ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

The Town of Kirkland Lake

OPERATIONAL PLAN

for the *Kirkland Lake Drinking Water System*

(L.J. Sherratt Water Filtration Plant and the Kirkland Lake Distribution System)

Updated: April 9, 2021

This Operational Plan is designed for the exclusive use of the system(s) specified in this Operational Plan.

This Operational Plan has been developed with OCWA's operating practices in mind and utilizing OCWA personnel to implement it.

Any use which a third party makes of this Operational Plan, or any part thereof, or any reliance on or decisions made based on information within it, is the responsibility of such third parties. OCWA accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this Operational Plan or any part thereof.

Any documents developed and owned by OCWA which are referred to in this Operational Plan (including, but not limited to, OCWA's QEMS documents, Standard Operating Procedures, policies and Facility Emergency Plans) remain the property of OCWA. Accordingly, these documents shall not be considered to form part of the Operational Plan belonging to the owner of a drinking-water system under Section 17 of the *Safe Drinking Water Act, 2002*.

QEMS

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Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To document OCWA's Quality & Environmental Management System (QEMS). This Operational Plan defines and documents the QEMS for the Kirkland Lake Drinking Water System operated by the Ontario Clean Water Agency (OCWA). It sets out the OCWA's policies and procedures with respect to quality and environmental management in accordance with the requirements of the Province of Ontario's Drinking Water Quality Management Standard (DWQMS).

2. Definitions

Drinking Water Quality Management Standard (DWQMS) – means the quality management standard approved by the Minister in accordance with section 21 of the SDWA.

Operational Plan – means the operational plan required by the Director's Direction.

Quality & Environmental Management System (QEMS) – a system to:
a) Establish policy and objectives, and to achieve those objectives; and
b) Direct and control an organization with regard to quality.

3. Procedure

3.1 The Kirkland Lake Drinking Water System is owned by the Town of Kirkland Lake. OCWA is the contracted Operating Authority for the Kirkland Lake Drinking Water System, which includes the L.J. Sherratt water filtration plant and the Kirkland Lake distribution system.

3.2 OCWA's Quality & Environmental Management System (QEMS) is structured and documented with the purpose of:

1. Establishing policy and objectives with respect to the effective management and operation of water/wastewater facilities;
2. Understanding and controlling the risks associated with the facility's activities and processes;
3. Achieving continual improvement of the QEMS and the facility's performance.

3.3 The Operational Plan for the facility listed above fulfils the requirements of the MECP's DWQMS. The 21 QEMS Procedures within this Operational Plan align with the 21 elements of the DWQMS.

4. Related Documents

All QEMS Procedures and Documents referenced in this Operational Plan
MECP's Drinking Water Quality Management Standard

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Information within OP-01 was originally set out in the main body of the Kirkland Lake Drinking Water System Operational Plan (revision 3, dated October 13, 2017). New Purpose, Definitions, Procedure, Related Documents and separate Revision History sections. Addition of new wording (s. 3.3) to clarify that the Operational Plan now aligns with the 21 elements of the DWQMS.
Oct. 06, 2019	1	Updated MOECC to MECP.

QUALITY & ENVIRONMENTAL MANAGEMENT SYSTEM (QEMS) POLICY

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To document a QEMS Policy that provides the foundation for OCWA's Quality & Environmental Management System.

2. Definitions

Quality Management System Policy – means the policy described in Element 2 developed for the Subject System or Subject Systems

3. Procedure

3.1 The Ontario Clean Water Agency, its Board of Directors, Officers and entire staff are committed to the principles and objectives set out in our QEMS Policy.

OCWA's Policy is to:

- Deliver safe, reliable and cost-effective clean water services that protect public health and the environment.
- Comply with applicable legislation and regulations.
- Promote client, consumer and stakeholder confidence through service excellence, effective communications and reporting.
- Train staff on their QEMS responsibilities.
- Maintain and continually improve the QEMS.

Originally issued as Environmental Policy on June 8, 1995
Last revised, approved by OCWA's Board of Directors on April 6, 2016
(This policy is annually reviewed)

3.2 Our Board of Directors, Officers and entire staff will act to ensure the implementation of this Policy and will monitor progress of the Quality & Environmental Management System (QEMS).

3.3 OCWA's QEMS Policy is readily communicated and available to all OCWA personnel, the Owner and the public through OCWA's intranet and public websites. A hardcopy of the QEMS Policy is posted as specified in the OP-05 Document and Records Control procedure.

3.4 Essential suppliers and service providers are advised of OCWA's QEMS Policy as per the OP-13 Essential Supplies and Services procedure.

3.5 Corporate Compliance coordinates the annual review and approval of the QEMS Policy by the Board of Directors and communicates the approval to all OCWA employees via an electronic communication.

3.6 The current version of the policy indicates the date of the last revision and that the policy is annually reviewed. Electronic and hard-copy documents that include the QEMS Policy will only be required to be updated in years when the Policy has been revised. A complete review/revision history of the QEMS Policy (documenting the annual policy review and/or revision approval date) is maintained on OCWA's intranet.

4. Related Documents

Current QEMS Policy (Posted on OCWA's intranet and internet)
QEMS Policy Revision History (Posted on OCWA's intranet)
OP-05 Document and Records Control
OP-13 Essential Supplies and Services

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Section 3.4, 3.5 and 3.6 were added to the information originally set out in the main body of the Kirkland Lake Drinking Water System Operational Plan (revision 3, dated October 13, 2017). New sections: Purpose, Definitions, Procedure, Related Documents and a separate Revision History. Minor revisions to wording in s. 3.3 to reference location of posted copy of the policy. Added sections on how annual policy review is conducted (s. 3.5 and s. 3.6) and reference to OP-13 ESS (s. 3.4). The full revision history for the QEMS policy is available on OCWA's intranet.

COMMITMENT AND ENDORSEMENT

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To document the endorsement of the Operational Plan for the Kirkland Lake Drinking Water System by OCWA Top Management and the Town of Kirkland Lake (Owner) and to set out when re-endorsement would be required.

2. Definitions

Top Management – a person, persons or a group of people at the highest management level within an Operating Authority that makes decisions respecting the QMS and recommendations to the Owner respecting the Subject System or Subject Systems

3. Procedure

3.1 The Operational Plan is provided to OCWA Top Management and to the Owner for endorsement. The signed written endorsement is presented in Appendix OP-03A. At a minimum, two members of Top Management must endorse the Operational Plan; however, the Operational Plan is made available to all members of Top Management in the specified document control location (refer to OP-05 Document and Records Control). Endorsement by OCWA's Top Management is represented by the Senior Operations Manager and the Regional Hub Manager.

Endorsement by the Owner is represented by the Mayor and the CAO or Clerk.

3.2 Any major revision of the operational plan will be re-endorsed by OCWA Top Management and the Owner. Major revisions include:

1. A revision to OCWA's QEMS Policy;
2. A change to both representatives of the facility's Top Management and/or both of the Owner's representatives that endorsed the Operational Plan;
3. A modification to the drinking water system processes/components that would require a major change to the description in OP-06 Drinking Water System;
4. The addition of a drinking water subsystem owned by the same Owner to this operational plan.

Any other changes would be considered a minor change and would not require the Operational Plan to be re-endorsed.

4. Related Documents

OP-03A Signed Commitment and Endorsement
OP-05 Document and Records Control
OP-06 Drinking Water System

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Information within OP-03 was originally set out in the main body of the Kirkland Lake Drinking Water System Operational Plan (revision 3, dated October 13, 2017). Procedure provides information on who from Top Management endorses the Operational Plan (s. 3.1); when owner re-endorsement is sought and 'criteria' as to what is considered a major revision to the Plan (s. 3.2). Appendix OP-03A includes the Owner and Top Management sign-off section.
Jan. 23, 2019	1	Updated step 3.1 to include representatives of the Owner who are responsible for re-endorsement of the Operational Plan and changed step 3.2.3 by adding "major" changes in the system description will require re-endorsement of the Plan.

QEMS Ontario Clean Water Agency	**OPERATIONAL PLAN** Kirkland Lake Drinking Water System	QEMS Doc: OP-03A Rev Date: 2020-03-20 Rev No: 1 Pages: 1 of 1

SIGNED COMMITMENT AND ENDORSEMENT

This Operational Plan sets out the framework for OCWA's Quality & Environmental Management System (QEMS) that is specific and relevant to your drinking water system(s) and supports the overall goal of OCWA and the Town of Kirkland Lake (Owner) to provide safe, cost-effective drinking water through sustained cooperation. OCWA will be responsible for developing, implementing, maintaining and continually improving its QEMS with respect to the operation and maintenance of the Kirkland Lake Drinking Water System and will do so in a manner that ensures compliance with applicable legislative and regulatory requirements.

Through the endorsement of this Operational Plan, the Owner commits to work with OCWA to facilitate this goal.

OCWA Top Management Endorsement

Anthony Danis
Senior Operations Manager, Kirkland Lake Cluster

Date: Apr 16/20

Eric Nielson
Regional Hub Manager, Northeastern Ontario Regional Hub

Date: Apr 16/20

Owner Endorsement

Rick McGee
Chief Administrative Officer

Date: 2020-04-16

Pat Kiely
Mayor

Date: 2020-04-16

The endorsement above is based on the Operational Plan that was current as of the revision date of this document (OP-03A).

QUALITY & ENVIRONMENTAL MANAGEMENT SYSTEM (QEMS) REPRESENTATIVE

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To identify and describe the specific roles and responsibilities of the QEMS Representative(s) for the Kirkland Lake Drinking Water System.

2. Definitions

None

3. Procedure

3.1 The role of QEMS Representative for the Kirkland Lake Drinking Water System is the Process and Compliance Technician (PCT). The Safety, Process and Compliance Manager (or alternate PCT) will act as an alternate QEMS Representative when required.

3.2 The QEMS Representative is responsible for:

- Administering the QEMS for the Kirkland Lake Drinking Water System by ensuring that processes and procedures needed for the facility's QEMS are established and maintained;
- Reporting to Top Management on the facility's QEMS performance and identifying opportunities for improvement;
- Ensuring that current versions of documents related to the QEMS are in use;
- Promoting awareness of the QEMS to all operations personnel; and
- In conjunction with Top Management, ensuring that operations personnel are aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the system.

4. Related Documents

None

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Information within OP-04 was originally set out in the main body of the Kirkland Lake Drinking Water System Operational Plan (revision 3, dated October 13, 2017). New Purpose, Definitions, Procedure, Related Documents and separate Revision History sections. Change to responsibilities: Operations Manager no longer considered QEMS Representative and SPC Manager to act as alternate as required (s. 3.1); added wording to clarify shared responsibilities for Top Management and QEMS Representative to ensure operations personnel are aware of applicable legislative and regulatory requirements (s. 3.2).

DOCUMENT AND RECORDS CONTROL

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe how OCWA's QEMS documents are kept current and how QEMS documents and records are kept legible, readily identifiable, retrievable, stored, protected, retained and disposed of. This procedure applies to QEMS Documents and QEMS records pertaining to the Kirkland Lake Drinking Water System as identified in this procedure.

2. Definitions

Document – includes a sound recording, video tape, film, photograph, chart, graph, map, plan, survey, book of account, and information recorded or stored by means of any device

Record – a document stating results achieved or providing proof of activities performed

QEMS Document – any document required by OCWA's QEMS as identified in this procedure

QEMS Record – any record required by OCWA's QEMS as identified in this procedure

Controlled – managed as per the conditions of this procedure

Retention Period – length of time that a document or record must be kept; starts from the date of issue for QEMS records or from the point of time when a QEMS document is replaced by a new or amended document

3. Procedure

3.1 Documents and records required by OCWA's QEMS and their locations are listed in Appendix OP-05A Document and Records Control Locations.

3.2 Internally developed QEMS documents and QEMS records (whenever possible) are generated electronically to ensure legibility and are identified through a header/title and issue date. Handwritten records must be legible and permanently rendered in ink or non-erasable marker.

3.3 Controls for the Operational Plan include the use of authorized approval, alpha-numeric procedure code, issue date, page numbers on every page, revision number and revision history.

Authorized personnel for review and approval of this Operational Plan are:

Review: QEMS Representative, Team Lead or Overall Responsible Operator (ORO)
Approval: SPC Manager or Operations Management

3.4 The QEMS Representative is responsible for ensuring that current versions of QEMS documents are being used at all times. Current QEMS documents and records are

readily accessible to operations personnel and to internal and external auditors/inspectors at established document control locations. The currency of internal documents is ensured by comparing the date on the document to that of the master hardcopy and/or electronic copy residing in the designated document control location(s) specified in Appendix OP-05A.

Document control locations are established in areas that provide adequate protection to prevent unauthorized use/access, damage, deterioration or loss of QEMS documents and records. Copies of QEMS documents and records located outside of designated control locations are considered uncontrolled.

3.5 Access to OCWA's computer network infrastructure is restricted through use of individually-assigned usernames and passwords and local area servers. Network security is maintained by OCWA's Information Technology department through a number of established mechanisms and practices such as daily back-up of files stored on servers, password expiry, limitations on login attempts and policies outlining specific conditions of use.

Access to facility QEMS records contained within internal electronic databases and applications (e.g., Wonderware, OPEX, PDM, WMS) is administered by designated application managers/trustees, requires the permission of Operations Management and is restricted through use of usernames and passwords. Records are protected by means of regular network back-ups of electronic files stored on servers and/or within databases.

3.6 Any employee of the drinking water system may make a verbal or written request for a revision to improve an existing internal QEMS document or request the preparation of a new document. These requests are to be made to the QEMS Representative and should indicate the reason for the change. The need for new or updated documents may also be identified through the Management Review or system audits.

The QEMS Representative communicates any changes made to QEMS documents to relevant operations personnel and coordinates related training (as required). Changes to corporately controlled QEMS documents are communicated and distributed to facility QEMS Representatives by OCWA's Corporate Compliance Group through e-mails, memos and/or provincial, regional hub/cluster or facility-level training sessions.

3.7 When a QEMS document is superseded, the hardcopy of the document is promptly removed from its location for disposal or retention (as appropriate). The authorized method for disposal of hardcopy documents and records after the specified retention requirements have been met is shredding.

3.8 Electronic copies are re-located to an obsolete folder and marked "superseded".

3.9 QEMS documents and records are retained in accordance with applicable regulations and legal instruments. Relevant regulatory and corporate minimum retention periods are as follows:

Type of Document/Record	Minimum Retention Time	Requirement Reference
DWQMS Operational Plan	10 years	Director's Direction under SDWA
Internal QEMS Audit Results	10 years	OCWA Requirement
External QEMS Audit Results	10 years	OCWA Requirement
Management Review Documentation	10 years	OCWA Requirement
Documents/records required to demonstrate conformance with the DWQMS (specifically all the documents/records listed in OP-05A)	3 years*if no specified legislative requirement below*	OCWA Requirement
Log Books or other record-keeping mechanisms	5 years	O. Reg. 128/04
Training Records for water operators and water quality analysts	5 years	O. Reg. 128/04
Operational checks, sampling and testing (e.g., chlorine residuals, turbidity, fluoride, sampling records), microbiological sampling and testing and chain of custodies	2 years	O. Reg. 170/03
Schedule 23 & 24 (LMR) and THM, HAA, nitrates, nitrites and lead program sampling and testing, Section 11 Annual Reports and Schedule 22 Summary Reports	6 years	O. Reg. 170/03
Sodium test results and related corrective action records/reports, 60 month fluoride test results (if the system doesn't fluoridate), Engineering Reports	15 years	O. Reg. 170/03
Lead samples, correction action records/reports for E. Coli, Total Coliforms and bacterial species	2 years	O. Reg. 170/03
Corrective action records/reports for chemical and radiological parameters under SDWA O. Reg. 169/03, pesticides not listed under O. Reg. 169/03 and health-related parameters in an order or approval	6 years (LMR) 15 years (SMR)	O. Reg. 170/03
Flow Meter Calibration Records, Analyzer Calibration Reports Maintenance Records/Work Orders	2 years	O. Reg. 170/03

3.10 The Operational Plan is reviewed for currency by the QEMS Representative during internal/external audit and Management Review processes. Other QEMS-related documents are reviewed as per the frequencies set out in this Operational Plan or as significant changes (e.g., changes in regulatory requirements, corporate policy or

operational processes and/or equipment, etc.) occur. QEMS documents and records are reviewed for evidence of control during each internal system audit as per OP-19 Internal QEMS Audits.

4. Related Documents

OP-05A Document and Records Control Locations
OP-19 Internal QEMS Audits
OP-20 Management Review

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 28, 2015	1	Revised Table 1 to include the Town's Consumer Complaint record
Jun. 29, 2016	2	Changed Team Lead to Senior Operator, added overall responsible operator (ORO) and Town of Kirkland Lake's Waterworks Foreman; Revised Table 1 to include the SCADA System Manual – Alarm Index and to update controlled locations for the Operational Plan, ORO letter, Sample schedule, Operations Manual, Incident Reports, Facility Sheets.
Oct. 17, 2016	3	Updated Table 1 to municipal operator certificates, and training records and the internet as a location for Equipment Operation Manual; added the distribution log book, changed the location for call-in reports, WMS summary reports, maintenance and calibration records; changed monthly reports to quarterly reports to the Owner.
Oct. 13, 2017	4	Removed position of Operations Manager and added the new position for Safety, Process and Compliance Manager, corrected system name in step 5.3, changed control location for Operational Plan, Tailgate records, Transportation and Dangerous Goods records and SCADA reports.
Jul. 06, 2018	5	QP-01 procedure renamed OP-05. Removed Scope and Responsibilities sections. Moved the former Table 1 (Designated location for documents and records required by OCWA's QEMS) to its own appendix (OP-05A). Assigned responsibility for ensuring current versions of QEMS documents are being used to the QEMS Representative (s. 3.4). Clarified that requests for revisions/new QEMS documents are made to the QEMS Representative (s. 3.6). Moved the former Table 2 (Relevant regulatory and corporate minimum retention periods) to be part of s. 3.9 and expanded on the minimum retention times for documents and records required to demonstrate compliance with legislation. Other minor wording changes.
Oct. 06, 2019	6	Changed Senior Operator to Team Lead in Step 3.3 and added Step 3.8 to describe how superseded electronic documents are managed.

