Colborne Drinking Water System

Drinking Water Quality Management System

Operational Plan

Prepared by the Operating Authority:
Lakefront Utility Services Inc.

On Behalf of the Owner:
The Corporation of the
Township of Cramahe

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INTRODUCTION TO THE OPERATIONAL PLAN

Purpose

The purpose of this Operational Plan is to describe the comprehensive Colborne Water System Quality Management System (QMS) developed and implemented by Lakefront Utility Services Inc. (LUSI) and owned by the Corporation of the Township of Cramahe.

Scope

The Colborne Water Supply, Treatment, Storage and Distribution System (Water System) Operational Plan covers the activities and personnel associated with all operational aspects of the production and distribution of safe drinking water to the Village of Colborne for The Corporation of the Township of Cramahe (owner).

This Operational Plan including any referenced procedures, work instructions and other QMS documentation are not intended to replace any of the prevailing regulations that govern the requirements for safe drinking water in the Province of Ontario.

References

Drinking Water Quality Management Standard
Bill 195 – A Safe Drinking Water Act

Definitions

A document has been prepared as guidance material to provide definitions for words, terms and acronyms that may be new to users of the DWQMS documentation.
Appendix A - "Definitions"

Notes on Reading / Navigating This Document

This Operational Plan and related documentation is intended to be controlled and maintained in electronic format. Any printed copy is uncontrolled and is intended for "information purposes" only.
All documentation relating to the Operational Plan is available to all Operating Authority personnel on the LUSI Internal Network. A hard copy of the Operational Plan and/or related documents is available to the owner and the public for viewing upon request.
D02 - "Master List of Documents"

Document History

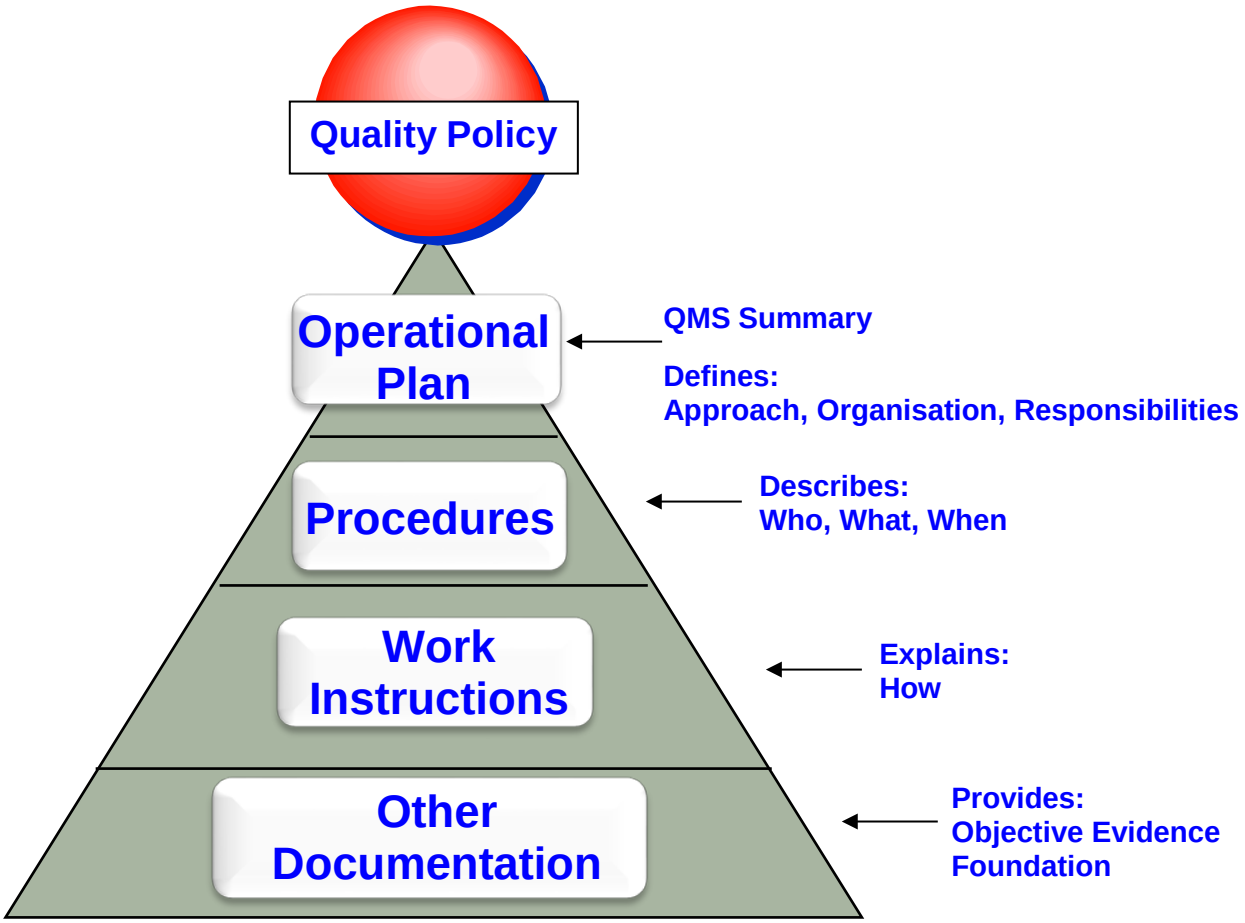
Rev. Level	Date	Change(s)	By
Drafts	02/Mar/09 to 09/July/09	Several successive draft versions issued as the system was developed	J. Nowee
Revision 01	22/July/09	Draft version was reviewed to correct errors in process and edit wording.	J. MacFarlane T. Clarey J. Nowee
Revision 02	16/Nov/09	Added W05 Contact Time	J. Nowee
Revision 03	July 22, 2010	Pg 1 – Notes on Reading/Navigating this Document	J. Nowee
Revision 04	April 27, 2012	Reviewed and updated	J. Nowee
Revision 05	Jan. 31, 2013	Revised documents as per NSF CAR's # J03356029-1 to 5	J. Nowee
Revision 06	Oct. 16, 2014	Reviewed, Revised & Updated	J. Nowee
Revision 07	June 30, 2015	Updated style format, updated titles to reflect current organizational structure, added 2014 data to tables along with data from previous years. Removed Turbidimeter from Discharge System	A. Finlay
Revision 08	Nov 12, 2015	Changed CCP's to maintain consistency with P04 per NSF CAR J0591612-2. Updated hyperlinks throughout document.	AF
Revision 9	March 21, 2016	Added Schedule C to attached documents. Updated operational data.	AF
Revision 10	Oct 28, 2016	Updated titles in Schedule C attachment.	AF
Revision 11	Nov 13, 2017	Review, updated typos in documents titles, and descriptions.	AF
Revision 12	Apr 12, 2018	Added schedule of valve exercising and hydrant flushing program to Section 15 as per NSF CAR. Updated water consumption data	AF
Revision 13	Aug 27, 2018	Updated reference documents, procedures, work instructions.	SW

