PORT COLBORNE

Port Colborne Distribution System
Summary QMS Report
for the
Management Review

Report Prepared on:
November 2, 2022

For the period of:
September 1, 2021- October 31, 2022

Executive Summary

- This management review summary covers the period from September 1, 2021 to October 31, 2022.
- There was one incident of regulatory non-compliance in this period for a missed lead sample (pH and alkalinity only).
- There were 2 adverse test results in 2021 (1 microbiological and 1 low free chlorine). There was 1 adverse in 2022 in the distribution system for a lab contaminated sample (microbiological), and 2 adverse tests results for the small drinking water system at Sherkston Community Centre (microbiological). In all instances, Public Health directives and MECP directives were followed and clear re-samples indicated the water was safe.
- The 2022 Internal Audit was completed on October 17, 2022.
- The external audit document review will occur on November 21, 2022 and the onsite portion of the re-accreditation audit will take place on December 12, 2022.
- Main breaks during this reporting period totaled 31 (10 in 2021 and 21 in 2022).
- Staff are in the process of changing the way maintenance targets are tracked. Citywide is being used by all W/WW staff to better track maintenance activities. Staff are currently reviewing the operational performance indicators and maintenance targets to make sure they represent the work being completed. Operational Performance Indicators are being met.
- The City's water purchases decreased in 2021, falling by 7%. As the volume of water sold to the City's customers only experienced a 1% decrease in 2021, it is likely that the majority of the decrease in purchases is a direct result of the efforts by the Water Wastewater Division to not only find and repair any watermain breaks in a timely fashion, but also to take a conservative, prudent approach to maintenance flushing activities.
- In 2022 to date the unaccounted water is at 27%.
- The City's Municipal Drinking Water Licence and Drinking Water Works Permit were renewed in October 2019.
- Water quality complaints totaled 19 in 2021 and 7 so far in 2022. Where the source of the complaint could be determined, activities in the distribution system (valve turning, hydrant flushing) were the most common sources.

Table of Contents

Port Colborne Distribution System
Summary QMS Report
for the
Management Review
Prepared on November 2, 2022

Introduction

Purpose

The purpose of this report is to summarize the activities of the Port Colborne Distribution System (PCDS) Operating Authority so that Top Management can ensure the continuing effectiveness of the Quality Management System (QMS) at scheduled Management Reviews.

Scope

This Summary Report for the Management Review covers key operational elements of the Drinking Water Quality Management Standard (DWQMS) from September 1, 2021-October 31, 2022.

Top Management reviews the information specified in:

Procedure QMS-SOP20-1 Management Review

This review will include, but is not limited to, the following:

a. Incidents of regulatory non-compliance
b. Incidents of adverse drinking water tests
c. Deviations from critical control point limits and response actions
d. Effectiveness of the risk assessment process
e. Results of internal and third party audits, including best management practices
f. Results of relevant emergency response testing
g. Operational performance
h. Raw water supply and water quality trends
i. Follow up on action items from previous management reviews
j. Status of management action items identified between reviews
k. Changes in resource requirements, infrastructure, process, personnel, the Standard or regulations that could affect the QMS
l. Consumer feedback
m. Resources needed to maintain the QMS
n. Results of infrastructure review
o. Operational plan currency, content and updates
p. Staff suggestions

Summary of Items

a. Incidents of Regulatory Non-Compliance

There was 1 incident of a reportable regulatory non-compliances during this time period. The Ministry was informed of a missed sample under the Lead Sampling Program. During the next inspection this may result in a formal non-compliance and a decrease in our rating. The winter lead sampling, which actually is only for pH and alkalinity this sample cycle year, was missed earlier this year. As soon as staff became aware of it, it was reported to the Ministry. A debrief occurred and training with staff was completed. Measures were put into place to make sure the samples are taken moving forward. The “Port Colborne Distribution System Annual Drinking Water Quality Report” for 2021 was presented to Council in March 2022 and details the City’s compliance with the regulations. The 2022 report will be prepared in February of 2023.

b. Incidents of Adverse Drinking Water Tests

In 2021, there were two Adverse Drinking Water Tests. One was related to low chlorine and one was due to a microbiological sample result in which total coliforms (TC) were detected. For the TC contaminated sample, chlorine residual was maintained, but flushing and resampling was completed to verify the water was safe. For the low chlorine sample, the City subsequently flushed and resampled, which indicated that microbiological organisms were absent from samples up and downstream of the adverse sample location, and free chlorine levels were well above the minimum regulated requirement of 0.05mg/L. There was one lab-contaminated sample in 2022 and 2 other adverse samples related to the Sherkston Community Centre for total coliforms in 2022. Staff flushed and resampled as a precaution for the contaminated lab sample. Chlorine residuals were continuously met and the water tested showed it was safe. For the Sherkston cistern samples, Public Health directives were followed and the cistern was cleaned and resampled. Subsequent samples met and exceeded the minimum requirements.

c. Deviations from Critical Control Point Limits and Response Actions

Critical Control Limits (CCL) for the PCDS are, where applicable, higher than the regulated limits, which then trigger a response procedure. During this period, Staff responded appropriately to low free chlorine levels (<0.20 mg/L but >0.04 mg/L) by flushing the distribution system to bring the chlorine levels up. Routine dead-end flushing aided in ensuring free chlorine levels remained adequate. In the summer, chlorine trends were closely monitored and the Region was informed of some decreasing trends that were being observed by staff. As a result, the Region indicated they would increase chlorine at the water tower. Minimum regulatory requirements were always being met.

d. Risk Assessment

A full Risk Assessment must be completed every 3 years. The result outcomes from the last full risk assessment completed in 2019 are attached as Appendix 1. A review of these outcomes was complete in 2021 and a full a risk assessment took place in October 2022, where the new addition of cybersecurity threats was evaluated and all other risks were also re-evaluated. Meeting minutes and result outcomes are not yet finalized from this meeting.

e. Results of Internal and Third Party Audits

Nonconformances (NCs) and Opportunities for Improvement (OFIs) that were generated during the report period are attached in the Appendix 2.