DOCUMENT AND RECORDS CONTROL LOCATIONS

Designated locations for documents and records required by OCWA's QEMS

Type of Document/Record	Designated Document Control Location (HC = Hardcopy, EC = Electronic)
Internal QEMS Documents	
Confined Space Program	HC – Kirkland Lake Wastewater Treatment Plant
Emergency Response Plan (corporate)	EC - OCWA's intranet (ocwanet.ocwa.com)
Facility Emergency Plan (FEP) Binder (includes Emergency Contact List, Essential Supplies and Services List, OCWA's Emergency Communications Protocol, Contingency Plans, Site Specific Emergency Procedures and OCWA's Emergency Management Program)	HC - Kirkland Lake Water Treatment Plant
OCWA's Health & Safety Management System	EC - OCWA's Portal http://portal.ocwa.com/
On-call Schedule	EC - Microsoft Outlook Shared Calendar (Team Lead)
Operational Plan (includes QEMS Procedures)	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System EC - Municipal website http://www.kirklandlake.ca HC - Kirkland Lake Wastewater Treatment Plant HC - Town of Kirkland Lake Public Works Department
ORO Letter	EC - \\ocwfile\public\NEO DWQMS\DWQMS
QEMS Policy	EC – OCWA's public website www.ocwa.com & OCWA's intranet (ocwanet.ocwa.com) HC - Kirkland Lake Process & Compliance Office HC - Kirkland Lake Wastewater Treatment Plant
Sample Schedule	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System HC - Kirkland Lake Water Treatment Plant
Vacation Calendar	EC - Microsoft Outlook Shared Calendar (Team Lead)
Internal QEMS Forms (blank)	
Analysis and Action Plan (AAP) Form	EC - \\ocwfile\public\NEO DWQMS\DWQMS
Community Complaint Form	
Contingency Plan Review/Test Summary Form	
Distribution Maintenance and Repair Form	
Environmental Incident Report Form	
Facility Rounds Sheets	
Incidents of Non-Compliance Form	
Instrumentation Calibration/Maintenance Report Form	
Laboratory Chain of Custody Forms	
Loss of Pressure Incident Form	
QEMS – Summary of Findings Spreadsheet	
Tailgate Meeting Form	

DOCUMENT AND RECORDS CONTROL LOCATIONS

Type of Document/Record	Designated Document Control Location (HC = Hardcopy, EC = Electronic)
Transportation of Dangerous Goods Form	
External QEMS Documents	
American Water Works Association (AWWA) Standards (as referenced in the DWWP) & MECP's Watermain Disinfection Procedure	EC - \\ocwfile\public\NEO DWQMS\DWQMS
Applicable Federal and Provincial Legislation	Online at www.e-laws.gov.on.ca
DWQMS Standard	EC - https://www.ontario.ca
Equipment Operation /Maintenance Manuals	HC - Kirkland Lake Water Treatment Plant EC - Internet
MECP Inspection Reports	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Municipal By-laws	Municipal Office
Municipal Drinking Water Licence (MDWL) / Drinking Water Works Permit (DWWP) / Permit to Take Water (PTTW)	HC - Kirkland Lake Water Treatment Plant
Operations Manual (including standards operating procedures)	HC - Kirkland Lake Water Treatment Plant (plant) HC – Kirkland Lake Public Works Office (distribution)
Operator Certificates (OCWA)	HC - Kirkland Lake Wastewater Treatment Plant
Operator Certificates (Municipality)	HC – Town of Kirkland Lake Public Works Department
External QEMS Forms (blank)	
Adverse Water Quality Incident (AWQI) Form	EC - \\ocwfile\public\NEO DWQMS
MECP Forms (Form 1,2,3 and Director Notification)	EC - \\ocwfile\public\NEO DWQMS
QEMS Records	
Adverse Water Quality Incident (AWQI) Reports	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Analysis and Action Plan (AAP) Report	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Annual Compliance / Summary Reports for Municipalities	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Audit Reports - External	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Audit Reports - Internal	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Call-in Reports	EC - Workplace Management System (Maximo)
Community Complaint Records	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Contingency Plan Review/Test Summary	EC - \\ocwfile\public\NEO DWQMS
Distribution Maintenance and Repair Records (water main breaks, replacements and new installs)	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Distribution Maintenance Records (for regularly scheduled maintenance)	HC – Town of Kirkland Lake Public Works Department

DOCUMENT AND RECORDS CONTROL LOCATIONS

Type of Document/Record	Designated Document Control Location (HC = Hardcopy, EC = Electronic)
Environmental Incident Reports	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Facility Logbooks	HC - Kirkland Lake Water Treatment Plant HC - Kirkland Lake Public Works Department
Facility Rounds Sheets	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Incidents of Non-Compliance Records	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Infrastructure Review (Capital Letter & 5 Year Capital/Major Maintenance Recommendations)	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Laboratory Analytical Reports and completed Chain of Custody Forms	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Loss of Pressure Incident Report	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Maintenance & Calibration Records (completed WMS work orders)	EC - Workplace Management System (WMS)
Management Review Documentation	EC - \\ocwfile\public\NEO DWQMS - Kirkland Lake Drinking Water System
MECP Records (Form 1,2,3 & Director Notification)	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Operator Training Records (OCWA)	EC - OCWA's Training Summary Database
Operator Training Records (Municipality)	HC - Public Works Department
QEMS Communications - External	EC - Microsoft Outlook E-mail
QEMS Communications - Internal	EC - Microsoft Outlook E-mail
QEMS – Summary of Findings Record	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
Quarterly Operations Reports (to the Owner)	EC - \\ocwfile\public\NEO DWQMS\DWQMS - Kirkland Lake Drinking Water System
SCADA Records	EC – Plant Computer EC - Outpost5/Wonderware (selected parameters)
Tailgate Records	HC – Kirkland Lake Process and Compliance Office
Transportation of Dangerous Goods Record	HC – Kirkland Lake Process and Compliance Office

Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	5	Appendix issued; Table was originally included within the Document and Records Control Procedure (QP-01) (revision 3, dated October 13, 2017). Added section for blank external QEMS forms, changed location for Confined Space Program and Operational Plan and changed name

DOCUMENT AND RECORDS CONTROL LOCATIONS

Date	Revision #	Reason for Revision
		of OCWA's Safety Manual to OCWA's Health and Safety Management System and its location.
Jan. 23, 2019	6	Updated table to include distribution maintenance records (for regularly schedule maintenance) to be kept at the Towns Public Works Office.
Oct. 06, 2019	7	Added OCWA's Emergency Communication Protocol to documents identified with the FEP binder, removed OCWA's Reference Manual, changed Senior Operator to Team Lead for the on-call and vacations schedules, added Loss of Pressure Incident Report under document/records and updated MOECC to MECP.
Sep. 25, 2020	8	Updated designated location for SCADA records and changed location of the Operational Plan to the Public Works Department rather than the Municipal Office.

1. Purpose

To document the following for the Kirkland Lake Drinking Water System:

- The name of the Owner and Operating Authority; and
- Provide a description of the system, including all applicable water sources, treatment system processes and distribution system components.

2. Definitions

Distribution System - means the part of a drinking water system that is used in the distribution, storage or supply of water and that is not part of a treatment system.

Primary Disinfection - means a process or series of processes intended to remove or inactivate human pathogens such as viruses, bacteria and protozoa in water.

Secondary Disinfection - means a process or series of processes intended to provide and maintain a disinfectant residual in a drinking water system's distribution system, and in plumbing connected to the distribution system, for the purposes of:

(a) protecting water from microbiological re-contamination;
(b) reducing bacterial regrowth;
(c) controlling biofilm formation;
(d) serving as an indicator of distribution system integrity; and

includes the use of disinfectant residuals from primary disinfection to provide and maintain a disinfectant residual in a drinking water system's distribution system for the purposes described in clauses (a) to (d).

Treatment System - means any part of a drinking water system that is used in relation to the treatment of water and includes,

(a) any thing that conveys or stores water and is part of a treatment process, including any treatment equipment installed in plumbing,
(b) any thing related to the management of residue from the treatment process or the management of the discharge of a substance into the natural environment from the system, and
(c) a well or intake that serves as the source or entry point of raw water supply for the system;

3. Procedure

3.1 Drinking Water System Overview

Owner / Operating Authority

The Kirkland Lake Drinking Water System is owned by the Corporation of the Town of Kirkland Lake and consists of a Class 3 conventional design water treatment plant (the Lionel. J. Sherratt water treatment plant) and a Class 2 water distribution system. The Ontario Clean Water Agency (OCWA) is designated as the Overall Responsible

Operator for both the water treatment and water distribution facilities. Certified municipal operators assist OCWA by performing routine maintenance, check and repairs of the distribution system.

The Kirkland Lake Drinking Water System has an approved rated capacity of 22,500 m^3/day and provides a potable water supply to the Town of Kirkland Lake which includes the communities of Chaput Hughes and Swastika

3.2 Source Water

Raw Water Supply

The L. J. Sherratt water plant draws raw water from Gull Lake through a 146 m long, 710 mm diameter intake pipe. The pipe terminates in an intake chamber located approximately 10 m from the lake shoreline. A 750 mm diameter, 17 m long pipe connects the intake chamber and the water plant.

A traveling water screen is installed immediately inside the plant. The screen removes large floating debris from the water prior to treatment. The provision for a manual screen immediately downstream from the traveling screen offers back up screening in the event the traveling screen is out of service. Following the screening, the raw water can be disinfected (pre-chlorination) prior to entering the wet well of the Low Lift Pumping Station. The raw water is also injected with soda ash, usually during the winter months to stabilize the water and aid in the coagulation and flocculation process which helps reduce the amount of iron and manganese passing through the process and into the distribution system. Soda ash is injected prior to the mechanical bar screen and operates pace-to-flow.

A chlorine dioxide pilot trial was implemented at the L. J. Sherratt water treatment plant in January 2018 to help reduce the amount of iron and manganese in the finished water leaving the plant. The process was permanently implemented in January 2019. Chlorine dioxide is injected into the bottom of the raw water wet well following the mechanical screens. It is flow paced to the raw water flow meter which is located on the common raw water header. Chlorine dioxide is generated and stored on site using a vendor supplied package generator system. The generator uses chlorine gas, which already exists on-site and 25% sodium chlorite solution which is stored in two (2) 1500 US gallon bulk tanks as feed chemicals which are drawn under partial vacuum into the generator. The generator is called to start on a low level signal in the day tank. The generator also uses a finished water supply line and a finished water booster pump to boost water pressure to a minimum of 60 psi. Upon fault condition, the generator will shut down.

General Characteristics

The raw water source for the treatment plant is Gull Lake. Gull Lake water is typically very low in turbidity (<2 NTU), hardness and alkalinity but moderate in colour, and

slightly basic. Temperature fluctuates significantly throughout the seasons ranging from approximately 4 Celsius in the winter to as high as 23 Celsius during the summer. Chemical and bacteriological analysis of the raw water indicates a source of good quality. The local Board of Health, through a provincial Order-In-Council dated Feb. 6th 1934 and The Township of Teck Act 1938, is responsible for the administration of the sanitary control for the public water supply of the Town as sourced from: Gull Lake and the drainage area of Gull, McTavish and Victoria Lakes. The Township of Teck Act 2(1) provides the town with power to control sanitation of this watershed, "The corporation may, with the approval of the department of Health for Ontario, by by-law control and regulate the sanitation of that area…".

*Gull Lake: Raw Water Characteristics (*based on average data from 2014 to 2019)

Characteristic	Average					
	2014	2015	2016	2017	2018	2019
E. coli (CFU/100 mL)	1.8	2.4	2.1	2.4	2.4	2.5
Total Coliforms (CFU/100 mL)	27	25	32	14	34	53
Turbidity (NTU)	0.72	0.79	0.89	0.76	1.85	1.16
pH	6.86	6.76	6.94	6.74	7.10	7.05
Apparent Colour (ACU)	-	37	30	24	36	33
Temperature (°C)	9.90	9.95	12.6	11.3	12.9	11.0
Iron (mg/L)	-	0.330	0.070	0.033	0.160	0.160
Manganese (mg/L)	-	0.261	0.031	0.051	0.080	0.061
Sodium (mg/L)	-	-	-	-	-	13.0

Common Fluctuations

Seasonal changes in raw water temperatures cause vertical turnover of the lake water during spring and fall. Turnover typically takes place over a relatively short duration (~2 – 7 days). During this period, settled solids from the lakebed are re-suspended resulting in increased raw water turbidity. Operators make appropriate plant adjustments to treat the elevated levels of turbidity experienced during turnover events.

Changes in water temperature will also impact treatment process performance (settling, disinfection). Warmer temperatures can result in algae blooms and the presence of cyanobacteria. A sampling program for microcystins is initiated from June to October each year. Colder winter temperatures may result in an increase of colour complaints. Optimal treatment requires timely adjustments to treatment chemical dosages (chlorine dioxide, disinfectants and coagulants) in response to temperature fluctuations.

High levels of iron and manganese occur in the raw water during the winter months when the lake is frozen over. The dissolved oxygen levels drop in the lake when ice cover forms over the surface, resulting in dissolution of iron and manganese into the

source water. The iron and manganese then pass through the treatment processes and precipitates out in the distribution system causing a high number of discoloured water complaints. The addition of soda ash and the implementation of a chlorine dioxide system are methods being used to help resolve this issue and reduce complaints.

Threats

Potential sources of raw water contamination include potential spills from adjacent train tracks and highway. Biological contamination from wildlife (eg. beavers) and harmful algae blooms may also be a potential risk.

Human activity including recreational is limited to help ensure the safety of the water source.

Operational Challenges

Operational challenges include seasonal/weather lake fluctuations such as thermal turnover and ice cover. Proper operation of the treatment processes help to meet the challenges of natural lake fluctuations.

3.3 Treatment System Description

Water Treatment

1. Coagulation / Flocculation / Sedimentation

The Low Lift Pumping Station (LLPS), equipped with five pumps, transfers water from the wet well (where water level corresponds to the water level in the lake) to the treatment processes. The raw water is continuously monitored by a 12" magnetic flow meter and flows by gravity through the treatment processes.

The first step of water treatment is coagulation; a process of destabilization and initial aggregation of colloidal and finely divided suspended matter by the addition of a floc-forming chemical. Raw water enters the treatment stage through an inlet chamber. Just prior to entering the chamber, a chemical coagulant, aluminum sulfate (alum), is injected into raw water and is rapidly agitated with a flash mixer.

The mixture then overflows into three (3) contact compartments – one per pre-treatment unit. In the compartments, the mixing weirs gently turn the mixture in order to promote coagulation. Just prior to leaving the mixing chambers, a flocculant aid, FloPam – an inorganic polymer, is added.

Flocculation in water treatment is agglomeration of colloidal and finely divided suspended matter after coagulation by gentle agitation by either mechanical or hydraulic means, sometimes with an aid of chemical flocculant.

The mixture enters the bottom distribution piping of each Degremont Ultra-Pulsator clarifier via vacuum chambers. The vacuum in the chambers is created by the vacuum pumps, one per chamber. The purpose of the vacuum chambers is to create gentle movement of the sludge blanket in the clarifier for both flocculation and sludge removal.

Sedimentation is the process of subsidence and deposition of suspended matter, carried by water or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid to below the point at which it can transport the suspended material or floc.

The flow is distributed equally over the full area of the clarifiers through the distribution pipes in the bottom of the unit. The flow percolates through the sludge blanket. Upon exiting the sludge blanket, the water flows through a plate settler and then the tube settler. Clarified water is gathered by the collection pipes at the top of the units and transferred to channels that lead to the filters.

2. Filtration

Filtration is the process of passing a liquid through a filtering medium (consisting of granular material, sand and anthracite) for the removal of suspended or colloidal matter.

There are four (4) dual media filters at the plant. Each filter is approximately 6.4 m x 4.3 m x 3m deep and rated to operate at a maximum rise rate of 9.0 m/hr or a maximum flow rate of 65.0 L/sec. The filter media consists of 450 mm of anthracite underlain by a 300 mm layer of silica sand. A concrete underdrain slab outfitted with strainer nozzles supports the filter media. During normal operation, the water flows into the filter from the filter channel via an inlet sluice gate and travels through the media in a downward pattern. The filtered water is collected in the underdrain area and transported by pipes to the clearwell, located under the ground slab of the plant. The flow through each filter is measured by individual flow meters and is controlled by dedicated filter control valves. A headloss indicator monitors the filter media condition. The filtrate quality is continuously monitored by individual turbidimeters, and a particle analyzer.

3. Disinfection (Chlorination)

Filtered water is disinfected following filtration. Chlorine solution is diffused into the water stream in the clearwell of the treatment building. The diffuser and a series of baffles promote complete mixing of chlorine with water. The chlorine solution is prepared on-site by mixing chlorine gas with water. A chlorinator controls the chlorine gas feed rate. There are two (2) chlorinators installed at the plant; one serves as a duty pre-chlorinator while the second is a duty post-chlorinator. Chlorine gas is mixed with water in the ejectors and is sent to diffusers as a chlorine solution. SCADA monitors the chlorinators which will generate alarms upon high and low vacuum levels or abnormal chlorine levels. Each chlorinator is rated to supply 67.0 kg per day of chlorine gas which, based on the plant rated capacity, equals to the maximum chlorine feed rate of up to 3.0 mg/L (3.0 ppm or parts per million) at each location. The gas is withdrawn at any given time from only one of the two one tonne cylinders that are located on the

monitored weigh scale. The chlorine feed system will switch automatically to another cylinder when pressure in the duty cylinder drops below the pre-set value. If both cylinders approach low levels, SCADA will alarm the operator.

4. pH Adjustment

The pH adjustment process uses 40% sodium hydroxide (NaOH) to restore treated water to a neutral pH. Two metering pumps (1 duty and 1 standby) feed the NaOH to the clearwell of the treatment building at the point of exit to the pumping building. At this point, the treated water is continuously monitored for pH, free chlorine residual, flow and pressure before being pumped by four high lift pumps to the distribution system.

Process Waste Residuals Management

Filter backwash water and withdrawn sludge from the sedimentation tanks are directed to two wastewater tanks. The capacity of each tank is approximately 900 m^3. Wastewater is discharged to the sanitary sewer system.

Emergency Power

A 500 kW standby diesel generator equipped with an automatic transfer switch supplies power for essential plant operations during a power outage. Diesel fuel is stored in an underground fuel storage tank with an approximate volume of 4000 imperial gallons and in-plant fuel day tank with an approximate volume of 44.5 imperial gallons.

Control System

Control System Supervisory Control and Data Acquisition (SCADA) is the method of control implemented for the Kirkland Lake Water Treatment System. All analyzing, monitoring and control module equipment information is routed through the SCADA system for operator monitoring and control. Control of equipment can be accomplished locally using the SCADA computer located at the Kirkland Lake water treatment plant or remotely using operator computers and cell phones. Alarm capability and set point adjustment along with trend monitoring are also available through SCADA system controls.

3.4 Treatment System Process Flow Diagram

Refer to Figure 1 on page 8.

3.5 Description of the Distribution System Components

The Kirkland Lake Drinking Water System is classified as a Large Municipal Residential Drinking Water System and provides water to approximately 9000 residents

through 2740 residential service connections. Distribution piping typically ranges in size from 150 mm to 250 mm, and may consist of cast iron, ductile iron, or PVC, depending on the location and date of installation. Typical system pressure ranges from 55 P.S.I. to 70 P.S.I. The standpipe provides for storage for approximately 7,115 m³ of water, helps stabilize water pressure in the distribution system and provides extra water in the case of an emergency. To ensure optimum chlorine residual in the distribution system there are two chlorine booster stations, one at the Chaput Hughes Water Control Building/Standpipe and the other at the Swastika Water Control Building.

3.6 Distribution System Components Map

Refer to Figure 2 on page 9.

