



Cobourg 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 Town of Cobourg



Table of Contents

Introduction

[Purpose](#)

[Scope](#)

[References](#)

[Definitions](#)

[Reading This Document](#)

Elemental Content

1. [Quality Management System](#)
2. [Quality Management System Policy](#)
3. [Commitment and Endorsement](#)
4. [Quality Management System Representative](#)
5. [Document and Records Control](#)
6. [Drinking-Water System](#)
7. [Risk Assessment](#)
8. [Risk Assessment Outcomes](#)
9. [Organizational Structure, Roles, Responsibilities and Authorities](#)
10. [Competencies](#)
11. [Personnel Coverage](#)
12. [Communications](#)
13. [Essential Supplies and Services](#)
14. [Review & Provision of Infrastructure](#)
15. [Infrastructure Maintenance, Rehabilitation & Renewal](#)
16. [Sampling and Monitoring](#)
17. [Measurement & Recording Equipment Calibration & Maintenance](#)
18. [Emergency Management](#)
19. [Internal Audits](#)
20. [Management Review](#)
21. [Continual Improvement](#)

Attachments

[“A” – DWQMS Definitions](#)

[“B” - DWQMS Requirement to LUSI Document Cross-Reference](#)

[“C” – Directors Directions Schedule C](#)



INTRODUCTION TO THE OPERATIONAL PLAN

Purpose

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

Scope

The Cobourg 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 Town of Cobourg (owner) by the Lakefront Utility Services Inc. (Operating Authority).

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 – Safe Drinking Water Act
O.Reg 170/03

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.

[**Attachment 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.

[**D06 - "Master List of Documents"**](#)