Internal Audit

The 2022 Internal Audit was completed on October 17, 2022 and the 2021 Internal Audit was completed on October 18, 2021. These audits were completed by an auditor from Acclaims Environmental. The Operational Plan and supporting documents were reviewed for conformity to the DWQMS 2.0. The auditor identified 6 opportunities for improvement which are summarized in the Log in Appendix 2. The auditor identified 4 opportunities for improvement and one non-conformance in 2022. These have not yet been added into the Log.

Many positive findings were noted during the 2022 audit such as:

- Staff interviewed were knowledgeable about their processes and programs and their roles' impacts on achieving the commitments included in the QMS Policy.
- All opportunities for improvement identified in previous audits had been verified as complete or in progress.
- Debrief sessions are held following occurrence of failures, with the goal of continual improvement (e.g. January watermain break events).
- The City's preventative maintenance leak detection activity has located and repaired 10 potential mainbreaks to date.

External Audits/Accreditation Status

The City's auditor from SAI Global completed the last external surveillance audit on November 5, 2021. The next desktop external audit will occur on November 21, 2022 and the onsite portion of the re-accreditation audit will take place on December 12, 2022.

The auditor identified 1 OFI during the 2021 desktop level audit, which is included in Appendix 2. No non-conformances were noted during the audit.

Ministry Inspections

The Ministry of the Environment, Conservation and Parks (Ministry) performed a document review inspection of the PCDS on November 22, 2022 with an onsite component on December 7, 2021. The inspection period covered November 1, 2020

to October 31, 2021. PCDS was assigned a rating of 100%. The next inspection has not been scheduled at this time.

f. Results of Relevant Emergency Response Testing

There was no emergency response testing completed during the report period. As per the Distribution System Emergency Preparedness Plan, testing is required every five years, therefore, the next test is required to be completed in 2022 and will take place in December.

g. Operational Performance

Table 1 summarizes Operational statistics for the PCDS from January 1, 2021 to October 31, 2022.

Table 1: PCDS Activity Report

ITEM	AMOUNT	
	2021	2022 (to date)
Distribution Samples		
Bacteriological (approx.)	412	332
Operational (free chlorine)	2244	634 (does not include non-routine sampling)
Adverse Samples	2	1 (+2 in Sherkston)
Lead Samples		
Distribution – Alkalinity and pH	8	4
Distribution – Lead (Exempt from plumbing sampling as of Dec/09)	0	0
Sample results > 10 ppb	0	0
Watermain breaks	10	22

A summary of the 2021 and 2022 operational performance indicators (OPI) are provided in Table 2 below. Targets and OPIs are periodically reviewed to make sure they reflect all of the efforts made by staff. In 2021, staffing changes and the COVID pandemic interrupted much of the routine maintenance work normally conducted. There were 10 watermain breaks recorded in 2021 and 21 so far in 2022.

Table 2: PCDS Maintenance and Operational Performance Indicators (OPI)

Maintenance Activity	Target/OPI	Status 2021	Status 2022 (to date)
Watermain Breaks	Meet response times in SOP	10	21
Valve Exercising, Inspections	25% annually/< 5 inoperable	271 valves of 1193=23%	302 Valves of 1193= 25%
Hydrant Inspections	100% annually/< 5 inoperable	648 Hydrants inspected 100%	392 Hydrants of 634= 61% to date
Winter Hydrant Inspection	2 inspections (Nov 1-Dec 31 and Jan 1-Apr 1)/0 frozen	435	643 to date
Fire flow testing	100% Completed over ten (10) yrs/<2 out of service, marked within 60 days	4	6 to date. Fire flow project to commence Nov 14
Curb stop/curb box repairs	Repair < 2 weeks	4	44
Emergency service repairs	Meet response times in Watermain Break SOP	-	-
Inspect bulk water stations	Annual/< 2 service disruptions	Part of routine sampling as required	Part of routine sampling as required
Dead end flushing	Weekly, May-Oct, autoflush stations/0 AWQIs, <10 complaints	431	459
Backflow inspections	Annually or as required/<40% failure	13	14

Total water purchased from the Region's Port Colborne Water Treatment Plant decreased in 2021, falling by 7% from 2,515,060 m^3 in 2020 to 2,335,980 m^3 in 2021(Figure 1, Table 3). The volume of water sold to the City's customers only experienced a 1% decrease (1,625,882 m^3 in 2020 vs. 1,607,686 m^3 in 2021) (Figure 2, Table 3).

