Ontario Clean Water Agency
Agence Ontarienne Des Eaux

OPERATIONAL PLAN

Petrolia Drinking Water System

Revision 8, 2016-09-29

DISCLAIMER STATEMENT

This Operational Plan is designed for the exclusive use of the Corporation of the Town of Petrolia.

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 and its associated Standard Operating Procedures, policies, Facility Emergency Plans, and audit protocol 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*.

OPERATIONAL PLAN

Petrolia Drinking Water System

Owned by the Corporation of the Town of Petrolia
Operated by the Ontario Clean Water Agency

This Operational Plan defines and documents the Quality & Environmental Management System (QEMS) for the Petrolia Drinking Water System is operated by the Ontario Clean Water Agency (OCWA). It sets out 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).

This Operational Plan expands on OCWA's corporate QEMS Reference Manual. Linkages between OCWA corporate and facility requirements are identified where appropriate.

OPERATIONAL PLAN REVISION HISTORY

Date	Revision	Description of Revision
2011-03-01	0	Operational Plan issued
2012-06-01	1	Revised as per Corporate Template update, hub re-structure and Management Review
2013-02-01	2	Revised per hub restructure
2013-03-15	3	Revised per Internal audit findings March 12, 2013
2014-01-31	4	Revised per 2013 Management Review findings & hub re-structure
2014-03-20	5	Revised per Internal Audit Findings March 13, 2014
2015-12-03	6	Revise Element 6 Raw Water Characteristics with 2014 data; revised Appendix C; revise Element 10 to include new requirements for Enviro. Compliance Course; update Element 15; all revisions as per OFI's IA 2015-03-30, remove Senior Operations Manager
2016-05-24	7	Add statement to E1 about meeting DWQMS, revise E2 with new QEMS policy, add need for re-endorsement to E3, revised E6 to clarify the system and better satisfy the DWQMS requirements, revise E9 to reflect new structure changes, add external audits to PCT responsibilities E9, add Regional Hub Manager and OCTL to E9 & E10, add Administrative Assistant duties to E15 as well as eReport access and bi-monthly meetings, add paragraph about new/ broken equipment to E15, as per OFIs IA 2016-03-05
2016-09-29	8	Revise name of system as per change in OA, revise E6 to include more information on distribution system

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LIST OF APPENDICES

1 OCWA's Quality & Environmental Management System (QEMS)

OCWA is the contracted Operating Authority for the Petrolia Drinking Water System. The Petrolia Drinking Water System QEMS Operational Plan has been documented to meet the DWQMS.

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.

2 Quality & Environmental Management System (QEMS) Policy

The Ontario Clean Water Agency, its Board of Directors, Officers and entire staff are committed to the principles and objectives set out in our Quality & Environmental Management System (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)

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).

OCWA's QEMS Policy is readily communicated to all OCWA personnel, the owner and the public through OCWA's intranet and public websites. A complete review/revision history of the QEMS Policy is maintained on OCWA's Intranet.

3 Commitment & Endorsement of OCWA'S QEMS & Operational Plan

This Operational Plan supports the overall goal of OCWA and the Corporation of the Town of Petrolia 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 Town of Petrolia Brights Grove Water Treatment Plant and will do so in a manner that ensures compliance with applicable legislation and regulations. Through the endorsement of this Operational Plan, the Corporation of the Town of Petrolia commits to cooperating in any reasonable request of OCWA to facilitate this goal.

The Operational Plan should be re-endorsed when there is a major change in the plan's intent or when the majority of the signing parties are no longer filling noted positions.

Top management of both OCWA and the Corporation of the Town of Petrolia has approved the QEMS for the drinking water system as documented in this Operational Plan.

Operating Authority Approval

Dan MacLeod
Operations Manager — Date: Jan 22/16

Dale LeBritton
Regional Hub Manager — Date: Jan 22/16

Owner Endorsement & Approval

John Mc Charles
Mayor — Date: Jan 25/16

Manny Baron
CAO – Town of Petrolia — Date: Jan 25/16

4 Quality Management System Representative

All personnel have a role and associated responsibilities within OCWA's QEMS.

The role of QEMS Representative for the Petrolia Drinking Water System is shared between the Senior Operations Manager and the Process and Compliance Technician (PCT).

The Senior Operations Manager is ultimately responsible for activities related to the operation of the drinking water system and for establishing and maintaining processes and procedures required for the overall administration of the facility's QEMS.

To assist in fulfilling the specific duties set out for the QEMS Representative, the PCT is responsible for:

- Reporting on QEMS performance and identifying opportunities for improvement,
- Ensuring that current versions of documents related to the QEMS are in use, and
- Ensuring personnel are aware of all applicable legislative and regulatory requirements that pertain to their operational duties.

The Senior Operations Manager and the PCT are responsible for promoting awareness of the QEMS to all facility personnel.

5 Document and Records Control

Refer to Appendix A for QEMS Procedure QP-01 Document and Records Control.

6 Drinking Water System

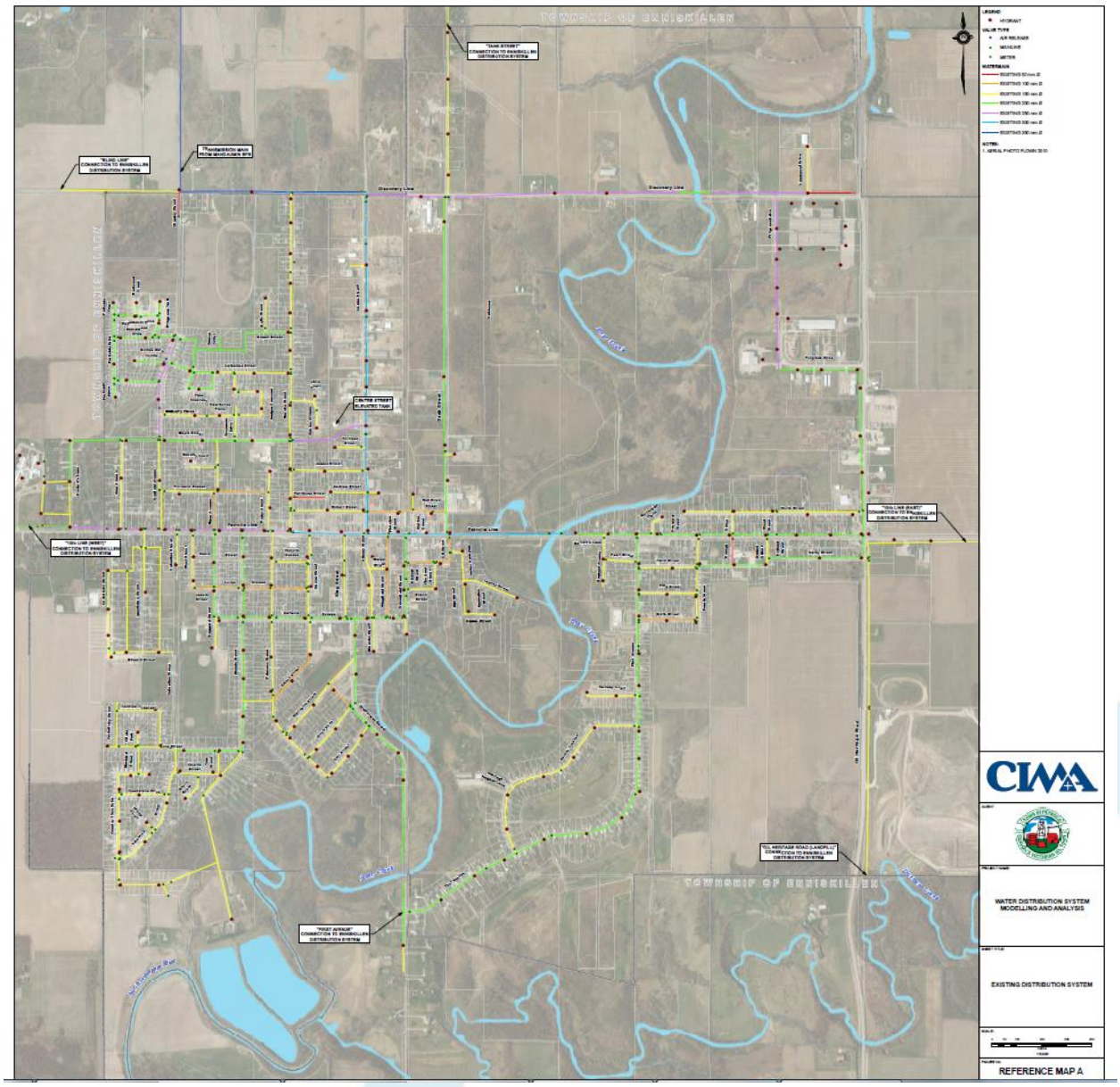
Description of the Drinking Water System

The Petrolia Drinking Water System is owned by the Corporation of the Town of Petrolia and is operated by the Ontario Clean Water Agency (OCWA)- Southwest Region, Lambton Cluster. The Petrolia Drinking Water System is located at 2701 Old Lakeshore Road, Brights Grove, Ontario and includes the water treatment plant, primary transmission line, Mandaumin Reservoir, Petrolia elevated storage tank and distribution system network which are all operated by the Ontario Clean Water Agency.

The Petrolia Drinking Water System is connected to the following systems:

Distribution System	Owner	Operating Authority
Village of Oil Springs	Village of Oil Springs	Village of Oil Springs
Township of Dawn-Euphemia	Township of Dawn-Euphemia	Township of Dawn-Euphemia
Township of Enniskillen	Township of Enniskillen	Township of Enniskillen
Lambton Area Water Supply System	Lambton Area Water Supply System Joint Board of Management	OCWA-LAWSS

Overview of The Petrolia Distribution System:



The treatment plant is a Class 2 membrane filtration surface water treatment facility with a total design capacity of 12,000 m^3 per day. The water treatment plant consists of an intake system, a low lift pumping system, a treatment system and a distribution pumping system. The distribution system is a Class 2 distribution system and consists of a reservoir, elevated storage tank, a network of watermains, hydrants and chambers.

Intake

Water is drawn into the plant via a 400mm diameter cast iron screened intake extending out approximately 430 m into Lake Huron. Zebra mussels are controlled by the use of a nickel-copper alloy intake screen (Johnson Screen).

Low Lift Pumping Station

Raw water is pumped from the low lift wet well by 3 vertical turbine pumps. Chlorine is injected on the low lift suction header to provide pre-chlorination.

Treatment Plant

Filtration

The raw water is pre-filtered by two automatic feed strainers on the low lift discharge header to remove fine debris and protect the filter membranes. After the water has been strained it enters the membrane filtration system which removes fine particles, sediment, algae, protozoa and bacteria.

Disinfection

Primary disinfection is achieved by the addition of chlorine gas solution at the membrane filtrate header with contact in the clear well. Pre- chlorination and post chlorination points are located at the low lift discharge header and after the clearwell.

Hydrofluosilicic acid solution is injected into the membrane filtrate header, after chlorination and prior to contact in the clear well.

Process Drain Water

Water from the floor drains and on line analyzers are directed to the process water handling facilities that includes a settling basin. Flush water that cleans the pre-strainers and the membranes is also sent to the process water handling facilities.

Monitoring and Control

The water treatment process and distribution components are controlled by a dedicated Supervisory Control and Data Acquisition (SCADA) computer system and monitored by certified operators.

Standby Power

A diesel generator is available to permit the treatment plant to remain in operation should a power failure occur.

