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Regional Source Control Program

2016 Annual Report

Parks & Environmental Services | Environmental Protection

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November 2017

REGIONAL SOURCE CONTROL PROGRAM
2016 ANNUAL REPORT

EXECUTIVE SUMMARY

Introduction

The purpose of the Capital Regional District (CRD) Regional Source Control Program (RSCP) is 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).

2016 Program Activities

The RSCP continued to apply a "sector-by-sector" approach to CoP inspections, focusing on the dental, dry cleaning, photographic imaging, printing and food services sectors. Overall compliance rates for CoP, permitted industrial facilities and facilities operating under authorizations reached 94% in 2016.

Inspections coordinated with internal programs and external agencies have been very successful, with 922 coordinated inspections completed in 2016.

The main activities and accomplishments of the program in 2016 are outlined below.

Industrial, Commercial and Institutional Liquid Waste Regulation

- Sector-by-sector inspections included the dental, dry cleaning, photographic imaging, printing and food services sectors.
- 1,298 CoP inspections conducted.
- 529 food services operations were inspected, with an additional 271 follow-up visits for compliance and/or further support.
- 148 dental sector, 37 dry cleaning, and a combined 272 photographic imaging and printing sector inspections were conducted.
- All permit inspections scheduled at the beginning of 2016 were completed within the year.
- Three new permits were issued (total of 40 active) and 17 new authorizations were issued (total of 112 active).

Monitoring

- The monitoring targets set for 2016 were achieved.
- On average, there were 2 scheduled audit monitoring events per permit.
- CoP monitoring focused on the food services and dry cleaning repair sectors, with follow-up compliance monitoring also conducted at 3 automotive repair locations with multiple exceedances in 2015.

Enforcement

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

Contaminants Management

- RSCP staff conducted research into emerging contaminant characterization of spirit distillation.
- RSCP refreshed the existing Medications Return Program (MRP) in response to request from Saanich Peninsula Wastewater Committee staff to explore areas to increase protection of wastewater dewatered sludge and biosolids.
- RSCP commissioned a study by Royal Roads University (RRU) Environmental Science undergrads to research the disposal of pharmaceuticals and personal care products in the veterinary sector of the CRD.
- A consultant undertook a full technical review of the RSCP Code of Practice for Food Services.

Contaminant Reductions

- For the eighth 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, initiated in 2013, continued in 2016. All of these results also met the Class A criteria for metals.

Significant Incident Response

- There were 4 significant incidents formally reported: 2 involving fats, oils and grease (FOG) build-up, 1 involving fuel oil at a CRD pump station and another involving obstructive waste to a municipal pump station.

Residential Outreach

- RSCP partnered with the BC Pharmacy Association and the Health Products Stewardship Association to promote proper disposal of waste medications.
- Approximately 10.5 tonnes of medications were collected in the region, the highest return amongst regional districts in the province.
- RSCP staff launched “Clean Water Begins at Home 2.0” to promote source control as the first step in wastewater treatment.

Business Outreach

- RSCP inspectors continued to deliver program outreach material to local businesses, including RSCP sector-based posters and guidebooks.
- RSCP inspectors continued to promote cross connection compliance and water conservation with inspected businesses.
- CRD participated in BizPaL, a web-based tool to help new and current business owners find and learn about required licenses and permits to operate their business, in March 2016.

Partnerships Initiatives

- RSCP staff worked with municipal staff to resolve various oil and grease blockages in sewers.
- RSCP staff conducted water audits for a post-secondary institution and 18 small franchise/retail/office space audits.
- RSCP staff provided information to inspected businesses that would be affected by the ban on Once-Through Cooling Equipment through the amended CRD Water Conservation Bylaw (4099).
- RSCP commissioned a study by RRU students to research medication disposal practices amongst the veterinary sector.
- RSCP staff collaborated with other CRD program and municipal staff to investigate sewer and storm discharges from the “Wet-Cutting” sector.
- RSCP staff collaborated with municipal business licensing staff to share new business information for review against permitting requirements.

- RSCP staff worked with Ministry of Environment staff for consistent interpretation and application of BC Hazardous Waste Regulations with RSCP permittees.

Program Planning and Development

- A 4-year implementation plan for the program (2016–2019), aligning program activities with the next CRD budget cycle went into effect.
- A consultant (hired in November 2015) completed a full technical review of the CRD's Code of Practice for Food Services Operations.

Performance Measures

- The percentage of businesses with a rating of "overall compliance" was 98%.
- For the eighth consecutive year, the percentage of mixed liquor and dewatered sludge samples that met Class A standards for metals was 100%.
- The percentage of priority contaminants showing no increase in loads to the core area environment was 95% – based on the trend assessment for 1990–2011 core area wastewater data.

Wastewater Trend Assessment

Macaulay Point and Clover Point

A detailed statistical assessment of the 1990 to 2015 wastewater data was also completed this year, 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 than Clover, 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.

The assessment findings have been discussed with the Marine Monitoring Program to determine the need for additional regulatory requirements and/or educational outreach for the few contaminants that experienced increasing trends.

Saanich Peninsula

Trend assessment of wastewater quality indicated generally decreasing concentrations and loadings over the 2000 to 2015 time period, with similar trends to the previous assessment. Significant trends in detection frequency were observed 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). Results have been discussed with the Marine Monitoring Program to look for opportunities to reduce the input of these contaminants to the Saanich Peninsula wastewater system.

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1.0 INTRODUCTION

Source control is a waste management strategy that is aimed at reducing the amount of contaminants that industries, businesses, institutions and households discharge to sewers. In 1993, the CRD committed to the development and implementation of a region-wide Source Control program and adoption of a Sewer Use Bylaw under the *BC Environmental Management Act*. This bylaw was designed to serve as the main regulatory instrument for source control in sanitary sewer systems, creating a level playing field for businesses and institutions throughout the district.

The goals and objectives of the RSCP 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 (BC MOE). This annual report presents a summary of program activities and accomplishments for the period January to December 2016, and provides a brief account of initiatives planned for 2017.

The RSCP is a key component of effective wastewater treatment and will form an integral part of the core area wastewater treatment strategy. 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 Program Components

The activities undertaken by RSCP staff in 2016 have been categorized under the following component headings:

- inspections
- monitoring
- enforcement
- outreach
- partnerships initiatives
- contaminants management
- data management
- planning and development

2.2 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.

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

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.

2.3 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 2016. Estimated annual sewage flows contributed by each participating area, over the period October 1, 2015 to September 30, 2016, are listed in Table 2.

Table 1 CRD Treatment Plants and Sewage Collection Areas – 2016

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

Table 2 Annual Sewage Flows 2015–2016

Participant	Estimated Annual Flow (m^3/year)*	Percentage of Total Flows
Saanich	10,031,752	27.55
Oak Bay	3,012,282	8.27
Victoria	12,931,588	35.52
Esquimalt	2,318,273	6.37
View Royal	824,527	2.26
Colwood	1,054,499	2.90
Langford	2,292,993	6.30
Sidney	1,355,639	3.72
Central Saanich	1,369,129	3.76
North Saanich	476,295	1.31
Esquimalt First Nation	14,058	0.04
Songhees First Nation	223,360	0.61
Pauquachin First Nation	32,250	0.09
Tseycum First Nation	13,619	0.04
Institute of Ocean Sciences	5,458	0.01
Department of National Defence	169,965	0.47
Ganges Sewer	160,928	0.44
Maliview Sewer	15,954	0.04
Magic Lakes Estates Sewer	88,010	0.24
Port Renfrew Sewer	23,087	0.06
Total Flow	**36,413,666**	**100%**

Note:
*Yearly flows cover the period October 1, 2015 to September 30, 2016

3.0 REGIONAL SOURCE CONTROL ACTIVITIES AND ACCOMPLISHMENTS – 2016

Regional source control activities and accomplishments in 2016 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
- partnerships initiatives
- 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 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 CoP.

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.

In 1998, the focus of the program shifted toward development, adoption and implementation of CoP to regulate discharges from larger numbers of smaller commercial and institutional facilities operating in the district. The first regulatory CoP, considered to be 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 under the Sewer Use Bylaw. 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.

3.1.2 Waste Discharge Permits

Waste discharge permits are site-specific regulatory documents, issued to businesses or institutions under the CRD Sewer Use Bylaw, that outline requirements for wastewater pre-treatment, effluent quality, monitoring and reporting. Waste discharge permits are issued to facilities or operations that discharge significant non-domestic wastewater flows (greater than 10 m^3/day) or wastewater containing high loads of restricted wastes or specified chemical contaminants into the sanitary sewer. Table 3 provides a summary of waste discharge permit activity in 2016.