4. Related Documents

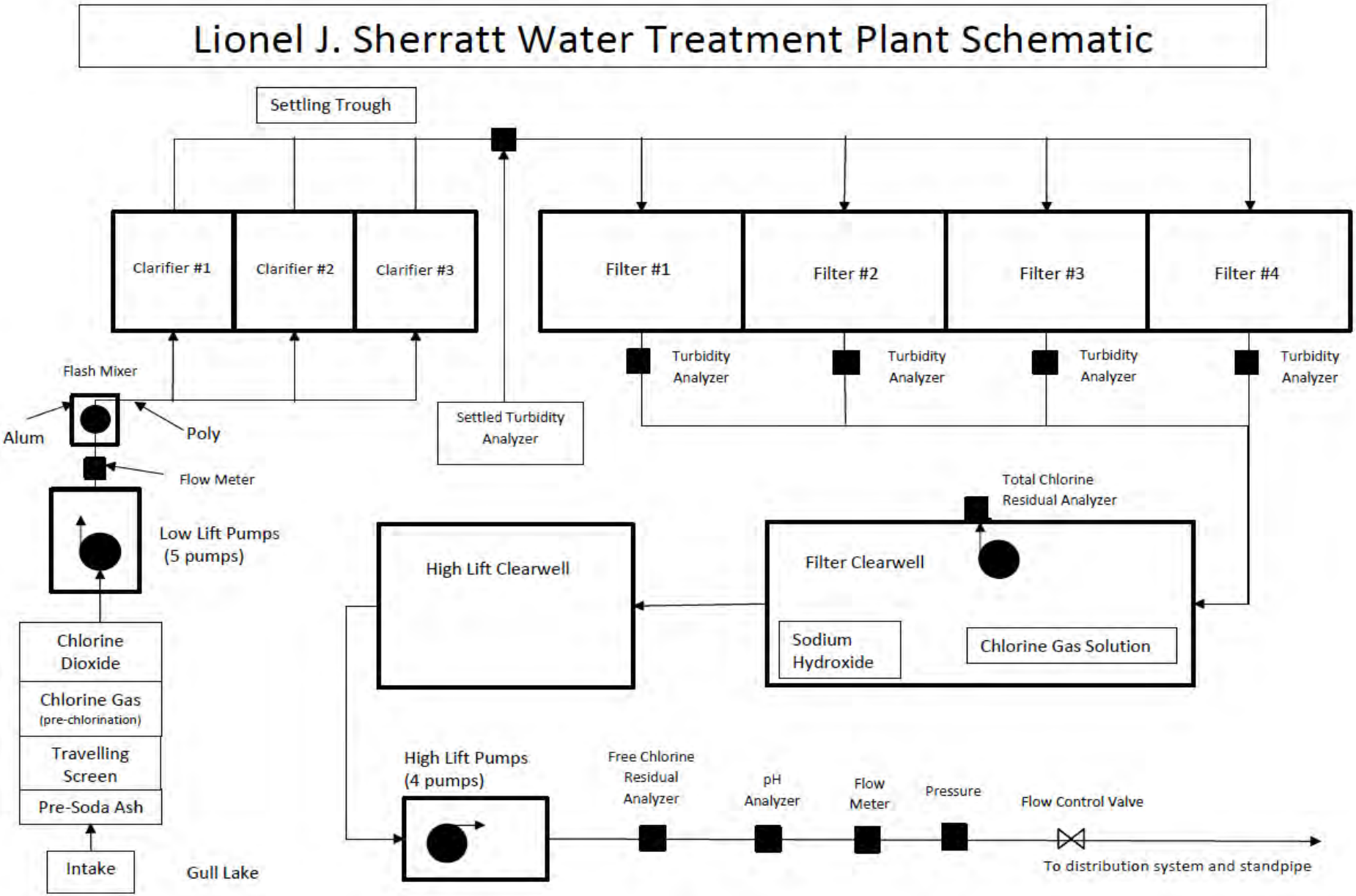
None

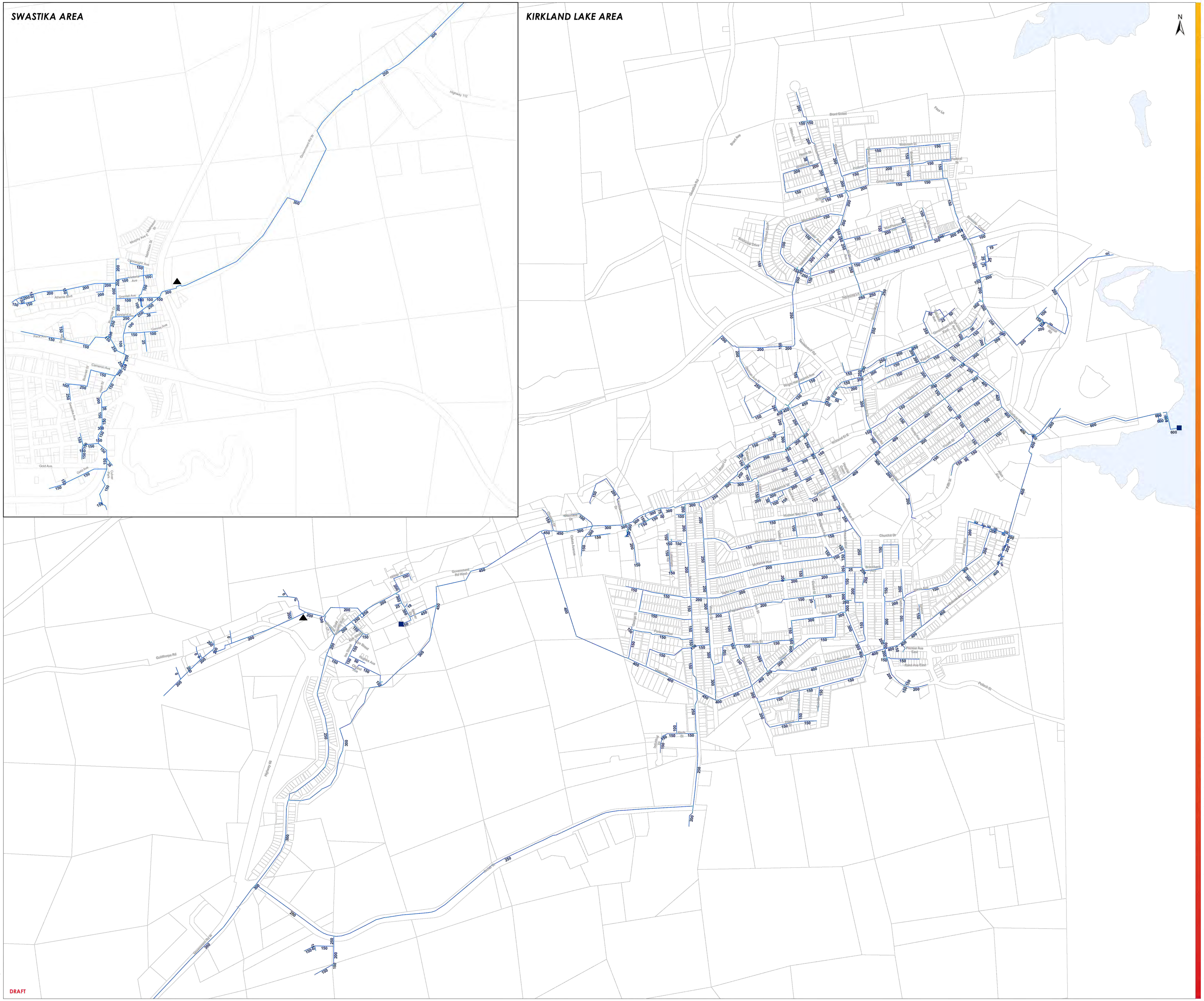
5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Information within OP-06 (s. 3) was originally set out in main body of the Kirkland Lake Drinking Water System Operational Plan (revision 3, dated October 13, 2017). New Purpose, Definitions, Procedure, Related Documents and separate Revision History sections. Updates based on revisions to DWQMS (e.g. removal of critical upstream or downstream processes, separation of systems that provide primary and/or secondary disinfection and systems that do not, for systems that are connected to another system with different owners, must now include which system is relied upon to ensure the provision of safe drinking water). Moved order of system description to follow the process (e.g., source water first, then treatment, then distribution). Updated the description to include the implementation of a chlorine dioxide trial, added high iron and manganese issued added to “Common Fluctuations”, changed the concentration of sodium hydroxide from 50% to 40% and updated the Raw Water Characteristics table with more current data. Included an updated process flow diagram and a new distribution system map.
Jan. 23, 2019	1	Procedure was updated to include a statement under Section 3.2 - Raw Water Supply to indicate the permanent installation of the chlorine dioxide system and to add the bulk storage tanks for sodium chlorite. Under Section 3.3(3) – Disinfection; changed the number of chlorinators from 3 to 2 as one was removed from service.
Oct. 06, 2019	2	Included the actual implementation date of the chlorine dioxide process in Step 3.2 and other minor wording edits.

Mar. 20, 2020	3	Changed name of the water treatment plant; Kirkland Lake water treatment plant to Lionel J. Sherratt water treatment plant.
Sep. 25, 2020	4	Revised Step 3.2 to include the threat of harmful algae blooms and updated Step 3.3 to include the raw water flow meter and treated water monitoring equipment. Revised step 3.5 to include the number of residential service connections. Updated the raw water characteristics in table to include average data from 2014 to 2019. Updated the water plant process for diagram to include the raw water flow meter.
Apr. 9, 2021	5	Included more information about the emergency standby generator and added a new section under Step 3.3 for the Control System

Figure 1: Kirkland Lake Water Treatment Plant - Process Flow & Instrumentation Diagram





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Legend
Watermain
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Pump Stations

Figure 2 Distribution System Components Map

Operational Plan
Revision 5
April 9, 2021

Notes

Revision	By	Appd.	YY.MM.DD.

Issued	By	Appd.	YY.MM.DD.

File Name: Dwn. Chkd. Dsgn. YY.MM.DD.

Permit-Seal

Client/Project
TOWN OF KIRKLAND LAKE
WATER DISTRIBUTION SYSTEM
Kirkland Lake, Ontario

Title
DRAFT - MODELED DISTRIBUTION SYSTEM
DRAFT

Project No.	Scale
165500693	1:5,000

Drawing No.	Sheet	Revision
1	1 of 1	1

1. Purpose

To document the process for conducting a risk assessment to identify and assess potential hazardous events and associated hazards that could affect drinking water safety.

2. Definitions

Consequence – the potential impact to public health and/or operation of the drinking water system if a hazard/hazardous event is not controlled

Control Measure – includes any processes, physical steps or other practices that have been put in place at a drinking water system to prevent or reduce a hazard before it occurs

Critical Control Point (CCP) – An essential step or point in the subject system at which control can be applied by the Operating Authority to prevent or eliminate a drinking water health hazard or reduce it to an acceptable level

Drinking Water Health Hazard – means, in respect of a drinking water system,

a) a condition of the system or a condition associated with the system's waters, including any thing found in the waters,
    i. that adversely affects, or is likely to adversely affect, the health of the users of the system,
    ii. that deters or hinders, or is likely to deter or hinder, the prevention or suppression of disease, or
    iii. that endangers or is likely to endanger public health,
b) a prescribed condition of the drinking water system, or
c) a prescribed condition associated with the system's waters or the presence of a prescribed thing in the waters

Hazardous Event – an incident or situation that can lead to the presence of a hazard

Hazard – a biological, chemical, physical or radiological agent that has the potential to cause harm

Likelihood – the probability of a hazard or hazardous event occurring

3. Procedure

3.1 Operations Management ensures that operations personnel are assigned to conduct a risk assessment at least once every thirty-six months. At a minimum, the Risk Assessment Team must include the QEMS Representative, at least one Operator for the system and at least one member of Operations Management.

3.2 The QEMS Representative is responsible for coordinating the risk assessment and ensuring that documents and records related to the risk assessment activities are maintained.

3.3 The Risk Assessment Team performs the risk assessment as follows:

3.3.1 OP-07 Risk Assessment and OP-08 Risk Assessment Outcomes are reviewed.

3.3.2 For each of the system's activities/process steps, potential hazardous events and associated hazards (possible outcomes) that could impact the system's ability to deliver safe drinking water are identified. At a minimum, potential hazardous events and associated hazard as identified in the most current version of the Ministry of the Environment, Conservation and Parks (MECP) document titled "Potential Hazardous Events for Municipal Residential Drinking Water Systems" (as applicable to the system type) must be considered.

3.3.3 For each of the hazardous events, control measures currently in place at the system to eliminate the hazard or prevent it from becoming a threat to public health are specified. Control measures may include alarms, monitoring procedures, standard operating procedures/emergency procedures/contingency plans, preventive maintenance activities, backup equipment, engineering controls, etc.

3.3.4 To ensure that potential drinking water health hazards are addressed and minimum treatment requirements as regulated by SDWA O. Reg. 170/03 and the MECP's "Procedure for Disinfection of Drinking Water in Ontario" are met, OCWA has established mandatory Critical Control Points (CCPs).

<u>As a minimum, the following must be included as CCPs (as applicable):</u>

- Equipment or processes required to achieve primary disinfection (e.g., chemical and/or UV disinfection system, coagulant dosing system, filters, etc.)
- Equipment or processes necessary for maintaining secondary disinfection in the distribution system
- Fluoridation system

3.3.5 Additional CCPs for the system are determined by evaluating and ranking the hazardous events for the remaining activities/process steps (i.e., those <u>not</u> included as OCWA's minimum CCPs).

3.3.6 Taking into consideration existing control measures (including the reliability and redundancy of equipment), each hazardous event is assigned a value for the likelihood and a value for the consequence of that event occurring based on the following criteria:

Value	Likelihood of Hazardous Event Occurring
1	**Rare** – Estimated to occur every 50 years or more (usually no documented occurrence at site)
2	**Unlikely** – Estimated to occur in the range of 10 – 49 years
3	**Possible** – Estimated to occur in the range of 1 – 9 years
4	**Likely** – Occurs monthly to annually
5	**Certain** – Occurs monthly or more frequently

Value	Consequence of Hazardous Event Occurring
1	**Insignificant** – Little or no disruption to normal operations, no impact on public health
2	**Minor** – Significant modification to normal operations but manageable, no impact on public health
3	**Moderate** – Potentially reportable, corrective action required, potential public health impact, disruption to operations is manageable
4	**Major** – Reportable, system significantly compromised and abnormal operations if at all, high level of monitoring and corrective action required, threat to public health
5	**Catastrophic** – Complete failure of system, water unsuitable for consumption

The likelihood and consequence values are multiplied to determine the risk value (ranking) of each hazardous event. Hazardous events with a ranking of 12 or greater are considered high risk.

3.3.7 Hazardous events and rankings are reviewed and any activity/process step is identified as an additional CCP if all of the following criteria are met:

- ✓ The associated hazardous event has a ranking of 12 or greater;
- ✓ The associated hazardous event can be controlled through control measure(s);
- ✓ Operation of the control measures can be monitored and corrective actions can be applied in a timely fashion;
- ✓ Specific control limits can be established for the control measure(s); and
- ✓ Failure of the control measures would lead to immediate notification of Medical Officer of Health (MOH) or MECP or both.

3.4 The outcomes of the risk assessment are documented as per OP-08 Risk Assessment Outcomes.

3.5 At least once every calendar year, the QEMS Representative facilitates the verification of the currency of the information and the validity of the assumptions used in the risk assessment in preparation for the Management Review (OP-20). When performing this review, the following may be considered:

- Process/equipment changes
- Reliability and redundancy of equipment
- Emergency situations/service interruptions
- CCP deviations
- Audit/inspection results

4. Related Documents

MECP's "Potential Hazardous Events for Municipal Residential Drinking Water Systems"
MECP's "Procedure for Disinfection of Drinking Water in Ontario"
OP-08 Risk Assessment Outcomes
OP-20 Management Review

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Information within OP-07 was originally set out in the QEMS Procedure QP-02 Risk Assessment and Risk Assessment Outcomes (revision 2, dated October 13, 2017). Revised Purpose to reflect element 7 requirements only. Included minimum requirements for the Risk Assessment Team (QEMS Representative, at least one operator for the system and at least one member of Operation Management. Clarified role of QEMS Representative in coordinating the risk assessment and maintaining documents and records. Re-worded procedure for performing the risk assessment (process itself remains essentially unchanged). Included reference to MOECC's "Potential Hazardous Events for Municipal Residential Drinking Water Systems". Removed requirements for documenting the outcomes of the risk assessment (now covered in OP-08). Changed annual review to at least once every calendar year and included potential considerations when performing the review.
Oct. 06, 2019	1	Updated MOECC to MECP.

RISK ASSESSMENT OUTCOMES

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To document the outcomes of the risk assessment conducted as per OP-07 Risk Assessment.

2. Definitions

Critical Control Point (CCP) – An essential step or point in the subject system at which control can be applied by the Operating Authority to prevent or eliminate a drinking water health hazard or reduce it to an acceptable level

Critical Control Limit (CCL) – The point at which a Critical Control Point response procedure is initiated

3. Procedure

3.1 The QEMS Representative is responsible for updating the information in OP-08A Summary of Risk Assessment Outcomes as required.

3.2 The results of the risk assessment conducted as per OP-07 are documented in Table 1 of OP-08A. This includes:

- Identified potential hazardous events and associated hazards (possible outcomes) for each of the system's activities/process steps;
  Note: Hazards listed in the MECP's "Potential Hazardous Events for Municipal Residential Drinking Water Systems" are indicated in the appropriate column using the reference numbers in Table 4 of OP-08A.
- Identified control measures to address the potential hazards and hazardous events; and
- Assigned rankings for the hazardous events (likelihood x consequence = risk value) and whether the hazardous event is a Critical Control Point (CCP) (mandatory or additional).
  Note: If the hazardous event is ranked as 12 or higher and it is <u>not</u> being identified as a CCP, provide rationale as to why it does not meet the criteria set out in section 3.3.7 of OP-07).

3.3 Operations Management is responsible for ensuring that for each CCP:

- Critical Control Limits (CCLs) are set;
- Procedures and processes to monitor the CCLs are established; and
- Procedures to respond to, report and record deviations from the CCLs are implemented.

The identified CCPs, their respective CCLs and associated procedures are documented in Table 2 of OP-08A.

3.4 A summary of the results of the annual review/36-month risk assessment is recorded in Table 3 of OP-08A.

3.5 Operations Management considers the risk assessment outcomes during the review of the adequacy of the infrastructure (Refer to OP-14 Review and Provision of Infrastructure).

4. Related Documents

MECP's "Potential Hazardous Events for Municipal Residential Drinking Water Systems"
OP-07 Risk Assessment
OP-08A Summary of Risk Assessment Outcomes
OP-14 Review and Provision of Infrastructure

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06 2018	0	Procedure issued – Information within OP-08 was originally set out in the QEMS Procedure QP-02 Risk Assessment and Risk Assessment Outcomes (revision 2, dated October 13, 2017). Clarified role of QEMS Representative in updating the information in OP-08A Summary of Risk Assessment Outcomes. Included requirements for how to document the risk assessment outcomes using the tables in OP-08A. Clarified responsibility of Operations Management to ensure Critical Control Limits are set and related procedures are developed. Included reference to OP-14 Review and Provision of Infrastructure to emphasize the need for Operations Management to review the risk assessment outcomes during the infrastructure review.
Oct. 06, 2019	1	Updated MOECC to MECP.

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Table 1: Risk Assessment Outcome Table

Note: Processes referred to in section 5.5 of QP-02 Risk Assessment must be identified as mandatory Critical Control Points (CCPs) as applicable. Mandatory CCPs are not required to be ranked.

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Source (Gull Lake)	*1, 2, 5, 6, 9, 12*	Spill of biological or chemical material into Gull Lake - accidentally or intentionally (eg. beaver activity, blue green algae bloom, snowmobiles or water crafts, ice fishing huts, rail car derailment or highway accident)	Contamination of source water	Shut down intake and plant - stop producing water, Approx. 1 day supply from reservoir & standpipe, Implement water restrictions and/or ban if necessary, Install temporary pipe to secondary water source (McTavish Lake), Town can provide an alternate source of water if required, The local board of Health, through a provincial Order-In-Council dated February 6th 1934 and the Township Teck Act 1938, are responsible for the administration of the sanitary control for the public water supply and the drainage area of Gull, McTavish and Victoria Lakes, SOP for Monitoring, Sampling and Reporting a Harmful Blue-Green Algae Bloom, EEP for Contaminated Raw Water, EEP for Fuel or Chemical Spill, EEP for Water Supply Shortage, Contingency Plan (CP) for Spill	2	2	4	**NO**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				Response, CP for Unsafe Water.				
Source (Gull Lake)	*9*	Spring/fall turnover of the lake	Public complaints, Increased demand on process operations such as chemical optimization for colour, odour, alkalinity, pH and turbidity	Appropriate process changes, Regular in-house colour, temperature, alkalinity, pH and turbidity, Treated water turbidity analyzer, Treated water turbidity alarms with automatic filter shutdown.	4	2	8	**NO**
Source (Gull Lake)	*4, 9*	Road salt in Gull Lake	High sodium in drinking water	Monthly sampling of raw water, Five year sampling of treated water and reporting as per regulation, EEP – Reporting and Responding to Adverse Nitrate/Nitrite/Sodium or Fluoride Results in large Municipal Systems	4	3	12	**NO** - does not meet all criteria in step 3.3.7 of OP-07. No control of the hazard
Intake	*1, 2, 3, 4, 6,*	Intake screen plugged or Intake Pipe breakage/ collapse due to natural disaster, freezing, accident or vandalism/terrorism	Loss of raw water supply	Low level alarm & pump shut down, Loss of raw water flow signal, Periodic inspection of intake screen & pipe, Install a temporary line to pump house, Implement water restrictions and/or ban if necessary, Town can provide an alternate source of water if required, EEP for Water Supply Shortage.	1	4	4	

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Intake	*9*	Traveling screen failure	Debris enters pre-treatment	SCADA alarm, Utilize bypass screen system.	2	2	4	**NO**
Intake	*2*	Low lift pump failure (mechanical or electrical)	Loss of raw water	Redundancy (system can operate using one of five pumps), Pump fail alarms, Preventative maintenance, Regular inspections, Install submersible pump, EEP for Low Lift Pump Failure.	1	2	2	**NO**
Intake	*2*	Flow Control Valve (FCV) failure	Loss of control of raw water	Preventative maintenance, Regular inspections, SCADA alarms, Immediate repair/replacement required.	1	2	2	**NO**
Alkalinity/pH Control (seasonally during winter months)	*10*	Sodium carbonate (soda ash) pump system failure	Loss of alkalinity, Loss of coagulation, Sludge carry over into filters, Raw water pH too low	Settled water turbidity monitoring, In-house alkalinity monitoring, Routine operator checks, Monthly consumption, EEP for Chemical Pump Failure.	3	2	6	**NO**
Chlorine Dioxide System (oxidation of iron and manganese)	*N/A*	System failure (generator failure)	High iron and manganese levels in winter months	Generator fail alarm, Routine operator checks,	5	1	5	**NO**
Filtration Process (includes flocculation, coagulation, and 4 dual media filters)	*10*	Aluminum Sulphate (alum) system pump failure	Ineffective filtration/removal of pathogens, (minimum treatment requirements not met),	Redundancy (back-up pump), Continuous online monitoring of turbidity with alarms and automatic filter shutdown at 0.80 NTU,				**YES – Mandatory CCP**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
			Increased turbidity, Potential for an AWQI	Regular operator checks (on-site and SCADA), Dosage calculations, More frequent backwashes, Scheduled maintenance activities, EEP for High Turbidity in Filtered Water, EEP for Chemical Pump Failure, EEP for Reporting and Responding to Adverse Turbidity in Large Municipal Systems, CP for Unsafe Water				
Filtration Process	*10*	Polymer pump system failure	Poor coagulation, Increased turbidity, Ineffective removal of pathogens, Potential for AWQI	Redundancy (back-up pump), Continuous online monitoring of turbidity with alarms and automatic filter shutdown at 0.80 NTU, Regular operator checks (on-site and SCADA), More frequent backwashes, Dosage calculations, EEP for High Turbidity in Filtered Water, EEP for Chemical Pump Failure, EEP for Reporting and Responding to Adverse Turbidity in Large Municipal Systems, CP for Unsafe Water.				**YES – Mandatory CCP**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Filtration Process	*10*	Chemical - low level (alum, polymer)	Increased turbidity, Ineffective removal of pathogens, Potential for AWQI	Regular operator checks, Continuous online monitoring of turbidity with alarms and automatic filter shutdown at 0.80 NTU, EEP for High Turbidity in Filtered Water, EEP for Reporting and Responding to Adverse Turbidity in Large Municipal Systems, CP for Unsafe Water.				**YES – Mandatory CCP**
Filtration Process	*10*	Clarifier failure – pulsation system failure (incl. vacuum pumps, release valves, air compressor) Sludge extraction failure (incl. valves)	Increased turbidity, Ineffective removal of pathogens, Potential for AWQI	Redundancy (3 units), Regular inspections, Continuous online monitoring of turbidity with alarms and automatic filter shutdown at 0.80 NTU, EEP for High Turbidity in Filtered Water, EEP for Reporting and Responding to Adverse Turbidity in Large Municipal Systems, CP for Unsafe Water.				**YES – Mandatory CCP**
Filtration Process	*10*	Filter breakthrough	Increased turbidity, Loss of media, Ineffective removal of pathogens, Potential for AWQI	Continuous online monitoring of turbidity with alarms and automatic filter shutdown at 0.80 NTU, Redundancy (4 filters), Regular automated backwash schedule, Regular operator checks (on-site and SCADA),				**YES – Mandatory CCP**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				EEP for High Turbidity in Filtered Water, EEP for Reporting and Responding to Adverse Turbidity in Large Municipal Systems, CP for Unsafe Water.				
Filtration Process	*10*	Backwash system failure	Increased turbidity, Ineffective removal of pathogens, Potential for AWQI, Potential for loss of treated water supply, Loss of filter	Redundancy (4 filters), Continuous online monitoring of filter effluent turbidity with alarm and automatic filter shutdown at 0.80 NTU, SCADA controlled backwash cycle will be aborted and sequence failure alarm will be initiated if backwash equipment fails, EEP for High Turbidity in Filtered Water, EEP for Reporting and Responding to Adverse Turbidity in Large Municipal Systems, CP for Unsafe Water.				**YES – Mandatory CCP**
Filtration Process	*10*	Turbidity analyzer failure	Unknown turbidity levels, Potential for AWQI	Redundancy (4 filter units and analyzers), Back-up analyzer available within hub, Scheduled maintenance activities, In-house turbidity readings every 15 minutes as per regulations, Regular operator checks,				**YES – Mandatory CCP**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				OCWA Instrumentation Technician available to repair analyzer in case of failure, EEP for Turbidity Analyzer Failure, EEP for Reporting and Responding to Adverse Turbidity in Large Municipal Systems, CP for Unsafe Water				
Filtration Process	*10*	Backwash return pump failure	Inability to backwash (resulting in loss of all filters), Potential spill	SCADA - sequence failure alarm, Backwash pump failure alarm, Tanks equipped with overflow weir and pipe to lake, EEP – Reporting Spills and Other Discharges, CP – Spill Response				**YES – Mandatory CCP**
Sewage Pump	*N/A*	Sewage pump failure	Flooding	Redundancy (2 pumps), High sewage wet-well alarm, Immediate repair.	1	2	2	**NO**
Post pH Adjustment	*N/A*	Sodium hydroxide (caustic soda) pump system failure	Treated water pH too low (corrosive water)	Redundancy (back-up pump), Continuous online monitoring of pH Regular operator checks, Regular cleaning of piping, SCADA, high finished water pH alarm, EEP for Chemical Pump Failure.	3	2	6	**NO**
Chlorination System (primary disinfection)	*10*	Chlorinator system failure, Cylinder failure	Loss of disinfection, Ineffective removal of pathogens (minimum	Redundancy - back-up chlorination system with automatic switchover, Chlorine Gas Vacuum alarm,				**YES – Mandatory CCP**