Distribution

Three high lift pumps at the water treatment plant provide water to customers along the transmission main from the plant to the Mandaumin Reservoir. Water is pumped from the Mandaumin Reservoir to an Elevated Storage Tank in Petrolia where it is distributed to approximately 5,200 customers. The following are significant features on the distribution system:

Mandaumin Reservoir:

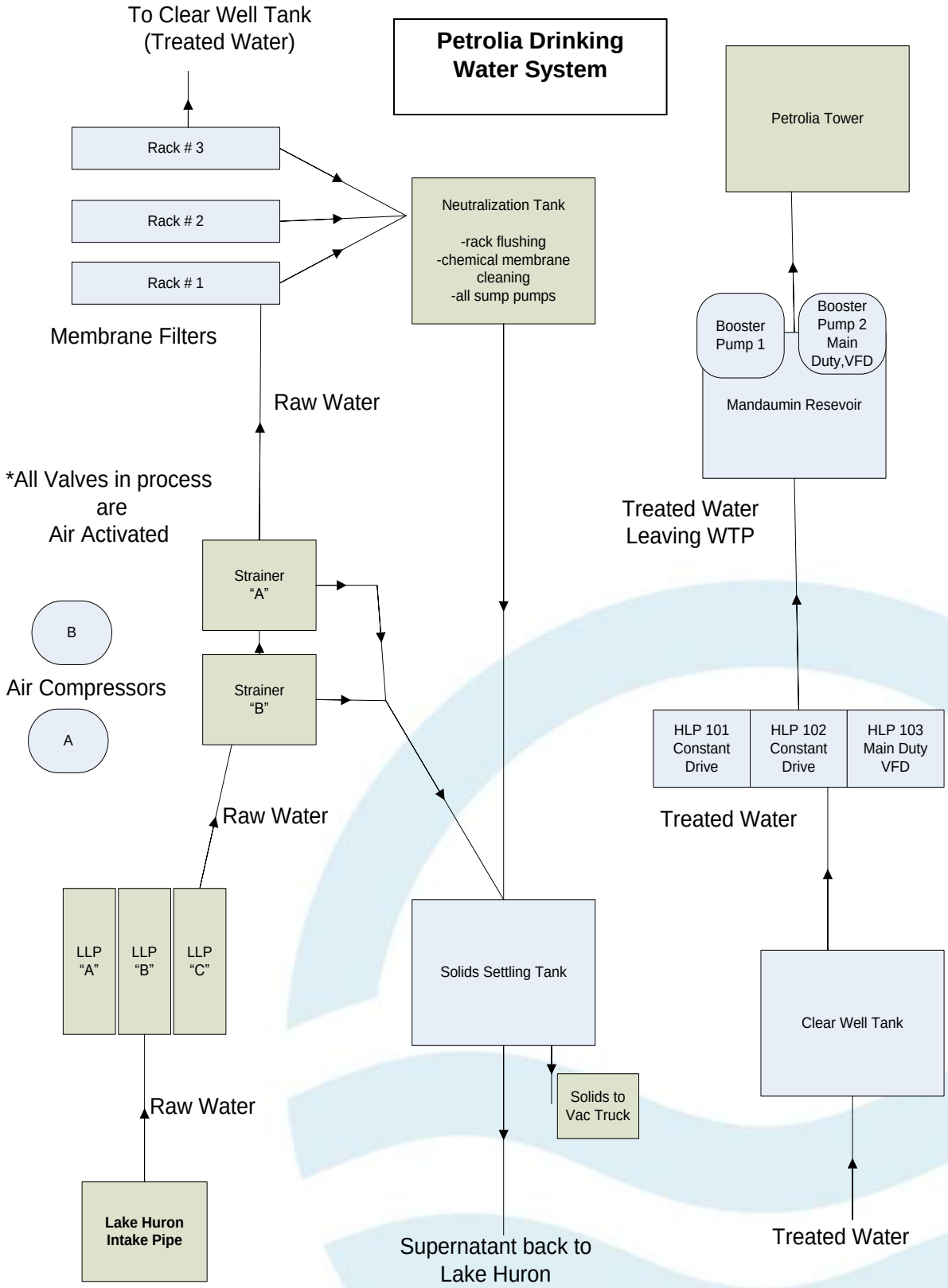
There is a circular ground reservoir located on Confederation Line in the village of Mandaumin which has an approximate volume of 2,272 m^3. The Mandaumin Reservoir is monitored and

controlled from the water treatment plant via SCADA. The Mandaumin Reservoir is equipped with two pumps (one duty and one standby) rated at 90 l/s and 80 l/s, flow meter installed on common outlet pipe, pressure transmitter, chlorine analyzer and turbidimeter. There is also an emergency cross-connection to the Lambton Area Water Supply System which can be manually operated in the event on an emergency. A flow meter is installed on the cross connection.

Petrolia Elevated Tank:

An elevated storage tank with an approximate volume of 2,290 m^3 is located on Centre Street in the Town of Petrolia. The Petrolia Elevated Tank is monitored and controlled from the water treatment plant via SCADA.

Process Flow Chart



Source Water

General Characteristics

The raw water source for the water treatment plant is Lake Huron. The water from Lake Huron is typically low in turbidity, slightly basic and low in conductivity. Temperature fluctuates significantly through the seasons ranging from approximately 4 ºC in the winter to as high as 24 ºC during the summer. Bacteriological analysis of the raw water indicates a source of relatively good quality. The results of chemical analyses are consistently below the Ontario Drinking Water Quality Standards.

Raw Water Characteristics at Intake (based on 2015 data)

Characteristic	Minimum	Maximum	Annual Average
Temperature (ºC)	4.6	20.8	12.0
Turbidity (NTU)	0.13	222.44	1.72
pH	7.22	8.58	8.26
E. coli (CFU/100 mL)	0	200	7.902
Total Coliforms(CFU/100 mL)	0	1000	50.19

Common Fluctuations

Raw water quality changes seasonally and during significant storm events. Raw water turbidity increases during spring runoff and significant rainfall events. The pre-membrane filter strainers will reduce turbidity and algae entering the membrane filtration system. Water temperature changes significantly from winter to summer. Filter trans-membrane pressure (TMP) increases with a decrease in water temperature. Additional Enhanced Filter Maintenance (EFM) and Clean-in-Place (CIP) may be required during winter months.

Threats

The main potential source of raw water contamination from upstream and downstream is agricultural runoff and the growth of algae.

The 400 mm diameter cast iron screened intake extends approximately 430 m off shore at a depth of approximately 3 to 4 meters. Due to the position of the crib, the intake is susceptible to potential accidental damage from marine craft and ice.

Operational Challenges

Frazil ice poses an operational challenge by restricting the intake. During those occasions the plant can be operated at a decreased capacity and/or emergency water can be supplied by the Lambton Area Water Supply System.

The distribution systems main challenge is maintaining the free chlorine residual through the large network of watermains, especially during the summer months. Routine sampling and flushing is conducted to monitor and maintain adequate disinfection residuals.

Upstream and Downstream Critical Processes

Conditions upstream of the Petrolia Drinking Water System at the Water Treatment Plant, in Lake Huron (the raw water source) are monitored through MOECC reports, advisories and other operating authorities to ensure the operating effectiveness of the treatment plant to provide safe drinking water.

The Petrolia Drinking Water System relays information to the Municipality's it provides water to (downstream users) should there be any issues with the supply or quality of the drinking water. As well, these downstream users provide information to the Petrolia Drinking Water System in regards to the supply and quality of water.

The Petrolia Drinking Water System relies on the proper installation and working order of backflow preventer on service connections in order to protect the quality of the water in the source watermains.

Refer to Appendix M for a copy of the Petrolia Drinking Water System Description Form (MOECC's Director's Directions *Minimum Requirements for Operational Plans* Schedule "C").

7 Risk Assessment

Refer to Appendix B for QEMS Procedure QP-02 Risk Assessment and Risk Assessment Outcomes.

8 Risk Assessment Outcomes

Refer to Appendix B for Summary of Risk Assessment Outcomes.

9 Organizational Structure, Roles, Responsibilities and Authorities

Organizational Structure and Top Management

OCWA provides operation, maintenance and management services for hundreds of water and wastewater facilities throughout the Province of Ontario. Direct operational activities are primarily delivered through the Agency's Operations Division. Corporate level divisions that carry out administrative functions for the Agency are expanded upon in the QEMS Reference Manual.

To best meet the needs of each facility and its owner, OCWA's Operations Division is structured as follows:

- *Cluster* – Facilities are grouped together geographically to form clusters. The Senior Operations Manager has oversight responsibility for all of the facilities contained within a particular cluster.

- *Regional* – Clusters are further grouped together to form regions, each headed by a Regional Hub Manager. Regional Hub Managers play a critical role within OCWA's QEMS in that they act as a key link between corporate and facility level management.
- *Provincial* – Regions are each under the direction of the VP of Operations.

The chart, QEMS Organizational Structure for the Petrolia Drinking Water System (Appendix C), reflects the lines of responsibility and authority for OCWA's QEMS at both the facility and corporate level.

OCWA has defined two levels of Top Management within its structure, which, through a shared responsibility for conducting periodic management reviews, ensure the maintenance and continual improvement of OCWA's QEMS:

Facility Level Top Management –The Senior Operations Manager, in accordance with QEMS Procedure QP-11 Management Review, holds a meeting at least once per year to review the effectiveness and performance of the QEMS implemented at the facility and to initiate appropriate facility management action to maintain and improve the QEMS. The results of the meeting are provided to the Regional Hub Manager for consideration by corporate level Top Management and to initiate appropriate action with respect to the Agency's broader QEMS.

Corporate Level Top Management – consisting of Regional Hub Managers, VP of Operations, Director of Operational Support Services, President & CEO and OCWA's Board of Directors. Each has specific corporate oversight responsibilities for the Agency's QEMS, which are described in the QEMS Reference Manual. The overall performance and effectiveness of OCWA's QEMS is formally reviewed and reported to corporate level Top Management on an annual basis. It is also monitored on an ongoing basis through scheduled meetings of OCWA's Operations & Compliance Committee, Executive Management Team and Board of Directors. Through these reporting and monitoring activities, corporate level Top Management identifies opportunities for improvement, initiates action plans and assigns responsibility for their completion.

QEMS Roles, Responsibilities and Authorities

OCWA management defines the roles, responsibilities and authorities under its QEMS for all employees whose work could have a significant impact on drinking water quality. These are communicated to all personnel to ensure that individual roles and responsibilities and how they relate to those of the rest of the organization are understood.

Specific QEMS-related roles, responsibilities and authorities of Operations personnel for the facility are summarized in the table below. Additional duties of employees are described in their job specifications.

Responsibilities and authorities for implementing and maintaining individual elements of the facility's QEMS are outlined in the QEMS Procedures referenced throughout this Operational Plan.

Position	QEMS Roles, Responsibilities and Authorities
All Operations Personnel	• Work in accordance with OCWA policies, procedures and plans • Document all activities • Participate in QEMS training • Be aware of all the environmental and public health risks at the facility • Consider risks and ramifications of all actions • Participate in testing and development of SOPs and contingency plans • Implement action plans to rectify deficiencies identified in audits and inspections of the facility • Take all appropriate training to ensure competence in their job • Identify and bring forward to the Operations Manager opportunities for improving the facility's QEMS • Perform duties in compliance with applicable legislation and regulations
Regional Hub Manager (Corporate Level Top Management)	• Ensure appropriate facility resources to maintain and continually improve the QEMS • Review major issues/deficiencies (including those from audit and inspection reports) and provide further direction to address/resolve • Ensure that each facility in the region has a site-specific emergency plan that meets the corporate standard • Participate in/respond to regular facility Management Reviews, as appropriate • Report to corporate level Top Management on the status of the QEMS implemented at the facilities in his/her region • Liaise with the owner on relevant components of the QEMS including OCWA's roles, responsibilities and authorities for the facility, as appropriate • Act as Overall Responsible Operator (ORO) when required
Senior Operations Manager (Facility Level Top Management and QEMS Representative)	• Delegate responsibilities, deploy resources and supervise sound operation and maintenance of the facility and of the QEMS • Arrange for/review annual internal audits (compliance and QEMS) • Develop action plans to respond to the findings of the internal audits and MOE inspections and verify action plan completion • Establish, test and update a site-specific emergency plan for each facility • Lead regular facility Management Reviews • Report to the Regional Manager on the performance and effectiveness of the QEMS implemented at the facility • Liaise with the owner on relevant components of the QEMS including OCWA's roles, responsibilities and authorities for the facility • Establish a training plan for staff to address regulatory requirements and the QEMS as part of the PPR process • Fulfill defined duties of the QEMS Representative (refer to element 4) • Act as Overall Responsible Operator (ORO) when required

Operations & Compliance Team Lead (OCTL)	• Fulfill duties assigned by the RHM • Report to the RHM on QEMS implementation and identify the need for additional processes and procedures • Deliver/participate in training on regulatory requirements and the QEMS • Implement, monitor and support corporate QEMS programs • Support PCT on all aspects of the QEMS • May act as Operator-in-Charge (OIC) and/or Overall Responsible Operator (ORO) when required.
Process & Compliance Technician (PCT) (QEMS Representative)	• Fulfill duties assigned by the Senior Operations Manager • Participate in the completion of annual internal audits, external audits and develop/monitor/implement action plans to respond to the findings • Participate in MOECC inspections and assist in the response to required actions or recommendations • Actively participate in the development and maintenance of facility emergency plans • Participate in regular facility Management Reviews; lead, organize, prepare documents & collect data for Management Reviews • Report to the Senior Operations Manager and OCTL on QEMS implementation and identify the need for additional processes and procedures • Liaise with the owner on relevant components of the QEMS • Deliver/participate in training on regulatory requirements and the QEMS • Implement, monitor and support corporate QEMS programs • Support Senior Operations Manager on all aspects of the QEMS and fulfill assigned duties of the QEMS Representative (refer to element 4)
Senior Operator/Mechanic	• Fulfill duties assigned by the Senior Operations Manager • Participate as a technical advisor to staff and management and provide specialized training on technical or other issues. • Prepare and/or coordinate staff work assignments and follow up to ensure completion • Assist management in providing recommendation for annual capital forecasts and gathering information for operational reports as required • Assist in the preparation of facility manuals and documenting operating processes and procedures for staff • Actively participate in the development and maintenance of facility emergency plans and assist with emergencies as required. • Act for management during vacations or periodic absences. • Perform duties of Operator/Mechanic as required • Maintain the facility log book according to regulatory requirements • May act as Operator-in-Charge (OIC) and/or Overall Responsible Operator (ORO) when required.
Operator/Mechanic	• Fulfill duties assigned by the Senior Operations Manager • Monitor facility processes through visual inspection, the SCADA system or by taking readings from the process control equipment

	• Operate and adjust equipment/processes to maintain compliance with applicable regulations, permits, certificates 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 • Train and direct new staff on the facility processes, equipment and procedures. • Maintain the facility log book according to regulatory requirements • May act as Operator-in-Charge (OIC) and/or Overall Responsible Operator (ORO) when required.

