Ontario Clean Water Agency
Agence Ontarienne Des Eaux

TOBERMORY SEWAGE TREATMENT FACILITY

ANNUAL PERFORMANCE REPORT

For the period of
JANUARY 1, 2015 TO DECEMBER 31, 2015

Prepared by the Ontario Clean Water Agency
For The Corporation of the Municipality of Northern Bruce Peninsula

1. System Description

The Tobermory Sewage Works System in the Municipality of Northern Bruce Peninsula (former Township of St. Edmunds) comprises a wastewater treatment plant and one sewage pumping station. The wastewater generated within the collection area of Tobermory is collected into the sewer system and pumped to the wastewater treatment plant by way of a 150 mm forcemain. The wastewater treatment plant consists of two aerated cells, one storage cell, two exfiltration ponds and one overflow cell.

The wastewater treatment plant contains two (2) aerated lagoons. The capacity of aeration cells #1 and #2 is 10,800 m^3 each. The aeration provided is tapered coarse bubble, diffused aeration. The aeration Cell #2 has a quiescent settling zone to permit effluent clarification. The effluent from the aeration Cell #2 can be recycled to Aeration Cell #1, can be transferred to Storage Cell #1 for winter storage, or can be transferred to the Exfiltration Cells #2 or 3 during summer operations. The exfiltration cells have a combined minimum rated capacity of 317 m^3/day, and each cell has approximately 13,750 m^2 of surface area.

To provide coarse bubble diffused aeration for the two aerated cells, the plant is provided with one duty and two standby blowers, each rated with a firm capacity of 193 L/sec at approximately 38 kPa.

The sewage pumping station (Little Tub Harbour Pumping Station), is located near the harbor and has two submersible pumps each rated at 17.0 L/sec capacity at 50.5 m TDH. The wet well has a normal operating volume of 5.7 m^3. Due to its location near the harbour, the sewage pumping station wet well is provided with an odour control activated carbon adsorption unit with a capacity of 188.8 L/sec, for adsorbing hydrogen sulphide gas emissions from the wet well. The pumping station is also equipped with a 150-kW diesel generator set for providing emergency power for the sewage pumps. An overview of Tobermory Sewage Treatment System can be found in Table 1 and a summary of the monitoring program can be found in Table 2.

Table 1. Tobermory Sewage Treatment System Overview

Facility Name	Tobermory Sewage Treatment System
Facility Type	Lagoon
Plant Classification	II
Works Number	120001577
Design Capacity	625 m^3/day
Receiving Water	None
C of A	3-0046-93-006 (Sewage Treatment System)
	8-1063-94-006 (Air)

Table 2. Tobermory Sewage Treatment System Monitoring Program

Source	Parameter	Frequency	Method
Influent	Flow (m^3)	Daily	Flowmeter
Secondary Aeration Cell Effluent	BOD_5, SS, TP, TKN, NH3+NH4(N), Nitrate, Nitrite	Monthly – March, June, July, August and October	External analysis
Aeration Cells	pH, Dissolved Oxygen	Weekly	In-House
Groundwater Wells	Alkalinity, Conductivity, Free Ammonia, Phenols, pH, Chloride, Sulphate, Nitrite, Magnesium, Iron, Nitrate, Calcium, Hardness, Sodium, DOC, Organic Nitrogen, TKN, Dissolved Reactive Phosphorous *, Total P*. (* = Shallow Wells Only)	Semi-Annual in May and October (for all 30 wells) Annual in August (for OW-6S, OW-6I, OW-6D, OW-7S, OW-9S, OW-9I, OW-9D, OW-10S, OW-11S, OW-12S)	External analysis
Ground Water Wells	Aluminum, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Zinc	Every 3 years in October	External Analysis

2. Monitoring and Compliance Reports

As per Section 15a. of C of A 3-0046-96-006, *a summary of all monitoring and compliance reports submitted in the reporting period, including an overview of the success and adequacy of the sewage treatment program* is required.

During the reporting period, the following reports were submitted:

- Discharge Data Report (Ministry of Environment and Climate Change, MOECC)
- Monthly Process and Compliance Report (Municipality of Northern Bruce Peninsula)

2.1 Discharge Data Report (MOECC)

The Ontario Clean Water Agency (OCWA) has an agreement with the MOECC to submit quarterly discharge data for all OCWA operated municipal sewage treatment facilities 45 days at the end of each quarter. Monitoring data is submitted via the Ministry of Environment Wastewater System (MEWS). The MOECC has these reports stored in a shared location where MOECC Inspectors can obtain and review them. There are no limits/ objectives for discharge for the quarterly Discharge Data Report. Refer to Appendix A for a copy of the discharge report.

2.2 Process & Compliance Report

As per the Services Agreement that OCWA has with the Municipality of Northern Bruce Peninsula, a Process and Compliance Report is to be submitted for each month of the year. The Monthly Process and Compliance Reports include the following information for the Tobermory Sewage Treatment System:

- Rated peak flow
- Rated average daily flow
- Number of days in operation
- Total volume of raw sewage
- Average daily raw sewage flow
- Maximum daily raw sewage flow
- Scheduled maintenance
- Unscheduled maintenance
- Call-ins
- Security issues
- Public inquiries and related issues

2.3 Adequacy of the Sewage Treatment Program

The current sewage treatment program provides effluent that met all the effluent objectives set out in the C of A with the exception of two occurrences. Based on this, the current sewage treatment program is deemed adequate. OCWA will continue to work towards staying within effluent objectives 100% of the time during each reporting period.

3. Monitoring and Analytical Data

As per Section 15b. of C of A 3-0046-96-006, *a comprehensive interpretation of all monitoring data and analytical data collected relative to the Tobermory Sewage Treatment System during the reporting period* is required.

All laboratory samples are analyzed by SGS Canada Inc., which is an ISO 17025 accredited laboratory. In-house readings (pH, DO, Temperature) are conducted for monitoring purposes by licensed operators using standardized methods. Calibrations and preventative maintenance are performed on facility equipment and monitoring equipment, see Section 9 for more details.

