



<i>Title:</i> <b>DWQMS Operational Plan Summary Report</b>			
<i>Document #</i>	<i>PW-WW-R-001-002</i>	<i>Document Level</i>	<i>3 (Divisional)</i>
<i>Issue #:</i>	<i>6</i>	<i>Issue Date:</i>	<i>February 2019</i>

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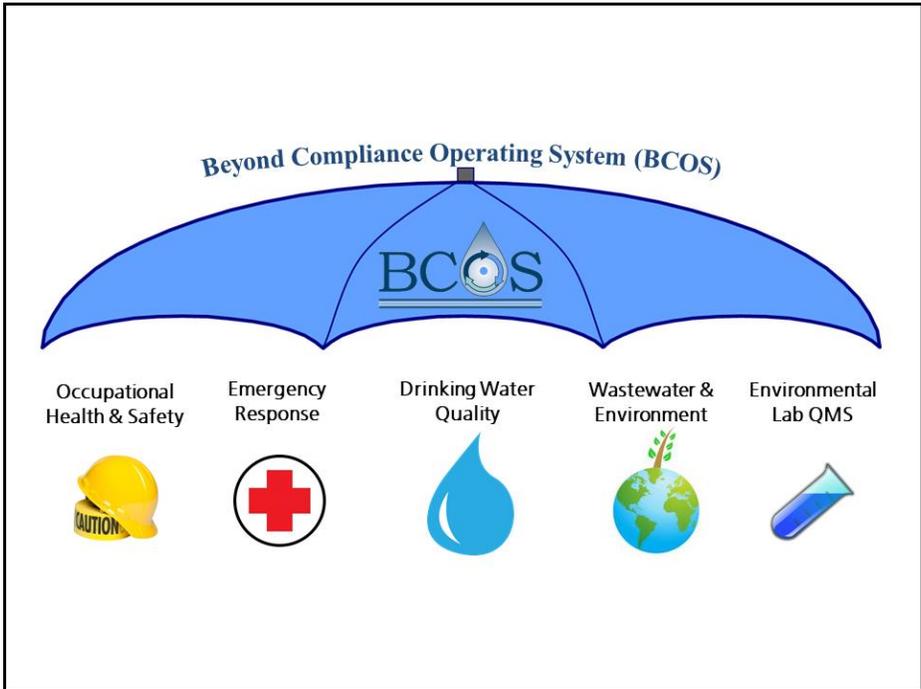


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**Preface**

A key priority of the Hamilton Water Division (HW) of the City of Hamilton (COH) is to ensure the protection of worker health, public health, property, and the environment. To support this objective, HW has developed the Beyond Compliance Operating System (BCOS). BCOS is an environmental, health and safety management system. Its successful implementation and use is a key component of our continuous improvement process and supports an environment, health and safety (EHS) compliance culture throughout HW. BCOS will strive to conform to environmental and occupational health and safety standards and is an umbrella program that oversees conformance to the Drinking Water Quality Management System (DWQMS), the Environmental Laboratory QMS, and future QMS (Occupational Health and Safety, Wastewater, etc). Select DWQMS elemental procedures have been integrated with BCOS procedures. Integrated procedures are identified through the "BCOS + DWQMS" text in the procedure title. Procedures pertaining to DWQMS alone are identified by the "DWQMS" in the procedure title. The figure below identifies BCOS as an "umbrella" program that supports other scoped management systems of HW.

**BCOS Framework & DWQMS**





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**Access to Reports**

The DWQMS Operational Plan Summary Report is posted on the COH website and DWQMS Operational Plan Binders are available at the Clerk’s Office, City Hall and the Hamilton Water storefront at 330 Wentworth.

The DWQMS Operational Plan Summary Report is also accessible to staff through the BCOS Database, Sectional Workspaces and the internal DWQMS website.

**1 QUALITY MANAGEMENT SYSTEM**

**1.1 Purpose**

The purpose of the DWQMS Operational Plan is to document the COH’s DWQMS as part of the City’s efforts to ensure that clean, safe, and reliable drinking water is supplied to all of its customers. The DWQMS Operational Plan meets and sometimes exceeds the requirements of the Ministry of the Environment, Conservation and Park’s (MECP) Drinking Water Quality Management Standard.

**1.2 Scope**

This DWQMS Operational Plan applies to HW which is the Operating Authority for the City’s drinking water systems (DWSs).

HW has developed an integrated DWQMS Operational Plan Manual. The majority of the documents in the DWQMS Operational Plan pertain to all five of the City’s DWSs. The use of integrated procedures ensures the DWQMS is efficient and effectively communicates common requirements for the DWSs to HW staff. The DWS descriptions are system specific descriptions of the City’s DWSs. The DWQMS Operational Plan also includes a map entitled “Drinking Water Systems – DWS” which illustrates the geographic scope of the City’s water distribution systems.

**1.3 Definitions**

AWQI	Adverse Water Quality Incident. Any situation where the drinking water in the system (treatment / distribution) does not meet the requirements listed in O. Reg. 170/03 Schedule 16
BCOS	Beyond Compliance Operating System – Environmental, Health and Safety Management System for the Hamilton Water Division. BCOS is an umbrella system to the Environmental Laboratory QMS and DWQMS sub-systems.