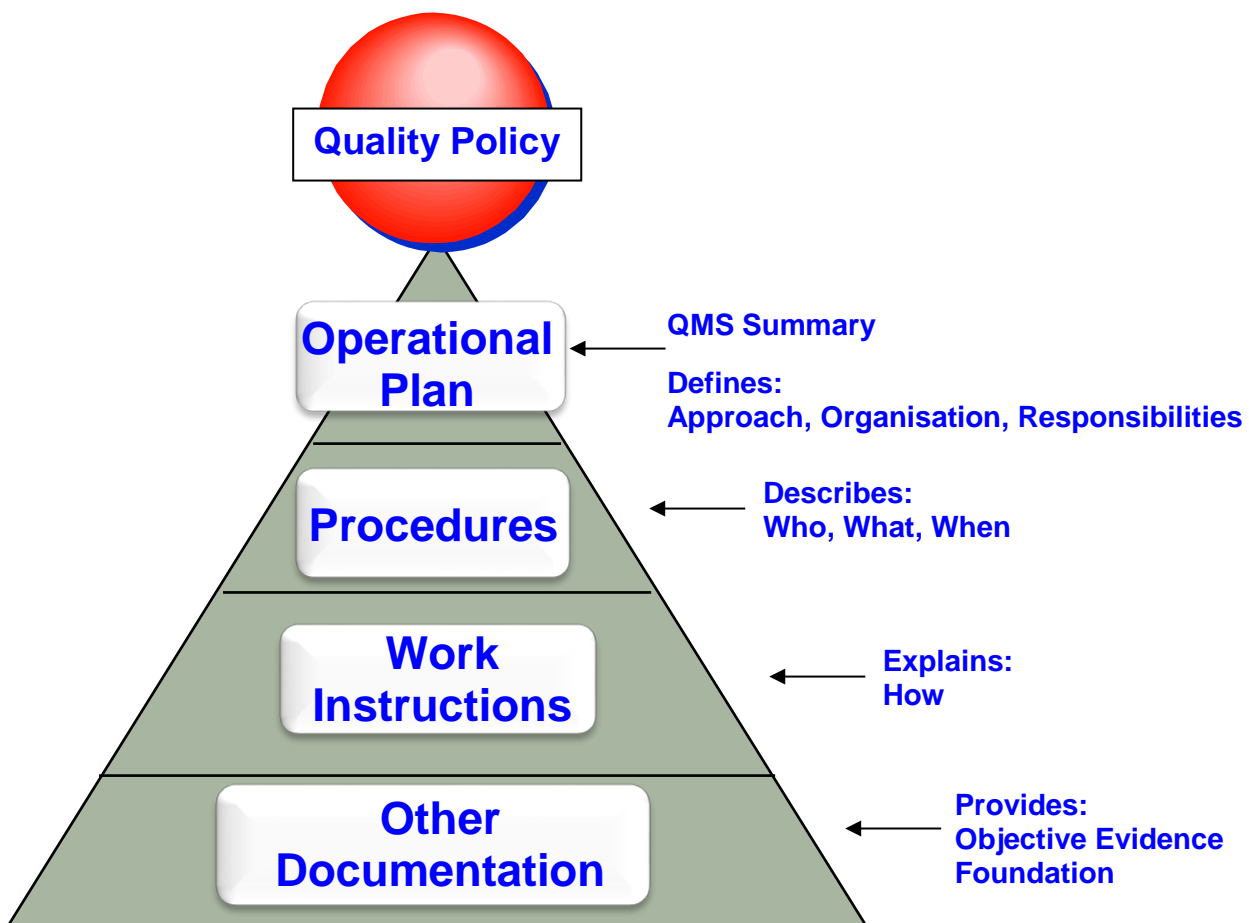


1.0 | Quality Management System – DWQMS Element 1

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 Cobourg Water System Operational Plan and related documents outline the processes and procedures for the QMS.

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. A cross-reference between the DWQMS and its conforming documents is attached.

Attachment B “DWQMS Cross-Reference”



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 (Town of Cobourg) prior to issue.

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

D06 “Master List of Documents”

Regulatory Requirements

LUSI has developed and implemented a procedure to address the reporting of regulatory requirements. This procedure does not address the compliance aspects of the Ontario Regulations covering Safe Drinking Water. 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.

W01 “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 Cobourg Water System.

This QMS Policy is applicable to Top Management of Lakefront Utility Services Inc. and all employees of the Water Department.

The QMS Policy shall be displayed in applicable LUSI operated facilities and on the LUSI website.

D02 “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.

D01 “Commitment to Quality”

Endorsement

A written endorsement provides assurance that the Top Management and Owner support and approve the contents of the Cobourg Operational Plan and its’ referenced documents.

D01 (a) “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

D03 “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. 137-101

The current Municipal Drinking Water Licence for the Cobourg Drinking Water System was issued by the Province of Ontario on June 23, 2016. Licence Expiry Date: June 22, 2021.

D04 (a) “Municipal Drinking Water Licence”

Drinking Water Works Permit No. 137-201

The current Drinking Water Works Permit for the Cobourg Drinking Water System was issued by the Province of Ontario on June 23, 2016.

D04 (b) “Drinking Water Works Permit”

Permit to Take Water No. 6423-8X8HF2

The quantity of water allowed to be taken is governed by **Permit to Take Water Permit**, issued August 30, 2012 and valid to October 28, 2022. Under the terms of the permit, water taken from Lake Ontario may not exceed 31,177 litres per minute or 31,822,000 litres per day.

D14 “Permit to Take Water”



| Summary of Water Consumption for 2013 to 2016 | | | | | |
|---|-----------------------|-----------------------|--|------------------------|--------------------------|
| Year | Average Daily Flow | Maximum Daily Flow | % of Max. Allowable (31,822 m ³) | Monthly Average | Yearly Total |
| 2013 | 8,681 m ³ | 15,339 m ³ | 39 % | 264,818 m ³ | 3,177,811 m ³ |
| 2014 | 9,157 m ³ | 11,842 m ³ | 37% | 278,580 m ³ | 3,342,957 m ³ |
| 2015 | 9,390 m ³ | 14,039 m ³ | 44 % | 285,772.28 | 3,429,267 m ³ |
| 2016 | 10,089 m ³ | 13,406 m ³ | 42 % | 307,810 | 3,693,725 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 Water Treatment Plant is located at 6 D’arcy Street on the shoreline of Lake Ontario in the Town of Cobourg. The original Treatment Plant was constructed in the late 1800’s with the most recent facilities constructed in the 2000’s. The Clarifier was constructed in 1954, the reservoir in 1969, the filter building in 1972, the pump house in 1988, and the contact chamber in 2005. This was followed by several cosmetic upgrades in recent years. The filter system underwent a structural upgrade in 2016.

