



RIPLEY DRINKING WATER SYSTEM APPENDIX

The following Section represents DWQMS information specific to the individual systems.

Element 6 - System Description

Element 8 – Risk Assessment Outcomes

Appendix B 2 – Risk Assessment Table

Appendix I 1 – Sampling, Testing, and Monitoring Table

Please see the appropriate section for details on the individual systems for the Township of Huron-Kinloss

File: C:\DWQMS\Huron-Kinloss- RIPLEY WELL SUPPLY SYSTEM APPENDIX

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



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6. Drinking Water System

Ripley Drinking Water System:

System Description

6.1 General

- 6.1.1 The Ripley water system is characterized as a “secure ground water” system. The system consists of two wells with a rated capacity of 864 m³/day, with chlorination treatment. The entire system is located in the Village of Ripley in the Township of Huron-Kinloss. The distribution system serves the community of Ripley with a population of approximately 675 residents, with approximately 270 customer services.
- 6.1.2 The Ripley Water System is a Class 2 Distribution and Supply large municipal residential system owned by the Township of Huron-Kinloss, and operated by Veolia Water Canada. The Ripley Water System provides potable water to the residents and businesses of the Village of Ripley.
- 6.1.3 Well # 1 is a 203 mm diameter, 84.4 m deep drilled groundwater well, located within the existing pumphouse at 74 Huron Street. The well is equipped with a submersible pump, a sanitary well seal, and discharge piping equipped with a check valve and isolation valve. Well # 1 was drilled in 1947, with the well pump and associated equipment replaced in 2007.
- 6.1.4 Well # 2 is a 203 mm diameter 85.3 m deep drilled groundwater well located approximately 60 m east of the existing pumphouse. Well # 2 is equipped with a submersible well pump. A pitless adapter connects the well pump to an underground discharge line which empties into the water storage reservoir. The discharge line is equipped with a check valve and an isolation valve. Well # 2 was drilled in 1994.
- 6.1.5 The Ripley drinking water system is equipped with a supervisory control and data acquisition system (SCADA) allowing for remote control, monitoring and record keeping of the system. This provides the operator with the current operating status of the supply and treatment equipment throughout the system at any given time.

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6.1.6 A 250 kW stand-by diesel generator and fuel storage tank are located in the fire hall adjacent to the pumphouse. The diesel generator provides emergency backup power for the water system in the event of a power failure.

6.2 Description of Water Source

6.2.1 Well # 1 and Well # 2 are not under the influence of surface water. The wells penetrate limestone aquifers. Because of the depth and structure of the aquifers, the water temperature is relatively constant, turbidity is low, and the water is relatively hard. The raw water is also relatively high in sodium and fluoride, but the lead content of the raw water is well below the half-MAC (Maximum Allowable Concentration). Those who are supplied water from the Ripley Well Supply are made aware of the various concentrations in their drinking water by numerous means of communication with the Township of Huron-Kinloss.

6.2.2 The high-lift pumps are located below grade and beneath the main pumphouse floor.

6.2.3 The full characterization of the raw water supply source is listed in the First Engineer's Report.

6.3 Disinfection System

6.3.1 The pumphouse in the Ripley Water System ensures that raw water is disinfected. Sodium hypochlorite (12%), the chemical used in the disinfection process, disinfects the raw water and serves primarily as a measure to prevent microbiological growth within the raw water pipeline, and distribution system. The pumphouse has a chlorine contact watermain to provide chlorine contact time between sodium hypochlorite and the raw water ensuring the deactivation of pathogens should they be present in the drinking water supply.

6.3.2 Disinfection equipment for each production well consists of two chemical feed pumps (one duty, one standby), with automatic switch over and alarms, and two chemical solution tanks complete with secondary containment. Chlorine residual levels are continuously monitored by on-line instrumentation to verify the pumphouses are supplying safe drinking water to the system.

6.3.2 The chlorine dosages range varies with the chlorine demand of the raw water.

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The free chlorine residual is monitored at the point of entry to the distribution system, by an on-line chlorine analyzer, with a target residual of > 1.0 and < 1.3 mg/l.

