Township of
SEVERN

Water Supply and Distribution System

Westshore
2023 Summary Report

Contents

Overview and Background

Safe Drinking Water Act

Safe Drinking Water Act Ontario Regulation 170/03, Schedule 22-2, requires that owners of municipal drinking water systems prepare a Summary Report and present this report to the members of Municipal Council by March 31 of each year. The report is prepared for the previous calendar year and the following criteria must be included as per the regulation:

- List the requirements of the Act, the regulations, the system's approval, drinking water works permit, municipal drinking water license, and orders applicable to the system that were not met during the period covered by the report.
- For each requirement referred to in clause (a) that was not met specify the duration of the failure and the measures that were taken to correct the failure.
- A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows.
- A comparison of the summary referred to in (c) to the rated capacity and flow rates approved by the system's certificate of approval, drinking water works permit or municipal drinking water license.

This Summary Report also serves as a comprehensive review of the systems performance as it relates to regulations and criteria that fall under the municipal drinking water licensing program.

Municipal Drinking Water Licensing Program

A Municipal Drinking Water License (MDWL) is required in Ontario to operate the drinking water system. The Municipal Drinking Water License (#148-106 Issue Number 3) was re-issued on May 20, 2021, and is valid until May 19, 2026. The reissuance was initiated by the Ministry of Environment, Conservation and Parks

(MECP) due to regulatory amendments that required timelines to be outlined in the MDWL. There are five requirements that must be achieved to obtain an MDWL:

- a valid Drinking Water Works Permit (#148-206 Issue Number 3)
- a valid Permit to Take Water for each source (#7763-9U4LB4)
- an Operational Plan
- must have an Accredited Operating Authority (C0124837-DWQ5)
- a Financial Plan approved by Council

System and Process Description

The Corporation of the Township of Severn is the owner and operator of the Westshore Water Supply and Distribution Systems (DWS# 260061958). The system began operation in October of 2005. It currently has approximately 991 residential and commercial service connections. It also supplies water to the West Shore Beach Club distribution system that is comprised of approximately 86 connections. It is classified as a Class 2 Water Treatment system and a Class 2 Water Distribution system.

Source Water

The Westshore Water Supply and Distribution System obtains its raw water from Lake Couchiching. The area of Lake Couchiching and Lake Simcoe combined is approximately 76,285 hectares with a total drainage area of approximately 3,850 square kilometres (km2). Lake Couchiching is part of the Trent Severn Waterway and is a controlled body of water with monitored water levels. Lake Couchiching has a surface area of 44.75 km2 with a maximum depth of 12 metres (m) and a mean depth of 6m. The lake and its immediate watershed are underlain by limestone bedrock in the southern and western areas with Precambrian bedrock along the northern and eastern areas.

Raw Water Characteristics

The raw water is of low turbidity and is of acceptable ph. Temperatures will range between seasons from as low as 2.5˚C during the winter months and up to 20˚C during the summer months.

Water Treatment

The water treatment plant is located at 3333 New Brailey Line. The water treatment plant is comprised of two packaged treatment plant trains which consist of coagulation, flocculation, sedimentation, filtration, and backwashing. The control and instrumentation include influent and effluent magnetic flow meters on each treatment train, four turbidity meters (raw and one on each treatment train and a final), level sensors and pressure differential sensors. Once filtered, water is then pumped to GAC filtration. Primary disinfection is achieved with two (one duty, one standby) ultraviolet (UV) systems. Secondary disinfection then takes place by sodium hypochlorite. Water is then stored in an underground reservoir with a total storage volume of 2143 cubic metres (m3).

Water is delivered to the distribution system by three VFD driven vertical turbine high lift pumps to supply water for domestic use and firefighting. Pressure in the distribution system is maintained between 60-65 pounds-per-square-inch (PSI).

Online analyzers monitor and record raw, filtered and distribution water flows, raw water turbidity, pH, and temperature, filtered water turbidity and treated water turbidity, free chlorine residual, pH, and temperature. The plant is also equipped with full SCADA control.

A 500-kilowatt (kW) diesel generator provides emergency backup power to the water and wastewater treatment systems.

Water Distribution

The distribution system is comprised of 19 kilometre (km) of PVC water main ranging in size between 150 millimetres (mm) and 300 mm. There are 12 sample stations, 127 fire hydrants and 7 private hydrants connected to the system.