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BLT	BCOS Lead Team. Includes SMR, Compliance Support Group, staff representatives (QA Supervisors or equivalent) from the Hamilton Water Division.
C&R Section	Compliance and Regulations Section
CD Section	Capital Delivery Section
CHEL QMS	City of Hamilton Environmental Laboratory (CHEL) Quality Management System (QMS). CHEL is accredited to ISO/IEC 17025 - general requirements for the competence of testing and calibration laboratories for specific tests which are listed in their scope of accreditation. If testing laboratories comply with the requirements of ISO/IEC 17025, they operate a QMS for their testing activities that also meets the principles of ISO 9001.
CMMS	Computerized Maintenance Management System
Controlled Document	Document deemed to be important to the functioning of Hamilton Water Division, as updated, reviewed, approved by the indicated staff, and authorized for release and distribution. The document is available to staff in a format that cannot be modified (i.e. BCOS Database) without appropriate approval. The document available to staff is always the most current version of the document. The document is subject to monitoring, auditing and update. Controlled documents have a unique BCOS issuance number.  Includes: procedures, manuals, checklists, forms, templates, lists, visual aids, guidelines and brochures.
COH	City of Hamilton
Corrective Action	Action to eliminate the cause of a detected non-conformance or non-compliance.
CS&CO Section	Customer Service and Community Outreach Section
DWQMS	Drinking Water Quality Management System of the Hamilton Water Division.
DWS	Drinking Water System





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E2	The Environmental Emergency (E2) Regulations came into force under the authorities of the Canadian Environmental Protection Act, 1999 (CEPA 1999). The E2 Regulations were put in place to enhance the safety of the environment and human life and health of Canadians by preventing, preparing for, responding to and recovering from environmental emergencies. Under the E2 Regulations, any person who owns or has the charge, management or control of a listed substance on a fixed facility may be required to: <ul style="list-style-type: none"> <li>• identify substance and place;</li> <li>• prepare an environmental emergency plan (E2 plan);</li> <li>• implement, update and test the E2 plan annually;</li> <li>• provide notice of closure or decommissioning; and</li> <li>• report environmental emergencies involving regulated substances.</li> </ul>
EQH&S	Environmental, quality, health and safety
Hamilton Water (HW)	The Hamilton Water Division, which is the water and wastewater Operating Authority for the City of Hamilton.
HW - SMT	The Hamilton Water Senior Management Team includes the Directors & Section Managers of the Hamilton Water Division
IPS	Infor Public Sector (formerly HANSEN). Departmental and cross-sectional modular software system, offering a variety of packages designed to handle different aspects of municipal operations such as infrastructure assets inventory, work management, stock inventory systems, service applications and call centers, licensing and enforcement.
Level III System Procedure	A procedure which relates to the Hamilton Water Division, but may not fall under the scope of the DWQMS. Related to how Divisional activity is conducted. May be related to the DWQMS but does not provide direction on how DWQMS item is being addressed.
Level III DWQMS Procedure	A procedure which relates to the Hamilton Water Division and falls under the scope of the DWQMS.
Level IV Procedure	Sectional Procedure





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Level V and Higher Procedure	Procedure within units of the sections within the Hamilton Water Division, broken down / organized based on criteria and requirements set by each section.
OIC	Operator in Charge
ORO	Overall Responsible Operator
Operating Authority	Staff within Hamilton Water Division responsible for the operation, maintenance and provision of support services to the COH DWSs (including water treatment and distribution)
Owner (AWQI)	Manager Compliance & Regulations (Owner for the purpose of adverse water notifications) or Superintendent of CHEL or designate (Owner backup).
Owner (DWS)	Every person who is a legal or beneficial owner of the City's Drinking Water Systems. Since the City's DWSs are publicly owned and operated, the Mayor and Council of the City of Hamilton have been identified as Owners of the City's DWSs.
PMATS Section	Plant Maintenance & Technical Services Section
PO Section	Plant Operations Section
Preventive Action	Action to eliminate the cause of a <i>potential</i> non-conformance (an action or lack of action that is not a non-conformance, however, over time could lead to a non-conformance).
QA	Quality Assurance - planned and systematic pattern of actions necessary to ensure that management and technical controls are being followed.
Regulators	Regulatory bodies which oversee activities, products and services of the Hamilton Water Division including Ministry of the Environment, Conservation and Parks (MECP), Ministry of Labour (MOL), Public Health Services (PHS) and others.
Scoped Level III Document	A procedure, or other document, that applies to 2 or more but not all the sections of the Hamilton Water Division.
SMR	Systems Management Representative (for both the BCOS and DWQMS Systems) - Manager of Compliance and Regulations Section. Equivalent to QMS Representative as described in the DWQMS Standard.