Table 3 Summary of Waste Discharge Permit Activity in 2016

Waste Discharge Permit Activity	2016
Permits active (at year end)	40
New permits issued	3
Permits closed	0
Permits amended	3
Permit site inspections (including evaluations for new permits)	62

At the end of 2016, there were 40 active waste discharge permits being managed by RSCP staff. The majority of these permits were ongoing, with no expiry date. Three new permits were issued: 1 for short-term discharges of seawater from a Department of National Defense (DND) ship-repair caisson, 1 for a local brewery with a distillery operation, and 1 for the discharge of treated battery waste.

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 2016 were completed within the year. Throughout 2016, 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, laundromats 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 2016.

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 2922 in the next amendment.

Table 4 Summary of Authorization Activity in 2016

Authorization Activity	2016
Authorizations active (at year end)	112
New authorizations issued	17
Authorizations closed or transferred to codes or permits	3
Authorizations amended	15
Authorization site inspections (including evaluations for new authorizations)	74

3.1.4 Codes of Practice

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 Codes of Practice 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

Code of Practice Inspection Summary – 2016

In 2016, 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.

Efforts to inform businesses about other CRD programs, coordinate inspections with other regulators, and to provide augmented services such as water audits have been successful. RSCP inspectors have provided customers with literature and contacts for Cross Connection Control, Demand Management, Trucked Liquid Waste, the Regional Kitchen Scraps Strategy and the Onsite Wastewater Management Program. In 2016, RSCP inspectors provided customers with information pertaining to a recent amendment to the Water Conservation Bylaw (Bylaw 4099) which will ban the use of once-through-cooling (OTC) equipment, effective January 1, 2019. This ban will affect some commercial food services regulated through that CoP, as well as some permitted facilities.

Table 6 provides a summary of CoP inspection activity in 2016. 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 (1,491 in 2016) 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 2016

Code of Practice (Est. Sector Size – 2016)	% of Sector Inspected in 2016
Automotive Repair (196)	11%
Carpet Cleaning (36)	6%
Dental (124)	100%
Dry Cleaning (10)	90%
Fermentation (34)	3%
Food Services (1386)	42%
Laboratory (21)	5%
Photographic Imaging (73)	77%
Printing (33)	97%
Recreation Facility (na**)	na
Vehicle Wash (36)	14%

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 2016 were automotive repair, dry cleaning, photographic imaging, printing 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 Program and a BC Assessment code query.

Starting in 2017, dischargers within the automotive and dry cleaning sectors (i.e., businesses operating treatment works on site) will be inspected annually. 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 on a 3-year cycle.

As follow up to an automotive sector wastewater characterization analysis[1] in 2015, some of the businesses with significant exceedances for copper, iron, zinc, polycyclic aromatic hydrocarbons (PAH), mineral oil and grease (MOG), and benzene, toluene, ethylbenzene, and xylenes (BTEX), were re-inspected in 2016 to

[1] (facilities within the sector were sampled for effluent quality downstream of installed oil/water separators)

investigate the causes for the high contaminant levels. As a result, several of those businesses received guidance for adjusting their treatment works to achieve wastewater effluent quality, compliant with Bylaw 2922 restricted waste concentrations.

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 has already shown promise 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 (>1,300 regulated businesses) and potential to impact sewer infrastructure through grease blockages. Of the 800 inspections conducted, 190 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). The kitchen cleaning sector, which regulates the hood and fan cleaning industry was also inspected this year.

In 2016, a consultant reviewed the entire food services CoP. The study considered approaches utilized in other jurisdictions, treatment requirements and changes in standards. The final report will be submitted in 2017; some of these findings will be incorporated into a future code amendment.

One component of the proposed food services code amendment was some requirements for food carts operating in the region. In extending our work with this sub-sector, RSCP staff continued to collaborate with Island Health inspectors and City of Victoria events planning staff to negotiate requirements for wastewater off-site disposal as part of agreements for outdoor events hosting food trucks. Negotiations in this area will continue in 2017.

3.1.5 Coordinated Inspections

A primary goal of the Environmental Partnerships Division is to provide superior customer service to businesses regulated by 3 CRD bylaws (Sewer Use Bylaw No. 2922, Water Conservation Bylaw No. 3061 and Cross Connection Control Bylaw No. 3516). The opportunity to provide better service in less time is achieved through a "water management" approach to business owners, combining wherever possible, services related to all 3 bylaws in fewer visits. Superior customer service is further achieved through collaboration with external regulatory partners (e.g., Island Health and municipal inspectors) and other CRD divisions. Aligning with a partnerships theme, other CRD Parks & Environmental Services programs have capitalized on the visibility and established relationships of RSCP inspectors with the business community. As such, inspectors have been called upon to represent a variety of programs with their inspections, helping customers to access information, services and grants or through provision of relevant information to customers on behalf of other CRD programs.

This approach required adoption of a "coordinated inspection" which was subsequently defined as:

> *Working with all our partners, provide augmented inspection services that achieve superior customer service and promote high environmental performance within businesses.*

The number of coordinated inspections achieved within a year is based on an assumption that every inspection is conducted with the intention to include coordinated services such as CRD program information or co-attendance with another regulator. However, there are some conditions whereby a coordinated inspection would not occur such as:

- a repeat inspection within a year
- an inspection with a serious compliance issue
- an inspection where staff were not able to converse with management and/or owners

Therefore, the method for estimating number of coordinated inspections is based on the following assumptions:

- Inspected facilities with a “compliant” or “Step 1” compliance status are assumed to be a coordinated inspection.
- Inspected facilities with a “Step 2” or higher compliance status are not considered to be a coordinated inspection.
- Repeat inspections within 1 year are not considered to be a coordinated inspection.

In total, 922 coordinated inspections were completed in 2016. These inspections included:

- **Multi-jurisdiction combined inspections:** On several occasions, RSCP inspectors combined site visits with 1 or more additional regulators from either Island Health or a municipality to assess compliance with multiple bylaws and/or regulations.
- **Island Health collaborative planning:** RSCP staff continue to collaborate with Island Health staff in regulating food carts wherever possible.

In general, the following practices also contribute to the RSCP inspector’s ability to provide coordinated services during inspections:

- **Cross Connection Control inspections – information sharing:** RSCP and Cross Connection Control (CCC) staff share information relevant to improving and aligning inspection strategies such as related renovations occurring, opening of new businesses, changes in ownership, and compliance observations. RSCP inspectors are conducting front line messaging to businesses operating with OTC equipment, which are banned as part of a 2016 amendment to the CRD Water Conservation Bylaw (4099); the ban is active January 1, 2019. CCC staff have assisted RSCP in this endeavour by delivering generic information letters about the ban to facilities that they inspect with OTC equipment. As OTC equipment requires a backflow preventer, the CCC data has also served this initiative in locating the OTC equipment in operation.
- **Island Health applications for food facility forms:** Island Health staff direct hundreds of new food facility applicant forms to the RSCP inspection team via e-mail. The forms indicate either a change of ownership or a new business, both of which are a priority for inspectors to communicate bylaw requirements and services available via a site visit, phone call or e-mail.
- **CRD programming and initiatives:** Inspectors helped their customers to stay informed on CRD programs and initiatives that are relevant to their business, such as the Regional Kitchen Scraps strategy. RSCP inspectors distributed brochures, engaged in dialogue, and connected their customers with primary contacts for these programs.
- **Municipal business licensing:** RSCP staff initiated a collaborative notification process in 2016 with municipal business licensing staff to help identify any industrial or commercial businesses that should be regulated under source control permits.
- **Wet Cutting Sector inspections:** RSCP and CRD controlled waste staff collaborated with municipal storm water regulators to investigate the wet-cutting sector (businesses using water jet saws for stone cutting, countertops etc.) for applicability for waste discharge permits. Twenty-nine businesses were reviewed and in several cases, joint inspections were conducted with municipal stormwater regulators.
- **Coordinated Significant Incident Responses:** There were 4 significant incidents that RSCP staff investigated in 2016: 1 involving hydrocarbon pollution at a CRD pump station, 2 grease blockages in municipal sewers and an obstructive waste (sharps) incident that occurred at a municipal pump station.

3.1.6 Monitoring

RSCP staff carried out the following types of monitoring in 2016: permit compliance, authorization compliance, CoP and key manhole monitoring. All wastewater samples collected in 2016 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 2016.

Table 7 Summary of RSCP Monitoring Activity in 2016

Monitoring Events	2016
Permit compliance	61
Authorization compliance	17
Code of practice	24
Key manhole	18
SPWWTP influent	8
SPWWTP dewatered sludge	14
Ganges influent	1
Ganges mixed liquor	14

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 2016 was 2. The goal of collecting audit samples from each permitted site twice per year was achieved at all but 3 permit sites. Two of those samples were not collected due to the permit sites eliminating their discharge and the closure of the permit. The other site was newly permitted and was not ready for sampling in 2016 as had been anticipated. One permit site was sampled 4 times due to its enforcement status as a discharger under review (DUR).