Regulatory Compliance

Regulations

All municipally owned and operated water systems are governed under the Safe Drinking Water Act, 2002, Ontario Water Resources Act (OWRA), and associated regulations. The following regulations, and associated standards and documents, are all applicable, and most relevant, to the compliant operation of the Township of Severn's Drinking Water system:

Ontario Regulation 170/03

This regulation includes requirements for:

- Sampling and analytical testing (microbiological and chemical)
- Adverse water quality incidents
- Corrective actions
- Continuous water quality monitoring

Ontario Regulation 169/03

This regulation includes requirements for:

- Water Quality Standards

Ontario Regulation 128/04

This regulation includes requirements for:

- Classifications of Drinking Water Systems
- Certifications and responsibilities of Operators
- Proper record keeping of the drinking water system

Wells Regulation 903

This regulation includes requirements for:

- Well maintenance
- Well specifications

Drinking Water Quality Management Standard (DWQMS)

This Standard specifies:

- Minimum requirements for the Quality Management System to allow for the accreditation of the Operating Authority

Municipal Drinking Water License

This document includes requirements for:

- Specific conditions / testing / monitoring
- Flow limits through the treatment system
- Regulatory relief conditions
- Operations and Maintenance manual criteria

Drinking Water Works Permit License

This document includes criteria for:

- Making alterations to the system

Non-Compliance and Adverse Water Quality Incidents

There were three adverse water quality incidents that occurred in 2023.

- August 1, 2023, a category 2 watermain repair occurred resulting in a boil water for 49 Residential homes and 1 commercial property.
- September 6, 2023, an adverse lead sample occurred from a fire hydrant in the Beach Club development. System was flushed and resampled with no adverse results.
- December 19, 2023, a category 2 watermain break occurred resulting in a boil water for 77 residential homes

DWQMS and Municipal Drinking Water Licensing Program

Third-Party Audit and Accreditation

On an annual basis, a third-party accreditation authority conducts an audit to determine whether the Quality Management System conforms to the requirements of the MECP Drinking Water Quality Management Standard (DWQMS).

On October 11 to October 13, 2023, NSF International completed a onsite audit with no corrective action required. The findings are included during the Management Review.

Internal Audit

As per the DWQMS, an internal audit is to be conducted once per year. September 1, 6, and 7, 2023, an internal audit was conducted by Acclaims Environmental. The findings were included during Management Review.

Management Review

As per the DWQMS, an annual Management Review is to be conducted and findings conveyed to the Owner. Management Reviews were conducted February 15, 2023, and August 29, 2023. The review included findings from the internal and external audits, MECP inspections and other prescribed items.

Annual Operations Summary

System Improvements and Maintenance

The following maintenance and improvements were carried out in 2023 to provide the highest possible drinking water quality:

- The water distribution system was directionally flushed to maintain the drinking water quality.
- Over 25 per cent of the main valves in the distribution system were exercised to ensure their reliability.

- The standby generator was tested under load monthly to ensure reliability.
- All critical alarms were tested monthly to ensure reliability.
- Drinking water quality was tested at the water treatment plant and in the distribution system weekly.
- (1) one new Alum dosing system was replaced.

Microbiological Testing

E. Coli and Total Coliform

Bacteriological samples, to be tested for E. Coli and Total Coliforms, are taken weekly from the raw and treated water at the facility and from the distribution system. Extra samples are taken after major repairs or maintenance work as per Regulation 170/03. E. Coli or Total Coliform results above 0 in treated water must be reported to the MECP and MOH. Resamples and other required actions are undertaken as quickly as possible.

The results are from the 2023 sampling program and are shown on the table below.

Type of Water	Number of Samples	Range of E-Coli Results (cfu/100ml) (Min – Max) MAC=0	Range of Total Coliform Results (cfu/100ml) (Min – Max) MAC=0
Raw	52	0 - >200	0 – >200
Treated	239	0 - 0	0 - 0

Heterotrophic Plate Count (HPC)

HPC analyses are completed weekly from the distribution water for large systems. HPC should be less than 500 colonies (cfu) per 1mL. Results over 500 colonies (cfu) per 1 mL may indicate a change in water quality but it is not considered an indicator of unsafe water.