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SMT (DWQMS)	The DWQMS Senior Management Team, includes the Directors and Section Managers of the Hamilton Water Division.
Top Management (DWQMS)	The General Manager of Public Works and the Director of Hamilton Water have been identified as Top Management of the DWSs.
WD&WWC Section	Water Distribution & Wastewater Collection Section
WWPC	Water & Wastewater Planning & Capital
WWWSP or WWSP	Water & Wastewater Systems Planning

**2 QUALITY MANAGEMENT SYSTEM POLICY**

The DWQMS Policy was endorsed by the Owner (Mayor and Council) on June 27, 2007 and has since been re-formatted into the visual aid shown on page 8. The DWQMS Policy is posted internally at several HW facilities. It has been communicated to HW staff during the following events:

- BCOS and DWQMS System Awareness training and DWQMS Refresher training
- Annual internal audits
- New staff BCOS Database and DWQMS training sessions

The DWQMS Policy is communicated to the public through posting on the City's website.





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**DWQMS Policy**

**DRINKING WATER  
QUALITY MANAGEMENT  
SYSTEM POLICY**

*The City of Hamilton owns, maintains and operates various drinking water systems. The City is committed to:*

**S** *Safe, high quality, consistent supply of drinking water*

**A** *Always improving the Drinking Water Quality Management System*

**F** *Following and complying with applicable legislation*

**E** *Effective and open communication with the community concerning matters of drinking water quality*

BCOS  
BEYOND COMPLIANCE  
OPERATING SYSTEM

Hamilton





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**3 COMMITMENT AND ENDORSEMENT**

The Owner (Mayor and Council) and Top Management (General Manager of the Public Works and the Director of HW) of the Operating Authority (HW) support the development, implementation, maintenance, and continual improvement of the DWQMS, which supports the COH’s five DWSs. The Owner acknowledges their role through the receipt and review of DWQMS reports related to the adequacy of infrastructure, audits and management reviews, and by provision of resources to support the DWQMS. Top Management of the Operating Authority includes the General Manager of the Public Works and the Director of HW. Top Management supports the DWQMS through provision of resources, ensuring staff are aware of relevant legal requirements, and supporting DWQMS communications. The Owner and Top Management attend Safe Drinking Water Act Due Diligence Training and Standard of Care training. The training sessions include an overview of Ontario’s legal framework for drinking water and Owner and Top Management’s roles and responsibilities.

The DWQMS Operational Plan was originally endorsed by Council on November 12, 2008 and is re-endorsed at minimum every four years, following the municipal election cycle. The signatures below serve as evidence of the endorsement of the DWQMS Operational Plan Manual.

---

Fred Eisenberger  
 Mayor  
 DWS Owner Representative

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Dan McKinnon  
 General Manager, Public Works Department  
 DWQMS Top Management Representative

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Janet Pilon  
 Deputy City Clerk  
*(Signing Authority on behalf of Council)*

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Andrew Grice  
 Director Hamilton Water Division  
 DWQMS Top Management Representative



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**4 QUALITY MANAGEMENT SYSTEM REPRESENTATIVE**

The Manager of the Compliance & Regulations Section, has been appointed as the Systems Management Representative (SMR) for the DWQMS and BCOS. The SMR is responsible for:

- Ensuring that the DWQMS is established, implemented, and maintained;
- Reporting to Top Management and SMT regarding DWQMS performance including recommended continual improvement initiatives;
- Promoting awareness of the DWQMS and of HW staff roles and responsibilities;
- Overseeing the document control process including the development, review, approval and release of DWQMS System procedures and revoking obsolete documents;
- Ensuring that HW and other staff are aware of all applicable legal requirements related to their duties and the DWQMS; and
- Managing the DWQMS Internal Audit Program.

**5 DOCUMENT AND RECORDS CONTROL**

**5.1 Control of Documents**

A procedure has been developed that outlines document control processes for the Operating Authority. The procedure entitled BCOS + DWQMS Control of Documents (PW-WW-P-010-001) is an integrated procedure (BCOS + DWQMS) that applies to the Operating Authority. The purpose of this procedure is to control the issue, change, and approval of documents, ensuring that only up to date, approved documentation is used by Operating Authority staff. The Control of Documents procedure also ensures that staff can locate and access documents relevant to their work, in the format most suitable to their work, whether the documents are created internally or externally to the Operating Authority.

BCOS and DWQMS documentation can be identified using a unique numbering system specified in the Control of Documents Procedure (PW-WW-P-010-001). The BCOS Database stores and protects DWQMS procedures and also has the ability to track all reviews, revisions, and approvals to procedures. HW staff access DWQMS procedures through the BCOS Database or specialized sectional workspaces. Sectional workspaces help to ensure efficient access to Level III, IV and V DWQMS procedures.





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Level III procedures which apply to all HW Sections are considered Non-Scoped and procedures which apply to 2 or more but not all Sections of HW are considered Scoped procedures. Level III procedures are developed by the Compliance Support Group (CSG) or by an individual with the relevant technical background. Level III procedures are reviewed by BLT Members, SMT, and other staff if applicable.

Final approval of Level III procedures is completed by the Director of HW, for scheduled reviews, and by the System Management Representative for non-scheduled reviews. As stated, the BCOS Database tracks the document release, review, and approval process. The need for Level IV and V Sectional Documents is determined by each Section Manager and/or other Senior Sectional staff. A Sectional staff member is assigned responsibility for development of the draft procedure. The corresponding Section Manager approves Level IV and V procedures.