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
			treatment requirements not met), Potential for AWQI	On-line chlorine residual monitoring with alarms, Daily CT monitoring on SCADA In-house residual testing, Remote and on-site operator checks, Scheduled maintenance activities, Weigh scale for chlorine cylinders, EEP for Chlorine Gas Leak, EEP for Low or High Chlorine Residual in Treated Water, EEP Primary Disinfection – CLR Instructions, EEP for Reporting and Responding to Adverse Chlorine or CT Results in Large Municipal Residential Systems, Standard Operating Procedure (SOP) for CT (Chlorine Concentration x Time), Site specific spreadsheet to calculate CT. CP for Unsafe Water.				
Chlorination System (primary disinfection)	*10*	Total Chlorine analyzer failure	In accurate chlorine dosing, Potential AWQI	Continuous online monitoring with low chlorine residual alarms, Regular in-house residual testing and analyzer checks, Scheduled maintenance activities, Spare analyzer available within the Region, EEP for Total Chlorine Analyzer				**YES – Mandatory CCP**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				Failure.				
Chlorination System (primary disinfection)	*10*	Free chlorine analyzer failure (at the discharge header)	Unknown chlorine residual levels, Potential for AWQI, Unknown pH levels (potential for dosing issues)	Continuous online monitoring with low chlorine residual alarms, High/low pH alarms SCADA – continuous CT monitoring, Regular in-house residual testing and analyzer checks, Scheduled maintenance activities, Spare analyzer available within the Region EEP for Free Chlorine Analyzer Failure, EEP for Low or High Chlorine Residual in Treated Water, EEP Primary Disinfection – CLR Instructions, EEP for Reporting and Responding to Adverse Chlorine or CT Results in Large Municipal Residential Systems, SOP for CT, Site specific spreadsheet to calculate CT, CP for Unsafe Water.				**YES – Mandatory CCP**
Clearwells	*2, 7, 10*	Low level	Inadequate treated water supply, Inadequate CT for primary disinfection, Inadequate fire	Continuous online monitoring with low level alarms, SCADA – continuous CT monitoring, Routine operator checks, Approx.1 day supply from standpipe				**YES – Mandatory CCP**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
			protection.	Town ordered water conservation or ban, EEP for Water Supply Shortage, EEP for Clearwell - Low Level, EEP Primary Disinfection – CLR Instructions, EEP for Reporting and Responding to Adverse Chlorine or CT Results in Large Municipal Residential Systems, SOP for CT, Site specific spreadsheet to calculate CT, CP for Unsafe Water.				
Clearwells	*2, 10*	Clearwell out of service for repair, maintenance	Inadequate CT for primary disinfection	Three-cell reservoir at the high lift pumping station. One common cell that splits into two cells to allow for isolation, Increase chlorine dosage into reservoir, Scheduled controlled maintenance plan and monitoring, EEP Primary Disinfection – CLR Instructions, EEP for Reporting and Responding to Adverse Chlorine Residuals in Large Municipal Residential Systems, SOP for CT, Site specific spreadsheet to calculate CT,				**YES – Mandatory CCP**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				CP for Unsafe Water.				
Clearwells	*2, 7, 10*	Loss of structure integrity	Inadequate treated water supply Inadequate fire protection, Potential cross contamination between raw and treated wells	Duel-cell reservoir with valve for isolation, Limited supply from standpipe Maintenance and inspection activities, Emergency repair, Town ordered water conservation or ban (alternate source of water), EEP for Water Supply Shortage, CP Loss of Service				**YES – Mandatory CCP**
High Lift Pumps	*2, 7*	High lift pump failure	Low pressure in distribution system, Low supply of water,	Redundancy (4 high lift pumps) Standpipe to pressurize system Pump fail alarms, On-line monitoring of discharge pressure, with low pressure alarm, Preventative maintenance, Back-up generator for loss of power situations, EEP for High Lift Pump Failure, EEP for Low or Loss Pressure in the Distribution System, EEP for Water Supply Shortage.	3	1	3	**NO**
Water Treatment System	*1, 2, 3, 4, 6, 7*	Power failure due to weather, or vandalism/terrorism	Loss of pressure/ supply, Potential loss of equipment, Power surges	Back-up diesel generator, Power fail alarms, Routine operator checks and scheduled maintenance activities for back-up generator,	3	2	6	**NO**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				Standpipe to pressurize system, EEP for Hydro Interruption, Surge or Failure, EEP for Standby Power Failure, CP for Loss of Service.				
Water Treatment System	*2, 6, 7*	Generator Failure (accident or vandalism/terrorism)	Loss of pressure/supply, Potential loss of equipment	Generator failure alarm, Portable generator available within the Region, Routine operator checks and scheduled maintenance activities for back-up generator, EEP for Power Failure of Long Duration, EEP for Standby Power Failure, CP for Loss of Service.	2	4	8	**NO**
Water Treatment System	*2, 6*	SCADA, CPU, RTU failure (accident or vandalism/terrorism)	Loss of automatic control, Loss of trending	System alarmed, Critical parameters are backed-up on Oupost5/Wonderware, Manual monitoring of parameters, SOP - Operate plant in manual mode, EEPs for Manual Start of KL WTP, Manual Filter backwash, Manual Caustic Day Tank Batch, Manual Polymer Batch	3	4	12	**NO** – does not meet all criteria in step 3.3.7 of OP-07. No control of the hazard
Water Treatment System	*2, 6, 7, 10, 11*	Fire in Plant, Tower or Stations (accidentally or intentionally)	Partial or full system shutdown, Potential loss of supply	Regular operator visits, System alarms, Fire suppression, EEP for Fire in Plant.	1	5	5	**NO**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Water Treatment System	*2, 5, 6*	Vandalism/terrorism	Contamination of the water supply, Damage to critical equipment, Computer hacking	Locked water plant, standpipe and booster stations, Intrusion alarms at plant and booster stations, Appropriate signage and lighting, Regular visits by operators, Regular sampling and monitoring, Police patrol, Town ordered ban, Town to supply an alternate source of drinking water, EEP for Vandalism or Suspected Unauthorized Entry, EEP for Contamination of Treated Water, EEP for Water Supply Shortage, CP for Spill, Response, CP for Loss of Service, CP for Security Breach.	2	5	10	**NO**
Water Treatment System	*1*	Pandemic	Shortage of staff Supply shortages Loss of sample locations	CP for Critical Shortage of Staff Staff training and PPE, OCWA's Emergency Operations Center/Action Group (EOC), Staff isolation, staff rescheduling, modifications to work rounds, remote work done where possible, Alternate suppliers available, refer to Essential Services & Suppliers list	1	4	4	**NO**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Water Treatment System	*1, 2, 3, 4*	Natural Disasters (ice storm, wind storm, flooding, forest fire)	Loss of supply, Contamination	Contingency Plans, Emergency Procedures, OCWA's Emergency Response Plan, Town's Emergency Response Plan, Staff training.	2	4	8	**NO**
Standpipe	*7, 8, 11*	Loss of structural Integrity, Tank Rupture	Flood, Loss of pressure	Alarmed (low level, fast change in level), Operator inspections, Operate Town on direct pressure; bypass standpipe to supply users	1	4	4	**NO**
Standpipe	*11*	Standpipe out of service for repair, maintenance	Minor modifications to operations	Scheduled controlled maintenance plan, Bypass standpipe to supply users,	3	1	3	**NO**
Distribution System (secondary disinfection)	*11*	Loss of chlorine residual in distribution	Failure to control biofilm and pathogens (long-term), Potential for AWQI	Two chlorine booster stations (Chaput Hughes and Swastika booster station), Continuous on-line monitoring of free chlorine residual into the distribution system, Alarms for low chlorine residuals in water entering distribution system, Distribution chlorine residual testing as per O. Reg. 170/03, Regularly scheduled checks and inspections, EEP Secondary Disinfection – CLR Instructions, EEP for Reporting and Responding to				**YES – Mandatory CCP**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				Adverse Chlorine or CT, CP for Unsafe Water.				
Distribution System	*N/A*	Adverse water quality as described in O. Reg. 170/03 (eg. Bacteriological, Total Trihalomethanes)	Potential for unsafe drinking water	Site specific Sampling Schedule, EEP for Reporting and Responding to Adverse Results in Large Municipal Residential Systems (several EEPs), CP for Unsafe Water.	3	4	12	**NO** – does not meet all criteria in step 3.3.7 of OP-07. No control of the hazard
Distribution System	*6, 7*	Fire (accidentally or intentionally)	Low pressure,	Communication with fire department, Low pressure alarm, Monitoring of flows and pressure, EEP for Low or Loss of Pressure, EEP for Water Supply Shortage,	3	2	6	**NO**
Distribution System (watermains)	*1, 2, 3, 4, 7, 8*	Structural failure/ breaks due to weather or age	Contamination, Loss of pressure/supply	Notification/complaints from customers, Routine monitoring of flows and pressure, clearwell levels via SCADA , Alarms (high flows, low pressure, low clearwell) Maintenance program, regular inspections conducted by Town (sanitary, hydrants, valves & curb stops), Leak detection program, AWWA Standards and MECP's Watermain Disinfection Procedure, EEP for Distribution System – Watermain Breaks,	4	3	12	**NO** – does not meet all criteria in step 3.3.7 of OP-07. No control of the hazard

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				EEP for Low or Loss of Pressure, EEP for Water Supply Shortage, EEP for Reporting and Responding to Adverse Bacteriological Results, CP for Unsafe Water.				
Distribution System (service connections)	*8*	Cross-connection, backflow, siphonage	Contamination	Back flow preventers (bi-annual inspections; units replaced as required) Leak detection program, Plumbing code, EEP for Reporting and Responding to Adverse Bacteriological Results, CP for Unsafe Water.	2	4	8	**NO**
Distribution System (service connections)	*1, 2, 3, 4, 7, 8*	Structural failure/breaks due to accident, weather, age	Contamination, Loss of pressure/supply to affected users	Customer notification/complaints, Routine monitoring of flows and pressure via SCADA, Alarms (high flows, low pressure, low clearwell), Tie in to temporary service lines, EEP for Distribution System – Watermain Breaks, EEP for Low or Loss of Pressure, EEP for Reporting and Responding to Adverse Bacteriological Results, CP for Unsafe Water.	3	3	9	**NO**
Distribution System (valves)	*1, 2, 3, 4, 7, 8*	Structural failure due to accident, weather, age	Loss of control, Contamination, Loss of pressure,	Routine monitoring of flows and pressure via SCADA, Alarms (high flows, low pressure),	3	1	3	**NO**

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
			Line breaks	Maintenance program, Immediate repair of valve, AWWA Standards and MECP's Watermain Disinfection Procedure, EEP for Low or Loss of Pressure, EEP for Reporting and Responding to Adverse Bacteriological Results, CP for Unsafe Water.				
Distribution System (hydrants)	*1, 2, 3, 4, 7, 8*	Structural failure/ component failure	Contamination, Loss of pressure, Loss of supply, Loss of fire control	Customer notification/complaints, Routine monitoring of flows, pressure and clearwell levels via SCADA, Alarms (high flows, low pressure, low clearwell), Regular inspections by certified Town staff, Maintenance program - regular flushing (2x per year) by Town AWWA Standards and MECP's Watermain Disinfection Procedure, EEP for Low or Loss of Pressure, EEP for Water Supply Shortage, EEP for Reporting and Responding to Adverse Bacteriological Results CP for Unsafe Water.	3	3	9	**NO**
Distribution System (Aqua flows)	*6*	Sabotage, misuse	Contamination	Maintenance by Town staff only, Disconnect Unit, Plans in place to remove all units,	2	5	10	**NO**

SUMMARY OF RISK ASSESSMENT OUTCOMES

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Activity/ Process Step	Ministry's Potential Hazardous Event/Hazard Reference # (see Table 4)	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
				CP for Unsafe Water				
Distribution System All - watermains, connections, valves, construction, etc.	*2, 6, 7, 8*	Accident, Vandalism/terrorism	Contamination, Loss of water supply, Loss of pressure	Notifications/complaints from customers, 24 hour on-call operator, Routine monitoring of flows, pressure and clearwell levels via SCADA, Alarms (high flows, low pressure, low clearwell), Routine monitoring of system by Town staff, EEP for Distribution System – Watermain Breaks, EEP for Low or Loss of Pressure, EEP for Water Supply Shortage, EEP for Reporting and Responding to Adverse Bacteriological Results, CP for Unsafe Water.	1	4	4	**NO**
Distribution System (capital construction)	7, 8	Sub-standard construction and commissioning	Contamination, Loss of pressure	AWWA guidelines, Provincial standards, Staff training, Sampling and testing.	1	3	3	**NO**

Table 2: Identified Critical Control Points (CCPs)

CCP	Critical Control Limits	Monitoring Procedures	Response, Reporting and Recording Procedures
Filtration Process (for primary disinfection)	**Filter Effluent Turbidity Alarms (4 alarmed filter units)** High-high set point = 1.0 NTU (filter shut down at 0.8 NTU)	SCADA (continuous online analyzers and chemical usage), Routine operator checks via SCADA (on-site and remotely), Data review and sign-off as per O. Reg. 170/03, Alarms, Sampling, Dosage calculations.	Refer to: • EEP for High Turbidity in Filtered Water • EEP for Turbidity Analyzer Failure • EEP for Chemical Pump Failure • EEP for Reporting and Responding to Adverse Turbidity in Large Municipal Systems • CP for Unsafe Water.
Chlorination System (for primary disinfection)	**Free Chlorine Residual Alarms – Treated Water (Plant)** Low-low set point = 0.70 mg/L High-high set point = 4.00 mg/L	SCADA (continuous online analyzer), Routine operator checks via SCADA (on-site and remotely), Trend review and sign-off as per O. Reg. 170/03, Alarms, Sampling, Chemical Usage	Refer to: • SOP for CT (Chlorine Concentration x Time), • Site specific spreadsheet to calculate CT, • SCADA – continuous CT monitoring, • EEP for Free Chlorine Analyzer Failure, • EEP for Low or High Chlorine Residual in Treated Water, • EEP Primary Disinfection – CLR Instructions, • EEP for Reporting and Responding to Adverse Chlorine or CT Results in Large Municipal Residential Systems, • CP for Unsafe Water.
Chlorination System (for primary disinfection)	**Total Chlorine Residual Alarms – Treated Water (Plant)** Low set point = 1.40 mg/L High-high set point = 2.50 mg/L	SCADA (continuous online analyzer), Routine operator checks via SCADA (on-site and remotely), Alarms, Sampling, Chemical Usage	Refer to: • EEP for Chemical Pump Failure, • EEP for Chlorine Analyzer Failure. • EEP for Low or High Chlorine Residual in Treated Water, • EEP Primary Disinfection – CLR Instructions,

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

CCP	Critical Control Limits	Monitoring Procedures	Response, Reporting and Recording Procedures
			• EEP for Reporting and Responding to Adverse Chlorine or CT Results in Large Municipal Residential Systems. • CP for Unsafe Water.
Clearwells (primary disinfection)	**Clearwell Low Level Alarm – High Lift Pump Station** Low-low set point = 2.0 meters (high lift shutdown)	SCADA (continuous online analyzers), Routine operator checks via SCADA (on-site and remotely), Data review and sign-off as per O. Reg. 170/03	Refer to: • SOP for CT (Chlorine Concentration x Time), • Site specific spreadsheet to calculate CT, • SCADA – continuous CT monitoring, • EEP for Water Supply Shortage. • EEP for Clearwell-Low Level. • EEP for Reporting and Responding to Adverse Chlorine or CT Results in Large Municipal Residential Systems • CP for Unsafe Water.
Secondary Disinfection	**Free Chlorine Residual - Distribution System** Regulatory Low = 0.05 mg/L High = 4.0 mg/L	Distribution chlorine residuals monitored as per O. Reg. 170/03, Distribution chlorine residuals monitored at the Chaput Hughes and Swastika booster station	Refer to: • EEP Secondary Disinfection – CLR Instructions, • EEP for Reporting and Responding to Adverse Chlorine or CT Results in Large Municipal Residential Systems, • CP for Unsafe Water.

Note: Standard Operating Procedures (SOPs) referenced in Tables 1 and 2 are controlled as per QP-01 Document and Records Control.

Table 3: Record of Annual Review/36-Month Risk Assessment

The Drinking Water Quality Management Standard (DWQMS) requires that the currency of the information and the validity of the assumptions used in the risk assessment be verified at least once every calendar year. In addition, the risk assessment must be conducted at least once every thirty-six months.

Date of Activity	Type of Activity	Participants	Summary of Results
August 21, 2015	Initial Risk Assessment conducted	Anthony Danis (Team Lead), Ilona Bruneau (PCT), Don Parcher (Town of KL Waterworks Foreman), Mark Vermette (Town of KL Operator)	Results captured in Revision 0 of this Summary of Risk Assessment Outcomes
November 10, 2015	Reviewed during an internal audit	Ilona Bruneau (PCT), Josh Gravelle (Operator), Patrick Roy (Operator)	No revisions necessary
May 27, 2016	Reviewed	Ilona Bruneau (PCT), Patrick Roy (Senior Operator)	Revised to included recreational activities as a hazardous event; provided possible outcomes, control measures and ranking Updated critical control limits for primary free chlorine and secondary free chlorine residuals in Table 2 Updated assessment with MOECC's new Watemain Disinfection procedure and OCWA's new Watermain Break EEP
September 23, 2016	Annual Review (water treatment system)	Ilona Bruneau (PCT), Steven Gerl (Operator)	Revised to include a second sewage pump in case of failure, regular cleaning of sodium hydroxide piping as another control measure for pump failure, SCADA – CT monitoring for chlorination, Increased the risk rating for vandalism/terrorism.
September 27, 2016	Annual Review (distribution system)	Ilona Bruneau (PCT), Don Parcher (T of KL Waterworks Foreman), Dixit Patel (T of KL Design Engineer)	Revised to remove back flow preventer maintenance for service connections, Included operator inspections of standpipe and 24 hour on-call operator for accident/vandalism in the distribution system, Changed risk values for failure/break of service connections and hydrants, for maintenance and repair of the standpipe, and for new construction
September 8, 2017	Annual Review (water treatment system)	Ilona Bruneau (PCT), Pat Roy (Senior Operator)	Revised to change risk value for spring and fall turnover, added alkalinity control as a new process step, removed activated silica system and added polymer system, change daily CT monitoring to continuous under chlorination and clearwell, added standpipe as a control measure to high

Date of Activity	Type of Activity	Participants	Summary of Results
			lift pump risks, updated terrorism and vandalism to include additional control measures and updated the risk value, updated critical control limits in Table 2.
September 20, 2017	Annual Review (distribution system)	Ilona Bruneau (PCT), Don Parcher (T of KL Waterworks Foreman), Dixit Patel (T of KL Design Engineer)	Changed risk value for AWQIs in distribution system, added inspection program for back flow preventers, updated risk value for service connection failure and hydrant failure,
July 12, 2018	36 month Risk Assessment	Pat Roy (Senior Operator), Ilona Bruneau (PCT), Anthony Danis (Sr. Operations Manager)	All Activities/Process Steps were re-assessed and new hazardous events and hazards identified (including those in the MOECC's "Potential Hazardous Events for Municipal Residential Drinking Water Systems") and ranked according to OP-07 (revision 0). Results captured in Revision 4 of this Summary of Risk Assessment Outcomes.
October 12, 2018	Reviewed during the annual internal audit	Pat Roy (Senior Operator), Ilona Bruneau (PCT)	Table – Updated critical control point for the filtration process.
January 23, 2019	Reviewed outcomes	Ilona Bruneau (PCT)	Table 1 - Updated or changed the MOECC Potential Hazardous Event/Hazard Reference numbers for source, clearwells, water treatment system and distribution system. Added new procedure "Primary Disinfection – CLR Instructions for the chlorination system and clearwells. Added new procedure "Secondary Disinfection – CLR Instructions for the Distribution System. Table 2 - Updated the critical control limits for the filtration process, chlorination system and clearwells.
October 3, 2019	Annual Review	Pat Roy (Team Lead), Ilona Bruneau (PCT)	Table 1 – Include monthly and quarterly sodium sampling of the raw water, added MECP's Potential Hazard No. 7 – sustained pressure loss to low clearwell level and loss of structural integrity of the clearwell, added No. 10 - failure of equipment or process associated with primary disinfection to clearwell out of service, added No. 2 - water supply shortfall to power failure at the water treatment plant and added No. 10 - failure of equipment or process associated with primary disinfection to vandalism/terrorism at the plant.
September 9, 2020	Annual Review	Steven Gerl (Operator)	Table 1 - Updated SCADA, CPU, RTU Failure to include terrorism and vandalism, added back-up for monitoring critical parameters and changed the risk value from 10 to 12 (not a CCP as it does not meet all the criteria listed in step 3.3.7 of OP-07).