1.0 | Quality Management System – DWQMS Element 1

In December of 2005, the Clean Water Act was introduced to promote water conservation and source water protection along with new regulations to initiate a Quality Management System (QMS) for all Operating Authorities. The Drinking Water Quality Management System (DWQMS) was implemented in 2007.

The Colborne Water System Operational Plan and related documents outline the processes and procedures for the QMS of the Colborne Water System.
See Figure 1 – "QMS Architecture"

Figure 1: QMS Architecture



The Operational Plan and its associated documents were developed to meet all of the elements of the Ministry of Environment's DWQMS and is structured to meet the order of those requirements.
Most importantly, this document, when combined with the Quality Policy, serves as the foundation of the QMS.

This Operational Plan was developed and documented by the Operating Authority (Lakefront Utility Services Inc.) and has been reviewed and approved by the owner (The Corporation of the Township of Cramahe) prior to issue.

A list of all DWQMS documentation is recorded in a Master List of Documents.
D02 "Master List of Documents"

Regulatory Requirements
LUSI has developed and implemented a procedure to address the reporting of regulatory requirements. It describes the method, for ensuring that the reporting of data to the Ontario Ministry of Environment is conducted per the frequency required by the regulations.
W07 "Regulatory Calendar"

2.0 | Quality Management System Policy – DWQMS Element 2

The Quality Management System Policy assures all stakeholders that the Operating Authority (LUSI) is committed to quality management in the management and operation of the Colborne Water System. This Quality Policy applies to top management of Lakefront Utility Services (Operating Authority) and all employees of the Water Department. The Quality Policy shall be displayed for ready communication to the Owner and the Public at The Township of Cramahe municipal building and at the Colborne Water Plant for communication to all Operating Authority Personnel.
D03 "QMS Policy"

3.0 | Commitment and Endorsement – DWQMS Element 3

Commitment

This document signifies that top management is committed to quality and provides evidence that Top Management will support and endorse an effective Quality Management System.
D04 "Commitment to Quality"

Endorsement

A written endorsement is contained provides assurance that the Top Management and Owner support and approve the contents of the Colborne Water System Operational Plan and its' referenced documents.
D05 "Commitment & Endorsement"

4.0 | QMS Representative – DWQMS Element 4

This Operational Plan identifies the appointment by Top Management of a Quality Management System Representative and describes the specific requirements, responsibilities and authorities of this special role in the QMS as prescribed in the DWQMS. The QMS Representative is generally responsible for the QMS and channels important QMS information to Top Management
D06 "QMS Representative"

5.0 | Document and Records Control – DWQMS Element 5

A procedure has been established to manage and control all documentation and records needed by the QMS.
P01 "Document Control"
P02 "Records Control"

The procedure describes how QMS documents and records are identified, kept legible, protected from damage or loss, retained, retrieved, stored, and disposed of. In addition, the procedure ensures that documents are kept up-to-date with the most current legislation and regulations as well as any changes in operations.

All QMS system documentation is controlled as defined in the referenced procedure.

6.0 | Drinking Water System – DWQMS Element 6

Municipal Drinking Water Licence No. 138-101
The current Municipal Drinking Water Licence for the Colborne drinking water system was issued by the Province of Ontario on June 23, 2016, replacing the Certificate of Approval. Licence Expiry Date: June 22, 2021.
D07 (a) "Municipal Drinking Water Licence"

Drinking Water Works Permit No. 138-201
The current Drinking Water Works Permit for the Colborne drinking water system was issued by the Province of Ontario on June 22, 2016.
D07 (b) "Drinking Water Works Permit"

Permit to Take Water No. 2363-8VMR6M
The quantity of water allowed to be taken is governed by Permit to Take Water Number 2363-8VMR6M, valid to June 30, 2022. Under the terms of the permit, water can be taken from the wells at a rate not to exceed 2,280 litres per minute or 3,283,200 litres (3,283 cu.m.) per day.