The present Water Treatment System consists of an intake, up-flow clarifier, filters, contact chamber, reservoir and chlorination. The Distribution Network consists of a Booster Station and two Water Storage Towers.

The system supplies approximately 6,000 residential homes and businesses with treated water to a population of 20,000 persons within the town of Cobourg.

The Cobourg Water System is a Class III (3) Treatment and Distribution Subsystem operated by the MOECC Certified Water Treatment / 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.

D18 “Certificate of Classification”

[See Section 10.0 “Competencies”](#)

To support the operations, LUSI 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 and characteristics of the water at the treatment plant, booster station and two water towers so that operators can assure continuing water quality for customers and respond to system alarms during off-hours. A significant upgrade of the SCADA system occurred in 2013 / 2014.

[See Section 11.0 “Personnel Coverage”](#)



Hamilton Township

The Town of Cobourg's water distribution system also provides drinking water to 114 residential customers in Hamilton Township. This is the result of an expansion to the distribution system in 1955 by the then Cobourg Public Utilities.

LUSI is the Operating Authority for this particular distribution system in Hamilton Township. The terms of the relationship, including roles, responsibilities and authorities, between LUSI and Hamilton Township are defined in a written agreement between both parties. This section of Hamilton Township is not served by, nor are there any connections to, the Hamilton Township Waterworks.

Introduction to Stages of the Water System

Raw Water Intake

Raw water is drawn from Lake Ontario and is delivered for processing through a single intake (1050 mm diameter reinforced concrete pipe) located 854 M from the shoreline of Lake Ontario. A marker buoy and protective crib are located at the beginning of the intake pipe. The raw water is fed from Lake Ontario and drawn through coarse and fine screens to remove debris.

There is a chlorine diffuser located near the opening of the intake fed by a 50 mm diameter chlorine solution supply line inside the raw water intake pipe used for zebra mussel control when raw water temperature is above 12°C. Another chlorine diffuser is located in the low-lift well to provide chlorination when the raw water temperature is below 12°C. After passing through the screens to the low-lift well, the water is then pumped to the clarifier by any of four low-lift pumps – two variable speed and two constant speed units.

Flocculation/Coagulation/Sedimentation

Liquid alum and polymer is injected into the raw water as it is pumped through the low-lift header to an up-flow clarifier. Waste materials/particulates precipitate. The resulting sludge is flushed from the clarifier and dispersed into the sanitary sewer to waste tanks where is sent to the lagoon or sent to the sanitary sewer. The clarified water is gravity fed to the filters.

Filtration

LUSI employs two dual-media gravity filters. The filters consist of a top layer of GAC (600mm thick), and a bottom layer of silica sand (150mm thick). Each filter is rated at 18,184 m³/Day (210 Litres/Sec or 4,000,000 Gals/Day). Losses of head, time, and/or turbidity dictate when the operator initiates backwashing of the filters. Filtration flow is monitored by SCADA. The filter media is routinely tested for adsorption capacity and effectiveness and is replaced as necessary. All filter media was replaced in 2016.

Disinfection / Contact Time

Chlorine is added between the backwash well and the contact chamber. Chlorine rate of flow and residual are both monitored to ensure that minimum CT is achieved. The contact chamber consists of two cells. Normal operating storage volume is 1378m³.

W20 "Contact Time"

FR435 "Contact Time Calculations"



Contact Chamber

The contact chamber was commissioned in the fall of 2004. The chlorinated water flows from the contact chamber to an underground two-cell reservoir (2282 m³/cell) before the finished water enters the high-lift well. If required, chlorine is added as the water enters the high-lift well.