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT | Approved by: Anthony Danis, Senior Operations Manager

Date of Activity	Type of Activity	Participants	Summary of Results
September 24, 2020	36 month Risk Assessment	Ilona Bruneau (PCT), Pat Roy (Team Lead)	Table 1 – For a potential blue green algae bloom in the source water; added SOP for Monitoring, Sampling and Reporting Harmful Blue-Green Algae. Changed quarterly sodium sampling of treated water to five year sampling. Added the procedure for Reporting Spills and Other Discharges for backwash return pump failure. Added Pandemic as risk to the water treatment systems in light of the COVID-19 Pandemic. Changed MOECC to MECP or Ministry.

Table 4: Potential Hazardous Event/Hazard Reference Numbers (based on MECP's "Potential Hazardous Events for Municipal Residential Drinking Water Systems" dated February 2017)

If the hazardous event/hazard is not applicable to this drinking water system (DWS), it will be noted in the first column of this table.

System Type (indicate all that apply to this DWS)		Reference Number	Description of Hazardous Event/Hazard
X	All Systems	1	Long Term Impacts of Climate Change
X	All Systems	2	Water supply shortfall
X	All Systems	3	Extreme weather events (e.g., tornado, ice storm)
X	All Systems	4	Sustained extreme temperatures (e.g., heat wave, deep freeze)
X	All Systems	5	Chemical spill impacting source water
X	All Systems	6	Terrorist and vandalism actions
X	Distribution Systems	7	Sustained pressure loss
X	Distribution Systems	8	Backflow
X	Treatment Systems	9	Sudden changes to raw water characteristics (e.g., turbidity, pH)
X	Treatment Systems	10	Failure of equipment or process associated with primary disinfection (e.g., coagulant dosing system, filters, UV system, chlorination system)
X	Treatment Systems and Distribution Systems providing secondary disinfection	11	Failure of equipment or process associated with secondary disinfection (e.g., chlorination equipment, chloramination equipment)
X	Treatment Systems using Surface Water	12	Algal blooms

SUMMARY OF RISK ASSESSMENT OUTCOMES

Reviewed by: Ilona Bruneau, PCT

Approved by: Anthony Danis, Senior Operations Manager

Revision History

Date	Revision #	Reason for Revision
Oct. 28, 2015	0	Risk assessment finalized and issued.
Jun. 17, 2016	1	Revised summary based on results of May 27, 2016 review.
Oct. 17, 2016	2	Revised summary based on results of September 23 & 27, 2016 reviews.
Oct. 13, 2017	3	Revised summary based on September 8 & 20, 2017 reviews
July 13, 2018	4	Summary of Risk Assessment Outcomes assigned document number (OP-08A); added table 4 to reference MOECC's "Potential Hazardous Events for Municipal Residential Drinking Water Systems"; Hazardous Events for Municipal Residential Drinking Water Systems"; Table 1 updated to include results of the 36-month risk assessment that took place on July 12, 2018.
Jan. 23, 2019	5	Revised summary based on results of October 12, 2018 and January 23, 2019 reviews.
Oct. 06, 2019	6	Revised summary based on results of October 3, 2019 review.
Sep. 25, 2020	7	Revised summary based on results of September 9, 2020 review and September 24, 2020 re-assessment.

ORGANIZATIONAL STRUCTURE, ROLES, RESPONSIBILITIES AND AUTHORITIES

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To document the following for the Kirkland Lake Drinking Water System:

- Owner;
- Organizational structure of the Operating Authority;
- QEMS roles, responsibilities and authorities of staff, Top Management and individuals/groups that provide corporate oversight; and
- Responsibilities for conducting the Management Review

2. Definitions

Operations Management – refers to the Senior Operations Manager and/or Operations Manager that directly oversees a facility's operations

Senior Leadership Team (SLT) – members include President and CEO, Executive Vice President and General Counsel, Vice Presidents of OCWA's business units and Regional Hub Managers

Top Management – a person, persons or a group of people at the highest management level within an operating authority that makes decisions respecting the QMS and recommendations to the owner respecting the subject system or subject systems

Operations Personnel – Employees of the drinking water system who perform various activities related to the compliance, operations and maintenance of the drinking water system that may directly affect drinking water quality

3. Procedure

3.1 Organizational Structure

The Kirkland Lake Drinking Water System is owned by the Corporation of the Town of Kirk Land Lake and is represented by the Mayor, Chief Administrative Officer and Council.

The organizational structure of OCWA, the Operating Authority, is outlined in appendix OP-09A: Organizational Structure.

3.2 Top Management

Top Management for the Kirkland Lake Drinking Water System consists of:

- Operations Management – Kirkland Lake Cluster
- Regional Hub Manager – Northeastern Ontario Regional Hub
- Safety, Process & Compliance Manager – Northeastern Ontario Regional Hub

Irrespective of other duties (see Table 9-2 below), Top Management's responsibilities and authorities include:

- Endorsing the Operational Plan as per the Commitment and Endorsement procedure (OP-03);
- Ensuring that the QEMS meets the requirements of the DWQMS;
- Ensuring staff are aware of the applicable legislative and regulatory requirements;
- Communicating the QEMS according to the Communications procedure (OP-12);
- Providing resources needed to maintain and continually improve the QEMS;
- Appointing and authorizing a QEMS Representative (OP-04); and
- Undertaking Management Reviews as per the Management Review procedure (OP-20).

Note: Specific responsibilities of the individual members of Top Management are identified in the referenced procedures.

3.3 Corporate Oversight

Roles, responsibilities and authorities for individuals/groups providing corporate oversight of OCWA's QEMS are summarized in Table 9-1 below.

Table 9-1: Corporate QEMS Roles, Responsibilities and Authorities

Role	Responsibilities and Authorities
Board of Directors	• Set the Agency's strategic direction, monitor overall performance and ensure appropriate systems and controls are in place in accordance with the Agency's governing documents • Review and approve the QEMS Policy
Senior Leadership Team (SLT)	• Establish the Agency's organizational structure and governing documents and ensure resources are in place to support strategic initiatives • Monitor and report on OCWA's operational and business performance to the Board of Directors • Review the QEMS Policy and recommend its approval to the Board • Approve corporate QEMS programs and procedures
Corporate Compliance	• Manage the QEMS Policy and corporate QEMS programs and procedures • Provide support for the local implementation of the QEMS • Monitor and report on QEMS performance and any need for improvement to SLT • Consult with the MOECC and other regulators and provide compliance support/guidance on applicable legislative, regulatory and policy requirements • Manage contract with OCWA's DWQMS accreditation body

3.4 Regional Hub Roles, Responsibilities and Authorities

QEMS roles, responsibilities and authorities of Northeastern Ontario Regional Hub personnel are summarized in Table 9-2 below. This information is kept current as per the Document and Records Control procedure (OP-05) and is communicated to staff as per the Communications procedure (OP-12).

Additional duties of employees are detailed in their job specifications and in the various QEMS programs and procedures that form, or are referenced in, this Operational Plan.

Table 9-2: QEMS Roles, Responsibilities and Authorities for the Regional Hub

Role	Responsibilities and Authorities
All Operations Personnel	• Perform duties in compliance with applicable legislative and regulatory requirements • Be familiar with the QEMS Policy and work in accordance with QEMS programs and procedures • Maintain operator certification (as required) • Attend/participate in training relevant to their duties under the QEMS • Document all operational activities • Identify potential hazards at their facility that could affect the environmental and/or public health and report to Operations Management • Report and act on all operational incidents • Recommend changes to improve the QEMS
Regional Hub Manager (Top Management)	• Oversee the administration and delivery of contractual water/wastewater services on a Regional Hub level • Fulfill role of Top Management • Ensure corporate QEMS programs and procedures are implemented consistently throughout the Regional Hub • Manages the planning of training programs for Regional Hub • Report to VP of Operations/SLT on the regional performance of the QEMS and any need for Agency-wide improvement
Operations Management (Top Management)	• Manage the day-to-day operations and maintenance of his/her assigned facilities and supervise facility operational staff • Fulfill role of Top Management • Ensure corporate and site-specific QEMS programs and procedures are implemented at his/her assigned facilities • Determine necessary action and assign resources in response to operational issues • Report to the Regional Hub Manager on facility operational performance • Ensure operational training is provided for the cluster (in

Role	Responsibilities and Authorities
	consultation with the SPC Manager as required) • Act as Overall Responsible Operator (ORO) when required.
Safety, Process & Compliance (SPC) Manager (Top Management)	• Supervise facility compliance staff and provide technical and program support to the Regional Hub related to process control and compliant operations • Fulfill role of Top Management • Ensure corporate/regional QEMS programs and procedures are implemented consistently throughout the Regional Hub • Assist in the development of site-specific operational procedures as required • Ensure training on applicable legislative and regulatory requirements and the QEMS is provided for the Regional Hub (in consultation with Operations Management as required) • Monitor and report to the Regional Hub Manager and Operations Management on the compliance status and QEMS performance within his/her Regional Hub and any need for improvement • Act as alternate QEMS Representative (when required)
Process & Compliance Technician – PCT (QEMS Representative)	• Implement, monitor and support corporate programs relating to environmental compliance and support management by evaluating and implementing process control systems at his/her assigned facilities • Fulfill role of QEMS Representative (OP-04) • Monitor, evaluate and report on compliance/quality status of his/her assigned facilities • Implement facility-specific QEMS programs and procedures consistently at his/her assigned facilities • Participate in audits and inspections and assist in developing, implementing and monitoring action items to respond to findings • Report to the SPC Manager on QEMS implementation and identify the need for additional/improved processes and procedures at the regional/cluster/facility level (in consultation with the Operations Management as required) • Communicates to Owners on facility compliance and DWQMS accreditation as directed • Deliver/participate in/coordinate training including applicable legislative and regulatory requirements and the QEMS
Team Lead	• Perform duties as assigned by Operations Management • Participate as a technical advisor to staff and management and provide specialized training on technical issues • Prepare and/or coordinate operational staff work assignments and follow up to ensure completion • Assist management in providing recommendations for annual capital forecasts and gathering information for operational reports

Role	Responsibilities and Authorities
	as required • Oversee maintenance activities on equipment and process in order to maintain compliance with applicable legislation, regulations, approvals, and established procedures • Assist in the preparation of facility manuals and documenting operating processes and procedures for staff • Act for management during vacations or periodic absences. • Perform duties of Operator/Mechanic as required • May act as Operator-in-Charge (OIC) and/or Overall Responsible Operator (ORO) when required. Refer to ORO Letter.
Operator/Mechanic	• Perform duties as assigned by Operations Management or designate • Monitor, maintain and operate facilities in accordance with applicable regulations, approvals and established operating procedures • Collect samples and perform laboratory tests and equipment calibrations as required • Regularly inspect operating equipment, perform routine preventive maintenance and repairs and prepare and complete work orders as assigned • Participate in facility inspections and audits • May act as Operator-in-Charge (OIC) and/or Overall Responsible Operator (ORO) when required. Refer to ORO Letter.
Mechanic/Operator	• Perform duties as assigned by Operations Management or designate • Act as lead with other staff on extensive maintenance/repair projects • Schedule and perform maintenance on equipment and processes in accordance with established procedures and record the maintenance data • Regularly inspect operating equipment, perform routine preventive maintenance and repairs
Instrumentation Technician	• Provide advice and technical expertise on the services required for process control and automation systems • Discuss and advise on detailed system and programming requirements, modify existing and new software in response to plant requests, analyze and resolve problems/error conditions, document changes/modifications and configure, install and support related software, hardware and network for such systems • Conduct inspections of the process control and automation systems to validate that all is operating within established parameters as requested • Install and commission new electrical/electronic equipment and

Role	Responsibilities and Authorities
	automation systems • May act as Operator-in-Charge (OIC)
Municipal Operators working in the Kirkland Lake Drinking Water System	• Fulfill duties assigned by their Supervisor • Regularly inspect the distribution system, perform routine maintenance and repairs and complete appropriate forms • Contact OCWA for all non-routine operational concerns or adjustments • Take control of emergency situations (eg. water main breaks) and complete repair according to applicable regulations, licences, permits and established operating procedures • Collect samples when required • Respond to water complaints and provide records to OCWA • Maintain the distribution log book according to regulatory requirements • Participate in facility inspections and audits • May act as Operator-in-Charge (OIC)

4. Related Documents

OP-03 Commitment and Endorsement
OP-04 QEMS Representative
OP-05 Document and Records Control
OP-09A Organizational Structure
OP-12 Communications
OP-20 Management Review

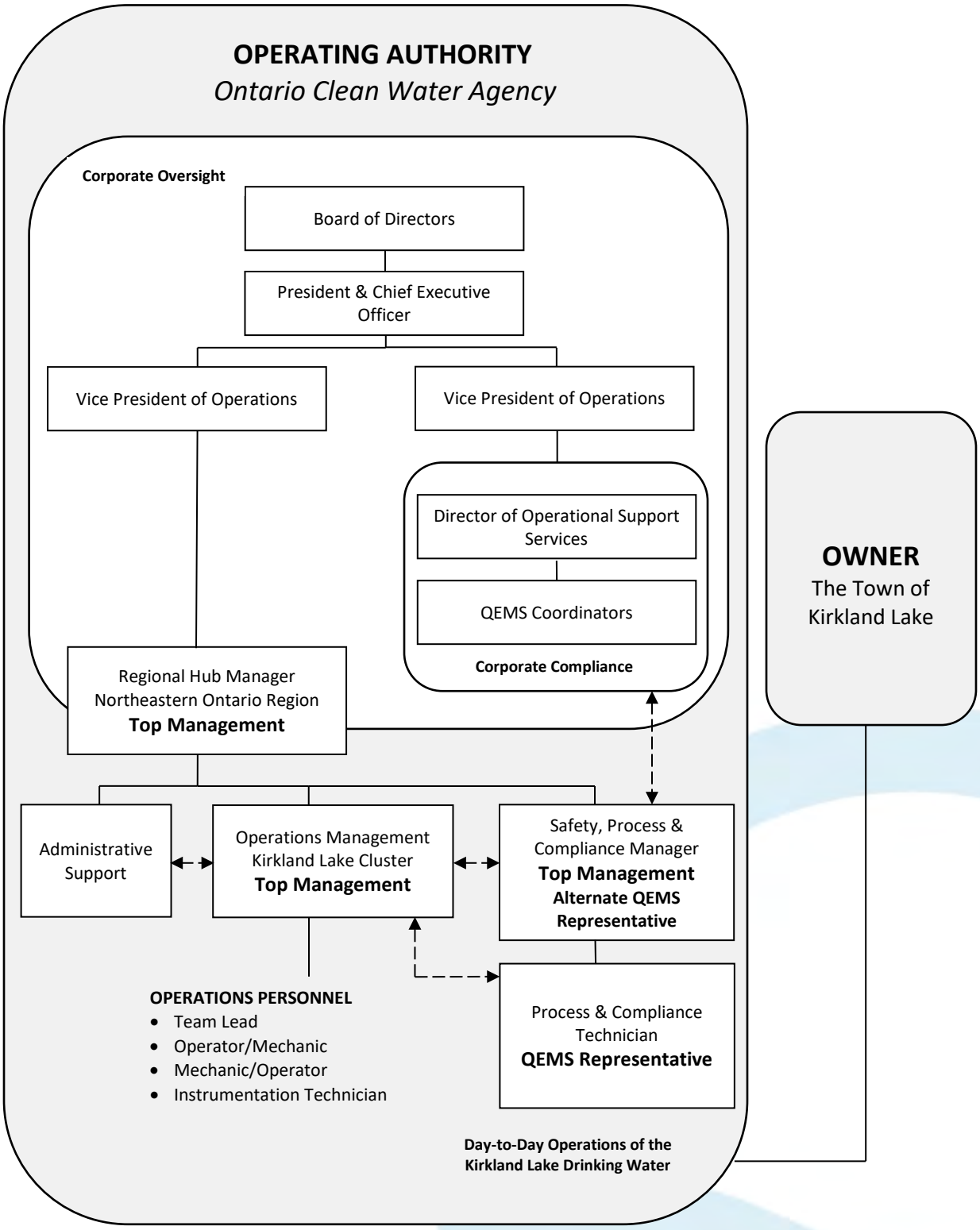
5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Information within OP-09 (s. 3) was originally set out in main body of the Kirkland Lake Drinking Water System Operational Plan (revision 3, dated October 13, 2017). New Purpose, Definitions, Procedure, Related Documents and separate Revision History sections. Added definitions for Operations Management and Operations Personnel and throughout procedure replaced 'Senior Operations Manager' references with 'Operations Management'. Incorporated OCWA's new org structure, including SPC Manager. Removed two levels of Top Management (e.g. Facility Level and Corporate level), instead Top Management is only at the facility level and corporate has been moved to Corporate oversight. Re-worded QEMS Roles, Responsibilities and Authorities for each position. Added QEMS Roles, Responsibilities and Authorities for Mechanic and Data Clerk.
Jan. 23, 2018	1	Changed position of mechanic to mechanic/operator, added bullet that

Date	Revision #	Reason for Revision
		an instrumentation technician can act as OIC and removed the position of Data Clerk.
Oct. 06, 2019	2	Added responsibilities and authorities for a Team Lead and removed position of Senior Operator.

ORGANIZATIONAL STRUCTURE

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager



Revision History

Date	Revision #	Reason for Revision
April 10, 2015	0	Organizational Chart issued.
Oct. 17, 2016	1	Removed Team Lead and added position of Senior Operator.
Oct. 13, 2017	2	Added Safety Process and Compliance Manager Position and changed media spokesperson from Senior Operations Manager to Regional Hub Manager.
Jul. 06, 2018	3	Appendix issued - Organizational Chart previously contained as Appendix C of the Operational Plan. Moved to a new Appendix.
Jan. 23, 2019	4	Updated position of mechanic to mechanic/operator.
Oct. 06, 2019	5	Changed Senior Operator to Team Lead.
Sep. 25, 2020	6	Revision to reflect change to reporting structure - Corporate Compliance now reports to VP of Operations.

1. Purpose

To document a procedure that describes:

- the competencies required for personnel performing duties directly affecting drinking water quality;
- the activities to develop and/or maintain those competencies; and
- the activities to ensure personnel are aware of the relevance of their duties and how they affect safe drinking water.