The results from the 2023 sampling program are shown on the table below.

Type of Water	Number of Samples	Range of HPC Results (cfu/1ml) (Min – Max)
Distribution	156	0 - 10

Chlorine Residual and Turbidity

Free chlorine levels of the treated water are monitored continuously at the discharge point of the treatment facility. In the distribution system, free chlorine is checked twice weekly at various locations. As a target, free chlorine residual within the distribution system should be above 0.20 mg/L. A free chlorine level lower than 0.05 mg/L must be reported to the MECP and corrective action taken. There were no reportable incidents in 2023. The results from the 2023 sampling program are shown on the table below.

Turbidity of treated water is continuously monitored at the treatment facility, as a change in turbidity can indicate an operational problem. Turbidity of the wells are checked monthly. Turbidity is measured in Nephelometric Turbidity Units (NTU).

The results from the 2023 sampling program are shown on the table below.

Parameter	Number of Tests	Range of Results (Min – Max) Average
Chlorine residual in distribution (mg/L)	365	(0.94 – 2.20) 1.53
Chlorine residual after treatment (mg/L)	CONTINUOUS	(1.32 – 2.34) 1.72
Turbidity after treatment (NTU)	CONTINUOUS	(0.06 – 0.14) 0.08

Chemical Testing

The Safe Drinking Water Act requires periodic testing of the water for different chemical parameters. The latest results are provided below. The sampling frequency varies for different types and sizes of water systems and chemical parameters. If the concentration of a parameter is above half of the Maximum Allowable Concentration (MAC) under the Ontario Drinking Water Quality

Standards, an increased testing frequency of once every three months is required by the Regulation. Where concerns regarding a parameter exist, the MECP can also require additional sampling. Information on the health effects and allowable limits of components in drinking water may be found on the MECP web page.

Understanding Chemical Test Results

Tables below are shown with concentrations units of either milligrams per litre (mg/L) or micrograms per litre (µg/L): 1 mg/L is equal to 1000 µg/L. The Maximum Acceptable Concentration (MAC) is the highest amount of a parameter that is acceptable in municipal drinking water and can be found in the MECP Drinking Water Standards. The Method Detection Limit (MDL) is the lowest amount to which the laboratory can confidently measure. A result of "ND" stands for "Not Detected" and means that the concentration of the chemical is lower than the laboratory's equipment is capable of measuring. Nitrate and Nitrite samples are required every 3 months in normal operation.

Parameter	Result Range Min - Max	Average	MAC (mg/L)	MDL (mg/L)
Nitrite (mg/L)	0.003 - 0.003	0.003	1	0.003
Nitrate (mg/L)	0.047 - 0.166	0.110	10	0.006

A Trihalomethane (THM) sample is required every 3 months from the distribution system.

Parameter	Annual	Result (Avg.)	MAC (µg/L)	MDL (µg/L)
THM	2023	45.0	100	0.37

A Haloacetic Acid (HAA) sample is required every 3 months from the distribution system.

Parameter	Annual	Result (Avg.)	MAC (µg/L)	MDL (µg/L)
HAA	2023	28.95	80	5.3

Summary of the most recent sodium, fluoride, and hardness results.

Parameter	Sample Date	Result (mg/L)	MAC (mg/L)	MDL (mg/L)
Sodium	2023	35.1	20	0.01
Fluoride	2023	0.06	1.5	0.06
Hardness	2023	152	N/A	0.05

Summary of the most recent lead testing results.

Parameter	Sample Date	Result Range (Min – Max)	Number of samples	Acceptable Level
Distribution Alkalinity	2023	76 – 97 mg/L	2	30 - 500 mg/L
Distribution pH	2023	7.4 – 7.5	2	6.5 - 8.5
Distribution Lead	2023	0.04 –0.08 µg/L	2	10 µg/L

Summary of the most recent Schedule 23/24 testing as per Regulation 170/03. *All results are measured in µg/L unless otherwise stated.