Finished water is moved into the distribution system with high-lift pumps. There are two variable speed and two constant speed units, rated for and matched to the requirements of the plant and the distribution system.

All process activities are monitored using SCADA. Various alarms are in place to indicate trends that may result in out-of-spec and/or out-of-control conditions. Please see the procedure for monitoring for details.

Distribution Network

The distribution network consists of two zones that include 126 km of distribution water mains and 6,350 residential and non-residential connections. Zone 1 includes a storage tower, mains and hydrants. Zone 2 includes a booster station, storage tower, mains and hydrants. The zones are separated by a series of PRV's.

The operating pressures of the distribution system are monitored by SCADA at the high lift pumps, the booster station and at the Zone #2 storage tower. Low pressure alarm limits have been programmed into SCADA to alert the plant operator(s) of any pressure drops. The low pressure alarm limits are well above the critical limits for system pressure in order to provide the operator(s) sufficient time to investigate the cause of the alarm and to take action as appropriate. Normal system pressures may range from 470Kpa to 630Kpa, depending upon location.

Booster Station

There is one booster station located on the south side of Ewart Street, just east of Division. The booster station contains three electric centrifugal pumps (each rated at 6,566 Cubic Metres/Day) and a diesel generator. Chlorine residual of water passing through the booster station is reported by SCADA and monitored by plant operators. Pumps and pressures are reported by SCADA. A Pressure Reducing Valve, located at the Booster Station, links the Zone 2 distribution network to the Zone 1 distribution network. If the downstream Zone 1 pressure falls below 40 psi, the PRV automatically opens and supplies Zone 1 with water from Zone 2. WTP personnel conduct operation and security checks at the booster station on a daily basis, except for weekends and statutory holidays.

Storage

There are two storage towers in the distribution system. WTP personnel conduct operation and security checks at each tower on a daily basis, except for weekends and statutory holidays. Certain aspects of the storage towers are monitored by plant personnel through the SCADA system.

Tower 1

Tower 1 is located at 665 Victoria Street in Cobourg. Built in 1985, Tower 1 is a composite steel/concrete structure. Tower capacity is 1751 m³. Water level and chlorine residual are constantly monitored by SCADA. There is an on-line pump to add sodium hypochlorite that can be controlled manually on site by plant operators, as required.



Tower 2

Tower 2 is located at 60 Strathy Road in Cobourg. Built in 2000, Tower 2 is a composite concrete/steel structure. Tower capacity is 3734 m³. Water level, pressure and chlorine residual are monitored by SCADA. There is an on-line pump to add sodium hypochlorite that can be controlled remotely from the treatment plant by plant operators, as required. The storage area contains a re-circulating pump to assist in the maintenance of chlorine residual.

Mains and Hydrants

There are approximately 126 km of mains, or underground piping, that carry treated water to the consumer. A variety of materials have been used over the years: PVC, ductile iron, cast iron, asbestos-cement, concrete and galvanized steel. There are approximately 971 valves and 720 hydrants located throughout the system.

Mains and other underground portions of the infrastructure are upgraded or replaced based on an annual capital works program and in conjunction with the Town of Cobourg annual works plans. There are valve exercising and hydrant flushing programs in place and are a part of the distribution operations maintenance responsibilities.

Owner - Town of Cobourg

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

Operating Authority - Lakefront Utility Services Inc

Incorporated in 2000, Lakefront Utility Services Inc. (LUSI) is the contracted operator (Operating Authority) of the Town of Cobourg's (Owner) water treatment plant and distribution network. The LUSI President, Vice-President of Operations, and Manager of Water Systems are designated as top management. LUSI and its Board of Directors are responsible, and have the authority for the operation and maintenance of the drinking-water system and the DWQMS.

LUSI Top Management and representatives from the Town of Cobourg meet on a regular basis (Water Committee meetings) to report upon overall performance, production capability / capacity, data relating to the expansion of the system, and a listing of infrastructure projects to be undertaken relevant to the waterworks.