10 Competencies

The following table presents the competencies required by OCWA personnel whose duties directly affect drinking water quality.

Position	Required Competencies
Regional Hub Manager (RHM)	• Operator certification in good standing; minimum level 2 required to act as ORO • Comprehensive general knowledge of and experience in managing water treatment operations, maintenance as well as facility financial planning and administration • Outstanding team leadership, managerial and coordinating skills • Sound knowledge of relevant legislation, regulations, codes, policies, guidelines and procedures • Knowledge and awareness of the DWQMS • Strong initiative, analytical, evaluating and problem-solving skills to assess administrative and technical needs and capabilities • Well-developed priority-setting and time management skills • Superior interpersonal skills • Excellent oral and written communication skills • Proficiency in office and operational computerized systems • Valid Class G Driver's License
Senior Operations Manager	• Operator certification in good standing • Comprehensive general knowledge of and experience in managing water treatment operations, maintenance as well as facility financial planning and administration • Outstanding team leadership, managerial and coordinating skills • Sound knowledge of relevant legislation, regulations, codes, policies, guidelines and procedures • Knowledge and awareness of the DWQMS • Strong initiative, analytical, evaluating and problem-solving skills to assess administrative and technical needs and capabilities • Well-developed priority-setting and time management skills • Superior interpersonal skills • Excellent oral and written communication skills • Proficiency in office and operational computerized systems • Knowledge of water/wastewater operations and maintenance • Management / Supervisory experience • Leadership Training • Financial management Training • Valid Class G Driver's License
Operations & Compliance Team Lead (OCTL)	• Operator certification in good standing; minimum OIT or minimum level 1 if required to act as OIC and/or ORO temporarily • Extensive knowledge of compliance requirements related to water treatment processes • Good knowledge of relevant legislation, regulations, codes, policies, guidelines and procedures to monitor program delivery and ensure compliance • Knowledge and awareness of the DWQMS • Good knowledge and understanding to apply impact of changes to

	legislative and regulatory requirements on programs and operational processes • Excellent knowledge of computers, operating programs and systems • Evaluative and analytical skills to monitor and assess facility performance against legal requirements and corporate goals • Excellent oral and written communication skills to provide technical advice related to compliance to a variety of staff and officials and to prepare analytical reports • Presentation skills to prepare and present informational material • Auditing skills/experience • Problem-solving skills to resolve compliance issues • Ability to work with a team and take initiative when required • Valid Class G Driver's Licence
Process & Compliance Technician	• Operator certification in good standing; minimum OIT • Extensive knowledge of compliance requirements related to water treatment processes • Good knowledge of relevant legislation, regulations, codes, policies, guidelines and procedures to monitor program delivery and ensure compliance • Knowledge and awareness of the DWQMS • Good knowledge and understanding to apply impact of changes to legislative and regulatory requirements on programs and operational processes • Excellent knowledge of computers, operating programs and systems • Evaluative and analytical skills to monitor and assess facility performance against legal requirements and corporate goals • Excellent oral and written communication skills to provide technical advice related to compliance to a variety of staff and officials and to prepare analytical reports • Presentation skills to prepare and present informational material • Auditing skills/experience • Problem-solving skills to resolve compliance issues • Ability to work with a team and take initiative when required • Valid Class G Driver's Licence
Senior Operator/Mechanic	• Operator certification in good standing; minimum WT Level 1 • Extensive knowledge and experience of water treatment processes to operate the facility • Experience and knowledge of the maintenance and repair of a variety of equipment and structures • Good working knowledge of legislation, regulations, codes, policies, guidelines and procedures related to operations and maintenance • Knowledge and awareness of the DWQMS • Basic mathematics and chemistry • Good knowledge of computers, monitoring and operating systems • Good knowledge to use and understand operating and maintenance manuals, blueprints and other technical specifications • Planning and organizational skills to lead projects and provide technical direction to staff • Demonstrated leadership and decision making skills required to direct an operational team • Problem solving and evaluative skills to provide technical guidance and resolve operational issues • Planning skills to regularly inspect and monitor the facility, processes

	and equipment and perform routine preventative maintenance • Good oral and written communication skills • Ability to work in a team and take initiative when required. • Valid Class G Driver's Licence
Operator/Mechanic	• Operator certification in good standing; minimum OIT Good knowledge of water treatment processes to operate the facility • Experience and knowledge of the maintenance and repair of a variety of equipment and structures • Good working knowledge of legislation, regulations, codes, policies, guidelines and procedures related to operations and maintenance • Knowledge and awareness of the DWQMS • Basic mathematics and chemistry • Familiarity with computers, monitoring and operating systems • Knowledge to use and understand operating and maintenance manuals, blueprints and other technical specifications • Planning, scheduling and problem-solving skills to regularly inspect and monitor the facility, processes and equipment and perform routine preventative maintenance • Good oral and written communication skills • Ability to work in a team and take initiative when required. • Valid Class G Driver's Licence

OCWA's recruiting and hiring practices follow those of the Ontario Public Service (OPS). As part of the OPS, 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 and based on this evaluation; the hiring manager selects and assigns personnel for specific duties.

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 Senior Operations Manager or Regional Hub Manager takes reasonable steps to ensure that every operator has the opportunity to attend training to meet the annual training hour requirements.

OCWA's Operational Training Program is maintained by the Risk, Compliance & Training Division and aims to:

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

The Program consists of both continuing education and on-the-job training and is delivered using a combination of methods (e.g., traditional classroom courses 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.

Facility personnel receive site-specific training 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.

Awareness of OCWA's QEMS is promoted through the OCWA Employee Orientation Program for new employees, cluster/regional level training sessions and meetings and the Agency's Environmental Compliance course. The Environmental Compliance course is attended by all new staff (upon availability and scheduling) to ensure staff are kept current on any changes to regulatory requirements and to reinforce their roles and responsibilities under OCWA's QEMS. Other mandatory and recommended training requirements are listed as part of the Employee Orientation Program available on OCWA's intranet or through the Human Resources department.

Individual OCWA employee training records are maintained and tracked using a computerized system, the Training Summary database, which is also administrated by the Risk, Compliance & Training Division. Training records maintained at the facility are controlled as per QEMS Procedure QP-01 Document and Records Control.

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 by the facility's management team as part of this process (and on an ongoing basis). In addition to this process, OCWA employees may at any time request training by both internal and external providers by submitting a request to the Regional Hub Manager or the Senior Operations Manager.

11 Personnel Coverage

Refer to Appendix D for QEMS Procedure QP-03 Personnel Coverage.

12 Communications

Refer to Appendix E for QEMS Procedure QP-04 Communications.

13 Essential Supplies and Services

Refer to Appendix F for QEMS Procedure QP-05 Essential Supplies and Services.

14 Review and Provision of Infrastructure

Refer to Appendix G for QEMS Procedure QP-06 Review and Provision of Infrastructure.

15 Infrastructure Maintenance, Rehabilitation and Renewal

Planned Maintenance

OCWA, under contract with the owner, maintains a program of scheduled inspection and maintenance of infrastructure for which it is operationally responsible. Routine planned maintenance activities include: pump inspection, analyzer calibrations, flow meter calibrations, valve inspection, facility inspections etc. Records of these activities are maintained as per QEMS Procedure QP-01 Document and Records Control.

Planned maintenance activities are scheduled using a computerized Work Management System (WMS) that allows user to:

- Enter detailed asset information
- Generate and process work orders
- Access maintenance and inspection procedures
- Plan, schedule and document all asset related tasks and activities
- 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 generated by the Administrative Assistant on a monthly basis and are distributed accordingly. Completed work orders are submitted to the Administrative Assistant for entry into WMS. Records of these activities are maintained as per QEMS Procedure QP-01 Document and Records Control.

An inventory of equipment is 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 staff at the locations specified in QEMS Procedure QP-01 Document and Records Control.

Unplanned Maintenance

Unplanned maintenance is conducted as required. All unplanned maintenance activities are authorized by the Senior Operations Manager. Unplanned maintenance activities are recorded on work orders and in the facility logbook. All documents are filed as per QP-01.

Rehabilitation and Renewal

Rehabilitation and renewal activities including capital upgrades are determined on an annual basis in consultation with the Owner (refer to QP-06 Review and Provision of Infrastructure). A list of required replacement or desired new equipment, the Summary of Capital Works Recommendations, is compiled and prioritized by the Senior Operations Manager and is presented to the Owner for review and comment. All major expenditures require the approval of the Owner.

All new equipment and repaired equipment must be documented in the WMS system. The operator is to complete the WMS Data Collection Sheet and assign a new WMS # for any new equipment. This form is submitted to the Senior Operations Manager to be entered and assigned appropriate maintenance procedures/schedules. Repaired equipment is to be

documented on the Equipment Breakdown Work Order and submitted to the Administrative Assistant to enter into WMS.

Program Monitoring and Reporting

To assist in monitoring the effectiveness of program the Regional Hub Managers and the Senior Operations Managers are provided with monthly summary reports for each facility. In addition, OCWA's Executive Management Team is provided with hub and regional summary reports on an ongoing basis.

Operations Staff have access to various reports through eReports.

On a bi-monthly basis the owner is provided with an operations and maintenance report through the Client Connection.

16 Sampling, Testing and Monitoring

Refer to Appendix H for QEMS Procedure QP-07 Sampling, Testing and Monitoring.

17 Measurement and Recording Equipment Calibration and Maintenance

Refer to Appendix I for QEMS Procedure QP-08 Measurement and Recording Equipment Calibration and Maintenance.

18 Emergency Management

Refer to Appendix J for QEMS Procedure QP-09 Emergency Management.

19 Internal QEMS Audits

Refer to Appendix K for QEMS Procedure QP-10 Internal QEMS Audits.

20 Management Review

Refer to Appendix L for QEMS Procedure QP-11 Management Review.

21 Continual Improvement

In conjunction with the internal QEMS audit and Management Review processes documented above, OCWA uses action plans and tracking spreadsheets to continually improve its QEMS. Through these processes, areas of concern as well as opportunities for improvement are identified at the drinking water systems operated and maintained by OCWA.

Appendix A

QP-01 Document and Records Control

DOCUMENT and RECORDS CONTROL

1.0 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.

2.0 Scope

Applies to QEMS Documents and QEMS Records pertaining to the Petrolia Drinking Water System as identified in this procedure.

3.0 Responsibility

Senior Operations Manager
Regional Hub Manager
Operations & Compliance Team Lead (OCTL)
Process & Compliance Technician (PCT)
All Facility Staff
Information Technology Department
Corporate Compliance Group

4.0 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

5.0 Procedure

5.1 Documents and records required by OCWA's QEMS are listed in Table 1.

5.2 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.

5.3 Additional controls for QEMS Procedures within this Operational Plan are used to ensure appropriate review and approval. These include the use of authorized approval, alpha-numeric procedure code, issue date, revision number and revision history.

Authorized personnel for review and approval of QEMS Procedures for the Petrolia Drinking Water System are:

Review	Process & Compliance Technician (PCT) or Operations & Compliance Team Lead (OCTL)
Approval	Senior Operations Manager or Regional Hub Manager

5.4 The PCT 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 document control locations established by the QEMS Representative. The designated document control location(s) for identified QEMS documents and records are defined in Table 1.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 Table 1.

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.

5.5 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., OPEX, WISKI, WMS) is administered by designated application managers/trustees, requires the permission of the Senior Operations Manager and is restricted through use of usernames and passwords.

SCADA records are maintained and accessible to all staff when required.