6.4 System Flows

- 6.4.1 The Ripley well supply has 1 PTWW (permit to take water) # 1140-7BEPD5 which allows 864 cubic metres per day to be pumped from the combined wells.
- 6.4.2 The Ripley treatment system has maximum flows as specified in C of A # 4975-6KWLQ5. The maximum total daily flow is 864 cubic meters per day. The maximum instantaneous flow allowed by the PTTW is 1818 L/min (or 30.3 litres per second). These flows may be exceeded when the water is being used for system maintenance or fire fighting.
- 6.4.3 The limiting factor regarding flow is chlorine contact time in the chlorine contact reservoir. In order to meet the regulatory CT requirements (CT value > 3.0) increased flows beyond 16.2 litres per second must have adequate free chlorine residual to counter the decreased retention time in the chlorine contact main. (From 2007 summary)

6.5 Distribution System

- 6.5.1 The Ripley Distribution System has approximately 270 water connections, and provides potable water to a population of approximately 675.
- 6.5.2 The system consists mostly of the original cast iron pipes and some ductile iron pipe. When these mains are replaced, PVC piping is used.
- 6.5.3 There are approximately 30 hydrants and 41 valves associated with the Ripley distribution system.
- 6.5.4 The reservoir adjacent to the pumphouse is made of concrete, and access to the reservoir is within the pumphouse. The reservoir has a water storage capacity of approximately 52.7 m³ at a top water level. There are no vents to the reservoir from outside the main pumphouse. An overflow from the reservoir discharges to the outside of the building through a downturn elbow. The reservoir does not contribute to the chlorine contact time. The concrete roof is

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covered with earth which is sloped to facilitate drainage. Raw water from Well #1 and Well #2 is emptied into the reservoir.

6.5.5 Distribution piping is mainly 150 mm with a small section of 100 mm, and consists of PVC piping on County Roads 6 (Queen Street) and 7 (Huron Street), with the remainder being either cast iron or ductile.

6.5.6 The system pressure set point is 450 kpa (65 psi).

6.6 Sample Analysis

6.6.1 Provincial regulations dictate the sampling and monitoring requirements for the system. Water quality is tested throughout the treatment process and distribution system. Where required by regulation, samples are submitted to an accredited laboratory for analyses.

6.7 Process Flow Schematic and Diagram:

(see below)