The roles, responsibilities and authorities of both Lakefront Utility Services Inc. and The Corporation of the Town of Cobourg for the operation and maintenance of the waterworks 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. The agreement commenced December 1, 2000 for a term of three years and is automatically renewed for consecutive 3-year terms until either party terminates the agreement under the terms of the agreement.

As the Owner, the Town of Cobourg is responsible for monitoring all operational aspects of the works to ensure the provision of safe drinking water, and sufficient water for other uses such as fire suppression, commercial and industrial applications.



Process Flow Schematic

A Process Schematic of the Cobourg Water System is included for reference to depict the treatment infrastructure used for the production of safe drinking water.

D13 – “Process Flow Schematic”

Water Source

| DATA | Temperature (°C) | | | Turbidity (NTU) | | | pH | | |
|---------|------------------|------|------|-----------------|------|------|------|------|------|
| Year | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 |
| Maximum | 22.8 | 23.3 | 21.1 | 15.3 | 28.0 | 18.6 | 8.67 | 8.44 | 8.60 |
| Average | 7.98 | 8.7 | 8.2 | 1.79 | 1.69 | 1.84 | 8.14 | 7.98 | 8.13 |
| Minimum | 0.20 | 0.6 | 0.6 | 0.23 | 0.17 | 0.26 | 7.53 | 7.32 | 7.60 |

Data compiled from physical “grab samples” at sample pump – inlet well. Complete continuous data available from Operational & SCADA reports.

Event Driven Fluctuations

Lakefront Utility Services Inc. draws water for processing from Lake Ontario. Typically, the water source is relatively consistent throughout the year. Temperature and turbidity vary at the mouth of the intake, while mineral content and pH have proven to be stable due primarily to the size, depth and volume of raw water that moves through the lake.

Operational Challenges / Threats

There is the potential for some impact to the supply due to zebra mussel infestation of the Great Lakes, however LUSI has mitigated if not altogether eliminated that impact by installing a chlorine diffuser at the intake crib. The chlorine solution supply line feeding the diffuser was replaced in 2013.

As Lake Ontario supports several commercial ports and industrial operations there is also the potential of negative impact to the raw water supply from the unplanned release of effluence, chemicals, compounds or fuels from vessel traffic and factories. This potential impact is minimal due to the location of the shipping lanes, the location of the factories and the overall volume of water in Lake Ontario.

Other potential risks to the water supply may include agricultural run-off, spillage/leakage/run-off associated with vehicular traffic on the Hwy 401 corridor and the CN/CP rail lines.

The main challenge to the operations is the seasonal turnover of lake water. This turn over may adversely affect turbidity. However risk resulting from this phenomenon is mitigated with both raw water temperature and turbidity monitoring, jar tests and adjustments to the clarification process when required.



7.0 | Risk Assessment - DWQMS Element 7

A “Water Supply System Risk and Criticality Assessment” was completed in August 2005 when LUSI engaged the services of R.V. Anderson to determine what hazards and associated risks could have the potential to impact water works operations and adversely affect drinking water Quality.

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

P24 “Risk Analysis”

W17 “Risk Assessment Review”

D05 “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 waterworks 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, 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.

W08 “Control Point Limits”

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. | Coagulant Dosing - Alum | N/A | Flow Alarms Pulse Alarms Pressure Alarms |
| 2. | Post-Filtration Turbidity | 0.3 NTU Filter Shutdown | N/A |
| 3. | Primary Disinfection | Contact Chambers | 1.0 mg/l Cl2 FR |
| 4. | a) Tower #1 | 2.5 mg/l Cl2 FR | 0.50 mg/l Cl2 FR |
| | b) Tower #2 | | 0.75 mg/l Cl2 FR |
| | c) Booster Station | | |
| 5. | a) Tower #1 | 4.75 m | 2.0 m |
| | b) Tower #2 | 525 kpa | 440 kpa |
| | c) Booster Discharge | 650 kpa | 400 kpa |
| | d) Booster Suction | 500 kpa | 225 kpa |

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 "Coagulant Dosing - Alum" | ✓ CRP 04 "Secondary Disinfection" |
| ✓ CRP 02 "Post Filtration Turbidity" | ✓ CRP 05 "System Pressure" |
| ✓ CRP 03 "Primary Disinfection" | |

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 or weekly charts.