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 2016 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.

Authorization Compliance Monitoring

Monitoring was also carried out in 2016 at 17 businesses operating under authorizations with self-monitoring requirements, with 1 follow-up visit conducted at a 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 2016 were generally in compliance with Sewer Use Bylaw restricted waste limits.

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 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 2016, CoP monitoring was carried out on 2 of the 11 regulated sectors; food services and dry cleaning. Follow-up inspections and monitoring were also conducted at 3 automotive repair locations with multiple exceedances in 2015, as recommended in the *Regional Source Control Program 2015 Annual Report*.

Food Services

In 2016, 800 food service establishment inspections were conducted, including repeat visits. There are currently 1,386 food service establishments operating with GI in the region. Of these, sampling was conducted at 14 sites with a history of compliant (properly sized and maintained) and accessible GI. Three restaurant categories were selected for sampling in 2016: Japanese, Thai and Mexican. These categories were selected due to the minimal amount of historical sampling data available for these types of restaurants.

Sampling was conducted alongside an inspector at each location, so that it could be fully inspected at the same time. Information of interest was the levels of grease and solids in the GI at the time of sampling, make and size of the GI, fixtures connected to the GI, pump-out frequency, and the date of last cleaning. This background information was collected at the time of sampling to determine if it had any bearing on results.

Samples were collected as grab samples from a downstream monitoring point and analyzed for total suspended solids (TSS), total oil and grease (TOG), pH and temperature. Chemical analytical results have been evaluated against Schedule “I” discharge regulations and Schedule “B” Restricted Waste Criteria established in the CRD Sewer Use Bylaw (Bylaw 2922), hence referred to as the ‘limits’.

Most of the results were within the limits for TSS and TOG, with 86% and 75% compliance rates, respectively. GI outflows did tend to be acidic, with 60% of GI having a pH value below the lower bylaw limit of 5.5. Japanese restaurants had consistently low pH results, likely caused by acidified sushi rice.

Food service type does not appear to have any bearing on TOG trends, as all 3 categories had similar and overlapping ranges of TOG results. The GI make, size, connected fixtures, pump-out frequency, and date of last cleaning all appear to have no bearing on GI compliant status or TOG results. Excessive grease levels in the trap did tend to correlate with high TOG results at the downstream monitoring point, although there were notable exceptions. Occasionally, a GI with high grease levels in the trap had low TOG results, or vice versa.

It is recommended that regularly scheduled maintenance of GI continue to be enforced, as low grease levels in the GI tend to correlate with low TOG levels being discharged to sewer. An investigation into what would cause an otherwise compliant GI to exceed bylaw limits for TOG may be a relevant undertaking.

Dry Cleaning

There are currently 31 dry cleaning businesses operating in the region. Of those 31, 21 have no regulated waste, as they serve as shop fronts only. The remaining 10 facilities were inspected during July and August 2016. Six facilities were sampled and assessed for compliant dry cleaning wastewater treatment systems. The remaining 4 facilities managed all their dry cleaning waste off site and were serviced by a waste management company.

Four of the 6 facilities tested for chemical oxygen demand (COD) exceeded concentration limits as defined in Bylaw 2922, Schedule "B" Restricted Waste. Five of the 6 facilities tested for PERC exceeded concentration limits as defined in Bylaw 2922, Schedule "J".

The last dry cleaning sector inspections were conducted in 2012. Over the past 4 years, there has been very little change in the effectiveness of the batch treatment systems. In 2012, 74% of the 20 PERC samples were above the bylaw limit. In 2016, the figure was 83% for the 6 PERC samples taken.

There was an apparent improvement in the COD results with 67% above the limit in 2016, compared to 96% above the limit in 2012. However, only 6 samples were collected in 2016 compared to 20 samples in 2012. The range of results between the years were very similar.

Some of the drycleaners were using vapour phase activated carbon in their Union Pure Water 22 treatment works. Manufacturer guidelines specifically recommend liquid phase activated carbon, and discourage the use of vapour phase. One business with very high PERC results switched from vapour phase to liquid phase carbon and had their wastewater retested after 30 and 60 days. Both samples were compliant with PERC limits. It may be that the use of vapour phase activated carbon was adversely affecting the effectiveness and efficiency of the treatment works of Union Pure Water systems.

It was recognized that off-site disposal facilities were not being inspected in-depth and records not fully investigated. There was the possibility of discharge to sewer of untreated wastewater from off-site disposal facilities.

It was recommended that businesses discharging to sewer be inspected and sampled annually, with emphasis given to following the RSCP enforcement policy for those exceeding bylaw limits. Facilities that dispose of waste off site should remain under the CoP and have disposal records inspected annually. Any facilities with "No Regulated Waste" should also remain under the CoP and be contacted every 3 years to maintain up-to-date records.

Stakeholder consultation with dischargers and off-site disposal facilities was also identified as a beneficial step to review trends and best practices based on the 2016 investigation, and to reiterate the financial costs for exceeding parameter limits.

Automotive Repair

In 2016, there was a small re-auditing exercise for 3 automotive facilities of concern, to ensure that proper maintenance was being conducted, and that best practices were being followed, based on a 2015 thorough sector review by RSCP inspectors, of all facilities operating under the Code of Practice for Automotive Repair. In conjunction with the 2015 inspections, sampling was carried out at 12 properly sized and maintained oil/water separators (OWS) to characterize the wastewater entering the sanitary sewer system from this sector.

The parameters analyzed from the samples collected in 2015 included: COD, TSS, MOG, total metals, BTEX, total PAH, pH and temperature.

Chemical analytical results were evaluated against Schedule "M" Discharge Regulations and Schedule "B" Restricted Waste Criteria, established in CRD Sewer Use Bylaw (Bylaw 2922), and hence referred to as the 'limits'.

The 2015 sector review identified 3 facilities of concern that had dramatic exceedances of the bylaw limits for a number of parameters. It was recommended that these facilities be revisited to ensure that proper maintenance was being conducted and that best practices were being followed.

Upon re-inspection, it was determined that all 3 facilities had compliant OWS units and best practices were being followed. To further understand the cause of the exceedances recorded in 2015, it was recommended that each facility be re-sampled for the same parameters.

The results from re-sampling the automotive facilities of concern in 2016 generally showed a reduction in contaminant levels. The total number of exceedances for the 3 automotive facilities of concern in 2015 was 21; the total number of exceedances in 2016 was 11. This is a marked improvement, with the total number of exceedances being reduced by almost 50%.

Primary contaminants of concern for this sector are MOG and TSS. There has been some improvement in these specific parameters as well. There are performance issues and/or sampling procedures at each facility that may help to improve results even further. These include the installation of a downstream monitoring point at 1 location, changing of the pumping rate between the sump and OWS at another, and timing the sampling at the final location for when the OWS is full. All 3 locations should be sampled in the next round of automotive CoP inspections, or if these changes are implemented, whichever comes first.

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 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 have been used to predict contaminant loads from domestic sources for planning purposes.

The 2016 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 no exceedances of Sewer Use Bylaw restricted waste limits at any of the residential sites in 2016.

DND Sites

In 2016, key manhole sampling was carried out at the Esquimalt pump station, serving the DND Dockyard area and at the DND Colwood pump station in March and October. There were no exceedances in 2016 and all results were within the Sewer Use Bylaw restricted waste limits.

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.

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 Marine 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 Programs staff at SPWWTP in 2016, those scheduled in January and July. Single 24-hour composite samples were collected in April and October.

Fourteen composite dewatered sludge samples were collected by SPWWTP Operations staff for analysis in 2016. 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.

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 2016 was submitted for priority pollutant analysis.

In 2016, 14 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 December 2006.

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.

The strategic direction and implementation approach outlined in a 2009 service delivery review specified introduction of a more supportive, proactive and collaborative approach to enforcement within the Environmental Partnerships Division. This more collaborative approach has been applied by RSCP staff since 2010.