3.1 Sampling Frequency

Both groundwater, and secondary aeration cell effluent are sampled on a regular basis. The sampling types and frequencies are summarized in Table 3, Table 4, Table 5 and Table 6. The sampling frequencies either meet or exceed the requirements set out in Section 15 of C of A 3-0046-93-006.

Table 3. Complete Groundwater Monitoring Program - Sampling Frequencies for all 30 Observation Wells

Parameter	Frequency
Alkalinity	Semi-annually in May and October
Conductivity	Semi-annually in May and October
Free Ammonia	Semi-annually in May and October
Phenols	Semi-annually in May and October
pH	Semi-annually in May and October
Chloride	Semi-annually in May and October
Sulphate	Semi-annually in May and October
Nitrite	Semi-annually in May and October
Magnesium	Semi-annually in May and October
Iron	Semi-annually in May and October
Nitrate	Semi-annually in May and October
Calcium	Semi-annually in May and October
Hardness	Semi-annually in May and October
Sodium	Semi-annually in May and October
Dissolved Organic Carbon	Semi-annually in May and October
Organic Nitrogen	Semi-annually in May and October
Total Kjeldahl Nitrogen	Semi-annually in May and October
Phosphorous-Dissolved Reactive*	Semi-annually in May and October
Total Phosphorous*	Semi-annually in May and October

Table 4. Limited Groundwater Monitoring Program– Sampling Frequencies for Wells 6S, 6I, 6D, 7S, 9S, 9I, 9D, 10S, 11S, 12S

Parameter	Frequency
Alkalinity	Annually in August
Conductivity	Annually in August
Free Ammonia	Annually in August
Phenols	Annually in August
pH	Annually in August
Chloride	Annually in August
Sulphate	Annually in August
Nitrite	Annually in August
Magnesium	Annually in August
Iron	Annually in August
Nitrate	Annually in August
Calcium	Annually in August
Hardness	Annually in August
Sodium	Annually in August
Dissolved Organic Carbon	Annually in August
Organic Nitrogen	Annually in August
Total Kjeldahl Nitrogen	Annually in August
Phosphorous-Dissolved Reactive*	Annually in August
Total Phosphorous*	Annually in August

* samples to be taken at shallow wells only

Table 5. Effluent (Secondary Aeration Cell) Sample Monitoring – Sampling Frequencies

Parameters	Frequency
BOD_5	Monthly, during March, June, July, August and October
Total Solids	Monthly, during March, June, July, August and October
Total Phosphorous	Monthly, during March, June, July, August and October
Total Kjeldahl Nitrogen	Monthly, during March, June, July, August and October
Ammonia Nitrogen	Monthly, during March, June, July, August and October
Nitrite	Monthly, during March, June, July, August and October
Nitrate	Monthly, during March, June, July, August and October
pH	In-house, weekly from May to September
Dissolved Oxygen	In-house, weekly from May to September

Table 6. Sludge Haulage Sample Monitoring – Sampling Frequencies

Parameters	Frequency

Total Solids	April, where sludge haulage is expected
Total Phosphorus	April, where sludge haulage is expected
Arsenic	April, where sludge haulage is expected
Cadmium	April, where sludge haulage is expected
Cobalt	April, where sludge haulage is expected
Chromium	April, where sludge haulage is expected
Copper	April, where sludge haulage is expected
Zinc	April, where sludge haulage is expected
Free Ammonia	April, where sludge haulage is expected
Nitrate – N	April, where sludge haulage is expected
Mercury	April, where sludge haulage is expected
Molybdenum	April, where sludge haulage is expected
Nickel	April, where sludge haulage is expected
Selenium	April, where sludge haulage is expected
Lead	April, where sludge haulage is expected

3.2 Effluent Limits & Effluent Objectives

There are no effluent limits specified in C of A 3-0046-93-006 for the Tobermory Sewage Treatment System.

The effluent objectives as per Section 10 of C of A 3-0046-93-006 for the Tobermory Sewage Treatment System are:

Table 7. Effluent (Secondary Aeration Cell) Objectives for Tobermory Sewage Treatment System

Effluent Parameter	Average Monthly Concentration mg/L)
BOD_5	50
Suspended Solids	50

3.3 Comparison of Data to Effluent Objectives

Analytical and monitoring data for the Tobermory Sewage Treatment System is housed in OCWA's data management system (PDM/WISKI7). A comparison of the analytical results compared to the effluent objectives can be found in Table 8.

Table 8. Comparison of Effluent Objectives to Sampled Effluent (Secondary Aeration Cell)

	BOD_5		Suspended Solids	
	Monthly Average Concentration (mg/L)	Within Objectives? (50.0 mg/L)	Monthly Average Concentration (mg/L)	Within Objectives? (50.0 mg/L)
March	4.00	Yes	2.00	Yes
June	64.00	No	53.00	No
July	4.00	Yes	3.00	Yes
August	44.00	Yes	23.00	Yes
October	40.00	Yes	8.00	Yes

In June 2015, the Tobermory Sewage Treatment System exceeded the effluent (Secondary Aeration Cell) objectives for BOD_5 and Total Suspended Solids (TSS). In response to these results, aeration was increased to the aeration cells to reduce the BOD_5 and TSS levels. The Tobermory Sewage Treatment System was closely monitored and the BOD_5 and TSS levels in July 2015 were found to be significantly lower and well within the effluent objectives. It is recommended that sludge levels be monitored to determine if sludge management is required.

3.4 Additional Monitoring Parameters

The following parameters do not have effluent limits or objectives but are monitored on a regular basis (see Section 3.1 for sampling frequency) as required by C of A 3-0046-93-006. Table 9, Table 10 and Table 11 summarize the monitoring data for the reporting period.

3.4.1 Flows

The total raw sewage flow for 2015 was 111,426 m^3 with an annual average daily flow of 304.44 m^3/day which is 48.7% of the design capacity of the system. Total and average daily flows for 2015 have increased in comparison to 2014. The maximum daily flow for 2015 was 559.74 m^3 (August 2015). A summary of the average daily flows on a monthy basis can be found in Table 9. For more detailed information regarding flows, refer to Appendix A.