Well #2 is the main production well and Well #1 is to be used for back-up (standby) purposes only.
D08 "Permit to Take Water"

Summary of Water Consumption					
Year	**Average Daily Flow**	**Maximum Daily Flow**	**% of Max. Allowable (3,283 m^3)**	**Monthly Average**	**Yearly Total**
2013	**906 m^3**	**1,475 m^3**	**45%**	**27,537 m^3**	**330,448 m^3**
2014	**844 m^3**	**1,744 m^3**	**53%**	**24,495 m^3**	**293,941 m^3**
2015	**992 m^3**	**1,955 m^3**	**59%**	**30,176 m^3**	**362,110 m^3**

2016	1,001 m^3	1,987 m^3	48%	30,533 m^3	366,396 m^3
2017	1,045 m^3	1,987 m^3	48%	30,638 m^3	379,659 m^3

The System is well within the consumption limits set out in the permit. The Operating Authority does not anticipate any problems with the supply of water in the near future.

Description of Water System

The Colborne Water System was originally constructed the early 1930's with several upgrades in recent years. The present Water System consists of two supply wells, a treatment plant, distribution network and water tower. The system supplies approximately 1,000 residential homes and businesses with treated water to a population of 2,160 persons within the Village of Colborne.
The water treatment plant and supply wells are located at 321 Purdy Road in the Township of Cramahe, County of Northumberland and the Water Tower is located north of the 401 at 220 Herley Road.

The Colborne water System is a Class III (3) Supply and Distribution Subsystem and is operated by MOECC Certified Water Supply / Distribution Operators who monitor operating parameters and sample water quality at various stages in accordance with the Ontario Regulations that govern the production of safe drinking-water.
See Section 10.0 "Competencies"

The plant is inspected on a daily basis (365 days/year). To support the operations, the Township has installed a Supervisory Control and Data Acquisition (SCADA) system that continuously monitors process parameters and water quality characteristics at numerous points. The SCADA system has been programmed to detect changes in the operating (process) parameters at the plant and the characteristics of the water, so that operators can assure continuing water quality for customers and respond to system alarms during off-hours. *See Section 11.0 "Personnel Coverage"*

Introduction to Components of the Water System

This section provides a broad overview of the Colborne Drinking Water System including its water source, treatment processes and distribution components so that a basic understanding of the water system will be fostered.

Note: *"The following components describe the Colborne Water System infrastructure in general terms and do not include volumes of tanks, dimensions of piping, pump capabilities, etc. For a detailed description please refer to the Drinking Water Works Permit, Process Schematic and system drawings".*

Ground Water Supply

A hydrological assessment conducted in 2014 concluded the ground water source is a confined aquifer not influenced by local surface water and that the water quality tends to remain constant with little or no significant changes in water temperature or pH levels.

The groundwater is collected from two drilled wells housed in separate pump houses. Well #2 is the main production well and is equipped with a vertical turbine pump discharging at a rate of 38 l/s . The No. 1 well, equipped with a submersible pump, discharges at a rate of approx. 10 l/s. Sand level production has restricted Well #1 to this low flow and it is used strictly as a standby well when Well #2 is out of service. Well #2 provides an excellent quality of drinking water with moderate hardness and iron levels.

Inlet System

The Inlet System consists of a raw water header to which the following are connected:

1. Raw water sample tap
2. Electromagnetic flow meters
3. Sodium hypochlorite injector
4. Sodium silicate injector
5. Second sample tap.

Chemical Addition

All chemicals used in the Colborne water system must be of high quality and purity and must meet the current AWWA and ANSI/NSF 60 requirements.

See Section 13.0 "Essential Supplies & Services

Chemical treatment consists of sodium hypochlorite for disinfection and sodium silicate for sequestering iron, which is naturally found in ground water.

The Sodium Hypochlorite solution storage and feed system for primary chlorination consists of a chlorine solution day tank and two (2) chlorine-metering pumps (one duty, one standby). The sodium Hypochlorite solution is feed to the raw water through an injector in the raw water header prior to discharge to the contact piping. The system is complete with controls to adjust dosing rates automatically, based on chlorine residuals in the distribution piping immediately after the contact piping.

The Sodium Silicate solution storage and feed system for sequestering iron consists of one storage tank and two metering pumps (one on-line and one standby). The Sodium Silicate solution is feed to the raw water through an injector in the raw water header prior to the contact piping. The pump rate is set manually with on/off control from the well pump relays.

Discharge System

Well #1 is equipped with submersible well pump while Well #2 is equipped with a 6-stage, VFD, vertical turbine well pump. The treated water is discharged via one of the above pumps through discharge header accommodating:

1. Chlorine Residual Analyzer
2. Pressure Transducer & Gauge
3. Sampling point

Chlorine Contact Time

The discharge main connects to contact piping installed in a common trench in a "serpentine" fashion to provide the required contact time before connecting to the distribution main which delivers treated water to the consumer. A sampling point is located at the end of the contact piping in the discharge main to deliver a continuous sample to the discharge system chlorine residual analyzer.

Storage

Water storage consists of a steel tanked water tower completed in 2005 having a capacity of 2,342 cu. m. and located north of the 401 at 220 Herley Road.