Electronic copies of documents are considered to be Controlled Documents. Hard copies of these documents are considered to be uncontrolled copies unless categorized as controlled with an electronic or physical stamp stating "This is a Controlled Document. Do Not Photocopy" printed or stamped in the footer or other location on the page. Hardcopy-Controlled documents are stored in designated locations and are updated by CSG, the QA Supervisor or equivalent, Administrative Assistant or the Section representative.

The review cycle of all DWQMS procedures is listed in BCOS + DWQMS Control of Documents (PW-WW-P-010-001), Operational Plan Procedure Review Frequency (PW-WW-L-010-004) and in the BCOS Database. Should there be discrepancies between the procedure, the list and BCOS, the frequency in the list will be taken as the correct review period. Obsolete documents are retained within the BCOS Database but only limited staff have access to obsolete documentation.

5.2 Control of Records

A procedure has been developed that outlines record control processes for the Operating Authority. Control of Records (PW-WW-P-016-001) is an integrated procedure (BCOS + DWQMS) that applies to all HW sections. The purpose of this procedure is to ensure that both COH and externally generated non-COH records identified as critical to the BCOS and DWQMS Systems are properly collected, identified, accessed, filed, stored, maintained, reviewed, and disposed of after their designated retention times.

Record profiles are developed in the BCOS Database which identify record type, record name, record identification method, storage location, retention time, person





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responsible, and review frequency. At minimum, record profiles are created for critical records which are records related to regulatory or legal requirements. In some cases, records are uploaded or attached to the record profiles. Record retention times are defined in individual BCOS Database record profiles. All retention times stated are minimum times and do not supersede legal, governmental, or other requirements. After the indicated storage period, unless otherwise specified, all records are destroyed by deletion, shredding, disposal in trash or recycling as determined by the controlling Supervisor, Director of HW, or the Manager of the C&R Section, as relevant. Electronic copies are removed from the active BCOS Database and labeled "obsolete".

**6 DRINKING WATER SYSTEM PROCESS DESCRIPTIONS**

The COH owns and operates the Hamilton DWS (treatment, distribution and the Fifty Road Subsystem) as well as the communal well DWSs (Carlisle, Freelton, Greensville and Lynden). Process descriptions including process flow charts are found in the following procedure:

- DWQMS Descriptions of Hamilton Drinking Water Systems (PW-WW-P-030-007)
- The map entitled "Drinking Water Systems – DWS" (PW-WW-V-030-001) illustrates the geographic scope of the COH's water distribution systems.

**7 RISK ASSESSMENT**

A procedure entitled DWQMS Risk Assessment (PW-WW-P-031-001) has been developed that documents the process followed by the COH's Operating Authority in planning, completing, documenting, reviewing, and maintaining its DWQMS Risk Assessment. The DWQMS Risk Assessment examines all aspects of the water uptake, treatment, and distribution processes controlled by the Operating Authority.

The DWQMS Risk Assessment is reviewed annually to verify the currency of the DWS information and any assumptions made in completing the Assessment. A new DWQMS Risk Assessment is conducted every three years.

**8 RISK ASSESSMENT OUTCOMES**

The DWQMS Risk Assessment was initially completed in the summer of 2008. Core outcomes are reviewed annually, with the Risk Assessment being redone in 2011, 2014 and 2017. Risk Assessment outcomes are recorded in the BCOS Database.





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A summary of relevant Critical Control Points identified during the Risk Assessment exercise is documented in the DWQMS Risk Assessment Critical Control Point Summary Chart (PW-WW-R-032-009). Outcomes of the DWQMS Risk Assessment are stored in the Risk Assessment Database and included in the Operational Plan.

**9 ORGANIZATIONAL STRUCTURE, ROLES, RESPONSIBILITIES, AND AUTHORITIES**

The BCOS + DWQMS Roles, Responsibilities, and Authorities Procedure (PW-WW-P-006-001) is an integrated procedure for BCOS and DWQMS that describes how roles, responsibilities and authorities are defined, communicated, and maintained to ensure accountability in the implementation of these Systems.

The BCOS + DWQMS Roles, Responsibilities, and Authorities Procedure applies to all sections of HW. Roles, responsibilities and authorities relating to other sub-systems under the BCOS umbrella are defined in Level IV procedures and do not fall within the scope of the DWQMS.

The following Organizational Chart identifies key roles and/or titles within HW:

- Hamilton Water – Photo Organizational Charts (PW-WW-R-006-002)

The roles, responsibilities and authorities relating to the BCOS and DWQMS Systems are defined in BCOS + DWQMS Roles, Responsibilities and Authorities Matrix (PW-WW-G-006-001). This document is reviewed every three years or sooner if significant organizational changes occur within HW.

