



CORPORATION OF THE CITY OF PEMBROKE



2014 D.W.Q.M.S. Management Review Report

City of Pembroke – Pembroke Drinking Water System
2014 DWQMS Management Review
D. Burton, Supervisor, Drinking Water Treatment/Compliance
Quality Management System Representative



City of Pembroke 2014 DWQMS Management Review Report

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1.0 INTRODUCTION TO DWQMS MANAGEMENT REVIEW

The requirements of management review are dictated by Element 20 “Management Review” of the Ministry of the Environment’s (MOE) Drinking Water Quality Management Standard (DWQMS). This standard requires that a management review is conducted at least once every 12 months to evaluate the continuing suitability, adequacy and effectiveness of the Quality Management System (QMS).

Through the management review process, Top Management shall identify deficiencies and action items (including personnel responsible and proposed timelines for implementation) to address the deficiencies. Results of the management review are reported to the Owner through Council Reports.

The following is a summary of information that Top Management must review annually in accordance with the Ontario DWQMS. The current review considers the entire 2014 calendar year (the “review period”) and where appropriate, touches on activities continuing in 2015. The following 16 aspects must be considered in the annual review:

The standard requires that input into management review include:

- 1) incidents of regulatory non-compliance
- 2) incidents of adverse drinking-water tests
- 3) deviations from critical control point (CCP) limits and response actions
- 4) the risk assessment process
- 5) internal and third-party audits
- 6) emergency response testing
- 7) operational performance
- 8) raw water supply and drinking water quality trends
- 9) action items from previous management reviews
- 10) status of other management action items
- 11) changes that could affect the quality management system
- 12) consumer feedback
- 13) resources to maintain the DWQMS
- 14) infrastructure review
- 15) operational plan: currency, content, updates
- 16) staff suggestions, recommendations for improvement

This report provides an overview of the operational performance of our drinking-water systems, as well as functional performance of our management system.



2.0 EXECUTIVE SUMMARY

A requirement of the Ontario Drinking Water Quality Management Standard (DWQMS) Operational Plan is for the Quality Management System (QMS) Representative to ensure annual management review results are conveyed to Top Management and the Owner (Council). This report fulfills that requirement.

This report contains a summary of information that Top Management must review annually in accordance with the Management Standard.

The DWQMS is the key tool that supports and ensures that Council, as the Owner of the drinking water systems, is meeting its duties and responsibilities under the *Safe Drinking Water Act* and Standard of Care.

The DWQMS has been designed for continual improvement, which is the foundation of the DWQMS Policy endorsed by Top Management and Council. The current review considers the entire 2014 calendar year (the "review period") and where appropriate, touches on activities continuing in 2015.

The DWQMS sets out a mandatory list of 16 issues to be examined during annual reviews and reports.

The detailed results have been reviewed by Top Management in accordance with the DWQMS management review system procedure.

Highlights of the review findings are:

- The City's Drinking Water System scored 98.26% per cent across the board after a detailed Ministry of the Environment inspection;
- The water quality testing program meets or is better than regulations;
- Maintenance procedures are appropriate;
- Shortcomings are being addressed.
- The operator certification program is working; and
- Staff is following procedures and showing a commitment to continual improvement.

In short, the 2014 Management Review shows the DWQMS is being implemented successfully and reinforces the fact that the City of Pembroke produces and supplies high quality, safe drinking water.



3.0 BACKGROUND & TIMELINE

November 18, 2009

City Council endorsed the City's QMS also known as the Operational Plan, which is in conformance with Ministry of Environment standards.

October 6, 2010

The City of Pembroke was advised that it had been successful in meeting the requirements of Ontario's Drinking Water Quality Management Standard to the satisfaction of the CGSB Accreditation Program for Operating Authorities and would be awarded a Limited Scope – Entire accreditation (Drinking Water Quality Management System: Operational Plan # 198-401)

The Limited Scope – Entire Accreditation Certificate was issued subject to the condition that the City of Pembroke submits an application for Full Scope – Entire DWQMS Accreditation. Full Scope Accreditation is based on a system audit and on-site verification audit of the DWQMS Elements.

September 29, 2011

The City of Pembroke filed application for Full Scope – Entire Accreditation on.

Also during the calendar year 2011, under O. Reg. 188/07, the City of Pembroke was required to obtain a Drinking Water System License. The City was issued Municipal Drinking Water License # 198-101 & Drinking Water Works Permit # 198-201 on March 30, 2011.

The licensing process mandated the preparation of a Water System Financial Plan in accordance with O. Reg. 453/07, and submission to the Ministry of the Environment within six (6) months of receiving the license. The City retained the services of DFA Infrastructure International Inc. to prepare a Financial Plan for its drinking water system. The Financial Plan required under O. Reg. 453/07 is for the six (6) year period from 2011 to 2016 inclusive. The City of Pembroke Water System Financial Plan was submitted to the Ministry of Municipal Affairs and Housing as required by regulation.

As the Owner of the municipal drinking water systems, Council has a number of duties and responsibilities under the *Safe Drinking Water Act*, which are described in sections 11, 13, 16 and 17 of the Act. The duties of the Owner related to the Standard of Care are under section 19.

This section of the *Act* (Standard of Care) came into force on December 31, 2013.

As the Owner, Council can be assured that the City of Pembroke is striving to meet the Standard of Care under the *Safe Drinking Water Act* by having a Municipal Drinking Water Licence in place for its drinking water system. The elements of the Licence include:

1. A permit to take water;
2. A drinking water works permit;
3. An operational plan;
4. A financial plan; and,
5. An accredited operating authority.



CORPORATION OF THE CITY OF PEMBROKE

DWQMS Management Review

The final requirement was for the Operating Authority to receive Full Scope Accreditation, and in order to receive it, the Operating Authority must have a successful on-site external audit of its Operational Plan conducted by an accredited third party.

September 29, 2011

The City of Pembroke, filed application for Full Scope – Entire Accreditation. Staff received notification in early December that the Canadian General Standards Board assigned auditor had commenced a desk top review of our DWQMS.

March 6th, 2012

The Ministry of the Environment contacted all owners and operating authorities to advise that **“the ministry will be transitioning accreditation bodies over the next few months”**.

March 7, 2012, owners and operating authorities were notified by CGSB, that because of the Ministry’s **“transitioning accreditation bodies”**, CGSB is not planning to conduct any further audits, but will ensure MOE is aware of the status of your file and CGSB will transfer all files to the MOE upon or before the termination of their program.

During the transition owners are expected to continue to meet your accreditation obligations, and required to notify CGSB of any changes to our quality management system.

May 2012

The City was notified that C.G.S.B. had completed their Document Review Audit of our Full Scope – Entire Accreditation resulting in the issuance of one (1) Minor Non-Conformance Corrective Action Request (CAR #1840).

The Corrective Action Request was completed by City staff on May 29, 2012, and forwarded to CGSB for review and assessment. On June 7, 2012, the City received notice that the C.A.R. had been reviewed, approved and closed.

On May 28, 2012, the City of Pembroke Signed the required Transfer of Accreditation Agreement as required before the Ministry of the Environment’s June 22, 2012 deadline, selecting QMI-SAI Global as our new Accreditation Body.

June 2012

The City of Pembroke received confirmation that our Accreditation Program documentation had been transferred to the Ministry of Environment, who will assist the transition of our file to the new Accreditation Body QMI-SAI Global.

2013 Full Scope Accreditation

On September 09, 2013, SAI Global External Auditor, Mr. Tim Moher completed the External Audit of our DWQMS. The External Audit consisted of a full day on-site Audit of our documentation, procedures and conducting interviews with key personnel and operating staff involved with the QMS.



Audit Objectives

The objective of the audit was to determine whether the drinking water Quality Management System of the City conformed to the requirements of the Ontario Ministry of the Environments Drinking Water Quality Management Standard. It was also intended to gather the information necessary for SAI Global to assess whether accreditation could be offered.

Audit Scope

The facilities and processes associated with the operating authority's QMS were objectively evaluated to obtain audit evidence and to determine a) whether the quality management activities and related results conform to DWQMS requirements, and b) if they had been effectively implemented.

