

DWQMS

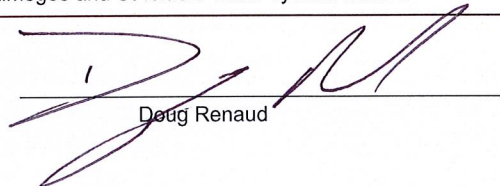
(Drinking Water Quality Management System)

Most recent version

Date: November 03, 2021

Record of issues and revisions						
Element	R	Date	Description	Prepared	Verified	Approved
Table of contents	02	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
1	03	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
2	05	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
3	04	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
4	04	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
5	07	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
6	07	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
7	05	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
8	04	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
9	05	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
10	04	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
11	04	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
12	06	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
13	06	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
14	06	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
15	05	21.11.03	Added reference to the Asset Management plan in the 3.0 RENEWAL/CAPITAL UPGRADES. The Asset make reference to the long term forecast.	J. Leroux	N. Pigeon	D. Renaud
16	05	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
17	09	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
18	06	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
19	05	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
20	06	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
21	07	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

All Elements were revised and updated



Doug Renaud

Date: Nov 3, 2021

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00	3	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	3	18.08.10	Removed table 3.4 – QMS Relationships	J. Leroux	N. Pigeon	D. Renaud
02	3	19.09.20	Removed the word “distribution” in item 1.0	J. Leroux	N. Pigeon	D. Renaud
03	3	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

This page is a record of all emissions and revisions for the concerned document. The elements that have been modified are indicated herein.

1.0 PURPOSE

The Nation Municipality, as the Owner and the Operating Authority of the drinking water systems, is required to attain conformance to the DWQMS (Drinking Water Quality Management Standard) developed by the Ontario Ministry of Environment. This document has been developed to help articulate the process approach to its design.

2.0 SCOPE

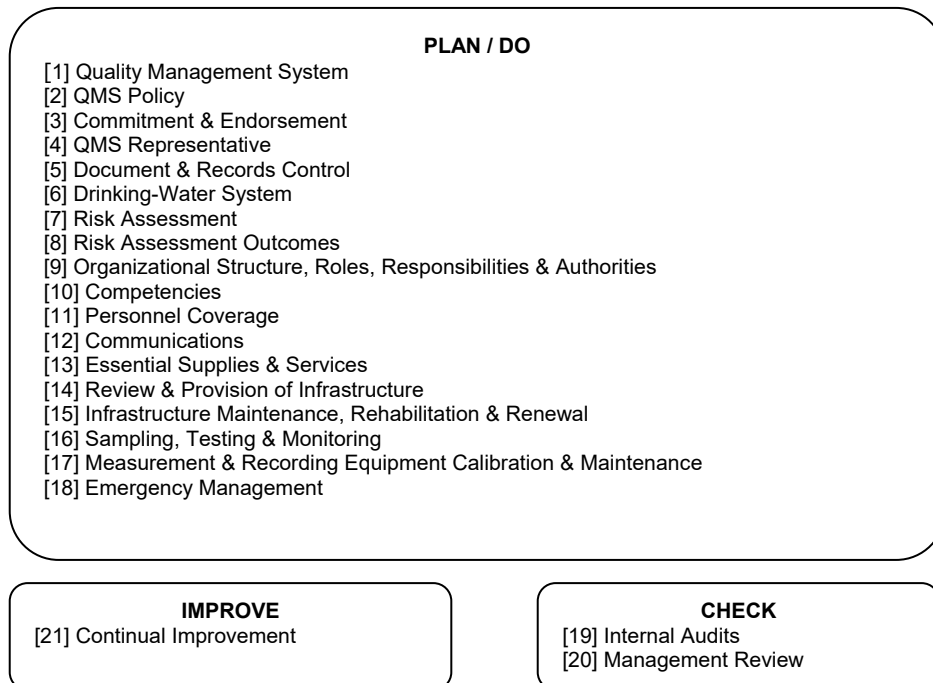
This managed approach to water quality will be applied to the extent outlined and drawn by the quality policies.

3.0 DETAILS OF THE PROCEDURE

3.1 A Managed Approach

The ultimate goal of achieving DWQMS compliance must be fully understood, and activities must strive to meet the requirements of the standard. An organization is a network of interdependent, value-adding processes, and improvement is achieved through understanding and changing these processes to enhance the total system. To facilitate long-term improvements, a mindset of prevention rather than correction must be applied to eliminate the root causes of non-conformance. Decisions are made based upon measured data, internal and external comparisons, and an understanding of the cause and effect mechanisms at work, not simply on the basis of instinct, authority or anecdotal data. A focus on continuous improvement is the cornerstone for breakthrough thinking and innovation. No matter how much improvement has been accomplished, there are always practical and innovative ways of doing even better, and of providing improved water quality to the customer.

3.2 Managed Approach Model



3.3 The Design of a Managed Approach

The successful implementation of the DWQMS does not only depend on meeting the intent of the Standard's 21 elements, but also on the inputs and outputs of those elements and their interdependency. The result is a series of processes that impart efficiency and effectiveness with their interaction.

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1.0 QUALITY MANAGEMENT SYSTEM POLICY 2

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R	Page	Date (yy.mm.dd)	Description	Prepared	Verified	Approved
00	2	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	2	18.08.10	Add Limoges and St-Isidore water system names and changed QMS Rep Function title	J. Leroux	N. Pigeon	D. Renaud
02	2	19.04.18	Changed QMS Rep Function title	J. Leroux	N. Pigeon	D. Renaud
03	2	19.09.20	Added CAO to the Clerk title	J. Leroux	N. Pigeon	D. Renaud
04	2	20.11.11	Updated the dates under the CAO and Director.	J. Leroux	N. Pigeon	D. Renaud
05	2	21.09.20	Added Limoges and St-Isidore water system names.	J. Leroux	N. Pigeon	D. Renaud

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1.0 QUALITY MANAGEMENT SYSTEM POLICY

The Nation Municipality operates and maintains the water supply systems, it includes (Limoges Drinking water system and St-Isidore Distribution system). The Nation Municipality commits to:

- Managing and operating The Nation Municipality Water Supply Systems in a responsible manner in accordance with documented quality management system policies and procedures;
- Continual improvement of the QMS and water works;
- Providing the consumer with clean, safe drinking water;
- Promoting owner and consumer confidence in the safety of the drinking water supply;
- At a minimum, meeting all applicable legislative and other requirements, and encouraging our suppliers and subcontractors to similarly meet these requirements;

The Nation Municipality strives to accomplish its goals through the dedication, support and participation of all employees, and the maintenance and continual improvement of the Quality Management System.

The Nation Municipality – Owner

Name: Josée Brizard

Function: CAO - Clerk

Date: 2020-11-11

The Nation Municipality – Operating Authority

Name: Doug Renaud

Function: QMS Rep, Director of Water and Wastewater

Date: 2020-11-11

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00	2	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	2	18.08.10	Add endorsement through a resolution	J. Leroux	N. Pigeon	D. Renaud
02	2	19.09.20	Added CAO to the Clerk title	J. Leroux	N. Pigeon	D. Renaud
03	2	19.10.22	Add endorsement through a resolution	J. Leroux	N. Pigeon	D. Renaud
04	2	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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COMMITMENT AND ENDORSEMENT

This Operational Plan has been reviewed and approved by Top Management of the Nation Municipality. The following signatures agree to ensure that an effective Quality Management System is in place which meets the requirements of the standard; that the operating authority is aware of all applicable legislative and regulatory requirements; and is communicated according to the procedure for communications. The Operating Authority also agrees to provide the resources needed to maintain and continually improve the Quality Management System.

The Owner endorsement of the Operational Plan is represented by signatures of the Mayor and CAO - Clerk as through a council resolution. A re-endorsement of the operational plan is sought once every 4 years by new councils (within 1 year of new council).

Francois St-Amour
Mayor – The Nation Municipality

Date

Josée Brizard
CAO – Clerk – The Nation Municipality

Date

Doug Renaud (Designated QMS Representative)

Date

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This Operational Plan has been reviewed and approved by Top Management of the Nation Municipality. The following signatures agree to ensure that an effective Quality Management System is in place which meets the requirements of the standard; that the operating authority is aware of all applicable legislative and regulatory requirements; and is communicated according to the procedure for communications. The Operating Authority also agrees to provide the resources needed to maintain and continually improve the Quality Management System.

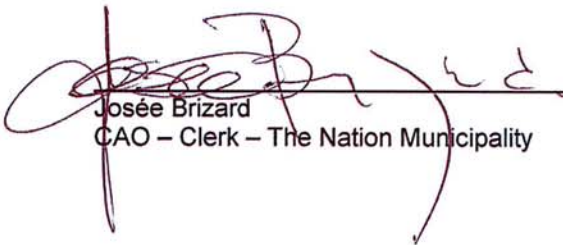
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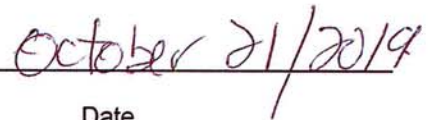
Francois St-Amour
Mayor – The Nation Municipality



Date




Josée Brizard
CAO – Clerk – The Nation Municipality



Date



Doug Renaud (Designated QMS Representative)



Date

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1.0 QUALITY MANAGEMENT SYSTEM REPRESENTATIVE 2

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R	Page	Date (yy.mm.dd)	Description	Prepared	Verified	Approved
00	2	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	2	18.01.26	Changed job title of the QMS representative	J. Leroux	N. Pigeon	D. Renaud
02	2	18.08.10	Changed job title of the backup QMS representative	J. Leroux	N. Pigeon	D. Renaud
03	2	19.04.18	Changed job title of the QMS representative and the person to report the performance of the QMS	J. Leroux	N. Pigeon	D. Renaud
04	2	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1.0 QUALITY MANAGEMENT SYSTEM REPRESENTATIVE

The Director of Water and Wastewater has been designated as the QMS representative. In his absence, the Director of Water and Wastewater has delegated the Senior Water & Wastewater Operator to be the alternate.

The QMS Representative will be responsible for the following:

- Ensure that processes and procedures needed for the QMS are established and maintained;
- Report to Owner Representative (Executive Committee) on the performance of the QMS; and any need for improvement, when necessary, or during the Management Review meetings at a minimum;
- QMS documentation and record control;
- Provision of training to Personnel so that they are aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the subject systems;
- Promote awareness of the QMS throughout the Operating Authority.

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00	5	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	5	18.08.10	Changed the name of the QMS Documents Register and change MOE for MOECC	J. Leroux	N. Pigeon	D. Renaud
02	5	18.09.10	Added 1.6.8. for legibility of records	J. Leroux	N. Pigeon	D. Renaud
03	5	19.04.18	Changed MOECC for MECP	J. Leroux	N. Pigeon	D. Renaud
04	5	20.02.26	Added at 1.1 Purpose, the names of both DWS.	J. Leroux	N. Pigeon	D. Renaud
05	5	20.11.13	Added more description at 1.6.6. for document control.	J. Leroux	N. Pigeon	D. Renaud
06	5	20.12.16	Added more description at 1.6.6. for document control and location.	J. Leroux	N. Pigeon	D. Renaud
07	5	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1. DOCUMENT AND RECORDS CONTROL PROCEDURE

1.1 Purpose

The following procedure describes the methods that ensure control and legibility of all documents affecting the Quality Management System for The Nation Drinking Water Systems (Limoges Drinking water system & St-Isidore Distribution system). The procedure contains details about the creation of new documents; updating of existing documents; reviewing and approving documents; protecting documents; and ensuring their availability for distribution.

1.2 Scope

This procedure is applicable to the following QMS documents:

- Operational Plan
- Quality Policy
- Procedures
- Meeting minutes
- Audit Checklists
- Management Review Records
- Forms related to the drinking water systems

1.3 Responsibility

The responsibility of following this procedure lies with the QMS representative and operators.

- The QMS representative creates, edits, approves and releases QMS documents; and controls obsolete documents.
- The Operators complete and file records related to test results and inspections; and record unscheduled events in the Operator Log Book.

1.4 References

DWQMS Element 5

1.5 Definitions

In accordance with DWQMS Element 5:

Documents include instructions, manuals, maps, plans, forms, communications, photos and results; in paper or electronic form that are relevant to the operation of the drinking water systems. Documents can be internal or external, can be modified, and must be kept current.

Records are proof of activities performed, or results achieved, and refer to events that happened in the past.

1.6 Procedures

1.6.1 Creating New or Updating Existing Document

Any employee of the Operating Authority may request the creation of a new QMS document or a change to an existing one. The request must be submitted to the QMS Representative. The need for new or updated documents may also be identified by audits or management review. The QMS Representative will be assigned the task of creating or revising such documents. The request should include the following information:

A) Reason for new or revised document - must belong in one or more of these categories:

- Required by the DWQMS
- Enhances process control
- Eliminates risk
- Supports regulatory requirements
- May improve operational efficiency

B) Outline of document change or new document content - narrative format is acceptable.

C) The “record of issues and revisions” part has to be filled out anytime a new or revised document is produced. The number 00 is given to the first official issue. Afterward, revision will be given number 01 to 99.

1.6.2 Document approval

Any new or revised document has to be approved by the QMS Representative. Written or electronic (e-mail) approval is accepted. Proof of approval is kept by the QMS representative. Any new or revised document has to be presented to the Municipal Council or its representative, following the annual QMS documents review.

1.6.3 Document Availability

The original location of all QMS documents (procedures, instructions, forms and checklists) is listed in the QMS Documents Register (NA-QMS).

Paper and/or digital format of the Operational Plan are retained at the Limoges Water Treatment Plant and at the owner’s city hall.

1.6.4 Distribution list

A distribution list is required to control where Operational Plan binders are located. Binders are numerically identified. Updated documents are sent once a year to the binders holders, following the annual QMS documents review. If required, a binder can be put out of circulation by its owner upon approval by the QMS Representative. The binder is then sent to the QMS Representative.

1.6.5 Retention of records

Minimum retention times for all MECP required records shall be maintained as per the relevant regulations. The following table summarizes some retention time requirements for large drinking water system.

Record	Retention Time	Legislation
Lab analyses of water samples for microbiological tests	2 years	O.Reg. 170/03
Log books and operator training records	5 years	O.Reg. 128/04
Lab analyses of water samples for organics and inorganics	6 years	O.Reg. 170/03
Annual reports prepared by the owner	6 years	O.Reg. 170/03
Corrective action reports regarding chemical and radiological parameter; pesticides and health related parameters.	6 years	O.Reg. 170/03
Lab analyses of water samples for Sodium and Fluoride	15 years	O.Reg. 170/03

The minimum QMS Documents Retention Period, as determined by the Operating Authority, is 10 years.

1.6.6 Protection and storage of documents and records

Filing and storage of paper records shall be such that they are protected from damage and are readily retrievable. Records from the current year are kept in filing cabinets. All records older than one year are stored in boxes, clearly marked with the dates and types of records contained within. After the regulatory period for retention has passed, these records will be scanned and archived into the Nation server: T, under scanned documents, allowing for the destruction of the original records. The server is backed up every day. Any hard copies are kept in the furnace room at the Water treatment room.

The filing shall be done as per the Filing Instructions available on following table.

Record	Filing Instructions
Lab analyses	Filing is done by year . The lab reports of a year are put in a binder identified for the year it's opened for. Ex.: 2010 binder will contain all reports from January to December 2010.
Log books	Chronological filing system.
Forms related to the drinking water system (ex.: round forms)	Filing is done by month . Files are opened and are identified for the month they're opened for. Ex.: November 2009 file will contain all records dated from November 1 st to November 30 th 2009.
Operator training records	Filing is done by employee . The training proof are sent by the operators at the Operating Authority central office where the training records are filing in the personal human resources file of the employee.
Annual and monthly reports	Filing is done electronically by year .
Corrective action reports	Filing is done by year . The reports of a year are put in a binder.

Record	Filing Instructions
Equipment information (ex.: specifications, calibration report, maintenance invoices copies)	Filing is done by equipment (or group of equipment). Files are opened and are identified for the equipment (or group of equipment) they're opened for.
Services and supplies information (ex.: invoices, MSDS, purchase requests)	Filing is done by service or supply . Files are opened and are identified for the service or supply they're opened for.
Corrective Actions Requests and Non-Conformities	Recorded in the Operating Authority's central CIR (Continual Improvement Report, NA-QMS).
Audit Reports	Filing is done electronically by audit type (external or internal) and by date.

The electronic gross data (from the SCADA) are stored on the internal hard disk of the local computer. This data is backed up each day on an external hard disk.

The other electronic records are stored on the Operating Authority's office central computer, where they are backed up each day.

All hardcopy and electronic records under the QMS are retained.

1.6.7 Sharing of records

Records shall be made available to the public where required by legislation (see O. Reg. 170/03, section 12).

1.6.8 Legibility of records

All Records shall be kept legible. All operational staff will maintain proper handwriting when producing records and will ensure all documents hand written are legible before scanning to save electronically. Refer to SOP 047.

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00	10	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	10	18.08.10	Added a challenge for Limoges DWS and added Raw water info. For the St-Isidore DWS.	J. Leroux	N. Pigeon	D. Renaud
02	10	18.10.15	Added description in Appendix 2, Free and Total analyzers are owned by Alfred and Plantagenet.	J. Leroux	N. Pigeon	D. Renaud
03	10	19.09.20	Modified the water treatment plant address and changed water tower for water reservoir	J. Leroux	N. Pigeon	D. Renaud
04	10	19.11.14	Modified the Dosage rate of the Pre-KMN04 pumps to 24.0L/hr	J. Leroux	N. Pigeon	D. Renaud
05	10	20.10.06	Modified the drawing description for the Analyzers	J. Leroux	N. Pigeon	D. Renaud
06	11	21.09.09	Added Schedule "C" to the element and added last updated date to the raw water characterization chart at item 1.2	J. Leroux	N. Pigeon	D. Renaud
07	11	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1. VILLAGE OF LIMOGES WATER TREATMENT PLANT

1.1 General

The Limoges drinking water systems, operating under the authority of the Nation Municipality, provides potable water supply to the residents and businesses of the Village of Limoges, Calypso Water Park, the communities of Forest Park, Le Baron Estates and the Ben Tardif Trailer Park (Limoges population serviced: 4 300). The systems, owned and operated by The Nation municipality, consist of a conventional, class 3 water treatment plant, with an approved capacity of 2 080 m³/d, and a class 2 water distribution system.

The Water Treatment Plant is located at:

269 Limoges Road, Limoges, ON
The Nation Municipality, United Counties of Prescott & Russell
K0A 2M0

The owner's address is:

The Corporation of The Nation Municipality
958 Route 500 West
Casselman, Ontario
K0A 1M0

The source water, for the treatment process is drawn from two ground water wells located in Township of Russell, on Russland Road. The Limoges water treatment plant removes Iron, manganese, dissolved hydrogen sulphide gas and organics from the raw water source using the following processes:

1. Aeration;
2. Potassium Permanganate System;
3. Coagulation/flocculation/sedimentation/clarification;
4. Filtration;
5. Chlorination (primary disinfection)
6. Chloramination (secondary disinfection);
7. Water reservoir with pressure sustaining booster pumps;
8. Distribution system with chlorine residual management;
9. Forest Park Reservoir/Booster pumping station

This multiple barrier approach ensures consistently compliant safe drinking water quality, that improves and maintains public health protection.

A process flow diagram of the Limoges Water Treatment Plant is presented in Appendix 1.

1.2 Description of the water source

Water Source:

There are two drilled wells in a geological esker; Well # 1 was drilled in 1994 and Well # 2 was drilled in 1998. Two additional wells were drilled in 2014, but they have not yet been equipped for operation.

Raw water characterization	Ph	Turibidity NTU	Manganese mg/l	Iron mg/l
Average	7.76	1.00	0.161	0.733
Range	7.25 – 8.08	0.34 – 2.09	0.130 – 0.290	0.33 – 0.95

Last Updated Date: September, 2021

Following water level trends in the groundwater aquifer from past years; the rate of water taking from the Limoges wells does not appear to be impacting the seasonal water levels in the aquifer. The rate of water taking for both wells is permitted at 2,080 liters/day. Despite the elevated levels of Iron and Manganese present in the raw water source, the water chemistry is stable.