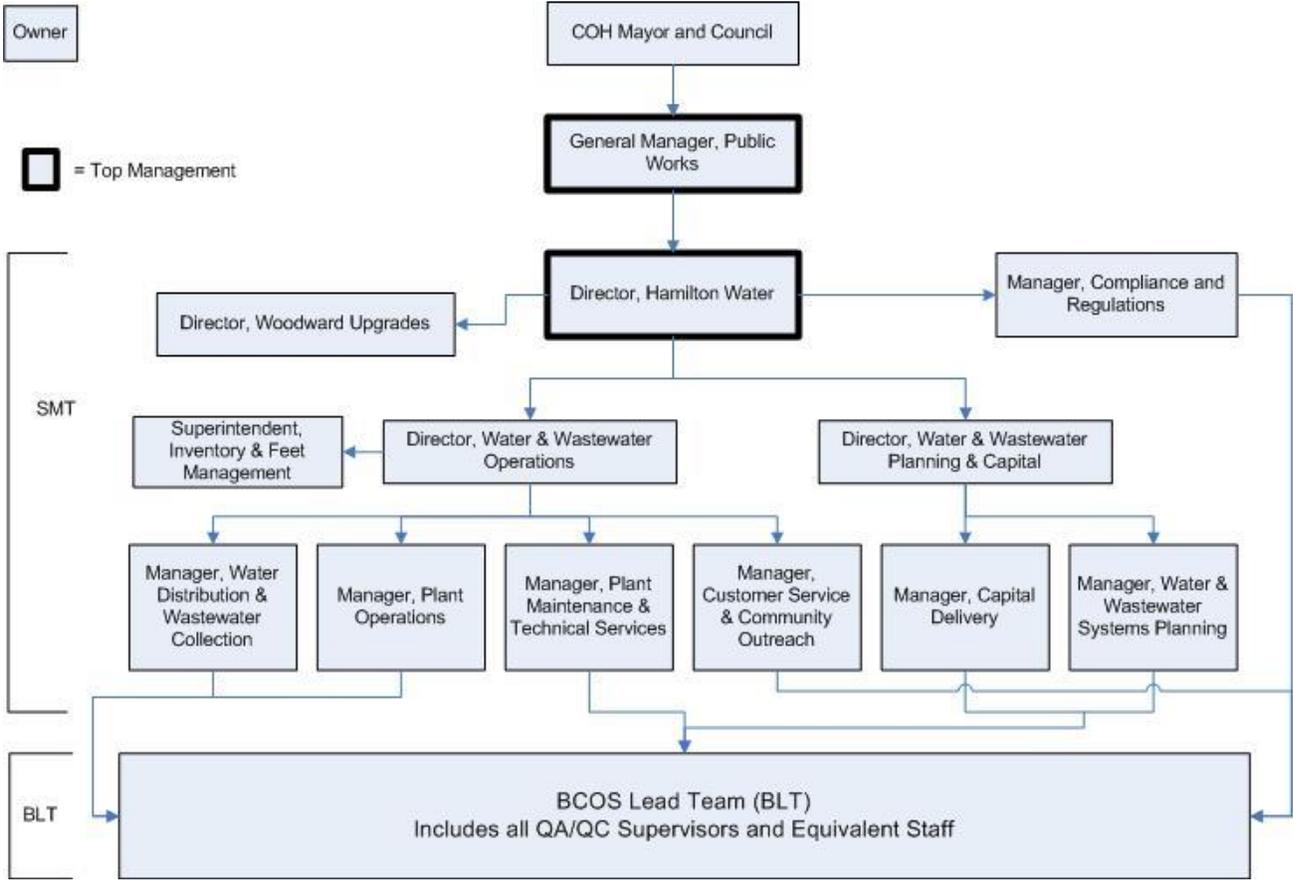
CSG and BLT are responsible for ensuring that Operating Authority staff are kept aware of their respective roles, responsibilities and authorities as they relate to the DWQMS. BCOS and DWQMS System Awareness Training was conducted across the Operating Authority in the summer of 2008. Awareness training for new staff is on-going. Refresher training is offered to staff, as required. All Operating Authority staff are expected to be aware of their roles, responsibilities and authorities. The following is an Organizational Chart defining the Owner, Top Management, SMT, and the BLT. This organizational chart delineates only water related positions and sections.





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**Organizational Structure (Operating Authority)**



**10 COMPETENCIES**

The BCOS + DWQMS Competency and Training Procedure (PW-WW-P-033-001) is an integrated procedure (BCOS and DWQMS) that applies across the Operating Authority and to all types of training including, but not limited to, water quality, environmental, and health and safety training. The procedure defines the framework for identification, delivery, and tracking of training requirements related to the Operating Authority and documents how the Operating Authority ensures competencies of staff that could have a direct input on water quality.

The Hamilton Water Division Core Training Guideline (PW-WW-G-033-002) lists required core and developmental competencies for job positions that could





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potentially impact the quality of water. Training requirements listed are established and approved by the respective Section Managers. Positions potentially impacting the quality of water have been identified as follows:

- Positions that require a Drinking-Water Operator’s Certificate (Treatment Operator, Distribution Operator, or Water Quality Analyst);
- Positions that supervise licensed Operators or Water Quality Analysts; and
- Other positions as recommended by the respective Section Manager.

Supervisors and Superintendents review training requirements with staff during an annual meeting or during their performance appraisals with the purpose of the development and/or maintenance of job position Training Plans.

Training can include a mix of training methods including classroom, hands-on, web-based, self-paced, on-the-job, equipment/site specific training, conferences, seminars, off-site training, operational meetings, one-to-one training, job shadowing, and video presentations. Inputs to Training Plans are identified in the BCOS + DWQMS Competency and Training Procedure (PW-WW-P-033-001).