Table 9. Average Daily Raw Sewage Flows by Month

Month	Average Day Flow (m^3)
January	200.871
February	139.821
March	169.387
April	290.800
May	301.452
June	383.467
July	461.258
August	559.742
September	426.063
October	237.950
November	233.300
December	233.097

3.4.2 Aeration Cell Effluent

In addition to the parameters which have effluent objectives, Total Phosphorous, Total Kjeldahl Nitrogen (TKN), Ammonia-Nitrogen, Nitrite, Nitrate, pH and DO are monitored. Please refer to Table 10 and Table 11 for monitoring and analytical results.

Table 10. Average Monthly Aeration Cell Effluent Monitoring Laboratory Analysis Results

	Total Phosphorus (mg/L)	Total Kjeldahl Nitrogen (as N mg/L)	Ammonia+Ammonium (N) (mg/L)	Nitrite (mg/L as N)	Nitrate (mg/L as N)
March	2.05	4.10	4.00	0.03	2.03
June	1.62	2.50	0.60	0.064	0.91
July	3.70	28.20	26.00	0.28	0.45
August	6.09	46.50	41.90	0.33	0.06
October	3.02	6.00	3.60	2.40	4.29

Overall the Total Phosphorous, TKN, Ammonia Nitrogen, Nitrite and Nitrate appear to have decreased since 2014 which is an indication of improved effluent quality.

Table 11. Aeration Cell In-House Monitoring - Average Monthly pH and DO

	pH				Dissolved Oxygen			
	Cell #1		Cell #2		Cell #1		Cell #2	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
May	7.50	8.39	8.06	8.64	9.05	16.68	8.15	11.86
June	7.00	7.42	7.35	7.62	2.40	5.43	4.66	6.02
July	7.18	7.52	7.25	7.57	1.10	2.94	0.85	3.90
August	7.09	7.42	7.36	7.58	1.75	3.84	3.34	4.32
September	7.12	7.60	7.36	7.56	1.86	6.00	3.80	4.29
October	7.72	7.89	7.63	7.85	7.63	7.85	6.89	7.52

For sewage it is optimal if the effluent is between pH 6.0 and 9.5. The pH of Cell #1 and Cell #2 remained well within the optimal range. The DO range for Cell #1 and Cell #2 was 0.85 to 16.68 in 2015 in comparison to 0.21 to 9.49 in 2014. Overall, the average DO in 2015 (5.33 mg/L) is similar with the average DO in 2014 (5.73 mg/L).

3.4.3 Groundwater Sampling Program

The complete and limited groundwater sampling of all on-site observation wells was completed in the Spring (May), Summer (August) and Fall (October) of 2015.

Due to dry wells, the following samples were not taken:

- Spring (May): OW8-S
- Summer (August): OW6-S
- Fall (October): OW6-S, OW61, OW9-I, OW7-s, OW8-S, OW2-S
-

Refer to Appendix B for the laboratory analysis results for the groundwater sampling program.

4. Major Maintenance Activities

As per Section 15c. of C of A 3-0046-96-006, *a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanisms or thing forming part of the facility* is required. For 2015, no maintenance was carried out on major structures, equipment, apparatus, mechanisms or thing forming part of the facility.

5. Operating Challenges

As per Section 15d. of C of A 3-0046-96-006, *a description of any operating problems encountered and corrective actions taken during the reporting period* are to be identified. During the reporting period there were no major operating challenges that occurred. There were no bypasses of raw sewage or spills at the Tobermory Sewage Treatment System or any associated pumping stations.

6. Proposed Alterations, Extensions or Replacements

As per Section 15e. of C of A 3-0046-96-006, *a summary of any proposed alteration, extension or replacement in the process or operations of the sewage treatment plant to be completed over the next reporting period which may require approval under the Ontario Water Resources Act* (OWRA) is required. The following alterations, extensions/ replacements are proposed for 2016, some of which may not require approval under OWRA:

- Generator load test
- Roof and metalwork
- Replacement of heating units to improve energy efficiency
- Installation of MCC (electrical system)
- Blower rebuild
- Manhole repair
- Lagoon sludge judge

7. Sludge Generation

As per Section 15f. of C of A 3-0046-96-006, *a tabulation of the volume of sludge generated in the reporting period and an outline of anticipated volumes to be generated over the next reporting period* is required.

Since the facility is a sewage lagoon system, sludge was not generated or disposed of. The volume of sludge generated during the reporting period was 0 m^3. It is anticipated that 0 m^3 of sludge will be produced during 2016.

8. Sludge Handling

As per Section 15g. of C of A 3-0046-96-006, an *outline of the sludge handing methods and disposal areas to be utilized over the next reporting period* are to be specified.

Since the facility is a sewage lagoon system, sludge was not generated or disposed of or handled. As such, no disposal areas will be utilized over the next reporting period.

9. Septage Receiving Works

In 2015, approximately 4,018.31 m^3 (883,905 imperial gallons) of sewage was received by the Tobermory Sewage Treatment. The sewage was received from various sources including:

- Bruce Peninsula Septic Service
- Scott Septic Pumping
- Mount Trough Camp

The total monthly volume of sewage received can be found in Table 12. Detailed haulage volumes can be found in Appendix C.

Table 12. Total Volume of Sewage Received in 2015

Month	Total Volume of Sewage Received (m^3)
January	14.09
February	29.09
March	73.08
April	183.34
May	304.77
June	687.51
July	1144.07
August	698.73
September	597.99
October	135.42
November	93.97
December	55.23

9. Calibration and Maintenance Procedures

As per Section 15.h. of C of A 3-0046-96-006, *an evaluation of the calibration and maintenance procedures conducted on all monitoring equipment* is required.

All in-house monitoring equipment is calibrated as per manufacturer's recommendations. Monitoring and metering equipment is also calibrated by a third party on an annual basis. In addition to sample analysis, preventative maintenance is scheduled for all equipment at the sewage treatment plant and pumping stations on at least a monthly basis. Maintenance activities were scheduled within the work management system HANSEN, upon completion, Operators sign-off and the work order is considered closed.

On May 5, 2015, Flowmetrix performed an annual third party instrument verification of the flow meter at the sewage lift station. All flow meters passed the annual verification all with percent errors of less than 5%. All records for calibrations/ verifications can be found in Appendix D.