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

Organizational Structure

The organizational structure of the Operating Authority (LUSI), to which this operational plan applies, who oversee the day-to-day operations of the Cobourg Water System are illustrated in an Organizational Chart. [D08 "DWQMS Organizational Chart"](#)

Roles

Town of Cobourg – Owner
Lakefront Utility Services Inc. – Operating Authority
Manager of Water Services – DWQMS Representative
Compliance Coordinator – DWQMS Coordinator



Top Management

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

Management Review

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

P06 “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.

D07 “Responsibilities & Authorities”

10.0 | Competencies – DWQMS Element 10

Competencies

LUSI has developed a list of Competencies 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 Cobourg Water System.

D07 “Responsibilities & Authorities”

Certification – Treatment Operators

All water treatment plant operators shall, at a minimum, attain and maintain a Class III certification as per the requirements of Ontario Regulations 128/04.



Certification – Distribution & Supply Operators

All water distribution and supply operators shall, at a minimum, attain and maintain a Class II certification 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.

P30 “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 meet and maintain competencies and to ensure that personnel meet or exceed minimum training requirements for maintaining operator certification in accordance with O. Reg. 128/04.

Operators are responsible for maintaining their certification by meeting the required training hours as set out in O. Reg. 128/04.

P03 “Operator Training”

Records

A record of operator training and copies of certificates are maintained by the Manager of Water Services. 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

The Operating Authority has developed and implemented a procedure to ensure that sufficient personnel meeting identified competencies are available for duties that directly affect drinking water quality.

P16 “Personnel Coverage”

Coverage is governed by Ontario Regulation and the contract between the unionized employees and the employer. The water treatment plant and distribution department are staffed during working hours Monday to Friday.

There is an assigned on-call operator for both the water treatment plant and the distribution system during off-hours. The on-call water treatment plant operator shall conduct a physical verification of conditions at the plant 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 shall be from quitting time on Friday to start time the following Friday. The Supervisor of Water Systems will establish and maintain the respective on-call schedules.

At all other times the water treatment plant is monitored by the SCADA system. The SCADA system has an auto-dialler that has been programmed to contact LUSI personnel through an answering service whenever conditions warrant.

Daily checks are performed by water treatment operators during regular working hours at the booster station and water towers. The time of the visits and the details of any related action taken are recorded in the on-site daily logs.



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) Town of Cobourg
- b) Operating Authority Personnel
- c) Suppliers
- d) General Public

The procedure makes reference to Water Committee meetings between LUSI and the Town of Cobourg, 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.

P12 “Communication”

13.0 | Essential Supplies and Services – DWQMS Element 13

A list 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.

P14 “Essential Supplies & Services”

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.

P13 “Infrastructure Monitoring”

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 and inspected at least once annually. Areas known to have older mains are directionally flushed to achieve optimal results. All hydrants have been flow tested and colour coded based on fire flows as per NFPA



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

P13 “Infrastructure Monitoring”

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.

P18 “Sampling”

P19 “Monitoring”

W03 “Master Sampling List”

W04 “SCADA Monitoring List”

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”

FR316 “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.

Records and certificates (where required) of calibration are maintained by LUSI.

P11 “Calibration”

18.0 | Emergency Management – Element 18

To prepare for emergency situations that could result in the loss of the Operating Authority’s 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 Emergency Plan meets the requirements of, and is in co-ordination with municipal emergency planning measures of the Town of Cobourg.

P20 “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.

D12 “Cobourg DWS Emergency Plan”

Emergency Contacts

The list of “Emergency Contacts” for responding to emergencies is updated as required and reviewed annually.

