



LAKESHORE 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- LAKESHORE WELL SUPPLY SYSTEM APPENDIX

Rev. Level:	Date:	Change:	By:	Approved By:
Initial Release	Apr. 20, 2009	Release	DC Scott –QMS Rep.	Laurie Cox - Veolia Project Manager
Rev. 1	Mar. 4, 2011	Rev name to DWS	DC Scott –QMS Rep.	Laurie Cox - Veolia Project Manager

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



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LAKESHORE

6. Drinking Water System

Lakeshore Drinking Water System:

System Description

6.1 General

6.1.1 The Lakeshore water system is characterized as a "secure ground water" system and is classified as a large municipally owned water system. The system consists of 4 sub-systems as described below. The plant and its equipment have a daily maximum capacity to deliver 12,000 cubic metres of potable water to the Huron Kinloss Lakeshore community extending from Point Clark in the south to Huronville in the north and the sub system supplying the Courtney/Amberley Beach Rd. subdivision subsystem in Ashfield Colborne Wawanosh. The Lakeshore Distribution System has 2135 water connections along the Huron-Kinloss Lakeshore and 151 water connections in the Courtney/Amberley Beach Rd. Subdivision. In total, the Lakeshore Distribution System supplies a population of approximately 5705. The Lakeshore area has a large seasonal population and therefore, the demands are significantly higher during the cottage season.

6.1.2 The Lakeshore Water Distribution and Supply System is a Class 3, large municipal residential system owned by the Township of Huron-Kinloss and the operated by Veolia Water Canada. The Lakeshore Area Water System provides potable water to the residents and businesses along the lakeshore of the Township of Huron-Kinloss and to as small number of properties that are outside the Township of Huron Kinloss boundary.

6.1.3 The Lakeshore Water Distribution and Supply System consists of the following 4 systems:

6.1.3.1 Blairs Grove: Blair's Grove Well 2 (BG-W2) is a 200 mm diameter, 73.2 m deep flowing/artesian bedrock well, equipped with a submersible pump with well pump discharge piping into the chlorine contact reservoir. BG-W2 is located at 28 Cathcart Street. Blair's Grove Well 3 (BG-W3) is an overflowing artesian bedrock well, currently not equipped with a well pump, and is covered by a removable, locked insulated wooden housing unit. The Blair's Grove high-lift pump (BG-HLP1) high-lift discharge manifold has a continuous residual chlorine analyzer. Blair's Grove well # 2 was drilled in 1982, with new well pump and piping installed in 2006.

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- 6.1.3.2 Huronville South: Huronville South Well 2 (HS-W2) is a 200 mm diameter, 93.3 m deep bedrock well, that is equipped with a submersible pump, with a well pump discharge piping discharging into the chlorine contact reservoir. HS-W2 is located within a municipal park at 39 Penetangore Row S. Huronville South well # 2 was drilled in 1994, with new well pump and piping installed in 2006.
- 6.1.3.3 Murdoch Glen: Well 2 (MG-W2) is a 200 mm diameter, 80.5 m deep bedrock well equipped with a submersible pump with well pump discharge piping going to the contact water main, and into the single cell concrete ground level storage reservoir that has a capacity of 400m³. MG-W2 is located at 815 Parkplace. The water level in the reservoir is monitored by an ultrasonic level transducer. The reservoir is configured so that when the level drops to the well pump start level the SCADA system triggers the well pump to maintain an adequate quantity of treated water in the reservoir. Murdoch Glen well # 2 was drilled in 1992, with new well pump and piping installed in 2006.
- 6.1.3.4 Point Clark: Both Point Clark Development Well # 1 and Point Clark Development Well # 2 (PCD-W1 and PCD-W2) are located at 603 Tuscarora Rd. PCD-W1 is a 150 mm diameter, 75.0 m deep bedrock well. PCD-W1 has a slotted steel casing for an open-hole section, equipped with a submersible pump, and with a discharge line discharging to the chlorine contact reservoir. PCD-W2 is a 200 mm diameter, 75.6 m deep bedrock well. PCD-W2 is equipped with a submersible pump with a well discharge manifold and a flow meter discharging to the chlorine contact reservoir. Point Clark well # 2 was drilled in 1994, with new well pump and piping installed in 2006.

6.1.4 The Lakeshore 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.

6.1.5 A 130 kW diesel generator, located at the Murdoch Glen pumphouse, includes an 1135 L capacity fuel storage tank and is used for emergency power supply.

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6.2 Description of Water Source

6.2.1 BG-W2, BG-W3 (currently not in use), HS-W2, MG-W2, PCD-W1 and PCD-W2 are all secure deep bedrock wells, not under the influence of surface water. The wells penetrate limestone aquifers. Due to the depth and structure of the aquifers, the water temperature is relatively constant, turbidity is low, with the exception of Huronville South, 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 Lakeshore Area Water System 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 full characterization of the raw water supply source is listed in the First Engineer's Report.

6.3 Disinfection System

6.3.1 Each pumphouse in the Lakeshore Area Water System ensures that raw water is disinfected and undergoes iron sequestering. 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, reservoir, and distribution system. The Lakeshore Area Water System has two different methods to achieve chlorine contact time. Three pumphouses have a chlorine contact chamber (baffled basement reservoir), while the Murdoch Glen pumphouse has a chlorine contact watermain.

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

6.3.3 In the well houses the chemical is added prior to the water entering the chlorine contact chambers at dosages high enough to achieve both primary and secondary disinfection objectives. The free chlorine residual was monitored at the point of entry to the distribution system with a target residual of > 1.00 mg/l and < 1.30 mg/l

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6.4 Iron Sequestering

6.4.1 Each pumphouse includes a chemical feed pump for each well and a chemical storage tank, complete with secondary containment. Chlorinated water is immediately treated with sodium silicate for iron sequestering. Sequestering prevents staining of plumbing fixtures and discoloration of the water, but can leave a slight metallic taste.

6.5 System Flows

6.5.1 The Lakeshore water treatment plant has 4 separate permits to take water. These are : Point Clark # 1786-665QUF, Murdock Glen # 7016-6HYKE3, Huronville South # 1166-666NSD, Blair's Grove #93P-0055 which allowed the transfer of 3273, 1814, 3928 and 2621 cubic metres of water per day respectively

6.5.2 The 4 well houses each have a maximum flow as specified in C of A # 0848-6FKPK2. These are based on the CT calculations for each site and the minimum free chlorine residuals used in those calculations. The maximum flow allowed by the C of A at Point Clark is 37.9 litres per second, at Blair's Grove 30.3, at Murdock Glen 21.0 and at Huronville 45.5 litres per second.

6.5.3 The limiting factor regarding flow is chlorine contact time in the reservoirs. In order to meet the regulatory CT requirements (CT value > 3.0) the maximum allowed flow must correspond with a free chlorine residual of 0.50 mg/l.

6.6 Distribution System

6.6.1 The Lakeshore Area Water System currently services the Huron-Kinloss Lakeshore community extending from Point Clark in the South to Huronville in the North and the subsystem supplying the Courtney/Amberley Beach Rd. Subdivision subsystem in the Township of Ashfield-Colborne- Wawanosh.

6.6.2 The Lakeshore Distribution System has 2135 water connections along the Huron-Kinloss Lakeshore and 151 water connections in the Courtney/Amberley Beach Rd. Subdivision. In total, the Lakeshore Distribution System supplies a population of approximately 5705. The Lakeshore area has a large seasonal population and therefore, the demands are significantly higher during the cottage season.