Parameter	Sample Date	Result Value	MAC	MDL
Antimony	Oct. 23, 2023	0.6	6	0.6
Arsenic	Oct. 23, 2023	0.3	10	0.2
Barium	Oct. 23, 2023	26.8	1000	0.02
Boron	Oct. 23, 2023	16	5000	2
Cadmium	Oct. 23, 2023	0.003	5	0.003
Chromium	Oct. 23, 2023	0.15	50	0.08
Mercury	Oct. 23, 2023	0.01	1	0.01
Selenium	Oct. 23, 2023	0.07	50	0.04
Uranium	Oct. 23, 2023	0.018	20	0.002
Benzene	Oct. 23, 2023	0.32	1	0.32
Carbon tetrachloride	Oct. 23, 2023	0.17	2	0.17
1,2-Dichlorobenzene	Oct. 23, 2023	0.41	200	0.41
1,4-Dichlorobenzene	Oct. 23, 2023	0.36	5	0.36
1,1-Dichloroethylene	Oct. 23, 2023	0.33	14	0.33
1,2-Dichloroethane	Oct. 23, 2023	0.35	5	0.35

Parameter	Sample Date	Result Value	MAC	MDL
Dichloromethane	Oct. 23, 2023	0.35	50	0.35
Monochlorobenzene	Oct. 23, 2023	0.3	80	0.3
Tetrachloroethylene	Oct. 23, 2023	0.35	10	0.35
Trichloroethylene	Oct. 23, 2023	0.44	5	0.44
Vinyl Chloride	Oct. 23, 2023	0.17	1	0.17
Diquat	Oct. 23, 2023	<1	70	1
Paraquat	Oct. 23, 2023	<1	10	1
Glyphosate	Oct. 23, 2023	<1	280	1
PCBs	Oct. 23, 2023	0.04	3	0.04
Bromoform	Oct. 23, 2023	0.34	--	0.34
Benzo(a)pyrene	Oct. 23, 2023	0.004	0.01	0.004
Bromodichloromethane	Oct. 23, 2023	12	--	0.26
Bromoacetic Acid	Oct. 23, 2023	2.9	--	2.9
Alachlor	Oct. 23, 2023	0.02	5	0.02
Atrazine	Oct. 23, 2023	0.01	--	0.01
Atrazine+N-daelkylated metabolites	Oct. 23, 2023	0.01	5	0.01
Desethyl atrazine	Oct. 23, 2023	0.01	--	0.01
Azinphos-methyl	Oct. 23, 2023	0.05	20	0.05
Carbaryl	Oct. 23, 2023	0.05	90	0.05
Carbofuron	Oct. 23, 2023	0.01	90	0.01
Chlorpyrifos	Oct. 23, 2023	0.02	90	0.02
Chloroacetic Acid	Oct. 23, 2023	4.7	--	4.7
Chloroform	Oct. 23, 2023	33	--	0.29
Diazinon	Oct. 23, 2023	0.02	20	0.02
Dimethoate	Oct. 23, 2023	0.06	20	0.06
Diuron	Oct. 23, 2023	0.03	150	0.03
Dibromoacetic Acid	Oct. 23, 2023	2.9	--	2.9
Dichloroacetic Acid	Oct. 23, 2023	13.9	--	13.9
Dibromochloromethane	Oct. 23, 2023	3.2	--	0.37
Malathion	Oct. 23, 2023	0.02	190	0.02
Metolachlor	Oct. 23, 2023	0.01	50	0.01
Monochlorobenzene	Oct. 23, 2023	0.30	--	0.30

Parameter	Sample Date	Result Value	MAC	MDL
Metribuzin	Oct. 23, 2023	0.02	80	0.02
Phorate	Oct. 23, 2023	0.01	2	0.01
Prometryne	Oct. 23, 2023	0.03	1	0.03
Simazine	Oct. 23, 2023	0.01	10	0.01
Terbufos	Oct. 23, 2023	0.01	1	0.01
Triallate	Oct. 23, 2023	0.01	230	0.01
Trifluralin	Oct. 23, 2023	0.02	45	0.02
Trichloroacetic Acid	Oct. 23, 2023	12	--	5.3
2,4-dichlorophenoxyacetic acid	Oct. 23, 2023	0.19	100	0.19
Bromoxynil	Oct. 23, 2023	0.33	5	0.33
Dicamba	Oct. 23, 2023	0.20	120	0.20
Diclofop-methyl	Oct. 23, 2023	0.40	9	0.40
MCPA (mg/L)	Oct. 23, 2023	0.00012	0.1	0.00012
Picloram	Oct. 23, 2023	<1	190	1
2,4-dichlorophenol	Oct. 23, 2023	0.15	900	0.15
2,4,6-trichlorophenol	Oct. 23, 2023	0.25	5	0.25
2,3,4,6 tetrachlorophenol	Oct. 23, 2023	0.20	100	0.20
Pentachlorophenol	Oct. 23, 2023	0.15	60	0.15

Water Quantity

Continuous monitoring of flow rates from supply wells into the treatment system and from the facility into the distribution system is required by Regulation 170/03. The Municipal Drinking Water License and Permit to Take Water issued by the MECP regulate the amount of water that can be utilized over a given time.

