

City of Hamilton's
Drinking Water Systems

DWQMS SUMMARY REPORT
(2013)
Safe Drinking Water Act



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1 INTRODUCTION

1.1 Purpose

This Drinking Water Quality Management System (DWQMS) Summary Report is being submitted to Council (Owner) on behalf of Top Management (General Manager, Public Works and Director of Hamilton Water) of the City’s five drinking water systems, as shown below.

Licence Number	Drinking Water System
005-101	Hamilton DWS
005-102	Freelton DWS
005-103	Greensville DWS
005-104	Carlisle DWS
005-105	Lynden DWS

The purpose of this DWQMS Summary Report is to keep Owners (Mayor and Council) of the City’s drinking water systems informed about the ongoing performance of the DWQMS, including major milestones achieved in 2013. This report also assists Owners in meeting their Standard of Care responsibilities under the Safe Drinking Water Act.

This DWQMS Summary Report is a key communication tool from Top Management to the Owner as referenced in Element 12 Communications of the DWQMS Standard. This Report also meets the communication requirements of Elements 14 Review and Provision of Infrastructure and Element 20 Management Review of the DWQMS Standard as identified in Sections 3 and 5, respectively.

1.2 Scope

The DWQMS Standard requires that the Operating Authority report on certain aspects of the DWQMS to Owners (Mayor and Council), specifically the outcomes of Element 14 Review and Provision of Infrastructure and Element 20 Management Review. This report fulfills the communication requirements of these elements and exceeds the Standard’s requirements by providing information on external and internal DWQMS audits, risk assessment and other major milestones of the DWQMS for 2013.

1.3 Overview of Key Milestones

DWQMS milestones related to the accreditation of the City’s Operating Authority are described below:

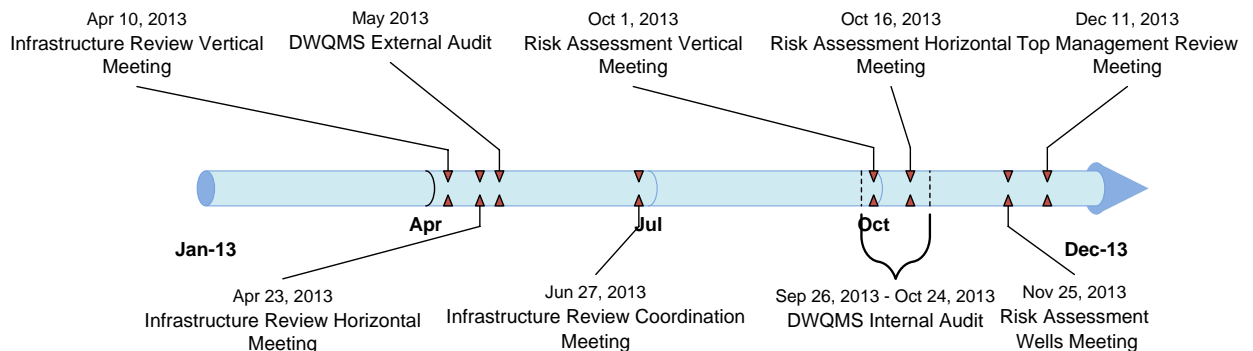
- November 2008 - DWQMS Operational Plan endorsed by Owners,

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- April 2009 - Operating Authority achieves Partial Scope; Entire DWQMS accreditation,
- June 2009 - Operating Authority receives Municipal Drinking Water Licences and Drinking Water Works Permits for all five City drinking water systems,
- February 2011 - On-site Verification Audit by Canadian General Standards Board (CGSB),
- July 2011 - Operating Authority achieves Full Scope; Entire DWQMS accreditation.
- 2012 - Identified QMI - SAI Global (QMI) as the new Accreditation Body
- 2012 - Standard of Care Training for Mayor and Council
- May 2013 - External Systems Audit (off-site document review)
- June 2013 - Operating Authority receives reaccreditation
- November 2013 - Submitted Municipal Drinking Water System Licence renewal applications for each of the City's five Drinking Water Systems (Licences will be renewed in June 2014).

Figure 1-1 illustrates key DWQMS milestones which occurred in 2013.