Bacteria is intermittently detected; however the treatment plant is consistently effective in complete inactivation and removal of bacteria before the treated water leaves the plant. Treated water from the water treatment plant is always compliant with the Ontario Drinking Water Quality Standards (ODWQS).

Well No.1:

250 mm diameter drilled well, located on part of Lot 21, Concession 7 in the Township of Russell, at 2460 Russland Road. The well is equipped as follows:

- One (1) vertical turbine pump with rated capacity of 24.1 L/sec @ 19.6m TDH
- Rate-of-flow control valve
- Flow meter
- One (1) sodium hypochlorite metering pump rated at 398 L/hr and one (1) 750L hypochlorite storage tank
- One (1) Standby Power Generator (50 kW) equipped with automatic transfer switch

Well No.2:

250 mm diameter drilled well, located on part of Lot 21, Concession 7 in the Township of Russell, at 2476 Russland Road. The well is equipped as follows:

- One (1) submersible pump with rated capacity of 24.1 L/sec @ 19.6m TDH
- Rate-of-flow control valve
- Flow meter

1.3 Treatment

1.3.1 Aeration

The water from the production wells is piped 4 km to the water treatment plant. It enters the aeration tank, the first stage of treatment where compressed air is used for stripping dissolved hydrogen sulphide from the raw water. The compressed air also oxidizes divalent metals including iron and manganese in the raw water. The equipment in the aeration process is as follows:

- One (1) tray aerator with a capacity of 63 L/s;
- One (1) aeration basin with approximate dimensions of 7.0 m diameter, 2.4 m high with capacity of 25 L/s;
- Two (2) air blowers rated at 75 SCFM @ 6 psi;
- Two (2) low lift pumps each rated at 24.1 L/sec @ 13.7 TDH, complete with flow control valve;
- Each pump is equipped with a flowmeter.

1.3.2 Potassium Permanganate Oxidation System

Post aeration water is treated with potassium permanganate (KMnO_4) to complete the oxidation of dissolved iron and manganese. The oxidation process consists of a potassium permanganate feed system and two contact tanks that provide the required detention time for full oxidation of iron and manganese to occur. The potassium permanganate system is equipped as follows:

- Two (2) solution tanks each with approximately 500 L volume complete with mixers;
- Two (2) primary potassium permanganate feed pumps each rated at 24.0 L/hr;
- Two (2) detention tanks each with approximately 8.0 m³ volume;
- Four (4) secondary potassium permanganate feed pumps each rated at 3.4 L/hr.

The Potassium permanganate (KMnO_4) feed system is equipped for automatic switchover.

1.3.3 Coagulation/Flocculation/Sedimentation/Clarification

Low lift pumps send water from the aeration basin to the potassium permanganate detention tanks. Actuated flow control valves located after the pumps maintain a constant flow throughout the water treatment plant. A chemical coagulant (PAX-XL6) is added to the water immediately after the detention tanks and a polymer flocculant aid (Magnafloc LT-25) is added further downstream. Rapid mixing of the coagulant and flocculant aid with the raw water occurs as the raw water passes through in-line static mixers at each location. The chemical coagulant and polymer is added to improve the settling potential of oxidized particulates downstream, and enhance filtration. The pre-treated water enters a baffled flocculation basin where gentle mixing promotes the formation of floc masses which attract and gather debris present in the source water. The process water then flows into sedimentation tanks where the floc is provided sufficient detention time for settling. Supernatant (the clear liquid above the settled floc) overflows the sedimentation tank effluent weir to the top of the dual media filters. Most of the particulate matter that was present in the raw water is captured by the floc particles and removed by gravity in the sedimentation tanks, however, during normal operations, some floc passes from the sedimentation tanks to the top of the filters.

The equipment for this process step is as follows:

Coagulant Feed System:

- One (1) solution tank with approx. 9 000 L volume
- Two (2) metering pumps each rated at 9.5 L/hr

Polymer Feed System

- One (1) solution tank with approx. 1 400 L volume

- Two (2) metering pumps each rated at 70 L/hr

1.3.4 Filtration

The filters each have a filter bed consisting of two (2) layers of filtration material:

- The top layer is consists of anthracite which removes the coarse particles;
- The lower layer consists of manganese green sand which adsorbs any remaining undissolved iron and manganese; and also filters out any fine oxidized particles not captured in the top layer anthracite bed. The greensand also absorbs slight KMnO_4 overdoses which regenerates and maintains the oxidizing capacity of the greensand; while maintaining treated water produced that is “balanced” in quality.

Each of the two (2) filters has a surface area of 12.6 m^2 for a filtration rate of 4.2 m/h; and a rated flow rate of $70 \text{ m}^3/\text{h}$. The filters are designed to operate at a service flowrate of 24 L/s. The filtered water is collected by a piped underdrain system installed in each filter.

Filtered water is piped from the filters into the clear well; chlorinated with sodium hypochlorite to achieve primary disinfection upstream of the clearwell; followed by the addition of ammonium sulphate solution at the exit of the clearwell to complete a chloramination process to achieve secondary disinfection. Treated water is pumped to the onsite water reservoir.

The filters are backwashed based on headloss across the filter media. Water for backwash is pumped from the treated water reservoir through a dedicated backwash pipe to the filters. The filters are air scoured to enhance cleaning during the backwashing process. The backwash waste water is directed to the municipal sewer.

a) Anthracite

The top layer of filter medium is composed of anthracite with a bed depth of 1.0 m. Anthracite particles have a media size is 1.0 to 1.5 mm and uniformity coefficient of less than 1.5. Anthracite is responsible for the removal of coarse oxidized particles. Due of its low relative density, anthracite settles in the top layer of the filter following the backwash process.

b) Green sand

The bottom layer of filter medium is composed of green sand with a bed depth of 1.0 m. Greensand particles have a media size of 0.30 to 0.35 mm; and uniformity coefficient of less than 1.6. The primary role of the green sand is to adsorb non-dissolved iron and manganese. The green sand also aids in the removal of residual fine particulates not captured by the top layer of anthracite. Each filter is equipped with a potassium permanganate pre-filter feed system that provides a small dosage of potassium permanganate in continuous or batch operation to oxidize metals adsorbed; and maintain the adsorption capacity of the green sand.

The equipment for this process step is as follows:

- Four (4) greensand filters, each rated at 24.1 L/s, each with approximate dimensions of 3.5m by 3.6m by 3.6m high, with anthracite and greensand filter media;
- Piping to convey backwash wastewater into the sanitary sewer.

After filtration the water is routed to the Clearwell Reservoir with a capacity of 160 m^3 .

1.3.5 Primary Disinfection (Chlorination)

Primary disinfection occurs following filtration, immediately upstream of the treated water clearwell. Primary disinfection is mandatory for drinking water; this process ensures microbiological safety of drinking water. Sodium hypochlorite is mixed into filtered water to inactivate any microbial pathogenic organisms that may remain in the water after sedimentation and filtration.

Following primary disinfection, ammonium sulphate solution is added to the water for chloramination; a process which satisfies the requirement for secondary disinfection. A combined monochloramine residual in the distribution system provides a consistent barrier to contamination, and it is essential to maintain safe drinking water to consumers. Safe drinking water is ensured by continuous monitoring of the chlorine residual in the treated water leaving the Limoges Water Treatment Facilities and at key monitoring locations within the distribution system.

If the residual drops below a safe level in the water leaving the Limoges water treatment plant, pumping to the distribution system is automatically stopped and an operator is notified to investigate and correct the problem.

The equipment for this process step is as follows:

- One (1) sodium hypochlorite solution tank with approximately 250 Litre volume;
- Two (2) metering pumps each rated at 2.4 L/hr complete with automatic switchover
- One (1) free chlorine residual analyzer

1.3.6 Clearwell

The filtered and chlorinated water is routed to the Clearwell which has a capacity of 160 m³. Chloramination occurs at the exit of the clearwell and chloraminated water is then pumped to the onsite water reservoir.

The equipment for this process step is described as follows:

- One (1) clearwell with approximate volume of 160 m³.
- Two (2) high lift pumps rated at 25.7 L/s @ 14.2m TDH
- One (1) backwash pump rated at 45.4 L/s @ 15.9 m TDH

1.3.7 Secondary Disinfection (Chloramination)

Chloramination is accomplished by adding sufficient ammonium sulphate to the free chlorine residual following primary disinfection. A combined monochloramine residual is formed which is ideally suited to maintain a disinfection residual throughout the distribution system. Ammonium sulphate is added in the high lift pump chamber located at the exit of the clearwell.

A feed system using an ammonia solution provides chloramination, which consists of:

- One (1) ammonium sulphate solution tank equipped with mixer
- Two (2) chemical feed pumps (duty, standby) complete with automatic switchover, each rated at 7.5 L/hr;
- One (1) total chlorine residual analyzer
- One (1) free chlorine residual analyzer

1.4 Grade Level Water Tank/Reservoir and Distribution System

Treated water is pumped from the clearwell into the two (2) Water Reservoirs. The water in the water reservoirs is distributed in the piped distribution network by a series of booster pumps.

Distribution piping typically ranges in size from 150 mm to 300 mm, and may consist of cast iron, ductile iron, or PVC, depending on the location and date of installation. The equipment for this process step is as follows:

1.4.1 *Water Reservoir*

- Two (2) grade level tank with approximate volume of 1 734 m³/each

1.4.2 *Booster Pumping Station*

- Three (3) pumps each rated at 8.7 L/s @ 40 m TDH;
- Three (3) fire pumps each rated at 54.9 L/s @ 25.6 m TDH;
- One (1) backwash pump rated at 54.9 L/s @ 25.6 m TDH;
- One (1) free chlorine residual analyzer.
- One (1) total chlorine residual analyzer.

1.4.3 *Standby Power*

A generator with a capacity of 250 kilowatts operates equipment essential to the production and supply of drinking water.

1.4.4 *The Limoges water distribution system*

- The distribution network water mains vary from 300 mm to 150 mm pipe diameter
- There are approximately 1400 connections on the network.

1.4.5 *Forest Park Reservoir/Pumphouse*

One Reservoir and pressure booster station located on 214 Maple Groves Street, (Forest Park), is used to provide water supply at adequate system pressure in a community remote to the Limoges Water treatment Plant. Typically the system pressure ranges from 45 PSI to 80 PSI. The purpose of the reservoir is to provide relatively constant system pressure and a reserve volume of water for community fire protection. Distribution piping typically ranges in size from 150 mm to 300 mm, and may consist of cast iron, ductile iron, or PVC, depending on the location and date of installation. The equipment for this process step is as follows:

- One (1) three cell reservoir with approximate volume of 700 m³;
- Three (3) booster pumps each rated at 8.0 L/s @ 42 m TDH;
- One (1) fire pump rated at 47.3 L/s @ 70 m TDH;
- One (1) free chlorine residual analyzer;
- One (1) total chlorine residual analyzer.

1.5 Sample Analysis

Provincial regulation dictates the sampling and monitoring requirements for the system. Water quality is tested throughout the treatment process and from dedicated sampling points located at the extremities of the distribution system. Where required by regulation, samples are submitted to an accredited laboratory for analyses.

On-line equipment monitors and records, flow, turbidity and chlorine residuals of the treated water.

1.6 The water treatment challenges

The treatment challenges generally include monitoring changes in raw water quality; effective and efficient removal of iron and manganese from the raw water; management of water budget that addresses a growing water demand versus the existing capacity of the water supply wells.

A challenge also exist in drought conditions due to the increase in demand in the distribution system which is directly related to the treatment plant capacity.

2. VILLAGE OF ST. ISIDORE DISTRIBUTION SYSTEM

The source water (raw water) from Lefavre which is withdrawn from the Outaouais River is generally low in dissolved solids, chlorides, nitrates, alkalinity and has a neutral pH. Source water turbidity is generally greater than 1 NTU and can fluctuate with periods of precipitation and spring runoff.

On July 2007, a new transmission watermain was designed and constructed to deliver chloraminated water from the Lefavre Water Treatment Plant; property of the municipality of Alfred-Plantagenet and operated by OCWA; to the St. Isidore water tower. This infrastructure represents Stage 1 of the Regional Waterworks; has been in operation and incorporates the following components:

- Two (2) vertical turbine high lift pumps each rated at 20 L/s
- One (1) 84.4 m³ clearwell
- One (1) out flowmeter
- Two (2) automatic chlorine analyzers to determine the combined chlorine residual
- One (1) post chloramination system (installed at Plantagenet Pumping Station)
- One (1) 125 KW standby power generator

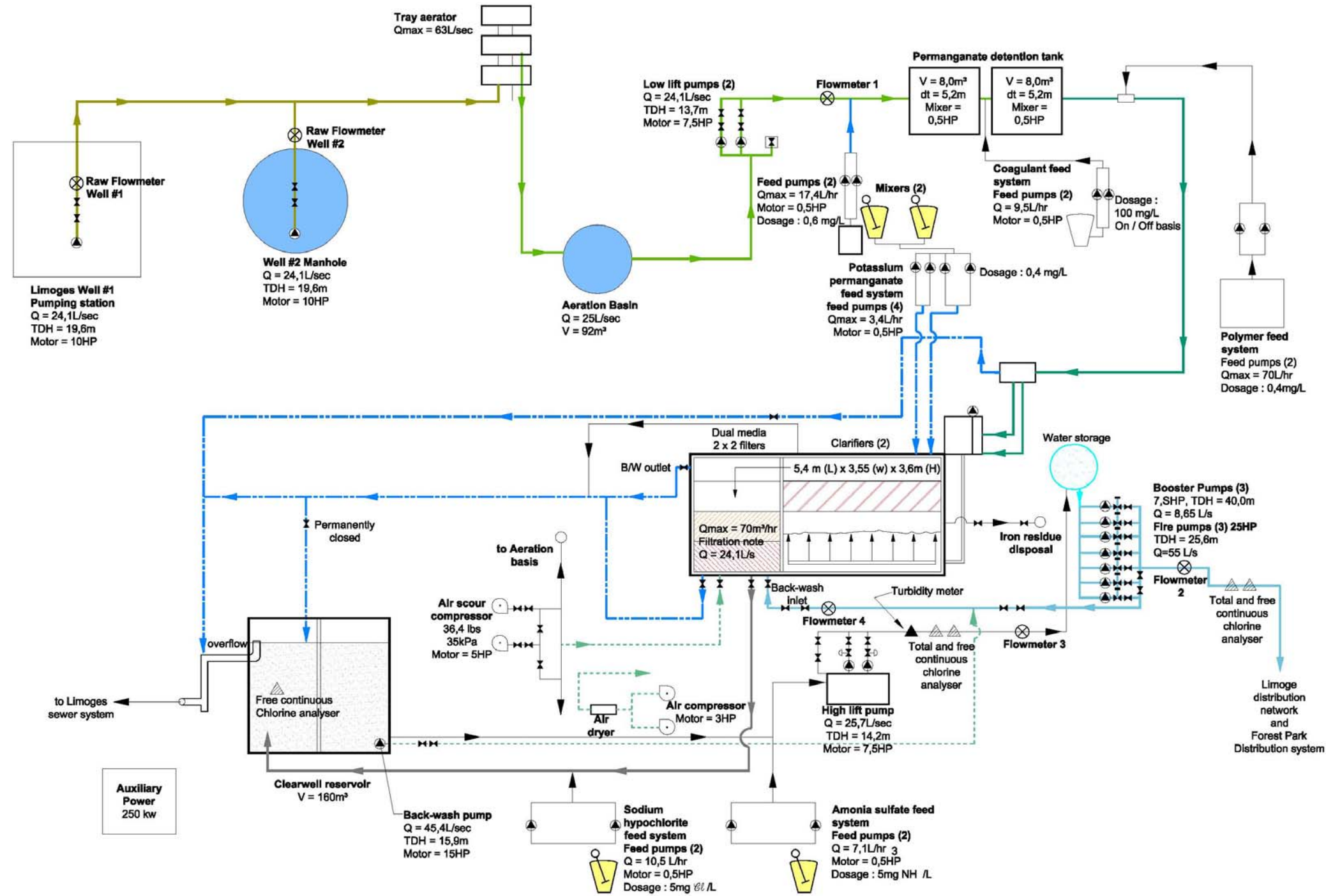
The above mentioned facility now operates under Certificate of Approval # 7256-6NEMJ7. A process flow diagram representing the St. Isidore drinking water system is presented in appendix 2 (St. Isidore population serviced: 1 000).

The elevated storage tank is an integral component of the distribution system. The purpose of the storage tank is to provide relatively constant system pressure and a reserve volume of water for community fire protection. Distribution piping typically ranges in size from 150 mm to 300 mm, and may consist of cast iron, ductile iron, concrete, or PVC, depending on the location and date of installation.

The water quality challenges

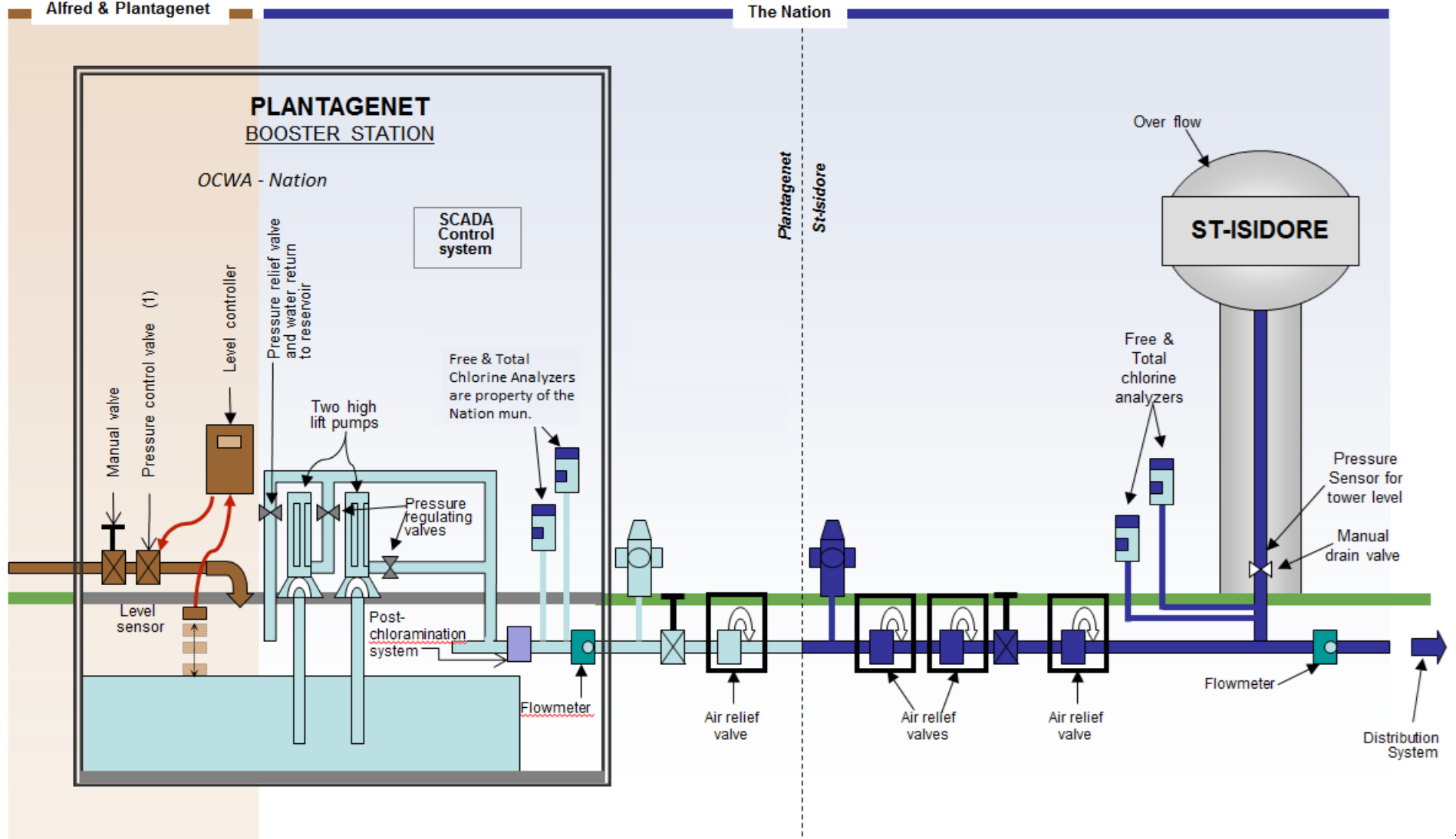
The challenges for this system is to ensure adequate chlorine residuals in the water distribution system, having a distance of 50 km from the Lefavre water treatment plant to the St Isidore Water tower, also ensuring the system can provide adequate water supply when the reservoir is not in service (maintenance/inspections). Residuals are monitored using on-line analyzers throughout the distribution system, including the Plantagenet booster station.