A summary of the 2023 flows is provided in the tables below.

Flow Summary	Quantity
Permit to Take Water Limit	3041 m^3/day
Municipal Drinking Water License Limit	2780 m^3/day
2023 Average Daily Flow	692 m^3/day
2023 Maximum Daily Flow	1189 m^3/day
2023 Total Amount of Water Supplied	252582 m^3

Summary of Raw Water Flows

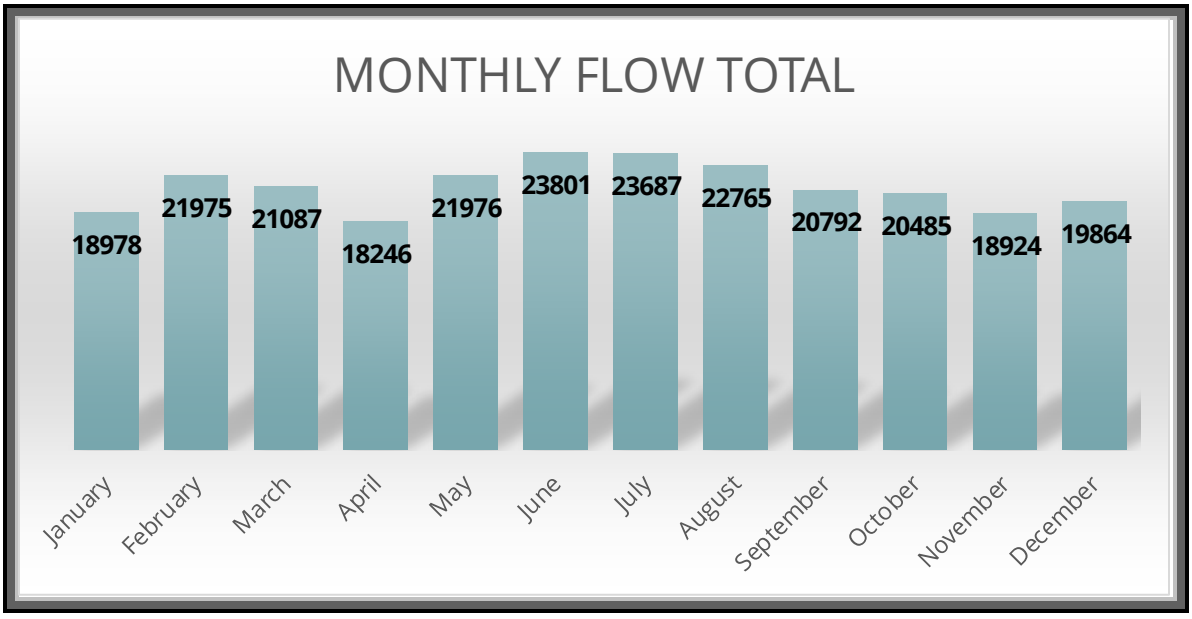
Month	Monthly Total (m^3)	
January	10993	9723
February	11234	12260
March	11494	11285
April	10607	10239
May	12558	11881
June	13875	11818
July	13923	11565
August	12035	12433
September	10848	11900
October	11687	10464
November	10517	9918
December	10134	11200
TOTAL	**139905**	**134686**
COMBINED TOTAL	**274590**	