Audit Criteria

- The Drinking Water Quality Management Standard
- Current QMS manuals, procedures and records implemented by the Operating Authority
- SAI Global Accreditation Program Handbook

September 18, 2013

The overall effectiveness of The Corporation of the City of Pembroke Quality Management System is considered:

Effective

No corrective actions were identified during this assessment, as noted in Part D of the report.

The audit objectives have been accomplished within the audit scope in accordance with the audit plan and the time allocation.

There were no unresolved diverging opinions between the auditor and the site visited.

Recommendation – Onsite

The result of the audit indicates that the Corporation of the City of Pembroke QMS was effectively implemented.

The following recommendation is made:

Offer of accreditation



CERTIFICATE OF ACCREDITATION

This is to certify that the following operating authority:

The Corporation of the City of Pembroke

1 Pembroke Street East, Pembroke, Ontario K8A 3J5 Canada

Additional Drinking Water System

Pembroke Drinking Water System

operates a

Quality Management System

which conforms with the requirements of

Drinking Water Quality Management Standard (DWQMS):2006

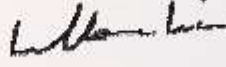
for the following scope of registration

Full Scope - Entire DWQMS

Certificate No.:	CERT-0067745	Original Certification Date:	September 18, 2013
File No.:	1639225	Current Certification Date:	September 18, 2013
Issue Date:	September 18, 2013	Certificate Expiry Date:	September 17, 2018



Chris Jouppi
President
QMI-SAI Canada Limited



Guillaume Gignac, Ing.1
Vice President, Corporate Operations, Accreditation & Quality
QMI-SAI Canada Limited



DWQMS

Accredited by:
SAI Global Certification Services Pty Ltd, 280 Blakey Street, Sydney NSW 2000 Australia with QMI-SAI Canada Limited, 20 Carlton Court, Suite 200,
Toronto, Ontario M5H 1Y8 Canada (SAI GLOBAL). This registration is subject to the SAI Global Terms and Conditions for Certification. SAI at all times
and will not be held responsible in carrying out this assessment. SAI Global accepts responsibility only for proven negligence. This certificate remains the property
of SAI Global and must be returned to them upon request.
To verify that this certificate is current, please refer to the SAI Global On-Line Certification Register: www.sai-global.com/certification-register



September 11, 2014 Off-Site Verification Audit



PART A. MANAGEMENT SUMMARY

This was an off-site system verification audit of the The Corporation of the City of Pembroke conformance with the requirements of DWQMS: Oct. 2006.

The overall effectiveness of the The Corporation of the City of Pembroke Quality Management System is considered:

- Effective**
- Not effective

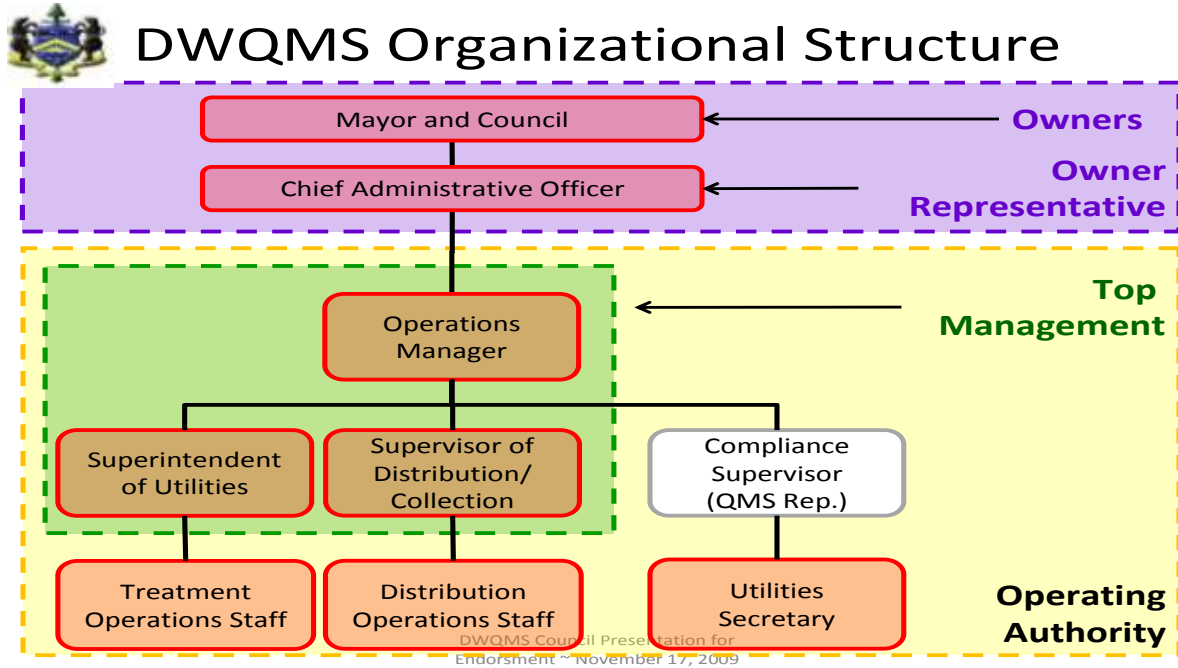
One (1) non-conformity was identified during this assessment, as noted in Part D of this report. Please review *Instruction for The Completion of Non-Conformance Reports (NCR)* found at the end of this report.

The audit objectives have been accomplished within the audit scope in accordance with the audit plan and the time allocation.

4.0 Roles & Responsibilities

Element 9 of the DWQMS requires the Operational Plan to document the organizational structure, roles, responsibilities and authorities of the Operating Authority (City of Pembroke). The table below outlines each group that has a role in the delivery of safe drinking water and their respective responsibilities.

Chart 1: DWQMS Organizational Structure



DWQMS Roles & Responsibilities

Participants	Roles & Responsibilities
Owner	<ul style="list-style-type: none"> Maintain Municipal Drinking Water Licence Endorse DWQMS Operational Plan Endorse DWS Financial Plan Provide resources for operation and maintenance of the DWS Ensure that DWS is operated in compliance with legislation
Top Management	<ul style="list-style-type: none"> Develop and endorse DWQMS Policy & Operational Plan Allocate resources for operation and maintenance of the DWS Participate in DWQMS Infrastructure Review, Internal Audits, and Management Review Communicate with Owner, Staff, Suppliers & Consumers
QMS Representative	<ul style="list-style-type: none"> Ensure that the DWQMS is established, implemented and maintained Report to Top Management regarding QMS performance Promote awareness of legislation, regulations, and QMS throughout Operating Authority Administer document and record control processes
Operating Authority	<ul style="list-style-type: none"> Meet and maintain required competencies for role Perform work relating to the drinking water system as assigned Participate in DWQMS Internal Audits Maintain & continually improve DWQMS Work in compliance with legislation, regulations, and procedures



5.0 Drinking-Water System Performance

5.1 Incidents of Regulatory Non-Compliance

All regulatory non-compliances, identified during the MOE inspection process, will be reported during the management review. The results help Operational Management identify regulatory deficiencies in our drinking-water system.

i. Ministry of Environment (MOE): inspection reports: All waterworks were inspected during 2014-15 by the MOE. For the 2014–15, inspection year, the water system received an inspection rating of 98.26 per cent.

There was one item of regulatory non-compliance.

All sampling requirements for lead prescribed by schedule 15.1 of O. Reg. 170/03 were not met.

MDWL 198-101, Schedule D, Issue 1 (March 30, 2011), 1.0 Lead Regulatory Relief does not contain any specific reference to relief from lead sampling. As such, the Pembroke DWS collected samples based on the Reduced Sampling model; collecting samples in every third 12-month period.

On June 10, 2014, MDWL 198-101, Issue 2, Schedule D was issued. Table 2 of this Schedule identifies the number and types of samples required to be collected under the granted relief and the sampling periods this relief applies to. Further Schedule D, 1.7 identifies that Subsection 15.1-5 (Reduced Sampling) of O. Reg. 170/03 does not apply to the Pembroke DWS as long as the relief granted remains in effect.

