential Outreach

In 2017, RSCP staff continued to partner with the Health Products Stewardship Association and Island Health to promote the proper disposal of waste medications through the BC Medication Return Program (BCMRP). A promotional campaign was launched in the spring of 2017.

The capital region, through the campaign and past initiatives, increased the medication return rate per capita in 2017 (0.0301 kg/capita) from 2016 (0.0275 kg/capita) and continues to have one of the highest rate of proper disposal among regional districts in the Province. Approximately 11.5 tonnes of medications were collected in the region 2017 (*Health Products Stewardship Association Annual Report to the Director, 2017 Calendar Year*).

Based on feedback from pharmacists, BC Pharmacy Association and Health Production Stewardship Association, recycling medication packaging (e.g., plastic pill bottles) remains a challenge to pharmacists who wish to support proper medication disposal. Consumer are bringing back containers that are mainly empty, which take up volume in the BCMRP disposal bins. Those pharmacists/pharmacies that took the extra step to recycle the container are unfortunately charged for recycling of the containers, as they are perceived as commercial waste. In response, RSCP staff designed and produced reusable disposal bags to promote consolidating medications into 1 package. The bags are 1 of the engagement and behaviour change tools distributed at outreach events throughout the region.

Based on concern that 92% of the public surveyed in 2015 believe that source control practices will not be relevant with wastewater treatment, and survey results that "*Clean Green*" was the most recognized Source Control campaign, new outreach tools and prompts were created for *Clean Green 2.0*. The campaign is scheduled to be launched in 2018.

3.6.2 Business Outreach

Inspectors continued to be the front line staff delivering RSCP outreach messaging to local businesses. Outreach included distribution of RSCP sector-based posters and guidebooks. 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.

RSCP staff, in cooperation with other CRD program staff, redeveloped, created and launched new business and sector-specific webpages for the CRD website in 2017.

3.6.3 Partnerships Initiatives

Since its inception, the RSCP has worked with many agencies to expand program reach and effectiveness, improve services and resolve problems of mutual concern. These agencies have included MOE, federal agencies, such as the DND and Public Works and Government Services Canada, regional districts, municipalities, Island Health and local academic institutions.

In 2017, there were continued collaborative efforts between RSCP staff, other CRD environmental programs and external partners to provide augmented inspection services and superior customer service, and to promote high environmental performance within businesses.

Some examples of both internal and external collaborative partnerships initiatives undertaken in 2017 are outlined below.

3.6.4 2017 Collaborations

In 2017, RSCP staff undertook the following collaborative activities:

- Worked with regulators in London, Ontario, sharing information on flushable wipes. The work being done in London involved developing technical specifications on flushable products, working to establish a “non-dispersables” standard. A non-dispersables standard is being considered for the next Sewer Use Bylaw amendment.
- RSCP commissioned a study by RRU Environmental Science students to research the effectiveness of treatment works used in the dry cleaning sector within the CRD.
- Leveraged RSCP’s standing as 1 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 at the first Source Control Symposium held during the BC Water and Waste Association (BCWWA) Conference.
- Continued to work with Island Health staff and other CRD program staff, including CCC and Onsite, to share information, maintaining the strong partnership between RSCP and Island Health inspectors.
- Continued the Business Licensing Municipal Working Group to share new businesses license information for RSCP CoP inspection and permitting purposes. Seven municipalities established information sharing procedures, and negotiations continue with 3 remaining municipalities.
- CRD Marine Monitoring Program staff continued to collaborate with RSCP staff through offering odour monitoring in the Lang Cove catchment area to ascertain sulfide sources with a number of permits.
- Collaborated with MOE for assistance in interpretation and application of BC Hazardous Waste Regulations pertaining to biomedical waste in hospital permits and other facilities regulated under the Bylaw. The results were shared with Metro Vancouver staff and led to discussion about working together to develop a consistent regulatory approach.
- Collaborated with CRD Operations staff and a local septage processing facility to accept a temporary high-strength waste discharge, due to an emergency product recall at a dairy processing facility.