10. Modifications for Performance and Reliability

As per Section 15j. of C of A 3-0046-96-006an *evaluation for the need for modifications to the Tobermory Sewage Treatment Facility to improve performance and reliability and to minimize upsets and bypasses* is required.

The Tobermory Sewage Treatment Facility consistently meets effluent objectives the majority of the time. Based on this evaluation, modifications for performance and reliability are not needed at this time.

Appendix A
Discharge Data Report

Ontario Clean Water Agency
Performance Assessment Report Wastewater/Lagoon

Report extracted 03/28/2016 12:18

From: 01/01/2015 to 31/12/2015

Facility: [1132] TOBERMORY WASTEWATER TREATMENT FACILITY

Works: [1132] TOBERMORY WASTEWATER TREATMENT FACILITY

Flows:	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	11/2015	12/2015	<--Total-->	<--Avg-->	<--Max-->	<--Criteria-->
Raw Flow: Total - Raw Sewage (m³)	6227	3915	5251	8724	9345	11504	14299	17352	13207.94	7378.45	6899	7226.01	111426.4			
Raw Flow: Avg - Raw Sewage (m³/d)	200.87	139.82	169.39	290.8	301.45	383.47	461.26	559.74	426.06	237.95	233.3	233.1		303.1		
Raw Flow: Max - Raw Sewage (m³/d)	200.9	139.86	169.49	290.8	301.5	383.66	461.5	559.74	432.33	237.95	233.3	233.1			559.74	

Appendix B

Groundwater Sampling Program Laboratory Analysis Results

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

OCWA-Southampton (Tobermory Sewage Plant)
Attn : Cherie Young

P.O. Box 760
Southampton, ON
N0H 2L0,

Phone: 519-797-2561
Fax:pdf, 519-941-1794

Works #: 120001577
Project : PO#017018

28-May-2015

Date Rec. : 20 May 2015
LR Report: CA15308-MAY15

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: Well 9-D-OW 9-D	6: Well 9-S-OW 9-S	7: Well 9-I-OW 9-I	8: Well 8-D-OW 8-D	9: Well 8-I-OW 8-I	10: Well 10-S-OW 10-S
Sample Date & Time					19-May-15 11:55	19-May-15 12:00	19-May-15 12:05	19-May-15 12:10	19-May-15 12:15	19-May-15 10:00
Temperature Upon Receipt [°C]	—	—	—	—	7.0	7.0	7.0	7.0	7.0	7.0
Alkalinity [mg/L as CaCO3]	21-May-15	13:58	25-May-15	11:14	234	266	255	273	268	240
Conductivity [uS/cm]	21-May-15	13:58	25-May-15	11:14	452	486	500	511	515	399
pH [no unit]	21-May-15	13:58	25-May-15	11:14	8.11	8.03	8.13	8.09	8.10	7.96
Temperature @ pH [°C]	21-May-15	13:58	25-May-15	11:14	22.1	21.8	22.6	22.0	22.9	19.3
Organic Nitrogen [mg/L]	22-May-15	11:41	22-May-15	11:43	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phosphorus (total) [mg/L]	20-May-15	19:00	21-May-15	13:09	< 0.03	0.03	< 0.03	< 0.03	< 0.03	0.74
Total Kjeldahl Nitrogen [as N mg/L]	21-May-15	19:30	22-May-15	11:41	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Unionized Ammonia [mg/L as N]	22-May-15	13:22	22-May-15	13:23	0.005	0.002	0.003	0.003	0.003	0.004
Ammonia+Ammonium (N) [mg/L]	20-May-15	14:15	22-May-15	08:40	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1
4AAP-Phenolics [mg/L]	21-May-15	08:00	22-May-15	13:22	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dissolved Organic Carbon [mg/L]	21-May-15	19:54	28-May-15	06:54	< 1	2.3	< 1	< 1	< 1	2.6
Phosphorus (dissolved reactive) [mg/L]	20-May-15	15:21	26-May-15	11:28	< 0.03	< 0.03	<0.03	< 0.03	< 0.03	< 0.03
Chloride [mg/L]	26-May-15	11:05	27-May-15	09:15	1	3	2	6	5	1
Sulphate [mg/L]	26-May-15	11:05	27-May-15	09:15	15	5	19	14	13	14
Nitrite (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Hardness (dissolved) [mg/L as CaCO3]	22-May-15	11:09	25-May-15	12:58	242	262	255	266	280	222
Magnesium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	24.7	23.1	24.5	26.9	26.7	21.2
Calcium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	56.4	66.9	61.8	62.2	68.3	53.9
Iron (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	0.020	0.027	0.006	0.050	0.043	0.085
Sodium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	2.94	0.93	7.66	1.80	1.66	3.05

OnLine LIMS

00004193D0

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Works #: 120001577
Project : PO#017018
LR Report : CA15308-MAY15