D20 “Emergency Contact List”

Contingency Plans

In addition to the above, specific emergency situations that could arise at the Cobourg 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”

Hard copies of the Emergency Plan, list of Emergency Contacts, and ERP’s are maintained in the following locations:

- Water Treatment Plant Control Room
- Supervisors OF Water Systems’ Office
- DWQMS Coordinators’ Office

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.

P09 “Internal Audits”

An internal audit must be conducted annually. Audits are conducted by trained Internal Auditors.

D21 “Qualified Internal Auditors”

D22 “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.

P07 “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.

P06 “Management Review”

A Management Review must be completed annually.

D22 “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.

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.

P22 “Continual Improvement”

Continual Improvement, for the purposes of this Operational Plan and the DWQMS is defined as...
The methods and processes employed by the organisation (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.

Change History

| Rev. Level | Date | Change(s) | By |
|------------|-------------------------|---|--------------|
| Drafts | 25/July/05 to 18/Feb/07 | Several successive draft versions issued as the system was developed | J. Nowee |
| Revision 1 | 19/Feb/07 | Updated several sections to conform to the released DWQMS. | J. Nowee |
| Revision 2 | 12/Apr/07 | Updated Risk Assessment (Table and commentary –Page 21) | R. MacGibbon |
| Revision 3 | 25/Apr/07 | Updated Calibration (Page 28), Attachments “B”, “J” & “K” | R. MacGibbon |
| Revision 4 | 30/May/07 | Updated format and Table of Contents | J. Nowee |
| Revision 5 | 18/Oct/07 | Updated Personnel Coverage – page 26. | J. Nowee |
| Revision 6 | 19/Dec/07 | Security checks conducted during regular working hours – not daily. (pg 16) | J. Nowee |
| Revision 7 | 24/Jun/08 | Updated to conform with document revisions to Jun/08 | J. Nowee |
| Revision 8 | 02/Apr/09 | Revised SCADA Alarm Limits re W08 | J. Nowee |
| Revision 9 | 16/Nov/09 | Added Disinfection / Contact Time References - W20 & FR 435 | J. Nowee |



| | | | |
|-------------|-----------------|--|---|
| Revision 10 | Jan. 20, 2011 | Top Management defined, revised organizational structure... | J. Nowee |
| Revision 11 | Feb. 28, 2011 | Reviewed, Revised Raw Water Chart Updated Risk Assessment Procedures/Review | J. Nowee |
| Revision 12 | July 20, 2011 | Element 6 – 3 pumps to 2 at Booster and Tower #1 sodium hypo pump from remote to manual operation | J. Nowee |
| Revision 13 | Jan. 03, 2012 | Reviewed, revised, updated as required. Deleted references to ISO, position & titles updated. | J. Nowee |
| Revision 14 | August 21, 2012 | Reviewed, revised, updated as required. Position changes. C of A replaced with Municipal Drinking Water License & Drinking Water Works Permit. | J. Nowee |
| Revision 15 | Jan. 30, 2013 | Document references & revisions as per NSF CAR #J0335885-1 thru 5 | J. Nowee |
| Revision 16 | July 16, 2014 | Annual review – revised & updated as required Chart data updated to 2014 New PTTW | J. Nowee |
| Revision 17 | Dec 22, 2014 | Sec. 7.0 & 8.0 Risk Assessment Revised as per new risk assessment Inserted CCP table with limits | J. Nowee as per 2014 external audit OFI & CAR 14-01-1 |
| Revision 18 | June 30, 2015 | Updated style format, updated titles to reflect current organizational structure, added 2014 data to tables. Added CRP06 to CCP table. | A. Finlay |
| Revision 19 | Sept. 22, 2015 | Updated 2014 pH values in Raw Water General Characteristics table. | AF |
| Revision 20 | Nov. 11, 2015 | Updated hyperlinks. Removed obsolete hyperlink references. | AF |
| Revision 21 | March 21, 2016 | Added Schedule C to documents. Updated operational data. | AF |
| Revision 22 | Oct 28, 2016 | Changed titles in Schedule C | AF |
| Revision 23 | Nov 20, 2017 | Reviewed. Updated MDWL and PTTW info, flow data, Removed CCP 6 from CCP table. Changed timeline of Internal Audit and Management Review to “annually”. | AF |
| Revision 24 | April 13, 2018 | Added valve exercising and hydrant flushing to Section 15 as per NSF CAR. | AF |
| Revision 25 | Jul 23, 2018 | Updated CCP – Primary Disinfection – Contact Chambers – Lower Chlorine limits for larger buffer of CT calculations | SW |
| Revision 26 | Aug 22, 2018 | Updated reference documents throughout plan | SW |
| Revision 27 | Nov 15, 2018 | Updated description of DWS to include polymer | SW |