Figure 1: Annual Water Purchases since 2010

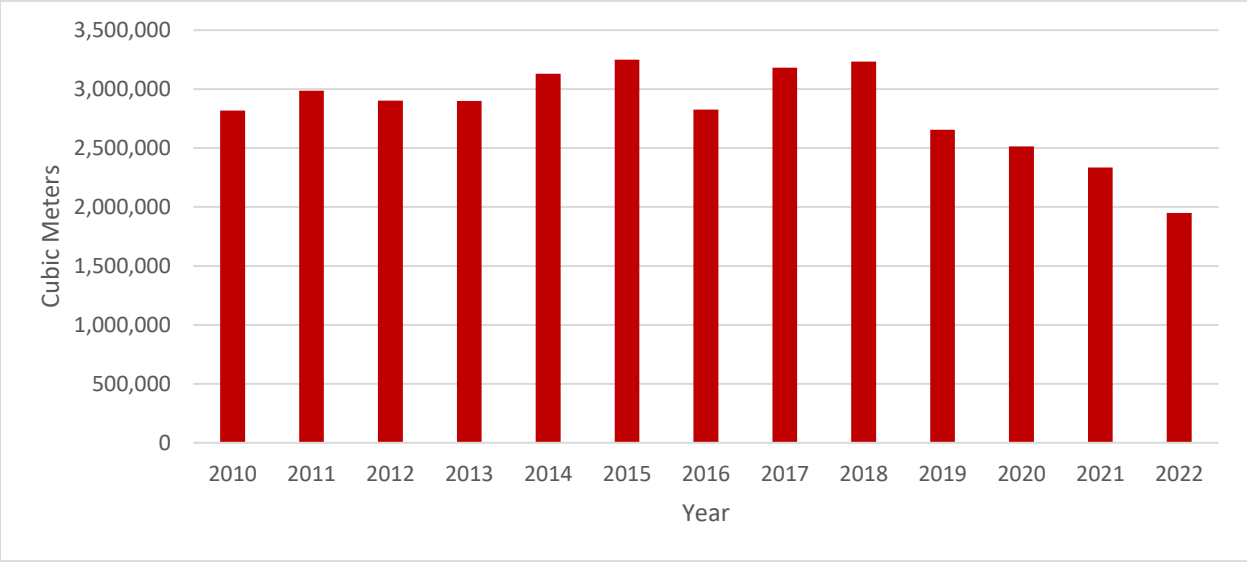
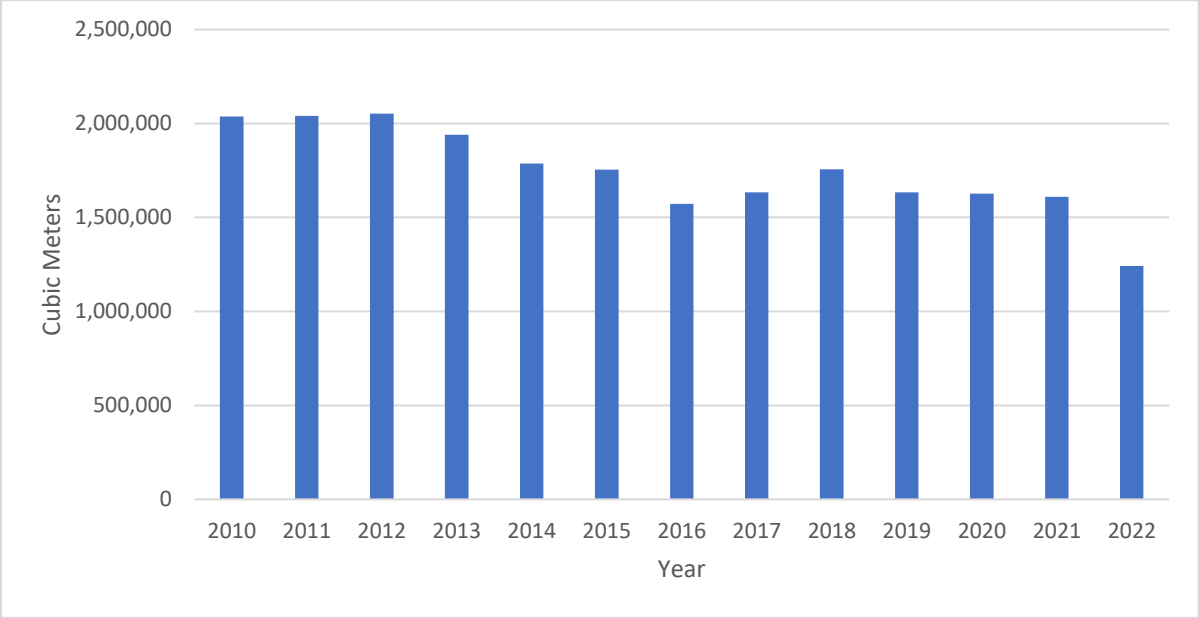