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- 6.6.3 The Lakeshore Distribution System is comprised of three different pressure zones. Interconnections permit water to be transmitted from one pressure zone to another, including during emergency or fire fighting conditions. Pressure Zone 1 (the southern system) is comprised of the Point Clark pumphouse, the Blair's Grove pumphouse and the standpipe. The northern portion of the Lakeshore Water Works is divided into two pressure zones (Pressure Zone 2 and Pressure Zone 3). Zone 2 is serviced by the Huronville South pumphouse, and Zone 3 is serviced by the Murdoch Glen pumphouse, and the reservoir. Murdoch Glen has the capability of providing both zone 2 and zone 3, plus standby with the diesel generator if required.
- 6.6.4 The Township of Huron-Kinloss is in an agreement with the Municipality of Kincardine, where Kincardine is the Operating Authority for a small area of Huron-Kinloss known as the Huronville Subdivision Distribution System (Plan M28) which receives all their water from the Municipality of Kincardine Water System.
- 6.6.5 The Township of Huron-Kinloss installed an interconnecting valve between the Lakeshore Well Supply to the Huronville Subdivision Distribution System and/or the Town of Kincardine. This valve is to be used for emergency purposes only.
- 6.6.6 Distribution piping consists of PVC and polyethylene piping.
- 6.6.7 The Bell Drive storage facility is a former pumphouse converted into a storage facility located at 179 Bell Drive. It currently houses water treatment chemicals and equipment. Piping still exists in this house to allow flushing of the distribution system and for water sample collection.
- 6.6.8 A standpipe is situated in the Point Clark area at 3405 Concession 2 and is constructed of bolted steel. The 102 ft high and 31 ft wide standpipe has storage of approximately 1500 m³. The high-lift pumps for the PCD pumphouse and the BG pumphouse are automatically controlled by the water level in the standpipe. The standpipe is surrounded by a chain-link fence to prevent unwarranted entry.
- 6.6.9 Watermain upgrades made since 1996 include isolation valves and sufficient size piping for hydrants and fire fighting.
- 6.6.10 Distribution piping is Polyethylene or PVC and ranges from 50 mm to 250 mm.

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6.6.11 The system pressure for Blair’s Grove is approximately 50 psi, Huronville South is approximately 76 psi, Murdoch Glen is approximately 62 psi in Zone 2 and 76 psi in Zone 3, and Point Clark is approximately 58 psi.

6.7 Sample Analysis

6.7.1 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.

6.8 Process Flow Schematic and Diagram:

(see below)

File: C:\DWQMS\Huron-Kinloss\H-K- Lakeshore - 6- Drinking Water System

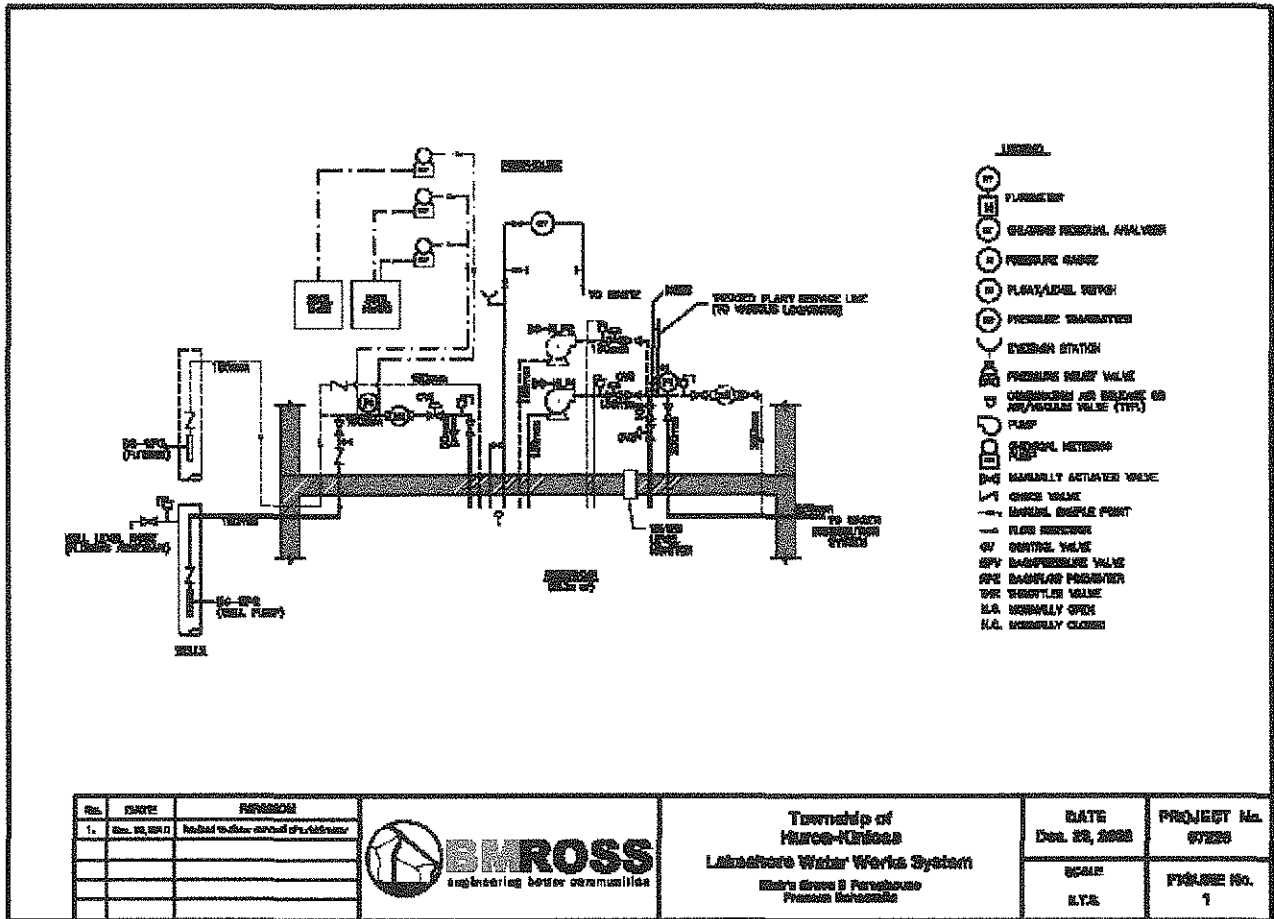
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DWQMS Operational Plan
LAKESHORE