Figure 1-1: Project Pipeline - 2013



1.4 DWQMS Operational Summary

Figure 1-2 illustrates the Plan, Do, Check and Act elements of the DWQMS Standard. The Ministry of the Environment was committed to reviewing the DWQMS once all final Licences had been issued. Once the Licences had been issued for all drinking water systems in Ontario, the MOE initiated a review of the Standard in April 2012 and issued a draft in March 2013 for review and comments. No release date for the revised DWQMS Standard has been announced at this time.

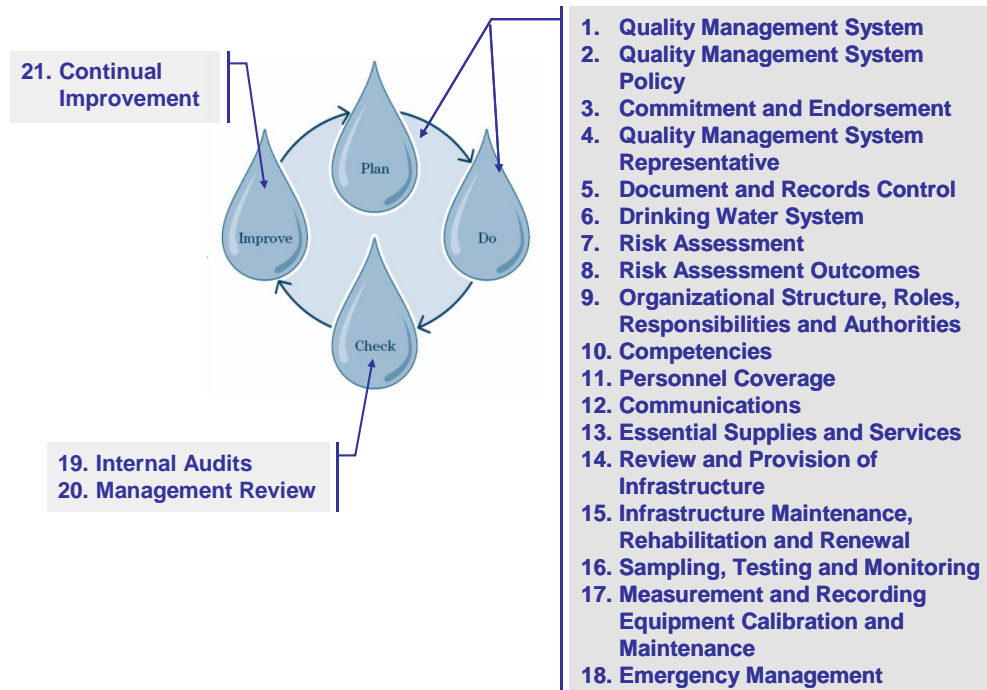
The following sections of this report include an overview of milestones related to the following elements of the DWQMS:

- Section 2 - Element 8 Risk Assessment Outcomes

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- Section 3 - Element 14 Review and Provision of Infrastructure,
- Section 4 - Element 19 Internal Audits,
- Section 5 - Element 20 Management Review.

Figure 1-2: DWQMS Standard Elements



Corrosion Control Plan

The City of Hamilton requires a Corrosion Control Plan (CCP) for the Woodward drinking water sub-system. The CCP is required because it has been identified that the Woodward DWS has over 10% of lead samples taken from residential and non-residential plumbing systems that exceeded 10µg/L in two subsequent sampling periods. The Community Lead Sampling Program included over 130 sampling locations in the downtown core and surrounding areas. As per the legal requirement sampling points must be from lead plumbing or suspected lead plumbing or plumbing connected to or suspected to be connected to lead service pipes.

The Corrosion Control Plan was accepted by the Ministry of the Environment (MOE) on June 7th, 2011. A treatment based corrosion control plan is being recommended using phosphate-based inhibition without pH adjustment. In 2012 and 2013, the Operating Authority conducted a Pilot Loop Testing Project using pipe loops from recovered lead services to assess the effectiveness of alternative treatments. The Pilot Loop Testing Project completed the final Stabilization Stage (Phase 3) and the Operating Authority expects a final pilot test report from the consultant by the end of January 2014. A Peer Review of the Pilot Loop Testing Project and recommendations

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is proposed to be undertaken in 2014 by a third-party. An update to Owners (Mayor and Council) will be provided once the results of the Peer Review are received.