Figure 2: Annual Water Sales since 2010

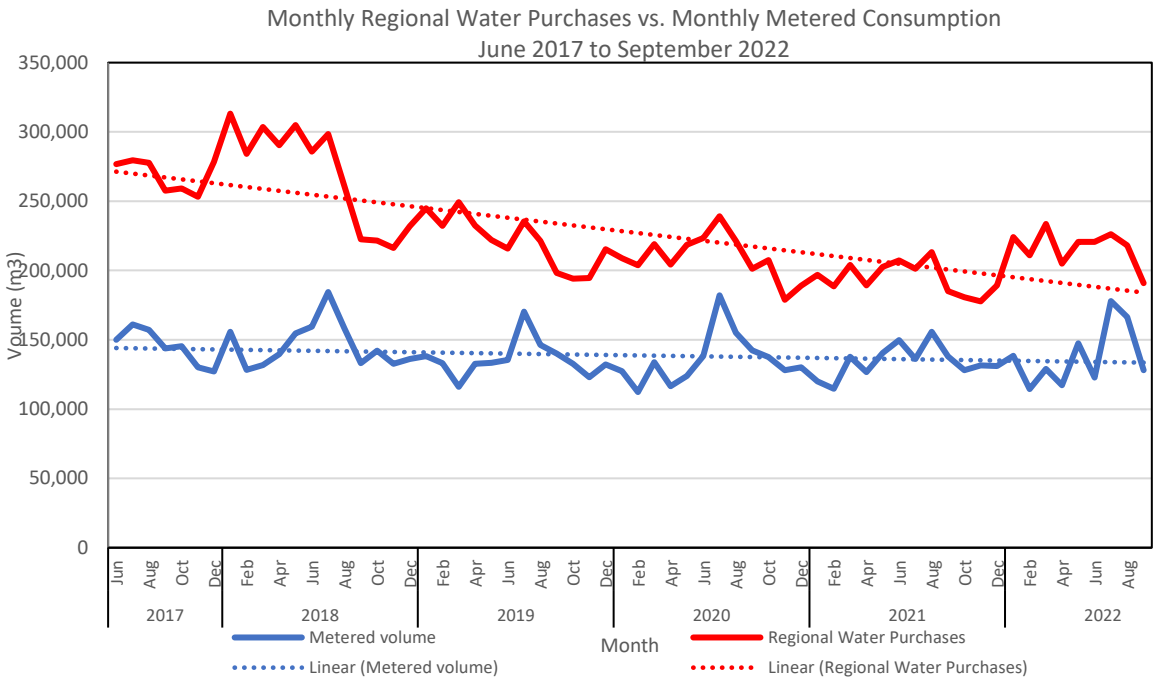


Since obtaining the ability to read all the water meters in the City monthly, we have tracked actual metered volumes against monthly purchases from the Region. Figure 3 below compares the monthly metered volumes from June 2017 to September 2022. There is generally a good correlation between the amount of water purchased vs. the amount of water metered.

What is most encouraging is the fact that the monthly trend between purchased and metered is narrowing and that, overall, monthly purchases from the Region have been declining while monthly metered volumes have remained relatively stable. This

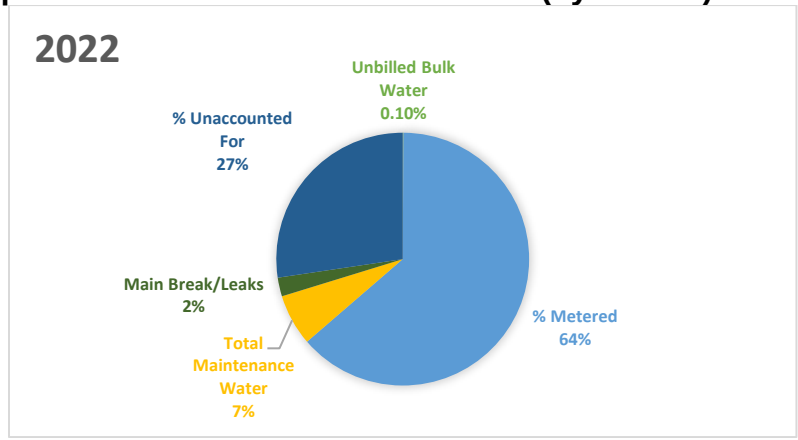
decrease in purchases from the Region is due in part to the efforts by the Public Works Department to not only find and repair any watermain breaks in a timely fashion, but to also take a conservative, prudent approach to maintenance flushing activities.

Figure 3: Monthly Purchased Volume vs. Monthly Metered Consumption - June 2017 to September 2022



In 2019, staff started to track all sources of unbilled water. There is some difficulty in collecting this data since water loss due to main breaks or other maintenance activities can be challenging to estimate. In 2022 to date, the unaccounted water is at 27% (Figure 4). Unfortunately, in 2021 due to staffing shortages and challenges with the ongoing pandemic, this data was not consistently collected.

Figure 4: Proportion of Billed vs. Unbilled Water (by source) – 2022



In 2022, maintenance flushing activities have used the greatest amount of unbilled accounted for water (Table 3). This is due in part to more frequent flushing activities during the summer months to maintain chlorine above our operational standards.

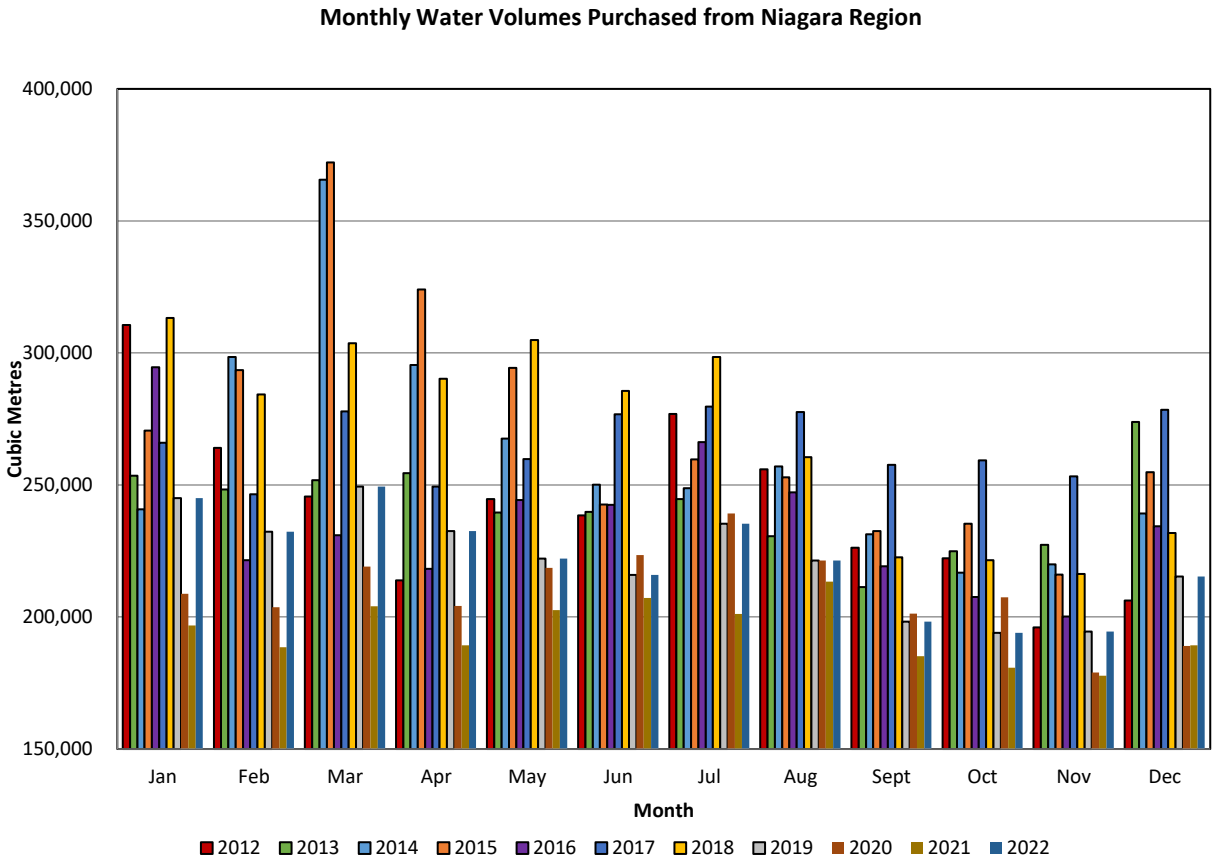
The commitment to tracking water usage will not only allow staff to accurately calculate the annual volume of unaccounted for water but will also allow the impact of watermain renewal to be assessed. The unfortunate reality of aging infrastructure is that watermain breaks will increase in frequency, and thus more water will be lost. Optimizing flushing programs will also assist in decreasing water use. Additionally, staff have been completing leak detection programs to proactively locate and repair watermain breaks before they reach the surface.