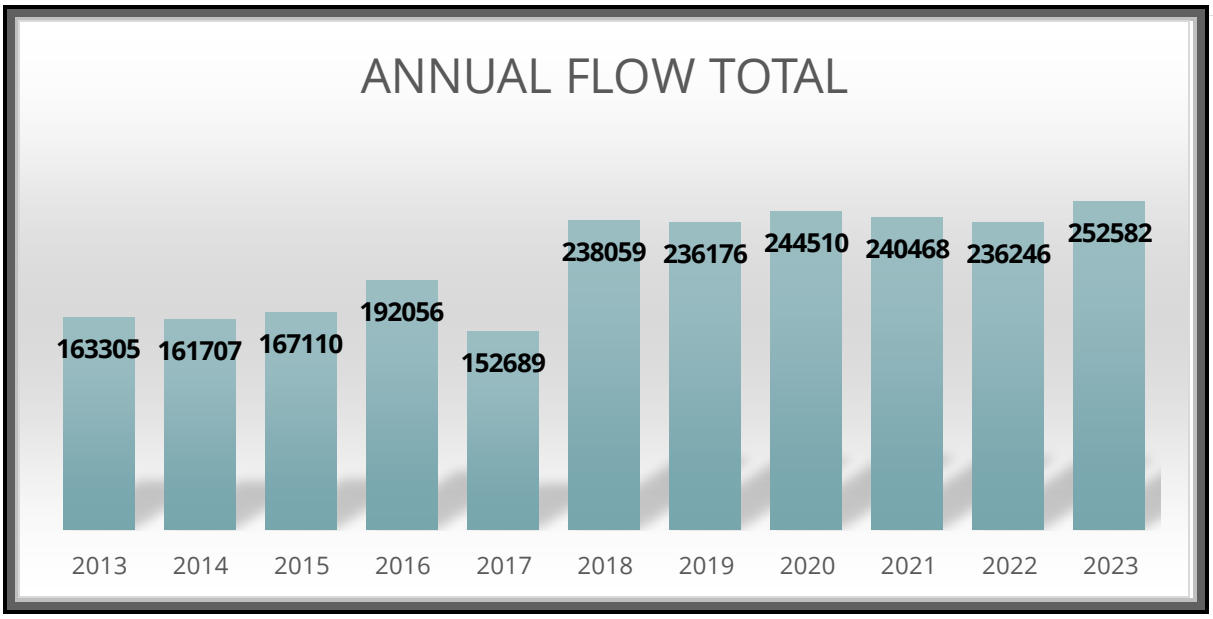
Summary of Distribution Flows

Month	Monthly Total (m^3)	Average Daily Flow (m^3/day)	Minimum Daily Flow (m^3/day)	Maximum Daily Flow (m^3/day)
January	18978	612	473	992
February	21975	785	494	1052
March	21087	680	381	870
April	18246	608	328	694
May	21976	709	525	1036
June	23801	793	580	972
July	23687	764	548	904
August	22765	734	612	809
September	20792	693	579	801
October	20485	661	448	798
November	18924	631	513	738
December	19864	641	505	1189
Total	**252582**			

Flow Charts

*Note all values are in (m^3)




ANNUAL FLOW TOTAL
163305
161707
167110
192056
152689
238059
236176
244510
240468
236246
252582
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

Appendix A

Common Acronyms

Regulatory and Compliance

MECP	Ministry of Environment, Conservation and Parks *(formerly Ministry of the Environment)*
DWQMS	Drinking Water Quality Management System
QMS	Quality Management System
PTTW	Permit to Take Water
MDWL	Municipal Drinking Water License
DWWP	Drinking Water Works Permit
C of A	Certificate of Approval
DWS	Drinking Water System
AWQI	Adverse Water Quality Incident
BWA	Boil Water Advisory
ORO	Overall Responsible Operator
OIC	Operator in Charge
OFI	Opportunity for Improvement
BMP	Best Management Practices

Parameters and Measurements

ppm	parts per million
mg/L	milligrams per litre
µg/L	micrograms per litre
mj/cm²	millijoule per square centimeter
psi	pounds per square inch
w/m²	watt per square meter
THM	Trihalomethane
HAA	Haloacetic Acid
UV	Ultra Violet
CCP	Critical Control Point

Facilities and Training/Licensing

OWWCO	Ontario Water Wastewater Certification Office
WCWC	Walkerton Clean Water Centre
OIT	Operator in Training
WTP	Water Treatment Plant
CEU	Credited Education Units

Other

GAC	Granular Activated Carbon
VFD	Variable Frequency Drive
HL	High Lift (pump)
SCADA	Supervisory Control and Data Acquisition
LL	Low Lift (pump)