

Town of Goderich / Veolia Water Canada
Drinking Water Quality Management System

MASTER
Operational Plan /
QMS Manual

Goderich Water Treatment Plant
and
Distribution System

Town of Goderich
57 West Street
Goderich, Ontario
N7A 2K5

File: C:\DWQMS\1-b - Title Page

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Operational Plan Change History Summary

OPERATIONAL PLAN CHANGE HISTORY:					
Procedure Description	Release / Revision No.	Date	Revision Description	Written By	Approved By
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DOCUMENT APPROVAL - CHANGE FORM

CHANGE INFORMATION:	NEW:	
	NEW REVISION LEVEL:	
	OBSOLETE:	
ORIGINATOR:		
DOCUMENT TITLE:		
DOCUMENT NUMBER:		
ELECTRONIC ADDRESS:		
WRITTEN / REVISED BY:		
PURPOSE OF DOCUMENT:		
DESCRIBE REVISION:		
DO ANY OTHER DOCUMENTS REQUIRE REVISION AS A RESULT OF THIS CHANGE ?		
HAVE ALL PERSONNEL AFFECTED BY THIS CHANGE BEEN ADVISED?	Employees to sign and date here as advised:	
APPROVED BY: (name & date & comments)		

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Glossary of Terms

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

Authority – official permission or approval to carry out a responsibility or task

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

Compliance – the fulfillment of a regulatory requirement

Conformance – the fulfillment of a DWQMS requirement

Consumer – the drinking water end user

Contingency Plan – Operating Authority's procedures to mitigate or control emergency situations beyond the Standard Operating Procedures.

Control Measure – includes any processes, physical steps, or other contingencies that have been put in place to prevent or reduce a hazard before it occurs.

Contact Time (CT) - This value is called "Chlorine Contact Time" or CT. To calculate CT, multiply the free chlorine residual concentration (C) times the contact time (T). CT measures the effectiveness of a disinfection process.

Critical Control Limit (CCL) – the point at which a critical control point response procedure is initiated.

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

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

File: C:\DWQMS\1-e- Glossary of Terms

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

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

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

Drinking Water System – means a system of works, excluding plumbing, that is established for the purposes of providing users of the system with drinking water and that includes,

- a) any thing used for the collection, production, treatment, storage, supply or distribution of water,
- b) any thing related to the management of residue from the treatment process or the management of the discharge of a substance into the natural environment from the treatment system, and
- c) a well or intake that serves as the source or entry point of raw water supply for the system.

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

Emergency Response – the effort to mitigate the impact of an emergency on consumers

Emergency Response Plan (ERP) – Municipal Plan or documentation of emergency response procedures

Gap Analysis – the process of determining and evaluating the variance between the requirements of the DWQMS, and the methods and documents in place in your drinking water system

Hazard – a source of danger or a property that may cause drinking water to be unsafe for human consumption; hazard may be biological, chemical, physical or radiological in nature.

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

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Implementation Action Plan – the product of a gap analysis which identifies the tasks required for implementing a QMS. The implementation action plan should include tasks, target dates, and people assigned to task duties.

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

Monitoring – includes any checks or systems that are available to detect hazards or the potential for hazards.

Municipal Drinking Water System – means a drinking water system or part of a drinking water system,

- a) that is owned by a municipality or by a municipal service board established under section 195 of the *Municipal Act, 2001*,
- b) that is owned by a corporation established under section 203 of the *Municipal Act, 2001*,
- c) from which a municipality obtains or will obtain water under the terms of a contract between the municipality and the owner of the system, or
- d) that is in a prescribed class.

Municipal Residential Drinking Water System – means a large municipal residential system or a small municipal residential system as defined in O. Reg. 170/03.

Non-Compliance – a failure under the *Safe Drinking Water Act, 2002*, the *Ontario Water Resources Act*, or any regulations or instruments under these Acts which are associated with drinking water.

Non-Conformance – the non-fulfillment of a DWQMS requirement

Operating Authority – means, in respect of a subject system, the person or entity that is given responsibility by the owner for the operation, management, maintenance or alteration of the subject system

Operational Plan – means, in respect of a subject system, the operational plan required by the Director’s Direction.

Owner – includes, in respect of a drinking water system, every person who is a legal or beneficial owner of all or part of the system.

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Public – subject system consumers and stakeholders

Quality Management System (QMS) – a system to:

- a) establish policy and objectives, and to achieve those objectives, and
- b) direct and control an organization with regard to quality.

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

Resources – tangible inputs that are required to deliver safe drinking water

Responsibility – a charge, trust, or duty for which one is responsible

Retrievable – For documents, “retrievable” means the documents must be readily available for personnel to refer to, especially in emergency situations, or in areas where operational procedures would need to be promptly referenced. For example, sampling procedures should be available for reference where sampling activities are performed. For records, “retrievable” is a slightly more flexible term. Usually, a record is considered to be retrievable if it can be produced on request by the end of the business day. This definition stems from audits and inspections – if a record can be provided by the end of the audit, it is usually considered to be retrievable.

Risk – the probability of identified hazards causing harm, including the magnitude of that harm or its consequences.

Risk Assessment – an orderly methodology of identifying hazards or hazardous events that may affect the safety of drinking water and evaluating their significance

Risk Priority Number (RPN) – in the risk assessment hazards or hazardous event are assigned a numeric value ranging from 1 to 5 in three different categories: likelihood, severity or consequence, and detectability then added to determine the overall risk value or Risk Priority Number (RPN).

SCADA - the abbreviation for Supervisory Control And Data Acquisition. It generally refers to an industrial control system: a computer system monitoring and controlling a process.

Standard Operating Procedures (SOP) – standardized operating procedures compiled in an Operations Manual

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Supplier – an organization or person that provides a product or service that affects drinking water quality.

SDWA – means *Safe Drinking Water Act, 2002, S.O. 2002, c. 32*, as amended.

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

Water Treatment Plant (WTP) – Operating Authority’s treatment system location

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1. Quality Management System

The Drinking Water Quality Management Standard (DWQMS) requires an Operating Authority to establish a Quality Management System (QMS) for each system that it operates.

A QMS is a system to establish policies and objectives, achieve those objectives, and assist in the direction and control of the organization with regard to quality.

An Operational Plan is a document or series of documents that outlines the policies, processes and procedures for the overall quality management of the drinking water system, and is the documentation of the QMS.

The QMS is documented in this Operational Plan as part of the effort to ensure clean, safe, and reliable drinking water is supplied to all customers served.

The QMS shall be reviewed annually to ensure that the policies and procedures are correct and current. The review will include the QMS Representative, Owner, Operating Authority and Operators of the system.

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2. Quality Management System Policy

The Town of Goderich utilizes the services of Veolia Water Canada to operate and maintain the water supply and distribution system.