APPENDIX 1 LIMOGES WATER TREATMENT PLANT



APPENDIX 2 ST. ISIDORE DRINKING WATER SYSTEM

 Alfred & Plantagenet



APPENDIX 3

SCHEDULE "C"

Schedule "C"				
Subject system Description Form				
Municipal Residential Drinking Water System				
Owner of Municipal Residential Drinking Water System:		<i>Corporation of the Nation Municipality</i>		
Subject System				
<i>Name of Drinking water system</i>	<i>Licence Number</i>	<i>Name of Operational Subsystems (if applicable)</i>	<i>Name of Operating Authority</i>	<i>DWS Number(s)</i>
Limoges Drinking water system	179-102		The Nation Municipality	260006841
St-Isidore Distribution system	179-101		The Nation Municipality	260091026
Contact Information for Questions Regarding the Operational Plan				
	<i>Name</i>	<i>Title</i>	<i>Phone No.</i>	<i>Email address</i>
Primary	Dour Renaud	Director of Water & Wastewater	613-880-7234	drenaud@nationmun.ca
Alternate	Nicholas Pigeon	Operator in charge Water & Wastewater	613-899-8955	npigeon@nationmun.ca

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Record of issues and revisions

R	Page	Date (yy.mm.dd)	Description	Prepared	Verified	Approved
00	11	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	07	18.08.10	Revised complete element	J. Leroux	N. Pigeon	D. Renaud
02	05	19.04.18	Changed Administrative Assistant for Administrative Secretary, changed MOECC for MECP and changed page numbering	J. Leroux	N. Pigeon	D. Renaud
03	05	20.10.06	Modified Risk Assessment Table	J. Leroux	N. Pigeon	D. Renaud
04	05	21.08.11	Revised complete element	J. Leroux	N. Pigeon	D. Renaud
05	05	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

This page is a record of all emissions and revisions for the concerned document. The elements that have been modified are indicated herein.

RISK ASSESSMENT

1.0 MAIN COMPONENTS

Risk assessment is an important element of the operational plan. Risk assessment enables the Nation Municipality to identify hazardous events; assess the risks associated with any occurrence of such hazardous events, and implement control measures to mitigate the risks.

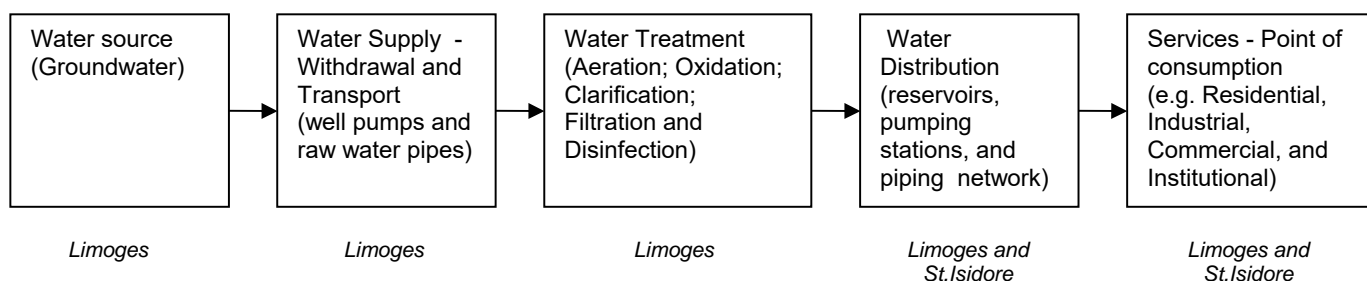
A risk assessment team has been set up to perform risk assessments. The team includes:

- Overall Responsible Operator (ORO)
- Operator in Charge (OIC)
- QMS Representative
- Administrative Secretary

The method used to perform the risk assessment is based on the Drinking Water Quality Management Standard version 2.0 (DWQMS 2.0) requirements as described in Elements 7 and 8 and also considers the MECP's Potential Hazardous Events for Municipal Residential Drinking Water Systems to Consider in the DWQMS Risk Assessment.

A thorough examination of the drinking water system's processes and the previous version of the risk assessment is carried out by the risk assessment team to identify the key elements that could be subject to hazards or hazardous events. For each aspect of the processes potential hazards were identified.

The main components of The Nation Drinking Water Systems assessed are represented in the diagram below.



2.0 POTENTIAL HAZARDS AND RISKS ASSOCIATED

For each component, a list of potential hazards and the risks associated with them has been identified. The hazardous events were later ranked according to their associated risk. The three main elements considered to rank them were the likelihood, the consequence of the event occurring, and the detectability of the hazardous event occurring. The following tables (originally taken from the MECP DWQMS Guide, July 2007; and updated) explain more in detail the rating system used.

Likelihood	1	Rare	May occur in exceptional circumstances. Has not occurred in past.
	2	Unlikely	Could occur at some time. Historically, has occurred less than once every 5 years.
	3	Possible	Has occurred or may occur once or more per year.
	4	Likely	Has occurred or may occur on a monthly to quarterly basis.
	5	Very Likely	One or more occurrences on a monthly or more frequent basis.
Consequence	1	Insignificant	Little to no public exposure or health risk AND/OR insignificant impact to drinking water system.
	2	Minor	Minor public exposure (i.e. cluster of users) AND/OR minor health risk AND/OR manageable disruption to drinking water system.
	3	Moderate	Moderate public exposure (i.e. neighbourhood of users) AND/OR health impacts for small population AND/OR significant disruption to drinking water system.
	4	Major	Major public exposure (i.e. multiple neighbourhoods of users) AND/OR potential health impacts for large population AND/OR major disruption to drinking water system.
	5	Catastrophic	Exposure and potential health impacts to all users within the drinking water system AND/OR complete failure of drinking water system.
Detectability	1	Very detectable	Easy to detect. Obvious. On-line monitoring and alarm through SCADA.
	2	Moderately detectable	Moderately detectable. Alarm present. Weekly sampling, testing, monitoring and/or special programs are in place.
	3	Normally detectable	Normally detectable. Visually detectable on rounds or regular maintenance. Monthly sampling, testing and/or monitoring are in place.
	4	Poorly detectable	Poorly detectable. Not normally detected before problem becomes evident. Quarterly (or less frequent) sampling, testing and/or monitoring are in place.
	5	Undetectable	Cannot detect before problem becomes evident.

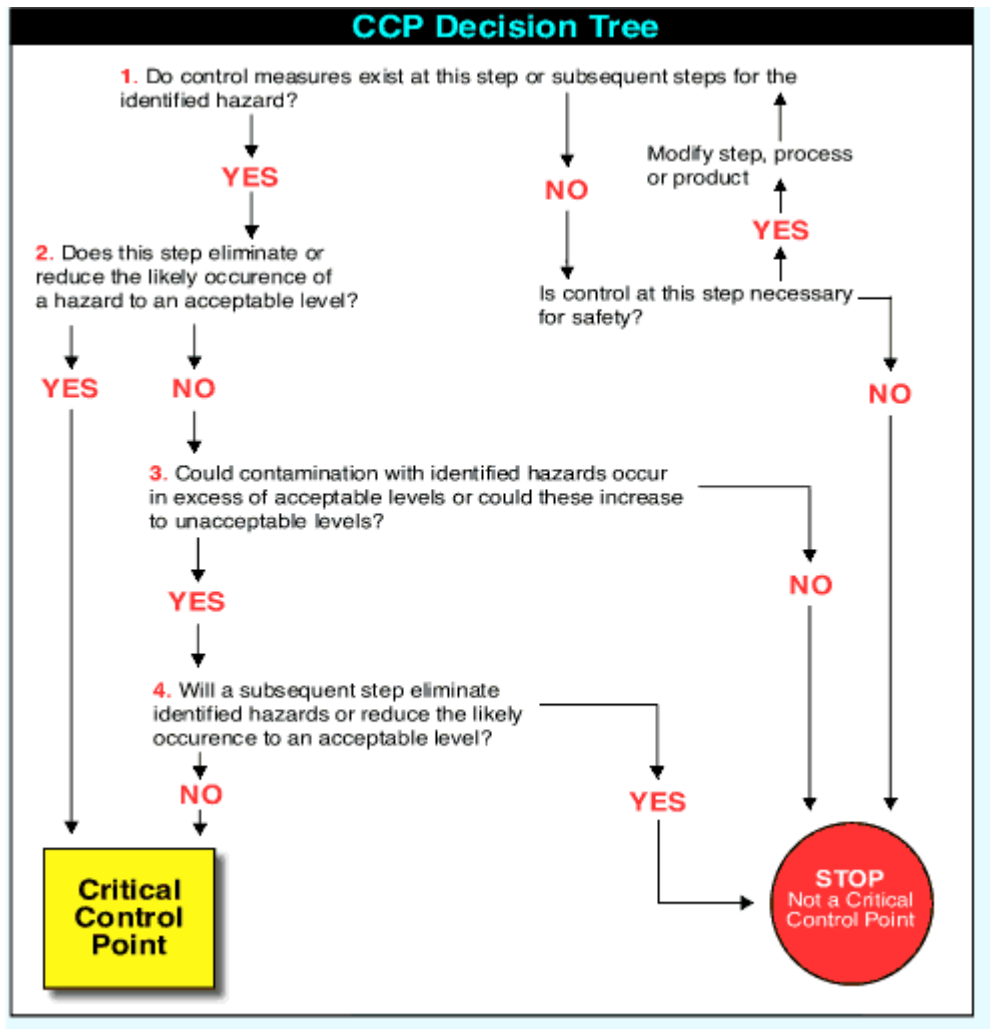
The next step was to establish a ranking of these hazards according to the following summation formula:

$$\text{RANK} = \text{LIKELIHOOD} + \text{CONSEQUENCE} + \text{DETECTABILITY}$$

3.0 CRITICAL CONTROL POINTS (CCPS)

After ranking the hazardous events according to their associated risk, an identification of control measures and critical control points (CCPs) to address the potential hazards were determined.

According to the MECP Guide for implementing a Quality Management system (July, 2007), a critical control point is defined as the last step at which a hazard can be controlled to prevent a drinking water health related hazard or to reduce it to an acceptable level. The step following the identification of control measure and critical control points is to determine critical control limits for the hazardous events that can be monitored in real time in order to prevent, eliminate or reduce the hazards associated to these events.



In order to ensure a proper risk assessment for the Nation Municipality drinking water systems, a review will take place once a year or when a significant change in operation occurs. This review will take place to verify the currency of the information and the validity of the assumptions used in the risk assessment.

The method to review the current risk assessment will consist of the following steps:

- Review of the current risk assessment by the risk assessment team
- Verify the accuracy of the assumptions
- Modify or update hazards or hazardous events, their risk ranking, control measures and critical points and critical control limits

As defined in the Element 14 of this Operational Plan, the Operating Authority will review infrastructure on an annual basis to assess the adequacy of those infrastructure; and whether it is adequate to safely and effectively operate the drinking water system. The review of the current risk assessment has to take into consideration this annual review of adequacy of the infrastructure.

Additionally, the risk assessment considers the reliability and redundancy of equipment, which may impact the Review and Provision of Infrastructure that occurs under Element 14.

In addition to the yearly verification, a risk assessment will again be done once every thirty-six months in order to ensure a proper and up-to-date risk assessment for the drinking water system.

A risk assessment table is presented in the following pages summarizing the various steps mentioned above.

4.0 RISK ASSESSMENT TABLE

See Hazard Identification & Risk Assessment.in NA-QMS-07-001, for complete assessment.

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Record of issues and revisions

R	Page	Date (yy.mm.dd)	Description	Prepared	Verified	Approved
00	6	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	5	18.03.23	Fit element on 5 pages instead of 6 pages	J. Leroux	N. Pigeon	D. Renaud
02	5	18.06.05	Reviewed CCP table	J. Leroux	N. Pigeon	D. Renaud
03	5	19.09.20	Changed quantity of NTU for CCL of Filter breakthrough	J. Leroux	N. Pigeon	D. Renaud
04	5	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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RISK ASSESSMENT OUTCOMES

1.0 CRITICAL CONTROL POINTS RESPONSE, REPORTING AND RECORDING PROCEDURE

1.1 Purpose

The identification and risk assessment of hazardous events and associated hazards including their ranking and the identification of control measures and critical control points and limits have been discussed in the previous element.

The following procedure describes the methods to respond, report and record deviations from critical control points that could affect the quality of the drinking water produced.

1.2 Scope

The procedure contains details about who responds, how the hazardous event is corrected, how the event is reported and recorded and to whom it is communicated.

1.3 Responsibility

The responsibility of following this procedure is pertinent to the QMS representative and operators who respond to the hazardous event/hazard. After the event, the operating personnel should report it to the OIC and ORO by regular means of communications (phone call or by email). Following the event, a thorough explanation should be recorded in the Operations Log book.

1.4 References

DWQMS Elements 7 and 8.

1.5 Definitions

Critical control point (CCP): The last step or point in the subject system where some sort of control to prevent or eliminate a drinking-water health hazard.
See sections 11.6 and 11.12 of the DWQMS.

1.6 Procedure

1.6.1 Monitoring of CCPs

In order to guarantee a safe drinking water production and distribution, the Nation water treatment plant and distribution networks possess various monitoring devices that will alert the operation personnel when critical control limits have been exceeded. Operation personnel will respond and take adequate corrective actions.

According to the Ministry of Environment DWQMS guide, the three main purposes of monitoring are to:

- Track system performance in order to assure that critical control limits are not exceeded.
- Indicate in real time a deviation from standard conditions in the system in order to respond to them following preestablished control procedures.
- Provide records for accountability.

The following real-time continuous monitoring equipments are installed within the Nation's water drinking supply systems.

Water treatment plant

Flowmeters for Well #1 and Well #2 are located at each well individually.

Flowmeter 1: Located downstream of the low lift pumps; inside the plant directly upstream of the KMnO₄ contact tanks.

Flowmeter 2: Located downstream of the treatment process right after the booster pumps from the water reservoir.

Flowmeter 3: Located downstream of the treatment process right after the high lift pumps to fill the water reservoir.

Flowmeter 4: Located on the backwash water lines.

Turbidity meter: Located downstream of the filtration process;

Free chlorine analyzer for primary disinfection in the clear well, upstream of the high lift pumps

Continuous Total and free chlorine analyzer 1; Located downstream of the treatment process right after the high lift pumps.

Continuous Total and free chlorine analyzer 2; Located downstream of the treatment process right after the booster pumps from the water reservoir.

Distribution network

Continuous Total and free chlorine analyzer 3; Located in the Forest Park distribution network at the Forest Park Pumping Station

Flowmeters within the distribution network:

Ultrasonic transducers to monitor reservoir water levels

In addition to real-time continuous monitoring devices, the water treatment plant day to day operation include daily and weekly laboratory analyses for scheduled water quality parameters; daily and weekly visual checks of equipment; service and calibration of critical equipments in accordance with the preventive maintenance program (PGMO); and reviews of continuous monitoring data and alarms on the SCADA system.

1.6.2 Response to deviation from critical control limits

The critical control points established in the risk assessment table (see section 4.0, element 7 of this Operational Plan) refer to specific response procedures (Standard Operating Procedures) included in the SOP Binder Manual. The following table taken from the Safe Drinking Water Act Ontario regulation 170/03 summarizes the key principal alarms for different monitoring parameters that are required in order to achieve primary disinfection for a drinking water system.

#	Critical Control Point	Minimum Testing and Recording Frequency	Compliance Requirement	Response SOP
1.	Free chlorine residual required to achieve primary disinfection	5 minutes	0.1 milligrams per litre less than the concentration of free chlorine residual that is required to achieve primary disinfection	SOP-001 Adverse Water Quality SOP-016 Chlorine Analyzer Failure SOP-040 Low Free Chlorine (Clearwell)
2.	Free chlorine residual and total chlorine residual measured for the purpose of determining combined chlorine residual required to achieve secondary disinfection	5 minutes	0.1 milligrams per litre less than the concentration of combined chlorine residual that is required to achieve secondary disinfection	SOP-001 Adverse Water Quality SOP-016 Chlorine Analyzer Failure SOP-040 Low Free Chlorine (Clearwell) SOP-045 Chemical pumps at Plantagenet Booster Station
3.	Free chlorine residual and total chlorine residual measured for the purpose of determining combined chlorine residual in a distribution sample	1 hour	0.25 milligrams per litre	SOP-001 Adverse Water Quality
4.	Turbidity	15 minutes	1.0 Nephelometric Turbidity Units (NTU)	Follow Standard Operating Procedure – Filter Media Failure (see Operations Manual, Appendix S, SOP-019)

O. Reg 170/03 – Shedule 6 – Operational checks, sampling & testing

The following table summarizes the critical control points determined through the risk assessment update for the Nation drinking water systems and the correspondent Standard Operating Procedure.

Critical Control Point (CCP)	Critical Control Limit (CCL)	Response Procedure
Plant – Treatment (Limoges) – Chemical feed	Operational and achieving dosages	SOP-015 Chemical Feed Pump Failure. SOP-001 Adverse Water Quality
Filter breakthrough	0.3 Nephelometric Turbidity Units (NTU)	Standard Operating Procedure – Filter Media Failure (see Operations Manual, Appendix S, SOP-019)
Failure of process equipment (compressor, chemical feed pumps, mixers)	Operational and/or achieving dosages	SOP Low Lift Pump Failure (see Operations Manual, Appendix S, SOP-012); SOP High Lift Pump Failure (see Operations Manual, Appendix S, SOP-014); SOP Backwash Pump Failure (see Operations Manual, Appendix S, SOP-025); SOP Chemical Feed Pump Failure(see Operations Manual, Appendix S, SOP-015)
Low or loss of water supply (St. Isidore)	1 milligrams per litre less than the concentration of combined chlorine residual that is required to achieve secondary disinfection	SOP Shut down of water feed (St.Isidore) (see Operations Manual, Appendix S, SOP-006)
Water Storage – declining water quality	1 milligrams per litre less than the concentration of combined chlorine residual that is required to achieve secondary disinfection	SOP-001 Adverse Water Quality SOP-040 Low Free Chlorine (Clearwell) SOP-045 Chemical Pumps at Plantagenet Booster Station
Distribution System – contamination of or declining treated water quality (e.g. aging water, backflow)	1 milligrams per litre less than the concentration of combined chlorine residual that is required to achieve secondary disinfection 40 psi system pressure targeted	Flush and keep positive pressure SOP Adverse Water Quality (see Operations Manual, Appendix S, SOP-001)

The response procedures included in the Operations Manual have to be verified and tested periodically or whenever a major modification in the drinking water system has been done.

1.6.3 Reporting and recording deviations from critical control limits

Whenever a critical control limit is passed and the corresponding response procedure is activated; the operating personnel should clearly record it into a log book.