3.6.4.1 Source Control Symposium Collaboration

RSCP staff developed and hosted, in partnership with Metro Vancouver, an all-day symposium on source control as part of the BCWWA's 45th Annual Conference, held in Victoria in May 2017.

Invitations were sent to jurisdictions throughout BC and Alberta, as well as the Pacific Northwest. The symposium included 2 panel sessions where attendees had the opportunity to discuss their favourite source control topic. Additionally, there were presentations from RSCP and Metro Vancouver staff covering common source control issues, such as program foundations and regulatory basics, FOG management, fermentation and dry cleaning sector bylaw approaches, "flushable wipes" issues and outreach approaches, and the BC Medication Return Program.

The true measure of success was the establishment of an ongoing network for sharing resources, ideas, updates and supports. Working with BCWWA's "Community of Practice" model, all the various source control programs that attended the symposium signed up to be a part of the community and have continued to work closely and collaborate on a diverse number of topics, which directly enhances RSCP's service delivery.

3.6.4.2 Island Health Collaboration

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

Island Health administrative staff continued their information sharing efforts in 2016, forwarding "Application for Food Facility" forms to RSCP staff. The forms provide contact and operating details for new food service businesses, enabling RSCP staff to work with new applicants more proactively, and dramatically improving RSCP data quality. The forms are forwarded to CRD Cross Connection Control staff so that, wherever possible, cross connection inspections can be conducted quickly for new businesses, and in some cases jointly with RSCP inspections, saving the businesses money and time for inspection visits.

3.6.4.3 Collaboration with Academic Institutions

The RSCP also developed various partnerships with educational institutions in 2017.

An RSCP inspector presented a workshop to Camosun College Environmental Technology students, covering overviews of regional government, regional wastewater management and source control practices.

RSCP commissioned a study by RRU Environmental Science undergrads to research the effectiveness of dry cleaning treatment works used within the CRD.

3.6.4.4 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 CoP operations directly contact RSCP staff regarding CoP requirements. Letters copied to municipal plumbing or licensing contacts are sent directly to CoP operations outlining specific requirements and providing information.

In 2017, RSCP staff worked with municipal staff to resolve various oil and grease blockages in sewers. Municipal staff continued to provide plumbing and building information, flow data and other information to RSCP staff to assist in the preparation of permits, authorizations and CoP treatment works installations.

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

3.7 Performance Measures

Three program performance measures were developed over the period 2004-2006. These measures have been incorporated in RSCP program budgets since 2007 and were included in the scope of the 5-year review undertaken in 2009. The performance measures are as follows:

- Percentage of regulated businesses with proper waste treatment installed. This measure is associated with the RSCP objective of consistent application of the program for all users of CRD sewage facilities.
- Percentage of priority contaminants showing no increase in loads to the core area environment. This measure is associated with the RSCP 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 RSCP objective of protecting the quality of sewage sludge and biosolids.

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

Table 11 Results of RSCP Performance Measures (2005-2017)

Performance Measure	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Proper waste treatment ¹	80	85	87	93	95	96	97	90	97				
Overall Compliance ²										95	97	98	96
Priority contaminants ³	92	--	--	78	--	--	94	--	--	--	--	92	--
Biosolids and sludge ⁴	92	67	88	93	100	100	100	100	100	100	100	100	100

Notes:

1. Percentage of regulated businesses with proper waste treatment installed.
2. Overall Compliance replaced “Proper waste treatment” as of 2014.
3. Percentage of priority contaminants showing no increase in loads to the core area environment (preliminary result from draft report). Study performed every 3-5 years.
4. Percentage of biosolids and sludge samples that meet Class A standards for metals.

“Proper waste treatment” was modified in 2014 to “Overall Compliance” as a better indicator of effective contaminants diversion. An enforcement status of “Compliant” or “Step 1” indicates proper treatment works or that an acceptable performance-based treatment arrangement has been made, though not necessarily compliant with what is prescribed in the CoP. 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 and Clover points outfalls for 36 priority contaminants, as documented in the most recent trend assessment report (Golder Associates Ltd, 2017). Long-term analysis of effluent trends for the core area outfalls is only undertaken every 3-5 years. The most recent analysis, including data from 1990-2015, was received in 2017.