Instrumentation and Control

The instrumentation at the Colborne Water Treatment Plant consists of:

1. One (1) on-line post-chlorine residual analyzer with continuous sampling from the discharge main complete with high and low level alarms and signal outputs to control and monitor post-chlorination.

Distribution System

The water distribution system dates from approximately 1930 and consists of approximately 27 kilometres of water mains ranging in size from 25 mm to 250 mm diameter.

Two Pressure-Reducing Valves in the distribution network maintain the pressure between 20 and 90 pounds per square inch.

Commercial and industrial customers are metered to record the consumption.

The distribution system is the responsibility of the LUSI Distribution Department whose personnel are all MOECC Certified Ontario Distribution Operators. Distribution personnel maintain the underground system of mains and services, ensure all hydrants and distribution valves are operational, and take water quality samples at various locations throughout the distribution network.

Owner

The owner of the Colborne Water System is the Township of Cramahe and as the Owner, is responsible for monitoring all operational aspects of the System to ensure the provision of safe drinking water and to ensure a sufficient supply of potable water for other uses such as fire suppression, commercial and industrial applications.

Operating Authority

Incorporated in 2000, Lakefront Utility Services Inc. (LUSI) is the contracted operator (Operating Authority) of the Township of Cramahe (Owner) water supply system and distribution network.

LUSI and its Board of Directors are responsible and have the authority for the operation and maintenance of the Colborne Water System and the DWQMS. Top management of LUSI meets with the representatives from the Township of Cramahe to report upon the overall performance of the system and address any quality, capacity and production concerns, as appropriate.

The roles, responsibilities and authorities of both Lakefront Utility Services Inc. and the Township of Cramahe for the operation and maintenance of the water System are detailed in a written agreement between the two parties. Copies of the agreement are maintained at the LUSI Administration offices at 207 Division Street in the Town of Cobourg and at the Cramahe Township municipal building. The agreement is renewable following a set term mutually agreed upon by both parties. The agreement may be terminated on 180 days' notice by either party.

In 2007, the Drinking Water Licensing Program (O. Reg. 188/07) was initiated. The major element requires all water system operating authorities to become accredited by submitting an Operational Plan. In order for LUSI to become the Accredited Operating Authority for the Colborne Water System, this Operational Plan was implemented in 2009.

Process Flow Schematic

A Process Flow Schematic of the Colborne Water System is included for reference to depict the treatment infrastructure used for the production of safe drinking water.
See D09 – "Process Flow Schematic"

Water Source

General Characteristics

The raw water source for the Colborne Water System is ground water taken from one of two wells developed in 1976 and 1984 respectively. The source water is considered secure and not influenced by local surface water. Land uses surrounding the production wells include:

- Residential
- Industrial
- Agricultural
- Vacant
- Highway 401

A detailed description of the source water is available in the Village of Colborne, Engineers' Report for Water System, Hydrogeologic Component, produced by Jagger Hims Ltd. on November 29th, 2000.

Well Head Protection Areas

The recharge areas to the wells and deep aquifer probably extend north from the site and may originate in the Oak Ridge's Moraine Aquifer.

Event-driven Fluctuations

Common event-driven fluctuations due to changes of seasons, storms, spring run-off, etc. do not change the well water quality significantly.

Operational Challenges (Water Source)

Iron Content

Due to the elevated levels of iron in the source water, sodium silicate is added after primary disinfection to sequester the iron. Problems normally associated with iron such as colour and taste have not been reported as a problem.

Hardness

Hardness concentrations exceed the Ontario Drinking Water Quality Standards guideline of 80 to 100 mg/L. This "operational guideline" is established to ensure efficient treatment of the water (predominantly in

surface water treatment plants). Elevated hardness is common in groundwater supplies and is not considered a constraint.

Road Salt

Chloride and sodium are monitored to ensure that road salt is not impacting on production well quality. There has been no elevated readings indicating that road salt is not impacting on production well quality.

Future Development

The production wells within the zone of influence should be protected from possible contamination by future development. The Township of Cramahe may wish to consider land zoning within the zone of influence to limit land uses which might present a risk to the quality of groundwater in the developed aquifer (such as landfills, septage disposal areas, gasoline stations, bulk petroleum storage facilities, waste treatment lagoons, feed lots and chemical storage).

Threats (Water Source)

Based on the information obtained from the first engineers' report, the following may pose a potential for bacteriological contamination:

- The proximity to the nearest sewage system (septic tank/field bed system) which is approximately 50 m away at the nearest private dwelling.
- Farmland and pasture to the southeast, south and southwest is no longer in use.
- To the west there is an industrial park containing a variety of industrial and manufacturing plants.

7.0 | Risk Assessment - DWQMS Element 7

Risk Assessment Procedure

LUSI has developed and implemented a risk assessment procedure that identifies:

- Potential hazardous events and associated hazards
- Risks associated with the hazards
- Ranking of hazards
- Control measures to address hazards
- Critical Control Points

P03 "Risk Analysis"
D10 "Risk Assessment Analysis"

Timetable for Risk Assessment

Risk assessment reviews are conducted to determine if the assumptions made during the current Risk Assessment are no longer valid or, if changes, additions or improvements have been made to the water system that may present a potential or actual risk to the production and delivery of safe drinking water. The currency of the information is verified through a yearly document review and a full risk assessment will be completed every three years.