Operations Regulated By Waste Discharge Permit

Of the 40 active waste discharge permits in place at the end of 2016, 26 sites were in “full compliance” with their permits and the Sewer Use Bylaw. Two permits were at “staff assessment”, 1 site was classified as a DUR and 6 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 (2016)

Enforcement Level	Number of Permits
Full Compliance	**26**
Step 1	**2**
Step 2	**2**
Step 3	**2**
Staff Assessment	**2**
Discharger Under Review (non-compliant)	**1**

Above Step 3, a significant escalation of enforcement action occurs, including notification of compliance status by letter, increased inspection or monitoring frequency, staff assessment of treatment works or procedures and scheduling of meetings to discuss remedial actions. Commitments and requirements agreed to at these meetings are confirmed in a follow-up letter to the permittee. 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 of time allows for 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 2016. These sites included:

- A septage disposal facility was escalated to DUR level for sulfide exceedances in 2015, and remained there throughout 2016. The permittee submitted a detailed compliance plan, which was accepted by RSCP staff. Throughout 2016, RSCP staff continued to monitor the effectiveness of changes to practices and treatment upgrades.
- A municipal public works yard was placed at ‘Staff Assessment’ level for exceedances in iron, which may have been input from a pile of catch basin waste stored on site. At the end of the year, the municipality was looking at potential solutions for protecting the waste pile from exposure to storm water and subsequent drainage to sewer.
- A food distributor and processing facility remained at ‘Staff Assessment’ level for TOG exceedances. The facility assessed operational causes related to an expanded operation, which now includes fish processing, and installed additional screening and operations to reduce oils and grease being released into sewer system. They were taken off ‘Staff Assessment’ in 2016.
- 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.

No charges were laid against waste discharge permit holders under the Sewer Use Bylaw during 2016.

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 2016, 84 of inspected businesses were in full compliance with their authorizations, 3 were at a Step 1, and 1 authorization was classified as a DUR. There were 74 inspections carried out at sites operating under authorizations in 2016.

A federally owned ship and boat waste facility was classified as a DUR in October 2013 as a result of a discharge of prohibited waste (Bunker "C" fuel oil) into the CRD sanitary sewer system at Lang Cove pump station in September 2013. The working group formed in 2015 to discuss measures that could be put in place to better control discharges from this facility in future, continued to collaborate in 2016, and will come to an end in 2017 with a newly issued authorization.

The overall compliance level ("full compliance" or "in progress") for the total 100 authorizations active at the end of 2016 was 100%.

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 2016 is presented in Table 9.

Table 9 Code of Practice Enforcement Summary – from implementation date to end of 2016

Code of Practice	% Full Compliance[1]	% In Progress[2]	% Non-Compliance[3] (DUR)
Automotive Repair	93%	7%	0
Carpet Cleaning	97%	3%	0
Dental	94%	4%	0
Dry Cleaning	80%	20%	0
Fermentation	85%	3%	0
Food Services	91%	4%	0.3%
Laboratory	76%	24%	0
Photographic Imaging	95%	3%	0
Printing	94%	6%	0
Recreation Facility	NA	NA	NA
Vehicle Wash	64%	11%	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.

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

Most CoP enforcement actions to date have been associated with implementation of the food services code, which regulates 1 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 7 tickets issued under the CRD TIA Bylaw to food services operations in 2016, all were paid.

The dry cleaning sector continued to have 20% of the facilities “in progress”, which equates to 2 of the 10 regulated facilities. A decision was made in 2016 to inspect this sector annually to ensure proper PERC management and/or disposal. In 2016, RSCP commissioned a student project (to take place in 2017) to investigate best practices for PERC treatment. This study will inform inspectors on how to better educate facilities being inspected in this sector and maximize effective treatment.

The laboratory sector had 24% of the facilities “in progress” in 2016, which equates to 5 of the 21 regulated facilities, respectively. Of the “in progress” lab facilities, all were located within the same large post-secondary institution, and all had Step 1 infractions for either inadequate spill materials, absent spill response plans, or no secondary containment.

In 2016, **94%** 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 2016 are outlined below.

Contaminant Characterization of Spirit Distillation 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 growing presence of stand-alone craft distillery enterprises. Although the existing Code of Practice for Fermentation Operations include distilleries as part of the regulated sector, inspection staff have generally not encountered this facility type and have limited information on the composition of its specific waste stream as it relates to potential impacts to sanitary sewer.

The distillation of whisky, gin, and other ethanol-based spirit production produces a liquid waste by-product generally referred to as stillage, which contains high concentrations of COD, BOD, TSS, and copper, as well as low pH. This liquid waste is generated during the distillation process after the initial production of fermentable sugars sourced from a variety of base ingredients (e.g., wheat, barley, rice, corn, sugar beets, sugar cane, etc.).

There are 3 distillery facilities, 2 of which are regulated under permit, and 1 under the Code of Practice for Fermentation Operations which opted to use off-site waste management for their high strength waste.

Monitoring of the 2 permitted distilleries showed BOD results ranging from 12,000 to 25,000 mg/L and COD results from 20,000 to 40,000 mg/L. Copper concentrations varied from 0.21 mg/L to as high as 9.8 mg/L and pH results were near pH 5.

Refreshed Medications Return Program

At a 2016 Saanich Peninsula Waste Water Committee 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. Part of the RSCP 4-year plan (2016–2019) approved in early 2016, included enhancement of initiatives and outreach to achieve further reduction of emerging contaminants throughout the region. In December, 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 CRD Board and Core Area Liquid Waste Management Committee in March.

The resulting refreshed residential medications return program components were designed and developed in 2016 and implemented in 2017 and consist of the following items:

- Communications plan completed/approved
- Redesigned Medications Return T-Shirt
- New Medications Return Program bag design
- Design of stickers for meds packaging or info sheets
- New Banners
- New Video development
- Redesigned Advertisements
- Refreshed Website/Social media content
- Campaign launch
- Pharmacy events plan

Investigation into the Disposal of Pharmaceuticals and Personal Care Products in the Veterinary Sector in the CRD

In 2016, RSCP commissioned a study by RRU Environmental Science students to research the disposal of pharmaceuticals and personal care products (PPCP) in the veterinary sector in the CRD to determine if a new management strategy and plan are required. Veterinarians operating within the CRD were contacted and surveyed to determine the most common PPCP used in their practices and their disposal methods. Several industry professional organizations were also interviewed, including: The Canadian Veterinary Medical Association, Canadian Animal Health Institute, Western Drug Distribution Center, Associated Veterinary Purchasing, and the College of Veterinarians of British Columbia.

Survey results showed that the primary method of PPCP disposal for the veterinary practices is through waste management companies, followed by the use of secure disposal. Most cleaning products are sent to the sewer and are never returned to the manufacturer. A small number of respondents reported that they disposed of parasite control products, hormones/anti-inflammatories, antibiotics, and expired PPCP in the trash.

A review of some of the drugs and cleaning products used by survey respondents revealed it is difficult to accurately gauge environmental risks for most of them, although many are shown to be very toxic substances. Antimicrobial resistance is a growing problem that may be exacerbated by improper disposal methods.

The survey and interviews identified opportunities for collaborative efforts between industry and government regarding proper PPCP waste disposal. The report recommends that a formal structure be put in place to allow veterinary practices to drop off their unused and expired pharmaceuticals at pharmacies. This would facilitate the collection of these excess drugs so that they may be properly disposed of by incineration.

Code of Practice for Food Services Operations Technical Review

In 2016, WSP Canada Inc. undertook a full technical review of the CRD's Code of Practice for Food Services Operations. The main areas of focus for the review included:

- GI sizing formula
- Requirements for GI with flow ratings greater than 100 gallons per minute
- Storage limits for FOG and solids, cleaning frequency and terms
- Fixtures requiring connection to a GI
- Flow control fittings and venting requirements
- GI types and alternative technologies
- Food services types and definition

A final report on the findings of the review was delivered in 2016.

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".

Core Area Outfall Effluent

CRD Marine 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%), 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%). 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 2016 can be found in the *Macaulay and Clover Points Wastewater and Marine Environment Program 2016 Annual Report*.

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:

Results of the trend assessment can be found in Golder (2017) and are summarized in Table 10. 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 the trend analysis and SPWWTP influent and effluent quality in 2016 can be found in the *Saanich Peninsula Treatment Plant Wastewater and Marine Environment Program 2016 Annual Report*.