Table 3: Breakdown of Billed and Unbilled Water Volumes – 2019 vs 2020 vs 2021 (to Aug 31)

		2020	2021	2022 (to date)
Purchased	**Purchased volume**	2,515,060	2,335,980	1,950,190
Billed	**Metered volume**	1,625,882	1,607,686	1,239,797
Unbilled	**Unbilled Bulk Water**	1,509	1,884	1,886
	Maintenance Water	49,291.50	-	128,349
	Main Break/Post Repair Flushing	146,523.50	-	46,765
	Service Leaks	-	-	-
	Fire Suppression	4,500	-	-
	Unaccounted for Water	691,403.99	726,410	533,393

Figure 5 illustrates the unique Port Colborne consumption trend, which almost always sees the City using more water in the first quarter of the year, as opposed to all other municipalities in Niagara which use more water in the warmer summer months. Region and City staff are unclear as to why this trend occurs in Port Colborne. Although in 2022 so far the water volumes fluctuate more over the year than they have in the past.

Figure 5: Volume of Water Purchased from RMON each Month - Jan 2012 to Aug 2021



h. Raw Water Supply and Water Quality Trends

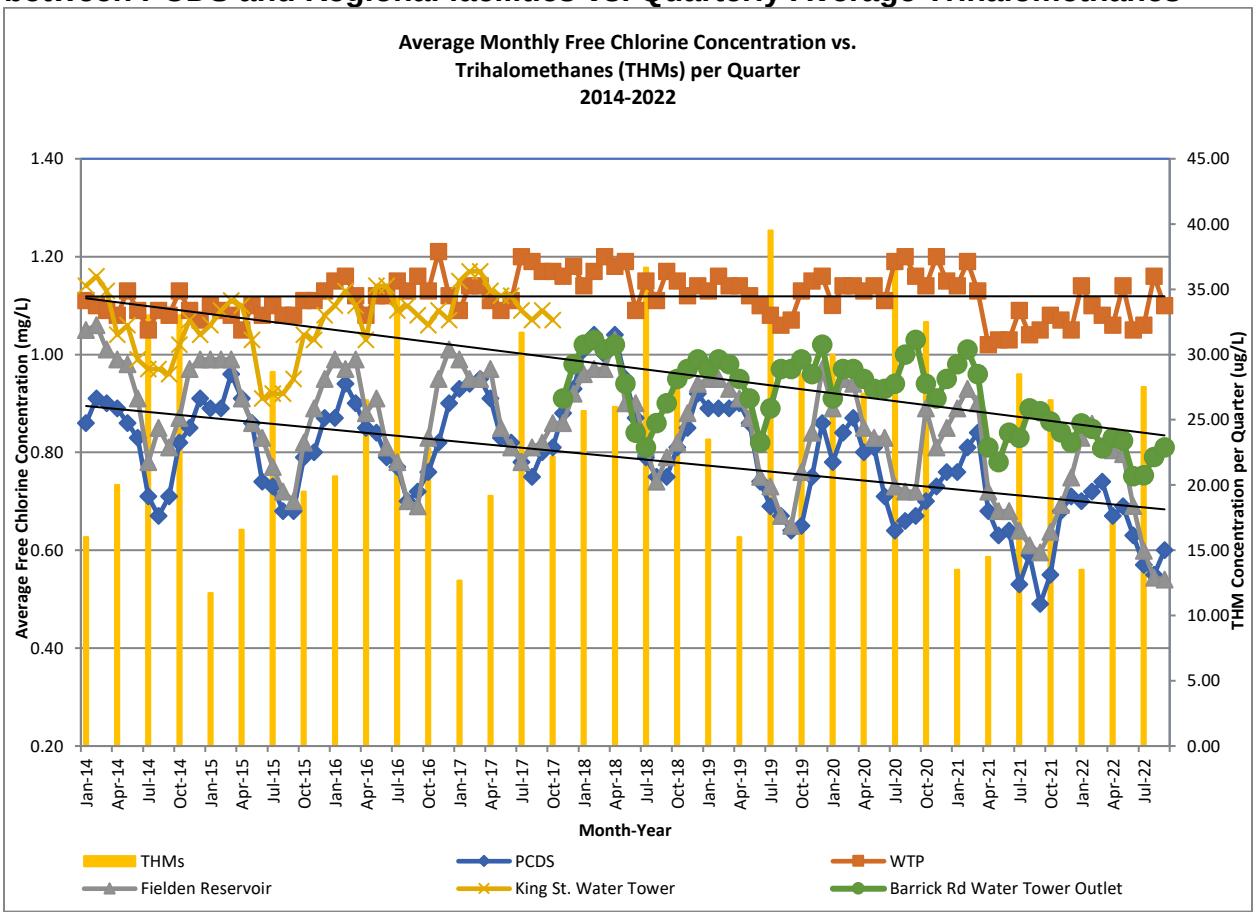
The Regional Municipality of Niagara (Region) supplies all drinking water to the PCDS, and as such, is responsible for all testing of the raw water supply (Welland Canal). Results of the testing are provided annually to the City in the Region's annual report.