Typically, the review addresses changes, additions or improvement to:

- raw water source/chemistry
- infrastructure
- technology
- process
- personnel

8.0 | Risk Assessment Outcomes – Element 8

Steps

1. Identify Hazards

Each process / equipment is reviewed for potential problems

2. Access Risks

Likely causes or issues for problems are identified
Reliability and redundancy of equipment is considered

3. Rank Hazards

Hazards are ranked as per probability and severity

4. Control Measures

Existing mitigation measures are listed to address identified risks

5. Control Points

These are points within the works that are monitored, measured or sampled to ensure process control, but if or when their limits are exceeded, do not present a potential or actual immediate negative impact upon the end user.
Each of the identified Control Points has an associated upper and lower alarm limits contained within and monitored by the SCADA system.

6. Critical Control Points (CCP's)

A Critical Control point is defined as a step or point in a drinking water system at which control can be applied by the operating authority to prevent or eliminate a drinking water health hazard or deduce it to an acceptable level.

Upper and Lower Control limits have been established that are within the regulatory requirements for turbidity, disinfection and distribution system pressures. These limits have been programmed into the SCADA system to alert the operator that action needs to be taken prior to exceeding regulatory limits.
P04 "Critical Control Points"

**The following have been identified by LUSI personnel as actual or potential* Critical Control Points and their limits which include MOECC suggested minimum CCP's.*

Critical Control Point			Critical Control Point Limits	
Process		Source	Upper	Lower
1.	**Primary Disinfection**	Contact Piping	4.0 mg/l	0.20 mg/l
2.	**System Pressure**	Distribution System	90 psi	45 psi

7. CCP Response Procedures

The following procedures have been implemented to identify action(s) to be taken in response to any deviation(s) from the CCP limits:

✓ CRP 01 "Primary Disinfection"	✓ CRP 02 "System Pressure"

8. Reporting and recording deviations

Deviations of Control Point limits are reported to the supervisor and recorded in the Daily Log Book, Daily Log and/or on the daily SCADA records.

P04 Critical Control Points

9.0 | Organizational Structure, Roles, Responsibilities & Authorities - Element 9

Organizational Structure

The organizational structure of LUSI, the Operating Authority to which this operational plan applies, and the LUSI Water Department who oversee the day-to-day operations of the Colborne Water System are illustrated in an Organizational Chart.

D11 "Organizational Chart"

Roles

Township of Cramahe– Owner of Water Supply System
Lakefront Utility Services Inc. – Operating Authority
Manager of Water Systems– DWQMS Representative
Compliance Coordinator – DWQMS Coordinator

Top Management

The President and Manager of Water Systems make up the top management of LUSI.

Management Review

Persons within Top Management, the DWQMS Representative and DWQMS Coordinator are generally responsible for undertaking Management Reviews. Participants may also include but are not limited to Water Department Supervisors.

P18 "Management Review"

Standard of Care Drinking Water Policy

This policy serves to advise municipal boards, committees and Council, as to the Statutory Standard of Care requirements under the Safe Drinking Water Act. The policy is applicable to all individuals who have oversight responsibilities for this drinking water system.

D23 "Standard of Care Policy"

Responsibilities and Authorities

A procedure describing the responsibilities and authorities of all personnel within the Organizational Structure has been developed and implemented.
Water Department Managers may also maintain responsibilities of Operators in the form of Job Descriptions. These documents may also include information regarding competencies – in combination with required proficiencies.

Responsibilities and authorities are also defined within the text of the procedures referred to in this Operational Plan and by the prevailing Ontario Regulations. A review of each employee's responsibilities and authorities is conducted upon initial hire, and during each subsequent performance review as appropriate.

Every employee of the LUSI Water Department has the responsibility to maintain a safe workplace and to report adverse conditions to management.
D12 "Responsibilities, Authorities & Competencies"

10.0 | Competencies – DWQMS Element 10

Competencies

All water department distribution operators shall, at a minimum, attain and maintain a Class II Water Distribution & Supply certificate as per the requirements of Ontario Regulations 128/04.

LUSI has developed a "Competency Table" that identifies the required competencies for personnel performing duties directly affecting water quality. A review is conducted to ensure that the competencies of Operating Authority personnel are in line with the requirements for the safe and effective operation of the Colborne Water System.

See P05 "Competencies & Training"

Certification – Distribution & Supply Operators

All water department operators shall, at a minimum, attain and maintain a Class II Water Distribution and Supply certificate as per the requirements of Ontario Regulations 128/04.

Overall Responsible Operator

A procedure has been developed and implemented to ensure that the designation of the Overall Responsible Operator (ORO) is clearly defined and documented for all operating personnel to quickly identify.
P20 "Overall Responsible Operator"

Training

LUSI has developed and implemented a training procedure that identifies the training requirements for water department operators whose duties directly affect drinking water quality.

Training is provided on both an annual and as required basis to ensure that personnel meet or exceed minimum standards established by the Ontario Ministry of the Environment and Climate Change for the operation of a Water System. Training effectiveness is evaluated.

The procedure not only identifies training requirements for maintaining operator certification in accordance with O. Reg. 128/04, but also includes training as required by LUSI and the Occupational Health & Safety Act.

Supervisors are encouraged to participate in an annual review of training/knowledge needs with the Water Superintendent. A list of recommended training can then be compiled based upon applicable legislation or regulations and discussions with the employees. The Manager of Water Systems then summarizes and prioritizes the training/knowledge needs for all departmental employees and training is then scheduled accordingly.
P05 "Competencies & Training"

The following satisfy training requirements for newly hired LUSI Water Department Staff:

- Orientation Training
- Safety Training Orientation provided by the JHSC
- Comprehensive on-the-job training commensurate with their level of skill, experience and education.