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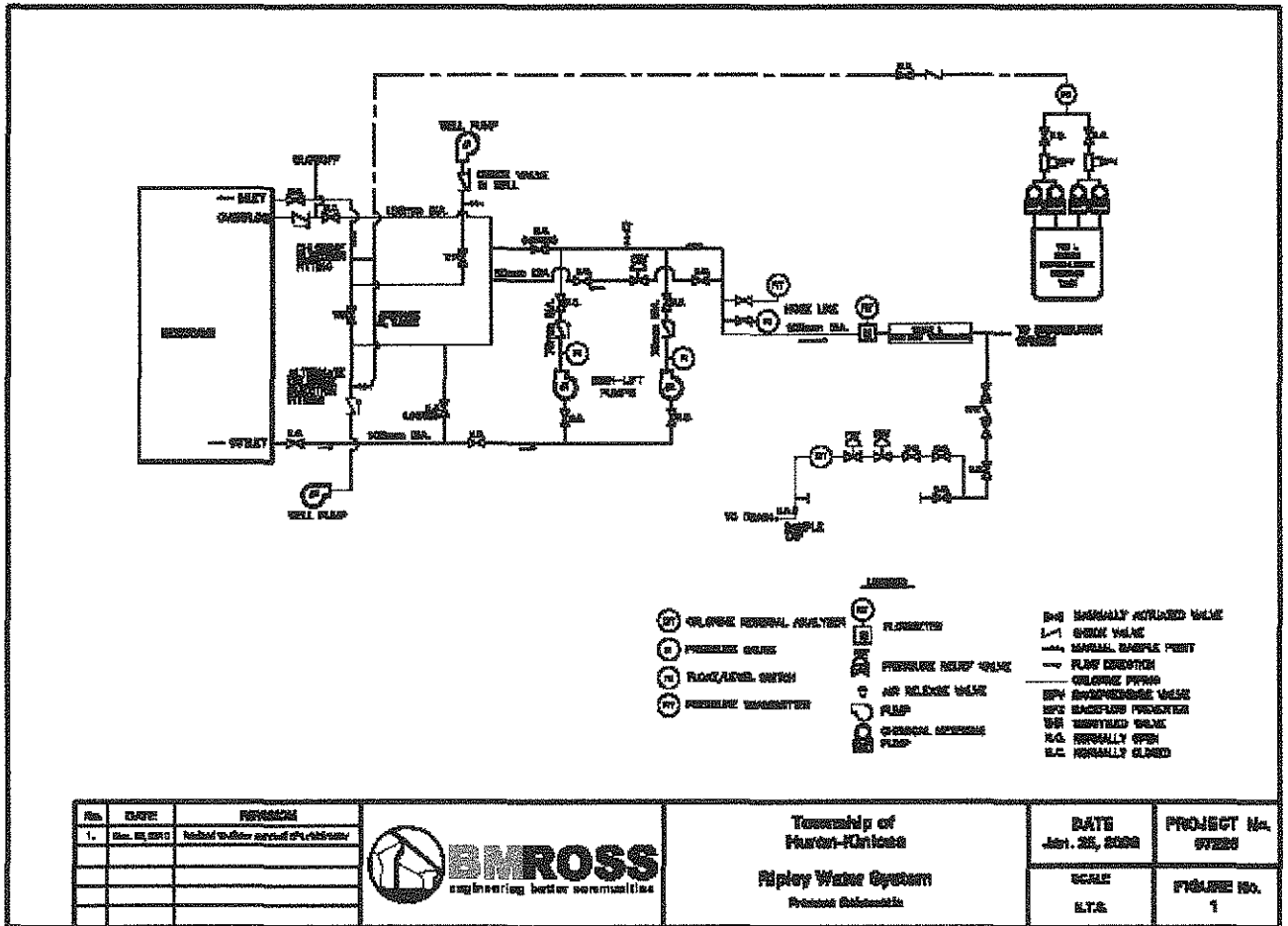
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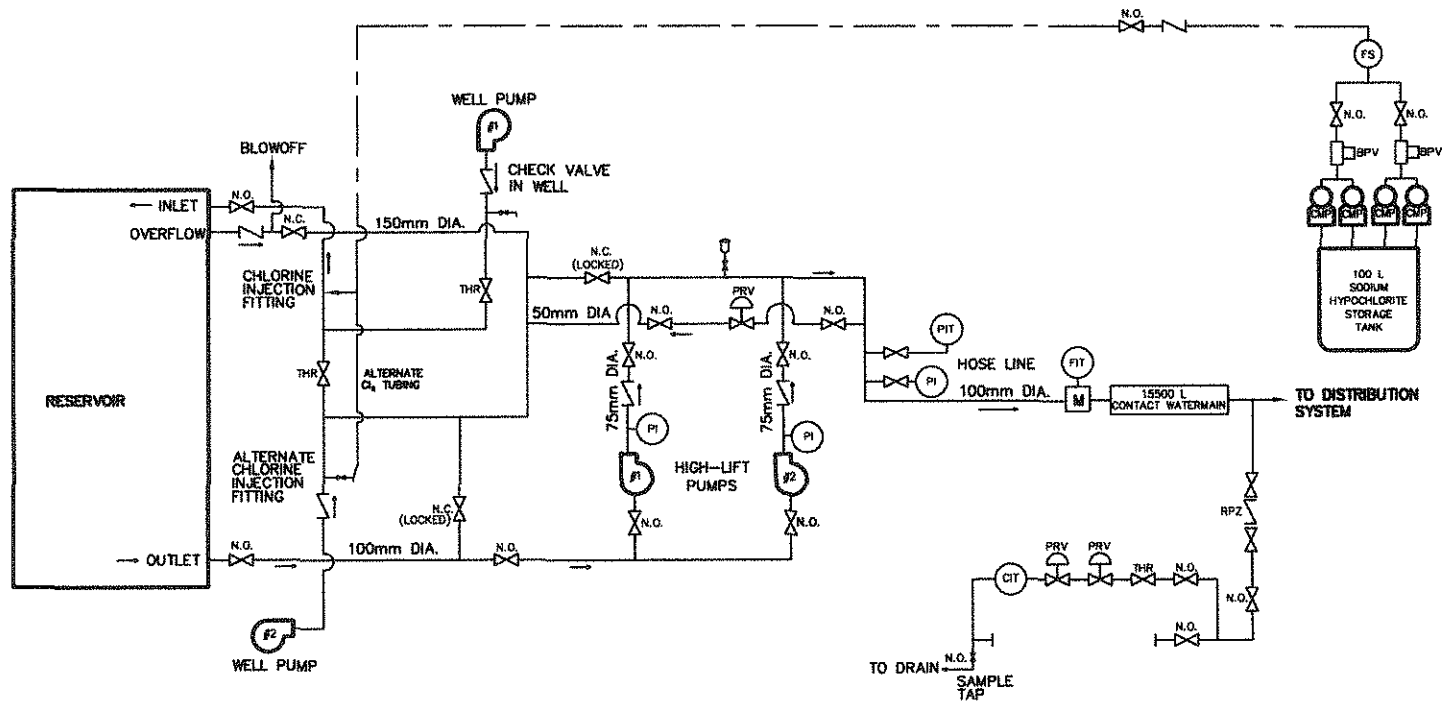
6.7.1 Process Flow Schematic