Within the PCDS, the City is required to collect samples on a routine basis and evaluate them for a number of parameters. Microbiological samples, in addition to free chlorine samples are the best indicators of water quality trends within the PCDS. As indicated in Table 1 and detailed in section b. above, there were a total of 2 adverse samples in 2021 and 3 in 2022 so far (2 were for Sherkston Community Centre – small drinking water system).

Figure 6 below illustrates the average monthly free chlorine concentrations within the PCDS, compared to the average monthly free chlorine concentrations exiting the Water Treatment Plant (WTP), Fielden Avenue Reservoir (Reservoir) and Water Tower (King Street 2014-Oct 2017, Barrick Road Oct 2017-present) (data provided by Region staff).

As expected, free chlorine concentrations in the PCDS are lower than those exiting the WTP, the Reservoir and Water Tower; although free chlorine concentrations leaving the Barrick Road Water Tower are closer to the PCDS concentrations than the King Street Water Tower concentrations were. Additionally, the relationship between warmer months and chlorine levels can be clearly observed, with free chlorine levels declining during the warmer months. In April 2021 a decline in FAC was noticeable leaving the WTP averaging just above 1.00 mg/L, which appears to be linked to the drop in FAC in the Fielden Reservoir and PCDS. This trend was again observed at the end of the summer in 2022. This issue is being closely monitored by staff and discussions are ongoing with Niagara Region staff. As a result of these discussions, the Region is targeting an increase in chlorine at the water tower and will be reviewing chlorine usage through a seasonal lens and potentially increasing it more in the summer as needed.

Figure 6: 2014-2021 Average Monthly Free Chlorine Concentration Comparison between PCDS and Regional facilities vs. Quarterly Average Trihalomethanes



.

Quarterly trihalomethanes (THM) in 2021 were lower than the levels observed in 2020. Overall, average THM concentrations have remained relatively stable since 2013 (Table 4).

Table 4: Average Annual Trihalomethanes Concentrations – 2009-2022

Year	Average Trihalomethanes (µg/L)
2009	31.00
2010	25.25
2011	7.50
2012	16.75
2013	26.00
2014	25.50
2015	19.12
2016	26.08
2017	22.30
2018	29.04
2019	26.88
2020	31.50
2021	20.75
2022	19.67

The City began sampling for Haloacetic Acids (HAAs), as required by the regulation, on a quarterly basis in 2017. The City is required to begin reporting results in January 2020. HAAs have remained far below the Ministry's maximum acceptable concentration of 0.08 mg/L (or 80 µg/L) in 2021 and 2022. These results indicate that HAAs are not going to be a water quality issue in the distribution system.

i. Follow up on Action Items from Previous Management Reviews

Action Items:

- Water loss calculations and assumptions need to be firmed up
  - STATUS: spreadsheet to estimate water loss for flushing activities and main breaks has been created

- Operation Performance Indicators need to be set and tracked for long term tracking.
  - Citywide is now being used to track many operational activities. Staff are looking at continual improvement and trying to automate OPI tracking. Indicators are also being reviewed to make sure they best reflect the efforts of staff.

- Sampling SOP - It was asked if the City's sampling procedure included instructions on how to check the sample bottle to ensure it was "good" before using it to collect a sample. Staff indicated they would check the procedure and incorporate if the procedure didn't contain that information
  - STATUS: This will be included in the update to O&M Manual procedures

- Reagent storage/disposal – It was discussed that a process for reagent storage/disposal will be created to ensure expired standards and reagents won't be used during watermain commissioning, and it was suggested that there may be an opportunity to set up automatic notifications regarding expiry dates.
    - STATUS: Calendar reminders have been set for the QMS rep to check expiration dates.

- Region communication in event of shutdown of Region facility – outcome of the 2017 mock emergency. The City was concerned that the Region does not notify the City of all outages/upsets at Region facilities. While it is true that the majority of system outages/upsets at Regional facilities will have little to no impact on the City's distribution system, knowing the status of the Regional facilities in the event of a distribution system incident and/or emergency would only assist the City and the Region in providing the highest quality drinking water and customer service to our residents – as drinking water is shared responsibility. Director was to discuss with Region's leadership team
    - STATUS: In the event of an emergency, Region QMS staff indicated they would inform City staff, but Director level conversation could occur.

- Leak detection on Region's trunk watermains – the Region does not do active leak detection on their trunk watermains, however, it has been indicated that there is an appetite to pursue program(s).
    - STATUS: Ongoing

- Asset Management Planning Regulation – O. Reg. 588/17 came into force on January 1, 2018.
    - STATUS: Ongoing. INS not yet complete.

- QMS Standard Operating Procedures - Councillor Wells to investigate possible on-line method to access DWQMS SOPs that are referenced in the Operational Plan. Councillors don't have access to IBM Notes, so are unable to access the Quality Management System database, and the files are too large to email out. It was discussed if there was a secure online tool that the Councillors could access to view the procedures.
    - STATUS: IBM Notes will no longer be supported. Looking at web option for Operational Plan using the Sharepoint platform.