Together the Town of Goderich and Veolia are committed to:

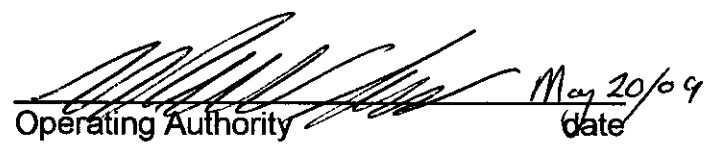
- Providing the consumer with a consistent supply of clean, safe drinking water
- Meeting or surpassing all applicable legislative and regulatory requirements
- Managing and operating the water supply system in a responsible manner in accordance with documented Quality Management System (QMS) policies and procedures
- Maintaining and continuously improving its Quality Management System (QMS)

Town of Goderich – Owner

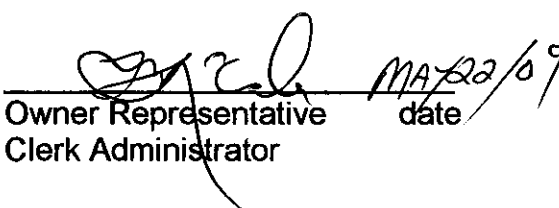


Owner Representative date
Mayor

Veolia Water Canada – Operating Authority



Operating Authority May 20/09
Representative date
Area Manager – Veolia Water Canada



Owner Representative May 22/09
Clerk Administrator date

File: C:\DWQMS\2 - Quality Management System Policy

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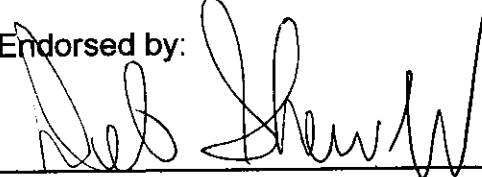
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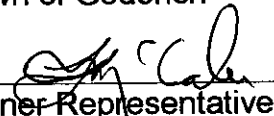
3. Commitment and Endorsement

The system owner, the Town of Goderich, and the Operating Authority, Veolia Water Canada, support the implementation, maintenance, and continual improvement of a drinking water Quality Management System (QMS) for the Town of Goderich Water Supply System, as documented in the Operational Plan.

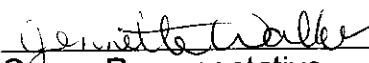
Endorsement by the owner (representatives of the Town of Goderich, the Mayor and Clerk-Administrator), and the Operating Authority top management (represented by Project Manager Veolia Water Canada Inc.) acknowledges the need for, and supports the provision of sufficient resources to implement, maintain, and continually improve the Quality Management System (QMS).

Endorsed by: 


 Owner Representative date
 (Mayor)
 Town of Goderich

 May 22/09

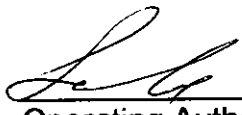
 Owner Representative date
 (Clerk Administrator)
 Town of Goderich

 May 22/09


 Owner Representative date
 (Environmental Services Technologist)
 Town of Goderich

 May 22/09

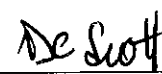
 Owner Representative date
 (Public Works Manager)
 Town of Goderich

 May 20/09

 Operating Authority date
 Representative
 (Project Manager- Veolia)

 May 20/09

 Operating Authority date
 Representative
 (Area Manager-Veolia)

 May 20/09

 Operating Authority date
 Representative
 (QMS Representative-Veolia)

File: C:\DWQMS\3 - Commitment and Endorsement Policy

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4. QMS Representative

The QMS Representative, in conjunction with the Project Manager / Overall Responsible Operator, will establish, implement, and maintain the policies, processes, and procedures required for the QMS. In addition the QMS Representative will report on the performance of the QMS and any need for improvement to Top Management.

The responsibilities of the of the QMS Representative are listed in the Responsibilities Table in Appendix E, as part of Element 9, Organizational Structure, Roles, Responsibilities, and Authorities.

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5. Document and Records Control

A process is in place for the control and management of the documents and records required by the Quality Management System (QMS).

This process is to ensure that documents are kept up to date with applicable legislation and regulations, and changes in operations. The process also ensures that documents and records are legible, are properly stored, and can be easily located and identified.

The procedure for Document and Records control can be found in Appendix A.

Appendix A

APPENDIX A1: Procedure for Document and Records Control

APPENDIX A2: Document and Records Control Table

APPENDIX A3: Document Approval – Change Form

File: C:\DWQMS\5 – Document and Records Control Policy

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6. Drinking Water System

6.1. General

- 6.1.1. The Goderich Water Treatment System, located at 100 Cove Road, Goderich, Ontario. The system is operated by Veolia Water Canada, the Operating Authority, and provides a potable water supply to the residents and businesses of the Corporation of the Town of Goderich. The system, also provides water to a commercial development and a distribution sub-system serving an institutional complex (Riocan – Property Management Group) in the Municipality of Central Huron, at the eastern edge of the Town.
- 6.1.2. The facilities, consisting of a Class III conventional design Water Treatment Plant having an approved capacity of 12,000 m³/d, and a Class III water distribution system, which are owned by the Town of Goderich and operated by Veolia Water Canada, the Operating Authority.
- 6.1.3. The raw water for the treatment process is drawn from a surface water source (Lake Huron) located directly west of the town. The raw water is treated by the following processes:
 - 6.1.3.1. Pre-chlorination
 - 6.1.3.2. Flash Mixing, Flocculation, Coagulation, and Sedimentation
 - 6.1.3.3. Filtration and Backwash
 - 6.1.3.4. Post-chlorination
 - 6.1.3.5. Fluoridation
 - 6.1.3.6. Distribution system chlorination
- 6.1.4. This multiple barrier approach helps to ensure consistently compliant drinking water quality, and ultimately improves the level of public health protection.

6.2. Raw Water Supply and Source Water Description

- 6.2.1. Water is drawn from Lake Huron, from a depth of approximately 5.5 m, approximately 518 m west of the Water Treatment Plant, and is fed by gravity through a 750 mm pipeline to a high traveling raw water screen in the Water Treatment Plant. The water then flows to a two celled concrete low lift pump well.
- 6.2.2. The major influences on raw water quality are rough lake conditions which can increase turbidity levels rapidly, and weather conditions which can cause a plume of turbid discharge from the Maitland River, which empties in to the lake north of the Water Treatment Plant intake, to be directed over the intake.

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- 6.2.3. Additional potential impacts on raw water could come from operations at the Goderich Harbour located north of the intake, and the outfall from the Goderich Sewage Treatment Plant located south of the intake.
- 6.2.4. The intake of the Plant is situated upstream (north) from the outfall of the Goderich sewage treatment plant and is not influenced by it. The characterization of the raw water from the lake is very good and chemical contamination is not a factor. A complete list of the contents of the source water is available from BM Ross Engineering who completed the First Engineer's Report
- 6.2.5. Chlorine gas is used from two on-line gas cylinders, with auto switch-over, to treat the water intake for zebra mussel control and to provide primary and secondary disinfection. The addition of chlorine gas to the raw water supply is referred to as pre-chlorination, and serves primarily as a measure to prevent microbiological growth within the raw water pipeline and the two celled low lift pump well. Pre-chlorine residual is measured continuously in the water leaving the filters.

6.3. Flash Mixing / Flocculation / Coagulation / Sedimentation

- 6.3.1. Water is pumped from the two celled concrete pump well to the flash mixing tank, using low lift pumps.
- 6.3.2. A coagulant is added to the incoming raw water in the flash mixing tank which is mixed and then flows to two flocculation tanks equipped with walking beam flocculation mechanisms. Detention time allows the formation of floc masses which attract and gather debris present in the source raw water.
- 6.3.3. The suspension then flows to two settling tanks equipped with chain and flight sludge collectors. The detention time here allows large particles to settle by gravity in the settling tanks.
- 6.3.4. Supernatant (the clear liquid above the settled floc) overflows from the settling tanks to the top of the dual media filters.
- 6.3.5. Most of the particulate matter that was present in the raw water is captured by the floc particles and is removed by gravity in the settling tanks, however, during normal operations, some floc passes from the settling tanks to the top of the filters.