Blair's Grove



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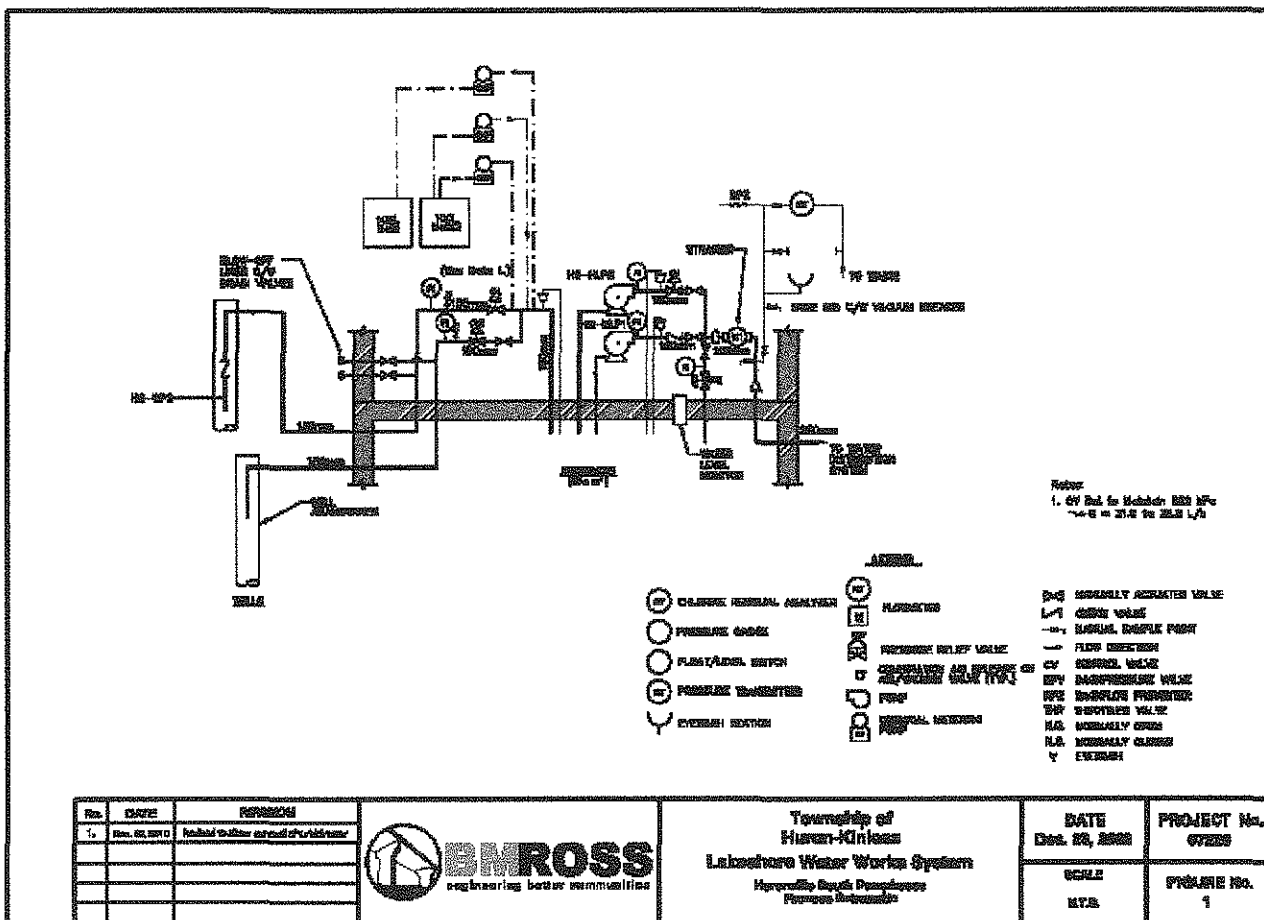
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Huronville



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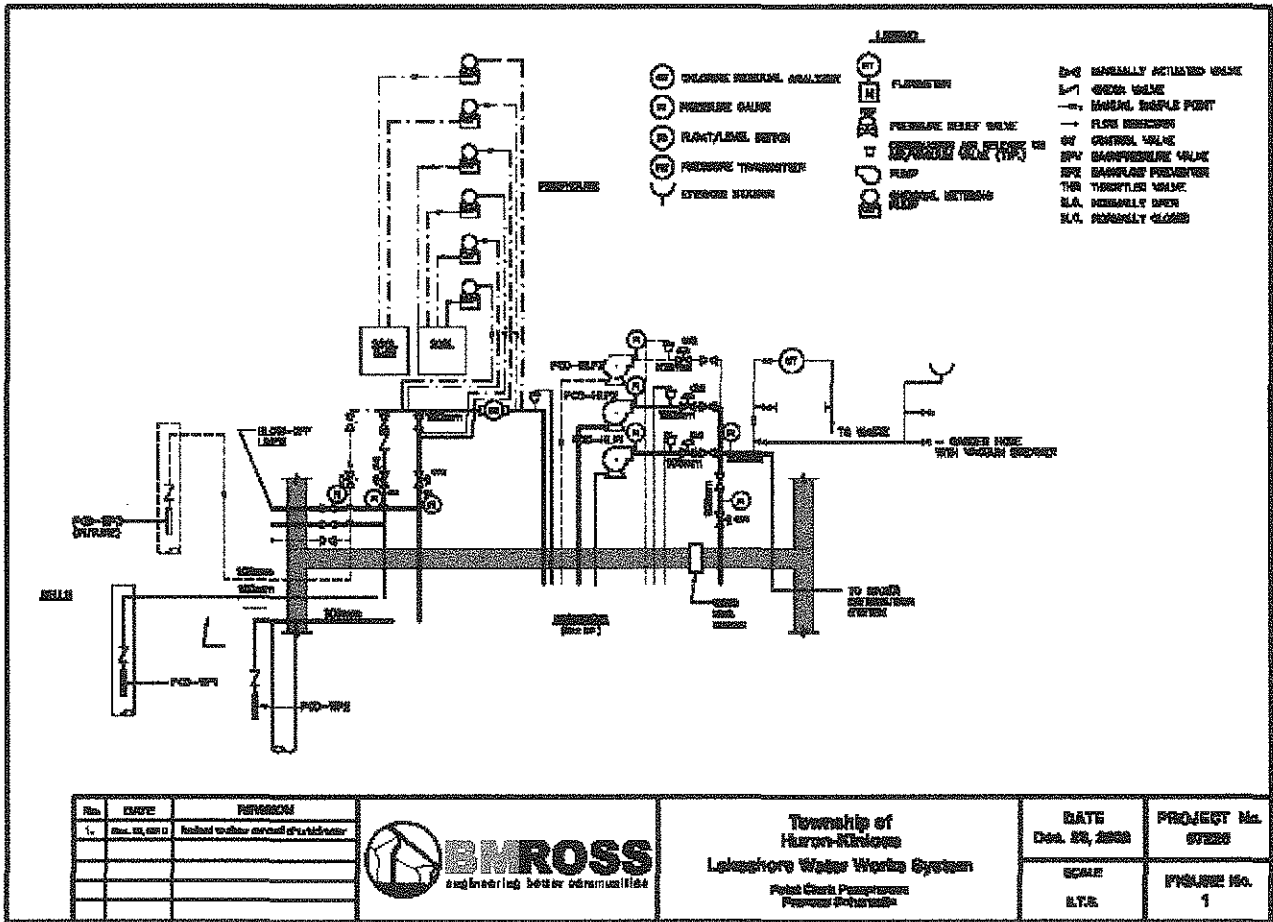
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Point Clark



Rev.	DATE	REVISION
1	Dec. 20, 2010	Initial release of drawing



Township of Huron-Kinloss
Lakeshore Water Works System
Point Clark Compressor
Pressure Retention