- It was discussed that when buildings are demolished, that the Utilities group needs to be kept in the loop to ensure that the water service and sewer lateral are correctly decommissioned to ensure the service is not leaking and that the sewer lateral is not allowing infiltration into the wastewater collection system.
    - STATUS: Still in progress. Meetings with Building Staff have been underway to finalize a process. CityWide may be a tool that can help facilitate the process and data tracking.

j. Status of Management Action Items Identified Between Reviews

There were no Management Action Items identified since the previous management review.

k. Changes That Could Affect the QMS or the PCDS

- *Sanitary and Storm Sewer Design Criteria and Wastewater Collection Environmental Compliance Approvals (ECAs)*
  Port Colborne has received their Consolidated Linear Infrastructure ECA for the stormwater system and is pending approval of the sanitary CLI-ECA. There will be significant effort required to comply with the new ECA requirements and this has been accounted for within the budget requests.

l. Consumer Feedback

There were 19 complaints received in 2021. The majority of the complaints were related to dirty water and most were a result of the Region exercising valves. After running the water, the issue was resolved and all water that was tested was well within the acceptable parameters.

So far in 2022, 7 complaints have been received. Three were related to dirty water, which was a result in watermain breaks in the area and the others were low pressure or a leak due to private plumping issues.

m. Resources Needed to Maintain the QMS

The Public Works department recently underwent a reorganization. Staffing resources will be reevaluated once the team has had time to adjust to any change in responsibilities.

n. Results of Infrastructure Review

The Infrastructure Review must be completed once every calendar year. The last Infrastructure review was completed in December 2021 and the next one is planned for early December 2022. Currently the Erie St watermain construction is underway and near completion. The Infrastructure Needs Study and Asset Management Plan will assist with capital planning.

o. Operational Plan Currency, Content and Updates

The Operational Plan has been updated to reflect the organization and staff changes and updated with the new logo. The Operational Plan will need to be endorsed by the new Council in 2023.

p. Staff Suggestions

Staff suggestions, where applicable, are captured under the Corrective Action Logs with Source identified as “other.”

q. New or Other Business

To be determined during the meeting.

r. Next Scheduled Review

The next Management Review will be scheduled for October 2023.

Table 8.1: Distribution System Risk Assessment Outcomes – April 15, 2019

Hazardous Event	Hazard	Hazard Type	Preventive Measure	Control Measure	Mitigating Processes/Procedure	Likelihood	Consequence	Responsiveness	Hazard Total (CCP Threshold =7)	Critical Control Point (CCP)?	Critical Control Limits (CCL)
Category 1 Main Break	Loss of pressure Quality/Quantity Contamination	Physical/ Biological	Water Main Replacement Program, valve turning program	Sampling after repair, up and downstream of break, following Provincial Watermain Disinfection Procedure	Annual Infrastructure Review process to identify priority replacements; identify breaks in timely manner; sample to ensure adequate chlorine residuals are maintained. Refer to Repair of Watermain Breaks (SOP C2)	5	1	1	6	Yes	Free Chlorine Residual 0.20 mg/L
Category 2 Main Break				Mechanical cleaning, sampling after repair, up and downstream of break, following Provincial Watermain Disinfection Procedure		4	2	1	9	Yes	Free Chlorine Residual 0.20 mg/L
Special Contamination Main Break				Development and implementation of site specific procedures, approved by the local Ministry office and Medical Officer of Health, as per the Provincial Watermain Disinfection Procedure		1	3	3	6	Yes	Free Chlorine Residual 0.20 mg/L
Loss of Chlorine Residual	Contamination	Biological/ Physical	Automatic/manual flushing in areas of concern	Monitoring free chlorine levels throughout WDS weekly	Flush system and resample. If still outside the CCL, continue flushing and re-sampling until adequate levels achieved. If cannot get appropriate residuals, investigate possible cause. If falls below 0.05 mg/L initiate reporting as per Adverse Drinking Water Quality Incident Notification – Port Colborne Distribution System (SOP C1) and corrective action as per Corrective Action for Adverse Water Quality – Distribution System (SOP C5) procedures	5	2	1	11	Yes	Free Chlorine Residual 0.20 mg/L

Hazardous Event	Hazard	Hazard Type	Preventive Measure	Control Measure	Mitigating Processes/Procedure	Likelihood	Consequence	Responsiveness	Hazard Total (CCP Threshold =7)	Critical Control Point (CCP)?	Critical Control Limits (CCL)
Cross Connection/ Backflow - ICI	Contamination	Chemical/ Biological	Future Backflow Prevention Program and Backflow Prevention Bylaw	Building Code requirements for new Industrial/Commercial builds	Refer to Port Colborne Distribution System Emergency Preparedness Plan – section 4.5 Suspected Backflow or Back Siphonage. Plumbing Permits	1	4	3	7	Yes	Free Chlorine Residual 0.20 mg/L
			Installation of backflow prevention devices on City facilities and on all temporary connections to distribution system	Devices tested annually; devices for temporary connections tested before use	Watermain Commissioning Protocol (QMS-WCP) and Provincial Watermain Disinfection Procedure specifies requirement for backflow protection; contractors required to state methodology in their Commissioning Plan						
Cross Connection/ Backflow - Residential			Plumbing inspections during building permit process	Building Code requirements for certain plumbing installations (i.e. external hose bibbs)	Refer to Port Colborne Distribution System Emergency Preparedness Plan – section 4.5 Suspected Backflow or Back Siphonage. Plumbing Permits	1	2	3	5		
Improper construction/ commissioning of new watermains	Contamination	Biological	Construction Inspector On-site; Provincial Watermain Disinfection Procedure	New Water Main Testing before put into service	Re-charge watermain as required to maintain chlorine levels and/or to achieve effective disinfection as evidenced by sample analysis results Watermain Commissioning Protocol (QMS-WCP) Provincial Watermain Disinfection Procedure	1	2	1	3	Yes	Free Chlorine Residual as dictated by AWWA C651; microbiological samples meet provincial standards
Submerged air release valves	Contamination	Chemical Biological	All new valves come with flood-safe system	None	If contamination from a submerged ARV is suspected to have occurred, would treat as a backflow/back siphonage and refer to Port Colborne Distribution System Emergency Preparedness Plan – section 4.5 Suspected Backflow or Back Siphonage	1	4	2	6	No	
Illegal hydrant use	Contamination/ Loss of pressure	Biological Chemical Physical	Use a key lock system on municipal hydrants where history of issues	Ensure key locks are in place	All hydrants inspected during annual hydrant flushing activities and any deficiencies reported and corrected	4	2	1	9	No	
Vandalism	Loss of pressure Quality/Quantity Contamination Unable to distribute	Biological Chemical Physical	None	N/A	Refer to Port Colborne Distribution System Emergency Preparedness Plan – section 4.4: Suspected Tampering of Distribution System	1	2	2	4	No	