5.6 Any employee of the drinking water system may request, in writing a revision to improve an existing internal QEMS document or the preparation of a new document. Written requests should indicate the reason for the requested 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 facility 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, OCWA's weekly electronic bulletin and provincial, regional, hub or facility-level training sessions.

5.7 When a QEMS document is superseded, the hardcopy of the document is promptly removed from its location and forwarded to the QEMS Representative or designate for disposal or retention (as appropriate).

5.8 The authorized method for disposal of hardcopy documents and records after the specified retention requirements have been met is shredding.

5.9 Electronic copies: Electronic copies of documents and records that are considered "originals" will be kept on the shared drive located on the Corporate Server under the

control of the QEMS Representative. Deletion of electronic copies will be conducted by the QEMS Representative using simple replace/rewrite software routines.

5.10 QEMS documents and records are retained in accordance with applicable regulations and legal instruments. QEMS documents and record without legislative minimum retention periods are retained according to corporate policy or, if none are specified, at the discretion of the Operations and Compliance Team Lead. Relevant regulatory and corporate minimum retention periods are listed in Table 2.

5.11 QEMS documents and records are reviewed for evidence of control during each internal system audit as per QEMS Procedure QP-10 Internal QEMS Audits.

6.0 Related Documents

QP-10 Internal QEMS Audits

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes per Corporate template update, hub re-structure and Management Review
2013-02-01	2	Revised per hub restructure
2013-03-15	3	Revision noting hard copy of lab results now kept at hub office
2014-01-31	4	Table 1: Added Internal & External Audit Findings Tracking Spreadsheet, Summary of Capital Works Recommendations, Operational Plan & Procedures Revision Tracking Worksheet; added Senior Operations Manager to 3.0
2014-03-20	5	Added reference to Senior Operations Manager in 5.3 & 5.4; Table 1: replaced Call Out report form with Call In/ Overtime / Work order Form
2015-12-03	6	Revise QP-01 as per OFI IA 2015-03-15; removed documents from table that were no longer used, updated locations of documents, updated table 2, removed Senior Operations Manager
2016-05-17	7	Revise 3.0 Responsibility, re-add Senior Ops Manager, add Regional Hub Manager to 5.3 add 5.9 Electronic copies, remove Operational Plan updates from 5.11, add corporate retention times to 5.10, include Operations/Equipment Manuals to Table 1 and Community Complaint form as per OFIs IA 2016-03-05
2016-09-29	8	Revise name of system as per change to OA, change Bright's Grove WTP to Water Treatment Plant

Table 1: Designated location for documents and records required by OCWA's QEMS

Type of Document/Record	Designated Document Control Location (HC = Hardcopy, E = Electronic)
Internal QEMS Documents	
Corrective Action Report	E-Shared Drive
Community Complaint Form	E-Share Drive
Critical Control Point Limit Exceedance Form	E-Share Drive
Emergency Response Plan (OCWA)	E-Intranet
Essential/Emergency Service and Supply Contact List	HC-FEP Binder E-Shared Drive
Facility Emergency Plan (FEP Binder)	HC- Water Treatment Plant E- Shared Drive
Internal Audit Protocol	E-PCT Folder on Corporate Server
Internal Audit Report Template	E-PCT Folder on Corporate Server
On-call Schedule	E- Shared Drive HC- Water Treatment Plant
Operational Plan (includes QEMS Procedures)	HC – Water Treatment Plant E – Shared Drive
QEMS Policy	HC- Water Treatment Plant E-OCWA website
Rounds Sheets	E- Shared Drive
Sample Schedule	E- Shared Drive
Standard Operating Procedures (referenced in Operational Plan and QEMS Procedures)	HC- Water Treatment Plant E- Shared Drive
Training Record Form	E-Shared Drive
Vacation Request Form	E-Shared Drive
Vacation/Training Schedule	E-Maintained in Outlook by Operations Manager
WMS Work Orders	E-WMS Database
External QEMS Documents	
Applicable regulations and legislation; municipal By-laws	E- www.e-laws.gov.on.ca; municipal website
Municipal Emergency Plan	HC-FEP Binder
QEMS Records	
Audit Reports—internal and External DWQMS Audits; Action Plans	HC – Water Treatment Plant E-Shared Drive
Calibration records	E – Shared Drive
Corrective Action Report	E-Shared Drive
Operations Report	E-Shared Drive
Community Complaint	E – OPEX database
Facility Logbooks	HC- Water Treatment Plant
Infrastructure review (capital/maintenance works recommendations)	E- Shared Drive
Management Review documentation	E- Shared Drive
Operations/Equipment Manuals	HC- Water Treatment Plant

Type of Document/Record	Designated Document Control Location (HC = Hardcopy, E = Electronic)
Reports—Schedule 22, Section 11	E-Shared Drive
Round Sheets	E-Shared Drive HC- Water Treatment Plant
SCADA Reports	E- Shared Drive
Sampling and Testing Records; Certificate of Analysis (Lab)	E - Shared Drive
Training Records	E-Training Database
Vacation Request	E- Maintained in Outlook by Operations Manager
WMS Work Orders	E - WMS Database

Table 2: Relevant regulatory and corporate minimum retention periods

Type of Document/Record	Minimum Retention Time	Requirement Reference
DWQMS Operational Plan	10 years	Director's Direction under SDWA
Internal QEMS Audit Reports	10 years	OCWA Requirement
Management Review Minutes	10 years	OCWA Requirement
DWQMS Records not specified	2 years	OCWA Requirement
Operational checks, sampling and testing (e.g., chlorine residuals, turbidity, fluoride, sampling records)	2 years	SDWA O. Reg. 170/03
Microbiological sampling and testing	2 years	SDWA O. Reg. 170/03
Schedule 23 & 24 sampling and testing	6 years (LMR) 15 years (SMR)	SDWA O. Reg. 170/03
Trihalomethanes (THMs), nitrates, nitrites and lead program (including alkalinity and pH) sampling and testing	6 years	SDWA O. Reg. 170/03
Sodium test results and related corrective action records/reports	15 years	SDWA O. Reg. 170/03
60-month fluoride test results (if system does not fluoridate)	15 years	SDWA O. Reg. 170/03
Tests required under an approval or order	2 years 6 years (if the tests were related to radiological standards under SDWA Reg. 169)	SDWA O. Reg. 170/03
Corrective action records/reports for E.coli, Total Coliforms and bacterial species (e.g., Aeromonas spp., etc. under section 17-9 of Schedule 17)	2 years	SDWA O. Reg. 170/03
Corrective action records/reports for chemical and radiological parameters under SDWA Reg. 169, pesticides not listed in Reg. 169 and health-related parameters in an approval or order	6 years (LMR) 15 years (SMR)	SDWA O. Reg. 170/03
Section 11 Annual Reports	6 years	SDWA O. Reg. 170/03

Type of Document/Record	Minimum Retention Time	Requirement Reference
Schedule 22 Summary Reports for Municipalities	6 years	SDWA O. Reg. 170/03
Reports prepared by a professional engineer or professional hydrologist stating whether a system's raw water supply is/is not GUDI	15 years	SDWA O. Reg. 170/03
Facility logs or other record-keeping mechanisms	5 years	SDWQ O. Reg. 128/04
Training records for water operators and water quality analysts (WQAs)	5 years	SDWQ O. Reg. 128/04

Appendix B

QP-02 Risk Assessment and Risk Assessment Outcomes

RISK ASSESSMENT and RISK ASSESSMENT OUTCOMES

1.0 Purpose

To define the process for conducting a drinking water risk assessment and for documenting and reviewing the results of the assessment at the facility level.

2.0 Scope

Applies to all OCWA-operated municipal residential drinking water systems and includes the identification and assessment of potential hazardous events and hazards that could affect drinking water safety. OCWA's approach to addressing other potential hazards is set out in QEMS Procedure QP-09 Emergency Management.

3.0 Responsibility

Senior Operations Manager
Regional Hub Manager
Operations & Compliance Team Lead (OCTL)
Process & Compliance Technician (PCT)
Risk Assessment Personnel

4.0 Definitions

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 anything 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

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

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

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

Likelihood – the probability of a hazard or hazardous event occurring

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

5.0 Procedure

5.1 The Senior Operations Manager assigns personnel to conduct the risk assessment (e.g., Process & Compliance Technician (PCT), Operations & Compliance Team Lead)

5.2 Using the system's process diagram, identify hazardous events and associated hazards (possible outcomes) that could impact the system's ability to deliver safe drinking water in Table 1[1] for each activity/process step.

5.3 For each of the hazardous events, specify control measures currently in place at the facility that eliminate the hazard or prevent it from becoming a threat to public health.

Note: Some hazards/hazardous events may have step-by-step contingency plans associated with them. These contingency plans are developed as per OCWA's Emergency Management Program and are further described in QEMS Procedure QP-09 Emergency Management.

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

As a minimum, the following must be included as CCPs at all OCWA-operated facilities (as applicable):

- Processes necessary to achieve the required log removal or inactivation of pathogens (i.e., chemical and/or UV disinfection system, filtration process[2] for surface water and GUDI systems)
- Processes necessary for maintaining a disinfectant residual in the distribution system (includes re-chlorination points)
- Fluoridation system

Identify the above processes (as they apply) as mandatory CCPs in the 'CCP?' column in Table 1.

5.5 To determine if there are any additional CCPs for the system, evaluate and rank the hazardous events (as set out below in steps 5.6 and 5.7) for the remaining activities/process steps (i.e., those not included as OCWA's minimum CCPs).

5.6 Taking into consideration existing control measures (including the reliability and redundancy of equipment), assign each hazardous event 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

[1] Tables referred to in this procedure are contained within the facility-specific **Summary of Risk Assessment Outcomes**
[2] Filtration process includes related processes (e.g., chemical coagulation, rapid mixing, flocculation, sedimentation)

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

Multiply the likelihood and consequence values to determine the risk value (ranking) of each hazardous event and record all values in Table 1. Hazardous events with a ranking of 12 or greater are considered high risk.

5.7 Review the hazardous events and rankings documented in Table 1 and identify any activity/process step as an additional CCP if all of the following criteria are met:

5.7.1 The associated hazardous event has a ranking of 12 or greater
5.7.2 The associated hazardous event can be controlled through control measure(s)
5.7.3 Operation of the control measures can be monitored and corrective actions can be applied in a timely fashion
5.7.4 Specific control limits can be established for the control measure(s)
5.7.5 Failure of the control measures would lead to immediate notification of Medical Officer of Health (MOH) or Ministry of the Environment and Climate Change (MOECC) or both.

High risk hazardous events that do not meet all the above criteria and are not considered CCPs are addressed with control measures.

5.8 List identified CCPs (required minimum and any additional CCPs established by the risk assessment) in Table 2. Set related critical control limits (e.g., limits for turbidity, chlorine residual, temperature, pH) for each CCP as appropriate.

5.9 Ensure procedures have been developed and implemented at the facility to:

- Monitor the critical control limits
- Respond to, report and record deviations from the critical control limits.

List these procedures in Table 2.

5.10 When a CCP limits is exceeded it is to be tracked using the Critical Control Point Limit Exceedance Form.

5.11 The information recorded in the Summary of Risk Assessment Outcomes is maintained at the facility level on an ongoing basis. At least once a year, the PCT reviews the risk assessment documentation to verify the currency of the information and the validity of the assumptions used in the risk assessment in preparation for the Management Review.

5.12 The Senior Operations Manager ensures that a risk assessment is conducted and documented at least once every thirty-six months.

6.0 Related Documents

Summary of Risk Assessment Outcomes Tables 1 and 2
QP-09 Emergency Management
Critical Control Point Limit Exceedance Form

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes made per Corporate Template update, hub re-structure and Management Review findings
2013-02-01	2	Revised per hub restructure
2014-01-31	3	Addition of Senior Operations Manager to 3.0 Responsibilities Addition of risk assessment assumptions statement to 5.11
2014-03-20	4	Addition of position Senior Operations Manager to 5.1 & 5.11
2016-05-13	5	Remove Operations Manager, re-add Senior Operations Manager, add 5.10, revise 5.11, add CCP limit exceedance form to 6.0 as per OFI in IA: 2016-03-05
2016-09-29	6	Revise system name, add numbers to criteria in 5.7

Summary of Risk Assessment Outcomes
Petrolia Drinking Water System

Table 1: Risk Assessment Table

Note: Processes referred to in section 5.4 of QP-02 Risk Assessment and Risk Assessment Outcomes must be identified as mandatory Critical Control Points (CCPs) as applicable for all OCWA-operated facilities. Mandatory CCPs are not required to be ranked.