2. Definitions

Competence – the combination of observable and measurable knowledge, skills, and abilities which are required for a person to carry out assigned responsibilities

Operations Management – refers to the Senior Operations Manager and/or Operations Manager that directly oversees a facility's operations

Operations Personnel – employees of the drinking water system who perform various activities related to the compliance, operations and maintenance of the drinking water system that may directly affect drinking water quality

Top Management – a person, persons or a group of people at the highest management level within an operating authority that makes decisions respecting the QMS and recommendations to the Owner respecting the subject system or subject systems

3. Procedure

3.1 The following table presents the minimum competencies required by operations personnel.

Position	Required Minimum Competencies
Operations Management	• Valid operator certification • Experience and/or training in managing/supervising drinking water system operations, maintenance, financial planning and administration • Training and/or experience related to drinking water system processes, principles and technologies • Training on OCWA's QEMS and the DWQMS • Training on relevant legislation, regulations, codes, policies, guidelines and procedures • Experience using computers and operational computerized systems

COMPETENCIES

Reviewed by: I. Bruneau, PCT | Approved by: Y. Rondeau, SPC Manager

Position	Required Minimum Competencies
Safety, Process & Compliance (SPC) Manager	• Valid operator certification • Experience in providing technical support and leading/managing programs related to process control and compliant operations • Experience and/or training in conducting compliance audits, and management system audits • Experience and/or training in preparing and presenting informational and training material • Training on OCWA's QEMS and the DWQMS • Training on relevant legislation, regulations, codes, policies, guidelines and procedures • Experience using computers and operational computerized systems
Team Lead	• Valid operator certification Experience and/or training in managing and planning multiple projects, assessing priorities and effectively coordinating operation and maintenance programs • Experience leading/directing operations personnel, and providing technical guidance to resolve operational issues • Training and/or experience related to operations and maintenance of drinking water system processes, principles and technologies • Training on OCWA's QEMS and the DWQMS • Training on relevant legislation, regulations, codes, policies, guidelines and procedures • Experience using computers and operational computerized systems
Operator/Mechanic	• Valid operator certification • Training and/or experience in inspecting and monitoring drinking water system processes and performing/planning maintenance activities • Training on OCWA's QEMS and the DWQMS • Training on relevant legislation, regulations, codes, policies, guidelines and procedures • Experience using computers and operational computerized systems
Mechanic/Operator	• Millwright and/or other trades certificates • Valid operator certification • Experience in maintaining and repairing equipment and structures and in planning and scheduling maintenance and repair tasks • Training and/or experience related to drinking water system processes • Training on OCWA's QEMS and the DWQMS • Training on relevant legislation, regulations, codes, policies, guidelines and procedures • Experience using computers and operational computerized systems
Process & Compliance Technician (PCT)	• Valid operator certification • Experience and/or training in resolving/addressing compliance issues for drinking water systems

Position	Required Minimum Competencies
	• Experience and/or training in monitoring, assessing and reporting on facility performance against legal requirements and corporate goals • Experience and/or training in preparing and presenting informational and training material • Experience in conducting management system audits or internal auditor education/training • Training on OCWA's QEMS and the DWQMS • Training on relevant legislation, regulations, codes, policies, guidelines and procedures • Experience using computers and operational computerized systems
Instrumentation Technician	• Valid operator certification • Experience and/or training in monitoring, programming, installing and troubleshooting network, hardware, software and instrumentation • Experience and/or training in drinking water system processes, design, instrumentation, process control and automation systems • Training on OCWA's QEMS and the DWQMS • Training on relevant legislation, regulations, codes, policies, guidelines and procedures • Experience using computers and operational computerized systems
Municipal Operators working in the Kirkland Lake Drinking Water System	• Valid operator certification; • Experience and/or training of the distribution system operations • Training in water treatment processes • Experience and training on the maintenance and repair of a variety of equipment and structures • Training on relevant legislation, regulations, codes, policies, guidelines and procedures • Training on OCWA's QEMS and the DWQMS

3.2 OCWA's recruiting and hiring practices follow those of the Ontario Public Service (OPS). As part of the OPS, minimum competencies, which include education, skills, knowledge and experience requirements, are established when designing the job description for a particular position. As part of the recruitment process, competencies are then evaluated against the job description. Based on this evaluation, the hiring manager selects and assigns personnel for specific duties.

3.3 OCWA's Operational Training Program aims to:

- Develop the skills and increase the knowledge of staff and management;
- Provide staff with information and access to resources that can assist them in performing their duties; and
- Assist OCWA certified operators in meeting the legislative and regulatory requirements with respect to training.

3.4 The Program consists of Director Approved, continuing education and on-the-job training and is delivered using a combination of methods (e.g., traditional classroom courses, e-learning/webinars and custom/program-based courses/sessions). A formal evaluation process is in place for all sessions under the Operational Training Program and is a critical part of the Program's continual improvement.

3.5 Awareness of OCWA's QEMS is promoted during the orientation of new staff, at facility/cluster/regional hub level training sessions and meetings and through OCWA's Environmental Compliance 101 (EC 101) course. All new staff are required to complete the EC 101 course within their first year of joining OCWA. The purpose of the EC 101 course is to ensure staff are aware of applicable legislative and regulatory requirements, to promote awareness of OCWA's QEMS and to reinforce their roles and responsibilities under OCWA's QEMS.

3.6 Staff are also required to complete the mandatory environmental and health and safety compliance training listed in OCWA's Mandatory Compliance Training Requirements document, based on their position and/or the duties they perform. This list is available on OCWA's intranet.

3.7 Operations personnel also receive site-specific training/instruction on relevant operational and emergency response procedures to ensure effective operational control of processes and equipment which may impact the safety and quality of drinking water.

3.8 As part of OCWA's annual Performance Planning and Review (PPR) process, employee performance is evaluated against their job expectations. Professional development opportunities and training needs (which could include formalized courses as well as site-specific on-the-job training or job shadowing/mentoring) are identified as part of this process (and on an ongoing basis). In addition to this process, OCWA employees may at any time request training from either internal or external providers by obtaining approval from their Manager.

3.9 Certified drinking water operators are responsible for completing the required number of training hours in order to renew their certificates based on the highest class of drinking water subsystem they operate. They are also responsible for completing mandatory courses required by *Safe Drinking Water Act* (SDWA) O. Reg. 128/04 Certification of Drinking Water System Operators and Water Quality Analysts. The Operations Management takes reasonable steps to ensure that every operator has the opportunity to attend training to meet the requirements.

3.10 It is the responsibility of operations personnel to ensure Operations Management are aware of any change to the status/classification of their drinking water operator certificate(s), the validity of their driver's licence (required to hold at a minimum a Class G license which is initially verified upon hire) and/or the validity of any other required certificates/qualifications.

3.11 Individual OCWA employee training records are maintained and tracked using a computerized system, the Training Summary database, which is administrated by OCWA's Training Department.

3.12 Municipal Employees: The Town of Kirkland Lake hires employees according to their own hiring practices and these employees are the responsibility of the Town. Certified operators are responsible for completing the annual number of required training hours for the highest type and class of subsystem where the operator works and completing mandatory courses required by *Safe Drinking Water Act* (SDWA) O. Reg. 128/04 Certification of Drinking Water System Operators and Water Quality Analysts. The Town of Kirkland Lake takes reasonable steps to ensure that every operator has the opportunity to attend training to meet the annual training hour requirements. The Town will notify OCWA if any municipal operator loses there certification.

Awareness of the system's QEMS is done through continuing education, on-the-job training sessions and internal audits.

Municipal employee training records are tracked and maintained by the Town. Training records are controlled as per QEMS Procedure QP-01 Document and Records Control.

4. Related Documents

OCWA's Mandatory Compliance Training list (OCWA intranet)
OCWA's Training Resources (OCWA Intranet)
OCWA's Training Summary Database
Performance Planning and Review (PPR) Database
OP-5 Document and Records Control

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Information within OP-10 (s. 3) was originally set out in main body of the Kirkland Lake Drinking Water System Operational Plan (revision 3, dated October 13, 2017). New Purpose, Definitions, Procedure, Related Documents and separate Revision History sections. Added definitions for Operations Management and Operations Personnel and throughout procedure replaced 'Senior Operations Manager' references with 'Operations Management'. Modified table in procedure (s. 3.1 and s. 3.2): removed/revised non-measurable competencies, added the word 'minimum' to competencies; removed 'Valid Class G Driver's License' listed under individual positions and referenced in s. 3.11; added competencies for SPC Manager and Data Clerk and merged competencies for Senior Operations Manager and Operations Manager under Operations Management. Updated training sections (s. 3.4 to s. 3.7) to reference new Environmental 101 course, Mandatory Compliance Training list and removed specific references to Orientation Training Program. Added s. 3.11 related to ensuring operators make Operations Management aware of changes to operator certification and other certificates/licenses. Other minor changes to wording.
Jan. 23, 2019	1	Updated the minimum competencies for Mechanic/Operator – added valid operator certification. Removed the minimum competencies required by a data clerk –position is eliminated.
Oct. 06, 2019	2	Added required minimum competencies for the Team Lead and removed position of Senior Operator.

PERSONNEL COVERAGE

Reviewed by: I. Bruneau, PCT | Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe the procedure for ensuring that sufficient and competent personnel are available for duties that directly affect drinking water quality at the Kirkland Lake Drinking Water System.

2. Definitions

Competency – an integrated set of requisite skills and knowledge that enables an individual to effectively perform the activities of a given occupation [*]

Essential Services – services that are necessary to enable the employer to prevent,

(a) danger to life, health or safety,
(b) the destruction or serious deterioration of machinery, equipment or premises,
(c) serious environmental damage, or
(d) disruption of the administration of the courts or of legislative drafting.

(*Crown Employees Collective Bargaining Act*, 1993)

3. Procedure

3.1 Operations Management ensures that personnel meeting the competencies identified in OP-10 Competencies are available for duties that directly affect drinking water quality.

3.2 The Kirkland Lake Drinking Water System is considered an un-manned facility. OCWA operations personnel routinely visit the plant daily Monday through Friday. Operators inspect the Chaput Hughes and Swastika booster stations at least once per week and the Kirkland Lake Gold booster station as required. The plant is also monitored daily using a remote monitoring SCADA system.

Certified municipal staff visit the distribution system every day during the work week and are responsible for the inspection, maintenance and repair of the system.

Both OCWA and municipal operators are available 24 hours a day, 7 days a week by cell phone. All water facilities (plant and booster stations) are monitored by the plant's SCADA system which sends out alarms when alarm conditions are encountered. The only exception is the Kirkland Lake Gold booster station which sends a signal to an alarm dialer when an alarm condition occurs. All plant and booster station alarms are responded to by OCWA operators.

Municipal operators respond to issues in the distribution system and provide reports to OCWA which detail actions taken to resolve the problem.

[*] Based on the *2005 National Occupational Guidelines for Canadian Water and Wastewater Operators* and International Board of Standards for Training, Performance and Instruction

3.3 Operations personnel are assigned to act as and fulfill the duties of Overall Responsible Operator (ORO) and Operator-in-Charge (OIC) in accordance with SDWA O. Reg. 128/04.

The Senior Operations Manager is the designated ORO for the water treatment plant and distribution system which includes the Chaput Hughes standpipe and water control building, the Swastika water control building and the KL Gold booster station. When the ORO is unavailable, the Regional Manager is designated as the ORO and is recorded as such in the facility logbook (refer to the ORO Letter).

The designated OIC for each shift is recorded in the facility logbook.

3.4 The Team Lead assigns an on-call operator for the time that the facility is un-staffed (i.e., evenings, weekends and Statutory Holidays. The on-call shift rotates every Thursday morning at 0700 hours. The on-call schedule is maintained by the Team Lead and is available to on-call operators in the Microsoft Outlook shared calendar.

3.5 The on-call operator conducts an inspection of the facility process at least once per day during the weekends and Statutory Holidays either on-site or via OCWA's remote monitoring system. Details of the inspection are recorded in the facility logbook and/or round sheets.

3.6 The alarm system auto dialer is programmed to contact the operator on-call. The operator on-call is responsible for responding to the alarm within a reasonable timeframe. If the nature of the alarm requires additional staff, the on-call operator can request assistance from any of the other certified operators. The on-call operator ensures details of the call-in are included in the facility logbook. OCWA operators also record details in OCWA's Workplace Management System (WMS/Maximo).

3.7 The Team Lead or Operations Management is responsible for approving vacation time for their staff in a manner which ensures sufficient personnel are available for the performance of normal operating duties.

3.8 OCWA's operations personnel are represented by the Ontario Public Service Employees Union (OPSEU). In the event of a labour disruption, Operations Management, together with the union, identifies operations personnel to provide "essential services" required to operate the facility so that the quality of drinking water is not compromised in any way.

3.9 A contingency plan for Critical Shortage of Staff is included in the Facility Emergency Plan. This plan provides direction in the event that there is a severe shortage of operations personnel due to sickness (e.g., pandemic flu) or other unusual situations.

4. Related Documents

Call-In Reports (WMS)

Critical Shortage of Staff Contingency Plan (Facility Emergency Plan)
Facility Logbook
Facility Round Sheets
On-Call Schedule
ORO Letter
Vacation Schedule
OP-10 Competencies

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 17, 2016	1	Changed Team Lead to Senior Operator and added overall responsible operator (ORO), updated location of call-in reports.
Oct. 13, 2017	2	Removed position of Operations Manager and added Regional Hub Manager.
Jul. 06, 2018	3	QP-03 procedure renamed OP-11. Removed Scope and Responsibilities sections. Other minor edits in wording.
Jan. 23, 2019	4	Clarified how the alarm system works in step 3.2. Removed the statement in step 3.4 that the on-call shift change is the end of the business day Friday.
Oct. 06, 2019	5	Changed frequency of visits to the booster stations to at least twice per week, changed Senior Operator to Team Lead, updated the on-call rotation in Step 3.4 and clarified how callouts are documented in Step 3.6.
Sep. 25, 2020	6	Updated ORO information
Apr. 9, 2021	7	Changed frequency of visits to the booster stations to at least once per week and updated Step 3.3 to indicate that the Senior Operations Manager is the ORO for the water and distribution systems and the Regional Manager is the back-up ORO. Team Lead is no longer ORO for the water plant.

COMMUNICATIONS

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe the procedure for facility level internal and external QEMS-related communications between Top Management and:

- OCWA staff;
- the Owner;
- essential suppliers and service providers (as identified in OP-13); and
- the public.

2. Definitions

Operations Management – refers to the Senior Operations Manager and/or Operations Manager that directly oversees a facility's operations

Operations Personnel – employees of the drinking water system who perform various activities related to the compliance, operations and maintenance of the drinking water system that may directly affect drinking water quality.

3. Procedure

3.1 Operations Management and the QEMS Representative are responsible for identifying and coordinating any site-specific communications in relation to the status/ development of the facility's QEMS.

3.2 Internal and external communication responsibilities and reporting requirements for emergency situations are set out under OCWA's Emergency Management Program (i.e., Facility Emergency Plan and OCWA's Emergency Response Plan). Refer to OP-18 Emergency Management for more information.

3.3 Communication with OCWA staff:

3.3.1 Within the first year of hire, all staff are required to complete the Environmental Compliance 101 (EC101) course. The objective of the EC 101 course is to ensure that staff are aware of applicable legislative and regulatory requirements and of OCWA's QEMS and to reinforce their roles and responsibilities under OCWA's QEMS.

3.3.2 Operations Management are responsible for ensuring operations personnel receive site-specific training on the Operational Plan, the organizational structure for the facility including the roles and responsibilities and authorities (outlined in OP-09 Organizational Structure, Roles, Responsibilities and Authorities), QEMS Procedures and other related operating instructions and procedures as part of the orientation process and on an on-going basis as required.

3.3.3 The Safety, Process and Compliance (SPC) Manager is responsible for ensuring training is provided for the Regional Hub (in consultation with Operations Management as required) on applicable legislative and regulatory requirements and the QEMS.

3.3.4 The QEMS Representative assists Operations Management and/or the SPC Manager in the coordination/delivery of training as required.

3.3.5 Revisions to the QEMS and associated documentation are communicated as per OP-05 Document and Records Control.

3.3.6 The QEMS Policy is available to all OCWA personnel through OCWA's intranet and as outlined in 3.6.2 of this procedure.

3.3.7 Operations personnel are responsible for identifying potential hazards at the facility that could affect the environmental and/or public health, and communicating these to Operations Management. They may also recommend changes be made to improve the facility's QEMS by making a request to the QEMS Representative (as per OP-05).

3.3.8 The QEMS Representative is responsible for ensuring that the Operations Management and the SPC Manager are informed regarding the compliance/quality status of the facility and QEMS implementation and any need for improved processes/procedures at the cluster/facility level.

3.3.9 The SPC Manager reports to the Regional Hub Manager on the compliance status, the QEMS performance and effectiveness, any need for improvement and on issues that may have Agency-wide significance. Operations Management reports to the Regional Hub Manager on facility operational performance.

3.4 Communication with the Owner:

3.4.1 The Regional Hub Manager, Operations Management and SPC Manager ensures that the Owner is provided with QEMS updates and that they are kept informed of the status of the facility's operational and compliance performance during regularly scheduled meetings and/or through electronic and/or verbal communications. The QEMS Representative/PCT assists in the coordination of these meetings and with communicating the updates as directed.

3.4.2 The continuing suitability, adequacy and effectiveness of OCWA's QEMS are communicated to the Owner as part of the Management Review process (refer to OP-20 Management Review).

3.5 Communications with Essential Suppliers and Service Providers:

3.5.1 Communication requirements to ensure essential suppliers and service providers understand the relevant OCWA QEMS policies, procedures and expectations are described in OP-13 Essential Supplies and Services.

3.6 Communication with the Public:

3.6.1 Media enquiries must be directed to the facility's designated media spokesperson as identified in the Facility Emergency Plan. The media spokesperson coordinates with local and corporate personnel (as appropriate) and the Owner in responding to media enquiries.

3.6.2 OCWA's QEMS and QEMS Policy are communicated to the public through OCWA's public website. The QEMS Policy is also posted at the Kirkland Lake Wastewater Treatment Plant and the Kirkland Lake Process and Compliance Office.

3.6.3 Facility tours of interested parties must be approved in advance by the Owner. A record of any tour is made in the facility logbook.

3.6.4 All complaints, whether received from the consumer, the community or other interested parties, are documented on a Community Complaint form. As appropriate, the Operations Management or the Team Lead ensures that the Owner is informed of the complaint and/or an action is developed to address the issue in a timely manner. The QEMS Representative ensures that consumer feedback is included for discussion at the Management Review.

3.6.5 Any complaints received by the Town of Kirkland Lake are responded to by the Town's distribution staff. The complaint; along with any actions taken are recorded on the Town's computerized information tracking spreadsheet and a summary is provided to OCWA every month.

4. Related Documents

Community Complaint Form
Complaint Summary (Town)
Emergency Response Plan
Facility Emergency Plan
OP-05 Document and Records Control
OP-09 Organizational Structure, Roles, Responsibilities and Authorities
OP-13 Essential Supplies and Services
OP-18 Emergency Management
OP-20 Management Review

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 28, 2015	1	Clarified the recording and filing of OCWA and Town complaints in step 5.6.
Oct. 17, 2016	2	Changed Team Lead to Senior Operator, Regional Manager to Regional Hub Manager, added overall responsible operator (ORO), changed monthly operations reports to quarterly and removed OPEX reporting from section 5.6.
Oct. 13, 2017	3	Changed how the Town documents complaints in step 5.6, removed position of Operations Manager and added the new position for Safety, Process and Compliance Manager.
Jul. 06, 2018	4	QP-04 procedure renamed OP-12. Removed Scope and Responsibilities sections. Added definitions for Operations Management and Operations Personnel. Reordered and created separate sections to clarify communications to each of the 4 parties. Clarified suppliers were those listed as essential as per Element 13 (as per DWQMS v. 2.0) and replaced references to Senior Operations Manager with 'Operations Management'. Updated training sections for OCWA personnel (s. 3.3.1 to s. 3.3.4) to reference new Environmental Compliance 101 course completed within first year of hire and to outline how training is coordinated between SPC Manager/Operations Management, and QEMS Representative. Included sections on R&Rs for performance reporting within OCWA (s. 3.3.7 to s. 3.3.9) and to Client (3.4.1). Replaced identification of media spokesperson (s. 3.6.1) with 'as identified in Facility Emergency Plan'. Added reference to site-specific records/documents used for recording tours (s. 3.6.3). Other minor edits.
Oct. 06, 2019	5	Changed Senior Operator to Team Lead in Step 3.6.4.

ESSENTIAL SUPPLIES AND SERVICES

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe OCWA's procedures for procurement and for ensuring the quality of essential supplies and services.

2. Definitions

Essential Supplies and Services – supplies and services deemed to be critical to the delivery of safe drinking water

3. Procedure

3.1 Essential supplies and services for the Kirkland Lake Drinking Water System are contained in the Facility Emergency Plan on the Essential Supplies and Services List. The list is reviewed at least once every calendar year by the QEMS Representative and updated as required.

3.2 Purchasing is conducted in accordance with OCWA's Corporate Procurement and Administration policies, procedures and guidelines, which are adopted from those of the Ontario Public Service.

Purchases of capital equipment are subject to formal approval by the facility's owner.

3.3 As part of the corporate procurement process, potential suppliers/service providers are informed of relevant aspects of OCWA's QEMS through the tendering process and through specific terms and conditions set out in our agreements and purchase orders. Essential suppliers and service providers (including those contracted locally) are sent a letter that provides an overview of the relevant aspects of the QEMS.

3.4 Contractors are selected based on their qualifications and ability to meet the facility's needs without compromising operational performance and compliance with applicable legislation and regulations.

Contracted personnel including suppliers may be requested or required to participate in additional relevant training/orientation activities to ensure conformance with facility procedures and to become familiar with OCWA workplaces.

If necessary, appropriate control measures are implemented while contracted work is being carried out and communicated to all relevant parties to minimize the risk to the integrity of the drinking water system and the environment.

3.5 All third-party drinking water testing services are provided by accredited and licensed laboratories. The Ministry of the Environment, Conservations and Parks (MECP) has agreement with The Canadian Association for Laboratory Accreditation (CALA) for accreditation of laboratories testing drinking water. The QEMS Representative is

responsible for notifying the MECP of any change to the drinking water testing services being utilized.

3.6 Internal verification and calibration activities (e.g. chlorine analyzer, turbidimeter, flowmeters, etc.) are conducted by operations personnel in accordance with equipment manuals and/or procedures (Refer to OP-17 Measurement Recording Equipment Calibration and Maintenance).