DWQMS Awareness Training is considered to be a Core Training requirement for all staff of the Operating Authority. This training may also be provided to other City staff outside of the Operating Authority, as required, as well as to Vendors providing essential supplies and services (refer to Section 13.0 of this Operational Plan).

Training records may include Certificates/Licenses, training matrices, sign-in sheets, registration forms, attendance lists, tests/quizzes, comment sheets, etc. These records are managed according to the Control of Records procedure (PW-WW-P-016-001).

In order to better connect staff to available training (e.g. catalogue), use training resources more effectively (e.g. competency tests) and help us manage our training records, HW utilizes the IT tool; the Learning Management Database (LMD).

**11 PERSONNEL COVERAGE**

The DWQMS Personnel Coverage Procedure (PW-WW-P-034-003) is a DWQMS-specific procedure that describes how adequate staffing and personnel coverage are ensured and maintained within the Operating Authority. The procedure describes personnel coverage measures followed during regular business hours as well as during evenings, weekends and holidays, and applies to both water and wastewater operations as relevant to the Operating Authority. Level IV (Sectional) Personnel





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Coverage procedures should be referenced for Section-specific processes, where applicable.

**12 COMMUNICATIONS**

**12.1 Internal Communications**

The BCOS + DWQMS Internal Communications procedure (PW-WW-P-008-001) has been developed to describe HW communication processes with internal stakeholders. The annual DWQMS Communication Plan has been developed to support the implementation and communication needs of the DWQMS and ensures the Owner, HW staff, suppliers, contractors, and customers understand the efforts and measures being put in place to protect the City's DWSs.

Top Management ensures that Council is aware of the DWQMS and communicates with Council to seek decisions/approval and input through Council meetings, informal DWQMS meetings, and Council Update documents.

DWQMS Refresher Training for HW staff is undertaken as needed. DWQMS Refresher Training should include quality management systems, roles and responsibilities under the DWQMS, elements of the DWQMS, including the Operational Plan, and impacts to staff. Staff can access the Operational Plan using the DWQMS website. Staff meetings may also be used as a forum for informing staff of DWQMS news, changes, and updates.

**12.2 External Regulatory and Other Communications**

The BCOS + DWQMS External Regulatory and Other Communications procedure (PW-WW-P-008-002) is an integrated procedure for the BCOS and DWQMS Systems. The purpose of this procedure is to describe HW communication processes with regulatory and other external environmental stakeholders.

Provisions for communication with the public are established in the DWQMS Communication Plan for each calendar year. The C&R and CS&CO Sections work together to provide the public with updated information regarding the DWQMS Operational Plan, the DWQMS Financial Plan, and Water Quality Reports. These documents are made available for review electronically (City website) or upon request. The Control of Records procedure (PW-WW-P-016-001) describes the control and management of these documents. Communication with suppliers is completed according to the DWQMS Essential Supplies & Services Procedure (PW-WW-P-035-001) and the annual DWQMS Communication Plan.





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The External Regulatory and Other Communications procedure (PW-WW-P-008-002) also discusses processes for communication with the Accreditation Body, the MECP, and other related environmental regulatory communications.

12.3 Licencing and Permitting Procedure

The procedure entitled DWQMS Approvals Process for Alterations of Drinking Water Systems (PW-WW-P-004-001) outlines the approvals process and identifies specific requirements needed to make alterations to the COH's DWSs under the licencing and permitting process. This procedure applies to all DWS alterations including: additions, modifications, replacements, or extensions of watermains as well as treatment, storage, and pumping infrastructure. Activities deemed to be maintenance and/or repair to infrastructure are not subject to the approvals requirements specified in this procedure. Alterations to service lines are also outside the scope of this procedure. The procedure applies to staff of HW as well as select staff from the Planning & Economic Development Department and Engineering Services Department.

13 ESSENTIAL SUPPLIES AND SERVICES

The DWQMS Essential Supplies and Services Procedure (PW-WW-P-035-001) is a DWQMS-specific procedure that describes the processes by which the Operating Authority identifies the supplies and services that are deemed essential to water-related operations. The procedure also documents the process followed by the Operating Authority in completing QA reviews for the essential supplies and services.

Essential supplies and services will be identified in the DWQMS Essential Supplies and Services List, PW-WW-L-035-001. A supply or service is identified as essential if, and only if, it meets at least one of the following requirements:

- Essential to the safe delivery of water
- Related to drinking-water disinfection (primary or secondary).

A QA Review of all DWQMS essential supplies and services is undertaken at minimum once per year. The SMR, HW - SMT and BLT review the results of the QA review on an annual basis and suggest potential continual improvement initiatives for DWQMS essential supplies and services, with guidance from HW - SMT. Vendor QA reviews, vendor non-conformances, and resolution actions are discussed as an input to DWQMS Management Review.





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All vendors providing essential supplies and services will be informed of their role in the DWQMS and records will be maintained by the Operating Authority. Quality requirements for supplies and services are determined through provincial regulations, City standards, industry best practices, and purchasing practices.