The operating authority was not in possession of the current Schedule D during the most recent sample period, June 15, 2014-October 15, 2014, and samples were collected for analysis of pH and alkalinity in accordance with Subsection 15.1-5 (Reduced Sampling) of O. Reg. 170/03.

The operating authority, having been made aware of the current issue of Schedule D, fully intends to comply with the requirements of that document. There is no further action required.

ii. Operator Certification Records: The Pembroke Water Treatment and Distribution Systems were operated at all times by certified operators. Considerable management effort and documentation is required to provide training and maintain valid certificates for the 21 (twenty one) certified operators and staff are continuing to streamline and document the certification and renewal process.

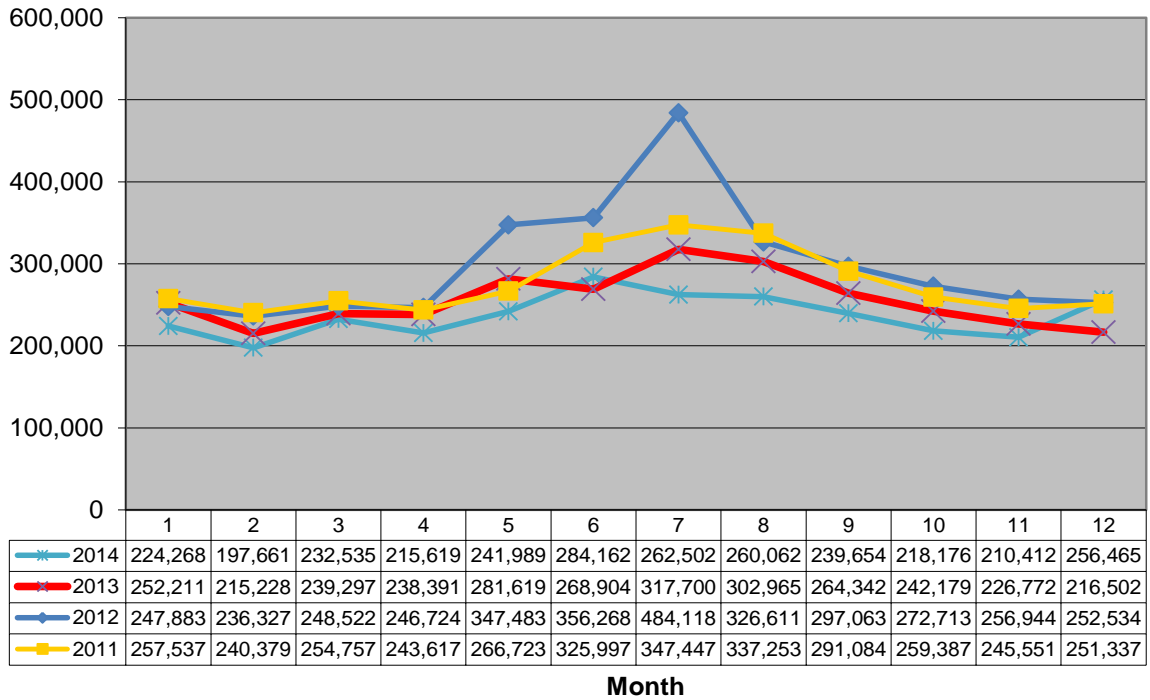
iii. Water Flow Rate Trends: There were no cases of daily “raw” water taking exceeding the permitted values stipulated in the Permit to Take Water.



Table 1: Raw Water Taking Pembroke Drinking Water System 2014

Month	Total (m ³)	Average (m ³ /day)	Max (m ³ /day)	Rated Capacity (m ³ /day)	% of Capacity	Max Instantaneous Peak Flow (L/s)	Rated Flows (L/s)	Exceedence
January	224,268	7,234	9,315	36500	25.52	256.0	421	NO
February	197,661	7,059	8,642	36500	23.68	100.0	421	NO
March	232,535	7,501	12,120	36500	33.21	250.0	421	NO
April	215,619	7,187	8,287	36500	22.70	253.0	421	NO
May	241,989	7,806	10,022	36500	27.46	363.0	421	NO
June	284,162	9,472	14,742	36500	40.39	314.0	421	NO
July	262,502	8,468	10,275	36500	28.15	187.0	421	NO
August	260,062	8,389	10,733	36500	29.41	175.0	421	NO
September	239,654	7,988	9,080	36500	24.88	296.0	421	NO
October	218,176	7,038	8,880	36500	24.33	307.0	421	NO
November	210,412	7,014	8,848	36500	24.24	236.0	421	NO
December	256,465	8,273	10,333	36500	28.31	195.0	421	NO
Total	2,843,505							
Min						100.0		
Max			14,742			363.0		
Average		7785.9				244.3		

Total Raw Water Use Per Month





iv. Water Quality Testing Records:

The City of Pembroke water quality testing program has been intentionally designed to provide more than the required amount of sampling and testing to meet regulations. All Ontario requirements for microbiological, inorganic and organic testing were met.

v. Community Lead Testing Regulation:

On June 10, 2014, MDWL 198-101, Issue 2, Schedule D was issued. Table 2 of this Schedule identifies the number and types of samples required to be collected under the granted relief and the sampling periods this relief applies to. Further Schedule D, 1.7 identifies that Subsection 15.1-5 (Reduced Sampling) of O. Reg. 170/03 does not apply to the Pembroke DWS as long as the relief granted remains in effect.

vi. MOE Orders: There were no MOE Orders in effect in 2014.

viii. Annual and Summary Reports: O.Reg.170/03 requires the Owner and the Operating Authority to prepare Annual Reports and Summary Reports for the waterworks. The Annual Reports for 2014 were completed within the required timeframe (by February 28, 2015) and are posted on the City of Pembroke’s website. Furthermore, the Summary Report for 2014 was completed by February 28, 2015 and endorsed by City Council February 17th, 2015, as required by the regulation.

5.2 Incidents of Adverse Drinking Water Tests

To assist in the detection of real-time issues in the drinking-water system, programs exist such as online monitoring through SCADA, and a rigorous sampling program. These testing and monitoring methods verify the quality of the drinking water. All adverse drinking-water test results will be reported during management reviews.

The drinking water regulations identify several Indicators of Adverse Water Quality Incidents (AWQI) for which the waterworks must immediately notify health officials and the MOE, and carry out specific corrective actions. Adverse Drinking Water Quality Incidents for the calendar year 2014 are listed in **Table: 2**.

During January to December 2014, there were zero (0) Adverse Water Quality Incidents. In the 2013 calendar year there was a total of 2 AWQI. In 2012, the City had 1 AWQI, and in 2011 there were 2 AWQI. This compares to 7 in 2010. This consistent improvement can be attributed primarily to operational changes and in part to the implementation of the DWQMS.

For each event, DWS staff immediately notified the Renfrew County & District Health Unit and the MOE as required by the regulation. In all cases, written reports were prepared and sent to the MOE and the Health Unit within 24 hours of the verbal notification, and corrective actions and re-sampling were carried out to resolve the incident. It should be noted that none of the adverse water quality events resulted in any indication of adverse health impacts or illness to the public.

Table 2: Adverse Water Quality Occurrences in the Pembroke Drinking Water System 2014

Drinking Water Legislation	Requirement(s) the System failed to Meet	Date	Corrective Action Taken	Status
170/03 169/03	NONE			



5.3 Deviations from Critical Control Point Limits and Response Actions

Through the DWQMS risk assessment review process completed December 6th, 2013, five Critical Control Points (CCPs) within Water Production were reviewed and fourteen CCPs were reviewed for Water Distribution. There were no revisions resulting from the Annual Review. Critical Control Limits (CCLs) are identified for each of these CCPs. The CCLs are self-imposed limits and are typically more stringent than MOE Drinking Water Standards or Municipal Drinking Water licence requirements. The identification of CCPs and associated CCLs results in a more rigorous screening of potential risks to water quality and is one benefit of the implementation of the DWQMS.

Deviations from CCLs do occur from time to time and do not necessarily mean that unsafe drinking water was delivered to the consumer. However, CCL deviations do require prompt action from water system operators to remediate the problem and prevent the passage of potentially unsafe water.

There were no deviations of a Critical Control Limit identified in 2014.