Carrie Greenlaw
Project Specialist
Environmental Services, Analytical

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Sample Date & Time					19-May-15 10:10	19-May-15 10:55	19-May-15 10:50	19-May-15 10:45	19-May-15 10:30	19-May-15 10:40
Temperature Upon Receipt [°C]	—	—	—	—	7.0	7.0	7.0	7.0	7.0	7.0
Alkalinity [mg/L as CaCO3]	21-May-15	13:58	25-May-15	11:14	308	335	277	267	287	330
Conductivity [uS/cm]	21-May-15	13:58	25-May-15	11:14	586	612	511	470	522	594
pH [no unit]	21-May-15	13:58	25-May-15	11:14	8.05	8.01	8.13	8.17	8.12	8.02
Temperature @ pH [°C]	21-May-15	13:58	25-May-15	11:14	21.6	22.5	22.3	22.8	22.2	22.8
Organic Nitrogen [mg/L]	22-May-15	11:41	22-May-15	11:43	< 0.05	< 0.05	< 0.05	0.15	< 0.05	< 0.05
Phosphorus (total) [mg/L]	20-May-15	19:00	21-May-15	13:09	0.03	0.22	< 0.03	< 0.03	0.11	0.34
Total Kjeldahl Nitrogen [as N mg/L]	21-May-15	19:30	22-May-15	11:41	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Unionized Ammonia [mg/L as N]	22-May-15	13:22	22-May-15	13:23	0.003	0.004	0.012	< 0.001	0.004	0.002
Ammonia+Ammonium (N) [mg/L]	20-May-15	14:15	22-May-15	08:40	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
4AAP-Phenolics [mg/L]	21-May-15	08:00	22-May-15	13:22	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dissolved Organic Carbon [mg/L]	21-May-15	19:54	28-May-15	06:54	4.5	3.0	1.5	5.0	2.0	2.5
Phosphorus (dissolved reactive) [mg/L]	20-May-15	15:21	26-May-15	11:28	< 0.03	< 0.03	< 0.03	<0.03	< 0.03	0.22
Chloride [mg/L]	26-May-15	11:05	27-May-15	09:15	2	3	3	< 1	2	2
Sulphate [mg/L]	26-May-15	11:05	27-May-15	09:15	18	11	7	2	9	6
Nitrite (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	1.53	< 0.06	< 0.06	< 0.06	< 0.06	0.06
Nitrate + Nitrite (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	1.53	< 0.06	< 0.06	< 0.06	< 0.06	0.06
Hardness (dissolved) [mg/L as CaCO3]	22-May-15	11:09	25-May-15	12:58	326	328	248	265	284	362
Magnesium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	28.2	31.7	23.9	30.9	27.2	29.1
Calcium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	84.2	79.1	59.2	55.2	68.8	96.9
Iron (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	0.023	0.073	0.081	0.037	0.057	0.023
Sodium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	1.16	3.94	18.6	0.57	2.40	4.26

OnLine LIMS

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Works #: 120001577
Project : PO#017018
LR Report : CA15308-MAY15

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Project : PO#017018

28-May-2015

Date Rec. : 20 May 2015
LR Report: CA15308-MAY15

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	17: Well 57-OW 57	18: Well 56-OW 56	19: Well 2-S-OW 2-S	20: Well 2-I-OW 2-I	21: Well 2-D-OW 2-D	22: Well 55-OW 55
Sample Date & Time					19-May-15 11:00	19-May-15 11:05	19-May-15 11:30	19-May-15 11:25	19-May-15 11:15	19-May-15 11:35
Temperature Upon Receipt [°C]	—	—	—	—	7.0	7.0	7.0	7.0	7.0	7.0
Alkalinity [mg/L as CaCO3]	21-May-15	13:58	25-May-15	11:14	442	249	292	384	264	438
Conductivity [uS/cm]	21-May-15	13:58	25-May-15	11:14	773	448	516	681	517	760
pH [no unit]	21-May-15	13:58	25-May-15	11:14	8.02	8.06	8.13	8.02	8.13	7.95
Temperature @ pH [°C]	21-May-15	13:58	25-May-15	11:14	22.0	22.1	23.0	22.1	22.5	23.1
Organic Nitrogen [mg/L]	22-May-15	11:41	22-May-15	11:43	0.08	< 0.05	0.05	0.05	0.05	0.10
Phosphorus (total) [mg/L]	20-May-15	19:00	21-May-15	13:09	< 0.03	< 0.03	0.18	0.23	< 0.03	< 0.03
Total Kjeldahl Nitrogen [as N mg/L]	21-May-15	19:30	22-May-15	11:41	< 0.5	< 0.5	< 0.5	2.6	< 0.5	< 0.5
Unionized Ammonia [mg/L as N]	22-May-15	13:22	22-May-15	13:23	0.003	0.005	< 0.001	0.115	< 0.001	0.001
Ammonia+Ammonium (N) [mg/L]	20-May-15	14:15	22-May-15	08:40	< 0.1	< 0.1	< 0.1	2.5	< 0.1	< 0.1
4AAP-Phenolics [mg/L]	21-May-15	08:00	22-May-15	13:22	< 0.002	0.003	0.003	< 0.002	< 0.002	0.002
Dissolved Organic Carbon [mg/L]	21-May-15	19:54	28-May-15	06:54	4.5	3.1	3.1	3.1	2.4	5.6
Phosphorus (dissolved reactive) [mg/L]	20-May-15	15:21	26-May-15	11:28	<0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chloride [mg/L]	26-May-15	11:05	27-May-15	09:15	1	< 1	< 1	2	1	1
Sulphate [mg/L]	26-May-15	11:05	27-May-15	09:15	7	< 1	< 1	< 1	19	2
Nitrite (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	0.28	0.12	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	0.28	0.12	< 0.06	< 0.06	< 0.06	< 0.06
Hardness (dissolved) [mg/L as CaCO3]	22-May-15	11:09	25-May-15	12:58	466	184	285	367	239	443
Magnesium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	35.2	16.9	19.1	32.8	24.2	22.4
Calcium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	129	46.0	82.5	92.8	55.7	140
Iron (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	< 0.002	< 0.002	0.046	0.096	< 0.002	0.065
Sodium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	0.81	0.33	0.49	4.85	18.1	0.78

OnLine LIMS

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Project : PO#017018
LR Report : CA15308-MAY15