Activity/ Process Step	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Source/ Intake	Frazil Ice	-Inability to supply water .	-SOP# PET-13, 20,46 -Water Storage at Reservoir & Tower	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Raw water quality issue	-AWQI -Inability to treat water -Aesthetic issues -Taste and odour issues	-Water Storage at Reservoir & Tower -SOP# PET-13, 30, 47 -Online analyzers, routine sampling	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Breakage/Blockage of Intake Pipe	-Inability to supply water	-Water Storage at Reservoir & Tower -SOP# PET-13, 46 -Intake inspections	2	3	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
Low Lift	Low Lift Pump Failures	-Inability to supply water	-Equipment Redundancy built in- 3 pumps -Water storage -SOP# PET-13 -pump rentals	2	2	4	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Biofilm in raw main	-Water quality issue -High chlorine demand	- Treated water storage in the distribution system - SOP# PET-13	2	2	4	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
Filtration Process	Strainer Failure	-AWQI -Inability to supply water	-Equipment Redundancy: 2 Strainers -Increase backwashing frequency -Automatic Backwashing Cycle -Pressure Alarms -Water Storage at Reservoir & Tower -SCADA Monitoring	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1

Activity/ Process Step	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Filtration Process			-SOP# PET-47				
	High turbidity on discharge of racks	-AWQI for >1 NTU for 15 minutes	-Equipment Redundancy: 3 separate Filter Trains - SOP# PET-05, 13, 47 --Alarms -Automatic System Shut Down Program -Water Storage at Reservoir & Tower -SCADA monitoring	3	4	12	☒ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☐ No
	Leak/Break on Rack	-Rack out of service -Inability to supply water	-Rack redundancy: 3 racks -PALL Operations Manual -Operator Inspections -SCADA monitoring -Alarms	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Failure on rack integrity test	-Rack out of service -Possible high turbidity -Failure to meet disinfection requirements	-Rack redundancy: 3 racks -PALL Operations Manual -SCADA monitoring -Alarms	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Air compressor failure	-Inability to treat water	- Redundancy: 2 air compressors -SCADA monitoring -Maintenance program - Treated water storage in the distribution system -Alarms	2	3	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
Clearwell	Miltronics Failure	-Low level -Loss of pump control -AWQI: Failure to meet CT	-Manual operations -SCADA monitoring -Alarms -Back up level control - SOP# PET-13 , 47	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.4
	Low Level	-AWQI : Failure to meet CT -Inability to supply water	- Treated water storage in the distribution system - SOP# PET-13 ,36, 47	4	3	12	☒ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility

Activity/ Process Step	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
							☐ No
Disinfection	Gas Injection System Failure	-AWQI -Low chlorine -Failure to meet CT	-Equipment Redundancy : 2 Cylinder System -SCADA monitoring -Alarms - SOP# PET-10, 47, 53 - Treated water storage in the distribution system -Shut down of the low lift	4	3	12	☒ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☐ No
Fluoridation	HFS Pump Failure	-AWQI >1.5 mg/L	-Alarms -SCADA monitoring -In house analysis -Flow paced calculated dosages (SCADA) -Automatic shut down -SOP# PET-03, 04, 47	4	3	12	☒ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☐ No
High Lift	High lift pump Failures	-Inability to supply water	-Equipment Redundancy – 3 pumps -Scheduled Maintenance Activities -Alarms -Treated water storage in the distribution system - SOP# PET-13	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
SCADA System	SCADA Failure	-Loss of continuous monitoring -Failure to meet regulatory requirements	-Data retrieval -Data storage -SOP#PET-02, 54	3	4	12	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.2 and 5.7.4
	Loss of Communication with Petrolia Tower or Mandaumin Reservoir	-Loss of continuous monitoring -Inability to supply water -Low pressure -AWQI	-Manual operations -Data retrieval -Data storage - SOP#PET-42, 47, 54	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1

Activity/ Process Step	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Power Supply	Power failure	-Inability to treat water -Inability to supply	- Treated water storage in the distribution system - SOP# PET-13 -Generator power (onsite or rental)	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Generator Failure	-Inability to treat water -Inability to supply	-Generator rental - Treated water storage in the distribution system - SOP# PET-13 , 31	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
Mandaumin Reservoir	Equipment Failure	-Low pressure -AWQI -Low level -Inability to supply	- Treated water storage in the distribution system - Manual operation of high lifts -Alarms - SOP# PET-13, 23, 32, 35, 45, 47 -By passing Reservoir	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Low chlorine	-AWQI: <0.05 ppm -Low chlorine residual	- Continuous monitoring -Routine sampling -Flushing - SOP# PET-01, 10, 13,16, 23, 32, 47 - SOP#PET-32 -By passing Reservoir	2	4	8	☒ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☐ No
	Analyzer Failure	-Loss of communication -Loss of continuous monitoring -AWQI	- Routine sampling -Grab samples -Alarms -SOP# PET-47,54, 55 -Routine maintenance	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Power Failure	-AWQI -Loss of pressure -Loss of communication -Loss of continuous monitoring	-Routine maintenance -Generator onsite -Treated water storage in tower - SOP#PET-32, 44, 47	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1

Activity/ Process Step	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Petrolia Tower	Low Level	-Low pressure in the system -AWQI	- Manual operation of Mandaumin booster pumps -Alarms -SOP# PET-26,28, 32, 45, 47	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Low chlorine	-AWQI: <0.05 ppm	-Routine sampling -Flushing - SOP# PET-16, 22, 47				☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.3
	Power failure	-Loss of communication -Loss of level control	-small generator onsite - Manual pump operation	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
Distribution System	Watermain Break	-Loss of pressure -AWQI -Inability to supply water	- System storage -Ability to isolate section -AWWA Standard C651, Watermain Disinfection Procedure -SOP#PET-41,42,45,47	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Water Quality Issue	-Low chlorine -Biofilm -Taste & odour issues -AWQI	-Routine sampling -SOP#PET-16, 22, 42,47	2	3	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Low Chlorine	-AWQI:<0.05 ppm	-Routine sampling -Flushing -SOP#PET-22, 47	3	4	12	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.3
	Aging Infrastructure	-AWQI: <0.05 -Failure of equipment (watermain breaks, valve failure)	-Capital replacement projects -Routine maintenance -Flushing -SOP#PET-16, 41,44,47,	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Illegal Hydrant Use	-AWQI -Low pressure	-SCADA Monitoring - Municipal By Law 17-2014	3	2	6	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP

Activity/ Process Step	Description of Hazardous Event	Possible Outcome (Hazards)	Existing Control Measures	Likelihood	Consequence	Risk Value	CCP?
Distribution System		-Watermain Break	- SOP# PET-41,45, 47				identified for facility ☒ Does not meet 5.7.1
	Failure of Backflow Preventers	-AWQI -Water quality issue	-Routine maintenance -Municipal By Law 17-2014 SOP# PET-47	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
Vandalism	Water Quality Issues	-AWQI	- SCADA Monitoring - SOP# PET-47	2	5	10	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Damage to Equipment	-AWQI	-SCADA Monitoring - Facility Emergency Plan - SOP# PET-47	3	3	9	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
Terrorism	Water Quality Issues	-AWQI	- SCADA Monitoring - SOP# PET-47	2	5	10	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1
	Damage to Equipment	-AWQI	- SCADA Monitoring - SOP# PET-47	2	5	10	☐ Yes – Mandatory CCP ☐ Yes – Additional CCP identified for facility ☒ Does not meet 5.7.1

Table 2: Identified Critical Control Points (CCPs)

CCP	Critical Control Limits	Monitoring Procedures	Response, Reporting and Recording Procedures
Filtration Process .	individual rack turbidity 75 mNTU or greater for 300 sec banners on SCADA individual rack turbidity 100 mNTU or greater for 300 sec calls out and shut down low lift and PALL system	-SCADA Monitoring -continuous monitoring by turbidimeter -alarm banner on SCADA -alarm to dialer	-equipment redundancy: 3 racks -SOP# PET-05, 13, 32, 47 -Critical Control Point Limit Exceedance Form -automatic shut down of rack Facility Emergency Plan -Distribution system storage -Alternate source of water
Primary Disinfection -low free chlorine residual	0.5 mg/L or less free chlorine for 300 sec on AIT 4005 call out alarm and shut down of low lift and PALL system 1.10 mg/L or less for 300 sec on AIT 5002 call out alarm and shut down high lift pumps	-SCADA monitoring -continuous chlorine analyzer -Alarm to dialer -pocket colorimeter	- Equipment redundancy: 2 cylinders -SOP# PET-01, 10, 32, 47 -SOP# PET-10 Low Chlorine -Critical Control Point Limit Exceedance Form -System storage -automatic shut down -Facility Emergency Pan
Secondary Disinfection -low free chlorine residual	1.10 mg/L or less for 300 sec on AIT 5003 call out alarm and shut down high lift pumps 1.00 mg/L on AIT 216 for 300 secs	-SCADA monitoring -continuous chlorine analyzer -Alarm to dialer -pocket colorimeter	- Equipment redundancy: 2 cylinders -SOP# PET-01, 10, 13, 32, 47 -alternate source of water -Critical Control Point Limit Exceedance Form -System storage -automatic shut down -Facility Emergency Pan
Fluoridation -high fluoride	-1.00 or higher for 300 sec on AIT 5004 call out alarm and shuts off fluoride pump	-SCADA monitoring -continuous fluoride analyzer -Alarm to dialer -grab samples	-SOP# PET-03, 32, 47 - automatic shut down -Facility Emergency Plan
Clearwell -low level	-3.50 m or less for 300 sec on LIT 4009 call out and shutdown high lift pumps	- SCADA monitoring -alarm to dialer	- Alternate source of water -SOP# PET-13,36, 47, 53 -distribution system storage -automatic shutdown of high lift pumps -Facility emergency plan

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

Standard Operating Procedures:

SOP# PET-01:	Chlorine CCP Exceedance
SOP# PET-03:	Fluoride CCP Exceedance
SOP# PET-05:	Turbidity CCP Exceedance
SOP# PET-10:	Low Chlorine
SOP# PET-13:	Emergency Water Taking from LAWSS
SOP# PET-20:	Frazil Ice
SOP# PET-23:	Mandaumin By-Pass
SOP# PET-26:	Tower Low Level
SOP# PET-28:	Tower Isolation
SOP# PET-30:	Potential Lake Contamination
SOP# PET-31:	Generator Fail to Start
SOP# PET-32:	Alarm Testing
SOP# PET-35:	Mandaumin Reservoir Low Level
SOP# PET-36:	Clearwell Low Level
SOP# PET-41:	Watermain Repair
SOP# PET-42:	Responding to Consumer Complaints
SOP# PET-45:	Low Distribution System Pressure
SOP# PET-46:	Provision of An Alternate Water Source
SOP# PET-47:	Reporting Adverse Water Quality
SOP# PET-53:	Primary Disinfection
SOP# PET-54:	Continuous Monitoring Equipment Failure
SOP# PET-55:	Process and Regulatory Analyzers

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 a year. In addition, the risk assessment must be conducted at least once every thirty-six months. Refer to steps 5.10 and 5.11 of QP-02.