6.4. Filtration

- 6.4.1. The water treatment plant has two parallel dual media filters. The top layer of the filter is granular anthracite, while the filter media below the anthracite layer is sand. As debris accumulates in the filters and limits flow, the filters must be cleaned by

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reversing the flow (referred to as backwashing) and directing the backwash to a waste holding tank (settling tank and two sludge lagoons).

- 6.4.2. Turbidity, a measure of the cloudiness of water, is measured continuously in the effluent from each filter to monitor the effectiveness of the filtration process. If the turbidity rises above a set point value, an alarm warns staff that corrective actions are needed.
- 6.4.3. Filtered water passes through the filter under-drain into the treated water clearwells. The clearwells are tanks located beneath the filters and are used to store filtered water prior to entering the chlorine contact reservoir.

6.5. Disinfection (Chlorination)

- 6.5.1. Primary disinfection (post-chlorination) occurs following filtration, immediately upstream from the treated water clearwells. Primary chlorination disinfects the filtered water, ensuring that any potentially pathogenic organisms that may remain after sedimentation and filtration are rendered harmless prior to distribution to consumers. Consistent disinfection is ensured by continuous monitoring of the chlorine residual in the treated water leaving the facility. If the residual drops below a safe level, pumping to the distribution system is automatically interrupted and an operator is notified to correct the problem.
- 6.5.2. Secondary disinfection is accomplished during post-chlorination by adding sufficient chlorine at the water treatment plant to maintain a residual throughout the entire distribution system. Secondary disinfection prevents regrowth of micro-organisms within the distribution system. Chlorine residual analyzers allow continuous monitoring of chlorine residual in the treatment plant effluent, and in the water upstream of the flash mixer (seasonally, in conjunction with zebra mussel control operation). A provision is available to top up residual chlorine levels using sodium hypochlorite injection at the booster station when required.
- 6.5.3. A two celled in-ground reservoir containing inlet and outlet diffusers and a baffle wall in each cell is also designed into the system to provide chlorine contact time for CT (Chlorine Contact Time) requirements.

6.6. Other Processes

6.6.1. Fluoridation

- 6.6.1.1. The raw water source is low in naturally occurring fluoride, and hydrofluosilicic acid is able to be added at the post-chlorination point. Equipment is also available to provide continuous monitoring of fluoride concentrations in the treatment plant effluent, and includes a high level alarm.

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6.6.2. Powdered Activated Carbon

6.6.2.1. Taste and odour control facilities are installed consisting of a powdered activated carbon feed system at the flash mixing tank.

6.6.3. Carbon Dioxide pH Control

6.6.3.1. A pH buffering system is installed with carbon dioxide storage containers, and necessary equipment and material, complete with monitoring and control system, to inject carbon dioxide into the raw water, for pH control.

6.6.4. Stand-By Power Facilities

6.6.4.1. Standby power is provided by a diesel generator and automatic transfer switch.

6.7. Process Waste Residuals Management

6.7.1. Filter backwash water and accumulated floc from the sedimentation tanks is directed to an equalization tank from where they are pumped to a residuals thickening process. The sludge collected within the thickening process is pumped to the holding lagoons. The clarified effluent from the thickener is pumped back to the holding lagoons as space is available. Alternately, the clarified effluent is pumped back to Lake Huron.

6.8. Distribution System and Elevated Storage Tank

6.8.1. Treated water is pumped from the high lift pump wells into the distribution sub-system. Distribution piping typically ranges in size from 100 mm to 400 mm, and may consist of cast iron, ductile iron, concrete, or PVC, depending on the location and date of installation.

6.8.2. One ground level, two cell storage reservoir provides reserve storage. The attached booster station is used to ensure adequate system pressure to zone 1.

6.8.3. The booster station is used to provide water to zone 2 and in addition supplies water to zone 1 when the Water Treatment Plant is not operational. An elevated storage tank is also an integral part of the distribution system and used to provide relatively constant pressure for zone 1.

6.8.4. Typical system pressure ranges from 45 P.S.I. to 80 P.S.I., depending on zone and elevation.

6.9. Sample Analysis

6.9.1. Provincial regulations dictate the sampling and monitoring requirements for the system. Water quality is tested throughout the treatment process and from dedicated

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sampling sites located at the extremities of the distribution system. Where required by regulation, samples are submitted to an accredited laboratory for analyses.

6.10. Process Flow Chart

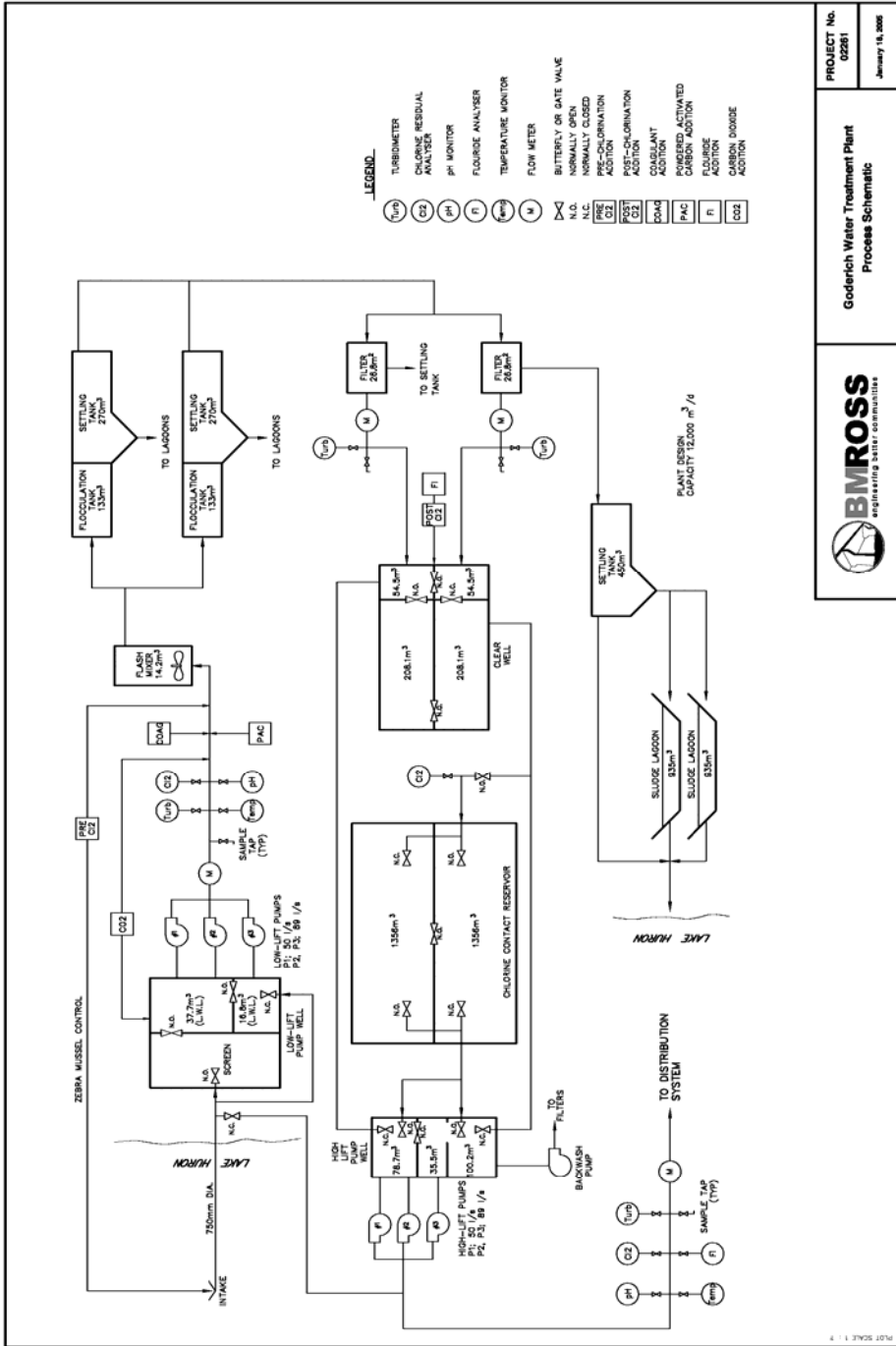
- 6.10.1. A process flow chart for the Goderich Water Treatment Plant is shown below.
- 6.10.2. A process flow chart for the Goderich Water Distribution System is shown below.
- 6.10.3. A process flow chart for the Goderich Water Booster Station is shown below.