5.4 Operational Performance

Table 3:

Per Capita Water Consumption for the City of Pembroke Drinking Water System 2014.

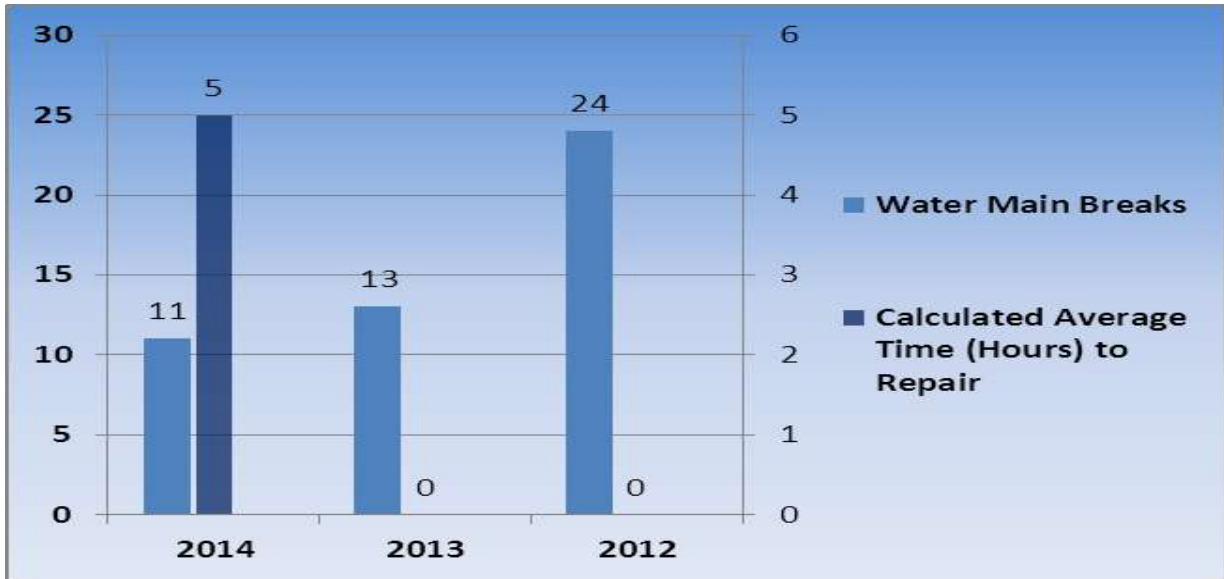
Per Capita Water Consumption for the Pembroke Drinking Water System Treated Water Flows 2014 & 2013						
Month	2014 m ³	2013 m ³		2014 Monthly Per Capita Usage Litres	2013 Monthly Per Capita Usage Litres	Monthly Increase Decrease Per Capita/Litres
Jan	210,912	225,479		13,077	14,221	1,144
Feb	187,282	193,343		11,612	12,213	601
Mar	218,881	214,793		13,571	13,554	17
April	201,753	217,305		12,509	13,711	1,202
May	227,643	255,692		14,114	16,110	1,996
June	263,788	246,086		16,355	15,509	846
July	249,150	284,968		15,447	17,940	2,493
August	245,540	277,706		15,224	17,486	2,262
Sept	225,304	242,968		13,969	15,315	1,346
Oct	214,972	228,521		13,328	14,412	1,084
Nov	202,165	212,323		12,534	13,399	865
Dec	221,030	205,092		13,704	12,947	757
Total	2,668,420	2,804,276	Average	13,787	14,735	
Population	16,129	16,129	Minimum	11,612	12,213	
Per Capita	165	174	Maximum	16,355	17,940	

Per Capita Residential Water Consumption Decreased in 2014 compared to 2013

Calculations compiled above are based on data from Statistics Canada, as well as information obtained from the Ontario Ministry of the Environment - Drinking Water Website

Population Data - There are a total of 16,130 persons served by the Pembroke Drinking Water System. This number includes 1,770 residents of Laurentian Valley, serviced by 629 connections to the Pembroke system.

Water Distribution Key Performance Indicators (KPI): The KPI's for Water Distribution give an indication of the effectiveness and the efficiency of the corrective and preventative maintenance programs. During the 2014 calendar year there were a total of 11 Watermain Repairs in the Distribution System. During the 2013 calendar year there were a total of 7 Watermain Repairs. All eleven (11) repairs were a result of extreme environmental conditions combined with aging infrastructure (Mains 55-65 years old). This compares to 24 Watermain Repairs in the Distribution System in the 2012 calendar year. All (24) watermain repairs were a result of environmental conditions, (Frost/Ground movement). Distribution personnel were able to complete the required repairs while maintaining pressure in the system in all cases.



5.5 Raw Water Supply and Drinking Water Quality Trends

As part of the Municipal Drinking Water License (MDWL), the City of Pembroke is required to provide information pertaining to raw water supply and drinking water quality trends. This information should identify key water quality issues that need to be addressed by Operational Management.

The Ottawa River provides a steady and abundant supply of source water for the treatment plants. Raw water quality monitoring for 2014 covered in excess of 400 test parameters utilizing in house testing and external laboratory testing. Our source water monitoring program exceeds the MOE requirements. In general, raw water trends were found to show typical levels of variation during 2014. There were no indications of raw water quality that would cause difficulties for the treatment process.

Table 4: Raw Water Supply Quality Trends City of Pembroke 2014

Month	pH	Temp (C)	Hardness	Alkalinity	Colour	Turbidity	Iron
Jan-14	7.17	2.0	27	21	55	4.050	0.080
Feb-14	7.13	1.9	26	22	68	4.618	0.088
Mar-14	7.06	1.5	27	21	70	4.540	0.12
Apr-14	7.04	3.2	24	19	67	4.966	0.157
May-14	6.97	8.3	17	15	62	2.779	0.149
Jun-14	7.05	14.5	20	18	58	2.918	0.117
Jul-14	7.06	19.9	20	20	50	2.311	0.099
Aug-14	7.14	21.2	22	21	47	1.815	0.127
Sep-14	7.22	19.6	23	23	43	1.619	0.110
Oct-14	7.26	15.1	23	22	47	1.714	0.098
Nov-14	7.30	8.1	21	21	52	2.286	0.101
Dec-14	7.24	3.1	23	20	64	3.337	0.137

pH – measurement of hydrogen ion activity; indication of acidity; effects efficiency of all chemical reactions in water treatment

Alkalinity – buffering capacity of water; the capacity of water to neutralize itself. Alkalinity stabilizes water at pH levels around 7.

Hardness - The hardness is determined by the number of calcium and magnesium atoms present

Turbidity - measure of non-transparency of water due to the presence of suspended matter