Date of Activity	Type of Activity	Participants	Summary of Results
2011-03-01	Initial Risk Assessment		Results captured in Revision 0 of the Summary of Risk Assessment Outcomes
2012-04-18	Annual Review; Risk Assessment re-done during Risk Assessment Workshop	T Bender, Sr Ops Mgr, C Grimstead, Compliance Mgr, K Burgess, RCA, B Tully, Sr Ops Mgr, J Stradeski, PCT, D Hunt Ops Mgr, B Labute Sr Ops Mgr, D Jubenville, PCT, D Dillen Compliance Manager, G Dunmore, Sr Ops Mgr, D Thomson, PCT	Results captured in Draft Revision 1 of the Summary of Risk Assessment Outcomes
2012-06-01	Annual Risk Assessment Review	T Bender, Sr Ops Mgr, D Thomson, PCT, T Simpson, Operator	Results captured in Revision 1 of the Summary of Risk Assessment Outcomes
2013-05-27	Annual Risk Assessment Review	Clive Barry, Operations Manager; Mike Weber, Senior Operator; Troy Simpson, Operator; Deb Thomson, PCT	Results captured in Revision 5 of the Summary of Risk Assessment Outcomes -Risk “plugged strainers”; consequence increased from 1 to 2 -Risk “high lift pump failures”; likelihood increased from 2 to 3
2014-02-27	36 Month Risk Assessment	Clive Barry, Operations Manager, D Thomson, PCT	Results captured in Revision 6 of the Summary of Risk Assessment Outcomes

			-Column “Possible Causes for Hazardous Event” added -Risk Value decreased associated with risk of; breakage/blockage of intake pipe, algae bloom, low lift pump failures, membrane filtration failure, chlorine analyzer failure, HFS Overdose, high lift pump failures, vandalism -Risk Value increased associate with risk of; Contaminate entry, Gas Injection system failure/low supply of chlorine gas (combined) and Loss of Tower level control -Removed Risk ; Loss of residual in distribution
2015-05-22	Annual Risk Assessment Review	Dale Le Britton, Senior Operations Manager; Dan MacLeod, Team Lead; Deb Thomson, PCT	Results captured in Revision 7 of the Summary of Risk Assessment Outcomes: -Contingency names revised following implementation of new OCWA Facility Emergency Plan Binder an associated contingencies -Table 2 revised alarm set points
2016-05-12	Annual Risk Assessment Review	Dan MacLeod, Cindy Sigurdson and Maegan Garber	-remove possible cause of hazardous event column, condense spill/adverse weather/algae bloom to raw water quality issue, clarify non CCPs, add rain main failure and biofilm to low lift station, add high turbid, leak on racks and compressor fail for filtration process, add hazardous event to clearwell, add SCADA system to activity, revised watermain activity, added Mandaumin, terrorism and vandalism, reviewed revised CCPs in Table 2. Add list of related SOPs
2016-09-27	36 Month Risk Assessment	Maegan Garber, Cindy Sigurdson and Dan MacLeod	-add additional SOPs to control measures, remove raw main failure, add inability to supply water to strainer failure and leak/break on rack, add SCADA monitoring and alarms as a control measure where appropriate, add AWQI to loss of communication, add Equipment Failure and Analyzer failure to reservoir, revise reservoir power failure outcomes and controls, add Petrolia tower activity and low level, low chlorine and power fail events, add Distribution system activity and events, revised SOP list

Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Initial risk assessment conducted
2012-06-01	1	Changes per Corporate Template update, hub re-structure, Risk Assessment Annual Review and Management Review
2012-08-31	2	Column titles added to Table 2
2013-02-01	3	Revised issue date
2013-03-15	4	Revisions made to SOP and Document naming
2013-05-27	5	Revised following Annual Risk Assessment Review
2014-02-27	6	36 Month Risk Assessment conducted
2015-05-22	7	Revised following Annual Risk Assessment Review

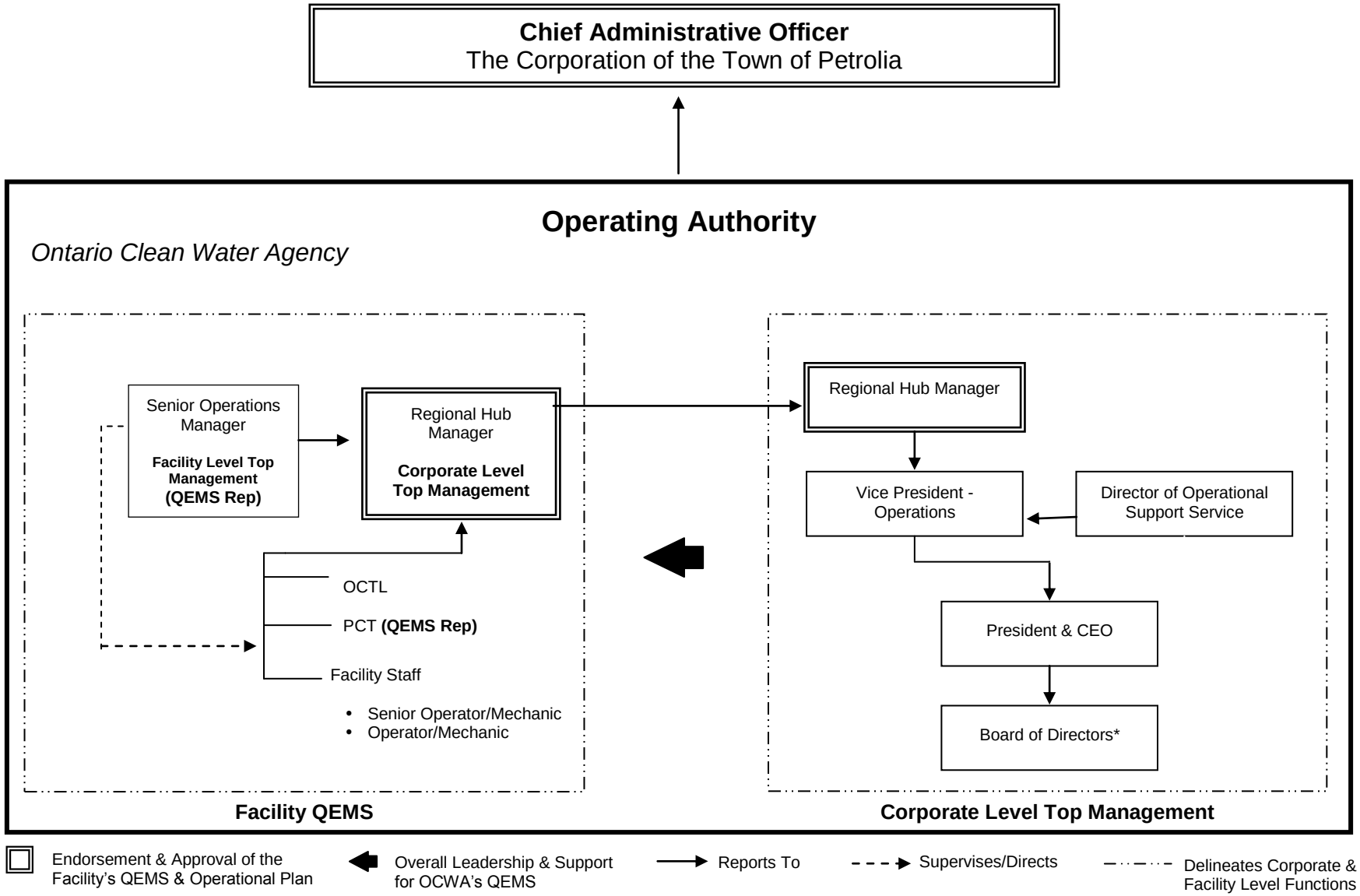
2015-12-03	8	Revised SOP numbers and CCP Limit Exceedance Form as per OFI from IA 2015-03-30
2016-05-12	9	Revised following Annual Risk Assessment review
2016-09-27	10	Revise name of system name, add Mandaumin booster station, add Petrolia Tower, add criteria to CCP all following 36 month review as per OA change

Appendix C

QEMS Organizational Structure for the Petrolia Drinking Water System

Ontario Clean Water Agency

QEMS Organizational Structure for the Petrolia Drinking Water System



Appendix D

QP-03 Personnel Coverage

PERSONNEL COVERAGE

1.0 Purpose

To describe the procedure for ensuring that sufficient and competent personnel are available for duties that directly affect drinking water quality.

2.0 Scope

Applies to operations personnel at the Petrolia Drinking Water System.

3.0 Responsibility

Senior Operations Manager
Regional Hub Manager

4.0 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)

5.0 Procedure

5.1 The Senior Operations Manager ensures that personnel meeting the competencies identified in the Operational Plan are available for duties that directly affect drinking water quality.

5.2 The Petrolia Drinking Water System is staffed by OCWA personnel as follows:

- 7:30- 16:00 5 days a week Monday to Friday.
- Staff on call after hours

5.3 OCWA 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 and the Regional Hub Manager are the designated Overall Responsible Operator (ORO) based on the ORO Schedule. When the either is unavailable, a competent designate acts as the ORO. This is recorded in the facility logbook.

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

5.4 The Senior Operations Manager or Regional Hub Manager assigns an on-call operator for the time that the facility is not staffed (i.e., evenings, weekends and Statutory

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

Holidays). The on-call shift change is start of the business day on Monday and follows a weekly rotation. The On - Call schedule is maintained by the Senior Operations Manager and is posted in the Water Treatment Plant office.

5.5 The on-call Operator conducts a physical inspection of the treatment plant and takes appropriate readings during the weekends, if necessary. On Statutory holidays the on-call operator performs normal operating tasks. Details of the physical inspection are recorded in the facility logbook and daily round sheets.

5.6 The SCADA system auto dialer is programmed to contact a pager operator whenever there is an alarm condition. The Auto-dialer contacts the on-call operator through a designated on-call pager. The on-call operator contacts the Auto-dialer to obtain the details of the alarm to determine the appropriate response. If the nature of the alarm requires additional staff, the on-call operator contacts the ORO to request assistance of other certified operators. The on-call operator records details of the call in the facility logbook and on the Call-In/ Overtime/ Work Order form.

5.7 The Senior Operations Manager is responsible for approving vacation time for staff in a manner which ensures sufficient personnel are available for the performance of normal operating duties.

5.8 The Senior Operations Manager is responsible for ensuring facilities are appropriately staffed when an operator is away due to training, illness of emergency.

5.9 OCWA Operational staff are represented by the Ontario Public Service Employees Union (OPSEU). In the event of a labour disruption, the Senior Operations Manager, together with the union, identifies “essential services” required to operate the facility so that the quality of drinking water is not compromised in any way.

5.10 A contingency plan for Critical Shortage of Staff is included in the Facility Emergency Plan. This plan provides direction to staff in the event that there is a severe shortage of staff due to sickness (e.g., pandemic flu) or other unusual situations where personnel might not be available.

6.0 Related Documents

Facility Logbook
Rounds Sheets
On-Call Schedule
ORO Schedule
Call In / Overtime/ Work Order form
Vacation Schedule
Critical Shortage of Staff Contingency Plan (Facility Emergency Plan)

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes per Corporate Template update, hub re-structure and Management Review
2013-02-01	2	Revised per hub re-structure
2013-03-15	3	Revised 5.4 & Related Documents
2014-01-31	4	Revised 3.0,5.1 & 5.2 per hub re-structure
2014-03-20	5	Revised 3.0,5.1, 5.2,5.4 &5.5 per hub re-structure
2015-12-03	6	Revise 5.1, 5.2 and 5.3 as per OFI’s IA 2015-03-30, remove Senior Operations Manager and reference to Lambton East Office

2016-05-24	7	Re-add Senior Ops Manager, revise 5.2 to clarify Operator coverage, revise 5.3 to include Regional Hub Manager and ORO schedule, revise 5.5 to clarify coverage on holidays, and add 5.8 to address responsibility of coverage as per OFIs IA 2016-03-05
2016-09-29	8	Revise system name as per change of OA, revise name of Bright's Grove Water Treatment Plant to Water Treatment Plant

Appendix E

QP-04 Communications

COMMUNICATIONS

1.0 Purpose

To describe the procedures for QEMS-related communications between the facility's Top Management and OCWA personnel, the owner, suppliers and the public.

2.0 Scope

Applies to facility level internal and external communications regarding the Quality & Environmental Management System (QEMS) implemented at the Petrolia Drinking Water System.

3.0 Responsibility

Senior Operations Manager (Facility Level Top Management)
Process & Compliance Technician (PCT)
Operations & Compliance Team Lead (OCTL)
Senior Operator/Mechanic
Regional Hub Manager (Facility Level/Corporate Level Top Management)

4.0 Definitions

None

5.0 Procedure

5.1 The Senior Operations Manager and PCT are responsible for identifying and coordinating any site-specific communications in relation to the status/development of the facility's QEMS. They are also responsible for ensuring that the Regional Hub Manager and the Operations and Compliance Team Lead are promptly informed regarding QEMS-related matters with Agency-wide significance.

5.2 OCWA personnel attend the Environmental Compliance course upon hire (dependent on availability and scheduling), which provides general awareness training on OCWA's QEMS.

The Senior Operations Manager ensures facility personnel receive site-specific training on the Operational Plan, QEMS Procedures and other related operating instructions and procedures as part of the orientation process.

Revisions to the QEMS and associated documentation are communicated to relevant employees at meetings, through internal memos or e-mails on an as-needed basis. The Operational Plan and procedures are available to all facility employees as per Table 1 of QP-01 Document and Records Control.

The QEMS Policy and an overview of the QEMS are available to all OCWA personnel through OCWA's intranet.

5.3 The continuing suitability, adequacy and effectiveness of OCWA's QEMS are communicated to the owner as part of the Management Review process (refer to QEMS Procedure QP-11 Management Review).

5.4 Communication requirements for ensuring suppliers and contractors understand the relevant OCWA QEMS policies, procedures and expectations are described in QEMS Procedure QP-05 Essential Supplies and Services.

5.5 Media enquiries must be directed to the facility's designated media spokesperson. The Senior Operations Manager or the Regional Hub Manager is the media spokesperson for the Petrolia Drinking Water System. The media spokesperson coordinates with facility and corporate personnel (as appropriate) and the Owner in responding to media enquiries.

5.6 OCWA's QEMS and QEMS Policy are communicated to the public through OCWA's public website. The QEMS Policy is also posted at the Water Treatment Plant Office.