DATE	PROJECT No.
Dec. 20, 2010	67226
SCALE	DRAWING No.
N.T.S.	1

File: C:\DWQMS\Huron-Kinloss\H-K- Lakeshore - 6- Drinking Water System

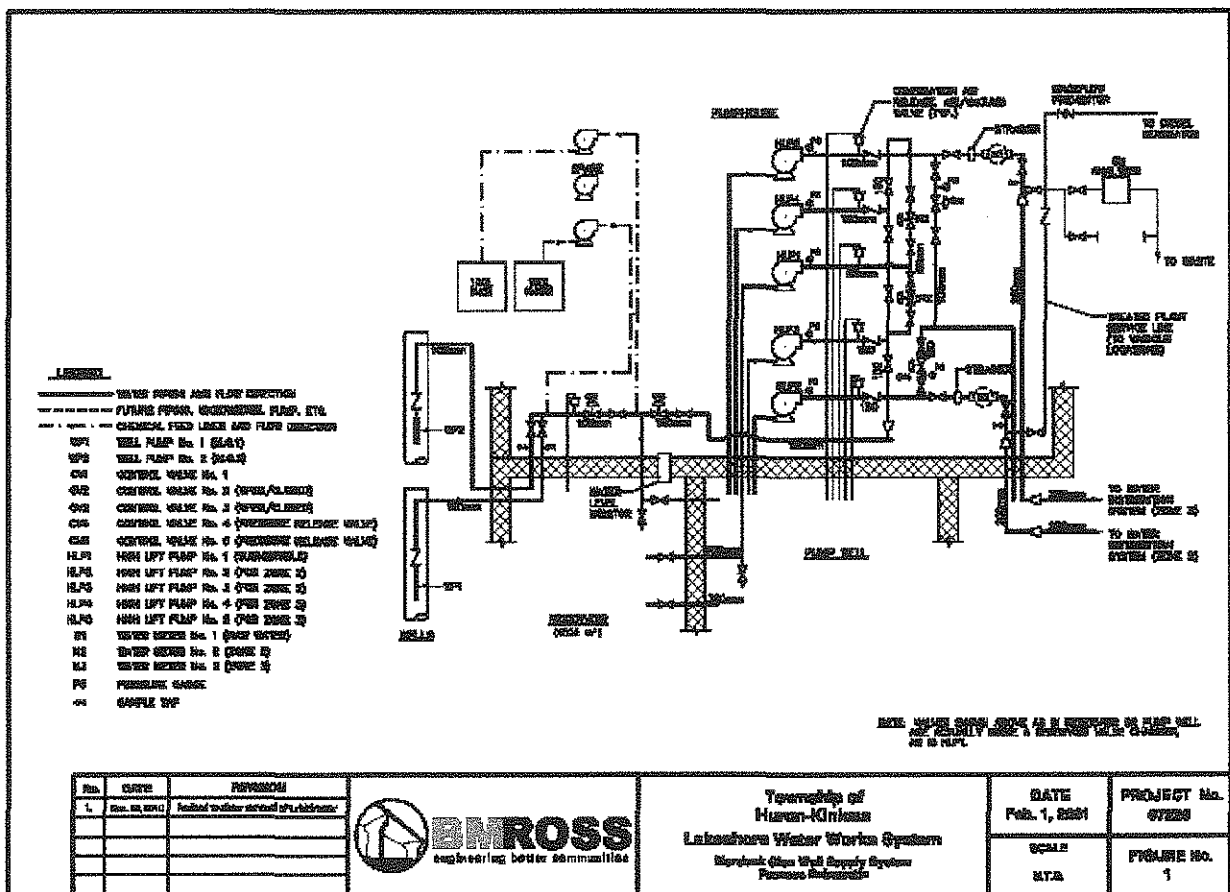
Rev. Level:	Date:	Change:	By:	Approved By:
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LAKESHORE