Chart 2: 2014 Raw Water Characteristics

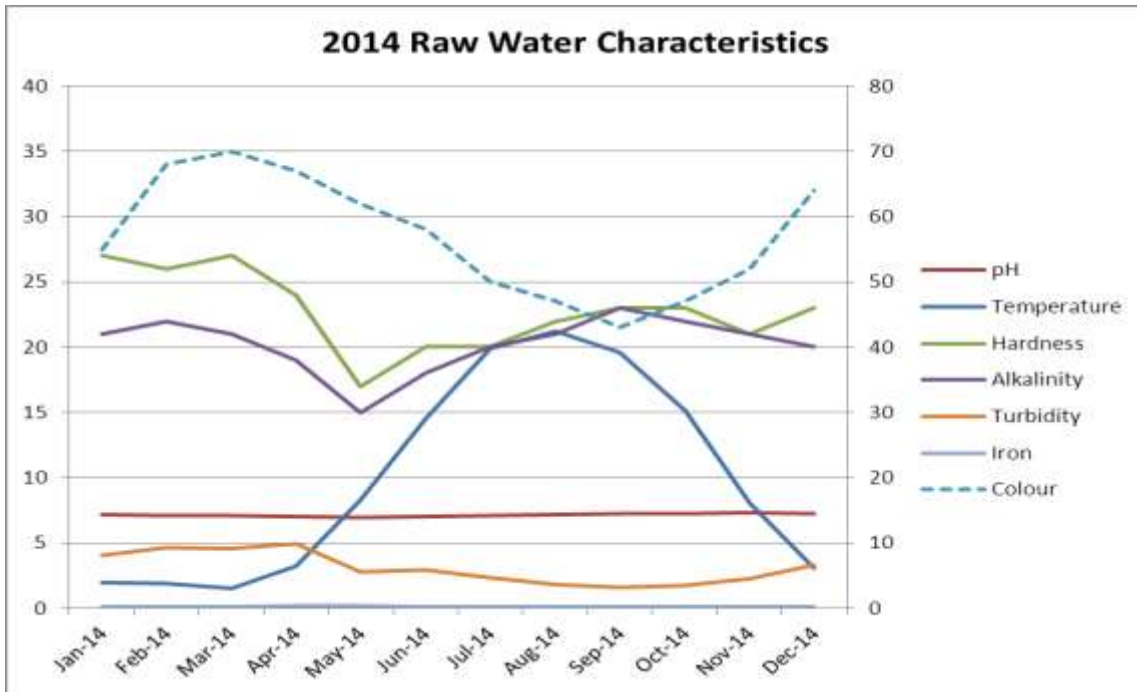
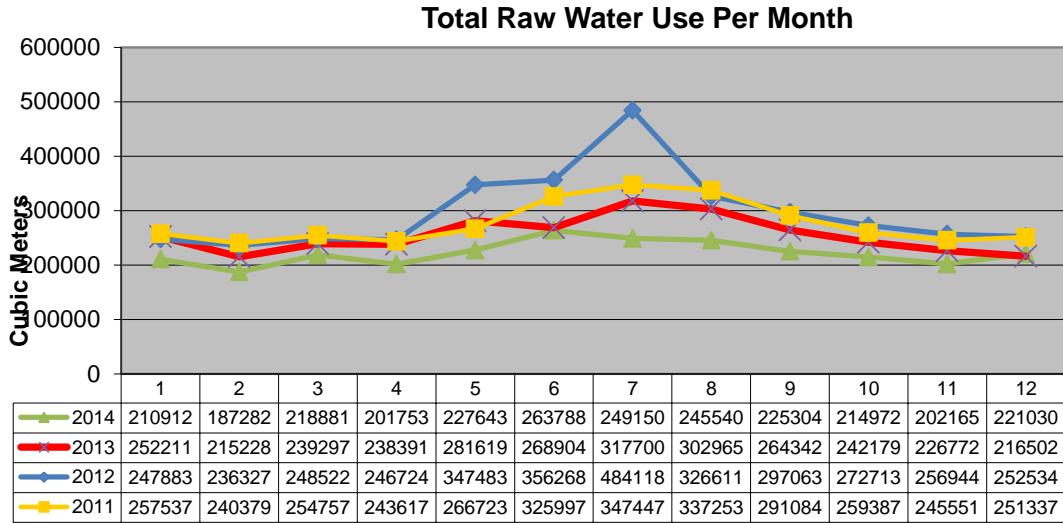


Chart 3: 2014 Raw Water Use Monthly Comparison



5.6 Treated Water Quality:

The 2014 performance measures for Water Quality indicate ongoing high quality drinking water. A One Hundred Percent (100%) rating for microbiological quality indicates that the treatment process effectively removed pathogens at all times. Similarly, a 100 per cent rating for chemical water quality indicates that all water quality tests were within the provincial and federal standards for safe drinking water.

Table 5: Summary of Distribution Bacteriological Sampling 2014

Month	Number of Samples Collected	**Min Cl ₂	Max Cl ₂	Average Cl ₂	Average pH
January	30	0.55	1.39	0.86	7.49
February	23	0.58	1.33	0.95	7.49
March	30	0.13	1.41	0.95	7.52
April	24	0.11	1.45	0.95	7.61
May	24	0.68	1.29	0.93	7.65
June	24	0.48	1.29	0.83	7.87
July	24	0.42	1.17	0.76	7.82
August	30	0.2	1.24	0.66	7.64
September	24	0.23	1.14	0.51	7.79
October	24	0.21	1.3	0.62	7.67
November	24	0.33	1.21	0.66	7.84
December	22	0.23	1.10	0.80	7.54

** Where the provision of secondary disinfection is required by the Regulation, the drinking-water system's distribution system must be operated such that at all times and at all locations within the distribution system, where there is a daily flow, there is at least a free chlorine residual of 0.05 mg/L at a pH 8.5 or lower.