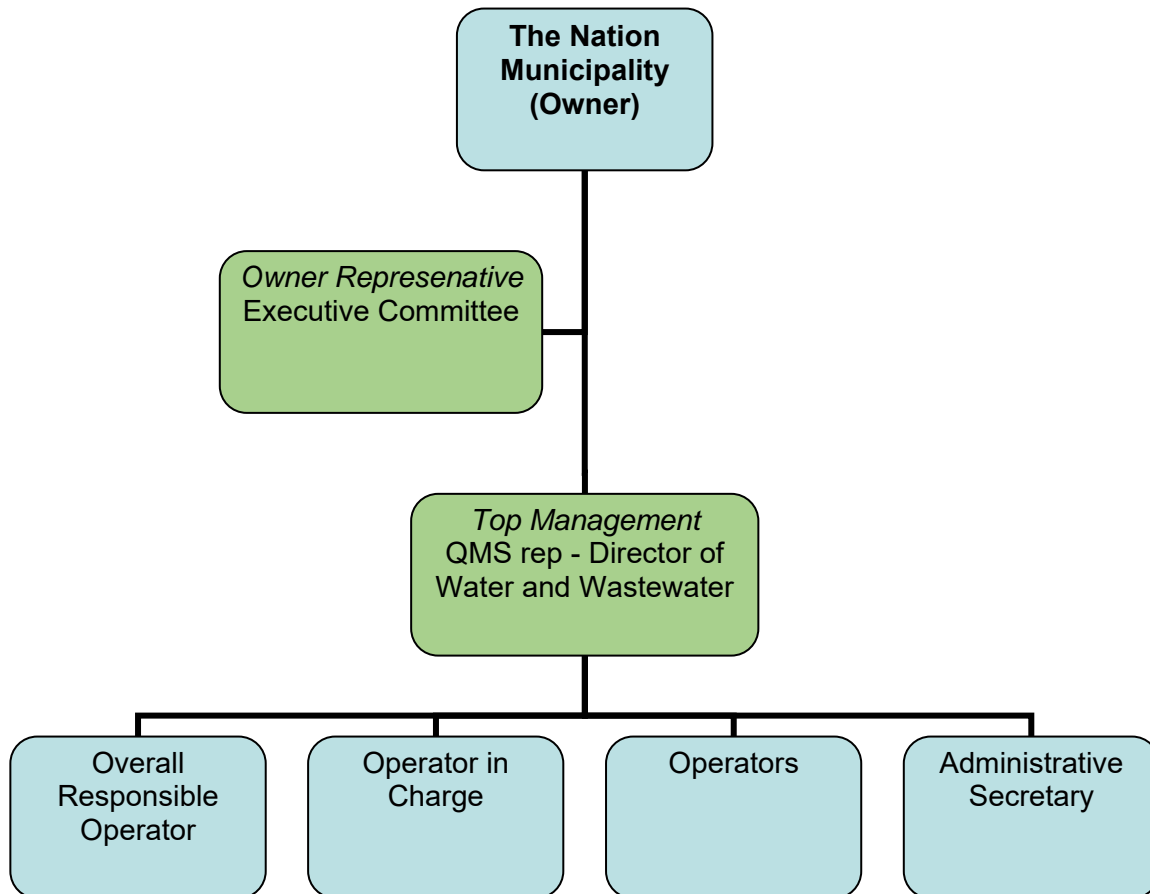
Following the event, a meeting should be conducted by the operator in charge with the operating personnel in order to review the causes that led to the activation of the response procedure; and establish that the results met the desired expectations. The information should be kept in a clearly identified folder in order to have easy access to them for future references.

Limoges Drinking water System & St-Isidore Distribution system

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Record of issues and revisions						
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00	4	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	4	18.08.10	Modified the organizational structure and QMS title.	J. Leroux	N. Pigeon	D. Renaud
02	4	18.11.12	QMS rep is now Director of Water & Wastewater, title was changed.	J. Leroux	N. Pigeon	D. Renaud
03	4	19.04.18	Modified job titles	J. Leroux	N. Pigeon	D. Renaud
04	4	19.09.20	Added CAO to the Clerk title	J. Leroux	N. Pigeon	D. Renaud
05	4	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1.0 ORGANIZATIONAL STRUCTURE



Structure in Green represent personnel who are able to undertake reviews.

2.0 ROLES, RESPONSIBILITIES AND AUTHORITIES

The Nation Municipality, Mayor and Municipal Council (Owner)

The Nation Municipality, which is represented by an elected Mayor and municipal council, is responsible for ensuring the delivery of a safe and reliable supply of drinking water to the residents of the Nation Municipality.

The owner has the authority to delegate the management of the drinking water system to qualified staff.

CAO - Clerk

The CAO - Clerk is responsible for arranging reports to the mayor and council on the oversight of the municipal water supply systems. The CAO - Clerk will receive (information) reports from the Nation's Operating Team regarding issues that are relevant to the overall operation of the water supply systems.

The Clerk is authorized by council to ensure that appropriate management staff is in place to ensure the municipal water system is reliable; it supplies safe and uninterrupted drinking water to its communities.

Director of Water and Wastewater

The Director is responsible for ensuring that municipal infrastructures are safely managed in compliance with current regulations. The Director must provide long term planning and budgeting data; inform the Clerk and Council of deficiencies and required resources; and also provide the CAO - Clerk and Council with current technical and administrative information and advice.

The Director has the authority to develop administrative and technical policies; and evaluate and prioritize long term utility needs.

QMS Representative

The QMS Representative is also the Director of Water and Wastewater. The Director of Water and Wastewater will provide guidance on water operations. He will engage in discussions with the Operation Team, and will solicit feedback on current operational efficiencies and future needs. His responsibilities also include preparing reports for capital expenditures, budgeting, maintenance activities, and infrastructure condition assessments for presentation to the Council, Regulatory Authorities, and the Public.

The QMS Representative is authorized to direct operators, develop policies, and maintain communication with regulatory and technical authorities including the Director of Water and Sewer, Senior Managers, and the general public.

The Director of Water and Wastewater is also responsible for the management of the daily operations of the water treatment plant and distribution system, and supervision of staff. His responsibilities also include oversight of process operation and controls; staff scheduling, and ensuring that employee certifications and minimum training requirements in accordance with O. Reg. 128/04 are kept up to date.

Administrative Secretary

Under the direction of the Director of Water and Wastewater, the Administrative Secretary is responsible for providing office management services by coordinating and monitoring the general administration of the office and the assignments of all operators and in assisting the development and maintenance of the Quality Management System (QMS) in accordance with the Drinking Water Quality Management Standard (DWQMS).

Overall Responsible Operator (Water Treatment plant and Distribution ORO)

The Overall Responsible Operator has overall operational responsibility of The Nation Drinking Water Supply Systems which includes the Limoges Water Treatment Plant and distribution system, and the St. Isidore water distribution system. He ensures a knowledgeable and experienced operator in charge is available at all times to lead other operators on the operation of the systems; and respond immediately and effectively to emergencies. The ORO ensures that all operational activities are carried out safely and in compliance with current regulations. The ORO also ensures a scheduled preventative maintenance program is carried out; confirms all required water quality tests are completed, and reports normal and abnormal conditions to the Project Manager. The ORO may also make process and system adjustments to ensure the supply of safe drinking water to the communities. The ORO may supervise the duties of the plant operators and may supervise any on site contractors.

Operator In Charge (Water Treatment plant and Distribution OIC)

The Operator In Charge controls day-to-day activities related to The Nation Drinking Water Supply Systems. The designated Operator in Charge (OIC) is responsible for process monitoring and adjusting operational parameters as required; and guide other operators when setting operational parameters. The OIC is also responsible to ensure that all activities related to in-house laboratory analyses, inspection and calibration of monitoring instruments; and measuring, sampling, and testing drinking water quality are done in accordance with O. Reg 170/03. He is responsible for record keeping, and ensures the proper use of the operations log book. The OIC ensures conformance to health and safety by operators and contractors when performing repair and maintenance of all aspects of the distribution system. This includes work carried out on hydrants, line valves, services and residential shut offs. The OIC is authorized to take control of emergency situations (eg. water main break); and use equipment which is necessary to complete repairs in a safe and efficient manner.

Operator in Charge – Alternate (OIC)

An OIC is selected for each shift for both the Water Treatment and the Distribution System. The OIC can be any operator that has a minimum Class I certificate for the Water Treatment and Distribution Systems. The OIC for each shift must be identified in the daily log books. The OIC has responsibility and authority to make all data entries in the logbooks and on log sheets, performs all on-site water tests, and makes and records all process adjustments. The OIC also has responsibility and authority to assist and oversee operators and contractors in the repair and maintenance of all aspects of the distribution system, and respond to emergencies.

Operators

All operators are personally responsible for maintaining their Ministry of the Environment Certification for the Water Treatment and Water Distribution Systems in accordance with O. Reg. 128/04. Operators are required to carry out the daily duties in accordance with prescribed SOPs for the treatment and distribution processes; and ensure operational activities are completed and recorded in a timely manner. All non-compliant incidents must be acted upon, reported and recorded as required by O. Reg. 170/03.

Certified operators are authorized to collect samples, perform testing, adjust treatment processes (with direction from the OIC), and perform maintenance on the treatment and distribution systems, in accordance with standard operating procedures, to ensure a safe and adequate water supply.

An Organization Chart (NA-QMS-E09-001) is available, showing the name of all the personnel who occupied these roles.

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00	4	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	4	18.08.10	Desired Competencies for the water operator changed for a level 1 instead of a level 3	J. Leroux	N. Pigeon	D. Renaud
02	4	19.04.18	Changed MOECC for MECP	J. Leroux	N. Pigeon	D. Renaud
03	4	20.11.23	3.0 Training, modify hours in table to reflect the requirements from OWWCO for the class system operated.	J. Leroux	N. Pigeon	D. Renaud
04	4	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

This page is a record of all emissions and revisions for the concerned document. The elements that have been modified are indicated herein.

1.0 IDENTIFICATION, DEVELOPMENT AND MAINTENANCE OF COMPETENCIES

To ensure the use of competent individuals for the management and maintenance of the drinking-water QMS, the Nation Municipality requires employees to have the appropriate licensing to adequately carry out their responsibilities. The Operator-in-Training (OIT) designation is the minimum requirement for working within the drinking-water systems. Specific requirements are outlined in the appropriate job descriptions and are enforced when hiring new employees (see section 2.0).

All personnel must be aware of and are responsible for complying with policies and procedures related to the operation of the system. Computer software access and hardcopies kept within binders will be available to operators to ensure they have easy access to any required documentation.

Copies of required certifications are maintained for all employees by the Operating Authority within the Water Treatment facility. The Operating Authority follows the training of the employees (NA-QMS-E10-001).

The development and maintenance of competencies is facilitated through a training matrix, which identifies the minimum required or recommended training for performing specific duties (see section 3.0).

Training is provided according to Ministry of the Environment, Conservation and Parks (MECP) specifications and may include any training related to an employee's responsibilities. The request to complete training must be submitted for review and approval before registration. On-the-job training is also provided as appropriate.

Awareness of the importance of employee responsibilities and its impact on drinking-water quality will be promoted through the following activities:

- Regular review of relevant policies and procedures;
- Communication of relevant legislative and regulatory requirements through formal meetings;
- Communication of roles and responsibilities (as outlined in Organizational Structure, Roles, Responsibilities, and Authorities Policy); and
- Internal and external training.

All activities will be recorded in Meeting Minutes (NA-QMS-E12-001) or by using the Attendance Sheet and will be filed by the Operating Authority. The meeting minutes are distributed to the participants, the QMS Representative and the person in charge of the training for the Operating Authority.

2.0 COMPETENCIES REQUIREMENTS

Competency Requirements Table			
Role	Required Competencies	Desired Competencies	Responsibilities
WTP Overall Responsible Operator (ORO)	<ul style="list-style-type: none"> • WTP Class III Certification • Distribution Class III Certification • Supervision Experience/Training • MS Word & Excel competency 	<ul style="list-style-type: none"> • Internal auditor training • DWQMS competency • WHMIS Training • First Aid (Including CPR) 	<ul style="list-style-type: none"> • Elaborate and monitor Operating Procedures • Aware of Adverse Drinking Water Quality Procedure • Supervision of operational activities • Respecting of following the Quality Management System
WTP Operator In Charge (OIC)	<ul style="list-style-type: none"> • WTP Class I or II Certification • Distribution Class I or II Certification • Mechanical Aptitude 	<ul style="list-style-type: none"> • DWQMS competency • WHMIS Training • First Aid (Including CPR) 	<ul style="list-style-type: none"> • Monitor and adjust operational parameters • Direct or instruct operational parameters adjustments • Measure, sample and test drinking water parameters • Perform in-house lab analysis • Inspect and calibrate monitoring equipments • Record keeping
WTP Operator	<ul style="list-style-type: none"> • Operator-in-Training Certification 	<ul style="list-style-type: none"> • WTP Class I Certification • Distribution Class I Certification • WHMIS Training • First Aid (Including CPR) 	<ul style="list-style-type: none"> • Collect samples, measure, and test drinking water parameters • Follow Operating Procedures • Monitor and adjust operational parameters under supervision of OIC
Distribution System Operator	<ul style="list-style-type: none"> • OIT • Mechanical Aptitude 		<ul style="list-style-type: none"> • Inspection of distribution system elements • Assist and oversee operators and contractors during repairs

3.0 TRAINING MATRIX

Training Matrix (Three year period requirements)				
Role	Minimum Level of Certification	Continuing Education Training *	On the job practical training	Minimum Total training
Overall Responsible Operator	Class III	Min 4.2 CEU	Min 78 hrs	120 hrs
Operator In Charge	Class II	Min 4.2 CEU	Min 78 hrs	120 hrs
Distribution System Operator	Class I	Min 4.2 CEU	Min 78 hrs	120 hrs
WTP Operator	OIT	Min 4.2 CEU	Min 78 hrs	120 hrs

* The training requirements include a mandatory certificate renewal course approved by the Director.

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00	3	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	3	18.04.23	Modify procedure and add on-call schedule	J. Leroux	N. Pigeon	D. Renaud
02	2	18.08.10	Removed Personnel Coverage on third page	J. Leroux	N. Pigeon	D. Renaud
03	2	19.04.18	Changed Deputy Director for Director of Water and Wastewater	J. Leroux	N. Pigeon	D. Renaud
04	2	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1.0 PERSONNEL COVERAGE

The Nation Municipality ensures that competent individuals are available at all times to fulfill the duties that affect drinking-water quality. This is documented in current personnel coverage schedules for both the treatment and distribution facilities (NA-QMS-E11-001).

The personnel coverage schedules address both after-hours as well as weekend and holiday coverage; and are updated on an annual basis at a minimum. A 1-week rotational schedule for on-call staff is in place. The Limoges water Treatment Plant and Distribution System, and the St. Isidore Water Distribution system are covered by the schedule.

In the case of an after-hour or holiday scenario where a SCADA alarm occurred, the SCADA system, as programmed, will call the designated on-call cell phone or pager in order to notify the on-call operator who is responsible to address the alarm. The On-Call Operator has 5 minutes to acknowledge receiving the call, and 30 minutes to investigate the alarm as per the On-Call Coverage Procedure. A back-up chain of on-call persons is maintained to respond to the SCADA alarm in case the designated on-call person does not acknowledge the call within 5 minutes. Calls to individuals in the backup chain is done in sequence automatically in 5 minute intervals until the call is acknowledged by someone. The backup chain of on-call persons is updated whenever there is a change in the current staff.

The Operating Authority ensures that all personnel included in the coverage schedules have the necessary skills and knowledge to perform the required responsibilities. Personnel skill levels and expectations are defined in the Competencies Policy.

In the event of the Overall Responsible Operator (ORO) not being available due to vacation, illness, etc., routine day to day operation and maintenance of the water systems will continue to be under the control of the OIC under the authority of the Director of Water and Wastewater of the Nation Municipality. The ORO is responsible to provide notification to the Director of scheduled or unscheduled unavailability. The ORO may be available remotely to provide advice by phone or email if necessary.

2.0 ON CALL COVERAGE PROCEDURE

The following procedure defines the method to ensure personnel coverage for The Nation Drinking Water System.

This procedure is relevant to the operating personnel of Operating Authority including the ORO, OIC and operators. It identifies how operational staff will assess and respond to situations that directly affect drinking water quality in The Nation Drinking Water supply Systems. It also clarifies performance of duties during weekends and holidays.

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00	2	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	2	18.08.10	Updated QMS rep title and modify operating authority	J. Leroux	N. Pigeon	D. Renaud
02	2	18.10.15	Modify phrases in OWNER / TOP MANAGEMENT	J. Leroux	N. Pigeon	D. Renaud
03	2	19.04.18	Modify MOECC for MECP	J. Leroux	N. Pigeon	D. Renaud
04	2	19.09.20	Added CAO to the Clerk title	J. Leroux	N. Pigeon	D. Renaud
05	2	20.11.23	Added at 2.0, that the DWQMS will now be posted on the Website.	J. Leroux	N. Pigeon	D. Renaud
06	2	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1.0 OWNER / TOP MANAGEMENT – THE NATION MUNICIPALITY

All revisions to the Operational Plan by Nation's Staff will be communicated to the QMS representative (Director of Water and Wastewater), and CAO - Clerk. The Nation Municipality will be provided with a current copy of the QMS following the annual revision. The QMS rep updates the executive committee on a regular basis with a minimum once a year presented as an annual report.

2.0 OPERATING AUTHORITY – THE NATION MUNICIPALITY

Copies of the currently approved Operational Plan will be kept at the Water Treatment Plant and at the Nation Municipality Headquarters, a digital copy is also available through the Nation Municipality website. The digital copy will be updated once a year, the latest revision date will be posted beside the document. Communication with Operating Authority personnel will be handled internally through formal meetings (NA-QMS-E12-001), and feedback from operators. Regular meetings will occur to keep the Owner/Top Management informed on the status of the water systems.

3.0 SUPPLIERS

Communication with parts and material suppliers, and service providers is achieved through regular written communications. The goal is to inform each supplier and service provider of the technical and financial procedures which must be followed in order to continue to provide their service to the Nation Municipality. In addition, MSDS sheets and material certifications (ANSI/NSF-approval) must be provided upon delivery of any product related to the treatment of drinking water to the municipality.

4.0 CONSUMERS

The Clerk has made available to the Nation's water consumers, an up-to-date copy of the Operational Plan for its Drinking Water Supply Systems. This plan is updated annually and is available at the offices of Nation's Headquarters. All questions or concerns from consumers relating to water quality or operation of the water systems will be directed to the Operating Authority; and will be responded to accordingly. Annual Water Reports from the MECP and Summary Reports will be also be made available in hard copy at the Nation's Headquarters.

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00	6	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	6	18.05.29	Updated Suppliers List and addresses	J. Leroux	N. Pigeon	D. Renaud
02	6	18.08.10	Updated Suppliers List and addresses	J. Leroux	N. Pigeon	D. Renaud
03	6	20.02.13	Updated Suppliers List and addresses	J. Leroux	N. Pigeon	D. Renaud
04	6	20.09.24	Added paragraph of other municipality help at 2.0	J. Leroux	N. Pigeon	D. Renaud
05	6	21.09.13	Updated the Essential supplies and services list. Also added the quality requirements for the distribution system components to reflect the right NSF standards.	J. Leroux	N. Pigeon	D. Renaud
06	6	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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ESSENTIAL SUPPLIES & SERVICES

1.0 IDENTIFICATION

All essential supplies and services for the operation and maintenance of The Nation Municipality drinking-water systems have been identified and documented in the Essential Supplies and Services List, which outlines vendors for each item.