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Project : PO#017018

28-May-2015

Date Rec. : 20 May 2015
LR Report: CA15308-MAY15

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	23: Well 5-S-OW 5-S	24: Well 5-I-OW 5-I	25: Well 5-D-OW 5-D	26: Well 4-S-OW 7-S	27: Well 60-OW 60	28: Well 61-OW 61	29: Well 12-S-OW 12-S
Sample Date & Time					19-May-15 13:00	19-May-15 12:55	19-May-15 12:45	19-May-15 11:40	19-May-15 13:25	19-May-15 13:10	19-May-15 10:20
Temperature Upon Receipt [°C]	—	—	—	—	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Alkalinity [mg/L as CaCO3]	21-May-15	13:58	25-May-15	11:14	217	315	315	264	404	308	421
Conductivity [uS/cm]	21-May-15	13:58	25-May-15	11:14	421	806	830	466	979	758	762
pH [no unit]	21-May-15	13:58	25-May-15	11:14	7.84	7.72	8.04	7.71	7.51	7.63	7.49
Temperature @ pH [°C]	21-May-15	13:58	25-May-15	11:14	18.0	17.8	18.5	18.8	18.7	17.7	17.7
Organic Nitrogen [mg/L]	22-May-15	11:41	22-May-15	11:43	0.20	0.10	0.14	< 0.05	0.41	0.08	< 0.05
Phosphorus (total) [mg/L]	20-May-15	19:00	21-May-15	13:09	0.28	< 0.03	0.04	0.03	2.15	0.08	< 0.03
Total Kjeldahl Nitrogen [as N mg/L]	21-May-15	19:30	22-May-15	11:41	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Unionized Ammonia [mg/L as N]	22-May-15	13:22	22-May-15	13:23	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	0.001
Ammonia+Ammonium (N) [mg/L]	20-May-15	14:15	22-May-15	08:40	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1
4AAP-Phenolics [mg/L]	21-May-15	08:00	22-May-15	13:22	0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dissolved Organic Carbon [mg/L]	21-May-15	19:54	26-May-15	06:54	5.5	4.5	4.4	3.1	2.9	1.8	3.5
Phosphorus (dissolved reactive) [mg/L]	20-May-15	15:21	26-May-15	11:28	0.09	< 0.03	< 0.03	<0.03	0.11	< 0.03	< 0.03
Chloride [mg/L]	26-May-15	11:05	27-May-15	09:15	18	74	97	1	96	63	21
Sulphate [mg/L]	26-May-15	11:05	27-May-15	09:15	5	24	26	7	25	30	10
Nitrite (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	< 0.06	< 0.06	< 0.06	< 0.06	0.64	0.18	1.86
Nitrate + Nitrite (as N) [mg/L]	21-May-15	07:09	25-May-15	14:41	< 0.06	< 0.06	< 0.06	< 0.06	0.64	0.18	1.86
Hardness (dissolved) [mg/L as CaCO3]	22-May-15	11:09	25-May-15	12:58	230	289	310	274	407	359	369
Magnesium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	17.0	20.2	22.5	21.4	30.2	31.0	24.4
Calcium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	64.2	82.3	87.2	74.4	113	92.8	108
Iron (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	0.413	0.035	0.134	0.077	0.274	0.006	< 0.002
Sodium (dissolved) [mg/L]	22-May-15	11:09	25-May-15	12:58	17.4	61.7	70.3	0.81	69.3	30.9	33.5

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LR Report : CA15308-MAY15

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Project : PO#017018

24-August-2015

Date Rec. : 18 August 2015
LR Report: CA15228-AUG15

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: OW-6I	6: OW-6D	7: OW-9S	8: OW-9I	9: OW-9D	10: OW-10S	11: OW-11S	12: OW-12S
Sample Date & Time					13-Aug-15 13:00	13-Aug-15 13:15	13-Aug-15 13:55	13-Aug-15 14:05	14-Aug-15 10:30	14-Aug-15 10:50	14-Aug-15 11:10	14-Aug-15 11:40
Temperature Upon Receipt [°C]	—	—	—	—	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Alkalinity [mg/L as CaCO3]	18-Aug-15	16:06	19-Aug-15	11:13	331	274	293	258	227	222	307	381
Conductivity [uS/cm]	18-Aug-15	16:06	19-Aug-15	11:13	602	510	527	497	440	395	574	759
pH [no unit]	18-Aug-15	16:06	19-Aug-15	11:13	7.99	8.14	8.02	8.12	8.10	8.09	8.07	7.93
Temperature @ pH [°C]	18-Aug-15	16:06	19-Aug-15	11:13	21.8	22.1	22.0	21.8	21.7	22.1	22.2	21.7
Organic Nitrogen [mg/L]	18-Aug-15	21:39	24-Aug-15	11:27	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phosphorus (total) [mg/L]	18-Aug-15	21:42	24-Aug-15	11:27	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.17	< 0.03	0.10
Total Kjeldahl Nitrogen [as N mg/L]	18-Aug-15	21:39	19-Aug-15	12:26	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Unionized Ammonia [mg/L as N]	18-Aug-15	21:38	19-Aug-15	16:20	< 0.001	0.005	0.001	0.004	0.006	0.003	< 0.001	< 0.001
Ammonia+Ammonium (N) [mg/L]	18-Aug-15	21:38	19-Aug-15	16:20	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
4AAP-Phenolics [mg/L]	19-Aug-15	13:10	20-Aug-15	15:37	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dissolved Organic Carbon [mg/L]	19-Aug-15	22:00	19-Aug-15	13:57	< 1	< 1	2.1	< 1	< 1	3.0	2.6	1.4
Phosphorus (dissolved reactive) [mg	18-Aug-15	17:52	21-Aug-15	11:37	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chloride [mg/L]	19-Aug-15	16:13	21-Aug-15	09:59	3	3	2	3	1	1	2	22
Sulphate [mg/L]	19-Aug-15	16:13	21-Aug-15	09:59	10	7	4	19	14	13	15	11
Nitrite (as N) [mg/L]	18-Aug-15	19:06	19-Aug-15	14:24	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N) [mg/L]	18-Aug-15	19:06	19-Aug-15	14:24	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	1.74	1.44
Nitrate + Nitrite (as N) [mg/L]	18-Aug-15	19:06	19-Aug-15	14:24	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	1.74	1.44
Hardness (dissolved) [mg/L as CaC	19-Aug-15	13:32	19-Aug-15	14:25	321	242	285	253	230	216	311	331
Magnesium (dissolved) [mg/L]	19-Aug-15	13:32	19-Aug-15	14:25	31.2	23.7	24.9	24.5	23.6	20.8	27.0	22.1
Calcium (dissolved) [mg/L]	19-Aug-15	13:32	19-Aug-15	14:25	77.0	57.8	73.0	60.8	53.4	52.1	80.2	96.3

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Works #: 120001577
Project : PO#017018
LR Report : CA15228-AUG15

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: OW-6I	6: OW-6D	7: OW-9S	8: OW-9I	9: OW-9D	10: OW-10S	11: OW-11S	12: OW-12S
Iron (dissolved) [mg/L]	19-Aug-15	13:32	19-Aug-15	14:25	0.120	0.032	0.006	0.014	0.031	0.141	0.004	0.005
Sodium (dissolved) [mg/L]	19-Aug-15	13:32	19-Aug-15	14:25	5.54	17.5	1.06	7.85	2.97	2.94	1.15	31.4

Note: Provincial unionized ammonia calculated using lab results for pH and temperature.