Records

A record of operator training and copies of certificates are maintained by the Manager. Supervisors should also keep records of operator training and certificates. Operator certification certificates are displayed as per regulations.

11.0 | Personnel Coverage – DWQMS Element 11

LUSI has developed and implemented a procedure to ensure that sufficient personnel meeting the identified competencies are available for duties that directly affect drinking water quality. Ontario Regulation and the contractual agreement between the Township of Cramahe (owner) and LUSI (operating authority) govern coverage.

The Colborne Water System is visited on a daily basis by a member of the Distribution Department to conduct checks and perform water analysis as required by regulation. The Supervisor of Water Systems shall assign other work as required such as routine maintenance and performance checks. At all other times the water treatment plant is monitored by the SCADA system. The SCADA system has an auto-dialler that is programmed to contact LUSI personnel whenever conditions warrant.

There is an assigned on-call operator covering both the treatment and the distribution system during off-hours. The on-call operator conducts a physical verification of conditions at the site once per day during weekends and statutory holidays or any other times as may be required. The normal on-call schedule for water department operators is from quitting time on Friday to start time the following Friday. The Manager of Water Systems establishes and maintains the on-call schedule. The time of all visits and the details of any related actions taken are recorded in the on-site daily log.
P06 "Personnel Coverage"

12.0 | Communications – DWQMS Element 12

A communication procedure has been established and maintained that describes how the relevant aspects of the DWQMS are communicated between top management and:

a) The Township of Cramahe
b) Operating Authority Personnel
c) Suppliers
d) General Public

The procedure makes reference to meetings between LUSI and the Township of Cramahe Director of Public Works and the CAO as necessary should the need arise. Also referenced are employee DWQMS awareness sessions, supplier DWQMS awareness materials as well as the methods (website and inserts) used to communicate the activities of LUSI with respect to the DWQMS to the consumer, as necessary.
P07 "Communication"

13.0 | Essential Supplies and Services – DWQMS Element 13

A procedure to identify and ensure procurement of all supplies and services essential for the delivery of safe drinking has been implemented.
D24 "Essential Supplies & Services"

Quality of Essential Supplies & Services

There are a small number of suppliers that provide goods or services that may affect drinking water Quality. These suppliers provide chemicals, equipment and equipment maintenance, parts, consulting, engineering, calibration and construction services.

A procedure has been established, implemented and maintained that addresses the quality of supplier products and services as well as the internal process for procurement.
W01 "Chemical Receiving"

14.0 | Review & Provision of Infrastructure – Element 14

The Owner and the Operating Authority meet on a regular basis to review the condition of the works and to discuss and plan any major improvements or additions to the infrastructure. Consideration is given as to the water systems' current and future ability to service the needs/demands of the municipality.
P09 "Review & Provision of Infrastructure"

15.0 | Infrastructure Maintenance, Rehabilitation and Renewal - Element 15

LUSI maintains a program of inspection and maintenance for System machinery, equipment and distribution components (including hydrants and metering equipment). When appropriate, upgrades and system rehabilitation (e.g. replacing distribution piping and mains) are considered. Typically, the condition of the system is assessed on an ongoing basis for the scheduling of upgrades and rehabilitation. Consideration is also given to potential and projected residential, commercial and industrial growth and demand.

Hydrants & Flushing Program – Hydrants are flushed as least once annually. Areas known to have older mains are directionally flushed to achieve optimal results.

Valve Exercising Program - A valve exercising program is being completed on a three-year rotational basis at minimum; valve exercising ensures proper operation of valves during emergencies.

P10 "Infrastructure Monitoring"
W06 "Well Inspection & Maintenance"

16.0 | Sampling and Monitoring – DWQMS Element 16

Procedures have been established to describe the sampling and monitoring activities for process control and finished drinking water quality in accordance with Element 16 of the DWQMS, and of the applicable Ontario Regulations.

All monitoring and sampling activities are conducted by trained and certified operators, and where required the testing of samples for bacteriological and microbial content is completed by certified laboratories. The procedures describe how sampling and monitoring results are recorded and shared between LUSI and the Owner where applicable.
P12 "Sampling"
P13 "Monitoring"

Adverse Water Quality

Reporting of adverse water Quality is in compliance with the Safe Drinking Water Act, 2002, 18. (1), 1. (2), (3). Procedures for reporting and correcting adverse water quality results have been developed and implemented.
P23 "AWQI Reporting"

17.0 | Measuring & Recording Equipment Calibration & Maintenance - Element 17

All calibration activities, per the manufacturer's recommendations, are conducted by qualified personnel. In some cases (e.g. selected Flow meters and transmitters) calibrations are conducted by an outside source with the result being traceable to a recognized National or International Standard.

A procedure has been developed and implemented for the calibration and maintenance of all measurement and recording equipment used in the Colborne Water System.