File: C:\DWQMS \ 6 – Drinking Water System

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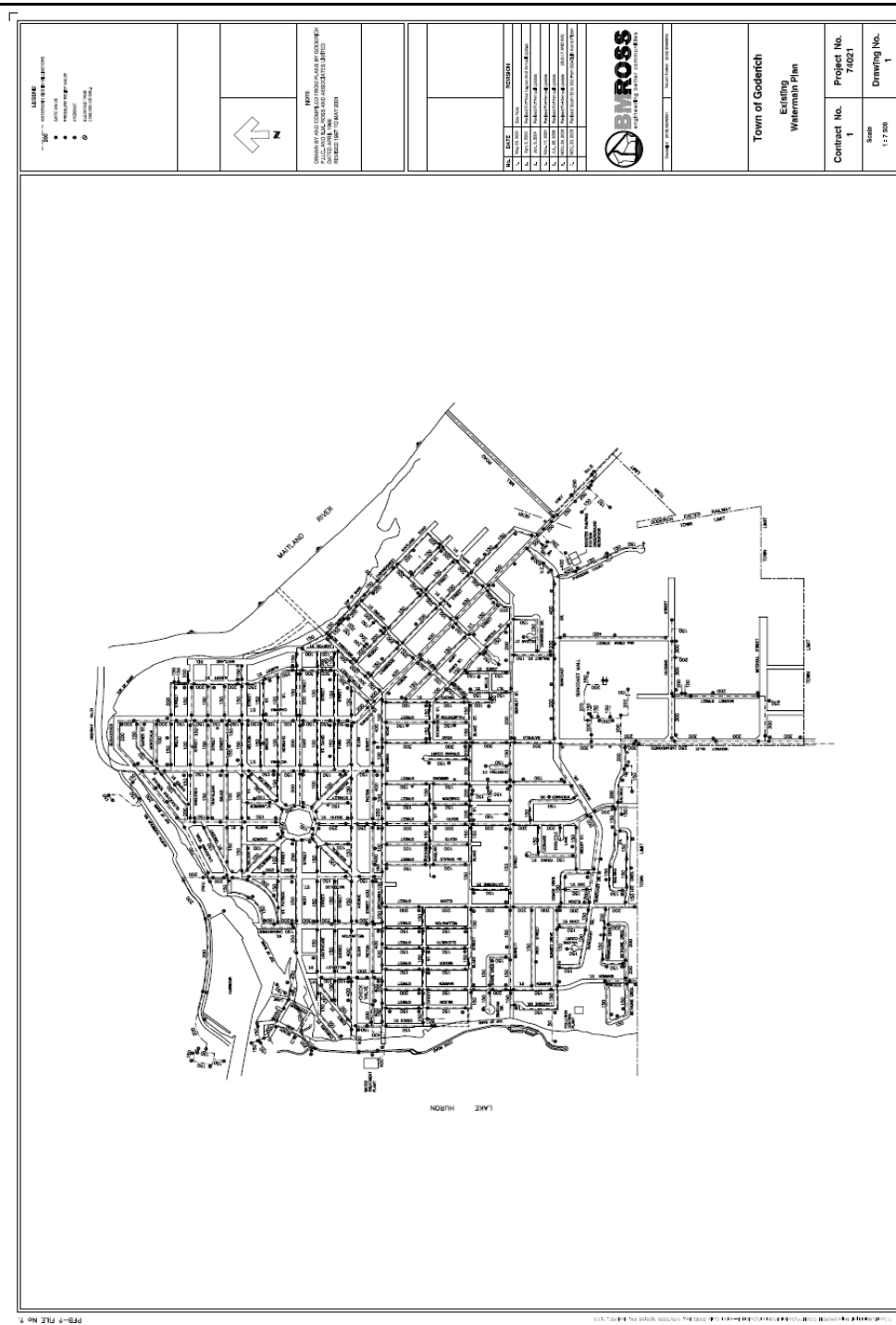


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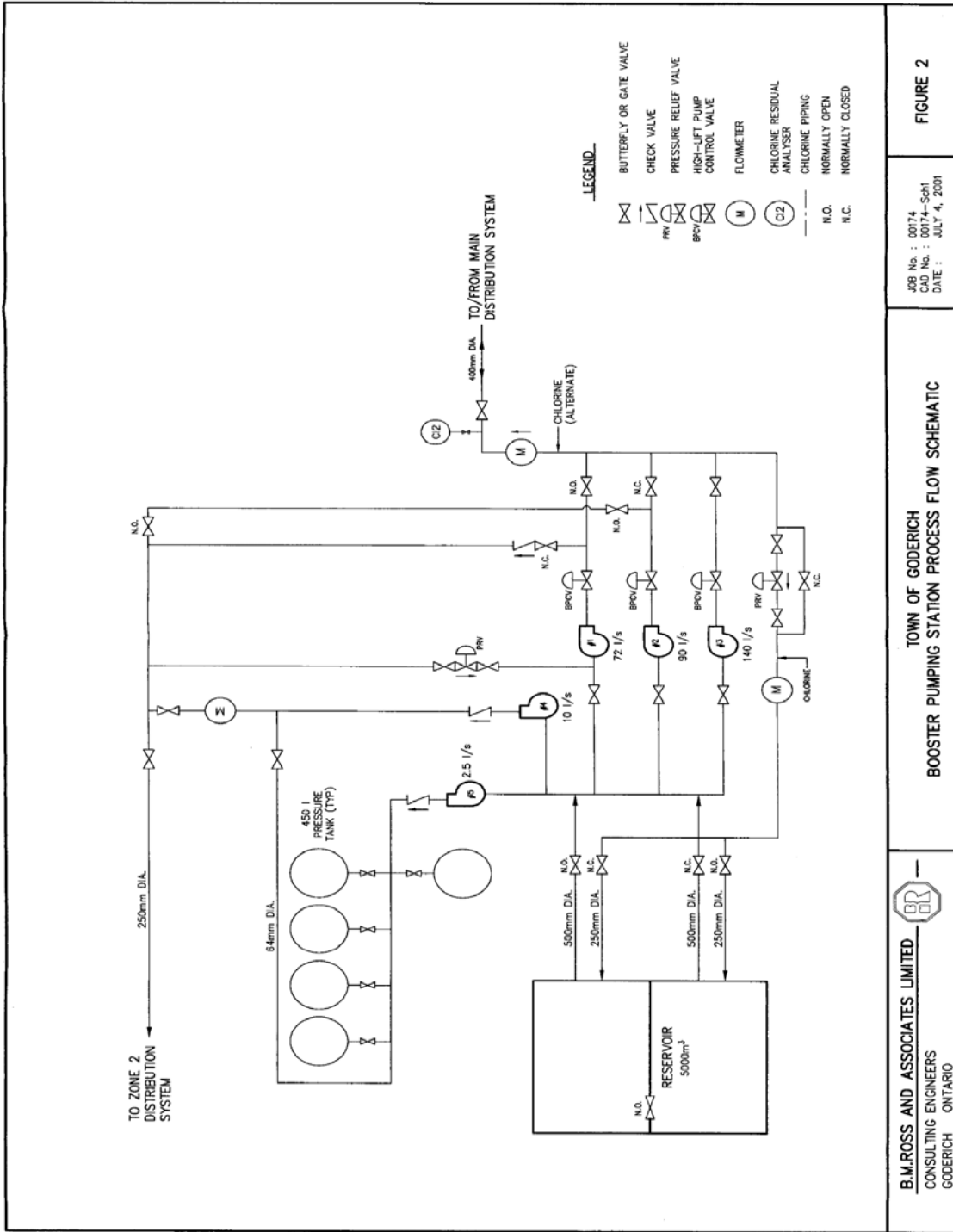