3.7 External calibration activities, if required are conducted by qualified third-party providers. Qualifications of the service provider are verified during the procurement process. The service provider is responsible for providing a record/certificate of all calibrations conducted.

3.8 Chemicals purchased for use in the drinking water treatment process must meet AWWA Standards and be ANSI/NSF certified as per the Municipal Drinking Water Licence (MDWL).

3.9 The facility orders and receives ongoing deliveries of chemicals to satisfy current short-term needs based on processing volumes and storage capacities. Incoming chemical orders are verified by reviewing the manifest or invoice in order to confirm that the product received is the product ordered.

3.10 Process components/equipment provided by the supplier must meet applicable regulatory requirements and industry standards for use in drinking water systems prior to their installation.

3.11 To ensure the safe delivery of drinking water, the Town maintains an inventory of critical repair components. The Procurement and Risk Management Coordinator places orders based on lists received by the Waterworks Foreman. The parts are ordered from reliable companies (Corix and Wamco) that supply parts with applicable certification and standards. Components are verified by the Waterworks Foreman and Procurement and Risk Management Coordinator to ensure the correct product was received.

4. Related Documents

ANSI/NSF Documentation
AWWA Standards
Calibration Certificates/Records
Essential Supplies and Services List
Municipal Drinking Water Licence (MDWL)
OP-17 Measurement Recording Equipment Calibration and Maintenance

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 17, 2016	1	Changed Team Lead to Senior Operator and added overall responsible operator (ORO) and updated step 5.7 to better clarify the requirements for chemicals and materials used in the drinking water system.
Oct. 13, 2017	2	Added positions for Regional Hub Manager and Safety, Process and Compliance Manager.
Jul. 06, 2018	3	QP-05 procedure renamed OP-13. Removed Scope and Responsibilities sections. Changes to wording to provide clarification on ensuring quality of essential supplies and services (s. 3.5, 3.6, 3.7 and 3.9).
Oct. 06, 2019	4	Added step 3.11 to describe the Town's purchasing and receiving process for distribution components. Updated MOECC to MECP.

REVIEW AND PROVISION OF INFRASTRUCTURE

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe OCWA's procedure for reviewing the adequacy of infrastructure necessary to operate and maintain the Kirkland Lake Drinking Water System.

2. Definitions

Infrastructure – the set of interconnected structural elements that provide the framework for supporting the operation of the drinking water system, including buildings, workspace, process equipment, hardware, software and supporting services, such as transport or communication

3. Procedure

3.1 At least once every calendar year, Operations Management in conjunction with operations personnel (Team Lead, PCT, operators, mechanics and instrumentation technicians) conducts a review of the drinking water system's infrastructure to assess its adequacy for the operation and maintenance of the system. Operations personnel assist with identifying the need for infrastructure repairs, replacements or alterations and with prioritizing each identified item. Documents and records that are reviewed may include:

- Maintenance records
- Call-in reports
- Adverse Water Quality Incidents (AWQIs) or other incidents
- Health & Safety Inspections
- MECP Inspection Reports
- QEMS Audit Reports

3.2 The outcomes of the risk assessment documented as per OP-08 are considered as part of this review.

3.3 The output of the review is a 5 year rolling Recommended Capital and Major Maintenance Report to assist the Owner and OCWA with planning infrastructure needs for the short and long-term. A letter, summarizing capital works recommendations and estimated expenditures for the upcoming year, is submitted to the Owner for review and approval. A capital letter is submitted, at least once every calendar year by Operations Management.

3.4 The final approved capital items form the long term forecast for any major infrastructure maintenance, rehabilitation and renewal activities as per OP-15.

3.5 Operations Management ensures that results of this review are considered during the Management Review process (OP-20).

4. Related Documents

Capital and Major Maintenance Recommendations Report
Capital Letter & Acknowledgement/Approval from the Owner
Management Review Minutes
OP-08 Risk Assessment Outcomes
OP-15 Infrastructure Maintenance, Rehabilitation and Renewal
OP-20 Management Review

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 17, 2016	1	Changed Team Lead to Senior Operator and added overall responsible operator (ORO).
Oct. 13, 2017	2	Removed position of Operations Manager.
Jul. 06, 2018	3	QP-06 procedure renamed OP-14. Removed Scope and Responsibilities sections. Replaced 'once every 12 months' with 'once every calendar year' (s. 3.1) to reflect wording in DWQMS v. 2.0. Added s. 3.2 to consider the outcomes of the risk assessment under Element 8 during the review to reflect wording in DWQMS v. 2.0. Changes to wording to provide clarification on who is required to attend the review and what documents and records may be considered during the review (s. 3.1). Linked the procedure with OP-15 in terms of documenting a long-term forecast (s. 3.3 and s. 3.4).
Oct. 06, 2019	4	Changed Senior Operator to Team Lead and MOECC to MECP.

INFRASTRUCTURE MAINTENANCE, REHABILITATION AND RENEWAL

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe OCWA's infrastructure maintenance, rehabilitation and renewal program for the Kirkland Lake Drinking Water System

2. Definitions

Infrastructure – the set of interconnected structural elements that provide the framework for supporting the operation of the drinking water system, including buildings, workspace, process equipment, hardware, software and supporting services, such as transport or communication

Rehabilitation – the process of repairing or refurbishing an infrastructure element.

Renewal – the process of replacing the infrastructure elements with new elements.

3. Procedure

3.1 OCWA, under contract with the Owner, maintains a computerized Work Management System (WMS) to manage maintenance, rehabilitation and renewal of infrastructure for which it is operationally responsible. The major components of the WMS consist of planned maintenance, unplanned maintenance, rehabilitation, renewal and program monitoring and reporting.

3.1.1 Planned Maintenance

Routine planned maintenance activities include:

- Inspect, adjust and calibrate process control equipment to ensure proper operation of water systems, pumps, chemical feeders, and all other equipment installed at the facilities.
- Monitor and inspect reservoir and standpipe condition and levels
- Perform routine maintenance duties to equipment including checking machinery and electrical equipment when required.
- Maintain an inventory of all equipment
- Maintain accurate records of work conducted, activities, and achievements.

Planned maintenance activities are scheduled in the WMS that allows the user to:

- Enter detailed asset information;
- Generate and process work orders;
- Access maintenance and inspection procedures;
- Plan preventive maintenance and inspection work;
- Plan, schedule and document all asset related tasks and activities; and
- Access maintenance records and asset histories.

Planned maintenance activities are communicated to the person responsible for completing the task through the issuance of WMS work orders. Work orders are automatically generated on a daily, weekly, monthly, quarterly and annual schedule as determined based on manufacturer's recommendations and site specific operational and maintenance needs and are assigned directly to the appropriate operations personnel. This schedule is set up by the Team Lead. Work orders are completed and electronically entered into WMS by the person responsible for completing the task. Records of these activities are maintained as per OP-05 Document and Records Control.

The Team Lead maintains the inventory of equipment in WMS and ensures that appropriate maintenance plans are in place. Maintenance plans are developed according to the manufacturer's instructions, regulatory requirements, industry standards, and/or client service requirements. Equipment Operation and Maintenance (O&M) manuals are accessible to operations personnel at the locations specified in OP-05 Document and Records Control.

3.1.2 Unplanned Maintenance

Unplanned maintenance is conducted as required. All unplanned maintenance activities are authorized by the Operations Management. Unplanned maintenance activities are recorded in the facility's logbook and as corrective/emergency work order and are entered into WMS by the person responsible for completing the unplanned maintenance activity.

3.1.3 Rehabilitation and Renewal

Rehabilitation and renewal activities including capital upgrades (major infrastructure maintenance) are determined at least once every calendar year in consultation with Operations Management and the Owner. A list of required replacement or desired new equipment is compiled and prioritized by Operations Management in conjunction with operations personnel and is presented to the Owner for review and comment. All major expenditures require the approval of the Owner. In addition to the short-term facility needs (i.e. current year), the Capital and Major Maintenance Recommendations Report also provides a long-term (i.e. rolling 5-year) list of major maintenance recommendations. (Refer to OP-14 Review and Provision of Infrastructure).

3.1.4 Program Monitoring and Reporting

Maintenance needs for the facility are determined through review of manufacturer's instructions, regulatory requirements, industry standards, and/or client service requirements and are communicated by means of work orders. Additionally, Operations Management and operations personnel (Team Lead, PCT, operators, mechanics and instrumentation technicians) conduct a review of

the drinking water system's infrastructure to assess its adequacy for the operation and maintenance of the system. (Refer to OP-14 Review and Provision of Infrastructure).

To assist in monitoring the effectiveness of the program, Operations Management (or designate) can review the WMS dashboard for a quick visualization of work order status and they generate summary reports as needed.

3.2 OCWA's infrastructure maintenance, rehabilitation and renewal program is initially communicated to the Owner through the operating agreement. OCWA's program is communicated to the Owner on an on-going basis through quarterly reports and at a minimum once every calendar year through submission of the capital letter and the results of the Management Review.

4. Related Documents

Capital and Major Maintenance Recommendations Report
Capital Letter & Acknowledgement/Approval from the Owner
Minutes of Management Review
OP-05 Document and Records Control
OP-14 Review and Provision of Infrastructure

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – Information within OP-15 (s. 3) was originally set out in main body of the Kirkland Lake Drinking Water System Operational Plan (last revision 3, dated October 13, 2017). New Purpose, Definitions, Procedure, Related Documents and separate Revision History sections. Added the requirement to ensure the long term forecast is reviewed at once every calendar year and to document a long term forecast (s. 3.1.3) to reflect in DWQMS v. 2.0. Minor wording updates to reflect OCWA's current WMS.
Oct. 06, 2019	1	Changed Senior Operator to Team Lead.
Sep. 25, 2020	2	Updated step 3.1.4 to include the WMS dashboard as a means of monitoring the effectiveness of the program.

SAMPLING, TESTING AND MONITORING

Reviewed by: I. Bruneau, PCT | Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe the procedure for sampling, testing and monitoring for process control and finished drinking water quality.

2. Definitions

Challenging Conditions – any existing characteristic of the water source or event-driven fluctuations that impact the operational process as identified and listed under OP-06 Drinking Water System

3. Procedure

3.1 All sampling, monitoring and testing is conducted at a minimum in accordance with SDWA O. Reg. 170/03 and the facility's Municipal Drinking Water License (MDWL).

3.2 Sampling requirements for the facility are defined in the facility's sampling schedule which is available to operations personnel, at the location(s) noted in OP-05 Document and Records Control. The sampling schedule is maintained by the PCT and is updated as required.

3.3 Samples that are required to be tested by an accredited and licensed laboratory, are collected, handled and submitted according to the directions provided by the licensed laboratory(ies) that conducts the analysis. The laboratory(ies) used for this facility are listed in the Essential Supplies and Services List (within the Facility Emergency Plan (FEP)).

Electronic and/or hardcopy reports received from the laboratory are maintained as per OP-05 Document and Records Control. Analytical results from laboratory reports are uploaded into OCWA's Process Data Management system (PDM).

3.4 Continuous monitoring equipment is used to sample and test for the following parameters related to process control and finished drinking water quality:

<u>L.J. Sherratt Water Filtration Plant</u>

- *Free chlorine residual* – treated water to distribution system
- *Total chlorine residual – filtered* water to clearwell
- *Turbidity* – clarifier effluent and filter effluent
- *Flow r*ates *(including totalized flows)* – raw water, treated water, filtered water,
- *Totalized Flows* – wastewater and backwash water
- *Water Levels* – plant intake, inlet channel, filter building clearwell and highlift clearwell

- *Pressure* – lowlift discharge, highlift head and treated water into the distribution system
- *pH* – finished water
- *Temperature* – raw water
- *Particle Index*
- *CT (to ensure primary disinfection)*
- *Chemical consumption levels*

Chaput Hughes Standpipe

- *Free chlorine residuals*
- *Water Level*

Swastika Booster Station

- *Free chlorine residuals*
- *Flow r*ates *(including totalized flows)*

Test results from continuous monitoring equipment are captured by the plant's SCADA system and are reviewed by a certified operator in accordance with the requirements of SDWA O. Reg. 170/03. A Data Review Protocol and a Standard Operating Procedure for the Continuous Monitoring of Operational Parameters for Drinking Water Systems are available in the systems Operations Manual.

3.5 Adverse water quality incidents are responded to and reported as per Environmental Emergency Procedures (EEPs) found in the Facility Emergency Plan Binder.

3.6 In-house process control activities are conducted on a regular basis by the certified operator(s) on duty and are as follows:

Raw Water*	**Process Water***	**Treated Water***	**Distribution Water**
Total Chlorine Residual (when pre-chlorinating)	Turbidity (clarifier/filter)	Free Chlorine Residual (clearwell/HLP discharge)	Free Chlorine Residual (weekly 4/3)
Turbidity	pH (clarifier/flash mix)	Total Chlorine Residual (clearwell/HLP discharge)	Turbidity
Temperature	Free Chlorine (clearwell)	Turbidity	pH
pH	Total Chlorine (clearwell)	Temperature	Colour
Colour	Chlorine Dioxide (pre-clarifier)	pH	
Alkalinity	Iron & Manganese (pre-clarifier)	Colour	

Raw Water*	Process Water*	Treated Water*	Distribution Water
Iron & Manganese		Aluminum Chlorine Dioxide Residual Alkalinity Iron & Manganese	

* Refer to the system's sampling schedule for frequency of testing.

In-house samples are analyzed following approved laboratory procedures. The sampling results are recorded on a facility round sheet and selected values are entered into the PDM system. Any required operational process adjustments are recorded in the facility log book.

3.7 Additional sampling, testing and monitoring activities related to the facility's most challenging conditions are captured in the existing in-house program as described above.

3.8 Upstream testing for the following parameters is conducted annually at McTavish Lake:

- Total, WAD (weak acid dissociable) and Free Cyanide
- Total Ammonia
- Total Phosphorus
- Anion Scan
- Total ICPMS Scan
- Total Petroleum Hydrocarbons (F1-F4)
- Total Coliform
- *E. coli*

3.9 Sampling, testing and monitoring results are readily accessible to the Owner at the Kirkland Lake Process and Compliance office and/or the Kirkland Lake Public Works Department.

Owners are provided Quarterly Operations Reports which discusses regulatory results and operational issues. Owners are also provided with an annual summary of sampling, testing and monitoring results through the SDWA O. Reg. 170/03 Section 11 - Annual Report, Schedule 22 - Municipal Summary Report and through the Management Review process outlined in OP-20 Management Review.

In addition, updates regarding sampling, testing and monitoring activities are provided as per the operating agreement and during regular client meetings.

4. Related Documents

Annual Report (O. Reg. 170 Section 11)
Continuous Monitoring of Operational Parameters for Drinking Water Systems SOP

Data Review Protocol
Facility Emergency Plan (FEP) Binder
Facility Logbook
Facility Round Sheets
Laboratory Analysis Reports
Laboratory Chain of Custody Forms
Municipal Summary Report (O. Reg. 170 Schedule 22)
Process Data Management System (PDM)
Quarterly Operations Reports
Reporting and Responding to Adverse Results (EEPs)
Sampling Schedule
OP-05 Document and Records Control
OP-06 Drinking Water System
OP-20 Management Review

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 28, 2015	1	
Oct. 27, 2016	2	
Oct. 13, 2017	3	
Jul. 06, 2018	4	
Mar. 20, 2020	5	
Sep. 25, 2020	6	

MEASUREMENT AND RECORDING EQUIPMENT CALIBRATION AND MAINTENANCE

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe the procedure for the calibration and/or verification and maintenance of measurement and recording equipment at the Kirkland Lake Drinking Water System.

2. Definitions

None

3. Procedure

3.1 All measurement and recording equipment calibration and maintenance activities must be performed by appropriately trained and qualified personnel or by a qualified third-party calibration service provider (refer to OP-13 Essential Supplies and Services).

3.2 The Instrumentation Technician establishes and maintains a list of measurement and recording devices and associated calibration and/or verification schedules using the automated Work Management System (WMS). When a new device is installed, it is added to the WMS system by a SuperUser. The new device is tagged with a unique identification number and the maintenance schedule is set up. Work orders are then automatically generated as per the schedule (refer to OP-15 Infrastructure Maintenance, Rehabilitation and Renewal).

3.3 Details regarding the results of the calibration and/or verification are recorded within each individual work order generated by the WMS, and in the facility logbook.

3.4 Calibration and maintenance activities are carried out in accordance with procedures specified in the manufacturer's manual, instructions specified in WMS or OCWA's calibration procedures.

3.5 Standards, reagents and/or chemicals that may be utilized during calibration and/or verification and/or maintenance activities are verified before use to ensure they are not expired. Any expired standards, reagents and/or chemicals are appropriately disposed of and are replaced with new standards, reagents and/or chemicals as applicable.

3.6 Any measurement device which does not meet its specified performance requirements during calibration and/or verification must be removed from service (if practical) until repaired, replaced or successfully calibrated. The failure must be reported to Operations Management and ORO, as soon as possible so that immediate measures can be taken to ensure that drinking water quality has not been compromised by the malfunctioning device. Any actions taken as a result of the failure are recorded in the facility logbook and Instrumentation Calibration/Maintenance form. Operations Management or the PCT ensures that any notifications required by applicable legislation are completed and documented within the specified time period.

3.7 Calibration and maintenance records and maintenance/equipment manuals are maintained as per OP-05 Document and Records Control.

4. Related Documents

Calibration/Maintenance Records
Facility Logbook
Maintenance/Equipment Manuals
WMS Records
OP-05 Document and Records Control
OP-13 Essential Supplies and Services
OP-15 Infrastructure Maintenance, Rehabilitation and Renewal

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 17, 2016	1	Changed Team Lead to Senior Operator and added overall responsible operator (ORO).
Oct. 13, 2017	2	Removed position of Operations Manager.
Jul. 06, 2018	3	QP-08 procedure renamed OP-17. Removed Scope and Responsibilities sections. Added s. 3.3 to clarify how calibration and/or verification activities are documented. Added s. 3.5 to include how standards, reagents and/or chemicals are verified before use to ensure they are not expired. Other minor edits.

1. Purpose

To describe the procedure for maintaining a state of emergency preparedness at the facility level under OCWA's Emergency Management Program.

2. Definitions

Emergency Response Plan (ERP) – a corporate-level emergency preparedness plan for responding to and supporting serious (Level 3) operations emergencies

Facility Emergency Plan (FEP) – a facility-level emergency preparedness plan for responding to and recovering from operations emergencies

Operations Management – refers to the Senior Operations Manager and/or Operations Manager that directly oversees a facility's operations

3. Procedure

3.1 The Facility Emergency Plan (FEP) is the corporate standard for emergency management at OCWA-operated facilities. The FEP supports the facility-level response to and recovery from Level 1, 2 and 3 events related to water and wastewater operations and directly links to the corporate-level Emergency Response Plan (ERP) for management of Level 3 events that require corporate support. Operations Management is responsible for establishing a site-specific FEP that meets the corporate standard for this drinking water system.

3.2 OCWA recognizes three levels of events:

Level 1 is an event that can be handled entirely by plant staff and regular contractors. The event and the actions taken to resolve it (and to prevent a reoccurrence, if possible) are then included in regular reporting (both internally and externally). Examples may include response to an operational alarm, first aid incident, small on-site spill, or a process upset that can be easily brought under control.

Level 2 is an event that is more serious and requires immediate notification of others (regulator, owner). Examples may include minor basement flooding, injury to staff that requires medical attention, or a spill that causes or is likely to cause localized, off-site adverse effects. If the event reaches this level, the instructions indicate the need to contact the Safety, Process and Compliance Manager and/or Regional Hub Manager.

Level 3 is an actual or potential situation that will likely require significant additional resources and/or threatens continued operations. It may require corporate-level support including activation of the OCWA Action Group and opening of an Emergency Operations Centre (EOC) as described in the corporate ERP. Level 3 events usually

involve intervention from outside organizations (client, emergency responders, Ministry of the Environment, Conservation and Parks, media, etc.). Examples may include:

- Disruption of service/inability to meet demand;
- Critical injury including loss of life;
- Breach of security that is a threat to public health;
- Intense media attention;
- Community emergency affecting water supply/treatment;
- Declared pandemic; or
- Catastrophic failure that could impact public health or the environment or cause significant property damage.

3.3 Potential emergency situations or service interruptions identified for the Kirkland Lake Drinking Water System include:

- Unsafe Water
- Spill Response
- Critical Injury
- Critical Shortage of Staff
- Loss of Service
- Security Breach

3.4 The processes for responding to and recovering from each potential emergency situation/service disruption are documented within a site-specific contingency plan (CP). The CPs and related site specific environmental emergency procedures (EEPs) are contained within the FEP.

3.5 OCWA's training requirements related to the FEP are as follows:

Training Topic	Training Provider	Type of Training	Frequency	Required For
Establishing and maintaining a FEP that meets the corporate standard	Safety, Process and Compliance Manager and/or Corporate Compliance (as required)	On-the-Job Practical	Upon hire and when changes are made to the corporate standard*	PCTs (or others identified by the Operations Management)
Contents of the site-specific FEP	Facility Level (coordinated by QEMS Representative)	On-the-Job Practical	Upon hire and when changes to the FEP are made*	All operations personnel with responsibilities for responding to an emergency

*Note: Changes to the corporate standard or site-specific FEP may only require the change to be communicated to Operations for implementation. Therefore, not all changes will require training.