Table 6: Treated Water Produced Pembroke Water Purification Plant 2014

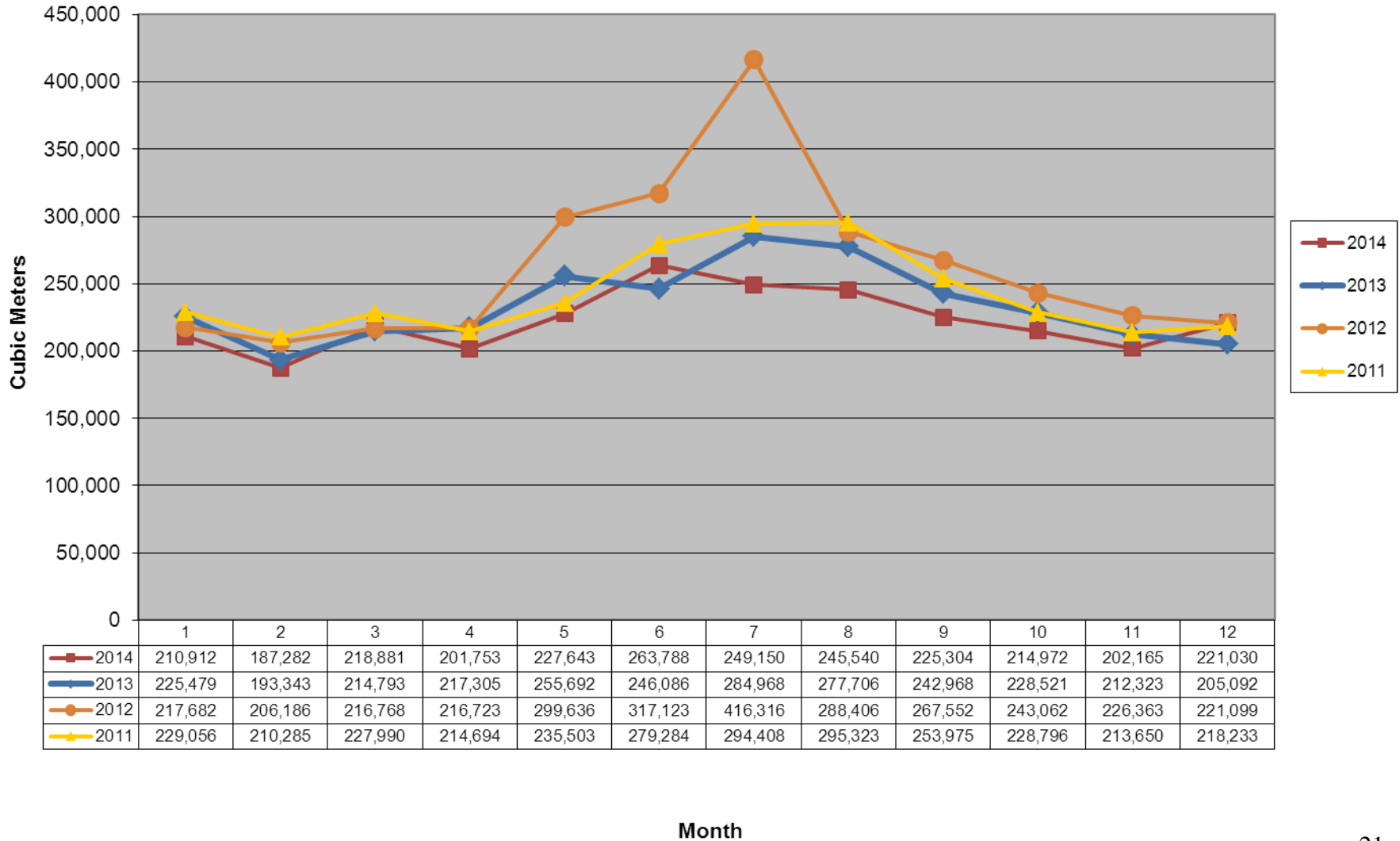
Treated Water for 2014

Month	Total (m ³)	Average (m ³ /day)	Max (m ³ /day)	Rated Capacity (m ³ /day)	% of Capacity	Max Instantaneous Peak Flow (L/s)	Rated Flows (L/s)	Exceedence	Min. Monthly CL2 Residual	Max. Monthly CL2 residual
January	210,912	6,804	7,827	36,372	21.52	308.0	421	no	1.16	1.90
February	187,282	6,689	7,296	36,372	20.06	310.0	421	no	1.21	1.61
March	218,881	7,061	10,317	36,372	28.37	308.0	421	no	1.20	1.80
April	201,753	6,725	7,529	36,372	20.70	312.0	421	no	1.19	1.79
May	227,643	7,343	9,029	36,372	24.82	311.0	421	no	0.62	1.63
June	263,788	8,793	12,692	36,372	34.89	312.0	421	no	1.17	1.54
July	249,150	8,037	9,388	36,372	25.81	307.0	421	no	0.97	1.59
August	245,540	7,921	10,245	36,372	28.17	309.0	421	no	1.19	1.78
September	225,304	7,510	8,844	36,372	24.32	308.0	421	no	1.28	1.52
October	214,972	6,935	8,720	36,372	23.97	317.0	421	no	1.14	1.52
November	202,165	6,739	7,235	36,372	19.89	312.0	421	no	1.17	1.54
December	221,030	7,130	10,215	36,372	28.08	311.0	421	no	1.08	1.67
Total	2,668,420									
Min									0.62	
Max			12,692		34.89	317.0				1.90
Average		7,307								

Average Daily Flow = 7310.74 m³/day



Treated Water Monthly Totals



5.7 Summary of Consumer Feedback

Element #12 “Communications” requires the development of a procedure for communications with various levels of the organization and its’ stakeholders. This section of management review will provide a summary of communication received from our customers regarding water quality.

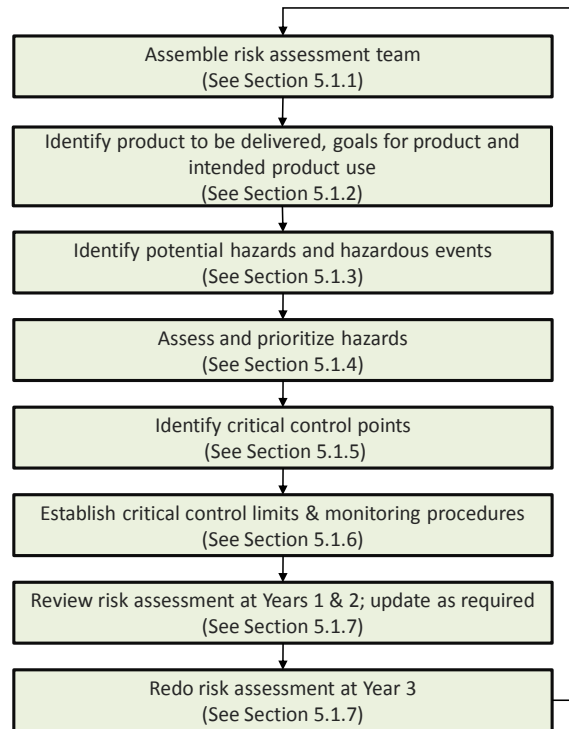
The number of water quality investigations in 2014 was three (3), a significant decrease from previous years. For 2013 the number of water quality investigations was eight (8), an increase of (1) one compared to seven (7) in 2012. (2011-11 investigations), (2010-11 investigations), (2009-14 investigations),

6.0 Management System Performance

6.1 The Risk Assessment Process

Element 7 of the DWQMS requires a risk assessment process be documented that identifies potential hazardous events and associated hazards then assesses and ranks risks related to each hazardous event. Furthermore, control measures must be identified and critical control measures must be identified and critical control points must be realized. The currency of information and assumptions used in the risk assessment process must be verified annually and a re-assessment of the risks in the drinking-water system must occur every 36 months.

Chart 5: Risk Assessment Process Risk Assessment Process – Overview



The risk assessment matrix contains all drinking-water components and their associated risks. The matrix is maintained by the Compliance Supervisor.

The risk assessment outcomes from 2013 were critically reviewed during the 2014 risk assessment review in order to make the CCPs/CCLs more effective as an operational tool and capture additional risks deemed important for safe drinking water. No changes to CCPs were identified for Water Production or Water Distribution.



6.2 Results of Audits (Internal and External)

The DWQMS requires each Operating Authority to implement a procedure that ensures internal audits are conducted at least once every 12 months to evaluate conformance to the Standard. The City of Pembroke's Operational Plan specifies that the Drinking Water System is audited internally once every 12 months. An external audit is conducted by an Accreditation body in response to an Operating Authority's application for accreditation.

A procedure has been developed that outlines aspects of the internal audit process (i.e. scheduling, audit preparation, conducting the audit and reporting results).

All Internal and Third-Party audit results will be communicated during Management Review.

Internal Audit: An Internal Audit was conducted on August 28th & 29th of 2014. There were no Major non-conformances found during the 2014 Internal Audits. The internal audit reports noted a stall in progress in continuing implementation of the DWQMS. A number of Minor Non-Conformances and Opportunities for Improvement were identified. The Internal Audit Reports were completed and for items identified, Preventative & Corrective Action Requests (PCARs) were reviewed by Upper Management. These non-conformances require a sustained, long-term effort in order to fully implement. Minor non-conformances were mainly administrative in nature and are being addressed with continual improvement efforts.

External Audit: As previously discussed in the **Background & Timeline Section** of this report on **September 11, 2014**, SAI Global External Auditor, Mr. Tim Moher completed a Systems Verification Audit of our DWQMS. .

Audit Objectives

The objective of the audit was to determine whether the drinking water Quality Management System (QMS) of the subject system conforms to the requirements of the Ontario Ministry of the Environment's (MOE) Drinking Water Quality Management Standard (DWQMS) at all of the locations noted in the Applicant Profile Form (AP 602). It was also intended to gather the information necessary for SAI Global to assess whether accreditation can be offered to the operating authority.

Audit Scope

The facilities and processes associated with the operating authority's QMS were objectively evaluated to obtain audit evidence and to determine a) whether the quality management activities and related results conform to DWQMS requirements, and b) if they had been effectively implemented.

Audit Criteria

- The Drinking Water Quality Management Standard
- Current QMS manuals, procedures and records implemented by the Operating Authority
- SAI Global Accreditation Program Handbook



Audit Conclusion

The overall effectiveness of The Corporation of the City of Pembroke Quality Management System is considered:

Effective

One (1) non-conformity was identified during this assessment, as noted in Part D of this report. Please review *Instruction for The Completion of Non-Conformance Reports (NCR)* found at the end of this report.

The audit objectives have been accomplished within the audit scope in accordance with the audit plan and the time allocation.

6.3 Results of Relevant Emergency Response Testing

Element 18 of the DWQMS is Emergency Management. An emergency is considered a potential situation that may result in the loss of the ability to maintain a service to customers. The DWQMS requires the Operating Authority to maintain a state of emergency preparedness. There are approximately 19 procedures that have been developed to effectively handle emergency situations in our drinking water system.

Several methods have been identified to train staff and test emergency procedures including:

- mock emergency testing of procedures related to a specific event, that audits a specific procedure.
- requirement for Operational Staff to review all emergency procedures annually and “sign off”.

6.3.1 Emergency Test – Water Treatment Plant FIRE

1. On August 20, 2014, an emergency exercise was conducted involving Water Treatment Plant Operational Staff and Management. The exercise tested the Water Treatment Plant’s response to test Hypochlorite Emergency Pump – filtered water header.

The exercise was successful as it demonstrated overall staff competency and ability to respond to an incident. As a result of the exercise it identified fluctuating power surges that require further investigation. The corresponding Response Plan was reviewed and procedural improvements are to be made.

Appendix A – Page 27 Copy of Emergency Exercise Debriefing Notes.