“Biosolids and Sludge” has shown some variability in the early years, largely due to the mixed liquor metals results from the GWWTP exceeding Class A criteria for biosolids. However, in 2017, for the ninth consecutive year, the GWWTP mixed liquor results met the Class A criteria for all metals, including mercury. SPWWTP dewatered sludge monitoring commenced in March 2013. All of these results also met the Class A criteria for metals. The combined results from the 2 plants provided an overall 100% rating for this performance measure in 2017.

4.0 CONCLUSION

The RSCP 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 district's sanitary sewer systems. The program regulated approximately 2,000 businesses through industrial wastewater discharge permits, authorizations and sector-specific codes of practice.

A total of 1,067 CoP inspections were conducted over the year. Semi-annual inspections of the 41 active permits, and annual inspections of the 92 active industrial, commercial and institutional authorizations, were completed. Six new short-term permits and 11 new authorizations for a variety of business types and terms were issued. Six significant incidents reported in regional and municipal sewers were investigated in 2017 and 5 tickets were issued to non-compliant food services operations. The overall compliance rate, including facilities operating under CoP, authorization and permit was 96% in 2017.

Ganges Wastewater Treatment Plant mixed liquor results met the Class A biosolids criteria for all metals, including mercury, for the 9th consecutive year. Saanich Peninsula Wastewater Treatment Plant dewatered sludge results also met the Class A criteria for metals.

Monitoring targets set for 2017 were achieved. In addition, 6 facilities in the fermentation sector were sampled to support a sector review. The review assisted staff in characterization of fermentation wastewater, particularly for microbreweries with an eye towards contaminant loadings and consistent requirements across sub-sectors. To further improve the program's regulatory components, a consultant was retained to review the CRD Sewer Use Bylaw and suggest improvements. Staff will revise the Sewer Use Bylaw in late 2019.

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

- refreshing the existing Medications Return Program and partnering with the Vancouver Island Health Authority and the Health Products Stewardship Association to launch a new campaign to increase public awareness and participation in the BC Medication Return Program. Approximately 11.5 tonnes of medications were collected in the region, one of the highest rates of return in BC.
- commissioning a study by Royal Roads University Environmental Science students to research the effectiveness of dry cleaning treatment works used within the CRD.
- developing new engagement and behaviour change tools for the Clean Green 2.0 campaign, which focuses on environmentally-safe alternatives to household cleaners.
- collaborating with other CRD program and municipal staff to investigate sewer and storm discharges from the "wet-cutting" sector.
- developing and co-hosting a Source Control symposium at the 45th annual British Columbia Water and Wastewater Association Conference & Trade Show in Victoria, BC.

5.0 REFERENCES

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APPENDIX 1

RSCP Priority Contaminant List (2017)

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 RSCP Performance Measures

The following methods are used to calculate the 4 RSCP performance measures referred to in Section 3.7.

RSCP Performance Measure #1:

“Percentage of regulated businesses with proper waste treatment installed”

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

- **Consistent high compliance with proper treatment works installed:** Inspection history shows that, as a baseline, almost all regulated facilities are operating with proper waste treatment.
- **Performance-based compliance site-specific practices:** Alternative arrangements in practices or technologies, which might deviate from what is prescribed in a code, may be effectively treating the waste. For example, there are several automotive facilities with (technically) under-sized oil/water separators, who are supplementing their systems with oil coalescing plates, analyzing the wastewater effluent and being monitored through an authorization to ensure that the systems are not bypassing hydrocarbons or in excess of other restricted waste limits.
- **Treatment works maintenance:** The top enforcement issue amongst regulated facilities is proper maintenance of treatment works. All treatment work systems are rendered ineffective if they are not maintained; thus as a compliance indicator this is much more accurate representation of proper contaminants diversion. A facility not maintaining a system will receive a major infraction (Step 2) compliance status.
- **Working with facilities with inadequate or no treatment works:** On the rare occasion where a facility is found to have no treatment works on site, staff work swiftly with the business towards adopting an effective system. When there is resistance to working proactively with staff, enforcement actions escalate quickly, typically resulting in positive action from the facility. When inspected treatment works are viewed as ineffective¹, the inspector will work with the business to improve treatment performance through either an upgraded system that meets CRD requirements; authorizing modifications to the existing system to meet or beat base performance requirements; or assisting the business in modifying their practices to eliminate the need for on-site treatment works².