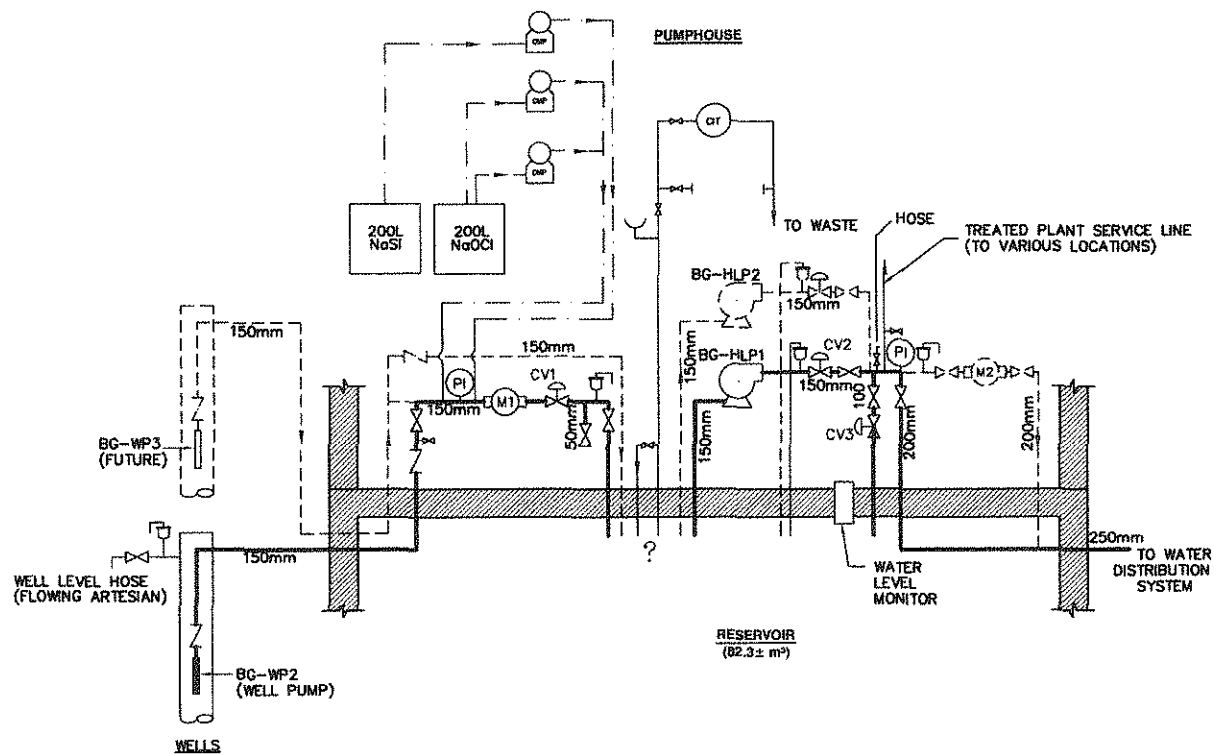
Murdoch Glen



File: C:\DWQMS\Huron-Kinloss\H-K- Lakeshore - 6- Drinking Water System

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LEGEND

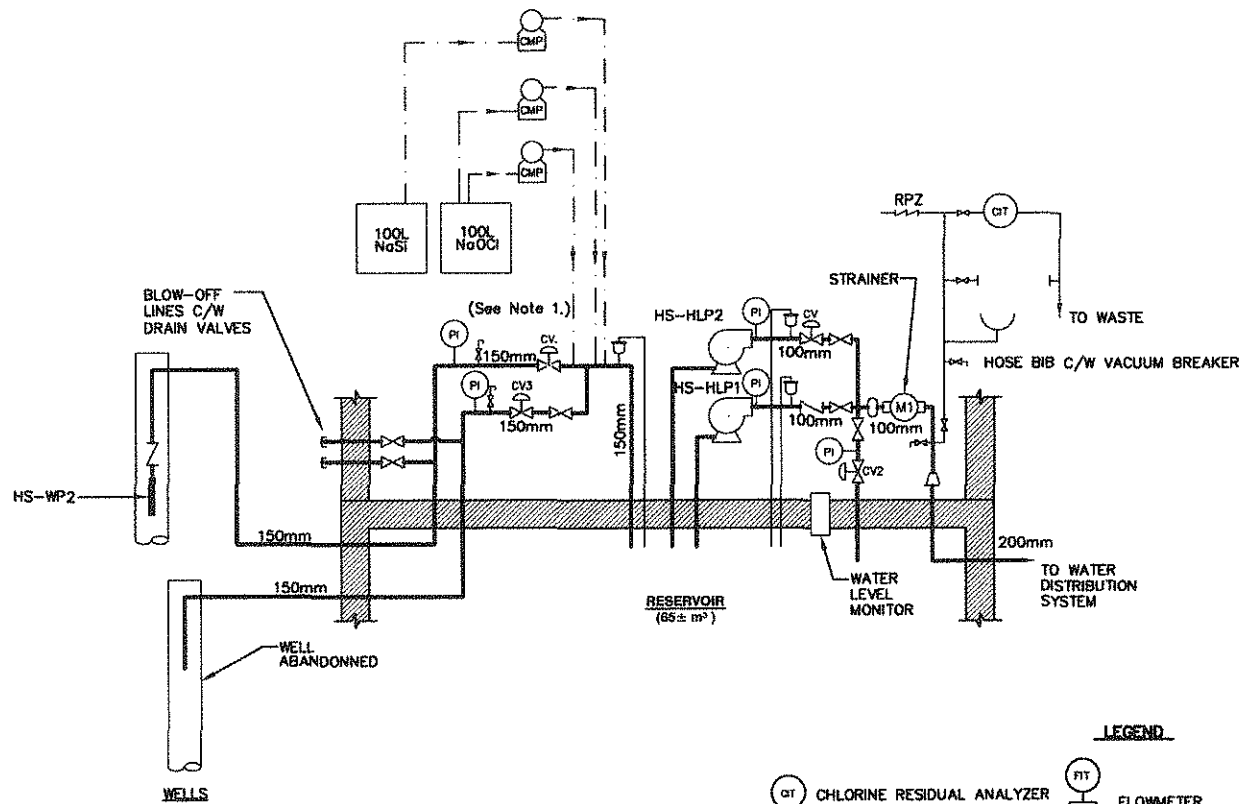
- FLOWMETER
- CHLORINE RESIDUAL ANALYZER
- PRESSURE GAUGE
- FLOAT/LEVEL SWITCH
- PRESSURE TRANSMITTER
- EYEWASH STATION
- PRESSURE RELIEF VALVE
- COMBINATION AIR RELEASE OR AIR/VACUUM VALVE (TYP.)
- PUMP
- CHEMICAL METERING PUMP
- MANUALLY ACTUATED VALVE
- CHECK VALVE
- MANUAL SAMPLE POINT
- FLOW DIRECTION
- CV
- BPV
- RPZ
- THR
- 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**
Lakeshore Water Works System
 Blair's Grove II Pumphouse
 Process Schematic

DATE Dec. 23, 2008	PROJECT No. 07226
SCALE N.T.S.	FIGURE No. 1



Notes:
 1. CV Set to Maintain 262 kPa
 → Q = 31.8 to 32.5 L/s

LEGEND

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> CHLORINE RESIDUAL ANALYZER PRESSURE GAUGE FLOAT/LEVEL SWITCH PRESSURE TRANSMITTER EYEWASH STATION | <ul style="list-style-type: none"> FLOWMETER PUMP PRESSURE RELIEF VALVE COMBINATION AIR RELEASE OR AIR/VACUUM VALVE (TYP.) PUMP CHEMICAL METERING PUMP | <ul style="list-style-type: none"> MANUALLY ACTUATED VALVE CHECK VALVE MANUAL SAMPLE POINT FLOW DIRECTION CONTROL VALVE BACKPRESSURE VALVE BACKFLOW PREVENTER THROTTLED VALVE NORMALLY OPEN NORMALLY CLOSED EYEWASH |
|--|--|---|