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OnLine LIMS

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Project : PO#017018

03-November-2015

Date Rec. : 22 October 2015
LR Report: CA15454-OCT15

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: Well 6S-OW6-S (Well 4)	6: Well 6I-OW6-I (Well 5)	7: Well 6D-OW6-D (Well 6)	8: Well 9D-OW9-D (Well 20)	9: Well 9I-OW9-I (Well 19)	10: Well 9S-OW9-S (Well 18)	11: Well 8I-OW8-I (Well 16)	12: Well 8D-OW8-D (Well 17)
Sample Date & Time					21-Oct-15 14:00	21-Oct-15 13:55	21-Oct-15 13:50	21-Oct-15 12:55	21-Oct-15 13:10	21-Oct-15 13:05	21-Oct-15 12:40	21-Oct-15 12:45
Temperature Upon Receipt [°C]	—	—	—	—	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Alkalinity [mg/L as CaCO3]	23-Oct-15	06:54	26-Oct-15	14:24	262	308	314	222	243	301	259	306
Conductivity [uS/cm]	23-Oct-15	06:54	26-Oct-15	14:24	583	843	842	418	492	558	500	518
pH [no unit]	23-Oct-15	06:54	26-Oct-15	14:24	7.77	7.86	7.81	7.87	7.89	7.97	8.09	7.80
Temperature @ pH [°C]	23-Oct-15	06:54	26-Oct-15	14:24	17.9	18.4	17.9	18.0	18.0	18.6	18.7	18.0
Phosphorus (total) [mg/L]	22-Oct-15	22:00	25-Oct-15	15:53	0.20	—	—	—	—	0.04	—	—
Organic Nitrogen [mg/L]	22-Oct-15	20:00	03-Nov-15	12:36	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Kjeldahl Nitrogen [as N mg/L]	22-Oct-15	20:00	24-Oct-15	20:44	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Unionized Ammonia [mg/L as N]	22-Oct-15	22:00	03-Nov-15	12:35	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.009	< 0.001	< 0.001
Ammonia+Ammonium (N) [mg/L]	22-Oct-15	22:00	03-Nov-15	12:35	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1
4AAP-Phenolics [mg/L]	23-Oct-15	14:48	26-Oct-15	14:51	< 0.002	< 0.002	0.009	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dissolved Organic Carbon [mg/L]	27-Oct-15	06:00	27-Oct-15	21:39	2.3	2.9	2.7	1.1	1.3	1.6	< 1	< 1
Phosphorus (dissolved reactive) [mg/L]	23-Oct-15	06:08	24-Oct-15	14:42	0.07	—	—	—	—	< 0.03	—	—
Chloride [mg/L]	23-Oct-15	16:57	27-Oct-15	15:54	45	75	76	< 1	2	5	5	6
Sulphate [mg/L]	26-Oct-15	12:24	27-Oct-15	15:54	14	23	20	14	19	5	12	15
Nitrite (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Hardness (dissolved) [mg/L as CaCO3]	30-Oct-15	13:57	02-Nov-15	16:13	294	357	355	287	283	342	304	330
Aluminum (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Barium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.0164	0.0185	0.0226	0.0317	0.0262	0.00567	0.00735	0.0132
Cadmium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000006	0.000009
Chromium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.00074	0.00097	0.00112	0.00018	0.00016	0.00027	0.00016	0.00013
Copper (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.00184	0.00101	0.00092	0.00083	0.00079	0.00086	0.00075	0.00087

OnLine LIMS

0000543077

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Works #: 120001577
Project : PO#017018
LR Report : CA15454-OCT15

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: Well 5S-OW5-S (Well 4)	6: Well 5I-OW5-I (Well 5)	7: Well 5D-OW5-D (Well 6)	8: Well 9D-OW9-D (Well 20)	9: Well 9I-OW9-I (Well 19)	10: Well 9S-OW9-S (Well 18)	11: Well 8I-OW8-I (Well 16)	12: Well 8D-OW8-D (Well 17)
Lead (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.00001	0.00002	< 0.00001	0.00005	< 0.00001	0.00002	0.00002	0.00002
Manganese (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.0751	0.0854	0.0872	0.00617	0.00029	0.00070	0.00003	0.00007
Magnesium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	21.1	25.7	26.1	30.5	29.3	29.1	29.8	30.9
Calcium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	83.1	101	99.3	64.4	65.3	88.8	72.5	81.2
Iron (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Sodium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	49.7	93.4	83.2	5.15	9.12	1.31	2.42	1.97
Zinc (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.004	0.025	0.006	0.008	0.004	0.004	0.006	0.005

Note: Provincial unionized ammonia calculated using lab results for pH and temperature.

Carrie Greenlaw
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000543077

SGS Canada Inc.
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Phone: 705-652-2000 FAX: 705-652-6365