Records and certificates (where required) of calibration are maintained by LUSI.
P14 "Calibration"
D15"Process Equipment Calibration"

18.0 | Emergency Management – Element 18

To prepare for emergency situations that could result in the loss of LUSIs' ability to maintain the supply of safe drinking water to consumers, LUSI has established, implemented and maintained an Emergency Plan, a list of Emergency Contacts and contingency procedures to maintain a state of emergency preparedness in

accordance with Element 18 of the DWQMS. The Township of Cramahe has also established an Emergency Management Plan.
P15 "Emergency Management"

Emergency Plan

The Emergency Plan is evaluated for suitability and applicability on an annual basis, or when there are changes to the organizations requirements or related emergency response regulations or techniques/technologies.
D16 "Emergency Plan"

Emergency Contacts

The list of "Emergency Contacts" for responding to emergencies is updated as required and reviewed annually.
D17 "Emergency Contact List"

Contingency Plans

In addition to the above, specific emergency situations that could arise at the Colborne Water System have been identified and Emergency Response Procedures (ERP) are in place to prepare and respond to emergencies such as weather, water quality, power failure, malfunctions, leaks/spills and terrorism/vandalism.
ERP -Emergency Response Procedures

19.0 | Internal Audits – Element 19

In accordance with Element 19 of the DWQMS, LUSI has documented a procedure for conducting internal audits of the QMS, and to verify conformity that the organization continues to conform to the requirements of the DWQMS.
P16 "Internal Audits"

An annual internal audit is conducted annually. Audits are conducted by trained Internal Auditors.
D21 "Qualified Internal Auditors"
D18 "QMS Schedule"

Corrective action procedures have been established to address any non-conformances resulting from customer complaints and internal or third party audits of the DWQMS and for any reports of Adverse Water Quality
P17 "Corrective Action Procedure"
FR201 "Water Quality Complaint Form"

20.0 | Management Review – Element 20

A Management Review Procedure has been established, implemented and maintained that evaluates the continuing suitability, adequacy and effectiveness of the Quality Management System in accordance with element 20 of the DWQMS.

P18 "Management Review"

Management Reviews must be completed annually.

D18 "QMS Schedule"

Annual Management Reviews include topics such as compliance, consumer, performance, audit information, etc. and any actions that may be initiated as a result of Management Review are supported by the Corrective Action, Preventive Action and Continual Improvement Procedures.

Top Management of the Water Department are responsible for undertaking Management Reviews, identifying any deficiencies and reporting the results to the owner.
W03 "Water Quality Complaints"

21.0 | Continual Improvement – Element 21

A Continual Improvement Procedure has been established, implemented and maintained in accordance with Element 21 of the DWQMS, to continuously improve the effectiveness of the QMS through the use of corrective actions.
P19 "Continual Improvement"

Continual Improvement, for the purposes of this Operational Plan and the DWQMS is defined as… *The methods and processes employed by the organization (LUSI) to improve the effectiveness of the Quality Management System.*

At a minimum, LUSI shall improve the effectiveness of the QMS through the application of knowledge gained from the risk assessment, owner and end user input, audit results, analysis of data, preventive and corrective actions and management reviews.

The Continual Improvement Procedure identifies several methods that may be employed by LUSI personnel to provide improvements to drinking water quality (within the scope of existing regulations), or drinking water operational processes and QMS processes.

DWQMS Definitions

Audit - a systematic and documented verification process that involves objectively obtaining and evaluating evidence to determine whether an operating authority's activities conform to the requirements of this Standard, including the assessment of an operating authority's implementation of a quality management system.

Auditee - Individual or group of individuals performing or owning the activities and/or requirements being audited.

CAR – Corrective Action Request

Compliance – fulfillment of a specified regulatory or other legal requirement. i.e.: "LUSI drinking water operations "comply" with all applicable Ontario Ministry of Environment Regulations".

Conformance – fulfillment of a specified non-regulatory/non-legal requirement. i.e.: "LUSI Drinking Water Quality Management System (DWQMS) "conforms" to the requirements of the ISO 9001:2000 Standard and the DWQMS Standard".

Consumer - drinking water end-users.

Continual improvement – a recurring process of enhancing the DWQMS in order to achieve improvements in overall performance consistent with the LUSI Quality policy.

Corrective action – action taken to eliminate the cause of detected non-conformance.

Critical control point (CCP) - a step or point in the drinking water system at which control can be applied by the operating authority and is essential to prevent or eliminate a drinking water health hazard or reduce it to an acceptable level.

Critical limit - the criterion that separates acceptability from unacceptability of an identified operational parameter of a CCP.

DCR – Document Change Request

Document - information and its supporting medium (e.g., procedure, specification, drawing, report, record, form).

Drinking water quality management standard (the Standard) - this Standard and the collective requirements for a quality management system listed therein.

Drinking water system - a system of System, excluding plumbing, that is established for the purpose of providing consumers of the system with drinking water and that includes:

a) any thing used for the collection, transport, production, treatment, storage, supply or distribution of water,

b) any thing related to the management of residue from the treatment process or the management of the discharge of a substance into the natural environment from the treatment system, and

c) a well or intake that serves as the source or entry point of raw water supply for the system. (Ontario Safe Drinking Water Act, 2002, S.O. 2002, c. 32)

Drinking water System (the "System") - a component of a connected municipal treatment or distribution System as defined by an associated Drinking Water
System Permit, under the Safe Drinking Water Act and as operated by an operating authority

DWQMS – Drinking Water Quality Management Standard

Internal Audit – an assessment of the effectiveness of the DWQMS by LUSI employees who do not perform the tasks/processes being audited

MOECC or MOE – The Ministry of the Environment and Climate Change or any other regulatory body governing drinking water in the province of Ontario.