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

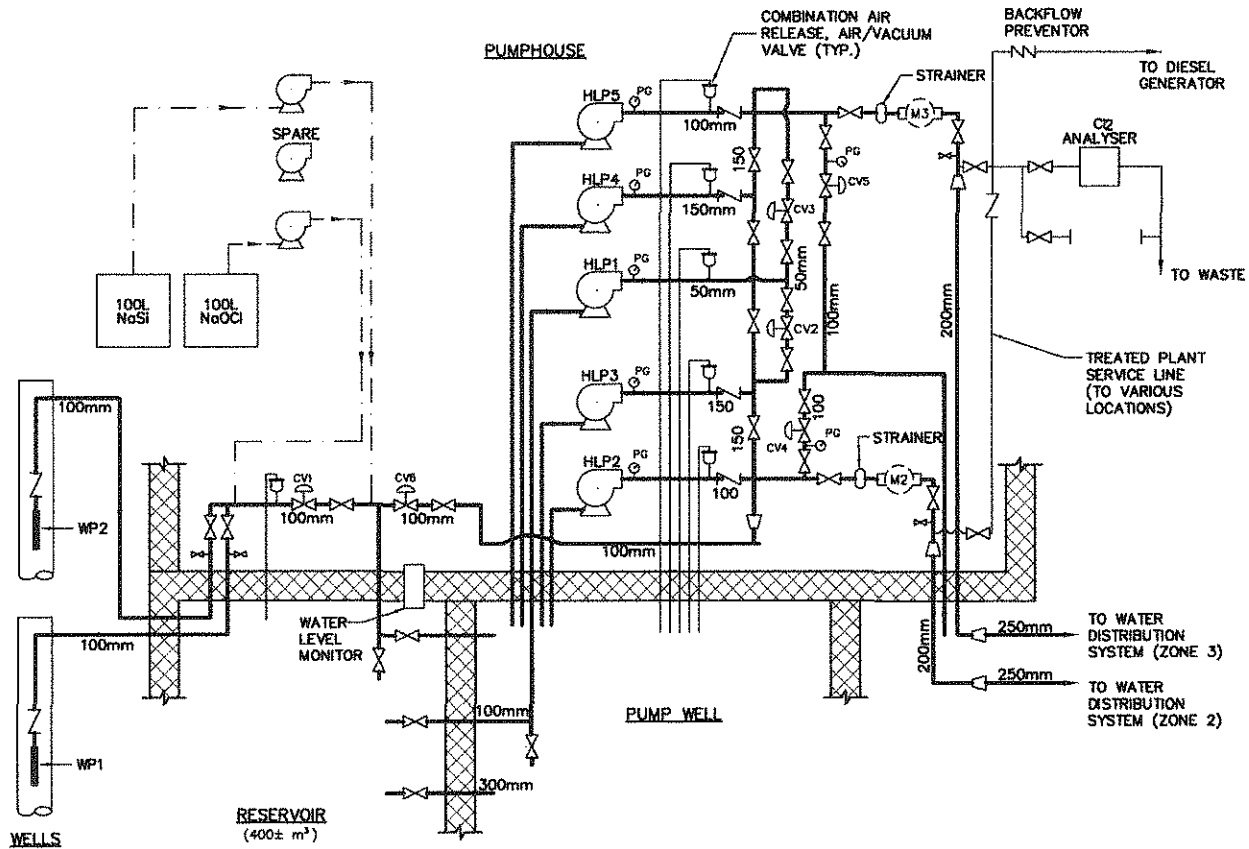


**Township of
 Huron-Kinloss**
Lakeshore Water Works System
 Huronville South Pumphouse
 Process Schematic

DATE	PROJECT No.
Dec. 23, 2008	07226
SCALE	FIGURE No.
N.T.S.	1

LEGEND

- WATER PIPING AND FLOW DIRECTION
- - - FUTURE PIPING, WATERMETER, PUMP, ETC.
- - - CHEMICAL FEED LINES AND FLOW DIRECTION
- WP1 WELL PUMP No. 1 (M.G.1)
- WP2 WELL PUMP No. 2 (M.G.2)
- CV1 CONTROL VALVE No. 1
- CV2 CONTROL VALVE No. 2 (OPEN/CLOSED)
- CV3 CONTROL VALVE No. 3 (OPEN/CLOSED)
- CV4 CONTROL VALVE No. 4 (PRESSURE RELEASE VALVE)
- CV5 CONTROL VALVE No. 5 (PRESSURE RELEASE VALVE)
- HLP1 HIGH LIFT PUMP No. 1 (SUBMERSIBLE)
- HLP2 HIGH LIFT PUMP No. 2 (FOR ZONE 2)
- HLP3 HIGH LIFT PUMP No. 3 (FOR ZONE 2)
- HLP4 HIGH LIFT PUMP No. 4 (FOR ZONE 3)
- HLP5 HIGH LIFT PUMP No. 5 (FOR ZONE 3)
- M1 WATER METER No. 1 (RAW WATER)
- M2 WATER METER No. 2 (ZONE 2)
- M3 WATER METER No. 3 (ZONE 3)
- PG PRESSURE GAUGE
- s- SAMPLE TAP



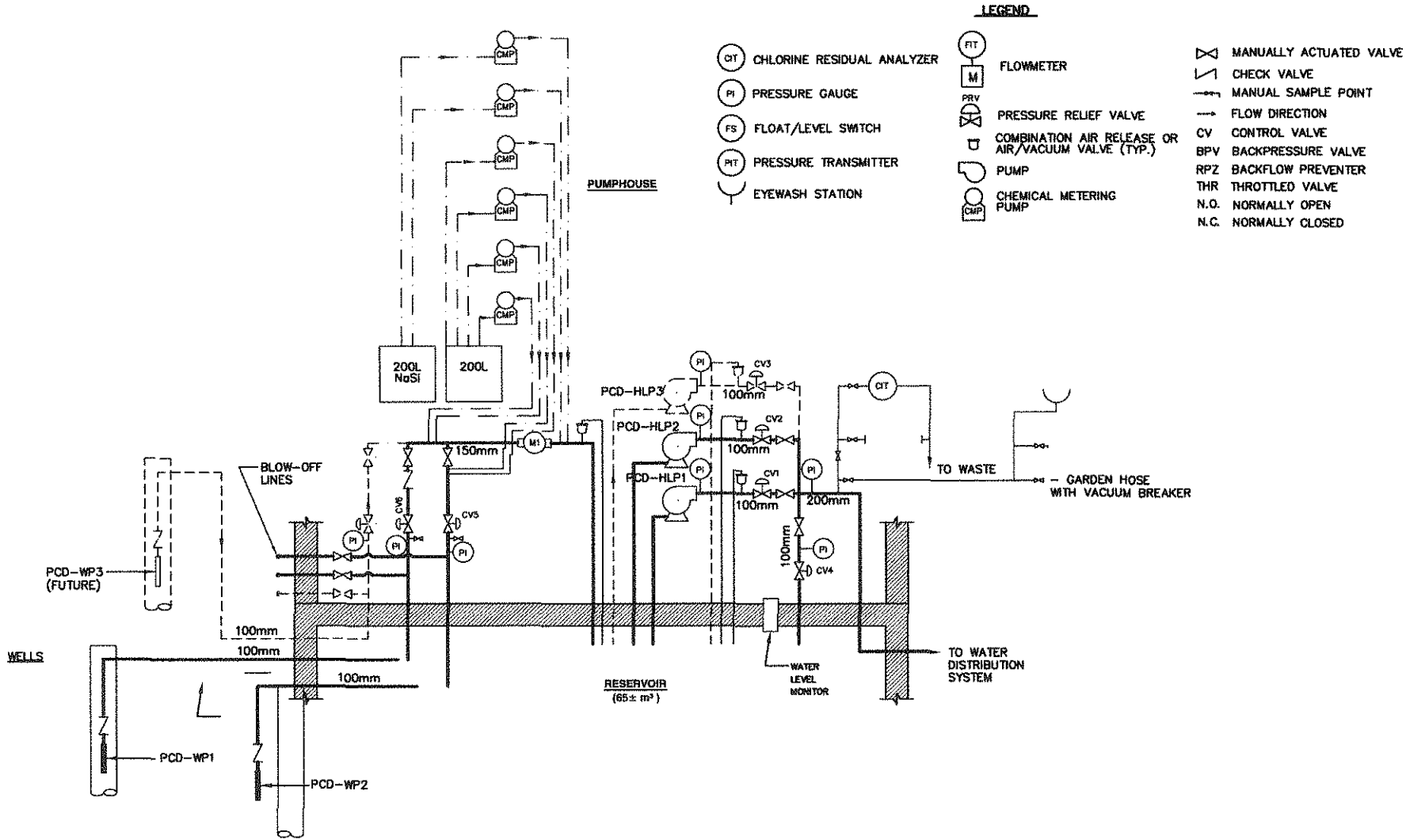
NOTE: VALVES SHOWN ABOVE AS IN RESERVOIR OR PUMP WELL ARE ACTUALLY INSIDE A RESERVOIR VALVE CHAMBER, AS IS HLP1.

No.	DATE	REVISION
1.	Mar. 29, 2010	Revised to show removal of turbidimeter



Township of Huron-Kinloss
Lakeshore Water Works System
 Murdock Glen Well Supply System
 Process Schematic

DATE Feb. 1, 2001	PROJECT No. 07226
SCALE N.T.S.	FIGURE No. 1



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



**Township of
Huron-Kinloss**
Lakeshore Water Works System
 Point Clark Pumphouse
 Process Schematic

DATE Dec. 23, 2008	PROJECT No. 07226
SCALE N.T.S.	FIGURE No. 1



8. Risk Assessment Outcomes

Risk Assessment Outcomes - Summary and Analysis

Huron-Kinloss – Lakeshore 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, with exceptions as shown of 4 and 5 considered in some cases. 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-Lakeshore- 8 – Risk Assessment Outcomes

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Risk Assessment Table Summary

NOTE: A total 27 hazards were identified in the Risk Assessment Table – Appendix B2

CCP's (see additional details in Table below)

	<u>RPN</u>	<u>CONTROL</u>
-Chemical feed system failure	6	SOP
-Contamination of the chamber with improperly disinfected water	6	ERP
-High Lift Pump failure	6	ERP
-High Lift Pump Lock-out due to control loss	6	ERP
-Inadequate chlorine residual in distribution system	7	ERP
-Loss of system pressure	5	ERP

Not Considered CCP's (< 6 RPN)

	<u>RPN</u>	<u>CONTROL</u>
-Well casing failure / Well head damage	4	SOP
-Well pump failure	4	SOP
-Low well levels	5	SOP
-High flows	5	SOP
-Sodium silicate addition system problems	5	SOP
-Out of service for maintenance / repair	4	SOP
-Commission of new mains	5	SOP
-Non-functioning pressure sustaining valves and pressure reducing valves	4	SOP
-Loss of use or damage to Standpipe	4	SOP

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

File: C:\DWQMS\Huron-Kinloss\H-K-Lakeshore- 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.)