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LEGEND

- (CIT) CHLORINE RESIDUAL ANALYZER
- (PI) PRESSURE GAUGE
- (FS) FLOAT/LEVEL SWITCH
- (FIT) PRESSURE TRANSMITTER
- (FIT) FLOWMETER
- (M) PRESSURE RELIEF VALVE
- (PRV) AIR RELEASE VALVE
- (P) PUMP
- (CM) CHEMICAL METERING PUMP
- ⊗ MANUALLY ACTUATED VALVE
- ∇ CHECK VALVE
- ↔ MANUAL SAMPLE POINT
- FLOW DIRECTION
- CHLORINE PIPING
- BPV BACKPRESSURE VALVE
- RPZ BACKFLOW PREVENTER
- THR THROTTLED VALVE
- N.O. NORMALLY OPEN
- N.C. NORMALLY CLOSED

No.	DATE	REVISION
1.	Mar. 30, 2010	Revised to show removal of turbidimeter



**Township of
Huron-Kinloss**

Ripley Water System
 Process Schematic

DATE Jan. 25, 2008	PROJECT No. 07226
SCALE N.T.S.	FIGURE No. 1



8. Risk Assessment Outcomes

Risk Assessment Outcomes - Summary and Analysis

Huron-Kinloss – Ripley Water Treatment System

Basis: Risk Assessment Table and Team Meeting June 11, 2008

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. 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\Huron-Kinloss\H-K-Ripley- 8 – Risk Assessment Outcomes

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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.)

<u>Not Considered CCP's (>= 6 RPN)</u>	<u>RPN</u>	<u>CONTROL</u>
-Chemical spill	8	ERP
-Agricultural run-off / septic infiltration	8	ERP
-Changes in aquifer water quality	7	SOP
-Degradation of liquid chlorine	7	SOP
-High Lift Pump failure	6	ERP
-High Lift Pump Lock-out due to control loss	6	ERP
-Watermain break	9	SOP
-Non-functioning isolation valves and hydrants	8	SOP
-Failure to receive critical supply of parts or chemicals	10	SOP
-Power failure	6	SOP
-Remote Transmitting Unit / Remote Processing Unit Failure	9	ERP
-Communications / Telemetry lines failure	9	SOP
-Primary power failure	6	SOP
-Vandalism, introduction of contaminant	11	ERP

The Operating Authority intends to document and implement Standard Operating Procedures (SOP's) for many of these potential hazards regardless of the RPN number. These are noted in the Risk Assessment Table.

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:

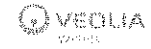
3- Establishing Procedures for Deviations from Critical Control Limits

Each CCP must have one or more documented response procedure to respond if a critical control limit is exceeded. These procedures are documented in the Operating Authority's Operations Manual or Contingency Plan (Emergency Response Plan – ERP).