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

All complaints, whether received from the consumer, the community or other interested parties, are documented in the OPEX database. As appropriate, the Senior Operations Manager ensures that the Owner is informed of the complaint and/or an action plan is developed to address the issue in a timely manner. The PCT ensures that consumer feedback is included for discussion at the Management Review.

5.7 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 QEMS Procedure QP-09 Emergency Management.

6.0 Related Documents

Facility Logbook
QP-01 Document and Records Control
QP-05 Essential Supplies and Services
QP-09 Emergency Management
QP-11 Management Review
Facility Emergency Plan
Emergency Response Plan
Community Complaint Form
OPEX Incident Reports

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes per Corporate Template Update, hub re-structure and Management Review
2013-02-01	2	Revised per hub restructure
2013-03-15	3	Revision to 5.3
2014-01-31	4	Revised 3.0, 5.1 and Related Documents
2014-03-20	5	Revised header & 5.5 referencing Senior Operator position
2015-12-29	6	Remove Senior Operations Manager
2016-05-24	7	re-add Senior Ops Manager, add OCTL to 3.0, revise 5.2 to clarify Envi.Compl. course, revise 6.0 to include Community Complaint Form as per OFIs IA 2015-03-05

2016-09-29	8	Revise name of system as per change in OA, change name of Brights Grove Water Treatment Plant to Water Treatment Plant

Appendix F

QP-05 Essential Supplies and Services

ESSENTIAL SUPPLIES and SERVICES

1.0 Purpose

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

2.0 Scope

Applies to essential supplies and services pertaining to the Petrolia Drinking Water System, as identified in this procedure.

3.0 Responsibility

Corporate Procurement and Administration
Regional Hub Manager
Senior Operations Manager
Operations & Compliance Team Lead (OCTL)
Process & Compliance Technician (PCT)
Senior Operator/Mechanic
Operator/Mechanic

4.0 Definitions

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

5.0 Procedure

5.1 Essential supplies and services for the Petrolia Drinking Water System are listed in the Essential/Emergency Service and Supply Contact List located in the Facility Emergency Plan Binder located in the Water Treatment Plant Office. The list is reviewed and updated as required by the QEMS Representative.

5.2 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.

5.3 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/service providers (including those contracted locally) are sent a letter that provides an overview of the relevant aspects of the QEMS.

5.4 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.

5.5 All third-party drinking water testing services are provided by accredited and licensed laboratories.

5.6 Calibration services are provided by qualified personnel.

5.7 Chemicals purchased for use in the drinking water treatment process must meet AWWA Standards and be ANSI/NSF certified.

The facility orders and receives ongoing deliveries of chemicals to satisfy current short-term needs based on processing volumes and storage capacities.

5.8 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.

6.0 Related Documents

Essential/Emergency Service and Supply Contact List
AWWA Standards

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Revised per Corporate Template update, hub re-structure and Management Review
2013-02-01	2	Revised per hub restructure
2014-01-31	3	Senior Operations Manager added to 3.0
2014-03-20	4	Revised Approved by header section
2015-12-03	5	Revised name of contact list as per OFI IA 2015-12-02, Remove Senior Operations Manager
2016-05-24	6	Re-add Senior Operations Manager, revise 3.0 to include RHM & OCTL, add AWWA Standards to 6.0 as per OFIs IA 2016-03-05
2016-09-29	7	Revise system name as per change in OA, change name of Brights Grove Water Treatment Plant to Water Treatment Plant

Appendix G

QP-06 Review and Provision of Infrastructure

REVIEW and PROVISION of INFRASTRUCTURE

1.0 Purpose

To describe OCWA's procedure for reviewing the adequacy of infrastructure necessary to operate and maintain a drinking water system.

2.0 Scope

Applies to the Petrolia Drinking Water System.

3.0 Responsibility

Senior Operations Manager
Owner/Municipal Representative(s)

4.0 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

5.0 Procedure

5.1 On an annual basis, the Senior Operations Manager conducts a review of the drinking water system's infrastructure to assess its adequacy for the operation and maintenance of the system. The specific areas reviewed are:

- 5.1.1 Intake
- 5.1.2 Treatment Plant
- 5.1.3 Highlift and Lowlift
- 5.1.4 Structural
- 5.1.5 Reservoir
- 5.1.6 Distribution

5.2 The output of the review is a Summary of Capital Works Recommendations that is submitted to the owner for review and comment. Together with the owner, timelines and responsibilities for implementation of priority items are determined and documented.

5.3 The Senior Operations Manager ensures that results of the review are included as input to the Management Review process.

6.0 Related Documents

Minutes of Management Review
Summary of Capital Works Recommendations

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes per Corporate Template Update, hub re-structure and Management Review
2013-02-01	2	Revised per hub restructure

2013-03-15	3	Revised 5.2; corrected grammar error
2014-01-31	4	Revised 3.0 per hub re-structure, 5.1 to add clarity
2014-03-20	5	Addition of position Senior Operator to 5.1 & 5.3 of procedure
2015-12-03	6	Revise 5.2 as per OFI IA 2015-03-30, remove Senior Operations Manager
2016-05-24	7	Re-add Senior Ops Manager, revise 5.1 to include areas covered, as per OFIs IA 2016-03-05
2016-09-29	8	Revise name of system as per OA change, add distribution to 5.1, change Brights Grove Water Treatment Plant to Water Treatment Plant

Appendix H

QP-07 Sampling, Testing and Monitoring

SAMPLING, TESTING and MONITORING

1.0 Purpose

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

2.0 Scope

Applies to sampling, testing and monitoring at the Petrolia Drinking Water System.

3.0 Responsibility

Senior Operations Manager
Process & Compliance Technician (PCT)
Operations & Compliance Team Lead (OCTL)
Operator/Mechanic
Senior Operator/Mechanic

4.0 Definitions

Challenging Conditions – any existing characteristic of the water source or event-driven fluctuations that impact the operational process as identified and listed under the Drinking Water System section in the facility's Operational Plan

5.0 Procedure

5.1 All sampling, monitoring and testing is conducted at a minimum in accordance with SDWA O. Reg. 170/03. Adverse water quality incidents are responded to and reported as per SOP#PET 47 Reporting Adverse Water Quality.

Additional sampling requirements for the facility are defined in the Municipal Drinking Water License for the Petrolia Drinking Water System.

5.2 Samples are submitted to an accredited and licensed laboratory according to the facility's Sampling Calendar schedule. The Sampling Calendar schedule is maintained by the PCT and is updated as required.

All analytical results from laboratory reports are entered/ uploaded into WISKI. Electronic reports are maintained as per QP-01 Document and Records Control.

5.3 Continuous monitoring equipment is used to sample, test and gather information . Test results from continuous monitoring equipment are captured by the SCADA system and are reviewed by a certified operator in accordance with the requirements of SDWA O. Reg. 170/03.

Continuous monitoring equipment used at this facility:

- Temperature – Raw Water
- Turbidity – Raw Water, Filter Influent, Filter Effluent, Treated Water (3 locations)
- Free Chlorine Residual – Raw Water, Treated Water,

  Distribution Water at Mandaumin Reservoir
- pH – Raw Water, Treated Water
- Fluoride Concentration – Treated Water
- Discharge Pressure – Treated Water, Distribution Water at Mandaumin Reservoir and Petrolia Water Tower
- Flow Rates – Raw Water, Filter Effluent, Backwash, In plant service water, Treated Water, Distribution inlet and outlet
- Levels –Clearwell, Reservoirs, Distribution Reservoirs- Mandaumin and Petrolia Water Tower
- Filter Trans Membrane Pressure (TMP)

Results from continuous monitoring equipment are recorded by the SCADA System and stored electronically on the server.

5.4 In-house process control activities are conducted on a regular basis by the certified operator(s).

In-house samples are analyzed following approved laboratory procedures. The results of these activities are recorded on the round sheet. Any adjustments made to process parameters are recorded in the facility log book.

5.5 All sampling, testing and monitoring activities related to the facility's most challenging conditions are maintained. The facilities challenging condition is frazil ice. Frazil ice can be monitored by temperature of the lake and ice cover. Follow the SOP #PET-20 for Frazil Ice.

5.6 Upstream sampling, testing and monitoring activities are routinely completed for temperature, pH, dissolved oxygen and turbidity of the raw water. Non-routine sampling, testing and monitoring takes place in response to events/issues to determine effects to the raw water supply to the treatment plant.

5.7 Sampling, testing and monitoring results are readily accessible to the owner by request.

As a minimum, owners are provided with an annual summary of sampling, testing and monitoring results through the SDWA O. Reg. 170/03 section 11 and schedule 22 reports and through the Management Review process outlined in QP-11 Management Review.

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

6.0 Related Documents

Facility Logbook

QP-01 Document and Records Control
QP-11 Management Review
Round Sheets
Reports—Schedule 22, Section 11
SOP# PET-20 Frazil Ice
SOP# PET-49 Reporting Adverse Water Quality
Sampling Schedule

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes per Corporate template update, hub re-structure and Management Review
2013-02-01	2	Revise pre hub restructure
2013 -03-15	3	Revised 5.2
2014-01-31	4	Addition of Senior Operations Manager to 3.0
2014-03-20	5	Revised 5.2 & 5.5 to address March 2014 Internal Audit OFI's
2015-12-03	6	Remove PDC reference, add WIKSI, add round sheets to 5.3 as per OFI IA 2015-03-30, remove Senior Operations Manager
2016-05-24	7	Re-add Senior Operations Manager, revise 3.0 to include OCTL, revise 5.1 to include additional sampling; remove table, revise 5.5 to include frazil ice conditions and 5.6 to include upstream sampling, revise 6.0 as per OFIs IA 2016-03-05
2016-09-29	8	Revise system name as per change in OA

Appendix I

QP-08 Measurement and Recording Equipment Calibration and Maintenance

MEASUREMENT and RECORDING EQUIPMENT CALIBRATION and MAINTENANCE

1.0 Purpose

To describe the procedure for the calibration and maintenance of measurement and recording equipment.

2.0 Scope

Applies to the measurement and recording equipment at the Town of Petrolia Brights Grove Water Treatment Plant

3.0 Responsibility

Operations Manager
Process & Compliance Technician (PCT)
Operator

4.0 Definitions

None

5.0 Procedure

5.1 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 QP-05 Essential Supplies and Services).

5.2 The Operations Manager or designee establishes and maintains a list of measurement and recording devices and associated calibration schedules using the automated Work Management System (WMS). An Equipment & Measuring Devices Table, listing devices that require calibration/maintenance, task completion date and the signature of the operator performing the task is completed and filed as per QP-01

5.3 Calibration and maintenance activities are carried out in accordance with procedures specified in the manufacturer's manual and/or instructions specified in WMS Any measurement device which does not meet its specified performance requirements during calibration must be removed from service if practical until repaired or replaced. The failure must be reported to the Operations Manager 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. The Operations Manager ensures that any notifications required by applicable legislation are completed and documented within the specified time period.

5.4 Calibration and maintenance records and maintenance/equipment manuals are maintained as per QP-01 Document and Records Control.

6.0 Related Documents

Facility Log*b*ook
WMS Records
Calibration/Maintenance Records
Equipment & Measuring Devices Table
QP-01 Document and Records Control
QP-05 Essential Supplies and Services

7.0 Revision History

Date	Revision #	Reason for Revision	Revision By
2011-03-21	0	Procedure issued	
2012-06-01	1	Changes per Corporate Template Update, hub re-structure and Management Review	
2013-02-01	2	Revised per hub restructure	
2014-01-31	3	Addition of Senior Operations Manager to 3.0	
2014-03-20	4	Procedure Approved by revised to Senior Operations Manager position	
2015-12-29	5	Remove Senior Operations Manager	Maegan Garber

Appendix J

QP-09 Emergency Management

EMERGENCY MANAGEMENT

1.0 Purpose

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

2.0 Scope

Applies to potential operations emergency situations or service interruptions identified for the Petrolia Drinking Water System.

3.0 Responsibility

Refer to section 5.8 of this procedure.

4.0 Definitions

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

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

5.0 Procedure

5.1 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.

Level 3 is an actual or potential situation that will likely require significant resources from normal operations and/or threatens continued operations. Examples may include disruption of service/inability to meet demand, critical injury, 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.

5.2 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 operations-related events and directly links to the corporate-level Emergency Response Plan (ERP) for management of Level 3 events that require corporate support. The Senior Operations Manager is responsible for establishing a site-specific FEP that meets the corporate standard for each facility in the hub. The document, "Emergency Management Program: OCWA's

Approach to Facility Emergency Planning", provides as an overview of OCWA's approach to emergency management and outlines the corporate requirements for implementing the FEP at each facility operated by OCWA.