Table 10 Narrative Summary of Trends in Concentrations and Loadings in SPWWTP Wastewater (Golder, 2017a)

Parameter	Concentrations			Loadings		
	Yearly Trend	Seasonal Trend	Outfalls	Yearly Trend	Seasonal Trend	Outfalls
Conventionals						
alkalinity	increase (INF)	yes (INF)	INF > EFF	-	-	-
BOD	decrease	NS	INF > EFF	decrease	NS	INF > EFF
CBOD	NS[a]	NS	INF > EFF	decrease	NS	INF > EFF
chloride	NS[a]	NS	NS	NS[a]	NS	NS
COD	NS	yes	INF > EFF	increase	NS	INF > EFF
conductivity	NS	yes	INF > EFF	-	-	-
Fecal Coliforms	increase	NS	INF > EFF	decrease	NS	INF > EFF
hardness	increase[a]	yes	NS	-	-	-
hardness (dissolved)	increase	yes	EFF > INF	-	-	-
N - NH3	NS	NS	INF > EFF	increase (INF)	yes (INF)	INF > EFF
N - NO2	NS (EFF)	NS (EFF)	EFF > INF	decrease (EFF)	NS (EFF)	EFF > INF
N - NO3	increase	NS	EFF > INF	increase	NS	EFF > INF
pH	decrease (EFF)	NS	INF > EFF	-	-	-
SAD cyanide	decrease	NS	INF > EFF	decrease	NS	INF > EFF
sulphide	increase (INF); increase (EFF)[a]	yes	INF > EFF	increase	yes	INF > EFF
sulphate	NS[a]	NS	EFF > INF	NS	yes	EFF > INF
TKN	NS	NS	INF > EFF	increase (INF)	yes (INF)	INF > EFF
TOC	NS	NS	INF > EFF	-	-	-
TSS	NS	Yes	INF > EFF	-	-	-
WAD cyanide	increase	NS	EFF > INF	increase	NS	EFF > INF
Metals						
aluminum	decrease	NS	INF > EFF	decrease	yes (INF)	INF > EFF
aluminum (dissolved)	decrease[a]	yes (EFF)	INF > EFF	decrease	yes (EFF)	INF > EFF
antimony	decrease	NS	NS	decrease (INF)	NS	INF > EFF
antimony (dissolved)	NS[a]	NS	EFF > INF	decrease	NS	EFF > INF
arsenic	decrease	NS	INF > EFF	decrease	NS	INF > EFF
arsenic (dissolved)	decrease	NS	INF > EFF	decrease	yes	INF > EFF
barium	decrease (INF); increase (EFF)[a]	NS	INF > EFF	decrease (INF); increase (EFF)	yes (EFF)	INF > EFF
barium (dissolved)	increase	yes	INF > EFF	increase	yes	INF > EFF
cadmium	decrease	NS	INF > EFF	decrease	NS	INF > EFF
cadmium (dissolved)	decrease	NS	EFF > INF	decrease	NS	EFF > INF

Table 10, continued

Parameter	Concentrations			Loadings		
	Yearly Trend	Seasonal Trend	Outfalls	Yearly Trend	Seasonal Trend	Outfalls
calcium	increase	yes	INF > EFF	NS	yes	NS
calcium (dissolved)	increase	yes	EFF > INF	increase	yes	EFF > INF
chromium	decrease[(a)]	yes	INF > EFF	decrease	NS	INF > EFF
chromium (dissolved)	decrease[(a)]	NS	INF > EFF	decrease	NS	NS
cobalt	NS	NS	INF > EFF	NS	NS	INF > EFF
cobalt (dissolved)	NS	NS	NS	NS	yes	NS
copper	NS	NS	INF > EFF	NS	NS	INF > EFF
copper (dissolved)	increase	NS	INF > EFF	increase	NS	INF > EFF
iron	NS	NS	INF > EFF	increase	NS	INF > EFF
iron (dissolved)	increase	yes	INF > EFF	increase	NS	INF > EFF
lead	decrease	yes	INF > EFF	decrease	yes	INF > EFF
lead (dissolved)	decrease	yes	INF > EFF	decrease	NS	INF > EFF
magnesium	NS[(a)]	yes	NS	NS	yes	NS
magnesium (dissolved)	NS[(a)]	yes	NS	NS	yes	NS
manganese	increase	NS	INF > EFF	increase	yes	INF > EFF
manganese (dissolved)	increase	NS	INF > EFF	increase	yes	INF > EFF
mercury	decrease (INF)	NS (INF)	INF > EFF	decrease (INF)	NS (INF)	INF > EFF
mercury (dissolved)	decrease (INF)	NS (INF)	INF > EFF	decrease (INF)	NS (INF)	INF > EFF
molybdenum	NS	yes	INF > EFF	NS	yes	INF > EFF
molybdenum (dissolved)	NS	yes	NS	NS	yes	NS
nickel	decrease[(a)]	NS	INF > EFF	decrease	NS	NS
nickel (dissolved)	decrease[(a)]	NS	NS	decrease	NS	NS
phosphorus	NS	yes	INF > EFF	increase	NS	INF > EFF
phosphorus (dissolved)	NS	yes	INF > EFF	increase	NS	INF > EFF
potassium	increase	yes	INF > EFF	increase	NS	NS
potassium (dissolved)	increase	yes	NS	increase	NS	NS
selenium	decrease (EFF)[(a)]	NS	INF > EFF	decrease	NS	INF > EFF
selenium (dissolved)	decrease[(a)]	NS	INF > EFF	decrease	yes (INF)	INF > EFF
silver	decrease	NS	INF > EFF	decrease	NS	INF > EFF
silver (dissolved)	decrease	NS	INF > EFF	decrease	NS	INF > EFF
tin	NS	NS	INF > EFF	NS	NS	INF > EFF
tin (dissolved)	NS	yes	INF > EFF	NS	yes	INF > EFF
zinc	NS	yes	INF > EFF	increase	NS	INF > EFF
zinc (dissolved)	NS	NS	EFF > INF	decrease (INF)	yes (INF)	EFF > INF

Table 10, continued

Parameter	Concentrations			Loadings		
	Yearly Trend	Seasonal Trend	Outfalls	Yearly Trend	Seasonal Trend	Outfalls
Miscellaneous Organics						
acetone	decrease (INF)[(a)]	NS	INF > EFF	NS (INF)	NS (INF)	INF > EFF
alpha-terpineol	decrease (INF)	NS (INF)	INF > EFF	decrease (INF)	NS (INF)	INF > EFF
oil & grease	decrease	NS	INF > EFF	decrease (INF)	NS	INF > EFF
toluene	NS (INF)	yes (INF)	INF > EFF	NS (INF)	yes (INF)	INF > EFF
trichloromethane	NS[(a)]	NS	INF > EFF	NS (INF)	NS (INF)	INF > EFF
Polycylic Aromatic Hydrocarbons						
fluorene	decrease (EFF)[(a)]	NS	INF > EFF	decrease (EFF)	NS	INF > EFF
phenanthrene	NS[(a)]	NS	INF > EFF	decrease	NS	INF > EFF
total PAH	increase	NS	INF > EFF	increase (EFF)	NS	INF > EFF
Phenolics						
phenol	NS (INF)	yes (INF)	INF > EFF	NS (INF)	NS (INF)	INF > EFF
total phenols	NS	yes	INF > EFF	increase	NS	INF > EFF
Phthalates						
bis(2-ethylhexyl)phthalate	decrease (INF)	yes (INF)	INF > EFF	decrease (INF)	NS (INF)	INF > EFF
diethyl phthalate	decrease (INF); increase (EFF)[(a)]	NS	INF > EFF	decrease (INF); increase (EFF)	NS	INF > EFF
di-n-butyl phthalate	NS (INF)	NS (INF)	INF > EFF	NS (INF)	NS (INF)	INF > EFF

Notes:
INF = Influent; EFF = Effluent
NS = non-significant (α = 0.05)
NA = not applicable; GLM not appropriate for this parameter
"-" = loadings not calculated for this parameter
(a) assumptions of GLM violated, non-parametric results used when residuals were severely structured; both GLM and non-parametric results considered when residuals were moderately structured

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 2016. Monitoring of the mixed liquor produced at the smaller GWWTP began in 1994 and continued in 2016.

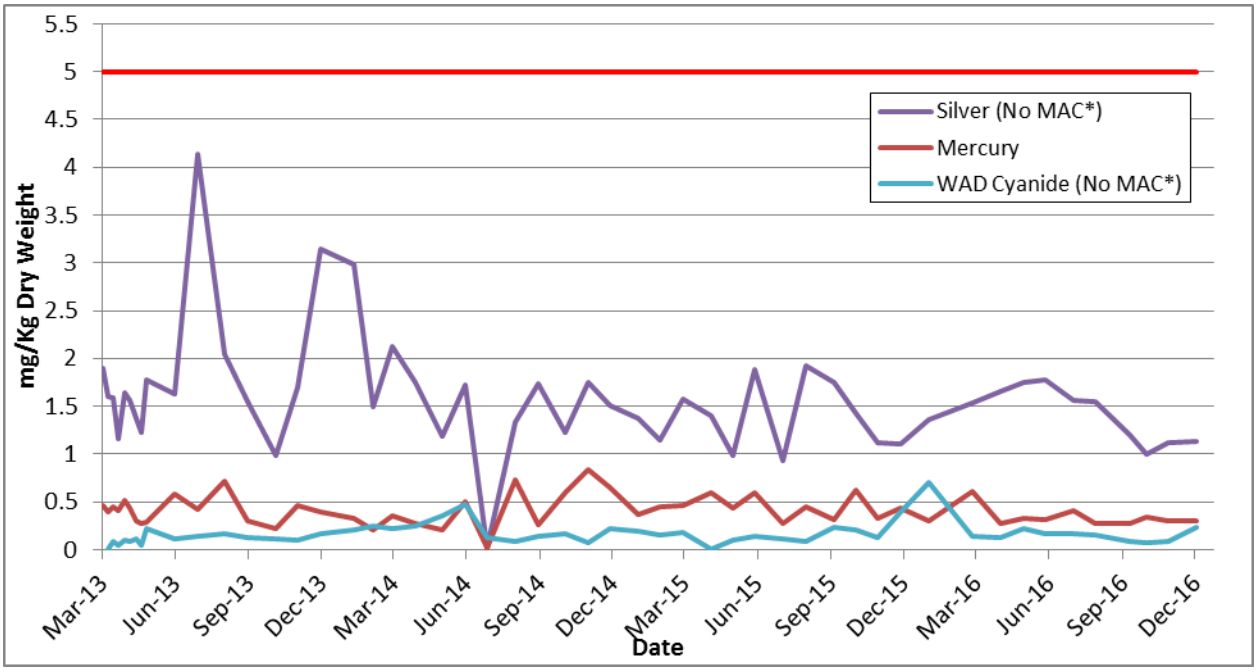
Saanich Peninsula Wastewater Treatment Plant Sludge