DWS Licences & Permits Approvals

Licences for each of our five Drinking Water Systems (DWS) expire in June 2014. Renewal applications were submitted collectively to meet the (earliest) renewal deadline of November 29, 2013.

The application packages included:

- Completed Application Forms
- Operational Plan Summary Report
- Raw Water Assessments
- DWSs Map

In addition, the MOE was notified that a copy of the council resolution adopting or approving the Water Infrastructure Financial Plan would be provided once Council endorsed the plan at the January 2014 Council meeting.

There were 4 Amendments to the City's DWSs submitted to MOE in 2013. In addition, there were 26 Form 1 approvals for extensions to the distribution system, 7 Form 2s for like for like infrastructure replacements (e.g. pumps) and 1 Form 3 approval for diesel generators.

2 RISK ASSESSMENT

2.1 Overview

The DWQMS Standard requires that the Risk Assessment be reviewed on an annual basis and redone every three years to verify the currency and validity of the information. A re-evaluation of the Risk Assessment scope, criteria, data fields and update of risk assessment data was conducted in 2011 as it was the 3 year "redo" milestone for the Risk Assessment. The purpose of the 2013 Risk Assessment was to review the outcomes from 2012 and focus on what was new and upgraded infrastructure (e.g. horizontal, vertical, including wells).

Staff from across Hamilton Water collaborated on updating the existing information considering the following key questions:

- Are identified control measures still valid and if so, are they still in place?
- Have additional controls been implemented?
- How has equipment condition, raw water quality, operational controls etc. revised the risk score?
- Are any modified "Risk Factors" now considered to be Critical Control Risks?

2.2 Key Updates

As part of the Risk Assessment, process changes, including capital upgrades in the

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DWSs, are considered and the associated risk scores (i.e., likelihood of occurrence) are updated as needed. The following includes a list of ongoing, completed and upcoming capital upgrades and projects that were considered in the 2013 Risk Assessment:

- New Security Master Plan
- SCADA Master Plan (Phase II)
- Public Works & Hamilton Water Emergency Management Plans
- SCADA outage
- Stelco Pumping Station (Isolation Valve replacement)
- Water Treatment Plant Study and related upgrades
- Total Coliform (TC) AWQIs
- Lake Ontario Algae Blooms
- Carlisle DWS capital upgrades
- Large Diameter PVC Pipes

In 2014, Compliance and Regulations will work with the Asset Management Section to enhance linkages with the State of the Infrastructure Report.

3 REVIEW AND PROVISION OF INFRASTRUCTURE

3.1 Purpose

The Operating Authority must ensure and verify, on an annual basis, the adequacy of water infrastructure. In order to satisfy the requirements of the DWQMS Standard, the Operating Authority conducted a formal annual review of its vertical (water treatment, storage and pumping) and horizontal (watermains) infrastructure. The scope of the review also considered the operation, maintenance and replacement of existing infrastructure assets as well as new infrastructure planned for the immediate and long-term future. A Coordination Meeting was held with the Management Team of Hamilton Water to discuss the outcomes of both the horizontal and vertical infrastructure reviews. This DWQMS Summary Report (2013) includes a brief summary of the results of the DWQMS Infrastructure Review.

3.2 Process

The Operating Authority assembled teams of representatives from across relevant sections of Hamilton Water to conduct the review of water infrastructure. Teams met in April 2013 to discuss vertical and horizontal infrastructure and a coordination meeting was held in June 2013.

The DWQMS Infrastructure Review teams collected and examined input data related to various asset management, maintenance and capital programs. A summary of the type of “indicator” data examined is provided below:

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Infrastructure Type	Input Data
Horizontal Infrastructure - Small Capital	<ul style="list-style-type: none"> • Leak Detection & Water Loss Audits • Corrosion Protection Planning • Valve and Meter Replacement • Preventative Maintenance • Emergency Repairs • Customer Complaints • Lead Service Replacement Program
Horizontal Infrastructure - Large Capital	<ul style="list-style-type: none"> • Replaced, Rehabilitated and New Watermains • Stand-Alone and Coordinated Works (i.e., with Sewers and Roads) • Condition Assessments • Master Plan Schedule
Vertical Infrastructure Small Capital	<ul style="list-style-type: none"> • Preventative Maintenance • Emergency Repairs • Capital Upgrades - Coordination and Scheduling
Vertical Infrastructure - Large Capital	<ul style="list-style-type: none"> • Master Plan Schedule • Site Specific Condition Assessments • Reservoir Inspections • Water Capital Projects Lists