ESSENTIAL SUPPLIES AND SERVICES LIST				
ESSENTIAL SUPPLY OR SERVICE	PRIMARY SUPPLIER	CONTIGENCY SUPPLIER	PROCUREMENT	QUALITY REQUIREMENTS
Ammonia sulphate	Brenntag Canada Inc. 2900 Boul. J-B Deschamps Lachine, QC, (514) 636-9230	General Chemical 201 City Centre Dr. Mississauga, ON (905) 566-3851 (800) 361-5308	Purchases will be made when needed using purchase requests via email. A minimum stock of ammonia sulphate for at least 1 month is available at all times at the Limoges WTP.	Product is NSF approved. Supplier delivers the product which includes a Certificate of Analysis and MSDS.
Automation	Capital Controls 1333 Michael Street, Ottawa, ON, K1B 3M9 (613) 248-1999	Dakins 1-4161 Sladeview Crescent, Mississauga, ON, L5L 5R3 (800) 862-1057	Service to be provided during emergency situations.	Supplier personnel must have essential certification for performing their duties.
Licensed Laboratory	Caducean Env. Labs. 2378 Holly Lane Ottawa, ON, K1V 7P1 (613) 228-1145 (613) 720-9765	Maxxam Analytics 32 Colonnade road, Nepean ON L5N 2L8 (613) 274-0573	Purchases will be made when needed using purchase requests via email.	Accredited to standard ISO/IEC 17025:2005 by Canadian Association for Laboratory Accreditation (CALA) or the Standards Council of Canada (SCC). Licensed to perform drinking water tests in Ontario See MECC list of licensed Labs http://www.ontario.ca/environment-and-energy/list-licensed-laboratories
Electrical equipment	Baxtec 2470 Don Reid Dr. Ottawa, ON. (613) 738-7450	Futech 2615 unit 16 Lancaster, Ottawa, ON, K1B 5N2 (613) 244-1595	Purchases will be made when needed using purchase requests via email.	The equipment and/or services provided must satisfy the request.

ESSENTIAL SUPPLIES AND SERVICES LIST				
ESSENTIAL SUPPLY OR SERVICE	PRIMARY SUPPLIER	CONTIGENCY SUPPLIER	PROCUREMENT	QUALITY REQUIREMENTS
Generator Maintenance	Genrep Ltd 25 Gifford St, Nepean K2E 7S3 tel: 613-225-9244 fax: 613-225-4690	Gal Power Systems Ottawa Ltd. 84A Bentley Ave, Nepean, ON, K2E 6T9 tel: 613-226-4876 fax: 613-226-7236 toll free: 1-800-619-4219	Service to be provided annually and during emergency situations.	Personnel must possess essential certification for performing their duties.
Coagulant	Kemira Water Solutions 3405 Boulevard Marie-Victorin Varenes, QC, J3X 1P7 (450) 652-0665	Canada Colors & Chemicals Limited (CCC) 6605 Hurontario Street, Suite 400, Mississauga, ON L5T 0A3 416-443-5500	Purchases will be made when needed using purchase requests via email. A minimum stock of coagulant for at least 2 weeks is available at the Limoges WTP.	Product must be NSF approved. Supplier delivers product which includes a Certificate of Analysis and MSDS.
Disinfectant (Sodium Hypochlorite)	Brenntag Canada Inc. 3000 Boul. J-B Deschamps Lachine, QC, H8T 1E2 (514) 636-9230	General Chemical 201 City Centre Dr. Mississauga, ON (905) 566-3851 (800) 361-5308	Purchases will be made when needed using purchase requests via email. A minimum stock of sodium hypochlorite for at least 7 days is available at the Limoges WTP.	Product must be NSF approved. Supplier delivers product which includes a Certificate of Analysis and MSDS.
Electrician and pump repair technician	Electrotek 4754 St_Catherine St. St-Isidore, ON K0C 2B0 (613) 524-3025	Maxi Power 1050 Route 500 West, Casselman, ON. K0A1M0 613-764-3000	Services will be requested when needed using standard purchase orders.	Personnel must possess essential certification for performing their duties
Laboratory supply	Hach SALES & SERVICE 3020 Gore Road, London, Ontario N5V 4T7 Phone: 1-800-665-7635	Metcon Sales & Engineering 15 connie Cr. Concord, On L4K 1L3 (905) 738-2355	Purchases will be made when needed using purchase requests via email.	Equipment and/or services must satisfy the request.

ESSENTIAL SUPPLIES AND SERVICES LIST				
ESSENTIAL SUPPLY OR SERVICE	PRIMARY SUPPLIER	CONTIGENCY SUPPLIER	PROCUREMENT	QUALITY REQUIREMENTS
Mechanical services	Baxtec 2470 Don Reid Dr. Ottawa, ON. (613) 738-7450	Genrep Ltd 25 Gifford St. Ottawa, On (613) 225-9244	Services will be requested when needed.	Personnel must possess essential certification for performing their duties
Polymer	Northland Chemical Inc 7480 Bath rd. Mississauga, ON L5S 1G7 Tel. 905-676-1777	Veolia Water 4105 Rue Sartelon Saint-Laurent, QC H4R (514) 334-7230	Purchases will be made when needed using purchase requests via email. A minimum stock of polymer for at least 1 month is available at the Limoges WTP.	Product must be NSF approved. Supplier delivers product which includes a Certificate of Analysis and MSDS.
Potassium permanganate	Brenntag 2900 Boul. J-B Deschamps Lachine, QC, H8T 1C8 (514) 636-9230	ClearTech Industries Inc. Unit 16, 151 Brunel Road P 800.387.7503 C 438-870-9085	Purchases will be made when needed using purchase requests via email. A minimum stock of potassium permanganate for at least 1 month is available at the Limoges WTP.	Product must be NSF approved. Supplier delivers product which includes a Certificate of Analysis and MSDS.
Pumping services	Lamoureux Pumping 758 Route 400 East, Casselman, ON K0A 1M0 (613) 764-3360	Clean Water Works 1800 Bantree St, Ottawa, ON K1B 4L6 613-745-2444	Services will be requested when needed.	Personnel must possess essential certification for performing their duties
Water Haulage (Potable Water)	Lamoureux Pumping 758 Route 400 East, Casselman, ON K0A 1M0 (613) 764-3360	Villeneuve Milk Transport Limited 17504 Dyer Rd County 22 Rr 1 Maxville, ON, K0C 1T0 (613) 538-2461	Service to be provided during emergency situations.	Truck must be designated for the delivery of potable water only

ESSENTIAL SUPPLIES AND SERVICES LIST				
ESSENTIAL SUPPLY OR SERVICE	PRIMARY SUPPLIER	CONTIGENCY SUPPLIER	PROCUREMENT	QUALITY REQUIREMENTS
Diesel fuel	W.O. Stinson & sons 1395 Greely Lane, Greely, ON K4P1A1 613-821-3724	Coop agricole d'Embrun 926 rue Notre-Dame P.O. Box 189 K0A 1W0 (613)-443-2833	Purchases will be made when needed using purchase requests via phone when the tank is half-full.	Commercial quality fuel is acceptable. Supplier delivers product which includes a certificate of analysis and MSDS
Distribution system components	Crane Supply 1630 Star Top Road Ottawa, ON, K1B 3W6 Canada TEL: (613) 745-9135	Wolseley Ottawa Waterworks 2474 Leitrim Rd. Gloucester, ON, K1T 3V3 613-822-3444	Purchases will be made when needed using purchase requests via phone or email.	Equipment and/or services must satisfy the request. Equipment must conform to the NSF 61.

Health-based standards have been designed to safeguard drinking water by helping to ensure the material safety and performance of products that come into contact with drinking water. These types of standards are primarily developed by NSF International/American National Standards Institute, and include:

- Health-based standards:
 - NSF 60 - Drinking water treatment additives - Health effects
 - NSF 61 - Drinking water system components - Health effects

2.0 EXPECTATIONS AND QUALITY

Services and supplies to the Nation Municipality must be provided in accordance with relevant legislative and regulatory requirements. These expectations are communicated to vendors and providers of essential services and supplies on a regular basis through regular communication. Details such as deliverables and measurable are outlined.

To ensure the quality of the supplies and services used by The Nation Municipality to maintain and operate its drinking-water systems meet expectations; all providers are required to supply the Operating Authority with approved certification that qualifies them to supply their products and services.

In the event of a disaster or a shortage of any kind, we will try to accommodate any nearby municipalities but will also call them for help for any of our Essential supply. In this case, if any certificate of analysis that is usually required, will still be required by the other helping municipality to confirm Quality requirements.

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00	3	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	3	18.05.23	Remove blank page	J. Leroux	N. Pigeon	D. Renaud
02	3	18.08.10	Updated Qms rep title and added risk assessment as part of the review	J. Leroux	N. Pigeon	D. Renaud
03	3	19.09.20	Modified the Key elements in the Procedure	J. Leroux	N. Pigeon	D. Renaud
04	3	19.11.18	Added under Element 8, in the paragraph 1.1.	J. Leroux	N. Pigeon	D. Renaud
05	3	19.12.16	Added the word checklist in 2. Report and Action	J. Leroux	N. Pigeon	D. Renaud
06	3	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1. REVIEW & PROVISION OF INFRASTRUCTURE

1.1 Infrastructure Review

The Operating Authority will review its infrastructure on an annual basis to assess the adequacy of the infrastructure; assuring safe, effective, and reliable operation of the Nation's Drinking Water Systems. This review is completed by the QMS rep and/or Overall Responsible Operator with input from other personnel as needed.

Operations personnel will monitor performance trends of existing drinking-water system infrastructure in order to create a plan for infrastructure management, and to prioritize future resource allocation. A summary of infrastructure reviews are documented and stored in the Central Server located at the Operating Authority office. It will also be an opportunity to consider outcomes of the risk assessment under Element 8.

Annual reviews of the drinking water infrastructure are carried out. These reviews include assessment of the condition and performance of the groundwater supply wells; the water treatment plant; and all distribution equipments such as water mains, line valves, fire hydrants, and pumping stations. Condition assessments of buildings and workspaces are also carried out annually.

1.2 Procedure Description

This procedure defines the method used to evaluate the adequacy of all components in The Nation Municipality drinking water supply infrastructure. This is a preventative-based procedure that has been developed to help personnel assess specific elements of the Drinking Water Systems.

The components of the Drinking Water Supply Systems listed below are assessed at least once a year:

Limoges Drinking Water System

- Groundwater wells
- Limoges Water Treatment Plant
- Forest Park Booster station
- Limoges Water Distribution System (Water main, line valves, and hydrants)

St-Isidore Drinking Water System

- Plantagenet Booster Station
- Plantagenet – St-Isidore Transmission (trunk) water main
- St-Isidore Water Storage Tower
- St-Isidore Water Distribution System (distribution water main, line valves, and hydrants)

1.3 Procedure

Infrastructure inspections are carried out as part of the Nation's preventative maintenance Board. The check-lists vary in length and content, based on component type, and frequency of the inspection. Key elements of the inspection are:

- Equipments components checks
 - Current level of wear on components
- Structural and Functional integrity checks of buildings
 - Exterior and interior structural damages
 - Adequacy of working spaces
- Loading Capacity assessment
 - Water pumps run time
 - Water production time schedules
 - Adequacy of water storage levels for fire and communal consumption
- Structural and Functional integrity checks of Fire hydrants, trunk and distribution water mains, line valves, and services
 - Corrosion and leaks
 - Pressure and water flow tests
 - Operability of components

The Nation's preventive maintenance board also includes review of documents :

- MSDS products
- Operational plan
- Risk assessment outcomes

2. REPORT AND ACTION

Upon the completion of the infrastructure review checklist, the QMS rep will prepare a year-end report that summarizes findings based on the review, and will outline infrastructure needs. This report is presented to Council or its representative during annual budget deliberations to ensure the needs in infrastructure rehabilitation or acquisition are known and planned for.

Regular reports on maintenance, operations, and capital infrastructure are produced and presented to Council for review. This information is also communicated through the Drinking-Water Systems Regulation O. Reg. 170/03 Annual Reports.

Based on the infrastructure needs outlined in the year-end report, the Council will be responsible for reviewing the findings and recommendations. Council will use this information to make the appropriate decisions related to the provision of required infrastructure, and granting approval for purchases.

Limoges Drinking water System & St-Isidore Distribution system

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00	4	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	3	18.08.10	Modify job titles, removed the PGMO for the maintenance Board	J. Leroux	N. Pigeon	D. Renaud
02	3	18.09.19	Modify and changed wording.	J. Leroux	N. Pigeon	D. Renaud
03	3	19.04.18	Changed Deputy Director for Director of Water and Wastewater	J. Leroux	N. Pigeon	D. Renaud
04	3	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud
05	3	21.11.03	Added reference to the Asset Management plan in the 3.0 RENEWAL/CAPITAL UPGRADES. The Asset make reference to the long term forecast.	J. Leroux	N. Pigeon	D. Renaud

This page is a record of all emissions and revisions for the concerned document. The elements that have been modified are indicated herein.

1.0 PLANNED MAINTENANCE

A preventative maintenance board for The Nation Drinking Water Systems is being implemented. Preventative maintenance tasks, procedures, and schedules for the water systems are described in this section. Preventative maintenance on the water systems is performed generally on a time-generated schedule, in accordance to needs and priorities. It is being developed to limit the risks associated with unplanned and emergency failures which could affect the production of safe drinking water; and consume valuable time and resources. The annual and monthly schedules are posted at the Limoges Water Treatment Plant and are available through a Computerized Maintenance Excell sheet.

Scheduled tasks are initially defined in accordance with manufacturer's recommendation. The tasks and schedules are later revised as needed according to experience gained from maintenance history; equipment run time accumulated by hour meters; and observation of performance by the OIC. Planned maintenance tasks and procedures are reviewed by the OIC and the operator and/or tradesperson. Monthly maintenance and performance reports generated from the preventative maintenance board are reviewed by the QMS rep. Optimization of tasks and schedules for planned maintenance improvement are implemented jointly by the OIC, ORO, and the QMS rep.

1.1 Maintenance Management Board

Water system maintenance is carried out using either planned and unplanned methodologies. Planned maintenance is scheduled using variables such as time generation and run hour meters, while unplanned is generated by an imminent failure or an actual failure. The Maintenance programs and data are stored in the central office server of the Operating Authority. It is both user-friendly and reliable, and operation. The server files are backed up daily, through the central server.

1.2 Schedule and work-orders issuance

Planned maintenance activities performed through the use of work-order system on pre-determined schedules are shown in NA-QMS Binder (NA-QMS-E15-001). During reviews of the maintenance board, the OIC may modify the procedure or the timing of tasks as required. The OIC will dispatch the work-orders to the appropriate operator(s) who may receive a list of work-orders; with a level of priority for completion of each task.

1.3 Program review

An assessment on the effectiveness of the maintenance management board will be done as needed throughout the year. Each modification to the maintenance board will create a new revision of the document.

Performance parameters such as rate of unplanned or failure occurrences, availability of material needed for the tasks, compared to sufficiency of resources relative to the work load defined in the maintenance program; the Director of Water and Wastewater (QMS rep), the ORO, and the OIC will assess effectiveness and efficiency of maintenance and could then modify maintenance schedules and task definitions as required.

2.0 UNPLANNED MAINTENANCE

Unplanned maintenance tasks result from equipment malfunction or complete failure. The operators typically respond to unplanned maintenance during normal working hours while the on-call operator responds during off-hours. A pager system is in place to allow quick response time for those unexpected activities. On-call personnel is responsible for recording all activities carried out in the log book. Measures to prepare for and expedite unplanned maintenance include equipment redundancy (back-up units), spare parts inventory, availability of updated plans, as well as documented repair and safety procedures.

Although impossible to predict, unplanned maintenance trends, such as the costs of supplies, the repair occurrence rates, and the amount of repair performed on any given equipment, are valuable in assessments of effective maintenance management. The effectiveness of the unplanned calls is measured by indicators such as downtime of equipment that may impact water supply, the response time by personnel to take corrective action, and the frequency of the maintenance activities performed.

3.0 RENEWAL / CAPITAL UPGRADES

Replacement of aging fixed heavy equipment, facility upgrades, expansions, and subsurface (underground) systems improvements are planned by the Director of Water and Wastewater and the OIC and submitted yearly to the budget submission. All major expenses are identified within the budget and require approval by Council. A detailed report on the maintenance programs; requirements for infrastructure rehabilitation; and renewal of the infrastructure is prepared annually by the Operating Authority.

As identified in the infrastructure review and asset management plan (long term forecast), infrastructure rehabilitation and renewal needs shall take into account future growth demands. Also, a criticality cost analysis for the recommended capital expense is validated by staff suggestions, consumer complaints, and water quality trends. The cost of repair/cost of renewal analysis will also indicate the priority for each requirement, taking into account that time is the most important parameter of this equation, with the consequences of equipment failure being its critical set point. Planning infrastructure rehabilitation and renewal should take into consideration the existing capacity of the water supply systems to meet growing demands; and priorities should be identified accordingly. It is recommended that, where practical, replacement of aging underground infrastructure is coordinated with road reconstruction activity conducted by the Public Works Department. Activities coordinated as such enhances water system reliability and will provide financial savings to the Nation Municipality.

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00	8	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	8	18.05.29	Added Haloacetic acids to 3.6.2.1 table	J. Leroux	N. Pigeon	D. Renaud
02	8	18.08.10	Modify NA-QMS element numbers	J. Leroux	N. Pigeon	D. Renaud
03	8	19.04.18	Changed MOECC for MECP	J. Leroux	N. Pigeon	D. Renaud
04	8	19.09.20	Modified name of Records in table 3.6.3	J. Leroux	N. Pigeon	D. Renaud
05	8	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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SAMPLING, TESTING & MONITORING

1.0 SAMPLING, TESTING, AND MONITORING ACTIVITIES

The Nation Municipality's water treatment and water distribution operators perform sampling, testing, and monitoring activities in accordance with regulatory and legislative requirements to ensure the safety and security of drinking-water for their consumers. Details of these activities are outlined in the Sampling, Testing, and Monitoring Procedure.

The frequency of sampling, testing, and monitoring will be increased during times of adverse water conditions and high risk to drinking-water quality. The process for addressing these situations is outlined in the Sampling, Testing, and Monitoring Procedure.

All collected samples are sent to a certified laboratory for testing. The Nation Municipality will request copies of accreditation licenses from all laboratories that are used. This documentation is kept on file for reference purposes.

If sampling, testing, and monitoring activities indicate that water quality results exceed acceptable limits, The Nation Municipality will follow established reactive plans to address the situation. The Nation Municipality will also ensure that its actions comply with requirements and guidelines specified by the Ministry of the Environment, Conservation and Parks (MECP).

2.0 COMMUNICATION OF RESULTS

Results of sampling, testing, and monitoring activities are documented in a Summary Report and included in the Drinking-Water Systems Regulation O. Reg. 170/03 Annual Report. These reports are submitted to Council and the MECP for review, and are also available to the public at The Nation Municipality's Office.

Results of sampling, testing, and monitoring activities are presented to the Director of Water and Wastewater and/or Clerk, who will then communicate the information to the appropriate internal personnel.

3.0 SAMPLING, TESTING AND MONITORING PROCEDURE

3.1 Purpose

The following procedure describes the sampling, testing and monitoring activities conducted by the Operating Authority for The Nation drinking water system in order to assure compliance to Ontario regulations in the production of safe drinking water.

3.2 Scope

The procedure includes a description of activities for process control and quality monitoring of treated drinking water; and the requirements during challenging conditions in the Nation drinking water system. The procedure also contains a description of sampling, testing and monitoring activities that occur upstream of the Limoges water treatment plant and describes the recording and sharing of results to the Owner.

3.3 Responsibility

The responsibility of following this procedure is pertinent to all personnel of The Nation Operating Authority including the QMS representative, the OIC, the ORO and operators.