3.6 At least one CP must be tested each calendar year and each CP must be reviewed at least once in a five-calendar year period. The reviews and tests are recorded on the FEP-01 Contingency Plan Review/Test Summary Form. This record includes the outcomes of the review/test, and identifies any opportunities for improvement and actions taken. A scheduled test of a CP may be regarded as a review of that particular

CP as long as the outcomes are evaluated using the FEP-01 form. A CP-related response to an actual event may also be considered a review or a test. A review of the incident including lessons learned should be recorded on FEP-01 following the resolution of the actual event, along with any opportunities for improvement/actions identified.

3.7 Revisions to the CPs, EEPs and other FEP documents are made (as necessary) following a review, test, actual event or other significant change (e.g., changes in regulatory requirements, corporate policy or operational processes and/or equipment, etc.). Results of the emergency response testing and any opportunities for improvement/actions identified are considered during the Management Review (OP-20).

3.8 Roles and responsibilities for emergency management at OCWA-operated facilities are set out in the FEP. Specific roles and responsibilities related to a particular emergency situation or service interruption (including those of the Owner where applicable) are set out in the relevant site-specific CP. A general description of the respective responsibilities of the Owner and the operating authority in the event an emergency occurs is included in the service agreement with the Owner (as required by the *Safe Drinking Water Act*).

3.9 Where they exist, any relevant sections of the Municipal Emergency Response Plan (MERP) are included or referenced in the appendices section of the FEP. Measures specified in the MERP are incorporated into CPs where appropriate.

3.10 An emergency contact list in conjunction with the essential supplies and services list is contained within the FEP and is reviewed/updated at least once per calendar year. An emergency communications protocol is contained within the FEP. Specific notification requirements during emergency situations or service interruptions are set out in the individual CPs and in the ERP.

4. Related Documents

Corporate Emergency Response Plan
Emergency Contact List/Essential Supplies & Services List (Contacts section of FEP)
Facility Emergency Plan
FEP-01 Contingency Plan Review/Test Summary Form
Municipal Emergency Response Plan (as applicable)
OP-20 Management Review

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Jul. 06, 2018	1	QP-09 procedure renamed OP-18. Removed Scope and Responsibilities sections and reordered some sections. Added definition 'Operations Management'. Throughout procedure replaced 'Senior Operations Manager' references with 'Operations Management'. Removed references to *'OCWA's Approach to Facility Emergency Planning'* document throughout procedure and referenced FEP instead. Aligned wording for level 1, 2 & 3 events (s. 3.2) with wording in '*OCWA's Emergency Response Plan*'. Updated training section to include role of SPC Manager (s. 3.5) and expanded testing/review section specifically to clarify how an actual test is documented (s. 3.6). Other minor edits.
Oct. 06, 2019	2	Updated Ministry of the Environment and Climate Change to Ministry of the Environment, Conservation and Parks in step 3.2.

INTERNAL QEMS AUDITS

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe the procedure for conducting internal audits at the facility level that evaluate the conformance of OCWA's Quality & Environmental Management System (QEMS) to the requirements of the Drinking Water Quality Management Standard (DWQMS).

This procedure applies to Internal QEMS Audits conducted at the Kirkland Lake Drinking Water System for the purpose of meeting the DWQMS requirements for internal audits.

Note**:** This procedure does not apply to internal compliance audits conducted in accordance with OCWA's Internal Audit Program.

2. Definitions

Audit Team – one or more Internal Auditors conducting an audit

Internal Auditor – an individual selected to conduct an Internal QEMS Audit

Internal QEMS Audit – a systematic and documented internal verification process that involves objectively obtaining and evaluating documents and processes to determine whether a quality management system conforms to the requirements of the DWQMS

Lead Auditor – Internal Auditor responsible for leading an Audit Team

Non-conformance – non-fulfillment of a DWQMS requirement

Objective Evidence – verifiable information, records or statements of facts. Audit evidence is typically based on interviews, examination of documents, observations of activities and conditions, reviewing results of measurements and tests or other means. Information gathered through interviews should be verified by acquiring supporting information from independent sources

Opportunity for Improvement (OFI) – an observation about the QEMS that may, in the opinion of the Internal Auditor, offer an opportunity to improve the effectiveness of the system or prevent future problems; implementation of an OFI is optional

3. Procedure

3.1 Audit Objectives, Scope and Criteria

3.1.1 In general, the objectives of an internal QEMS audit are:

- To evaluate conformance of the implemented QEMS to the requirements of the DWQMS;
- To identify non-conformances with the documented QEMS; and
- To assess the effectiveness of the QEMS and assist in its continual improvement.

3.1.2 The scope of an internal QEMS audit includes activities and processes related to the QEMS as documented in the Operational Plan.

3.1.3 The criteria covered by an internal QEMS audit include:
- Drinking Water Quality Management Standard (DWQMS)
- Current Operational Plan
- QEMS-related documents and records

3.1.4 The audit scope and criteria may be customized as necessary to focus on a particular process/critical control point and/or any elements of the DWQMS which may warrant specific attention. The results of previous internal and external audits should also be considered.

3.2 Audit Frequency

3.2.1 Internal QEMS audits may be scheduled and conducted once every calendar year or may be separated into smaller audit sessions scheduled at various intervals throughout the calendar year. However, all elements of the DWQMS must be audited at least once every calendar year.

3.2.2 The QEMS Representative is responsible for maintaining the internal QEMS audit schedule. The audit schedule may be modified based on previous audit results.

3.3 Internal Auditor Qualifications

3.3.1 Internal QEMS audits shall only be conducted by persons approved by the QEMS Representative and having the following minimum qualifications:
- Internal auditor training or experience in conducting management system audits; and
- Familiarity with the DWQMS requirements.

3.3.2 Internal Auditors that do not meet the qualifications in s.3.3.1 may form part of the Audit Team for training purposes, but cannot act as Lead Auditor.

3.3.3 Internal Auditors must remain objective and, where practical, be independent of the areas/activities being audited.

3.4 Audit Preparation

3.4.1 Together, the QEMS Representative and the Lead Auditor:
- Establish the audit objectives, scope and criteria;
- Confirm the audit logistics (locations, dates, expected time and duration of audit activities, any health and safety considerations, availability of key

personnel, audit team assignments, etc.).

3.4.2 Each Internal Auditor is responsible for:

- Reviewing documentation to prepare for their audit assignments including:
  - the Operational Plan and related procedures;
  - results of previous internal and external QEMS audits;
  - the status and effectiveness of corrective and preventive actions implemented;
  - the results of the management review;
  - the status/consideration of OFIs identified in previous audits; and
  - other relevant documentation.
- Preparing work documents (e.g., checklists, forms, etc.) for reference purposes and for recording objective evidence collected during the audit

3.5 Conducting the Audit

3.5.1 Opening and closing meetings are not required, but may be conducted at the discretion of the QEMS Representative and the Lead Auditor taking into account expectations of Top Management.

3.5.2 The Audit Team gathers and records objective evidence by engaging in activities that may include conducting interviews with Operations Management and staff (in person, over the phone and/or through e-mail), observing operational activities and reviewing documents and records.

3.5.3 The Audit Team generates the audit findings by evaluating the objective evidence against the audit criteria (s. 3.1.3). In addition to indicating conformance or non-conformance, the audit findings may also lead to the identification of opportunities for improvement (OFIs). The Lead Auditor is responsible for resolving any differences of opinion among Audit Team members with respect to the audit findings and conclusions.

3.6 Reporting the Results

3.6.1 The Lead Auditor reviews the audit findings and conclusions with the QEMS Representative and Top Management. Other audit participants may also take part in this review as appropriate. This review may take place in person (e.g., during a closing meeting) or through other means (phone call, email, etc.). Any diverging opinions regarding the audit findings and conclusions should be discussed and, if possible, resolved. If not resolved, this should be noted by the Lead Auditor.

3.6.2 The Lead Auditor submits a written report and/or completed work documents to the QEMS Representative. The submitted documentation must identify (at a minimum):

- Audit objectives, scope and criteria;
- Audit Team member(s) and audit participants;
- Date(s) and location(s) where audit activities where conducted;
- Audit findings including:
  - Related objective evidence for each element;
  - Any non-conformance identified referencing the requirement that was not met; and
  - OFIs or other observations.
- Audit conclusions.

3.6.3 The QEMS Representative distributes the audit results to Top Management and others as appropriate.

3.6.4 The QEMS Representative ensures that results of internal QEMS audits are included as inputs to the Management Review as per OP-20 Management Review.

3.7 Corrective Actions and Opportunities for Improvement (OFIs)

3.7.1 Corrective actions are initiated when non-conformances are identified through internal QEMS audits and are documented and monitored as per OP-21 Continual Improvement.

3.7.2 OFIs are considered, and preventive actions initiated, documented and monitored as per OP-21 Continual Improvement.

3.8 Record-Keeping

3.8.1 Internal QEMS audit records are filed by the QEMS Representative and retained as per OP-05 Document and Records Control.

4. Related Documents

Internal Audit Records (checklists, forms, reports, etc.)
QEMS – Summary of Findings spreadsheet
OP-05 Document and Records Control
OP-20 Management Review
OP-21 Continual Improvement

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 28, 2015	1	Major revisions throughout procedure to clarify requirements for

		conducting internal QEMS audits, reporting results and dealing with corrective actions.
Oct.17, 2016	2	Changed Team Lead to Senior Operator and added overall responsible operator (ORO).
Oct. 13, 2017	3	Added new position for Safety, Process and Compliance Manager.
Jul. 06, 2018	4	QP-10 procedure renamed OP-19. Removed Scope and Responsibilities sections and moved scope wording to purpose section. Added definition 'Objective Evidence' and modified 'non-conformance' definition. Replaced 'audit evidence' with 'objective evidence', and 'conformity' with 'conformance' throughout procedure. Replaced 'once every 12 months' with 'once every calendar year' (s. 3.2.1, s. 3.2.3 and s. 3.4.1) to reflect wording in DWQMS v. 2.0. Added s. 3.2.3 (and modified s. 3.4.1) to describe the frequency for auditing all DWSs covered in multi-facility Operational Plans. Changed s. 3.4.2 to include preventive actions, the results of the management review and the status/consideration of OFIs. Included wording 'for each element', and 'identified referencing the requirement that was not met' to s. 3.6.2. Moved description of process for corrective actions from QP-10 s. 5.7 and OFIs from QP-10 s. 5.8 to OP-21. Added s. 3.7 to refer to OP-21.

MANAGEMENT REVIEW

Reviewed by: I. Bruneau, PCT	Approved by: Y. Rondeau, SPC Manager

1. Purpose

To describe the procedure for conducting a Management Review of the Quality & Environmental Management System (QEMS) at the facility level.

2. Definitions

Management Review – a formal (documented) meeting conducted at least once every calendar year by Top Management to evaluate the continuing suitability, adequacy and effectiveness of OCWA's Quality & Environmental Management System (QEMS)

Operations Management – refers to the Senior Operations Manager and/or Operations Manager that directly oversees a facility's operations

Top Management – a person, persons or group of people at the highest management level within an operating authority that makes decisions respecting the QMS and recommendations to the owner respecting the subject system or subject systems.

OCWA has defined Top Management for the Kirkland Lake Drinking Water System as:

- Operations Management – Kirkland Lake Cluster
- Regional Hub Manager – Northeastern Ontario Regional Hub
- Safety, Process & Compliance (SPC) Manager – Northeastern Ontario Regional Hub

3. Procedure

3.1 Top Management ensures that a Management Review is conducted at least once every calendar year.

Management Reviews for more than one drinking water system may be conducted at the same meeting provided the systems belong to the same owner and the considerations listed in section 3.4 below are taken into account for each individual system and documented in the Management Review meeting minutes.

3.2 At a minimum, the QEMS Representative, at least one member of Top Management and at least one facility operator must attend the Management Review meeting. Other members of Top Management may participate though their attendance is optional.

3.3 Other staff may be invited to attend the Management Review meeting or to assist with presenting information or in reviewing the information presented, where they offer additional expertise regarding the subject matter.

3.4 The standing agenda for Management Review meetings is as follows:

a) Incidents of regulatory non-compliance;
b) Incidents of adverse drinking water tests;
c) Deviations from critical control limits and response actions;

d) The effectiveness of the risk assessment process;
e) Internal and third-party audit results (including any preventive actions implemented to address Opportunities for Improvement (OFI) or rationale as to why OFIs were not implemented);
f) Results of emergency response testing (including any OFIs identified);
g) Operational performance;
h) Raw water supply and drinking water quality trends;
i) Follow-up on action items from previous Management Reviews;
j) The status of management action items identified between reviews;
k) Changes that could affect the QEMS;
l) Consumer feedback;
m) The resources needed to maintain the QEMS;
n) The results of the infrastructure review;
o) Operational Plan currency, content and updates;
p) Staff suggestions; and
q) Consideration of applicable Best Management Practices (BMPs).

3.5 In relation to standing agenda item q), applicable BMPs, if any, to address drinking water system risks discussed during other agenda items, are identified and documented in the Management Review minutes. Review and possible adoption of applicable BMPs are revisited during subsequent Management Reviews and are incorporated into preventive and/or corrective actions as per OP-21 as appropriate.

3.6 The SPC Manager coordinates the Management Review and distributes the agenda with identified responsibilities to participants in advance of the Management Review meeting along with any related reference materials.

3.7 The Management Review participants review the data presented and make recommendations and/or initiate action to address identified deficiencies as appropriate as per OP-21.

3.8 The QEMS Representative ensures that minutes of and actions resulting from the Management Review meeting are prepared and distributed to the appropriate OCWA Top Management, personnel and the Owner.

3.9 The QEMS Representative monitors the progress and documents the completion of actions resulting from the Management Review.

4. Related Documents

Management Review Reference Materials
Minutes and actions resulting from the Management Review
OP-21 Continual Improvement

5. Revision History

Date	Revision #	Reason for Revision
Apr. 10, 2015	0	Procedure issued.
Oct. 17, 2016	1	Changed Team Lead to Senior Operator, Regional Manager to Regional Hub Manager and added overall responsible operator (ORO).
Oct. 13, 2017	2	Added new position for Safety, Process and Compliance Manager, removed Regional Compliance Advisor and Corporate Compliance Advisor from *Responsibilities.*
Jul. 06, 2018	3	Removed Scope and Responsibilities sections. Added definitions for Top Management and Operations Management. Revisions based on new requirements of the Standard; at least once every 12 months changed to once every calendar year (s. 3.1) and efficacy changed to effectiveness (s. 3.4). Added s. 3.2 and s. 3.3 to describe who is participating in the Management Review process. Added clarification on including any preventive actions implemented to address Opportunities for Improvement (OFI) or rationale as to why OFIs were not implemented when reviewing audit results (s. 3.4.e). Added Best Management Practices (BMPs) as a standing agenda item (s. 3.4.q). Added s. 3.5 to include consideration of BMPs and link OP-20 to OP-21 Continual Improvement.

1. Purpose

To describe the procedure for tracking and measuring continual improvement of the Quality & Environmental Management System (QEMS) for the Kirkland Lake Drinking Water System.

2. Definitions

Continual Improvement - recurring activity to enhance performance *(ISO 14001:2014)*

Corrective Action – action to eliminate the cause of detected nonconformity of the QMS with the requirements of the DWQMS or other undesirable situation

Non-conformance – the non-fulfilment of a DWQMS requirement

Preventive Action – action to prevent the occurrence of nonconformity of the QMS with the requirements of the DWQMS or other undesirable situation

3. Procedure

3.1 OCWA strives to continually improve the effectiveness of its QEMS for this drinking water system(s) through the identification and implementation of corrective/preventive actions and, as appropriate, through review and consideration of applicable Best Management Practices (BMPs).

3.2 Corrective Actions

3.2.1 Non-conformances may be identified through an internal or external QEMS audit(s) conducted for this drinking water system. They may also be identified as a result of other events such as:

- an incident/emergency;
- community/Owner complaint;
- other reviews; and
- operational checks, inspections or audits.

3.2.2 The QEMS Representative (in consultation with Operations Management and/or the SPC Manager) investigates the need for a corrective action to eliminate the root cause(s) so as to prevent the non-conformance from recurring. The investigation may also include input from the operators and other stakeholders and the consideration of BMPs as appropriate.

3.2.3 The QEMS Representative determines the corrective action needed based on this consultation. The Operations Management (or designate) assigns

responsibility and a target date for resolution.

3.2.4 The QEMS Representative ensures corrective actions are documented using the QEMS - Summary of Findings spreadsheet. A root cause analysis is performed on any major or minor non-conformance identified during the audit. The QEMS Representative monitors the progress of corrective action(s) and provides status updates to Top Management.

3.2.5 The implementation and effectiveness of corrective actions are verified during subsequent internal QEMS audits and are considered during the Management Review. If there is evidence that the action taken was not effective, the Operations Management (or designate) initiates further corrective action and assigns resources as appropriate until the non-conformance is fully resolved.

3.3 Preventive Actions

3.3.1 Potential preventive actions may be identified through an internal or external QEMS audit as Opportunities For Improvement (OFIs), during the Management Review or through other means such as:

- staff/Owner suggestions;
- regulator observations;
- evaluation of incidents/emergency response/tests;
- the analysis of facility/Regional Hub or OCWA-wide data/trends;
- non-conformances identified at other drinking water systems; or
- a result of considering a BMP.

3.3.2 The QEMS Representative (in consultation with Operations Management and/or the SPC Manager) considers whether a preventive action is necessary. The review may also include input from the operators and other stakeholders and the consideration of BMPs as appropriate.

3.3.3 If it is decided that a preventive action is necessary, the QEMS Representative determines the action to be taken based on this consultation and the Operations Management (or designate) assigns responsibility and a target date for implementation.

3.3.4 The implementation of preventive actions are tracked by the QEMS Representative using the QEMS - Summary of Findings spreadsheet.

3.3.5 The implementation and effectiveness of preventive actions are verified during subsequent internal QEMS audits and are considered during the Management Review. If there is evidence that the action taken was not effective, the Operations Management (or designate) may consider further preventive actions and assigns resources as appropriate.

3.4 The QEMS Rep. and Operations Management monitor corrective/preventive actions on an ongoing basis and review the status and effectiveness of the actions during subsequent Management Review meetings.

3.5 Best Management Practices (BMPs)

3.5.1 The QEMS Representative and/or Operations Management in consultation with the SPC Manager will review and consider applicable internal and/or external BMPs identified by internal and/or external sources as part of the Management Review (OP-20) and in the corrective and preventive action processes described above.

3.5.2 BMPs may include, but are not limited to:

- Facility/Regional Hub practices developed and adopted as a result of changes to legislative or regulatory requirements, trends from audit findings or drinking water system performance trends;
- OCWA-wide BMPs/guidance or recommended actions;
- Drinking water industry based standards/BMPs or recommendations; or
- Those published by the Ministry of the Environment, Conservation and Parks.

3.5.3 At a minimum, applicable BMPs must be reviewed and considered once every 36 months.

4. Related Documents

Internal Audit Records
QEMS - Summary of Findings spreadsheet
OP-05 Document and Records Control
OP-20 Management Review

5. Revision History

Date	Revision #	Reason for Revision
Jul. 06, 2018	0	Procedure issued – The original information within the main body of the Kirkland Lake Drinking Water System Operational Plan (revision 3, dated October 13, 2017) was not used in OP-21 as it did meet the requirements of the new DWQMS v. 2.0. Information from QP-10 Internal Audit (s. 5.7 and s. 5.8) was incorporated into s. 3.2 and s. 3.3 of OP-21 but was modified to address non-conformances identified from additional inputs other than internal audits and preventive actions resulting from means other than OFIs from internal audits. In addition R&Rs were revised to include the SPC Manager, and to clarify the role of the QEMS Representative in investigating and determining corrective and preventive actions needed. A section on Best Management Practices (s. 3.5) was added to meet the new requirements of DWQMS v. 2.0.
Oct.06, 2019	1	Updated Ministry of the Environment and Climate Change to Ministry of the Environment, Conservation and Parks in step 3.5.2.

Ontario

Ministry of the Environment and Climate Change

Schedule C – Director's Directions for Operational Plans (Subject System Description Form)

Municipal Residential Drinking Water System

Fields marked with an asterisk (*) are mandatory.

Owner of Municipal Residential Drinking Water System *
The Corporation of the Town of Kirkland Lake

Name of Municipal Residential Drinking Water System *
Kirkland Lake Drinking Water System

Subject Systems

☑ Check here if the Municipal Residential Drinking Water System is operated by one operating authority. Enter the name of the operating authority in the below table.

	Name of Operational Subsystems(if Applicable)	Name of Operating Authority *	DWS Number(s) *
1		Ontario Clean Water Agency	220000308

Provide the information outlined in the 'Contact Information' section for **each** Operational Subsystem.

Contact Information 1

Last Name *	First Name *	Middle Initial
Danis	Anthony	

Title *	Phone Number *
Senior Operations Manager	705 568-7392

Email Address *
adanis@ocwa.com

Contact Information 2

Last Name *	First Name *	Middle Initial
Bruneau	Ilona	

Title *	Phone Number *
Process & Compliance Technician	705 648-4314

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