3.3 Overview of Results

Overall, the review concluded that vertical and horizontal infrastructure is generally found to be available, when needed, and maintained and improved, when necessary. Below is a summary of some general continual improvement suggestions as well as some specific action items from the Vertical and Horizontal Infrastructure Review meetings.

General Infrastructure Review Process Continual Improvement Areas:

- Provide the Infrastructure Review procedure to Engineering Services, Asset Management Section.
- Discuss cul-de-sac recirculation options, logistics and feasibility with Water Distribution & Waste Water Collection and the Engineering Services, Asset Management Section.
- Include a discussion item at the Infrastructure Review Coordination meeting about the need for a Capital Project Shutdown Schedule.

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- Provide geographic reference points and/or maps for new developments.
- Work with Plant Operations Maintenance to select performance metrics for review.
- Show charts comparing the scheduled and completed preventative maintenance activities.
- Review the procedures (and update it if required) to ensure that Infrastructure Planning and Systems Design are circulated on Drinking Water Works Permit (DWWP) Form 2 Verifications and DWWP amendments.
- Show Watermain breaks in Hansen, by their type (i.e. emergency\reactive or preventative)
- Review how risk is considered during watermain project scheduling.
- Provide Plant Operations with a copy of System Control Valve Assessment Study
- In consultation with HW-SMT, and with the approval from the HW Director, provide Engineering Services with outcomes from the 2013 Infrastructure Review process for the 2013 annual update of the SOTI Report Card.

The following action items relate to vertical infrastructure and depending on the subject, have been assigned to Plant Operations (PO), Capital Delivery Services (CDS), Infrastructure Planning and Systems Design (IP&SD), Water Distribution and Wastewater Collection (WD&WWC) or Compliance & Regulations (C&R):

- IP&SD to meet with PO to discuss SCADA set points at reservoirs and towers for fire flow protection requirements.
- Review raw water nitrate trend data for the Greenville DWS.
- Discuss the installation of rain gauges at the Greenville and/or Freelton water treatment plant locations.
- PO and WD&WWC to discuss ownership of the 15 Water Distribution System Control Valves.
- Create a table of immediate needs from the Water System Outstation Audit and meet with PO Operations and Maintenance to discuss what was already addressed. The table will be shared with all stakeholders (IP&SD, CDS).
- Discuss the status of the Woodward Water Treatment Plant Transient Review of Filter Backwash System at the Infrastructure Review Coordination Meeting.
- Provide an update on Pipe Loop Test Passivation results at the Infrastructure Review Coordination Meeting.
- Discuss project scope and ownership of the Valve Chamber No. 3 (District 5) Upgrades.
- Communicate status of Carlisle Well Project at the next Public Health Services Meeting.
- Include an update of the Ancaster Elevated Water Reservoir Class Environmental Assessment Master Plan project in the Master Plan in the 2013 Infrastructure Review reference package.

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The following action items relate to horizontal infrastructure and depending on the subject, have been assigned to WD&WWC, Customer Service & Community Outreach (CS&CO), IP&SD, Asset Management (AM) or C&R:

- Schedule a meeting with WD&WWC to provide an overview of the Aqua Rehab structural lining product.
- Provide watermain break data that distinguishes between the number of 'emergency' breaks and those breaks that were repaired as part of the Leak Detection Program.

4 DWQMS AUDITS

The DWQMS accreditation process requires both 3rd Party Accreditation Audits and annual internal audits by the Operating Authority. The cycle of external audits includes an on-site Verification Audit every 3 years and Systems Audit or documentation review annually.

4.1 External DWQMS Audits

Hamilton Water identified QMI-SAI Global as the new Accreditation Body for the DWQMS. On May 13 to 14, 2013, QMI-SAI Global conducted an off-site documentation surveillance audit. The Accreditation Body will be conducting the 2014 annual documentation surveillance audit on May 13 to 14, 2014. The next on-site reaccreditation audit is anticipated to take place in April 2015 following a documentation audit in March 2015.