Municipal drinking water system - a drinking water system or part of a drinking water system:

a) that is owned by a municipality or by a municipal service board established under section 195 of the Municipal Act, 2001,

b) that is owned by a corporation established under section 203 of the Municipal Act, 2001,

c) from which a municipality obtains or will obtain water under the terms of a contract between the municipality and the owner of the system, or

d) that is in a prescribed class.

(Ontario Safe Drinking Water Act, 2002, S.O. 2002, c. 32)

Non-conformance (nonconformity) – non-fulfillment of, or failure to meet a specified requirement

Organization – a company, corporation, firm, enterprise, authority or institution, or part of combination thereof, whether incorporated or not, public or private, that has its own functions and administration.

Operator – means a person who conducts operational checks of or who adjusts, tests or evaluates a process that controls the effectiveness or efficiency of a subsystem and who meets the requirements of O. Reg. 128/04.

Operating authority - a person or entity that is given responsibility by the owner of a drinking water System for operating the System, regardless of its structure, or affiliation to the owner.

Operational Plan (the Plan) - the documentation of an operating authority's quality management system, relevant to operating a subject System

Owner – Municipal Drinking Water Licence Holder

Procedure – specified way to carry out an activity or process. Identifies who does what and when. Typically, cross-functional

Public - consumers and other stakeholders of the drinking water system.

Quality Management System (QMS) - a system of management controls and information flows intended to achieve the quality conditions, as required in this document.

Record - document stating results achieved or providing evidence of activities performed.

Soft Copy – an electronic version of a DWQMS document

SOP – Standard Operating Procedure, see Work Instruction below.

Supplier – an organization or person that supplies a product, including water, or a service to the operating authority

Top management - the person or group of persons who directs and controls the Operating Authority

Work instruction – specified way to carry out an individual task related to an activity or process (procedure). Defines how a specific task is carried out. Not cross-functional.

WTP – Water Treatment Plant

DWQMS CROSS REFERENCE

DWQMS Element	Document Procedure Work Instruction
1. Quality Management System (QMS)	D01 Operational Plan D02 Master List of Documents
2. Quality Management System Policy	D03 LUSI Quality Policy
3. Commitment and Endorsement	D04 Commitment to Quality D05 Endorsement
4. QMS Representative	D06 Appointment of Mgt. Rep.
5. Document and Records Control	P01 Document Control P02 Records Control
6. Drinking-Water System	D07a) Municipal Licence D07b) Drinking Water Works Permit D08 Permit to Take Water D09 Process Flow Chart D19 Distribution Schematic D20 Certificate of Classification
7. Risk Assessment	P03 Risk Assessment
8. Risk Assessment Outcomes	D10 Risk Assessment Analysis P04 Critical Control Points CRP01 Primary Disinfection CRP02 System Pressure P21 Pesticides
9. Organisational Structure, Roles, Responsibilities and Authorities	D11 Organizational Chart D12 Roles, Responsibilities & Authorities P20 Overall Responsible Operator
10. Competencies	P05 Competencies & Training
11. Personnel Coverage	P06 Personnel Coverage P20 Overall Responsible Operator
12. Communications	P07 Communication

DWQMS Element	Document Procedure Work Instruction
13. Essential Supplies & Services	D24 Essential Supplies & Services W01 Chemical Receiving
14. Review & Provision of Infrastructure	P09 Review & Provision of Infrastructure
15. Infrastructure Maintenance, Rehabilitation and Renewal	P10 Infrastructure Monitoring W06 Well Inspection & Maintenance
16. Sampling, Testing & Monitoring	P12 Sampling P13 Monitoring P23 AWQI Reporting W03 Water Quality Complaints W05 Chlorine Contact Time
17. Measurement and Recording Equipment Calibration and Maintenance	D15 Process Equipment Calibration P14 Calibration W04 SCADA W05 Chlorine Contact Time
18. Emergency Management	D16 Emergency Plan D17 Emergency Contacts P15 Emergency Management ERP01 Weather Hazards ERP02 Source Water Contamination ERP03 Treated Water Contamination ERP04 Prolonged Power Failures ERP05 Treated Process Malfunction ERP06 Distribution System Malfunction ERP07 Chemical Leaks / Spills ERP10 Terrorism / Vandalism ERP11 Well Inspection Risk
19. Internal Audits	D18 QMS Schedule D21 Qualified Internal Auditors P16 Internal Audit P17 Corrective Action
20. Management Review	P18 Management Review
21. Continual Improvement	P19 Continual Improvement

Operational Plan Attachments

Attachment "C"

DWQMS Cross Reference

Subject System Description Form			
Municipal Residential Drinking Water			
Owner of Municipal Residential Drinking Water System:		The Corporation of The Township of Cramahe	
Name of Municipal Drinking Water System:		Colborne Drinking Water System	
Subject Systems			
	Name of Operational Subsystems	**Name of Operating Authority**	**DWS Number(s)**
☒ 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.		Lakefront Utility Services Inc.	220000790
Operational Subsystem 1:			
Operational Subsystem 2:			
Operational Subsystem 3:			
Operational Subsystem 4:			
Add attachments if there are additional "Operational Systems"			
Contact Information			
Name	**Title**	**Phone Number**	**Email Address**
Primary: Larry Spyrka	Manager of Water Systems	905-372-2193 x 5238	lspyrka@lusi.on.ca
Alternate: Sarah Whitton	Compliance Coordinator	905-372-2193 x 5228	swhitton@lusi.on.ca