FIGURE 2

JOB No. : 0074
CAD No. : 0074-Sch1
DATE : JULY 4, 2001

**TOWN OF GODERICH
BOOSTER PUMPING STATION PROCESS FLOW SCHEMATIC**

B.M.ROSS AND ASSOCIATES LIMITED
CONSULTING ENGINEERS
GODERICH ONTARIO

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7. Risk Assessment

A Risk Assessment Procedure has been established and implemented to determine the potential hazards and critical control points that exist in the water treatment system.

A Risk Assessment Table has been developed to list potential hazards and their effects, and the associated monitoring and control measures. Critical Control Points (CCP) and Critical Control Limits (CCL) are identified using a Risk Priority Number system described in the risk assessment procedure.

For emergency situations or hazardous events outside the regular monitoring and control process, a Contingency Plan is available for response to deviations from critical control limits.

An Operational Plan binder and Contingency Plan are readily available for employee's reference at the Water Treatment Plant Main Office.

Procedures are implemented for reporting and recording deviations from critical control limits.

An annual Management Review, as described in Element 20, takes place to ensure the system is current and the risk assessment procedure and outcomes are reviewed and maintained.

A full updated Risk Assessment is to be conducted every 36 months in addition to the annual reviews.

Appendix E

APPENDIX B 1: Risk Assessment Procedure

APPENDIX B 2: Risk Assessment Table

File: C:\DWQMS\7 – Risk Assessment Policy

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8. Risk Assessment Outcomes

Risk Assessment Outcomes - Summary and Analysis

Goderich Water Treatment System

Basis: Risk Assessment Table and Team Meeting Oct 21, 2008 (Appendix B2)

1- First Engineer's Report

No outstanding items

2- Rank Hazardous Events and Identify CCP's

From the Risk Assessment Table ranking of the potential result of the hazard, the Risk Priority Numbers (RPN) ranged from 4 to 11 (out of a total max of 15).

An RPN Threshold Value of 6 was chosen from review of the Risk Table because the Critical Control Point minimum number is 6 (with one exception of a 5 also deemed a CCP) . It should be noted that although all hazards were assigned RPNs, only Critical Control Points and hazards with control measures available have Standard Operating Procedures or Contingency Plan response procedures.

Potential hazards and events always considered critically hazardous to water quality are high turbidity, inadequate primary and secondary disinfection, and loss of or low system pressure. These have been taken into account in this assessment.

RPN numbers less than 6 will be further assessed on an on-going basis as annual Risk Assessment reviews take place, and additional Monitoring or Control Measures may be considered at that time. Also not all high ranking hazards have Critical Control Limits or Control Measures, and will be considered in Contingency Plans or future reviews as required.

File: C:\DWQMS\8 – Risk Assessment Outcomes

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Risk Assessment Table Summary

NOTE: A total 43 potential hazards were identified in the Risk Assessment Table – Appendix B2, the list is summarized below

CCP's (see additional details in Table below)

	<u>RPN</u>	<u>CONTROL</u>
-equipment failure at pre-chlorination line break, blockage, chemical pump failure	6	CP (Cont. Plan)
-insufficient coagulant dosage as water quality changes	9	SOP (Std. Op. Proc.)
-coagulant feeder pump failure, coagulant tank runs empty (loss of coagulant)	9	SOP
-equipment failure potential, coagulant pump failure, plugging of lines	9	SOP
-filter breakthrough	11	SOP
-equipment failure, backwash pump failure, filter valves	9	SOP
-chlorinator failure, low chlorine concentration	9	SOP
-high fluoride level -potential pump relay failure - fluoride stays on, low lift pump off	6	SOP
-potential overfeed of PAC (Powdered Activated Carbon)	5	SOP
-loss of main power supply (potential loss of system pressure)	7	SOP
-failure of stand-by power (potential loss of system pressure)	8	SOP
-loss of system pressure in distribution system	7	CP
-inadequate chlorine residual in distribution system	9	SOP

Not Considered CCP's (< 6 RPN)

-intake pipe break	5	SOP
-blocked intake	5	CP
-equipment failure at traveling screen, screen plugging, low lift pump failure	5	SOP
-coagulant overdosage	5	SOP
-too rapid flow for proper settling	5	SOP
-failure of collector tile	5	CP
-chlorinator failure-high chlorine concentration	5	CP
-pump failure, loss of fluoride supply	4	SOP
-contaminated lagoon sludge	5	CP
-Commission of new mains	5	SOP

Not all high ranking hazards have Critical Control Limits or Control Measures. A summary of results from the risk assessment is shown below.

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Additional Potential Hazards or Hazardous Events Identified in the Risk Assessment (>= 6 RPN)

(Although assessed with RPNs equal to or greater than the threshold value these are not considered CCP's, or assessed as required to have formal Operator response plans because no control measures are available.)

-accidental spill into lake by vessel	7
-algae blooms, clogging filters	8
-nuclear facility occurrence	8
-farm run-off into river and streams, storm drain run-off	7
-wind / wave action stirring lake bottom, shallow intake with water currents stirring lake bottom	7
-equipment failure -settling, potential sludge / mud valve failure	6
-equipment failure – settling tank sludge collectors, line break,	6
-loss of media	8
-insufficient chlorine gas supply	7
-clear well integrity	9
-chlorine contact reservoir concerns	9
-high lift pump well failure	9
-watermain break	9
-non-functioning appurtenances	8
-failure to receive critical supply of parts or chemical	8
-control systems power failure	7
-remote transmitting unit / remote processing unit failure	7
-equipment failure – pump, chlorine residual analyzers, alarm system failure	7
-primary power failure – entire system	6
-vandalism, introduction of contaminant	11

The Operating Authority intends to document and implement Contingency Plans (CPs) or Standard Operating Procedures (SOPs) for additional potential hazards, as a continual improvement exercise over time, regardless of the RPN number, as feasible for the Water Treatment Plant operation.