3.4 References

DWQMS Element 16

Limoges water treatment plant Operations Manual – Part G and Appendix M

Standard Methods for the Examination of Water and Wastewater – 20th edition

3.5 Definitions

See section 5 – appendix G of the Limoges water treatment plant Operations Manual

3.6 Procedure

3.6.1 Sampling

3.6.1.1 Type of samples

Water samples for in-house analysis (pH, temperature, turbidity, free and total chlorine)

Water samples for external laboratory analysis according to O.Reg 170/03

Continuous monitoring equipment samples (turbidity, free and total chlorine)

3.6.1.2 Collection of samples

Samples are taken from various locations within The Nation drinking water systems in approved sample containers. Glass or polyethylene containers are usually accepted containers. All samples are to be collected by certified operators within the Operating Authority. The operating personnel must ensure that the samples are preserved and properly protected so that the testing results are indicative of the actual treated water. For further information see *Practices for the Collection and Handling of Drinking Water Samples, Version 2.0, April 1, 2009* and Section 1 of *Standard Methods for the Examination of Water and Wastewater – 20th edition*.

The principal sampling points for in-house and external analysis are: raw water at the pumping well, clarified water downstream of the filters, treated water following the primary disinfection, the point of entry of the treated water into the Limoges distribution network as well as samples along the distribution network for the Limoges and the St. Isidore drinking water system.

For samples to be analyzed by an external laboratory, the operating personnel will follow specific laboratories sampling directions and:

- Label the pertinent containers provided by the accredited laboratory
- Complete and submit the forms provided by the accredited laboratory
- Respect specific temperature conservation requirements and time delays

3.6.2 Testing

3.6.2.1 Type and frequency of analysis - O.Reg 170/03

Operational	Raw water	Treated water	Distribution
Turbidity	Monthly		
Free and total chlorine residual			Daily

O.Reg 170/03 – Schedule 7

Microbiological	Raw water	Treated water	Distribution
Escherichia coli/Fecal coliforms	Weekly	Weekly	Monthly (8+2 samples)
Total coliforms	Weekly	Weekly	Monthly (8+2 samples)
Bacteria (heterotrophic plate count)	N/A	Weekly	Monthly (25% of samples)

O.Reg 170/03 – Schedule 10

Chemical	3 months	1 year	36 months	60 months
Inorganics ¹			x	
Organic ²			x	
Nitrate/Nitrite	x			
Trihalomethanes	x			
Haloacetic acids	x			
Sodium				x
Fluoride				x
Lead ³		x		

O.Reg 170/03 – Schedule 13

1 See schedule 23

2 See schedule 24

3 See schedule 15

3.6.2.2 In-house of analysis

Routine laboratory analysis will be performed by certified operators at the Limoges water treatment plant. The results will confirm online continuous monitoring equipment as well as provide additional verifications to the performance and quality of the drinking water production. The analysis results will be recorded on Monthly round spreadsheets (NA-QMS-E16-001) which are filed in cabinet at the end of the year. The analysis methods used by the certified operators are listed in a separate document.

In-house analysis schedule

Parameter	Raw Water (Limoges)	Pre-Treatment (splitter box) (Limoges)	Water to reservoir (storage tank) (Limoges)	Point of entry in the network (booster station exit) (Limoges)	Distribution (Limoges)	Distribution (St. Isidore)
pH	monthly		monthly			
Temperature	monthly		monthly			
Turbidity	monthly		monthly			
Free chlorine residual			Daily	Daily	Weekly	Weekly
Total chlorine residual			Daily	Daily	Weekly	Weekly
Colour	monthly		monthly			
Iron	monthly		monthly			
Manganese	monthly	Weekly	monthly			
Hydrogen Sulfide	monthly					
Aluminum			monthly			
Free Ammonia (NH3)			monthly		Monthly	
Nitrate (NO3)					Monthly	Monthly
Nitrite (NO2)					Monthly	Monthly
Hardness						

3.6.2.3 External analysis

Microbiological analyses are performed by an external laboratory every week. The weekly samples collected for microbiological analyses include raw water samples, treated water samples and distribution samples.

Nitrate, nitrite and trihalomethanes analyses are also conducted by an external laboratory every three months. The samples for trihalomethanes analyses are collected at points in the distribution network most likely to have an elevated potential for the formation of THM. The samples for nitrate and nitrite analyses are collected from the point of entry sampling location at the laboratory water tap.

Lead sampling is conducted every year by the operating authority and analyses are performed by an external laboratory. These samples are collected within the distribution network according to schedule 15 of O.Reg 170/03.

Inorganics and organics analyses are performed every 36 months. The list of parameters analyzed can listed in schedule 23 and 24 of O.Reg 170/03. The samples for these analyses will be collected from the point of entry sampling location at the laboratory water tap.

Fluoride and sodium analyses are performed every 5 years by an external laboratory from samples taken from the point of entry sampling location at the laboratory water tap.

An external analysis sampling program is also available (NA-QMS-E16-002).

3.6.2.4 Continuous monitoring

The SCADA system located in the Laboratory allows operators with the capability to continuously monitor all measurable operation parameters including water flows, reservoir and basin levels, chemical dosage set points, turbidity, and free and total chlorine residual.

3.6.2.5 Challenging conditions sample and testing

Specific challenging conditions for the production of safe drinking water at The Nation Drinking Water Systems are summarized in the following table.

Challenging condition	Raw water	Treated water	Distribution	Planned action
Spring run-off/Heavy rainfall (<i>Limoges</i>)	Possible increase of turbidity			Increase of coagulant addition. Closer monitoring of results.
Watermain repairs (<i>Limoges and St. Isidore</i>)			Contamination following repairs	Isolation of section and disinfection.
Dead ends in distribution network (<i>Limoges and St. Isidore</i>)			Increase in THM formation Drop in combined chlorine residual	Pertinent sampling at location for THM. Regular flushing
Snow accumulation (<i>Limoges and St. Isidore</i>)			Sampling difficulties	Provide operating personnel with appropriate equipment.
Poor water quality sent to the St Isidore elevated reservoir (<i>St. Isidore</i>)			Poor water quality in St. Isidore distribution system; Potential drinking water contamination	Upon low chloramine alarm; Notify OCWA at LeFaive WTP; Onsite startup of standby top-up Cl. system at Plantagenet BS; Flush St. Isidore distribution; sample and validate results
Pressure drops in distribution network (<i>Limoges and St. Isidore</i>)			Increase of water pumped from booster station	On site inspection to determine if leakage is occurring.

The planned actions listed in the table summarize or refer to pertinent procedures in the case of challenging conditions.

3.6.2.6 Upstream monitoring

The following operational monitoring upstream of The Nation subject system is conducted by operational authority according to O. Reg 170/03.

Operational in house analyses	Raw Water (<i>Limoges</i>)
pH	Monthly
Temperature	Monthly
Turbidity	Monthly
Colour	Monthly
Iron	Monthly
Manganese	Monthly
Hydrogen Sulfide	Monthly
Escherichia coli/Fecal coliforms	Weekly
Total coliforms	Weekly

The drinking water delivered to the elevated reservoir in St-Isidore is treated at the Lefavre Water Treatment Plant (owned by the municipality of Alfred-Plantagenet and operated by OCWA). The distribution from the St-Isidore elevated reservoir is the responsibility of The Nation Operating Authority. The quality of the water sent to the elevated reservoir is monitored by a continuous chlorine analyzer to determine the combine chlorine residual at the point of entry to the St-Isidore distribution network. Frequent samples are collected at the point of entry into the St-Isidore distribution system in order to asses the drinking water quality provided by the Lefavre WTP. A top-up chloramination system in the Plantagenet pumping station can be used to increase total chlorine residual when water delivered from the Lefavre treatment plant has low total chlorine residuals.

3.6.3 Record-keeping

All testing results are recorded in the appropriate laboratory analysis data sheets, monthly operational reading and & in-house testing results spreadsheets and operation log books.

Sampling Parameter	Location	Quality Targets at POE	Response	Challenging Conditions	Records
pH	Raw, treated and distribution	6.5 to 8.5	Lime addition	Spring run-off/Heavy rainfall	Maintenance checklist (NA-QMS-E15-003) Log books (NA-QMS-E16-003)
Temperature	Raw, treated and distribution	6 to 20 °C	No control	Spring run-off/Heavy rainfall	
Turbidity	Raw, treated and distribution	< 0.3 NTU	Coagulant increase	Spring run-off/Heavy rainfall	
Free chlorine residual	Treated, POE and distribution	min 0.25 mg/L max 4.0 mg/L	Adjustment of chlorination and chloramination	Dead ends in distribution network	
Total chlorine residual	Treated, POE and distribution	N/A	Adjustment of chlorination and chloramination	Dead ends in distribution network	
Colour	Raw, treated and distribution	1.0 to 6.0 TCU	Adjustment possible if colour caused by Iron	Spring run-off/Heavy rainfall	
Iron	Raw, treated and distribution	TBD	Potassium permanganate addition		
Manganese	Raw, treated and distribution	TBD	Potassium permanganate addition		
Hydrogen Sulfide	Raw	TBD	Adjustment of aeration by increasing air blowers.		
Aluminum	Distribution	TBD	TBD		
Free Ammonia (NH3)	Distribution	TBD	TBD		
Nitrate (NO3)	Distribution	< 10 mg/L1	TBD		
Nitrite (NO2)	Distribution	< 1 mg/L1	TBD		

¹ O.Reg 169/03

Limoges water treatment plant in-lab results

3.6.4 Communication of results

Results of sampling, testing, and monitoring activities are documented in a Summary Report and included in the Drinking Water Systems Regulation O. Reg. 170/03 Annual Report. These reports are submitted to Council and the MECP for review, and are also available to the public at The Nation Municipality Municipal Office.

Results of sampling, testing, and monitoring activities are presented to the Director of Water and Wastewater and/or Clerk, who will then communicate the information to the appropriate internal personnel.

3.6.5 Adverse results

If sampling, testing, and monitoring activities indicate that results exceed acceptable limits, The Nation Municipality will follow established reactive plans to address the situation. The Nation Municipality will also ensure that its actions comply with requirements and guidelines put forth by the Ministry of the Environment, Conservation and Parks (MECP).

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00	4	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	4	18.05.29	Added the Calibration frequency in table 2.0	J. Leroux	N. Pigeon	D. Renaud
02	4	18.10.16	Added the "weekly check" description in 1.0 and updated the Free analyzer description for Forest Park.	J. Leroux	N. Pigeon	D. Renaud
03	4	18.10.29	Updated item #4 of the Calibration Table, new Free Analyzer.	J. Leroux	N. Pigeon	D. Renaud
04	4	19.09.20	Added item #24 & 25.	J. Leroux	N. Pigeon	D. Renaud
05	4	20.02.04	Added description about recording equipment failure of calibration.	J. Leroux	N. Pigeon	D. Renaud
06	4	20.09.10	Updated item #8 and #11 in the calibration table.	J. Leroux	N. Pigeon	D. Renaud
07	4	20.10.06	Changed Serial Number of Flow meter item#8 and #11	J. Leroux	N. Pigeon	D. Renaud
08	4	21.09.13	Below table 2.0, added the description for the cross reference to the Contact Time calculation for the level of Treatment.	J. Leroux	N. Pigeon	D. Renaud
09	4	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1.0 CALIBRATION AND MAINTENANCE ACTIVITIES

The Nation Municipality's water treatment facility and water distribution system operators calibrate and maintain measurement and recording equipment to ensure their continued operation.

The list of measurement and recording equipment used by The Nation Municipality is outlined in the Calibration Table (see section 2.0). This document is reviewed regularly and updated as required. The associated maintenance and calibration requirements are available in the maintenance board.

The calibration of measurement and recording equipment is managed through the preventative maintenance board, which outlines when equipment requires service.

When possible, maintenance activities are performed by internal personnel. If external support is required, calibration and maintenance is performed by the original equipment manufacturer (OEM) or by a contractor that has been certified by a national standard.

Measurement and recording equipment produces a calibration report or certificate when calibrated by external support. If the report does not pass, the recording equipment needs to be replaced. The replacement of the equipment depends on the importance of the recording equipment. If the recording device is part of the drinking water treatment and process the device must be replaced immediately. If the device is for information purposes only, example: a Flow Meter. The replacement can be completed within the next 12 months.

The Nation Municipality requires records documenting calibration and maintenance performed by external resources. These records are stored onsite at the Limoges Water Treatment facility.

The “*weekly check*” in the “*calibration Frequency*” column means that when the operator sees a variation in between the Bench test and the Analyzer result, for a couple of days, they then manually calibrate the analyzer to match the Bench result.

Limoges Drinking water System & St-Isidore Distribution system

2.0 CALIBRATION TABLE

CALIBRATION OF MONITORING EQUIPMENT (<i>Limoges</i>)						
Item #	Equipment	Location	Model	Serial Number	Calibration Method	Calibration Frequency
1	Continuous turbidity monitoring	Upstream of water reservoir	Turbidimeter – 1720E	1211C0050704	External calibration	Yearly
2	Cont. free chlorine analyzer	Upstream of water reservoir	Free chlorine analyzer – Hach CL17	Cont. free chlorine analyzer	Comparison method	Weekly check
3	Cont. free chlorine analyzer	Point of entry/Limoges Network	Free chlorine analyzer – Hach CL17	060400015488	Comparison method	Weekly check
4	Cont. free chlorine analyzer	Forest Park Distribution network	Free chlorine analyzer- Wallace & Tiernan – Depolox 3 Plus	7107858	Comparison method	Weekly check
5	Cont. free chlorine analyzer	Clearwell	Free chlorine analyzer - Swan	5419	Comparison method	Weekly check
6	Forest Park flow meter	Forest Park reservoir	Promag 50	JC07C916000	External calibration	Yearly
7	Flow meter 1	Downstream of low lift pumps	Flowmeter - ABB	4581440701	External calibration	Yearly
8	Flow meter 2	Point of entry/Downstream of booster station	Flowmeter - ABB	3K672019370389	External calibration	Yearly
9	Flow meter 3	Downstream of high lift pumps	Flowmeter - ABB	4581440402	External calibration	Yearly
10	Flow meter 4	Upstream backwash water valve	Flowmeter - ABB	4581440401	External calibration	Yearly
11	Flow meter well 1	Well No. 1	Siemens	M5134502	External calibration	Yearly
12	Flow meter well 2	Well No. 2	Flowmeter-ABB	5635	External calibration	Yearly
13	Cont. Total Chlorine analyzer	Upstream of water reservoir	Total chlorine analyzer – Hach CL17	1110004221916	Comparison method	Weekly check
14	Cont. Total Chlorine analyzer	Point of entry/Limoges Network	Total chlorine analyzer – Hach CL17	060400015489	Comparison method	Weekly check
315	Cont. Total Chlorine analyzer and free	Forest Park Distribution network	Total chlorine analyzer – Hach CL17	130500473603	Comparison method	Weekly check
16	Chlorine analyzer	Limoges' Plant Laboratory	Pocket Colorimeter II	HACH	External calibration	Yearly

MEASUREMENT AND RECORDING EQUIPMENT CALIBRATION AND MAINTENANCE

Element 17

Limoges Drinking water System & St-Isidore Distribution system

CALIBRATION OF MONITORING EQUIPMENT (<i>Limoges</i>)						
Item #	Equipment	Location	Model	Serial Number	Calibration Method	Calibration Frequency
17	Chlorine analyzer	Limoges' Plant Laboratory	Pocket Colorimeter II	HACH	External calibration	Yearly
18	Turbidimeter	Limoges' Plant Laboratory	Turbidimeter - 2100 P	001100026978	External calibration	Yearly
19	Spectrophotometer	Limoges' Plant Laboratory	Spectrophotometer – DR3900	1586031	External calibration	Yearly

CALIBRATION OF MONITORING EQUIPMENT (<i>St. Isidore</i>)						
Item #	Equipment	Location	Model	Serial Number	Calibration Method	Calibration Frequency
20	Tower Flowmeter	St. Isidore Water Tower	Flowmeter – Endress & Hauser	F10BAD16000	External calibration	Yearly
21	Cont. free chlorine analyzer	St. Isidore Water Tower	Free chlorine analyzer Swan	6552	Comparison method	Weekly check
22	Cont. Total Chlorine analyzer	St. Isidore Water Tower	Total chlorine analyzer Hach CL-17	111000421447	Comparison method	Weekly check
23	Flow meter	Plantagenet	Flowmeter - ABB	D699B180U01	External calibration	Yearly
24	Cont. free chlorine analyzer	Plantagenet	Free chlorine analyzer Depolox 3 plus	BN 92712-08	Comparison method	Weekly check
25	Cont. Total chlorine analyzer	Plantagenet	Total chlorine analyzer Depolox 3 plus	BN 92711-08	Comparison method	Weekly check

Items marked in red (#5), are used to calculate the Contact Time (CT) for the Log removal of the treatment plant. Those analyzers are calibrated as needed at least once every 12 months.

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00	8	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	8	18.08.10	Updated job titles	J. Leroux	N. Pigeon	D. Renaud
02	8	19.04.18	Changed Deputy Director for Director of Water and Wastewater and changed MOECC for MECP	J. Leroux	N. Pigeon	D. Renaud
03	8	19.09.20	Added CAO to the Clerk title	J. Leroux	N. Pigeon	D. Renaud
04	8	20.01.21	Updated contact information list	J. Leroux	N. Pigeon	D. Renaud
05	8	21.09.10	Added description in the Potential emergencies table for the Pandemics or Strike	J. Leroux	N. Pigeon	D. Renaud
06	8	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

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1.0 EMERGENCY PREPAREDNESS & RESPONSE

The Nation Municipality has documented an emergency procedure, which identifies possible emergency events related to water quality and outlines required response actions and details on responsibility and contacts specific to the incident. Information on managing emergency situations is also documented in the Operations Manual – Standard Operating Procedures.

The Nation Municipality Emergency Plan documents a standardized process for emergency response and recovery and outlines specific responsibilities and details for handling an emergency that occurs.

Employee responsibilities for emergency management are documented in the On-Call Coverage Procedure (see element 11). The Operating Authority has also an emergency contact list to ensure that the appropriate individuals will be contacted in the event of an emergency. This list is reviewed on a regular basis to ensure that it remains current.

Emergency training is completed annually according to regulatory requirements. Through this training, The Nation Municipality will ensure that all personnel working within the drinking water system are aware of:

- Individual roles and responsibilities;
- Relevant procedures;
- Existing threats and hazards, and associated protective actions; and
- Information related to emergency equipment (including location).

Following the occurrence of an emergency event, samples will be taken to evaluate water quality. Sampling will be completed according to regulatory requirements.

2.0 EMERGENCY PROCEDURE

Purpose

The following procedure describes the methods to respond to emergency situations.

Scope

The procedure contains a list of potential emergency situations, specific procedures to respond to potential emergency situations, details about the Owner and Operating Authority responsibilities during an emergency situation, an emergency contact list, a communication protocol and references to The Nation Emergency Management Plan.

Responsibility

The responsibility of following this procedure is pertinent to the QMS representative and operators who respond to an emergency situation.

References

DWQMS Element 18

The Nation Municipality – Emergency Management Plan

Definitions

Emergency: A potential situation or service interruption that may result in the loss of the ability to maintain a supply of safe drinking water to consumers.

See section 18.3 of the DWQMS.