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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Secondary Disinfection	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 ERP	5	2	3	10	YES	-less than 0.2 mg/L free chlorine in distribution	Emergency Response Procedure
Distribution	Loss of system pressure	-potential chemical or biological contamination -backflow from private plumbing	-monitoring of system pressure	-consumer complaint -precautionary boil water notice -standpipe -refer to SOP	3	2	1	6	Yes	Table provided	Part of Emergency Response Procedure

Note: Primary Disinfection and Distribution have been added as minimum Critical Control Points, although not originally assessed as such.

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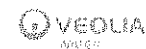
APPENDIX B 2: RISK ASSESSMENT TABLE - Well #1 and #2 (From Team Meeting June 11, 2008)

Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring and Control Measures	Control Procedure	Likelihood	Severity	Detectability	Risk Priority Number - RPN	CCP ?	Critical Control Limits	Contingency Plan
Raw Water / Well	Well casing failure / Well head damage	-Loss of raw water -potential biological / chemical contamination	-finished water on-line turbidity testing -weekly samples for microbiological testing -monthly monit. and raw water turbidity testing -redundancy back-up well	-shut down the affected well -refer to SOP -plans for a new well	2	2	1	5	N	None	Need procedure-SOP / ERP

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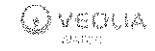
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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Raw Water / Well	Agricultural run-off	-potential biological / chemical contamination of aquifer	-monitoring - weekly microbiological, -monthly turbidity -quarterly chemical testing -36 month chemical testing -Operator observation -Customer complaint -well head protection plan	-Operator response -refer to SOP	1	3	4	8	N	None	-Water Quality Monitoring Part of Emergency Response Plan
Raw Water / Well	Low well levels	-loss of water	-monitoring well levels weekly -trending	-Operator response -refer to SOP	1	2	2	5	N	None	Prepare procedure-SOP

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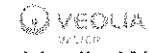
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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Primary Disinfection	High flows	-insufficient chlorine contact time -evacuation of reservoir -possible loss of water	-on-line monitoring and controls -Operator inspection, response, and repair -calculation of CT	-Operator response -control access to hydrants	2	2	1	5	N		-procedure required -minimum chlorine residual allowable at maximum flow is 0.5 mg/L
Primary Disinfection	Degradation of liquid chlorine	-improper disinfection	-on-line monitoring and controls with auto pump lock-out -Operator response	-Operator response -refer to test method -spare chlorine kept on site -increase chemical dosage -refer to SOP	2	4	1	7	YES	-less than 8%	-refer to test method –SOP Procedure required
Chlorine Contact Chamber	Out of service for maintenance / repair	-inadequate contact time for primary disinfection	-increase dosage rate -utilize CT available in reservoir	-limit flows -increase chlorine residual at point of entry	1	2	1	4	N	None	PROCEDURE TO BE DEVELOPED

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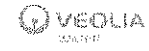
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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Secondary Disinfection	inadequate chlorine residual in distribution system	-potential biological contamination	-on-line monitoring and 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	5	2	3	10	YES	-less than 0.2 mg/L free chlorine in distribution	Review / Amend Procedure Part of Emergency Response Procedure -As provided by Nancy
Distribution	Watermain break	-loss of system pressure - potential biological contamination of distributed water -property damage	-alarm -Operator response / observation -consumer complaint	-Operator response -refer SOP -refer to contingency plan	4	2	3	9	N	None	Review / Amend procedure SOP

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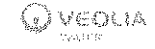
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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Distribution	Non-functioning pressure sustaining valves and press.reducing valves	-loss of water pressure -high pressure breaks -no access to fire protection	-alarms -consumer complaints	-operator response -interconnection valve with Kincardine	1	2	1	4	N	None	Refer to Kinc. Procedure SOP Req'd
Suppliers	Failure to receive critical supply of parts or chemical	-unable to treat water adequately -failure of equipment	-written communication and agreements with suppliers -NSF and CofA requirement on site -redundancy of equipment	-Operator response -alternate source -critical spare parts available	4	3	3	10	N	None	PROCEDURE REQ'D FOR LISTING SPARE PARTS AND CRITICAL QUANTITIES OF CHEMICALS
Control Systems	Power failure	-loss of SCADA -loss of pumps, water pressure, and supply	-UPS -back-up disks, memory stick -propane back-up generator with auto transfer switch at Municipal office	-Operator response -stand-by genset for SCADA PC	3	2	1	6	N	None	Develop procedure

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Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Facility Security	-Vandalism, -introduction of contaminant	-damage to equipment -inability to produce treated water -potential contamination	-locks -daily checks -high visibility	-operator response -refer to procedure	1	5	5	11	N	None	Need Procedure Part of ERP
Emergency Preparedness											PROCEDURE REQ'D FOR EMERGENCY PROCEDURE FOR WATER SYSTEM- CONTACT #'S NAMES ETC.