3- Establishing Procedures for Deviations from Critical Control Limits

Each CCP must have one or more documented response procedure for response if a Critical Control Limit (CCL) is exceeded. These procedures are documented in the Operating Authority's Operations Manual or Contingency Plan (Emergency Response Plan – ERP)

A summary of Process Steps established from the Risk Assessment Table, as Critical Control Points (CCPs) with Critical Control Limits (CCLs) is shown in the Table below:

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SUMMARY OF CRITICAL CONTROL POINTS'S (CCP'S) FROM RISK ASSESSMENT TABLE:

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Raw Water Supply	-equipment failure at pre-chlorination- line break , blockage, chemical pump failure	-physical / mechanical issue -potential from zebra mussel build-up and loss of raw water supply	-on-line turbidity, temperature, pH, alkalinity, and chlorine residual monitoring -back-up daily grab sample testing at sample point after low lift pumps	-Operator to respond to significant changes in readings	2	1	3	6	YES	0.50 mg / l Free chlorine minimum	Contingency Plan procedure (note- not short term risk for zebra mussel buildup, also zebra mussels cannot reproduce <10C)
Flocculation / Coagulation	-insufficient dosage as water quality changes	-poor or lack of floc formation resulting in poor settling and potential filter breakthrough -potential for microbiological contamination from improper treatment , -cryptosporidium / giardia potential	-online monitoring of turbidity analysis -more frequent monitoring if raw water quality changes -Jar Test	Operator to respond Operations Manual #12 (Coagulant Control Adjustment)	4	4	1	9	YES	0.40 NTU maximum	Contingency Plan procedure

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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	┘	∞	□	#	CCP ?	CCL	Contin.Plan
Flocculation / Coagulation	-insufficient dosage -feeder pump failure, -coagulant tank runs empty (loss of coagulant)	-potential for microbiological contamination from improper treatment - loss of chemically assisted filtration	-auto control shuts down low lift pumps if coagulant flow stops -Operator response for repair -spare parts available	-Operator Response	4	4	1	9	YES	0.40 NTU maximum	Contingency Plan procedure (Sensor to be installed for auto control)
Flocculation / Coagulation	-insufficient dosage -equipment failure, plugging of lines	-poor or lack of floc formation resulting in poor settling and potential filter breakthrough and potential microbiological contamination	-Operator response for repair -spare parts available	-Operator Response	4	4	1	9	YES	0.40 NTU maximum	Contingency Plan procedure
Filtration	-filter breakthrough	-high turbidity -potential for microbiological contamination cryptosporidium, giardia, virus or viral organisms	-Operator response -regular backwash -redundancy -lockout of filter control valve and low lift pumps on high turbidity	-Operator response -on-line monitoring -Operations Manual Procedure #8 Filter Backwash, #9 Filter to Drain	5	5	1	11	YES	-turbidity max @ 0.4 NTU alarm and lockout of low lift pump	SOP

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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	┘	∞	□	#	CCP ?	CCL	Contin.Plan
Filtration	-equipment failure -backwash pump failure, filter valves	physical / mechanical issue – loss of water supply	-on-line turbidity, temperature, pH, and chlorine residual monitoring -back-up daily grab sample testing from filter 1 and filter 2 -redundancy (spare pump)	Operator Response SOP	4	3	2	9	YES	-turbidity max @ 0.4 NTU alarm lockout of low lift pump	SOP
Disinfection / Chlorination	-chlorinator failure -low chlorine concentration	-potential for microbiological contamination	-on-line monitoring residual testing point of entry -on-line sample from filters -Daily residual testing grab sample	-Operator response -Op. Manual Proc. #3 Low Cl2 in Distribution System	3	5	1	9	YES	0.65 mg/l min. At point of entry 0.20 mg/l in distribution system min.	Contingency Plan # 19 – low Cl2
Fluoridation	-potential pump relay failure and stays on -low lift pump off	-potential high fluoride level and toxic effect if overfeeding - potential chemical contamination	-on-line fluoride analyzer and alarm -daily grab samples -calculation of dosage daily	Operator response	2	3	1	6	YES	0.80 mg/l max	Contingency plan procedure required – for flushing for chemical overfeed

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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	┘	∞	□	#	CCP ?	CCL	Contin.Plan
Powdered Activated Carbon (PAC)	-potential overfeed of PAC	-potential plugging of filter -filter breakthrough -reduction of Cl2 level and loss of disinfection -potential biological contamination	-Operator response -calculation of dosage - Online analysers	-Operator Response -SOP	1	3	1	5	YES	To meet aesthetic goals	SOP
Stand-By Power Facilities	-loss of main power supply (potential to lose system pressure and not supply customers)	-loss of system pressure -potential for biological contamination	Stand-by diesel generators with auto start	-Operator response	4	2	1	7	YES	None (Power on)	SOP
Stand-By Power Facilities	Failure of stand-by power	-loss of system pressure -potential for biological contamination	-preventive maintenance -regular trial of system	-Operator response	2	5	1	8	YES	None (Power on)	SOP
Distribution System and Elevated Storage Tank	Loss of system pressure	potential pressure drop could allow contaminants back into system (back siphoning)	Operator response -back flow preventors added to new systems	Operator response -issue of precautionary boil water advisory	3	3	1	7	YES	35 psi at booster station for zone 1 50 psi for zone 2	SOP

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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	┌	∞	□	#	CCP ?	CCL	Contin.Plan
Distribution	inadequate chlorine residual in distribution system	-potential biological contamination	-on-line monitoring and controls of primary disinfection -chlorine residual at point of entry to distribution system -daily residual from distribution system	-Operator response -increase chemical dosage -routine flushing of dead-ends -refer to contingency plan	4	2	3	9	YES	-less than 0.2 mg/L free chlorine in distribution	SOP

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Note: To be reviewed annually or when a QMS change occurs.

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9. Organizational Structure, Roles, Responsibilities, and Authorities

The system Owner, and the Operating Authority, Veolia Water Canada, have an organizational structure in place to ensure the management of the drinking water system by qualified staff.

Job descriptions are created for each Operating Authority position, and are outlined in the Responsibilities Table, showing title, responsibilities and authorities. An Operating Authority Organizational Chart shows the relationship of roles in the structure. These can be found in Appendix E.

The Owner and Owner’s representatives also have significant roles, responsibilities and authority in the management, operation, and support of the water supply system, as outlined in the QMS Policy (Element 2), and the Commitment and Endorsement Policy (Element 3). An Organizational Chart and Responsibilities Table for the Owner are also shown in Appendices E4 and E5.

An annual Management Review, as described in Element 20, takes place to ensure the system is current.

Appendix E

APPENDIX E 1: Organizational Chart - Veolia Water Canada

APPENDIX E 2: Responsibilities Table - Veolia Water Canada

APPENDIX E 3: Job Descriptions - Veolia Water Canada

APPENDIX E 4: Organizational Chart - Town of Goderich

APPENDIX E 5: Responsibilities Table - Town of Goderich

File: C:\DWQMS\9 – Organizational Structure, Roles, Responsibilities, and Authorities

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Note: To be reviewed annually or when a QMS change occurs.

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10. Competencies

All personnel performing duties directly affecting drinking water quality must have adequate training and be competent in their position. This relates to legislative as well as DWQMS requirements.

Legislative Requirements:

- All Water Treatment Plant operators shall, at a minimum, attain and maintain a Class I certification as per O. Reg. 128/04.
- The Water Treatment Plant Overall Responsible Operator (ORO) shall maintain, at a minimum, a Class III certification (with exceptions for relief periods as specified in the legislation).
- All Water Treatment Plant distribution employees shall, at a minimum, maintain a Class I certification as per O. Reg. 128/04 and in accordance with the classification of the works.
- The Water Treatment Plant distribution Overall Responsible Operator (ORO) shall maintain, at a minimum, a Class III certification.

Additionally, annual training is provided to ensure that personnel meet or exceed minimum standards for annual training hours and continuing education hours as established in O. Reg. 128/04.

Veolia is required to provide competent operators to maintain effective water treatment. It is required as part of the operator's responsibility to monitor and ensure he / she receives adequate annual training hours to maintain his / her operator certification for the operation of the Water Treatment Plant.