Procedure

1. List of potential emergency situations or service disruptions

Potential emergencies table

Description of Emergency	Potential Outcome	Response Procedure
Accidents		
Traffic accident causing spill of contaminant	Chemical contamination of water table Contamination of environment Service disruption	SOP Adverse Water Quality (see Operations Manual, Appendix S, SOP-001) SOP Contaminated Aquifer (see Operations Manual, Appendix S, SOP-004)
Well casing collapse	Loss of raw water for treatment	SOP Well Low Level (see Operations Manual, Appendix S, SOP-011)
Fire/explosion	Contamination of treated water Loss or damage to infrastructure	SOP Fire Procedure (see Operations Manual, Appendix S, SOP-008) SOP Fire at Facility (see Operations Manual, Appendix S, SOP-037)
Power failure	Service disruption	SOP Power Failure (see Operations Manual, Appendix S, SOP-021)
Shut down of water distribution to the St Isidore water tower from Lefavre WTP in Plantagenet	Loss of water for the town of St-Isidore	SOP Shut down of water feed (St.Isidore) (see Operations Manual, Appendix S, SOP-006)
Natural disasters		
Pipe break due to thawing or earthquake	Loss of raw water for treatment	SOP Water Main Break (see Operations Manual, Appendix S, SOP-002)
Sewage pipe break	Biological contamination of water table	SOP Adverse Water Quality (see Operations Manual, Appendix S, SOP-001) SOP Contaminated Aquifer (see Operations Manual, Appendix S, SOP-004)

Description of Emergency	Potential Outcome	Response Procedure
Vandalism		
Security breach/Vandalism/Terrorism	Loss or damage of infrastructure Service disruption Contamination of treated water	SOP Adverse Water Quality (see Operations Manual, Appendix S, SOP-001) SOP Intrusion / Vandalism (see Operations Manual, Appendix S, SOP-007)
System neglect or deferred maintenance		
Well pump failure	Service disruption	SOP Well Pump Failure (see Operations Manual, Appendix S, SOP-010)
Chemical shortage	Health risk to consumers Service disruption	See Element 13 – Essential Supplies and Services of The Nation Operational Plan
SCADA failure	Service disruption	Manual plant operation SOP PLC Failure (see Operations Manual, Appendix S, SOP-022)
Pandemics or Strike		
Pandemic or Strike affecting personnel (e.g. H1N1, Flu, Covid-19)	Unavailability of staff for operations. Service disruption	Follow federal and provincial recommendations. Ontario Regulation 128/04. ERO notice no. 019-3513. Contact Operating Authority's certified backup staff to perform operating duties at the Drinking Water Systems.

In the event of a Pandemic or strike where the staff becomes unavailable, the Operating authority shall do its best to divide the crew. By dividing the crew we would prevent contamination to other operators. Some help would also be available from the public works department. We would follow the O. Reg 128/04.

2. Response and recovery emergency procedure

Several Standard Operating Procedures (SOPs) related to emergency management are documented in the Limoges Water Treatment Plant Operations Manual located in the administration building of the plant. The following list includes several SOPs concerning specific potential emergency situations located in various points in the drinking water system.

Location	Standard Operating Procedure	Reference
Well site	Well pump failure	SOP-010
	Contaminated Aquifer	SOP-004
	Water Haulage	SOP-005
Water Treatment Plant	Power Failure	SOP-021
	PLC Failure	SOP-022
	Vandalism	SOP-007
Booster Station/Reservoir	Fire pump Failure	SOP-024
Water Distribution System	Water Main Break	SOP-002
	Adverse Water Quality	SOP-001

3. Emergency situation Responsibilities/Chain of command

Name and Title	Responsibilities During Emergency
The Nation Municipality Representative/Owner	Owner representative during emergency. Chief liaison between the operating authority and the Mayor and council. Authorization of resource requests with input from council. Coordination of activities by municipal personnel.
Director of Water and Wastewater / Operating Authority representative	Overall management and decision making of the water system on behalf of the Owner. The lead for managing the emergency, providing information to government agencies, the public and the media. All external communications are approved by the OA representative.
Overall Responsible Operator	Responsible of following Standard Operating Procedures related to emergency situations. Follow emergency procedures, inspections, communications and system operations including sampling.
Operator In Charge	Responsible for operations of the water distribution system and responsible for following SOP related to emergency situations. Perform duties on behalf of the ORO.

4. Emergency Contact List

Contact Name	Contact Information			Reason For Contacting	Who Contacts	Special Instructions
	Phone	Cell /Pager	Fax/Other			
EMERGENCY (fire, police, ambulance)	911			Accident or injured personnel	ORO, OIC or operator	Record call in Log Book
<u>The Nation Municipality</u>	613-764-5444					
Marc Legault (Director of Public Works)	613-524-2932		613-913-5640			
Josée Brizard (CAO - Clerk)	613-764-5444 ext 235					
Doug Renaud		613-880-7234				
Cécile Maisonneuve (Billing)	613-764-5444, ext. 224					
Lefavre WTP	613-679-4631			Shut down of water distribution to the St. Isidore Water Tower in St. Isidore		
O.P.P.	1-888-310-1122			Emergency involving vandalism		
<u>Fire Department</u>				Fire/Explosion emergency		
Limoges	613-443-2177					
Hawkesbury dispatch	613-632-1105					
St. Isidore	613-524-2653					
SAC (Spills Action Center)	1-800-268-6060		1-800-268-6061	Accidental spill		
Eastern Ontario Health unit	1-800-267-7120		613-933-7390	Reporting adverse water test results		
MECP	613-933-7402					
Hydro One	1-800-565-2778			Power failure		
Ontario One Call (underground facilities)	1-800-400-2255			Watermain Break		
Robert Excavation	613-443-2311		613-769-1686	Watermain Break		
Embrun Sanitation	613-443-5153					
<u>Water Haulage</u>				Water haulage		
Lamoureux Pumping	613-764-3360					
Villeneuve	613-538-2461					
<u>Electrician</u>				Motor failure		
Electrotek	613-524-3025					
Maxi Power	613-764-3000					
Capital Controls – Michel Boucher		1-819-923-8166		Automation failure		
OCWA – Plantagenet Maurice Benoit		613-229-9239				
Desmond Verasammy		416-986-4429				

5. Emergency Response Training and Testing

Who	Emergency Training Topic	Purpose	Testing
All operators	General Emergency Awareness	All Staff should be aware of general emergency procedures in place for the drinking water system.	Orientation sessions regarding potential emergency situations.
ORO, OIC	Specific response instructions included in the Operations Manual SOP section.	Staff with specific detection, response, contact or recovery responsibilities should be trained in response and recovery procedures. Shut down procedures, threats, hazards and emergency situations information and responsibilities.	Table-top exercise. Emergency situations scenarios are simulated with the operational staff in order to verify the validity of the procedures. Walk-through drills that involve the operational staff and the management team of the Operating Authority to perform their emergency response functions. Full-scale Exercises involving operation personnel, the Operating Authority project manager and external contractors.
Visitors/ Subcontractors	General emergency Awareness	Awareness of non-staff of what to do during emergency situations.	Explanations of location of emergency exits and evacuation procedures.

Emergency response training records can be recorded under several forms: work orders, meeting minutes, attendance sheets. All record must include the name of the trainees, the date of the training/test and a description of the training/test. NC or CAR have to be issued if problems are detected during the training/test.

Review of the Emergency management procedure will be performed yearly with the management review as well as after a training drill, a major change in the design layout of the plant and following an emergency.

6. Communication Protocol

In the event of an emergency situation, the operation personnel should follow the Standard Operation Procedures response measures as well as inform immediately the ORO and the Director of Water and Wastewater of the situation. The Director of Water and Wastewater will be responsible for the overall management of the situation including communication to government agencies including the MECP, and the Medical Officer of Health, public authorities including the Owner, service and repair contractors, the public including consumers and the media.

7. The Nation Emergency Management Plan

The Nation Emergency Management plan is a guide documenting the actions of key officials and their responsibilities in the case of an emergency situation. It covers, the declaration of state of emergency, the responses by municipal emergency services including first aid treatment, the distribution of information, evacuation of areas, the availability of social services assistance, the authorization of expenditures and the restoration of normal service. In case of an emergency at The Nation Drinking Water System that falls under an emergency situation covered by the Emergency Management Plan that constitutes a danger of major proportions to the lives of the population, the Operating Authority will follow directions from Municipal Authorities covered in the Emergency Management plan to reestablish normal conditions.

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Record of issues and revisions

R	Page	Date (yy.mm.dd)	Description	Prepared	Verified	Approved
00	17	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	16	18.08.10	Updated titles and wording	J. Leroux	N. Pigeon	D. Renaud
02	16	19.04.18	Changed Deputy Director for Director of Water and Wastewater	J. Leroux	N. Pigeon	D. Renaud
03	17	19.11.18	Updated version to DWQMS 2.0	J. Leroux	N. Pigeon	D. Renaud
04	17	20.02.04	Added more info about the Version 2.0 (Feb-2017) and updated the template	J. Leroux	N. Pigeon	D. Renaud
05	17	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

This page is a record of all emissions and revisions for the concerned document. The elements that have been modified are indicated herein.

1.0 OBJECTIVE

Plan - To document the procedure for internal audits that:

- a) Evaluates conformity of the QMS with the requirements of the Standard;
- b) Identifies internal audit criteria, frequency, scope, methodology and record-keeping requirements;
- c) Considers previous internal and external audit results; and,
- d) Describe how the QMS corrective actions are identified and initiated.

Do – The Operating authority shall implement and conform to the procedure and shall ensure that internal Audits are conducted at least once every Calendar year.

2.0 SCOPE

This procedure applies to all internal audits conducted.

3.0 REFERENCES

3.1 Forms

The following forms are used:

- Internal Audit Check list (see section 7.0)

4.0 INTERNAL AUDIT PROCEDURE

Purpose

The following procedure defines the method to conduct internal audits in order to verify conformity of the QMS for The Nation Drinking Water System.

Scope

The procedure documents the steps required to perform an internal audit that will evaluate conformity of the QMS with the requirement of the DWQMS 2.0, Feb.2017. The procedure identifies the criteria, frequency, scope and methodology for the internal audit including record-keeping requirements. It also describes consideration of previous internal and external audit results and describes how corrective actions are identified and initiated.

Responsibility

The responsibility of following this procedure is relevant to the QMS representative and designated internal auditor.

References

DWQMS Element 19

Definitions

Audit: A systematic and documented verification process that involves objectively obtaining and evaluating evidence to determine whether an operating authority's QMS conforms to the requirements of the Drinking Water Quality Management Standard.

Non-conformance: The non-fulfillment of a DWQMS requirement.

Non-compliance: A failure under the Safe Drinking Water Act, 2002, the Ontario Water Resources Act, or any regulations or instruments under these Acts with are associated with drinking water.

DWQMS: Drinking Water Quality Management Standard.

QMS: Quality Management System.

See section 19.3 of the DWQMS.

Procedure

1. Audit Schedule

The frequency to perform an internal audit has to be scheduled in order to respect the DWQMS minimum requirement of conducting an internal audit at least once every calendar year. The schedule shall be revised according to previous audit results and prioritizing elements in the QMS that have received an external audit non-conformance. The scope of the Internal Audit will be specified following the audit planning done by the internal auditor, according to elements covered in previous audits that prompted specific attention.

2. Audit Preparation

The selection of the Chief Auditor that will conduct the internal audit will be determined by the Director of Water and Wastewater.

The Chief Auditor will then proceed to planning the Internal Audit. The preparation shall include:

- Consulting prior audit results conducted by internal or external auditors.
- Creating or updating the internal audit checklist to be used that includes, the audit date and lists the elements to be audited.
- Notifying those responsible for the elements to be audited (eg ORO, OIC, Operators, QMS representative) at least a week ahead of time.
- Reviewing specific elements of the DWQMS and the Operational Plan.
- Preparing specific audit questions.

3. Conducting the Audit

Following preparation, the Chief Advisor will conduct audit interviews with the notified personnel responsible for specific elements of the QMS implemented in the Operational Plan. The methodology to be used is to follow all the specific requirements listed in the DWQMS Version 2.0 (Feb-2017) for each element.

The internal audit checklist will be used in order to record information during the audit interviews.

4. Audit Report and Follow-Up

After the Internal Audit has been performed an Audit Report will be issued by the Chief Auditor that will include comments and remarks regarding the conformity of the QMS with the requirements from the DWQMS. A copy of the report will be provided to the QMS Representative who will ensure to file it. The QMS Representative will then submit Corrective Action Report(s) to the personnel responsible for addressing non-conformity. The personnel shall initiate a response in order to correct any non-conformances and should respond to the QMS representative. The QMS representative is responsible to accept the corrective action plan, to follow its implementation and to verify its effectiveness. The CAR shall be considered closed once all corrective actions have been verified as being effective. The internal auditor verifies if the delays for closing the Corrective Action Requests are acceptable.

5.0 INTERNAL AUDIT CHECKLIST

DATE OF INTERNAL AUDIT:

AUDITOR NAMES:

AREAS VISITED:

PEOPLE INTERVIEWED:

DOCUMENTS VIEWED:

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
<p>1. Quality Management System</p> <p>PLAN – The Operational Plan shall document a Quality Management System that meets the requirements of this Standard.</p>		PL	
<p>DO – The Operating Authority shall establish and maintain the Quality Management System in accordance with the requirements of this Standard and the policies and procedures documented in the Operational Plan.</p>		DO	
<p>2. Quality Management System Policy</p> <p>PLAN – The Operational Plan shall document a Quality Management System Policy that provides the foundation for the Quality Management System, and:</p> <ul style="list-style-type: none"> a) includes a commitment to the maintenance and continual improvement of the Quality Management System, b) includes a commitment to the consumer to provide safe drinking water, c) includes a commitment to comply with applicable legislation and regulations, and d) is in a form that can be communicated to all Operating Authority personnel, the Owner and the public. 		PL	
		a)	
		b)	
		c)	
		d)	
		e)	
<p>DO – The Operating Authority shall establish and maintain a Quality Management System that is consistent with the Policy.</p>		DO	
<p>3. Commitment and Endorsement</p> <p>PLAN – The Operational Plan shall contain a written endorsement of its contents by Top Management and the Owner.</p>		PL	
<p>DO – Top Management shall provide evidence of its commitment to an effective Quality Management System by:</p>		DO	

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
a) ensuring that a Quality Management System is in place that meets the requirements of this Standard, b) ensuring that the Operating Authority is aware of all applicable legislative and regulatory requirements, c) communicating the Quality Management System according to the procedure for communications, and d) determining, obtaining or providing the resources needed to maintain and continually improve the Quality Management System.		a)	
		b)	
		c)	
		d)	
4. Quality Management System Representative PLAN – The Operational Plan shall identify a Quality Management System representative.		PL	
DO – Top Management shall appoint, and authorize a Quality Management System representative who, irrespective of other responsibilities, shall: a) administer the Quality Management System by ensuring that processes and procedures needed for the Quality Management System are established and maintained, b) report to Top Management on the performance of the Quality Management System and any need for improvement, c) ensure that current versions of documents required by the Quality Management System are being used at all times, d) ensure that personnel are aware of all applicable legislative and regulatory requirements that pertain to their duties for the operation of the subject system, and e) promote awareness of the Quality Management System throughout the Operating Authority.		DO	
		a)	
		b)	
		c)	
		d)	
		e)	
5. Document and Records Control PLAN – The Operational Plan shall document a procedure for document and records control that describes how:		PL	

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
a) documents required by the Quality Management System are: <ul style="list-style-type: none"> i. kept current, legible and readily identifiable ii. retrievable iii. stored, protected, retained and disposed of, and b) records required by the Quality Management System are: <ul style="list-style-type: none"> i. kept legible, and readily identifiable ii. retrievable iii. stored, protected, retained and disposed of. 		a)i.	
		a)ii.	
		a)iii.	
		b)i.	
		b)ii.	
		b)iii.	
DO – The Operating Authority shall implement and conform to the procedure for document and records control and shall ensure that the Quality Management System documentation for the subject system includes: <ul style="list-style-type: none"> a) the Operational Plan and its associated policies and procedures, b) documents and records determined by the Operating Authority as being needed to ensure the effective planning, operation and control of its operations, and c) the results of internal and external audits and management reviews. 		DO	
		a)	
		b)	
6. Drinking-Water System PLAN – The Operational Plan shall document, as applicable: <ul style="list-style-type: none"> a) for the subject system: <ul style="list-style-type: none"> i. the name of the Owner and Operating Authority ii. if the system includes equipment that provides Primary Disinfection and/or Secondary Disinfection: <ul style="list-style-type: none"> A. a description of the system including all applicable Treatment System processes and Distribution System components, B. a Treatment System process flow chart, C. a description of the water source, including: <ul style="list-style-type: none"> i) general characteristics of the raw water supply, ii) common event-driven fluctuations, and iii) any resulting operational challenges and threats. iii. if the system does not include equipment that 		PL	
		i.	
		ii.	
		iii.	
		iv.	
		i.	
ii.			

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
<p>provides Primary Disinfection of Secondary Disinfection:</p> <p>A. a description of the system including all Distribution System components, and</p> <p>B. a description of any procedures that are in place to maintain disinfection residuals.</p> <p>b) if the Subject System is an Operational Subsystem, a summary description of the Municipal Residential Drinking Water System it is a part of including the name of the Operating Authority(ies) for the other Operational Subsystems.</p> <p>c) if the Subject System is connected to one or more other Drinking Water Systems owned by different Owners, a summary description of those systems which:</p> <ul style="list-style-type: none"> i. indicates whether the Subject System obtains water from or supplies water to those systems, ii. names the Owner and Operating Authority(ies) of those systems, iii. identifies which, if any, of those systems that the Subject System obtains water from are relied upon to ensure the provision of safe drinking water. 		<p>iii.</p> <p>v.</p> <p>b)</p> <p>c)</p> <p>i.</p> <p>ii.</p>	
<p>DO – The Operating Authority shall ensure that the description of the drinking-water system is kept current.</p>		DO	
<p>7. Risk Assessment</p> <p>PLAN – The Operational Plan shall document a risk assessment process that:</p> <ul style="list-style-type: none"> a) Considers potential hazardous events and associated hazards, as identified in the Ministry of the Environment and Climate Change document title Potential Hazardous Events for Municipal Residential Drinking Water Systems, dated February 2017 as it may be amended. A copy of this document is available at www.ontario.ca/drinkingwater. b) identifies additional potential hazardous events and associated hazards, c) assesses the risks associated with the occurrence of hazardous events, d) ranks the hazardous events according to the associated risk, e) identifies control measures to address the potential hazards and hazardous events, f) identifies critical control points, 		<p>PL</p> <p>a)</p> <p>b)</p> <p>c)</p> <p>d)</p> <p>e)</p> <p>f)</p>	

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
<ul style="list-style-type: none"> g) identifies a method to verify at least once a year, the currency of the information and the validity of the assumptions used in the risk assessment, h) ensures that the risks are assessed at least once every thirty-six months, and i) considers the reliability and redundancy of equipment. 		g)	
		h)	
		DO	
<p>DO – The Operating Authority shall perform a risk assessment consistent with the documented process.</p>		DO	
<p>8. Risk Assessment Outcomes</p> <p>PLAN – The Operational Plan shall document:</p> <ul style="list-style-type: none"> a) the identified potential hazardous events and associated hazards, b) the assessed risks associated with the occurrence of hazardous events, c) the ranked hazardous events, d) the identified control measures to address the potential hazards and hazardous events, e) the identified critical control points and their respective critical control limits, f) procedures and/or processes to monitor the critical control limits, g) procedures to respond to deviations from the critical control limits, and h) procedures for reporting and recording deviations from the critical control limits. 		PL	
		a)	
		b)	
		c)	
		d)	
		e)	
		f)	
		g)	
h)			
<p>DO – The Operating Authority shall implement and conform to the procedures.</p>		DO	
<p>9. Organizational Structure, Roles, Responsibilities and Authorities</p> <p>PLAN – The Operational Plan shall:</p> <ul style="list-style-type: none"> a) describe the organizational structure of the Operating Authority including respective roles, responsibilities and authorities, b) delineate corporate oversight roles, responsibilities and authorities in the case where the Operating Authority operates multiple subject systems, c) identify the person, persons or group of people within 		PL	
		a)	
		b)	

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
<p>the management structure of the organization responsible for undertaking the Management Review,</p> <p>d) identify the person, persons or group of people, having Top Management responsibilities required by this Standard, along with their responsibilities, and</p> <p>e) identify the Owner of the subject system.</p>			
		c)	
		d)	
		e)	
<p>DO – The Operating Authority shall keep current the description of the organizational structure including respective roles, responsibilities and authorities, and shall communicate this information to Operating Authority personnel and the Owner.</p>		DO	
<p>10. Competencies</p> <p>PLAN – The Operational Plan shall document:</p> <p>a) competencies required for personnel performing duties directly affecting drinking water quality,</p> <p>b) activities to develop and/or maintain competencies for personnel performing duties directly affecting drinking water quality, and</p> <p>c) activities to ensure that personnel are aware of the relevance of their duties and how they affect safe drinking water.</p>		PL	
		a)	
		b)	
		c)	
<p>DO – The Operating Authority shall undertake activities to:</p> <p>a) meet and maintain competencies for personnel directly affecting drinking water quality and shall maintain records of these activities, and</p> <p>b) ensure that personnel are aware of the relevance of their duties and how they affect safe drinking water, and shall maintain records of these activities.</p>		DO	
		a)	
		b)	