Hazardous Event	Hazard	Hazard Type	Preventive Measure	Control Measure	Mitigating Processes/Procedure	Likelihood	Consequence	Responsiveness	Hazard Total (CCP Threshold =7)	Critical Control Point (CCP)?	Critical Control Limits (CCL)
Terrorism	Loss of pressure Quality/Quantity Contamination Unable to distribute	Biological Chemical Physical	None	N/A	Refer to Port Colborne Distribution System Emergency Preparedness Plan – section 4.4: Suspected Tampering of Distribution System	1	4	3	7		
Staff Shortage	Loss of staff	Biological Chemical Physical	Certified management staff, approved contractors, Regional personnel backup, Member of ONWarn (pending)	N/A	Refer to Personnel Shortage Contingency procedure (QMS-SOP11-1)	1	3	1	4	No	
Disruption in water supply from Regional facilities/ trunk lines	Sustained pressure loss, Quality/Quantity, Contamination, Water supply shortfall/Chemical spill impacting source water	Biological Chemical Physical	None	None	Refer to Disrupted Water Supply procedure (QMS-SOP18-1)	3	4	5	17	No	
Long term impacts of Climate Change	Thermal - Severe temperature variations/ Sustained extreme temperatures	Biological, Physical	None	N/A	Follow best practices for advanced construction techniques Refer to Port Colborne Distribution System Emergency Preparedness Plan	2	3	2	8	No	
	Hydraulic - External pipe pressures	Physical, Biological	None	N/A		1	3	2	5	No	
	Physical - Extreme Weather/ Geological Events	Physical, Biological, Chemical	None	N/A		1	4	4	8	No	

Rating System			
Rating	**Likelihood**	**Consequence**	**Responsiveness**
1	Rare	Insignificant	Excellent
2	Unlikely (<once per 5-10 years)	Minor	Very Good
3	Possible (=>once or more per 2-5 yrs)	Moderate	Good
4	Likely (=>one or more per year)	Major	Fair
5	Very Likely (=>monthly or quarterly)	Catastrophic	Poor

Risk	
Hazard Calculation	**Category**
2-3	Very Low
4-6	Low
7-14	Moderate
15-30	High

Nonconformance and Corrective Action Log

Date (mm/dd/yy)	CAR Number	Source (IA, EA, MOE, NonC, AWQI, Mtg, Other)	NC or OFI	Element	Description	Root Cause (NCs only)	Corrective/Preventive Action	Assigned to	Due Date (mm/dd/yy)
10/19/2021		IA	OFI		Complete the latest Subject System Description Form in Schedule "C" of the updated Director's Directions and include it within the Operational Plan.				
10/19/2021		IA	OFI		Consider placing the text of the QMS policy commitments on the water webpage (addressing AODA requirements as well).		working with Communications are re-writing QMS Policy for AODA - Q42022		
10/19/2021		IA	OFI		Consider adding O. Reg. 170/03 15-year records (e.g. AWQI corrective actions) and DWWP-related records (Form 1's and 2's) to the Legislated Record Retention Times (10-year records, as tracked with projects).		completed in draft OP and added to OP database (Lotus Notes)		
10/19/2021		IA	OFI		Consider more clearly describing the procedures for reporting and recording deviations from Critical Control Limits and linking these to Table 8.1		will review during RA in 2022		
10/19/2021		IA	OFI		Consider establishing formal checklist for onboarding staff with new hires (e.g. to develop competencies regarding the Port Colborne Distribution System, related processes and procedures, computer programs used, etc.). Consider including staff training on the Emergency Preparedness Plan in the new staff orientation program.		HR to assist. 2023.		
2021-11-08		EA	OFI		Ensure Non-conformance Action Reports are generated for Action Items identified during the 2021 Management Review.		added in. will add in 2022 action items moving forward		
2021-10-04		Mtg	OFI		Management meeting actions: SOP for vacation and other absenses - created for ORO and designate		created procedure QMS-SOP11-2 for designation of ORO and OIC and backup when needed		
2022-05-05	ICAR 2022-01	Other	NC		Samples were not placed out front to be picked up. We were still able to meet sample requirements, but it could have turned into a non-compliance if not	poor communication between staff who had planned absenses and no one knew to put samples out for pickup.	better communication with vacation calendar, front desk clerks now know where samples are kept and who to ask when delivery person comes by.	Tommy P	5-31-22
01-Sep-22	ICAR 2022-02	NonC	NC		lead sampling was missed for winter season.	the sample date was scheduled ended up being an excessive snow event, operators were out plowing, split shift because of COVID precaution and debreifing after 8 watermain break events previous week.	calendar reminders put into outlook calendars, year at a glance plan and meeting with all operators every January planned	CB	09-31-2022
					**action items from internal audit, management review 2022, watermain break debrief, RA?				