2. On August 24, 2014, an emergency exercise was conducted involving Water Treatment Plant Operational Staff, Distribution Operational Staff and Management. The exercise tested the Pembroke Drinking Water System response to Distribution System Failure – Major Water Main Break OPS-UTL-DWS-GEN-SOP-014-017.

Appendix B – Page 27 Copy of Emergency Exercise Debriefing Notes.

6.4 Follow up items from Previous Management Review

Action items from management review meetings are initiated to address deficiencies in the Quality Management System. At each management review the status of action items from previous management reviews will be reported.

2014 marks the City of Pembroke’s fourth Management Review.

During the calendar year 2014, six (6) Preventative and Corrective Action Requests (PCARs) were issued as a result of Internal Audits. Four (4) PCARs were addressed and closed.



6.5 Status of Management Action Items identified between Reviews

As identified during the 2014 Management Review, some items must be addressed over the long term, but it is expected that the majority of items will be completed by the time of the next management review. Action items are prioritized and tracked to completion.

6.6 Changes that could affect the QMS

Changes that could affect the QMS' allows for discussion of changes that have occurred within the organization or management system that cover the review period.

During the period covered by this Management Review, there have been no significant changes within the organization or management system. All elements within the QMS were reviewed according to the developed timetable to ensure that any changes were correctly reflected. Changes outside the Department are not anticipated; however, staff will ensure that these changes are reflected in the QMS accordingly as they become evident.

6.7 Resources Needed to Maintain the QMS

Resources are broadly defined as those things needed to implement and maintain the management system – they include human, physical work environment and financial resources. As part of the maintenance and continual improvement of the DWQMS, resources required to run the system will be discussed at management review.

These resources support the implementation of the continual improvement process under the DWQMS and involve the dedication of staff to support the Drinking Water System.

Additional resource needs relate to ongoing implementation of operational improvements and staffs “buy in”.

In 2012 the Operations Department lost a number of trained internal auditors due to attrition. During the 2014 period covered by this report training of additional auditors was completed and at the same time refresher training was provided to our current pool of auditors.

Efforts continue to address the needs and priorities within the Drinking Water System by having Supervisors dedicate time and resources for development of required procedures and documents.

6.8 Results of the Infrastructure Review

The annual review of the provision of drinking water infrastructure has two objectives: (i) to identify new drinking water infrastructure needs related to growth and system optimization and (ii) to identify upgrades or renewals of existing infrastructure to optimize operations and maintenance.

In February 2014, a Multi-Year Capital Construction Forecast (MYCCF) was approved by Council. This MYCCF identified the intentions of the City for infrastructure renewal for the next several years. This is the second year that the City has undertaken this exercise and the MYCCF will evolve over time.

The Operations Department was required to develop a “Financial Plan” (under Ont. Regulation 453) as it relates to the water system. This “Financial Plan” was required to be completed no later than 6 months after the date of the issuance of the updated Drinking Waterworks Permit and Drinking Water License.



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The City retained the services of DFA Infrastructure International Inc. to prepare a Financial Plan for its drinking water system. The Financial Plan required under O. Reg. 453/07 is for the six (6) year period from 2011 to 2016 inclusive. The City of Pembroke Water System Financial Plan was submitted to the Ministry of Municipal Affairs and Housing as required by regulation.

Over the last several years, data has been collected relating to such items as watermain repairs, inoperable valves, etc. As identified in the 2013 Management Review Report, the challenge remains to integrate this data into the MYCCF and either advance or defer major capital expenditures to address inferred infrastructure deficiencies.

The Operations Department began populating an infrastructure management database (Municipal Data Works – MDW) in 2011. This database is used to update the MYCCF and confirm priorities. The Operations Department continues to make extensive use of our Geographical Information System (G.I.S.)

The Operations Department is aware of capital needs for water related infrastructure renewal. These capital needs must be balanced with the rate payers “ability to pay” and integrated with other priority infrastructure renewal initiatives (Roads for example).

6.9 Operational Plan Currency, Content and Updates

The DWQMS requires Operating Authorities to document QMS for our drinking water system in the form of an Operational Plan. The Operational Plan is required by the Director’s Direction; therefore it must be submitted to the MOE for acceptance. The Operational Plan is the document that describes how the City of Pembroke plans to meet the requirements of the DWQMS. It is then the responsibility of the Operating Authority to implement the plan.

The DWQMS Operational Plan has not gone through any significant revisions during the 2014 calendar year. Revisions and updates made to System Level Procedures & Supporting Documentation have been completed as per schedule or as required in a timely manner and updated controlled hard copies were distributed.

7.0 Summary of Staff Suggestions

Any staff suggestions regarding DWQMS are presented initially to Supervisors; once validated a *Change Request Form* OPS-UTL-DWS-GEN-FRM-002-003 is then filled out to accommodate the necessary change. Staff suggestions continue to be addressed through the DWQMS continual improvement process.

8.0 Next Management Review Meeting

Scheduled for the First Quarter of 2016.



Appendix A

Test of Emergency Response Plan – Debriefing Notes	
Date of Training:	<i>Aug 20, 2014</i>
Training of Document(s) #:	<i>PM Q-9 ~ Hypochlorite Emergency Pump - Filtered Water Header</i>
Participants:	<i>Michel Dubois, Operator; Matt Pilon, Operator; Mike Beaulieu, Summer Student</i>
Absent:	<i>Doug Burton, Compliance Supervisor; Kerry Casselman, Electrical/Maintenance Operator; Tim Thom, Chief Operator, Brenda Lowe, Utilities Secretary; Blaine McEwen, Superintendent of Utilities; Tim Ward, Operator</i>

In accordance with the DWQMS, the City of Pembroke is required to test the performance of the Emergency Response Plan as it specifically relates to the Utilities Section and as documented in the DWQMS.

For the purposes of this exercise a test of PM Q-9 ~ Hypochlorite Emergency Pump – Filtered Water Header was performed.

EXERCISE

PM Q-9 ~ Hypochlorite Emergency Pump - filtered water header, an emergency scenario on losing both post chlorinators because of loss of chlorine gas was performed. Ran the pump in manual and observed the reaction for the chlorinator until the hypo took over chlorination.

OUTCOMES

OFI - Review if this procedure needs to be documented in the DWQMS Emergency Response Plan for Water Operators under Chlorine Emergencies.

Appendix B

Test of Emergency Response Plan – Debriefing Notes	
Date of Training:	<i>Aug 24, 2014</i>
Training of Document(s) #:	<i>OPS-UTL-DWS-GEN-SOP-014-017 ~ Distribution System Failure – Major Water Main Break</i>
Participants:	<i>Douglas Burton, Compliance Supervisor; Douglas Sitland, Manager of Operators; Chris Mantha, Supervisor Roads & Fleet; Curtis Mick, Supervisor Collection & Distribution; Blaine McEwen, Superintendent of Utilities; Tim Ward, Operator; John Beevis, Chief Operator</i>
Absent:	<i>Ron Conroy, Supervisor Parks & Facilities, Tim Thom, Chief Operator, Michel Dubois, Operator; Kerry Casselman, Electrical/Maintenance Operator; Brenda Lowe, Utilities Secretary; Matt Pilon, OIT</i>

In accordance with the DWQMS, the City of Pembroke is required to test the performance of the Emergency Response Plan as it specifically relates to the Utilities Section and as documented in the DWQMS.



For the purposes of this exercise, a table top drill was done to evaluate the procedure of a live tap into 600mm diameter Hyprescon Watermain (Boundary Road) to prepare for the actual tapping, and potential failure of a major watermain.

EXERCISE

An outside contractor was to perform work on a major water main to eliminate a dead end in the City of Pembroke Drinking Water System. In order to do this, a live tap into the largest water main in the system needed to be done. The exercise was a table top discussion to go through all potential emergency scenarios before the work was actually done.

Procedure *OPS-UTL-DWS-GEN-SOP-014-017 ~ Distribution System Failure – Major Water Main Break* was followed with a detailed contingency plan produced for this incident.