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 (OMRR). 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 first 3 years' results for metals and WAD cyanide in dewatered sludge are presented in Figure 1. Mercury and silver continue at levels similar to those in biosolids in the last 3 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. There is, however, no criterion for this substance in biosolids to use as a benchmark for evaluating the impact of these observations.

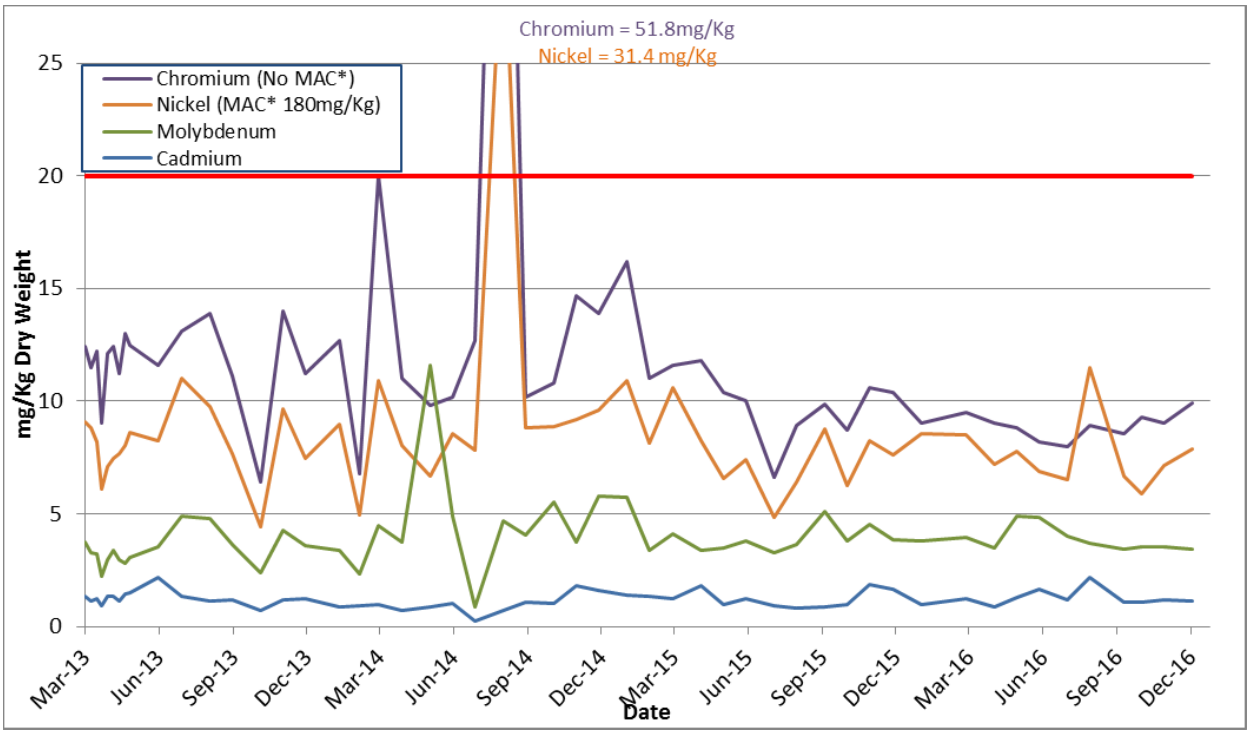
Figure 1 Mercury, Silver and Cyanide in SPWWTP Dewatered Sludge (2013–2016)



*MAC = Maximum Acceptable Concentration for Class A Biosolids

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; however, there was a single high result for molybdenum in May 2014. 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. There was also a minor spike in nickel concentration in August 2016. These intermittent elevated results are of concern and merit further investigation.

Figure 2 Chromium, Nickel, Cadmium and Molybdenum in SPWWTP Dewatered Sludge (2013–2016)



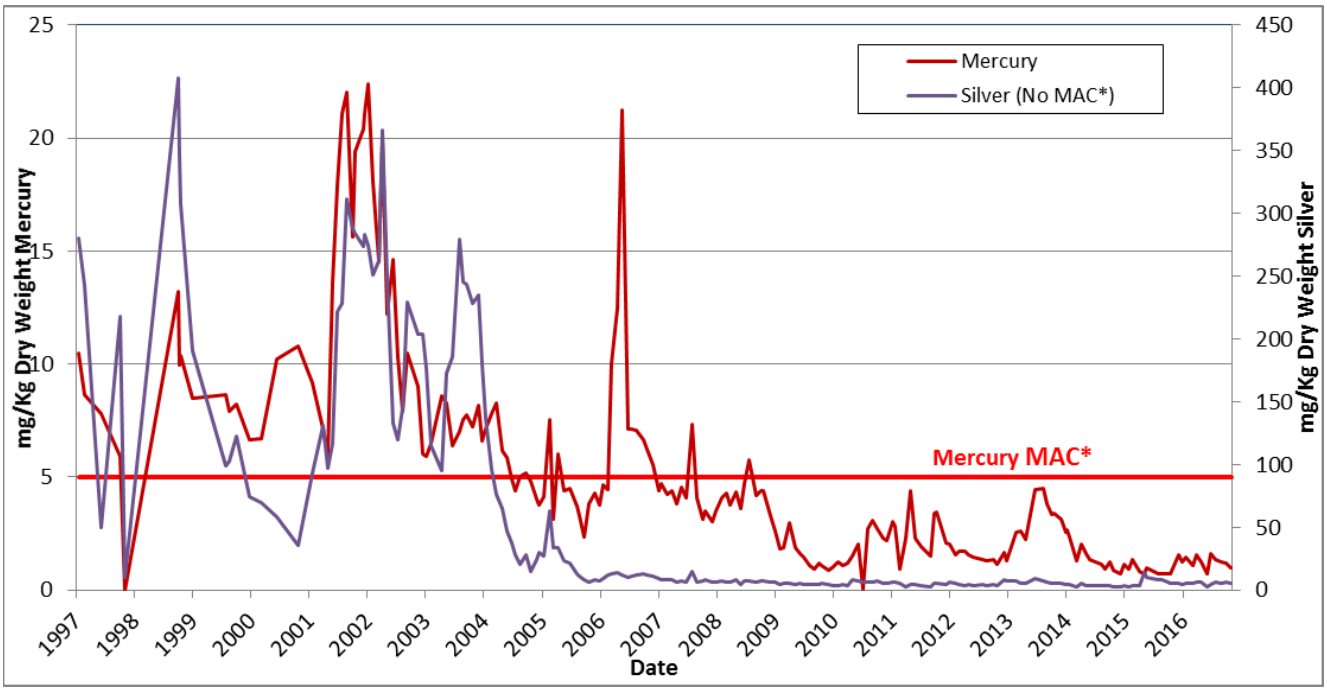
*MAC = Maximum Acceptable Concentration for Class A Biosolids

Ganges Wastewater Treatment Plant Mixed Liquor

The GWWTP process produces a mixed liquor product, not a biosolids product as defined by the OMRR. 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.