4.2 Internal DWQMS Audits

The Operating Authority must conduct internal audits to evaluate the conformity of the DWQMS with the requirements of the DWQMS Standard and its procedures, at least annually.

Internal Audit Team

The Audit Team consists of staff members from all sections of Hamilton Water. The diversity of our Audit Team is an advantage and ensures that auditors do not audit water processes related to their job or area of authority. Independence of auditors avoids potential conflict of interest and provides a fresh set of eyes on water processes external to their day to day responsibilities.

Fall 2013 Audit

The Internal Audit Team conducted a full internal audit from September 26 to October 24, 2013. The Fall 2013 audit assessed the implementation of all 21 elements of the DWQMS Standard. Key meetings relating to the internal audit include:

- Opening meeting – September 26th, 2013,

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- Closing meeting – October 24th, 2013.

Continual improvement initiatives related to the audit process included streamlining the process for Opportunities for Improvement and developing an audit survey. The non-conformances and potential nonconformances will be uploaded in the BCOS Database and root cause investigations will be undertaken in early 2014. Following this, corrective action plans will be implemented by delegated staff, where required.

2014 DWQMS Audit Plan

The Compliance Support Group of the Compliance & Regulations Section will be developing an Audit Plan for the 2014 DWQMS internal audits. It was proposed and approved at the Top Management meeting in December 2013, to conduct Internal Auditor training in early 2014 that includes a mini-audit of an area or element of the DWQMS. A full internal audit is proposed to be undertaken in September/October 2014. The Audit Plan will be reviewed and approved by the management team prior to implementation.

5 MANAGEMENT REVIEW

The PLAN component of Element 20 Management Review of the DWQMS Standard requires a documented procedure to describe how the Operating Authority reviews the suitability, adequacy and effectiveness of the DWQMS. The 'ACT' component of the element requires that Top Management participate in a management review at least once per year to review the DWQMS and consider recommendations for continual improvement. Required outputs of the meeting are:

- Consideration of the results of the management review and identifying deficiencies and action items to address deficiencies,
- Provide a record of decisions and actions items related to management review action items including responsibilities and timelines,
- Report the results of the management review to the Owner.

In 2013, the DWQMS Top Management Review was held on December 11th. Attendees included Top Management (General Manager of Public Works and Director of Hamilton Water), Section Managers, Overall Responsible Operators (OROs) for treatment and distribution, the System Management Representative and staff from the Compliance Support Group.

Management Review Action Items

Overall, Top Management and Section Managers concluded that the DWQMS is suitable, adequate and effective and recommended continual improvement actions as summarized in Table 6-1.

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Table 5-1: Management Review Outcomes

No.	Summary of Action Item	Rsp.	Due Date
1	Inform relevant Councillors of discussions about the possibility of putting fencing around water reservoirs that are currently accessible to the public and that are being used as green spaces.	Director, HW	March 2014
2	Ensure that the repairs to the rail car security system at 700 Woodward Ave. are repaired immediately.	PO	January 2014
3	Review current practices for logging MOE Best Practice Recommendations and HW responses in the BCOS Database to ensure documentation of outcomes.	C&R	December 2014
4	Create a Non-Conformance Report for missing the Financial Plan due date. Action complete.	C&R	February 2014
5	Follow up with the MOE to gain a better understanding of the calculation used to determine Inspection Ratings and Water Quality Scores. Action Complete in Inspection Reports.	C&R	December 2013
6	Review the 2011 - 2012 Inspection Report to identify the Non-Compliances that resulted in the Inspection Rating of 93.47% for the Woodward DWS. Action Complete.	C&R	January 2014
7	Determine if the Inspection Report Ratings can be identified for 2013 and if there is a trend.	C&R	December 2014
8	Contact CS&CO to get a copy of the recent notification sent to residents of the Lynden DWS. Follow-up: The recent notification was delivered on December 4, 2013. Action Complete.	C&R	January 2014
9	Schedule a meeting for HW-SMT to review the status of the work to identify a second well location in Lynden and revisit alternatives identified in the Master Planning process as well as consider other options.	HW Director	April 2014