OUTCOMES

Contingency Planning – Live Tap into 600 mm diameter Hyprescon Watermain – Boundary Road

- As part of the Boundary Road water and sewer project currently underway, to provide for looping of the watermain, the connection to the 600 mm diameter Hyprescon Watermain will be provided via a live tap.
- The operation will be conducted by a specialty contractor (Hanson) and the 600 mm Hyprescon Watermain will be under full pressure.
- This contingency plan is developed in the highly unlikely event that there is a problem during the live tap operation.

Understanding Existing Conditions

- The Hyprescon Watermain was installed in 1983 and is considered a trunk watermain. It is a primary link from the Water Treatment Plant, ultimately splitting and providing 300 mm diameter feeder watermains to both the Tower and Quarry Reservoir
- In the unlikely event of a failure, it is possible that a complete failure of the 600 mm diameter Hyprescon Watermain could occur
- The Hyprescon Watermain is regulated by a number of valve chambers along its length. These valve chambers are “butterfly” valves and have not been operated for several years. Even if the valves are operational, their effectiveness in abetting uncontrolled flow during a catastrophic failure is questionable.
- In the event of a failure of the Hyprescon Watermain, given the very high flow of water that will be ongoing, it may not be safe to enter the valve chambers
- The Hyprescon Watermain also provides direct water distribution to areas across the City through various connections. As such, while its primary purpose is as a trunk watermain, in itself it is connected and looped into the overall water distribution network

Possible Consequences of a Catastrophic Failure of the Hyprescon Watermain

- In the unlikely event of a catastrophic failure of the Hyprescon Watermain, it is unlikely that the City will be able to control the flow of water in the short term. As such a number of possibilities exist as follows (not an exhaustive list):
 - Due to the location, there will be a large flow of chlorinated water discharged to the Indian River
 - Due to the location, an uncontrolled flow of water has the potential to adversely impact existing infrastructure – City (road, bridge, water, sewer and storm), Utilities (ORPC, Enbridge primarily and to a lesser extent Bell and Cogeco), Laurentian Valley and private homeowners
 - Given the nature of the Hyprescon Watermain, an uncontrolled flow has the potential of dewatering a large portion of the entire water distribution network

Basic Principles

- In the unlikely event of a catastrophic failure, resources must be deployed to mitigate against the above possibilities. While the detailed response will depend upon the circumstances, it is possible to prepare to some extent

Prior to the Operation

- Valve Chambers – Hyprescon Watermain
 - In advance of the operation, staff shall pump dry the various valve chambers of relevance along the Hyprescon Watermain. In order of importance/relevance, valve chambers are located as follows:
 1. Johnson Crescent at Boundary Road
 2. Bruham at Boundary Road
 3. At Water Treatment Plant
 4. Bennett at Boundary Road
 5. Trafalgar Road at Mary Street
 6. Trafalgar Road at Pembroke Street West
 - **ACTION – Water Distribution and Wastewater Collection Section**
- Distribution Valves – Hyprescon Watermain
 - Between each Valve Chamber, there are a number of valves to the distribution network. While closing the main line valve in valve chambers is a preferred first step (may not be possible due to safety concerns), to reduce the direct flow of water into the main line Hyprescon Watermain, it may be required to close all Distribution Valves first, to not provide pressure to the distribution system and to then attempt to close the mainline valve chambers.
 - Distribution Valves are to be listed in terms of geographical proximity and relative elevation.
 - The distribution network shall be confirmed so that when the Hyprescon Watermain is isolated (as best as possible), pumping from the WTP, Tower and Quarry will provide service to as many customers as reasonably possible. In particular, service from the 12 inch main on George shall be expected to supply water to points east.

- **ACTION – Water Distribution and Wastewater Collection Section**
- Isolation of East and West Pembroke
 - In the event of a catastrophic failure, it may become necessary to isolate the water distribution system between east and west Pembroke. Accordingly crews should inspect and locate relevant valves to isolate east and west Pembroke. Crossings are located as follows:
 1. Lake Street Bridge
 2. Pembroke Street Bridge
 3. Welland to Herbert
 4. Park to Deacon *** Already valved OFF
 5. Bennett Street Bridge – Under direct influence of the Hyprescon Watermain
 - A pressure monitoring device shall be installed at City Hall and the Manager of Planning (CEMC) shall be instructed as to how to read the device
 - While isolation of East and West Pembroke may become important into the future, this is considered a lower priority
- **ACTION – Water Distribution and Wastewater Collection Section**
- Road Closure
 - In the event of a catastrophic failure, Boundary Road will be closed. A detour should be established and ready to go
- **ACTION – Capital Section, to Eastway Contracting**
- Infrastructure Protection
 - In the event of a catastrophic failure, the Contractor shall have in place a contingency plan for the protection of infrastructure
- **ACTION – Capital Section, to Eastway Contracting**
- Notifications and Contacts
 - In the event of a failure, likely an emergency condition will exist
 - To mitigate against this, relevant partners shall be advised in advance of the action, including a schedule for the activity and notification protocols in the event of an emergency
 - Internally, the Fire Department shall be notified of the possibility of need for water rescue on the Indian River at Boundary Road
 - A master list of agencies, contacts, phone numbers and emails shall be established
- **ACTION – Manager, Operations**
- Banking of Water
 - In the event of a failure of the Hyprescon Watermain, despite efforts to isolate the watermain, it is likely that the water tower will drain. As such, it is suggested that

tower be left at a near minimum elevation and that the valve at the tower be confirmed to be in operating condition

- The quarry operates via pumping and thus can be full. In the event of a failure, the quarry shall not pump
- The water treatment clear wells shall be full, filters backwashed in advance and other steps taken to ensure that the plant can produce treated water at high capacity for an extended period
- **ACTION – Water Treatment Section**
- Service to Hospital
 - In the event of a failure, it is likely there will be disruption of water service across the City, including to the hospital. On an immediate basis, as soon as practical after isolating the Hyprescon Watermain, plans should be made to service the hospital either from the Quarry or via the regular distribution system
 - **ACTION – Water Distribution and Wastewater Collection Section**

Sequence of Events

- On Site Supervision
 - Some staff shall be on “stand by” to provide immediate response and coordination in the event of an incident
 - Confined Space Rescue Team – ONE Confined Space Rescue Team shall be established for the day with team members drawn from sections other than Water Sewer and Water Treatment – Given staff limitations, the Supervisor of Water and Sewer shall be tasked with assembling the Confined Space Rescue Team
 - Water and Sewer Employees shall be prepared to act immediately to begin distribution valve closure in a coordinated fashion
 - The “on scene” incident commander shall be the Superintendent of Utilities who shall provide direction and make decisions as necessary.
 - The Manager of Operations shall be in direct contact with the Superintendent and advise the CAO, CEMC, Fire Chief and other key City Staff
 - Staff shall be equipped with relevant PPE and necessary equipment including portable radios. As an opportunity, new Personal Floatation Devices will be purchased (Supervisor of Roads and Fleet.
- Immediate Response
 - In the event of an incident, the Water Tower and the Quarry Road Reservoir shall be isolated / closed. It is understood that the Water Tower may not be able to be closed until after it has fully drained. The water treatment plant shall continue to provide water to the distribution system at minimum pressure. The Manager of Planning will be in contact with the Water Treatment Plant – Action Superintendent of Utilities and Supervisor Water Treatment
 - It may be necessary to cease all water pumping in order to isolate the Hyprescon Watermain break area before re-pressurization of the distribution system



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- An immediate determination of the safety with respect to entering upstream and downstream valve chambers shall be made – Action Superintendent of Utilities and Supervisor Water and Sewer
- Boundary Road shall be closed – Action Superintendent of Utilities and Supervisor Capital
- All Distribution Valves onto the Hyprescon Watermain shall be closed in logical order – Action Superintendent of Utilities and Supervisor Water and Sewer.

- Staff may be drawn from other sections and assigned to assist Water/Sewer employees – Action Superintendent of Utilities, Supervisors Water and Sewer, Roads and Fleet and Parks and Facilities
- Appropriate notifications to affected parties – Action Superintendent of Utilities and Manager Operations
- As Distribution Valves are closed, ongoing determination of the safety of entering the Valve Chambers shall be made – Action Superintendent of Utilities and Supervisor Water and Sewer