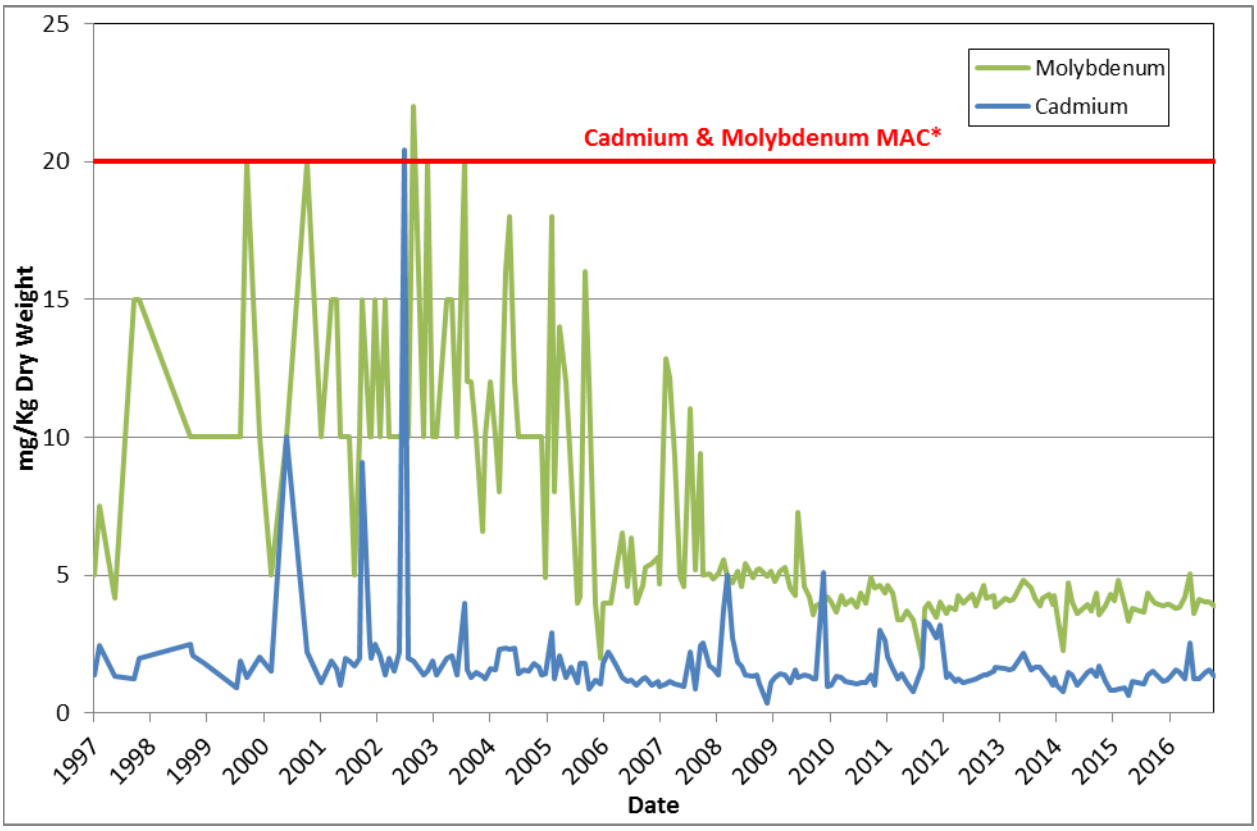
Figure 3 Mercury and Silver in GWWTP Mixed Liquor (1999–2016)



*MAC = Maximum Acceptable Concentration for Class A Biosolids

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 4 Cadmium and Molybdenum in GWWTP Mixed Liquor (1999–2016)



*MAC = Maximum Acceptable Concentration for Class A Biosolids

For the eighth consecutive calendar year, the GWWTP mixed liquor results met the Class A criteria for all metals, including mercury.

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, in development in 2017.

Table 11 provides a summary of incidents reported in 2016 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 2016.

Table 11 Summary of Reported Sewer System Incidents (2016)

Contaminant	Nature of Incident	Potential Impact	Incident Follow-up
Fuel Oil	CRD Operations staff reported an oily, foamy surface layer with a diesel odor at the Craigflower pump station – March 2016	Pollution to marine receiving environment	RSCP staff responded, obtained samples from several manholes. Analysis confirmed fuel oil or diesel, however, the source was unable to be located due to the large catchment area involved. Craigflower catchment maps will be developed in 2017.
Fats, Oils and Grease	City of Victoria staff reported blockages of sewer laterals downstream of 2 Victoria restaurants – March 2016	Grease blockages resulting in overflows in municipal sewer pipes and mains – maintenance and health concerns	RSCP staff followed up with inspections of the 2 restaurant locations and found collapsed sewer pipes at 1 location and bypassing of a GI due to lack of maintenance at the other. Owners were advised of results and remedial actions to be taken.
Fats, Oils and Grease	City of Victoria staff reported sewer backups and flooding due to blocked laterals downstream of a Victoria restaurant – June 2016	Grease blockage resulting in backup in municipal sewer laterals and mains – maintenance and health concerns	RSCP staff carried out an inspection of the restaurant and determined the grease build-up to be related to lack of GI maintenance. Follow-up to assess GI integrity and adequacy of clean-out frequency.
Obstructive Wastes	City of Victoria staff reported sharps obstruction of pumps at the Garbally pump station. Pump shut-down, maintenance and repair required – November 2016	Risk to sewer workers health and safety and potential for sewer overflow at pump station	RSCP Staff inspected an upstream housing project suspected to be the source of the sharps. Enforcement letter issued. Facility response indicated opening of a new safe injection site will significantly decrease disposal of sharps to sewer.

3.6 Outreach

RSCP staff continued to develop and maintain program-specific outreach and education messaging throughout 2016. 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 2016 and the first half of 2017 are summarized below under separate sections for residential and business outreach, education and the RSCP website.

Residential Outreach

- In 2016, RSCP staff continued to partner with the BC Pharmacy Association and the Health Products Stewardship Association proper disposal of waste medications. RSCP cross promoted and provided approval to BC Pharmacy Association to use a previous RSCP campaign slogan "*Fish can't say no to drugs*" in their new video.

  The Capital Region had the highest medication return rate per capita (0.0275 kg/capita) amongst regional districts in the province. Approximately 10.5 tonnes of medications were collected in the region. Although the Capital Region continues to have high rate of proper disposal through the efforts of the RSCP, there is room for improvement (30% of those surveyed did not dispose of medications at the pharmacy).

- Based on concern that 92% of the public surveyed in 2015 believe that source control practices will not be relevant with wastewater treatment, RSCP staff launched "*Clean Water Begins at Home 2.0*". The campaign was developed in 2016 to promote source control as the first step in wastewater treatment. Further, staff worked with other CRD programs to develop an integrated approach to protecting private infrastructure related to wastewater and stormwater. The other programs included Onsite Wastewater Management, Integrated Watershed Management and Inflow & Infiltration.

  New banners, videos, logo and posters were created to support the new initiative. The new materials were used at both staffed and static display throughout the region. Social media, web material and messaging were designed to match the campaign. Partner programs used similar designs in their campaign to ensure a consistent approach.

- Leveraging the knowledge gained from the 2015 residential survey that highlighted "*Clean Green*" as the most recognized Source Control campaign, new outreach tools and prompts were created for *Clean Green 2.0*. The tools and prompts will be used in a campaign in the fall and/or winter 2017/2018.

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.

Based on the "One Window Approach" initiative (incorporating environmental messaging from a wide range of CRD programs into 1 package) the CRD officially participated in BizPaL in March 2016. The participation was based on the work in 2015. BizPaL is a web-based tool to help new and current business owners find and learn about required licenses and permits to operate their business. The BizPaL website also provides information on other applicable bylaws. RSCP staff worked with the BC Ministry of Jobs - Tourism and Skills Training and Industry Canada to customize BizPaL to fit the CRD.

To support BizPaL and CRD web based business outreach, the CRD webpages associated with stormwater, wastewater and septic were re-designed in coordination with program staff. The new design focuses on providing relevant information based on ICI owners' and operators' interest and searches.

3.7 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 BC MOE, federal agencies such as the DND and Public Works, regional districts, municipalities, Island Health and local academic institutions.

In 2016, 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 2016 are outlined below.

2016 Collaborations

In 2016, 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.

- Sponsored a “Greenest Restaurant” award for the 2016 Ecostar Awards to recognize restaurants in the region that are, among other environmental performance indicators, examples of excellent source control practices.
- Commissioned a study by RRU Environmental Science undergrad students to research the disposal of PPCP in the veterinary sector.
- Organized specialized flow meter training for Metro Vancouver staff, using in-house technical expertise.
- Collaborated with municipalities of Saanich, Victoria and Langford, as well as staff from the Environmental Protection Division to investigate the wet-cutting sector. This sector utilizes wet-jet cutting and water-cooled cutting technologies, resulting in a liquid waste stream and solid waste stream requiring regulation for discharge. The investigation identified businesses discharging to storm and sewer, created new permits and established regulation by the RSCP, municipal storm programs or the Trucked Liquid Waste and Controlled Waste Permit Programs, as required.
- Presented at a Business Licensing Municipal Working Group meeting to request that municipal business licensing offices share new businesses license information for RSCP permitting purposes. All municipalities present agreed to share the information. RSCP worked closely with City of Victoria Business Licensing staff to establish a process that could then be repeated with other municipalities.
- CRD Marine Monitoring staff began collaborating with RSCP staff through offering odour monitoring in the Lang Cove catchment area to ascertain sulfide sources with a number of permits.
- Collaborated with BC MOE, Hazardous Waste Program staff to ensure that the Hazardous Waste Regulations pertaining to biomedical waste are adhered to in hospital permits.