Not Considered CCP's (>= 6 RPN)

	<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	6	SOP
-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:

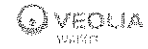
3- Establishing Procedures for Deviations from Critical Control Limits

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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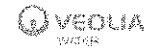
SUMMARY OF CCP'S FROM RISK ASSESSMENT TABLE:

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Primary Disinfection	Chemical feed system failure	-loss of disinfection -possible loss of water -potential biological contamination	-on-line monitoring and controls with auto pump lock-out -Operator response -automatic back-up feed system	-Operator response -maintain spare parts on site -refer to SOP -routine preventative maintenance -standpipe	2	3	1	6	YES	-less than 0.5 mg/L free chlorine for HS, BG and PC. -less than 0.2 mg/L free chlorine for MG.	- SOP -Boil Water Procedure
Chlorine Contact Chamber	Contamination of the chamber with improperly disinfected water	-improperly disinfected water entering the distribution system -potential biological contamination	-online chlorine analyzers -alarms -operator observation	-Operator response -refer to ERP	3	2	1	6	YES	-less than 0.5 mg/L free chlorine for HS, BG and PC. -less than 0.2 mg/L free chlorine for MG.	Contingency Plan / Emergency Response Procedure
High Lift Pumps	Pump failure	-loss of treated water -loss of system pressure -potential biological contamination	-alarms -back-up pumps- -redundancy -regular maintenance	-Operator response -refer to ERP	3	2	1	6	YES	Table provided by Nancy	Contingency Plan / Emergency Response Procedure

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



DWQMS Operational Plan
LAKESHORE

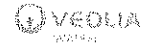
Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
High Lift Pumps	Lock-out due to control loss	-loss of treated water -loss of system pressure -potential biological contamination	-alarms -consumer complaints -regular maintenance	-Operator response	3	2	1	6	YES	Table provided	Contingency Plan / Emergency Response Procedure
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	2	2	3	7	YES	-less than 0.05 mg/L free chlorine	Contingency Plan / 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	2	2	1	5	Yes	Table provided	Contingency Plan / 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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DWQMS Operational Plan
LAKESHORE SYSTEM

APPENDIX B 2: RISK ASSESSMENT TABLE (From Team Meeting June 11, 2008)
(Lakeshore Systems - Point Clark, Blairs Grove, Murdoch Glen, Huronville South)

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 monitoring and raw water turbidity testing -preventative maintenance	-shut down the affected well -refer to SOP -plans for a new well? -redundancy back-up well houses -standpipe	1	2	1	4	N	None	Need procedure SOP

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LAKESHORE SYSTEM

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Raw Water / Well	Well pump failure	-loss of raw water	-alarm system -preventative maintenance -well monitoring	-Operator response -shut down the affected well -refer to SOP -redundancy back-up well -standpipe	2	1	1	4	N	None	Need Plan Develop SOPs
Raw Water / Well	Chemical spill	-potential chemical contamination of aquifer	-monitoring weekly microbiological -monthly turbidity -36 month chemical testing -Operator observation -Customer complaint -well head protection plan	-refer to contingency plan -Operator response -redundancy back-up well -standpipe	1	5	2	8	N	None	Part of Emergency Response Plan

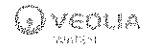
File: C:\DWQMS\Huron-Kinloss\H-K-Ripley- APPENDIX B 2 – Risk Assessment Table

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Township of Huron-Kinloss



Veolia Water Canada

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LAKESHORE SYSTEM

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 / septic infiltration	-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 -redundancy back-up well -standpipe	1	3	4	8	N	None	-Water Quality Monitoring -Part of Emergency Response Procedure

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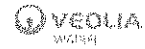
DWQMS Operational Plan
LAKESHORE SYSTEM

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Raw Water / Well	Low well levels	-loss of water	-monitoring well levels -trending	-Operator response -refer to SOP	1	2	2	5	N	None	Prepare SOP
Additional Treated Water Quality Exceedances	Changes in aquifer water quality	-potential chemical contamination -restrictions on water use	-monitoring -advise health unit as required	Refer to SOP	1	2	4	7	N	None	SOP for adverse
Primary Disinfection	Chemical feed system failure	-loss of disinfection -possible loss of water	-on-line monitoring and controls with auto pump lock-out -Operator response -automatic back-up feed system	-Operator response -maintain spare parts on site -refer to SOP -routine preventative maintenance -standpipe	2	3	1	6	N	None	-Prepare SOP -Boil Water Procedure -0.5 mg/L free chlorine -chlorine alarm sounds and well pump locks out -operator response

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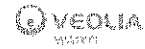
DWQMS Operational Plan
LAKESHORE SYSTEM

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 -possible loss of water	-on-line monitoring and controls -Operator inspection, response, and repair -calculation of CT	-Operator response -control access to hydrants -refer to SOP	2	2	1	5	N	None	-SOP required -0.5 mg/L free chlorine resid. -chlorine alarm sounds and well pump locks out -operator response
Primary Disinfection	Degradation of liquid chlorine	-improper disinfection	-on-line monitoring and controls with auto pump lock-out -Operator response	-Operator response -refer to SOP -spare chlorine kept on site -increase chemical dosage -standpipe	2	3	1	6	N	None	-refer to SOP (test method) -less than 8%
Iron Sequestering	Sodium silicate addition system problems	Insufficient or excess sodium silicate addition -potential chemical hazard	-Operator inspection -consumer complaints	-Operator response	1	2	2	5	N	None	Procedure required

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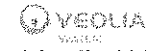
DWQMS Operational Plan
LAKESHORE SYSTEM

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Chlorine Contact Chamber/ Baffled Reservoir	Out of service for maintenance / repair	-inadequate contact time for primary disinfection	-increase dosage rate	-limit flows -increase chlorine residual at point of entry -redundancy alternate well house -standpipe	1	2	1	4	N	None	PROCEDURE TO BE DEVELOPED
Chlorine Contact Chamber	Contamination of the chamber with improperly disinfected water	-improperly disinfected water entering the distribution system	-online chlorine analyzers -alarms -operator observation	-Operator response -refer to ERP	3	2	1	6	YES	-less than 0.5 mg/L free chlorine for HS, BG and PC. -less than 0.2 mg/L free chlorine for MG.	Part of Emergency Response Procedure

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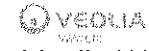
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LAKESHORE SYSTEM

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
High Lift Pumps	Pump failure	-loss of treated water -loss of system pressure	-alarms -back-up pumps- redundancy -regular maintenance	-Operator response -refer to ERP	3	2	1	6	Yes	Table provided by Nancy	Part of Emergency Response Procedure -as provided by Nancy
High Lift Pumps	Lock-out due to control loss	-loss of treated water -loss of system pressure	-alarms -consumer complaints -regular maintenance	-Operator response	3	2	1	6	Yes	Table provided by Nancy	Part of Emergency Response Procedure -as provided by Nancy

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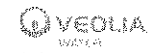
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LAKESHORE SYSTEM