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No.	Summary of Action Item	Rsp.	Due Date
10	Schedule a meeting with select HW and Construction Section Staff to review the recent East 23rd incident and protocols for the connection of new watermains. Action Complete.	HW Director	March 2014
11	Coordinate with CS&CO to add G. Davis to the notification list for the ERMS automated call system. Action Complete.	C&R	January 2014
12	Schedule a meeting with the Asset Management Section to create linkages with the Risk Assessment Process and the State of the Infrastructure reporting process.	C&R	May 2014
13	Gather recommendations from HW for areas or processes for conducting mini-audits in 2014 and as part of the Internal Auditor training.	C&R	February 2014
14	Emergency Response Instructions (ERIs) to be added to the HW Emergency Binders once approved.	C&R	March 2014
15	Schedule a meeting to discuss alternative measures of operational performance for 2014.	C&R	March 2014
16	Coordinate with CSCO to confirm if the newly lined pipe in Hamilton is being captured as new pipe. Action complete.	C&R	January 2014
17	Provide PO Maintenance with access to the Raw Water and Treated Water data.	C&R	February 2014
18	Confirm the Carlisle service connections used to calculate the population estimate of 1,818.	CS&CO	February 2014
19	Schedule a follow up meeting to discuss the coding and/or prioritization of DWQMS projects for the budget process prior to the PeopleSoft upload - WIPS.	C&R	March 2014
20	Use maps to show the location of specific large valves in relation to critical watermains and other capital works at next DWQMS TMR meeting.	C&R	December 2014

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No.	Summary of Action Item	Rsp.	Due Date
21	Show both commissioned and proposed projects at next DWQMS TMR meeting.	C&R	December 2014
22	Confirm that the high number of customer calls tracked in HANSEN as a Drinking Water Advisory (EWDWA) for Lynden, were related to requests for replacement filters. Action Complete.	C&R	January 2014
23	Confirm whether the requirement to conduct the DWQMS training was included in essential vendors Level of Service Agreements.	C&R	March 2014
24	Add discussion about essential supplies and services to an upcoming Beyond Compliance Lead Team (BLT) Agenda. Should the Call Centre be considered an essential supplier?	C&R	February 2014
25	Include voices of both SMR and HW Director in the next revision to the DWQMS Awareness video.	C&R	April 2014
26	Consider holding an annual divisional meeting for the review of operational challenges. Action Complete.	HW Director	Monday, March 31, 2014
27	Include DWQMS awareness at the upcoming (February 2014) HW Divisional Meeting.	HW Director	March 2014
28	Investigate options for Level III procedure review to improve engagement of HW - SMT.	C&R	March 2014

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6 CONCLUSIONS

The outcomes from the internal DWQMS audit and the Management Review concluded that the DWQMS is adequate, suitable and effective and conforms to the requirements of the DWQMS Standard. Corrective action plans from the audit and action items from the Management Review will be implemented to ensure continual improvement of the DWQMS.

7 NEXT STEPS – TIMELINE

The management system requires ongoing commitment by staff and management. A challenge will be to ensure that maintenance and improvement of the system continues to be a high priority of the Operating Authority. Major next steps related to the maintenance of the DWQMS in 2014 include the following:

Month of 2014	Scheduled DWQMS Milestones
January to June	<ul style="list-style-type: none"> Investigate and correct internal audit findings from DWQMS Internal Audits Roll out new training software to track staff training and licences
February\March	<ul style="list-style-type: none"> Annual O.Reg. 170 Schedule 22 Report and DWQMS Summary Report to Council
March	<ul style="list-style-type: none"> HW - SMT Meeting #1 DWQMS Internal Audit Training and Focused Audit
April\May	<ul style="list-style-type: none"> Infrastructure Review Meetings
May	<ul style="list-style-type: none"> DWQMS 3rd Party Surveillance Audit - Documentation
June	<ul style="list-style-type: none"> HW - SMT Meeting # 2
September	<ul style="list-style-type: none"> SMT Meeting # 3 DWQMS Internal Audit
October	<ul style="list-style-type: none"> Risk Assessment Review Meetings
December	<ul style="list-style-type: none"> DWQMS Top Management Review

BCOS software tracks the revision history of document.