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 | OP Pg # | Associated LUSI Document(s) |
|----|---|---------|---|
| 1 | Quality Management System | 4 | D22 DWQMS Schedule |
| 2 | QMS Policy | 5 | D02 LUSI Quality Policy |
| 3 | Commitment & Endorsement | 6 | D01 Commitment to Quality |
| 4 | QMS Representative | 6 | D03 Appointment of Management Representative |
| 5 | Document & Records Control | 6 | P01 Document Control P02 Control of Records |
| 6 | Drinking-Water System | 7-13 | D13 Process Flow Schematic D10 Operations Process Map |
| 7 | Risk Assessment | 13 | D09 RV Anderson Risk Analysis D05 Hazard Analysis P24 Risk Analysis |
| 8 | Risk Assessment Outcomes | 15 | W08 Control Point Limits CRP (Critical Response Procedures) |
| 9 | Organisational Structure, Roles, Responsibilities & Authorities | 16 | D07 Responsibilities & Authorities D08 Organizational Chart D23 Standard of Care Policy P30 Overall Responsible Operator |
| 10 | Competencies | 17 | D07 Responsibilities & Authorities P03 Operator Training P30 Overall Responsible Operator |
| 11 | Personnel Coverage | 18 | P16 Coverage |
| 12 | Communications | 19 | P12 Communications |
| 13 | Essential Supplies and Services | 19 | P14 Essential Supplies & Services D24 Essential Supplies and Services List |
| 14 | Review and Provision of Infrastructure | 20 | P13 Maintenance |



| # | DWQMS Element | OP Page # | Associated LUSI Document(s) |
|----|---|-----------|---|
| 15 | Infrastructure Maintenance, Rehabilitation & Renewal | 20 | P13 Maintenance W09 Maintenance List W15 Equipment Manuals |
| 16 | Sampling & Monitoring | 20 | P18 Sampling P19 Monitoring W03 Master Sampling List W04 SCADA Monitoring List P23 Adverse Water Quality Reporting P27 Adverse Water Quality Corrective Action |
| 17 | Measurement & Recording Equipment Calibration & Maintenance | 21 | D16 Process Equipment Calibration P11 Calibration |
| 18 | Emergency Management | 21 | D12 Emergency Plan D20 Emergency Contact List P20 Emergency Management P21 Contingency Plan ERP's - Emergency Response Procedures |
| 19 | Internal Audits | 22 | D21 Qualified Internal Auditors P09 Internal Audits P07 Corrective Action |
| 20 | Management Review | 23 | P06 Management Review |
| 21 | Continual Improvement | 23 | P22 Continual Improvement |



Lakefront
Utility
Services
Inc.

DWQMS Document – Cobourg DWS
D11 – Operational Plan
Attachment - C

| Subject System Description Form | | | |
|---|---|--|---------------------|
| Municipal Residential Drinking Water | | | |
| Owner of Municipal Residential Drinking Water System: | | The Corporation of The Town of Cobourg | |
| Name of Municipal Drinking Water System: | | Cobourg Drinking Water System | |
| Subject Systems | | | |
| | Name of Operational Subsystems | Name of Operating Authority | DWS Number(s) |
| <input checked="" type="checkbox"/> | 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. | 220000825 |
| 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 |