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 CCC staff so that, wherever possible, CCC 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.

Collaboration with Academic Institutions

The RSCP also developed various partnerships with educational institutions in 2016.

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

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 2016, 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.

The application will be integrated into a re-write of the CRIMS application scheduled to take place in 2017.

3.8 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.

A fourth performance measure, 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 12 Results of RSCP Performance Measures (2005–2016)

Performance Measure	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Proper waste treatment[1]	80	85	87	93	95	96	97	90	97	N/M[5]	N/M[5]	N/M[5]
Priority contaminants[2]	92	N/M	N/M	78	N/M	N/M	94	N/M	N/M	N/M	N/M	92[2]
Biosolids and sludge[3]	92	67	88	93	100	100	100	100	100	100	100	100
Overall Compliance[4]	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	N/M	95	97	98

Notes:
1. Percentage of regulated businesses with proper waste treatment installed.
2. Percentage of priority contaminants showing no increase in loads to the core area environment (preliminary result from draft report).
3. Percentage of biosolids and sludge samples that meet Class A standards for metals.
4. Overall Compliance is now substituting "Proper waste treatment" as of 2014.
5. N/M = Not measured
6. I/P = In preparation

Performance measure #1 was not able to be calculated prior to 2004 due to the lack of complete data on the installation of proper waste treatment for CoP. Steady progress had been recorded for this measure over the period 2005–2011.

Performance Measure #1 was modified in 2014 to "Overall Compliance" as a better indicator of effective contaminants diversion. Proper waste treatment was a significant marker of program influence in the developing years, as new CoP were being introduced to the region. 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 code of practice. Further, a "Compliant" or "Step 1" enforcement status assumes that the treatment works are being properly maintained. All treatment work 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.

Performance measure #2 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). This report found that there were significant decreasing trends, or no significant trend, in 33 of the 36 priority contaminants listed in Appendix 1. Increasing trends were recorded for acenaphthene and

fluorene at Macaulay Point and WAD cyanide at both Macaulay and Clover points, resulting in a 92% rating for this performance measure in 2011.

Long-term analysis of effluent trends for the core area outfalls is only undertaken every 3 to 4 years. This measure cannot be calculated for the 2 to 3 years in between. The most recent analysis, including data from 1990–2015, was received in 2017.

The final performance measure has shown some variability over the years, largely due to the mixed liquor metals results from the GWWTP exceeding Class A criteria for biosolids. However, in 2016, for the eighth 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 2016.

4.0 REFERENCES

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APPENDIX 1

RSCP Priority Contaminant List (2016)

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)
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)
Total PAH
Low molecular weight PAH
naphthalene
acenaphthylene
acenaphthene
fluorene
phenanthrene
anthracene
fluoranthene
High molecular weight PAH
pyrene
benzo(a)anthracene
chrysene
benzo(b)fluoranthene
benzo(k)fluoranthene
benzo(a)pyrene
dibenzo(a,h)anthracene
indeno(1,2,3-cd)pyrene
benzo(g,h,i)perylene
Phthalates
bis(2 ethylhexl)phthalate
di-n-butyl phthalate
Miscellaneous
1,4-dichlorobenzene
Cyanide - weak acid dissociable (WAD)
Cyanide - strong acid dissociable (SAD)
phenol
total oil and grease

APPENDIX 2

Calculation Methods for RSCP Performance Measures

The following methods are used to calculate the 4 RSCP performance measures referred to in Section 3.11.

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:** We know from our inspection history 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 OWS, who are supplementing their systems with oil coalescing plates, analyzing the wastewater effluent and being monitored through an authorization to ensure that the systems are not bypassing hydrocarbons or in excess of other restricted waste limits.
- **Treatment works maintenance:** The top enforcement issue amongst regulated facilities is proper maintenance of treatment works. All treatment work systems are rendered ineffective if they are not maintained; thus as a compliance indicator this is much more accurate representation of proper contaminants diversion. A facility not maintaining a system will receive a major infraction (Step 2) compliance status.
- **Working with facilities with inadequate or no treatment works:** On the rare occasion where a facility is found to have no treatment works on site, staff work swiftly with the business towards adopting an effective system. When there is resistance to working proactively with staff, enforcement actions escalate quickly, typically resulting in positive action from the facility. When inspected treatment works are viewed as ineffective[2], the inspector will work with the business to improve treatment performance through either an upgraded system that meets CRD requirements; authorizing modifications to the existing system to meet or beat base performance requirements; or assisting the business in modifying their practices to eliminate the need for on-site treatment works[3].

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 Environmental Protection Division's Marine Programs 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., 2013), utilizing data

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

from the period 1990–2011, updates the previous assessment (Golder Associates Ltd., 2009a), which included data from 1990–2008.

In 2008, the RSCP prepared a list of core area priority contaminants based on information provided by Marine Programs 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 PAH, trends for individual PAH, LMW, HMW 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 PAHs		Increase (MAC)		
Phthalates				
bis(2 ethylhexl)phthalate	Increase	Increase (MAC)		
di-n-butyl phthalate				
Miscellaneous				
1,4-dichlorobenzene				
phenol				
total oil and grease				
Cyanide - WAD			Increase (CLO)	Increase (CLO + MAC)
Cyanide - SAD				
Total # Increase	**3**	**8**	**2**	**3**
Total # Decrease or "ns"	**33**	**28**	**34**	**33**
% of 36 Priority Contaminants	**92%**	**78%**	**94%**	**92%**

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 analysed 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 – 2015

The following table illustrates how performance measure #3 is calculated, using 2015 data as an example.

Treatment Plant	# Samples (2015)[1]	# Compliant (2015)[2]
Ganges WWTP (Mixed Liquor)	11	11
Saanich Peninsula WWTP (Dewatered Sludge)	12	12
Totals	**23**	**23**
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 – 2016

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 sewered 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 2016

Code of Practice	Est. Sector Size (2016)
Automotive Repair	183
Carpet Cleaning	36
Dental	124
Dry Cleaning	10
Fermentation	34
Food Services	1,386
Laboratory	21
Photographic Imaging	73
Printing	33
Recreation Facility	na*
Vehicle Wash	36
Total CoP Operations	**1,949**
Total Active Permits	40
Total Active Authorizations	112
Total Regulated Facilities	**2,101**

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 2016. 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 2016 since Adapting New Success Measures

CODES	Sector SIZE	# INSP 2016	COMP	COMP %	IN PROG	IN PROG %	STEP 1	# OVERALL COMPLIANT (Compliant or Step 1)	% OVERALL COMPLIANT	DUR	DUR %
AUTO	196	29	183	93.37%	13	6.63%	12	195	99.49%	0	0
CARPET	36	2	35	97.22%	1	2.78%	0	35	97.22%	0	0
DENTAL	124	148	117	94.35%	5	4.03%	5	122	98.39%	0	0
DRY CL	10	37	8	80.00%	2	20.00%	0	8	80.00%	0	0
FERM	34	1	29	85.29%	1	2.94%	1	30	88.24%	0	0
FOOD	1386	800	1260	90.91%	55	3.97%	29	1289	93.00%	4	0.30%
LABS	21	1	16	76.19%	5	23.81%	5	21	100.00%	0	0
PHOTO	73	220	69	94.52%	2	2.74%	1	70	95.89%	0	0
PRINTING	33	52	31	93.94%	2	6.06%	1	32	96.97%	0	0
REC	na	na	na	na	na	na	na	na	na	na	na
VEH WASH	36	8	23	63.89%	4	11.11%	3	26	72.22%	0	0
TOTAL	1949	1298	1771		90			1828		4	
AUTH	112	74	109	97.32%	8	7.14%	3	112	100.00%	0	0
PERMITS	40	62	31	77.50%	3	7.50%	2	33	82.50%	1	2.50%
ALL TOTALS	4050	2732	3682	90.91%	191	4.72%		3801	93.85%	5	

As a result, the “Overall Compliance” in 2016 is 98%.

APPENDIX 3

CRD Regulated Industrial Categories (Currently Operating under RSCP Permits or Authorizations)

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