An annual review of training records and certifications is made by the Compliance Officer (or Project Manager) to ensure classifications are current and competency is maintained. Operators are advised by the CO of upcoming requirements.

The Project Manager may also recommend training courses and approves training registration requests as appropriate. The Compliance Officer assists in course arrangements and maintains and monitors the employee training matrix.

Effectiveness of outside training is evaluated by the Project Manager, after completion, by discussions with the employee. Certifications from the training, when provided, are filed with the employee training records, and added to the Training Matrix.

File: C:\DWQMS\10 - Competencies

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In-House Training Requirements

In-house training such as new employee orientation, internal systems (SCADA etc.), refresher training is provided by the Project Manager / Overall Responsible Operator or designate.

Training session records are to be noted by the employee, signed by the trainer and trainee, and forwarded to the Compliance Officer for filing and entering in the Training Matrix.

QMS Awareness Training Requirements

All personnel must be aware of the Quality Management System and their requirements under the QMS, especially those pertaining to their specific roles.

The QMS Operational Plan, and any changes to procedures affecting personnel, will be reviewed with employees by the Project Manager and / or QMS Representative at least prior to the accreditation audit, and as appropriate throughout the development of the Operational Plan (Document and Records Control, Risk Assessment, for example) and when changes may be made to the Operational Plan.

Appendix F

APPENDIX F 1: Competency Requirements Table

APPENDIX F 2 :Training Matrix

File: C:\DWQMS \ 10 - Competencies

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11. Personnel Coverage

The Water Treatment Plant (WTP) is staffed from Monday to Friday from 7:30 a.m. until 4:30 p.m. and attended on weekends for normal daily rounds.

The Water Treatment Plant Project Manager is the primary Overall Responsible Operator (ORO). Back-up OROs are identified in the shift log, as required.

There is an assigned on-call water treatment plant operator during off-hours as described in the After Hours Dispatch Procedure for WTP personnel coverage. The on-call operator conducts a physical verification of conditions at the plant once per day during weekends and statutory holidays.

The normal on-call schedule for water treatment plant operators shall be from quitting time on Tuesday to start time the following Tuesday. The Water Treatment Plant Project Manager establishes and maintains the on-call schedule.

At all times, the Water Treatment Plant is monitored by the SCADA system. The SCADA system has an auto-dialer that has been programmed to contact the Project Manager / Overall Responsible Operator, or personnel designated by the Project Manager, whenever conditions warrant.

The on-call operator is the designated operator in charge and will respond to, and investigate all alarms within 45 minutes.

An Overall Responsible Operator, or designated back-up ORO, is available by cell phone when not physically at the system.

There are regular daily checks of the distribution system conducted by water distribution personnel, and weekend checks of the booster station. The time of the visit and the details of any related action taken are recorded in the on-site daily log.

Procedures are located in the WTP Operations Manual.

Appendix G

APPENDIX G1: After Hours Dispatch Procedure

Response to Auto-Dialer Alarm Procedure

File: C:\DWQMS\11 – Personnel Coverage

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Note: To be reviewed annually or when a QMS change occurs.

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12. Communications

The Project Manager / ORO shall ensure that the Owner is provided with a current copy of the Operational Plan. The owner shall also be advised of any changes to the Quality Management System, following revisions, and a status update shall be communicated following Management Reviews. This communication may take place during the regular annual report to Council by the Project Manager, or separate meetings arranged as necessary.

In addition to the Operational Plan, potential changes, and Management Reviews, other relevant information could include audit reviews, risk assessment changes, and provision for infrastructure information. The procedure for this information to be communicated to the Owner will be by the Project Manager to the Owner through the Owner's liaison, at Council Meetings, or Committee Meetings, as applicable.

Operating Authority Personnel will be informed of the QMS and any changes or updates through staff meetings with the Project Manager and/or QMS Representative following the original implementation, and thereafter following the Management Review, or as changes occur. The QMS Policy and Operational Plan are to be posted in the Operations Room for access by all employees.

Essential Suppliers shall receive information regarding the QMS from the Operating Authority as required for purchasing as described in Element 13.

Consumers or the General Public will have access to the QMS policy at the Operating Authority's Water Treatment Plant (WTP) site, as well as at the Municipal Office.

The Owner shall make the Operational Plans available for viewing by the public at the principal office of the owner and at one other publicly accessible location in the geographical area served by the subject system.

Information about the QMS may be added to the Municipal website, as decided by the Owner.

File: C:\DWQMS \ 12 - Communications

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Note: To be reviewed annually or when a QMS change occurs.

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13. Essential Supplies and Services

Essential supplies and services are purchased by the Operating Authority on behalf of the Owner under the direction of the Project Manager.

All essential Chemical, Material, Equipment, and Part Suppliers, and Service Providers must meet the Quality and Performance standards suitable for the production and delivery of safe drinking water to the customer.

Essential suppliers of chemicals and materials must meet NSF / ANSI (National Sanitary Foundation / American National Standards Institute) and / or AWWA (American Water Works Association) standards. Current versions of these standards are to be reviewed, as required, on the appropriate internet website by Operations or Purchasing personnel.

Ontario legislation requires that Laboratories performing drinking water testing must be accredited for the parameters being tested, and Operating Authorities must use accredited labs as required for testing.

Documentation on quality, and other supplier requirements, is provided to all essential suppliers and service providers annually, or more frequently as required, by letter, or information on the Purchase Order outlining requirements.

The Project Manager / ORO reviews the requirements annually, or as may be required for changes, and suppliers are informed (as required and noted above), by the Project Manager, Administrative Assistant, or designate.

Meetings are held with contractors and service providers prior to work being carried out on water treatment equipment. They are accompanied by a Water Treatment Operator to ensure water plant and distribution system requirements are understood and met prior to performing their task. Contractors and service providers are required to sign a document confirming the meeting with the Project Manager or Operator, and their understanding of the requirements.

Appendix H lists the Essential Suppliers and Services, Procurement information, and Quality expectations.

Appendix H

APPENDIX H: Essential Supplies and Services Table

File: C:\DWQMS \ 13 – Essential Supplies and Services

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Note: To be reviewed annually or when a QMS change occurs.

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14. Review and Provision of Infrastructure

On an annual basis a summary of the Water Treatment System is prepared by the Operating Authority's Project Manager / Overall Responsible Operator and is submitted to the Owner. Included in the Summary Report is a review and updates on the Operating Authority's infrastructure and related programs.

The procedure will be for the Project Manager / Overall Responsible Operator to compile information received from the Maintenance Manager and Operators throughout the year based on work orders and observations relating to the infrastructure of the water treatment system. This information will be summarized in an Infrastructure section of the annual summary report and presented to the Owner on an annual basis. The Annual Summary is required to be submitted to the MOE by March 1st , and to the Owner by March 30th of each year.

The report shall cover the infrastructure in place - the water system infrastructure necessary to operate and maintain the system includes buildings, workspace, associated utilities, process equipment, supporting services, vehicles, distribution system and elevated storage. The report will advise on the adequacy or condition of the infrastructure, with recommendations were warranted .

An annual Management Review is carried out as part of the DWQMS requirements, and the results of the infrastructure review are also considered at that time for deficiencies and action items.

File: C:\DWQMS \ 14 – Review and Provision of Infrastructure

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Note: To be reviewed annually or when a QMS change occurs.