Team Members: H-K – Tracey Howe, Hugh Nichol, Nicole Elliott
Veolia – Laurie Cox, Nancy Mayhew, Wendy Gallant, Don Scott

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APPENDIX I 1: SAMPLING, TESTING, AND MONITORING SUMMARY TABLE: (Ground Water System)

PARAMETER						
Process step	Sampling or Monitoring Parameter and Frequency	Location	Quality Targets	Response	Challenging Conditions	Records
<u>Raw Water</u> -WELL LEVEL STATIC	WEEKLY level checks -static	Well #1 and #2	Flows & level: Operator responds to / reports significant changes in flows, levels or pressure	-Operator to note and respond to significant changes in readings or observations and note in Log Book	None known	Recorded in Log Book and log sheet
<u>Raw Water</u> -TURBIDITY	MONTHLY grab sample testing from each well -turbidity	-collected at raw water tap	Turbidity: Observe trends, report significant change (of +/- .25 NTU)	-Operator to note and respond to significant changes in readings or observations and note in Log Book	-status of aquifer such as limestone flaking -well casing deterioration	Recorded in Log Book and log sheet
<u>Raw Water</u> MICRO-BIOLOGICAL	WEEKLY microbiological grab sample from each well -E-coli -total coliform	-collected at raw water tap	-not detectable -not detectable	samples sent to outside lab for analysis and report	As above	-Operator records on Custody Sheets -results reported by outside lab to WTP

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Process step	Sampling or Monitoring Parameter and Frequency	Location	Quality Targets	Response	Challenging Conditions	Records
<u>Treated Water</u> CHLORINE RESIDUAL - Disinfection / Chlorination	<u>ON-LINE / SCADA</u> Cl2 analyzer residual monitoring analysis <u>DAILY</u> grab sample Cl2 residual testing (free chlorine residuals)	point of entry treated tap	-Operational Goal is 0.90-1.10 mg/l	Operator to respond to significant changes in readings or observations and note in Log Book	-raw water quality changes	On-line SCADA record Recorded in Log Book and log sheet
<u>Treated Water</u> TURBIDITY	Daily Operator checks	-point of entry to distribution system (treated tap)	-observe trends	Operator to respond to significant changes in readings or observations and note in Log Book	-raw water quality changes	On-line SCADA record Recorded on log sheets only
<u>Treated Water</u> MICRO-BIOLOGICAL	<u>WEEKLY</u> sample collection from each well microbiological sample for -E-coli -total coliform -Heterotrophic Plate Count (HPC) -bacteria plate count (25% HPC- distr.)	-point of entry -collected at treated tap	Operational Goals: -E-coli- not detectable -Coliform-not detectable -HPC steady baseline, no sudden change ((< 10 – plate count (colonies per ml) < 10- HPC plate count (colonies per ml))	samples sent to outside lab for analysis and report	Raw water quality	-Operator records on Custody Sheets -results reported by outside lab to WTP