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
<p>11. Personnel Coverage</p> <p>PLAN – The Operational Plan shall document a procedure to ensure that sufficient personnel meeting identified competencies are available for duties that directly affect drinking water quality.</p>		PL	
<p>DO – The Operating Authority shall implement and conform to the procedure.</p>		DO	
<p>12. Communications</p> <p>PLAN – The Operational Plan shall document a procedure for communications that describes how the relevant aspects of the Quality Management System are communicated between Top Management and:</p> <ul style="list-style-type: none"> a) the Owner, b) Operating Authority personnel, c) Suppliers that have been identified as essential under Plan (a) of Element 13 of this Standard, and d) the public. 		PL	
<p>DO – The Operating Authority shall implement and conform to the procedure.</p>		DO	
<p>13. Essential Supplies and Services</p> <p>PLAN – The Operational Plan shall:</p> <ul style="list-style-type: none"> a) identify all supplies and services essential for the delivery of safe drinking water and shall state, for each supply or service, the means to ensure its procurement, and b) include a procedure by which the Operating Authority ensures the quality of essential supplies and services, in as much as they may affect drinking water quality. 		PL	
<p>DO – The Operating Authority shall implement the procedure.</p>		DO	
<p>14. Review and Provision of Infrastructure</p> <p>PLAN – The Operational Plan shall document a procedure for the annual review of the adequacy of the infrastructure necessary to operate and maintain the subject system that:</p> <ul style="list-style-type: none"> a) Considers the outcomes of the risk assessment documented under Element 8, and b) Ensures that adequacy of the infrastructure 		PL	

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
necessary to operate and maintain the Subject System is reviewed at least once every Calendar year.			
DO – The Operating Authority shall implement and conform to the procedure and communicate the findings of the review to the Owner.		DO	
15. Infrastructure Maintenance, Rehabilitation and Renewal PLAN – The Operational Plan shall document: <ul style="list-style-type: none"> a) a summary of the Operating Authority’s infrastructure maintenance, rehabilitation and renewal programs for the subject system, and b) A long term forecast of major infrastructure maintenance, rehabilitation and renewal activities. 		PL	
DO – The Operating Authority shall: <ul style="list-style-type: none"> a) keep the summary of the infrastructure maintenance, rehabilitation and renewal programs current, b) ensure that the long term forecast is reviewed at least once every Calendar Year, c) communicate the programs to the Owner, and d) monitor the effectiveness of the maintenance program. 		PL	
		a)	
		b)	
		c)	
16. Sampling, Testing and Monitoring PLAN – The Operational Plan shall document: <ul style="list-style-type: none"> a) a sampling, testing and monitoring procedure for process control and finished drinking water quality including requirements for sampling, testing and monitoring at the conditions most challenging to the subject system, b) a description of any relevant sampling, testing or monitoring activities, if any, that take place upstream of the subject system, and c) a procedure that describes how sampling, testing and monitoring results are recorded and shared between the Operating Authority and the Owner, where applicable. 		PL	
		a)	
		b)	
		c)	

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
DO – The Operating Authority shall implement and conform to the procedures.		DO	
17. Measurement and Recording Equipment Calibration and Maintenance PLAN – The Operational Plan shall document a procedure for the calibration and maintenance of measurement and recording equipment.		PL	
DO – The Operating Authority shall implement and conform to the procedure.		DO	
18. Emergency Management PLAN – The Operational Plan shall document a procedure to maintain a state of emergency preparedness that includes: <ul style="list-style-type: none"> a) a list of potential emergency situations or service interruptions, b) processes for emergency response and recovery, c) emergency response training and testing requirements, d) Owner and Operating Authority responsibilities during emergency situations, e) references to municipal emergency planning measures as appropriate, and f) an emergency communication protocol and an up-to-date list of emergency contacts. 		PL	
		a)	
		b)	
		c)	
		d)	
		e)	
		f)	
DO – The Operating Authority shall implement and conform to the procedure.		DO	
19. Internal Audits PLAN – The Operational Plan shall document a procedure for internal audits that: <ul style="list-style-type: none"> a) evaluates conformity of the QMS with the requirements of this Standard, b) identifies internal audit criteria, frequency, scope, methodology and record-keeping requirements, c) considers previous internal and external audit results, and d) describes how Quality Management System corrective actions are identified and initiated. 		PL	
		a)	
		b)	
		c)	

DWQMS Requirement Version 2.0 (Feb-2017)	Notes	Method in Place?	Documented?
		d)	
DO – The Operating Authority shall implement and conform to the procedure and shall ensure that internal audits are conducted at least once every twelve months.		DO	
20. Management Review PLAN - The Operational Plan shall document a procedure for management review that evaluates the continuing suitability, adequacy and effectiveness of the Quality Management System and that includes consideration of: <ul style="list-style-type: none"> a) incidents of regulatory non-compliance, b) incidents of adverse drinking-water tests, c) deviations from critical control point limits and response actions, d) the effectiveness of the risk assessment process, e) internal and third-party audit results, f) results of emergency response testing, g) operational performance, h) raw water supply and drinking water quality trends, i) follow-up on action items from previous management reviews, j) the status of management action items identified between reviews, k) changes that could affect the Quality Management System, l) consumer feedback, m) the resources needed to maintain the Quality Management System, n) the results of the infrastructure review, o) Operational Plan currency, content and updates, and p) staff suggestions. 		PL	
		a)	
		b)	
		c)	
		d)	
		e)	
		f)	
		g)	
		h)	
		i)	
		j)	
		k)	
		l)	
		m)	
	n)		
	o)		
	p)		
DO – Top Management shall implement and conform to		DO	

<p style="text-align: center;">DWQMS Requirement Version 2.0 (Feb-2017)</p>	<p style="text-align: center;">Notes</p>	<p style="text-align: center;">Method in Place?</p>	<p style="text-align: center;">Documented?</p>
<p>the procedure and shall:</p> <ul style="list-style-type: none"> a) ensure that a management review is conducted at least once every twelve months, b) consider the results of the management review and identify deficiencies and actions items to address the deficiencies, c) provide a record of any decisions and action items related to the management review including the personnel responsible for delivering the action items and the proposed timelines for their implementation, d) report the results of the management review, the identified deficiencies, decisions and action items to the Owner. 		a)	
		b)	
		c)	
		d)	
<p>21. Continual Improvement</p> <p>PLAN - The Operating Authority shall develop a procedure for tracking and measuring continual improvement of its Quality Management System by:</p> <ul style="list-style-type: none"> a) reviewing and considering applicable best management practices, including any published by the Ministry of the Environment and Climate Change and available on www.ontario.ca/drinkingwater, at least once every thirty six months; b) documenting a process for identification and management of Quality Management System Corrective Actions that includes: <ul style="list-style-type: none"> i. investigating the cause(s) of an identified non-conformity, ii. documenting the action(s) that will be taken to correct the non-conformity and prevent the non-conformity from re-occurring, and iii. reviewing the action(s) taken to correct the non-conformity, verifying that they are implemented and are effective in correcting and preventing the re-occurrence of the non-conformity. c) documenting a process for identifying and implementing Preventive Actions to eliminate the occurrence of potential non-conformities in the Quality Management System that includes: <ul style="list-style-type: none"> i. reviewing potential non-conformities that are identified to determine if 		a)	
		b)	

<p style="text-align: center;">DWQMS Requirement Version 2.0 (Feb-2017)</p>	<p style="text-align: center;">Notes</p>	<p style="text-align: center;">Method in Place?</p>	<p style="text-align: center;">Documented?</p>
<ul style="list-style-type: none"> ii. preventive actions may be necessary, documenting the outcome of the review, including the action(s), if any, that will be taken to prevent a non-conformity from occurring, and iii. reviewing the action(s) taken to prevent a non-conformity, verifying that they are implemented and are effective in preventing the occurrence of the non-conformity. 		c)	
<p>DO- The Operating Authority shall strive to continually improve the effectiveness of its Quality Management System by implementing and conforming to the procedure.</p>		DO	

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00	7	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	7	18.08.10	Updated titles and wording	J. Leroux	N. Pigeon	D. Renaud
02	7	19.01.15	Management Review Meeting Minutes of 2018	J. Leroux	N. Pigeon	D. Renaud
03	7	19.04.18	Changed Deputy Director for Director of Water and Wastewater	J. Leroux	N. Pigeon	D. Renaud
04	7	19.09.25	Removed Meeting Minutes of 2018	J. Leroux	N. Pigeon	D. Renaud
05	7	20.02.12	Added clarification for the timeline at 5.0 and modify template of minutes	J. Leroux	N. Pigeon	D. Renaud
06	7	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

This page is a record of all emissions and revisions for the concerned document. The elements that have been modified are indicated herein.

1.0 OBJECTIVE

This procedure defines the Management Review process to evaluate the continuing suitability, adequacy and effectiveness of the QMS.

2.0 MANAGEMENT REVIEW PROCEDURE

Purpose

The following procedure defines the method to conduct a management review that evaluates the Quality Management System for The Nation Drinking Water Systems.

Scope

The procedure documents the steps required to perform a management review that will evaluate the suitability, adequacy and effectiveness of the QMS. The procedure identifies a list of items to be reviewed during the management review, the frequency of conducting the review. It also describes the preparation prior to conducting the management review, how the results and actions to correct deficiencies are recorded and how the whole process is reported to the Owner.

Responsibility

The responsibility of following this procedure is relevant to the QMS representative and designated members participating in the management review that are identified in Element 9 – Organizational Structure, Roles, Responsibilities and Authorities.

References

DWQMS Element 9 and 20

Definitions

QMS: Quality Management System

Procedure

1. Management Review Schedule

Management Reviews shall be conducted at least once every 12 months, and prior to completion of the annual budget process.

2. Management Review Participants

Management Review participants are identified within the Organization Chart (Element 9 – Organizational Structure, Roles, Responsibilities & Authorities). They include the Operating Authority Top management representative and Director of Water and Wastewater who acts as the QMS representative. Other participants may be included as needed.

3. Management Review Preparation

The designated QMS Representative will be responsible for collecting and summarizing the documents supporting the List of items to be reviewed during the Management Review. The information regarding the list will be collected from various documents including lab results, internal audit report, consumer complaint forms, emergency testing minutes, annual reports, infrastructure review minutes and the Operational Plan.

The management review agenda will follow through the following list of items to be reviewed:

- A. Incidents of regulatory non-compliance
- B. Incidents of adverse drinking water tests
- C. Deviations from critical control point limits and response actions
- D. The effectiveness of the risk assessment process
- E. Results of internal and 3rd party audits
- F. Results of relevant emergency response testing
- G. Operational performance
- H. Raw water supply and water quality trends
- I. Follow-up on actions items from previous management reviews
- J. Status of management action items (if any) identified between reviews
- K. Changes in resource requirements, infrastructure, process, personnel, the Drinking Water Quality Management Standard or regulations that could affect the QMS
- L. Consumer feedback
- M. The resources needed to maintain the QMS
- N. The results of the infrastructure review
- O. Operational Plan currency, content and updates, and
- P. Staff suggestions

4. Conducting the Management Review

The Management Review will be conducted as a planned formal meeting with the participants invited in advance. A time allowance shall be set aside by the participants to ensure a thorough review of the QMS is conducted. Each input category shall be reviewed in order to identify if, where and when improvements to the QMS and its procedures are required. The QMS Representative shall make note of any changes or action items required during the course of the review.

5. Management Reviews Report and Follow-Up

The Management Review Report will be the Management Review meeting minutes that will provide a record of the decisions and results of the review including identified deficiencies and their corresponding actions and proposed timelines for their implementation, it will also includes action items assigned to staff with timelines for completion. The Management Review will be communicated to the owner through the Management Review meeting Minutes at least once per year.

3.0 MANAGEMENT REVIEW MEETING MINUTES

Meeting Minutes		
Meeting Date :	Time :	
Project : The Nation Drinking Water System	N° :	Location : 958 Route 500 W, Casselman
Meeting Purpose : Management Review		
Participants :	Copies to :	
		Actions Assigned to & timeline for completion
A. Incidents of regulatory non-compliance		
B. Incidents of adverse drinking water tests		
C. Deviations from critical control point limits and response actions		
D. The effectiveness of the risk assessment process		

Meeting Minutes		
Meeting Date :	Time :	
Project : The Nation Drinking Water System	N° :	Location : 958 Route 500 W, Casselman
Meeting Purpose : Management Review		
Participants :	Copies to :	
		Actions Assigned to & timeline for completion
E. Results of internal and 3rd party audits		
1) Internal audit (every year):		
2) External audit (every three years):		
F. Results of relevant emergency response testing		
G. Operational performance		
H. Raw water supply and water quality trends		
I. Follow-up on actions items from previous management reviews		

Meeting Minutes		
Meeting Date :	Time :	
Project : The Nation Drinking Water System	N° :	Location : 958 Route 500 W, Casselman
Meeting Purpose : Management Review		
Participants :	Copies to :	
		Actions Assigned to & timeline for completion
J. Status of management action items (if any) identified between reviews		
K. Changes in resource requirements, infrastructure, process, personnel, the Drinking Water Quality Management Standard or regulations that could affect the QMS		
L. Consumer feedback		
M. The resources needed to maintain the QMS		
N. The results of the infrastructure review		

Meeting Minutes		
Meeting Date :	Time :	
Project : The Nation Drinking Water System	N° :	Location : 958 Route 500 W, Casselman
Meeting Purpose : Management Review		
Participants :	Copies to :	
		Actions Assigned to & timeline for completion
O. Operational Plan currency, content and updates		
P. Staff suggestions		

Prepared by:

Date:

Approved by:

Date:

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Record of issues and revisions

R	Page	Date (yy.mm.dd)	Description	Prepared	Verified	Approved
00	2	17.05.29	First official issue	J. Leroux	N. Pigeon	D. Renaud
01	4	18.08.10	Updated version to 2.0 update	J. Leroux	N. Pigeon	D. Renaud
02	4	19.04.18	Changed Deputy Director for Director of Water and Wastewater and changed MOECC for MECP	J. Leroux	N. Pigeon	D. Renaud
03	4	20.02.13	Added 4.0 (3.0) best management practices and CIR review through minutes from meetings.	J. Leroux	N. Pigeon	D. Renaud
04	4	20.02.26	Added description to 4.0 PROCEDURES at 3.	J. Leroux	N. Pigeon	D. Renaud
05	4	20.03.05	Modify description to 4.0 PROCEDURES at 3.	J. Leroux	N. Pigeon	D. Renaud
06	4	20.05.01	Added two items in the issue source: OFI_Int.Audit & OFI_Ext.Audit.	J. Leroux	N. Pigeon	D. Renaud
07	4	21.09.20	Added Limoges and St-Isidore water system names	J. Leroux	N. Pigeon	D. Renaud

This page is a record of all emissions and revisions for the concerned document. The elements that have been modified are indicated herein.

1.0 PURPOSE

To describe Water Services' procedure for tracking and measuring continual improvement of its Quality Management System (QMS) and Drinking Water System (DWS) by:

- a) reviewing and considering applicable best management practices, including those [when] published by the Ministry of the Environment, Conservation and Parks (MECP), at least once every thirty-six months;
- b) documenting a process for identification and management of corrective actions; and
- c) documenting a process for identification and implementation of preventive actions to eliminate the cause of potential issues of non-compliance or non-conformity.

2.0 DEFINITIONS

Corrective Action – action taken to eliminate the cause of a detected non-compliance or non-conformity with legal, DWQMS and other requirements or other undesirable situation.

Preventive Action – action taken to eliminate or prevent the cause of potential non-compliance or non-conformity with legal, DWQMS and other requirements or other undesirable situation.

3.0 RESPONSIBILITIES

Director of Water and Wastewater and OIC - assess and prevent future non-compliance through risk management and ensure adequate resources (e.g. workload management) to address responses to issues as presented from sources of non-compliance, non-conformance and opportunities for improvement (see "Procedures" section 1).

4.0 PROCEDURES

1. Issues of non-compliance, non-conformance, and opportunities for improvement are presented through:
 - a) MECP's best management practices document (when published, at least 1:36 months)
 - b) MECP Compliance Inspections
 - c) Adverse Water Quality Incidents (documented as per SOP-001 Adverse Water Quality)
 - d) External DWQMS Accreditation Audits
 - e) Internal Audits
 - f) Management Review
 - g) Staff Suggestions (presented verbally or in writing, etc.)
 - h) Customer Calls (as logged in Customer Complaint Form)
 - i) Actions requiring longer-term projects
 - j) Other means (e.g. near-misses, Water Services' historical or other utilities' non-compliance)

-
2. Using the *Continual Improvement Report*, complete the following information:
- a) Issue Date:
 - b) Issued by:
 - c) CIR #:
 - d) Issue source:
 - i. Best_Management_Practices
 - ii. Compliance_AWQI
 - iii. Compliance_General
 - iv. Compliance_Inspection
 - v. Compliance_Health & Safety
 - vi. Conformance_General
 - vii. Conformance_Internal Audit
 - viii. Conformance_External Audit
 - ix. Opportunity for Improvement_Internal Audit
 - x. Opportunity for Improvement_External Audit
 - xi. Conformance_Health & Safety
 - xii. Drinking Water System_Infrastructure
 - xiii. Drinking Water System_Process
 - xiv. Feedback_Customer Calls
 - xv. Feedback_Management Review
 - xvi. Feedback_Staff
 - xvii. Feedback_Other
 - e) Assigned to:
 - f) Response:
 - i. Accept
 - ii. Deferred
 - iii. Decline (if decline, need to include comment why)
 - iv. Delete (if delete, need to include comment why)
 - g) Issue Description:
 - h) Priority:
 - i. High
 - ii. Medium
 - iii. Low
 - i) Immediate / Containment Action:
 - j) Issue Root Cause: [To describe the cause(s) of the identified issue]
 - k) Corrective Action: [To describe action(s) that will be taken to correct the issue and prevent it from re-occurring]
 - l) Preventive Action: [To describe action(s) that will be taken to eliminate or prevent causes of potential issues; whether corrective actions could be applied elsewhere]
 - m) Description of Follow-up Verification: [To review action(s) taken to correct / prevent issues, verifying actions were implemented and are effective in correcting and/or preventing the re-occurrence of the issue]
 - n) Verified by:
 - o) Date Verified:

- p) CIR Sign-Off:
- q) Date Closed

3. Best Management practices are presented and exist in many formats within the QMS, they are in the form of continual improvements, OFIs, Municipal Maintenance Plans, Municipal Water use by laws, source water protection, water conservation etc.

Best management practices are all identified in the CIR report for the appropriate action triggered if any. These BMP's are all reviewed annually at the management review to optimize all existing management practices and create new ones as required. These are captured in the minutes of the management review.

Through regular meetings, the Continual Improvement Report spreadsheet is reviewed for progress and status of Continual Improvement Reports. The continual improvement report is also considering best management practices, including any published by the MECP and available on www.ontario.ca/drinkingwater.

All Issues of non-compliance, non-conformance, and opportunities for improvement are presented through several documents, see *4.0 PROCEDURES 1. A to J*. When presented through these documents, they trigger the creation of a Continual Improvement Report. However, not all CIR will need a modification. Example: If a CIR is created from an audit OFI, the QMS rep might not see the need to implement the OFI. However, an explanation will be made available in the CIR containment action.

5.0 REFERENCE DOCUMENTS

- Continual Improvement Report
- Continual Improvement Report Spreadsheet
- Customer Complaint Form
- SOP-001 Adverse Water Quality