**14 REVIEW AND PROVISION OF INFRASTRUCTURE**

The DWQMS Review and Provision of Infrastructure procedure (PW-WW-P-025-001) has been developed to document the process followed by the Operating Authority in reviewing the adequacy of its drinking-water system infrastructure. This is a DWQMS-specific procedure that applies to all of the City’s DWS-related infrastructure, including both horizontal and vertical infrastructure.

**15 INFRASTRUCTURE, MAINTENANCE, REHABILITATION AND RENEWAL**

The procedure entitled DWQMS Infrastructure Maintenance, Rehabilitation & Renewal (PW-WW-P-026-001) describes how the Operating Authority undertakes maintenance and infrastructure renewal programs related to the water infrastructure. Infrastructure maintenance is addressed by both planned and unplanned maintenance.

Planned maintenance is scheduled and records are stored in the CMMS (PO and PMATs Sections) and IPS (WD&WWC Section) databases. Server files are backed up daily. Planned maintenance tasks are communicated to the person responsible by issuance of work orders from CMMS (PO and PMATS Section staff) or IPS (WD&WWC Section staff). Completed work orders are reviewed by the designated Superintendent, Supervisor, or Maintenance Tradesperson Maintenance Planner, Technologist, or Operator of the respective Section.

Unplanned maintenance tasks result from equipment malfunction or breakage and / or customer complaints. Measures to prepare for and expedite unplanned maintenance include equipment redundancy (back-up units), spare parts inventory, availability of updated GIS maps of water infrastructure, as well as documented repair and safety procedures.

Replacement of aging fixed heavy equipment, as well as upgrades, expansions, and in-ground systems improvements are planned by the infrastructure review teams as described in Section 14 of this DWQMS Operational Plan Summary Report.





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**16 SAMPLING, TESTING AND MONITORING**

**16.1 General Sampling, Testing and Monitoring**

The DWQMS Sampling, Testing and Monitoring procedure (PW-WW-P-013-004) describes how the Operating Authority undertakes water sampling, testing and monitoring to ensure the production and distribution of safe drinking water. A description of how results are communicated and how regulatory requirements are met is also provided in this procedure.

Sampling, testing and monitoring requirements are identified and incorporated into various sampling plan and schedule documents such as the DWQMS City of Hamilton Drinking Water Sampling Procedure (PW-WW-P-013-002). The plans and schedules are reviewed and updated as necessary to incorporate regulatory and/or operational sampling, testing and monitoring requirements.

The DWQMS Sampling, Testing and Monitoring procedure includes both grab sampling (i.e. discrete samples representing water characteristics at a particular time) and continuous sampling (i.e. the measurement of parameters and processes through the use of online monitors and instruments). All grab samples brought for analysis to the COH's Environmental Laboratory are collected according to protocols as specified by the City of Hamilton Environmental Laboratory General Sampling Protocols (PW-WW-CR-EL-V-011) and Ontario Regulation 170/03 Sampling Protocols for Lead (PW-WW-CR-EL-V-012). Continuous samples are collected and analyzed through the use of online analyzers and instruments as per the Water Regulatory Devices Operations Procedure (PW-WW-PO-P-011-001).

As required, and/or regulated, sampling, testing and monitoring results are communicated to: the Operating Authority, Owner (AWQI), Owner (DWS), Regulators, and to the public. In the event of an AWQI, staff follow the steps outlined in the procedure Adverse Water Quality Incidents (AWQIs) and Corrective Actions (PW-WW-P-015-001).

**16.2 Regulatory Lead Sampling**

To ensure the COH's Lead Sampling Program is implemented in accordance with Ontario Regulation 170/03, Schedule 15.1, the BCOS + DWQMS Regulatory Lead Sampling Program (PW-WW-P-013-009) was developed. This procedure applies to the COH's DWSs and to all aspects of the Lead Sampling Program from the initial point of contact with the consumer to delivery of the Final Report. The Program includes both Industrial/Commercial/Institutional and residential customers.





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**17 MEASUREMENT AND RECORDING EQUIPMENT CALIBRATION AND MAINTENANCE**

The procedure entitled DWQMS Calibration & Maintenance of Measurement & Recording Equipment (PW-WW-P-036-001) describes the requirements for the calibration and verification of measurement and recording equipment used for sampling, testing, and monitoring.

Types of recording equipment used for sampling testing and monitoring may include:

- Chlorine field kits
- Continuous chlorine analyzers
- Flow meters
- Fluoride meters
- pH meters
- Turbidity analyzers
- UV intensity analyzers
- Orthophosphate analyzers

For each type of recording equipment, the procedure provides information including maintenance frequency, methods, and a description of how records of maintenance activities are kept. Also provided is a listing of who is responsible for the maintenance of equipment and related record keeping.

**18 EMERGENCY MANAGEMENT**

The Hamilton Water Emergency Response Plan (PW-WW-P-012-001) is an integrated procedure for BCOS and DWQMS. This procedure describes processes developed to meet Emergency Preparedness and Response requirements of the DWQMS. The procedure also describes the City’s Corporate, Departmental, Divisional, and Sectional Emergency Response structure.

The procedure includes a list of emergencies that could potentially impact one or more of the City’s DWSs. A Risk Assessment approach is used to identify possible risks and to highlight risks requiring Emergency Response Instructions.