5.3 Potential emergency situations or service interruptions identified for the Petrolia Drinking Water System include:

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

Site specific contingencies:

- None

5.4 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 standard operating procedures (SOPs) are contained within the FEP.

5.5 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	Corporate Compliance/ Regional Compliance Advisor	On-the-Job Practical	Upon hire and when changes are made to the corporate standard*	PCTs (or others identified by the Senior Operations Manager)
Contents of the site-specific FEP	Hub-Level (QEMS Rep)	On-the-Job Practical	Upon hire and when changes to the FEP are made*	All facility employees with responsibilities for responding to an emergency

*Note: Minor 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.

5.6 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 outcomes of reviews and tests are evaluated using the FEP-01 Contingency Plan Review/Test Summary Form. A CP-related response to an actual event may be considered a review or a test and a scheduled test of a CP may also be regarded as a review of that particular CP as long as the outcomes are evaluated using the FEP-01 form. Additional information regarding CP review and testing requirements is contained with "Emergency Management Program: OCWA's Approach to Facility Emergency Planning".

5.7 Revisions to the CPs, SOPs 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.).

5.8 Roles and responsibilities for emergency management at OCWA-operated facilities are set out in "OCWA's Approach to Facility Emergency Planning". 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*).

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

5.10 An emergency contact list is contained within the FEP and is reviewed/updated at least once per calendar year. OCWA's Emergency Communications Protocol depicts the established escalation of communications in relation to Level 1, 2 and 3 events. Specific notification requirements during emergency situations or service interruptions are set out in the individual CPs and in the ERP.

6.0 Related Documents

- Facility Emergency Plan
- Corporate Emergency Response Plan
- Emergency Management Program: OCWA's Approach to Facility Emergency Planning (appendix to the FEP)
- FEP-01 Contingency Plan Review/Test Summary Form
- Municipal Emergency Response Plan (as applicable)
- Emergency Contact List and Emergency Communication Protocol (Contacts section of the FEP)

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes per Corporate Template Update, hub re-structure and Management Review
2013-02-01	2	Changes per hub restructure
2014-01-31	3	Addition of Senior Operations Manager to 3.0
2014-03-20	4	Revised procedure Approved by to Senior Operations Manager position
2015-12-03	5	Revised as per corporate review and OFI IA 2015-03-30, remove Senior Operations Manager
2016-05-24	6	Re-add Senior Operations Manager, update procedure with new corporate template as per OFI IA 2016-03-05
2016-09-29	7	Revise system name as per change in OA

Appendix K

QP-10 Internal QEMS Audits

INTERNAL QEMS AUDITS

1.0 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).

2.0 Scope

Applies to all activities within the scope of the QEMS implemented at the Petrolia Drinking Water System as documented in the Operational Plan.

Note: this procedure does not include the facility's internal compliance audits conducted in accordance with OCWA's Internal Audit Program.

3.0 Responsibility

Senior Operations Manager
Regional Hub Manager
Corporate Compliance Group
Operations & Compliance Team Lead (OCTL)
Process & Compliance Technician (PCT)
Lead Auditor

4.0 Definitions

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

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

Lead Auditor – Internal Auditor responsible for leading an Audit Team

Audit Team – one or more Internal Auditors conducting an audit

Nonconformity – non-fulfillment of a requirement

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

5.0 Procedure

5.1 Audit Objectives, Scope and Criteria

5.1.1 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 nonconformities with the documented QEMS, and
- To assess the effectiveness of the QEMS and assist in its continual improvement.

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

5.1.3 The criteria covered by an internal QEMS audit include:

- Drinking Water Quality Management Standard (DWQMS)
- Current Operational Plan
- QEMS-related documents and records

5.1.4 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. However, all elements of the DWQMS must be audited at least once every 12 months.

5.2 Audit Frequency

5.2.1 Internal QEMS audits may be scheduled and conducted in one annual exercise or may be separated into smaller audit sessions scheduled at various intervals throughout the year.

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

5.2.3 Regardless of the approach, the QEMS Representative must ensure that an internal audit is conducted at least once every 12 months.

5.3 Internal Auditor Qualifications

5.3.1 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
- Familiarity with the DWQMS requirements

5.3.2 Internal Auditors that do not meet the qualifications in s.5.3.1 may form part of the Audit Team for training purposes, but cannot act as Lead Auditor.

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

5.4 Audit Preparation

5.4.1 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.)

5.4.2 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 actions to address previously identified nonconformities and other relevant documentation

- Preparing work documents (e.g., checklists, forms, etc.) for reference purposes and for recording audit evidence collected during the audit

5.5 Conducting the Audit

5.5.1 Opening and closing meetings are not required, but may be conducted at the discretion of the QEMS Representative and the Lead Auditor.

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

5.5.3 The Audit Team generates the audit findings by evaluating the audit evidence against the audit criteria. In addition to indicating conformity or nonconformity, 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.

5.6 Reporting the Results

5.6.1 The Lead Auditor reviews the audit findings and conclusions with the QEMS Representative and Facility 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.

5.6.2 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 and related evidence (including any nonconformities, OFIs or other observations)
- Audit conclusions

5.6.3 The QEMS Representative distributes the audit report to Facility Top Management and others as appropriate. The audit report and supporting documentation are filed by the QEMS Representative and retained as per QP-01 Document and Records Control.

5.6.4 The QEMS Representative ensures that results of internal QEMS audits are included as inputs to the Management Review as per QP-11 Management Review.

5.7 Corrective Action

5.7.1 When a nonconformity is identified through an internal QEMS audit, the Senior Operations Manager (or designate) investigates the need for action to eliminate the root cause(s) so as to prevent the nonconformity from recurring. The investigation may include consultation with the Regional Hub Manager, OCTL, PCT, operators and others as appropriate.

5.7.2 The Senior Operations Manager (or designate) determines the corrective action needed and assigns responsibility and a target date for resolution.

5.7.3 Any necessary revisions to QEMS documents are completed as per QP-01 Document and Records Control.

5.7.4 The QEMS Representative ensures corrective actions are documented in the DWQMS Corrective Action Report. The QEMS Representative monitors the progress of corrective action(s) and provides status updates to Facility Top Management.

5.7.5 The effectiveness of corrective actions is reviewed during subsequent internal QEMS audits. If there is evidence that the action taken was not effective, the Senior Operations Manager (or designate) initiates further corrective action and assigns resources as appropriate until the nonconformity is fully resolved.

5.8 Opportunities for Improvement (OFIs)

5.8.1 The implementation status of any identified OFIs (or rationale for not implementing an OFI) is discussed and documented during the Management Review.

5.8.2 The implementation of OFIs are tracked by the QEMS Representative using the Management Review Minutes and associated action items.

6.0 Related Documents

Internal Audit Protocol
Audit Reports
Corrective Action Reports
QP-01 Document and Records Control
QP-11 Management Review

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes per Corporate Template update, hub re-structure and Management Review
2013-02-01	2	Revised per hub restructure
2014-01-31	3	Addition of Senior Operations Manager to 3.0
2014-03-20	4	Additional reference to Senior Operations Manager position
2015-12-29	5	Revise procedure using corporate template, add QP-11 to 6.0, remove Senior Operations Manager
2016-05-24	6	Re-add Senior Operations Manager, add OCTL, Regional Hub Manager to 3.0 as per OFIs IA 2016-03-05
2016-09-29	7	Revise system name as per change in OA

Appendix L

QP-11 Management Review

MANAGEMENT REVIEW

1.0 Purpose

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

2.0 Scope

Applies to the review of the QEMS implemented at the Petrolia Drinking Water System.

3.0 Responsibility

Top Management (hub/facility level):

- Regional Hub Manager
- Senior Operations Manager

Other Management Review Participants:

- Process & Compliance Technician (PCT)
- Operations & Compliance Team Lead (OCTL)
- Senior Operator/Mechanic
- Operator/Mechanic

4.0 Definitions

Management Review – a formal (documented) meeting conducted at least once every 12 months by Top Management to evaluate the continuing suitability, adequacy and effectiveness of OCWA's Quality & Environmental Management System (QEMS)

5.0 Procedure

5.1 The Senior Operations Manager along with the PCT determine a suitable frequency for Management Review meetings for the drinking water system. As a minimum, reviews must be conducted at least once every 12 months.

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 5.2 below are taken into account for each individual system and documented in the Management Review meeting minutes.

5.2 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 efficacy of the risk assessment process,
e) Internal and third-party audit results,
f) Results of emergency response testing,
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, and
p) Staff suggestions.

The QEMS Representative(s) coordinates the Management Review and distributes the agenda to participants in advance of the Management Review meeting.

5.3 The Management Review participants review the data presented and make recommendations and/or initiate action plans to address identified deficiencies as appropriate.

5.4 The QEMS Representative(s) ensures that minutes of and action plans resulting from the Management Review meeting are prepared and distributed to the appropriate OCWA management (including the Regional Hub Manager) and personnel and the representative(s) of the owner and/ or the municipality.

5.5 The Senior Operations Manager or designate monitors the progress and documents the completion of action plans resulting from the Management Review.

6.0 Related Documents

Minutes and action plans resulting from the Management Review
Management Review Agenda

7.0 Revision History

Date	Revision #	Reason for Revision
2011-03-01	0	Procedure issued
2012-06-01	1	Changes per Corporate Template update, hub re-structure and Management Review
2013-02-01	2	Revised per hub restructure
2014-01-31	3	Addition of Senior Operations Manager to 3.0
2014-03-20	4	Addition of Senior Operations Manager made to 5.0 and Approved by
2015-12-29	5	Remove Senior Operations Manager
2016-05-24	6	Revise 5.2, add Senior Operator & OCTL to 3.0, revise Operator to Operator/Mechanic in 3.0 and remove Regional Compliance Advisor as per IA 2016-03-05
2016-09-29	7	Revise system name as per change in OA

Appendix M

MOECC's Director's Directions *Minimum Requirements for Operational Plans* – Schedule "C"

Schedule "C"

Subject System Description Form

Municipal Residential Drinking-Water System

Owner of Municipal Residential Drinking-Water System:[1]	The Corporation of the Town of Petrolia
Name of Municipal Residential Drinking-Water System:[2]	Petrolia Drinking Water System

Subject Systems

	Name of Operational Subsystems (if applicable)[3]	Name of Operating Authority[5]	DWS Number(s)[6]
☒ Check here if the Municipal Residential Drinking-Water System is operated by one operating authority. Enter the name of the operating authority in adjacent column[4]			
Operational Subsystem 1:	Petrolia Drinking Water System	Ontario Clean Water Agency	220002903
Operational Subsystem 2:			
Operational Subsystem 3:			
Operational Subsystem 4:			

Add attachments if there are additional 'Operational Subsystems'

Contact Information[7]

Name	Title	Phone No(s).	Email Address
Primary: Dale Le Britton	Regional Hub Manager	Cell: 519-476-5898	dlebritton@ocwa.com
Alternate: Dan MacLeod	Senior Operations Manager	Cell:519-671-5202	dmacleod@ocwa.com
Alternate: Maegan Garber	Process & Compliance Technician	Cell:519-312-0847	mgarber@ocwa.com

Revision 5 2015-12-29

Subject System Description Form Notes:

1. The legal name of the owner should be used for this entry.

2. The name of the municipal residential drinking-water system should be the name most commonly used to describe the entire system. If information or records have been submitted to the ministry respecting this system, using an identifier name (e.g. for DWS), that identifier name should be used.

3. The identification of each operational subsystem will be necessary in cases where the municipal residential drinking-water system is being operated by more than one operating authority. For example, if a municipality owns a treatment and distribution system but contracts the operation of the treatment system to a separate entity there will be two 'operational subsystems', treatment and distribution. The name used to identify these operational subsystems should be one that is commonly used or describes the component. For example, the Everytown Treatment System and the Everytown Distribution System as separate operational subsystems of the same municipal residential drinking-water system.

4. If there is only one operating authority for the municipal residential drinking-water system, the box should be checked as such. In this case the subject system is the municipal residential drinking-water system and there will be no operational subsystem. The operating authority will need to be identified in the adjacent box.

5. The legal or corporate name of the operating authority should be used for this entry.

6. The DWS number is the number, or numbers, assigned to the drinking-water system by the Ministry of the Environment in response to the owner submitting a written notice containing information about the system further to section 10.1 of O. Reg. 170/03. In some cases multiple DWS numbers may exist for components of a municipal residential drinking-water system. In these cases enter all DWS numbers. Conversely, if one DWS number exists for multiple subject systems, enter the number opposite each operational subsystem.

7. The contact entry should identify a person who may be contacted for clarification of information contained in the form. An alternate person may also be identified.