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15. Infrastructure Maintenance, Rehabilitation and Renewal

The Operating Authority maintains a documented summary of the Operating Authority’s infrastructure maintenance, rehabilitation, and renewal programs for the water treatment and distribution system. This assists in ensuring the infrastructure required is in place and is adequately maintained, or plans for improvement are in place for continued safe drinking water to be provided to the customer.

The summary is kept current, and is communicated to the Owner at least annually, or as deemed required by the Operating Authority’s Project Manager / Overall Responsible Operator, in presentations to the local council, and committee, if applicable or required.

Monitoring of the effectiveness of the maintenance, rehabilitation, and renewal programs is a requirement of the DWQMS, and is carried out by monitoring the maintenance work order system and assessing the amount of planned versus unplanned maintenance activity.

The Maintenance Request system can be initiated by any employee by filling in a Maintenance Request Form. This request is then forwarded to be assessed by the Maintenance Manager or Project Manager / ORO. Maintenance Requests are filed and reviewed as required to assess or confirm trends and issues are reported in the annual summary.

A “Jobs Plus’ Maintenance system also generates work orders for routine equipment servicing and preventive maintenance for designated equipment in the water treatment and distribution system.

A summary of key infrastructure material and equipment from Jobs Plus is generated by the Maintenance Manager or Project Manager / ORO and also added to the annual infrastructure summary.

File: C:\DWQMS \ 15 - Infrastructure Maintenance, Rehabilitation and Renewal

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Note: To be reviewed annually or when a QMS change occurs.

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16. Sampling, Testing, and Monitoring

The Operating Authority maintains a sampling, testing, and monitoring process as required by the Ontario Regulation 170/03, including under conditions challenging to the system, as shown in the Table in Appendix I 1.

Specific sampling and monitoring procedures are established for operating the water treatment facility, and are listed in the Operations Manual. Laboratory analysis is carried out in-house as well as from an accredited outside lab. In house test procedures are kept in a binder in the test lab.

Test results are reported to the Operating Authority by the Accredited Lab and Operator Test results are recorded in the logbook in the Water Treatment Plant lab by the Operator.

All sampling and test records from the SCADA system, laboratories, and Operators are recorded, properly filed and maintained according to procedures as outlined in the Document and Records Control Procedures, and the Water Treatment Plant Operations Manual.

The procedure is for test results to be provided to the Owner on a monthly basis by the Compliance Officer who compiles the data and forwards the results to the Owner, The accredited Lab also forwards test results to the owner on a monthly basis, unless otherwise requested by the Owner to forward the results to the Operating Authority only.

A summary of the sampling and monitoring requirements of the various WTP process steps, including frequency, location, quality targets, challenging conditions, and records is shown in Appendix I - Sampling, Testing and Monitoring Table.

Appendix I

APPENDIX I1: Sampling, Testing and Monitoring Table

File: C:\DWQMS \ 16 – Sampling, Testing and Monitoring

Rev. Level:	Date:	Change:	By:	Approved By:
Initial Release	May 15, 2009	Release	DC Scott –QMS Rep.	Laurie Cox - Veolia PM / ORO

Note: To be reviewed annually or when a QMS change occurs.

DWQMS Operational Plan

17. Measuring and Recording Equipment Calibration and Maintenance

The Operating Authority maintains a calibration and maintenance process, as required for the measurement and recording equipment used in the water treatment system. Procedures are established for calibration and maintenance of this equipment, and are listed in the Operations Manual.

Specific equipment procedures are available in the Equipment Manufacturer’s Manuals and Users Manuals are available for Operators as required.

Certified sub-contractor’s are used as required for maintenance and calibration of flow meters, and records maintained.

All calibration and maintenance records are properly filed and maintained according to procedures as outlined in the Document and Records Control Procedures, and the Water Treatment Plant Operations Manual.

A summary of the calibration and maintenance requirements, for the WTP measurement and recording instruments, including method, frequency, and records is shown in Appendix J - Measurement and Recording Equipment Calibration Table. The Table is maintained by the Compliance Officer as revisions are required.

Appendix J

APPENDIX J1: Measurement and Recording Equipment Calibration Table

File: C:\DWQMS \ 17 – Measuring and Recording Equipment Calibration and Maintenance

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Note: To be reviewed annually or when a QMS change occurs.

DWQMS Operational Plan

18. Emergency Management

An emergency, with regard to drinking water, is 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.

Some emergency situations that could occur include chemical, biological, or radiological contamination, major distribution line or watermain breaks, interruptions in pressure, or loss of power. The Risk Assessment Outcomes, and Risk Assessment Table in Section 8 reference potential emergency situations. Procedures or Contingency Plans related to potential emergency situations can be found in the Operations Manual or Contingency Plan.

A Contingency Plan (Emergency Response Plan) for the Operating Authority is available at the Water Treatment Plant listing potential emergencies and the appropriate measures for response, contacts, and how to restore the system to normal operation. WTP Operators and staff are kept up to date with annual reviews of the Operations Manual and Contingency Plan, or as required if changes occur.

It is the responsibility of the Project Manager to ensure that employees are aware of the Contingency Plan and are trained in their responsibilities with regard to emergency preparedness.

A list of emergency contacts and essential suppliers and services is kept with the Contingency Plan.

In addition to the above, the Owner has an Emergency Response Plan, in accordance with current legislation and regulations, at the municipal office that provides information and contact information in the case of a water related emergency situation.

Appendix K

APPENDIX K1: Emergency Procedures

File: C:\DWQMS \ 18 - Emergency Management

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Note: To be reviewed annually or when a QMS change occurs.

19. Internal Audits

An Internal Audit procedure has been established by the Operating Authority to comply with the DWQMS standard. The intent of the procedure is to evaluate conformity of the QMS with the requirements of the Standard.

The Procedure, found in Appendix L1, identifies the internal audit criteria, the frequency recommended for the audit schedule, the scope, method and requirement for documentation of the audits.

The procedure also describes how Corrective Action Reports (CARs) are initiated and addressed to provide irreversible corrective actions to deficiencies found in the audits.

An Internal Audit Checklist is also included as Appendix L2 to assist with the audit.

Internal Audits are required to be completed at least once every 12 months.

Appendix L

APPENDIX L1: Internal Audit Procedure and Schedule

APPENDIX L2: Internal Audit Checklist

File: C:\DWQMS\19 – Internal Audits

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Note: To be reviewed annually or when a QMS change occurs.

20. Management Review

A Management Review procedure has been established by the Operating Authority to comply with the DWQMS standard. The intent of the procedure is to provide a structured mechanism for Top Management to perform an annual review of prescribed topics covering compliance, consumer, performance, and audit information based on the Quality Management System.

Top Management for the Operating Authority is defined, in Element 9 Organizational Structure, Roles, Responsibilities and Authorities, and Appendix E2, as the Area Manager and Project Manager. A Municipality representative is also included in the management review.

The Procedure, found in Appendix M1, identifies the management review process and specific topics to be assessed.

Management Reviews are required to be completed at least once every 12 months.

A report of the results of the management review are reported to the Owner by the Project Manager on an annual basis.

Appendix M

APPENDIX M1: Management Review Procedure

File: C:\DWQMS \ 20 – Management Review

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Note: To be reviewed annually or when a QMS change occurs.

21. Continual Improvement

The Operating Authority shall strive to continually improve the effectiveness of its Quality Management System through the use of corrective actions.

The review of the Operations Plan by a third party represents the first step in improving the effectiveness of the QMS. On-going annual Management Reviews and resulting corrective actions will be the basis for further improvement.

File: C:\DWQMS \ 21 – Continual Improvement

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