Annual testing of the COH (Corporate) Emergency Response Plan, the HW Emergency Response Plan, and the Plant Operation’s E2 Plan is required. Upon completion of testing, a debrief is held to determine possible improvement actions





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and document any procedural upgrades that may be required.

HW staff must receive training for all emergency response plans and/or procedures related to their job or responsibilities. Divisional training requirements are listed in the Hamilton Water Division Core Training Guideline (PW-WW-G-033-002). The City’s Emergency Management Office determines training requirements for the COH’s Emergency Response Plan.

**19 INTERNAL AUDIT**

The BCOS + DWQMS Internal Auditing procedure (PW-WW-P-017-001) is an integrated procedure that describes how HW conducts objective and systematic internal audits as a means of measuring the performance of its BCOS and its DWQMS. DWQMS Internal Audits assess DWQMS-related processes against the DWQMS Standards and relevant system procedures.

Internal auditors are appointed by HW – SMT and are identified in the BCOS + DWQMS Internal Auditor List (PW-WW-L-017-003). Auditors must remain objective and unbiased in their assessments of DWQMS processes and procedures and are prohibited from auditing their own work.

The SMR holds overall responsibility for ensuring that internal audits are planned and executed according to the requirements of the DWQMS Standard and of the BCOS + DWQMS Internal Auditing procedure (PW-WW-P-017-001). The SMR appoints a Lead Auditor on a per-audit basis to assist in planning the internal audit and to oversee the execution of the internal audit.

At minimum, all elements or clauses of the DWQMS must be audited once annually.

Audit findings may indicate the need for corrective, preventive, or improvement actions. Corrective, preventive, and improvement actions are recorded in the BCOS Database (See Section 21.0 of this Operational Plan).

Once scheduled internal audits are completed, the SMR (or designate) reviews audit findings and compiles the information for presentation to SMT. Audit findings must be considered in future relevant audits. In addition, the Internal Audit Program is reviewed on an annual basis as an input to DWQMS Management Review.

**20 MANAGEMENT REVIEW**

The DWQMS Management Review procedure (PW-WW-P-018-001) is a DWQMS-specific procedure that has been developed to document the process followed in planning, executing, and documenting DWQMS Management Reviews. This





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includes provision of feedback to HW sections and reporting of review results to the Owner (DWS). The Management Review process ensures that all levels of the organizational structure are kept informed and aware of DWQMS and DWS performance.

The SMR has a significant role in the DWQMS Management Review process, including the coordination and facilitation of Management Review meetings and the compilation of required input data for presentation to Top Management. Required inputs to Management Review are listed in the DWQMS Management Review procedure (PW-WW-P-018-001). Other Managers or Operating Authority staff may be invited to assist in presenting information to the Management Review Team or to assist in the review of information where they offer additional expertise or insight. Top Management is responsible for reviewing the input materials presented and generating outputs as specified in the DWQMS Management Review procedure (PW-WW-P-018-001).

Management Review Meetings are held at minimum on an annual basis. The Management Review can be conducted as one meeting per year or be split into several smaller meetings over the course of the year. Either method is acceptable as long as all required review inputs and agenda items are addressed over the course of the year.

DWQMS Management Review outputs must be documented and retained as proof of completion. The SMR or delegate prepares minutes of Management Review meetings for this purpose. Top Management or their delegates are responsible for communicating Management Review results to the Owner as per the DWQMS Management Review procedure (PW-WW-P-018-001).

Results of management reviews are summarized in the annual DWQMS Summary Report which is circulated to the Owner (DWS) (Mayor and Council).

**21 CONTINUAL IMPROVEMENT**

The COH is committed to continually improving its DWQMS. Several methods of improvement are embedded in and essential to the system but are not limited to:

- Management Review
- Internal/External Audits
- Kaizens
- Six Sigma Projects





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The integrated BCOS + DWQMS Non-conformance, Corrective & Preventive Action Process procedure (PW-WW-P-015-002) applies to both the BCOS and DWQMS Systems. This procedure documents the process to be taken to ensure the effective resolution of BCOS and DWQMS system non-conformances, potential non-conformances, and legal non-compliances. The process includes a root cause analysis, identification of corrective / preventive actions, and verification of completeness and effectiveness, as required. Corrective actions are generated through audits and management reviews and on an ongoing basis through NC/PNC/OFI submissions. The scope of the procedure does not include the management of adverse water quality events. This process is documented in Adverse Drinking Water Quality Incidents (AWQIs) and Corrective Actions (PW-WW-P-015-001).

The BCOS + DWQMS Corrective and Preventive Action procedure (PW-WW-P-015-002) specifically illustrates how DWQMS non-conformances are resolved. Non-conformances are entered into the "Findings" Application of the BCOS Database. Once details of the nature of the non-conformance are entered into BCOS, a root cause analysis can be completed and an action plan can be developed to correct or prevent the non-conformance. All action plans are verified as being complete. Verification for effectiveness may occur at the discretion of the SMR. All of the above information must be entered into the BCOS Database. Once the completion of the plan has been verified, the non-conformance report can be closed out.

**BCOS software tracks the revision history of document.**