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Process step	Sampling or Monitoring Parameter and Frequency	Location	Quality Targets	Response	Challenging Conditions	Records
<u>Treated Water</u> NITRATE & NITRITE	<u>QUARTERLY</u> (every 3 mo) -nitrate & nitrite testing	-point of entry (collected at treated water tap)	Per O.Reg 169/03 -MAC 10 mg/l (Operational Goal 5 mg/l) -MAC 1.0 mg/l (as nitrogen) (Operational goal 0.5 mg/l)	-samples sent to outside lab for analysis and report	Raw water quality	-Operator records on Custody Sheets -results reported by outside lab to WTP
<u>Treated Water</u> INORGANICS	<u>TRI-ANNUALLY</u> (every 36 mo) Per schedule 23 of O.Reg. 170/03	-point of entry (collected at treated water tap)	As outlined in O.Reg 169/03 for parameters in sch. 23 of O.Reg. 170/03 (< 50% MAC Operational Goal)	-samples sent to outside lab for analysis and report	Raw water quality	-Operator records on Custody Sheets -results reported by outside lab
<u>Treated Water</u> ORGANICS	<u>TRI-ANNUALLY</u> (every 36 mo) Per schedule 24 of O.Reg. 170/03	-point of entry (collected at treated water tap)	As outlined in O.Reg 169/03 for parameters in sch. 24 of O.Reg. 170/03 (< 50% MAC Operational Goal)	-samples sent to outside lab for analysis and report	Raw water quality	-Operator records on Custody Sheets -results reported by outside lab to WTP
<u>Treated Water</u> SODIUM	<u>5 YEAR</u> intervals (every 60 mo) (Per schedule 23 of O.Reg. 107/03)	-point of entry (collected at treated water tap)	<20 mg/l (if above- advise MOH) See also Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines	-samples sent to outside lab for analysis and report	Raw water quality	-Operator records on Custody Sheets -results reported by outside lab

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Rev. Level:	Date:	Change:	By:	Approved By:
Initial Release	Apr. 20, 2009	Release	DC Scott –QMS Rep.	Laurie Cox - Veolia PM / ORO
Rev. 1	Mar. 4, 2011	No Dist. Cl2 analyser, remove turbidity analyser	DC Scott –QMS Rep.	Laurie Cox - Veolia PM / ORO

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



DWQMS Operational Plan
RIPLEY

Process step	Sampling or Monitoring Parameter and Frequency	Location	Quality Targets	Response	Challenging Conditions	Records
<u>Treated Water</u> FLUORIDE CONTENT	5 YEAR intervals (every 60 mo)	- point of entry (treated water sample tap)	Operational goal is < 1.5 mg/l (if above – call MOH)	-samples tested by Operator, records results, and advises MOH if above 1.5 mg/l	Raw water quality	Recorded in Log Book
<u>Treated Water</u> HARDNESS	ON REQUEST grab sample collected	-collected at treated tap	N/A See Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines	Operator to report result to ORO / CO to respond to Request	N/A	Recorded in Log Book
<u>Distribution System</u> CHLORINE RESIDUAL	-DAILY grab sample Cl2 residual testing (free chlorine residuals)	-household or business tap	-Operational Goal is > 0.2 mg/l (and <2.0 mg/l)	Operator to respond as required and note in Log Book	-raw water quality changes	On-line SCADA record Recorded in Log Book

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DWQMS Operational Plan
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Process step	Sampling or Monitoring Parameter and Frequency	Location	Quality Targets	Response	Challenging Conditions	Records
Distribution System MICRO-BIOLOGICAL	- WEEKLY sample collection 8 per month 2-samples / week from distribution system microbiological sample for -E-coli -total coliform -Heterotrophic Plate Count (HPC) bacteria plate count (25% HPC- distr.)	Distribution system per Weekly Bacti Sample Routes and Locations (per SOP Sampling Schedule)	Operational Goals: -E-coli- not detectable -Coliform-not detectable -HPC steady baseline, no sudden change Operational Goal ((< 10 – plate count (colonies per ml) < 10- HPC plate count (colonies per ml))	samples sent to outside lab for analysis and report	Raw water quality	-Operator records on Custody Sheets -results reported by outside lab to WTP
Distribution System TRIHALOMETHANES	QUARTERLY (every 3 mo) trihalomethane testing	-distribution system (collected at rotating distant points in the system)	MAC - 0.10 mg/l (Ref. O.Reg 169/03)	-samples sent to outside lab for analysis and report	Raw water quality	-Operator records on Custody Sheets -results reported by outside lab
Distribution System LEAD (see SOP also for lead Sampling Schedule)	SEMI-ANNUALLY (every 6 mo) -lead testing	-distribution system- private plumbing, non-private plumbing, and distribution system samples (collected per Operations Manual Schedule)	0.10 mg/l Per O.Reg 169/03	-samples sent to outside lab for analysis and report		-Operator records on Custody Sheets -results reported by outside lab

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