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	2	2	3	7	YES	-less than 0.05 mg/L free chlorine	Part of Emergency Response Procedure -As provided by Nancy
Distribution	Watermain break	-loss of system pressure - potential biological contamination of distributed water -property dmg.	-alarm -trending -Operator response / observation -consumer complaint	-Operator response -refer to SOP	4	2	3	9	N	None	Need SOP

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DWQMS Operational Plan
LAKESHORE SYSTEM

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Distribution	Commission of new mains	-potential contamination	-daily sampling and monitoring -Operator response -system maintenance and repair -operating authority notification	-Disinfection procedure -refer to SOP	3	1	1	5	N	None	Amend/Review SOP
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	2	2	1	5	N	None	Review / Amend Procedure

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DWQMS Operational Plan
LAKESHORE SYSTEM

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Distribution	Non-functioning isolation valves and hydrants	-unable to isolate -no access to fire protection -loss of water	-annual exercise -annual inspection -regular maintenance	-Operator response -refer to SOP	4	1	3	8	N	None	Amend procedure
Distribution	Non-functioning pressure sustaining valves and pressure 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
Distribution	Loss of use or damage to Standpipe	-loss of water pressure -no access to fire protection -potential contamination -restrictions on water use	-alarms -visual examinations	-operator response -refer to SOP -high-lift control options -pressure control valves	1	2	1	4	N	None	Need SOP

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DWQMS Operational Plan
LAKESHORE SYSTEM

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Suppliers	Failure to receive critical supply of parts or chemicals	-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 generator w/ auto transfer switch at Ripley Municipal Office	-Operator response -stand-by gen set for SCADA PC -standpipe	3	2	1	6	N	None	Develop SOP (gen set from Municipal Office) Refer to SOP for interconnection valve

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DWQMS Operational Plan
LAKESHORE SYSTEM

Process Step	Description of Hazard	Result of Hazard	Monit. & Cont Meas.	Control Proc.	L	S	D	#	CCP ?	CCL	Contin.Plan
Control Systems	Remote Transmitting Unit / Remote Processing Unit Failure	-loss of control of equipment -loss of communication and record keeping	-alarms -regular checks -RTU record retention capability	-Operator response -spare components -refer to procedure	3	2	4	9	N	None	Part of Emergency Response Procedure
Control Systems	Communications / Telemetry lines failure	-loss of operator monitoring and control	-alarms -regular checks	-operator response	5	2	2	9	N	None	Need SOP - purchase remote dialers -install phone lines
Entire System	Primary power failure	-loss of treated water supply	-back-up diesel generator -UPS on SCADA PC -annual inspections	-Operator response -refer to SOP -standpipe	3	2	1	6	N	None	Review SOP

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DWQMS Operational Plan
LAKESHORE SYSTEM

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 -some fencing	-operator response -refer to ERP	1	5	5	11	N	None	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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DWQMS Operational Plan
LAKESHORE

APPENDIX I 1: SAMPLING, TESTING, AND MONITORING SUMMARY TABLE: (Ground Water System)
(Blair's Grove, Point Clark, Huronville, Murdoch Glen)

PARAMETER						
Process step	Sampling or Monitoring Parameter and Frequency	Location	Quality Targets	Response	Challenging Conditions	Records
<u>Raw Water</u> -WELL LEVEL STATIC	MONTHLY level checks -static WEEKLY level checks -static WEEKLY level checks -static MONTHLY level checks -static	Blair's Grove Point Clark Huronville Murdoch Glen	<u>Flows & level:</u> 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	<u>Turbidity:</u> 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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Rev. 1	Mar. 4, 2011	Dist. Cl2- no analyser, turbidity-no on-line treated water analyser,	DC Scott -QMS Rep.	Laurie Cox - Veolia PM / ORO

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



DWQMS Operational Plan
LAKESHORE

Process step	Sampling or Monitoring Parameter and Frequency	Location	Quality Targets	Response	Challenging Conditions	Records
Treated Water 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
Treated Water TURBIDITY	<u>ON-LINE / SCADA</u> turbidity monitoring analysis 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
Treated Water 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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DWQMS Operational Plan
LAKESHORE

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>3 YEAR</u> intervals (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>3 YEAR</u> intervals (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 report 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. 1	Mar. 4, 2011	Dist. Cl2- no analyser, turbidity-no on-line treated water analyser,	DC Scott –QMS Rep.	Laurie Cox - Veolia PM / ORO

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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
LAKESHORE

Process step	Sampling or Monitoring Parameter and Frequency	Location	Quality Targets	Response	Challenging Conditions	Records
<u>Distribution System</u> MICRO-BIOLOGICAL	- WEEKLY sample collection 11 per month- 3-samples week 1,2,3 2- samples week 4 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
<u>Distribution System</u> TRIHALOMETHANES	<u>QUARTERLY</u> (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
<u>Distribution System</u> LEAD (see SOP also for lead Sampling Schedule)	<u>SEMI-ANNUALLY</u> (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

File: C:\DWQMS \Huron-Kinloss\H-K- Lakeshore - APPENDIX I 1 – Sampling, Testing, and Monitoring Summary Table

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	Dist. Cl2- no analyser, turbidity-no on-line treated water analyser,	DC Scott –QMS Rep.	Laurie Cox - Veolia PM / ORO

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

Sampling at the Standpipe / Weekly Inspection

Weekly microbiology samples are collected at the standpipe once per week. This involves descending a ladder into a restricted space below ground level (chamber). It has not been designated as a confined space, but should be treated with special attention.

- 1) Prior to entering the space via the ground-level access hatch, open the hatch fully to engage the lid in an open position. Inside the hatch (within reaching distance), there is a light switch and a fan knob. Turn on the light switch, and turn the knob until you can hear the fan running. You must allow the fan to run for several minutes prior to entry (for fresh air exchange into the chamber). It is also a good idea to check the air vent pipe for pests prior to entry.
- 2) A quick visual inspection of the area around the standpipe perimeter should be conducted at every visit. This includes making sure the area around the fence has not been compromised. The pad-locks should also be visually inspected (on the gate, on the access hatch, and on the caged ladder). The top of the standpipe should also be inspected once a year, or if there is evidence of trespassing. There is also a pad-lock on the access hatch on the top of the tower.
- 3) Phone someone to let them know you are going to enter the restricted space (or if necessary, climb the tower). You must speak to a live voice (no voice-mail). Tell them you will call them back once you have finished sampling and are no longer in the restricted space. Tell them that if you do not call them back, they must attempt to call you. If you do not answer, then they are to send someone to the standpipe immediately. Here are a few contact numbers:

Township Office	519-395-3735	Administrative Assistant Public Works
		Director of Public Works

Goderich WTP	519-524-6583	Compliance Officer	ext. 313
		Administrative Assistant	ext. 314
		Accounts Clerk	ext. 315

- 4) Descend the ladder carefully. Once at the bottom, there is a sample tap on the east side of the main inlet/outlet pipe. Disinfect the tap with a small torch or lighter. Open the sample tap and let the water run for a few minutes. Test the water for chlorine residual and collect sample. Shut off sample tap.
- 5) It is a good idea to perform a visual inspection of the equipment in the chamber. Check pressure gauges, UPS, lights and piping for functionality, signs of damage or degradation.
- 6) After your egress from the chamber, shut the lights and fan off, and close the hatch. Secure the pad-lock.
- 7) Report back to the same contact person you called in step 3).