RSCP Performance Measure #2

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

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

CRD Marine Monitoring Program has collected samples of wastewater from the Macaulay and Clover points 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., 2017), utilizing data from the period 1990-2015, updates the previous assessment (Golder Associates Ltd., 2013).

¹ (e.g., under capacity, in poor repair, or not undergone base standard certification)

² (e.g., an automotive shop disconnecting their floor drains and using off-site treatment services exclusively)

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

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

Performance Measure Calculation

The following table shows how performance measure #2 was calculated for 2005, 2008, 2011 and 2017, based on information provided in Golder Associates Ltd. Note: only the contaminants for which a significant increasing trend was reported are shown – all other contaminants showed either a “significant decrease”, no “significant trend” (ns) or “could not be calculated” (nc).

RSCP Priority Contaminant	Yearly Trend Core Area Loads			
	(1990-2005)	(1990-2008)	(1990-2011)	(1990-2016)
TOTAL METALS				
arsenic (As)		Increase		
cadmium (Cd)				
cobalt (Co)			Increase (MAC)	
chromium (Cr)				
copper (Cu)				
lead (Pb)				
molybdenum (Mo)	Increase (CLO)	Increase (MAC)		
manganese (Mn)				
mercury (Hg)				
nickel (Ni)				
selenium (Se)		Increase		
silver (Ag)				
zinc (Zn)				
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)				
Low molecular weight PAH				
naphthalene				
acenaphthylene				
acenaphthene		Increase		Increase (MAC)
fluorene				Increase (MAC)
phenanthrene				
anthracene				
fluoranthene		Increase		
High molecular weight PAH	Increase	Increase		
pyrene				
benzo(a)anthracene				
chrysene				
benzo(b)fluoranthene				
benzo(k)fluoranthene				
benzo(a)pyrene				
dibenzo(a,h)anthracene				
indeno(1,2,3-cd)pyrene				
benzo(g,h,i)perylene				
Total PAH		Increase (MAC)		
Phthalates				
bis(2 ethylhexyl)phthalate	Increase	Increase (MAC)		
di-n-butyl phthalate				
Miscellaneous				
1,4-dichlorobenzene				
phenol				
total oil and grease				
Cyanide - WAD			Increase (CLO)	Increase (CLO + MAC)
Cyanide - SAD				
Total # Increase	3	8	2	3
Total # Decrease or "ns"	33	28	34	33
% of 36 Priority Contaminants	92%	78%	94%	92%

RSCP Performance Measure #3

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

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

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

Following CRD Board direction to cease land application of biosolids, SPWWTP 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 SPWWTP dewatered sludge data available for input to this performance measure. SPWWTP 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

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

The GWWTP produces a mixed liquor product, and the SPWWTP produces dewatered sludge. Neither of these are biosolids products by definition. Grab samples of GWWTP mixed liquor are analyzed for metals and moisture on a monthly basis. Composite samples of SPWWTP 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 – 2017

The following table illustrates how performance measure #3 is calculated for 2017.

Treatment Plant	# Samples (2017)¹	# Compliant (2017)²
Ganges WWTP (Mixed Liquor)	12	12
Saanich Peninsula WWTP (Dewatered Sludge)	12	12
Totals	24	24
Percentage Compliant		100%

Notes:

- 1 the number of dates on which discrete samples were submitted for analysis.
- 2 the number of samples with results that were fully compliant with Class A Biosolids standards for 9 metals. Results for any field duplicates taken on the same date are averaged. If the standards are exceeded for 1 or more of the 9 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 2016 was 100%.

RSCP Performance Measure #4

“Overall compliance”

This new performance measure, replacing “Number of facilities with proper waste treatment” would include facilities regulated through permits, authorizations or CoP 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 – 2017

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

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

It should be noted that the screened facilities are not assumed to permanently exist in that state, and are re-visited for updates through “newly sewerer facility” GIS 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 2017

Code of Practice	Est. Sector Size (2017)
Automotive Repair	202
Carpet Cleaning	34
Dental	124
Dry Cleaning	7
Fermentation	21
Food Services	1225
Laboratory	22
Photographic Imaging	67
Printing	21
Recreation Facility	na*
Vehicle Wash	38
Total CoP Operations	1,761
Total Active Permits	41
Total Active Authorizations	92
Total Regulated Facilities	1,894

Notes:

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

With the established CoP 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 2017. Facilities with “Compliant” or “Step 1” status are considered “Overall compliant” i.e., minor infractions but assumed treatment works and associated maintenance. Overall compliance since full implementation of CoP are presented in the following table.

Progress on Overall Compliance for 2017 since Adapting New Success Measures

CODES	Sector SIZE	# INSP 2017	% INSP	Total COMP	COMP %	IN PROG	IN PROG %	STEP 1	# OVERALL COMPLIANT (Compliant or Step 1)	% OVERALL COMPLIANT	DUR	DUR %
Automotive	202	67	33.17%	192	95.05%	7	3.47%	6	198	98.02%	0	0.00%
Carpet	34	3	8.82%	33	97.06%	1	2.94%	1	34	100.00%	0	0.00%
Dental	124	1	0.81%	115	92.74%	7	5.65%	7	122	98.39%	0	0.00%
Dry Cleaning	7	1	14.29%	5	71.43%	2	28.57%	1	6	85.71%	0	0.00%
Fermentation	21	21	100.00%	21	100.00%	0	0.00%	0	21	100.00%	0	0.00%
Food	1,225	937	76.49%	1,152	94.04%	46	3.76%	22	1,174	95.84%	4	0.33%
Labs	22	4	18.18%	14	63.64%	5	22.73%	5	19	86.36%	0	0.00%
Photo	67	5	7.46%	66	98.51%	0	0.00%	0	66	98.51%	0	0.00%
Printing	21	2	9.52%	20	95.24%	1	4.76%	0	20	95.24%	0	0.00%
Recreation*	-	-	-	-	-	-	-	-	-	-	-	-
Vehicle Wash	38	26	68.42%	27	71.05%	5	13.16%	4	31	81.58%	0	0.00%
Total	1,761	1,067	60.59%	1,645	93.41%	74	4.20%	46	1,691	96.02%	4	0.33%
Authorizations	92	76	82.61%	87	94.57%	4	4.35%	3	90	97.83%	0	0.00%
Permits	41	75	182.93%	28	68.29%	8	19.51%	4	32	78.05%	1	2.44%
ALL TOTALS	1,894	1,218	64.31%	1,760	92.93%	86	4.54%	53	1,813	95.72%	5	0.26%

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 RSCP Permits or Authorizations)

BUSINESS TYPE	TYPICAL CONTAMINANTS OF CONCERN	TYPICAL PRE-TREATMENT INSTALLED
Breweries	solids, organics, pH	solids diversion, filtration, pH adjustment
Chemical Manufacturing	pH, toxic metals, solvents	process control, waste neutralization, off-site waste management
Food Processing	fats, oil and grease, solids, organics	solids separation, grease interceptor, neutralization, dissolved air floatation
Groundwater Remediation	mineral oil and grease, toxic metals, toxic organics, solids, sulphides	settling, filtration, sulphide reduction, adsorption
Hazardous Waste Treatment	mineral oil and grease, toxic organics, sulphides, solids, solvents	filtration, oil/water separation, chemical oxidation, aeration, precipitation, flocculation, adsorption, sulphide reduction
Hospitals	fats, oil and grease, solids, organics, solvents, pH	solids separation, grease interceptor, off-site waste management, absorption
Industrial Laundries	fats (and mineral) oil and grease, solids, organics	grease interceptor, filtration, oil skimmers
Metal Platers	toxic metals, cyanide, solvents, pH	process control, metals adsorption, off-site waste management
Organic Waste Treatment	fats, oil and grease, metals, solids, pH, sulphides	dewatering, grease interceptor, bio-reactors, sulphide reduction, dissolved air floatation
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 floatation
Wet-Cutting	suspended solids	solids separation, settling