OCWA-Southampton (Tobermory Sewage Plant)
Attn : Camille Leung

P.O. Box 760
Southampton, ON
N0H 2L0,

Phone: 519-797-2561
Fax:pdf

Works #: 120001577
Project : PO#017018

03-November-2015

Date Rec. : 22 October 2015
LR Report: CA15454-OCT15

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	13: Well 10S-OW10-S (Well 23)	14: Well 11S-OW11-S (Well 24)	15: Well 12S-OW12-S (Well 10)	16: Well 1D-OW1-D (Well 22)	17: Well 1I-OW1-I (Well 21)	18: Well 6D-OW6-D (Well 2)	19: Well 6I-OW6-I (Well 3)	20: Well 57-OW57 (Well 13)
Sample Date & Time					21-Oct-15 14:10	21-Oct-15 14:25	21-Oct-15 09:50	21-Oct-15 10:05	21-Oct-15 10:15	21-Oct-15 10:40	21-Oct-15 10:30	21-Oct-15 10:55
Temperature Upon Receipt [°C]	—	—	—	—	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Alkalinity (mg/L as CaCO3)	23-Oct-15	06:54	26-Oct-15	14:24	213	284	338	272	362	321	280	444
Conductivity (uS/cm)	23-Oct-15	06:54	26-Oct-15	14:24	401	555	683	502	641	603	503	793
pH (no unit)	23-Oct-15	06:54	26-Oct-15	14:24	8.03	8.05	7.78	8.00	7.91	8.08	8.08	7.80
Temperature @ pH [°C]	23-Oct-15	06:54	26-Oct-15	14:24	18.1	18.6	18.0	18.0	18.3	18.6	18.3	18.2
Phosphorus (total) [mg/L]	22-Oct-15	22:00	25-Oct-15	15:53	0.17	< 0.03	0.04	—	—	—	—	—
Organic Nitrogen [mg/L]	22-Oct-15	20:00	03-Nov-15	12:36	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Kjeldahl Nitrogen [as N mg/L]	22-Oct-15	20:00	24-Oct-15	20:44	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8
Unionized Ammonia [mg/L as N]	22-Oct-15	22:00	03-Nov-15	12:35	0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.004	0.013
Ammonia+Ammonium (N) [mg/L]	22-Oct-15	22:00	03-Nov-15	12:35	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.6
4AAP-Phenolics [mg/L]	23-Oct-15	14:48	26-Oct-15	14:51	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.013
Dissolved Organic Carbon [mg/L]	27-Oct-15	06:00	27-Oct-15	21:39	2.4	1.2	1.2	< 1	1.6	1.1	< 1	1.7
Phosphorus (dissolved reactive) [mg/L]	23-Oct-15	06:08	24-Oct-15	14:42	< 0.03	< 0.03	< 0.03	—	—	—	—	—
Chloride [mg/L]	23-Oct-15	16:57	27-Oct-15	15:54	1	2	18	2	1	3	3	1
Sulphate [mg/L]	26-Oct-15	12:24	27-Oct-15	15:54	16	14	14	9	5	10	7	6
Nitrite (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.06	1.74	0.54	< 0.06	< 0.06	< 0.06	< 0.06	0.23
Nitrate + Nitrite (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.06	1.74	0.54	< 0.06	< 0.06	< 0.06	< 0.06	0.23
Hardness (dissolved) [mg/L as CaCO3]	30-Oct-15	13:57	02-Nov-15	16:13	254	352	384	321	410	387	305	508
Aluminum (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Barium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.0315	0.00553	0.0106	0.0184	0.00764	0.0462	0.0238	0.00799
Cadmium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000004	< 0.000003	< 0.000003	0.000005
Chromium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.00006	0.00016	0.00046	0.00017	0.00015	0.00021	0.00005	0.00025
Copper (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.00074	0.00085	0.00444	0.00082	0.00118	0.00085	0.00177	0.00072
Lead (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00001	0.00002	< 0.00001	0.00002

OnLine LIMS

0000543001

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Works #: 120001577
Project : PO#017018
LR Report : CA15454-OCT15

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	13: Well 10S-OW10-S (Well 23)	14: Well 11S-OW11-S (Well 24)	15: Well 12S-OW12-S (Well 10)	16: Well 1D-OW1-D (Well 22)	17: Well 1I-OW1-I (Well 21)	18: Well 6D-OW6-D (Well 2)	19: Well 6I-OW6-I (Well 3)	20: Well 87-OW87 (Well 13)
Manganese (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.00459	0.00008	0.00012	0.00015	0.00704	0.00467	0.0127	0.00025
Magnesium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	25.4	30.3	27.7	32.7	32.9	37.4	29.7	37.7
Calcium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	80.1	90.9	108	74.7	110	93.1	73.1	141
Iron (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Sodium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	3.61	1.32	31.5	3.02	3.57	5.26	12.0	0.88
Zinc (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.005	0.007	0.004	0.005	0.007	0.004	0.004	0.004

Note: Provincial unionized ammonia calculated using lab results for pH and temperature.

Carrie Greenlaw
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000543081

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

OCWA-Southampton (Tobermory Sewage Plant)
Attn : Camille Leung

P.O. Box 760
Southampton, ON
N0H 2L0,

Phone: 519-797-2561
Fax:pdf

Works #: 120001577
Project : PO#017018

03-November-2015

Date Rec. : 22 October 2015
LR Report: CA15454-OCT15

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	21: Well 56-OW56 (Well 12)	22: Well 2I-OW2-I (Well 8)	23: Well 2D-OW2-D (Well 9)	24: Well 55-OW55 (Well 11)	25: Well 60-OW60 (Well 14)
Sample Date & Time					21-Oct-15 11:05	21-Oct-15 11:20	21-Oct-15 11:30	21-Oct-15 11:45	21-Oct-15 13:30
Temperature Upon Receipt [°C]	---	---	---	---	13.0	13.0	13.0	13.0	13.0
Alkalinity [mg/L as CaCO3]	23-Oct-15	06:54	26-Oct-15	14:24	393	384	270	422	411
Conductivity [uS/cm]	23-Oct-15	06:54	26-Oct-15	14:24	698	664	503	761	1100
pH [no unit]	23-Oct-15	06:54	26-Oct-15	14:24	7.69	7.91	8.06	7.66	7.86
Temperature @ pH [°C]	23-Oct-15	06:54	26-Oct-15	14:24	18.2	18.8	18.3	18.8	18.4
Phosphorus (total) [mg/L]	22-Oct-15	22:00	25-Oct-15	15:53	---	---	---	---	---
Organic Nitrogen [mg/L]	22-Oct-15	20:00	03-Nov-15	12:36	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Kjeldahl Nitrogen [as N mg/L]	22-Oct-15	20:00	24-Oct-15	20:44	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Unionized Ammonia [mg/L as N]	22-Oct-15	22:00	03-Nov-15	12:35	< 0.001	0.015	< 0.001	< 0.001	0.005
Ammonia+Ammonium (N) [mg/L]	22-Oct-15	22:00	03-Nov-15	12:35	< 0.1	0.5	< 0.1	< 0.1	0.2
4AAP-Phenolics [mg/L]	23-Oct-15	14:48	26-Oct-15	14:51	< 0.002	< 0.002	< 0.002	< 0.002	0.004
Dissolved Organic Carbon [mg/L]	27-Oct-15	06:00	27-Oct-15	21:39	1.5	1.2	< 1	2.0	2.1
Phosphorus (dissolved reactive) [mg/L]	23-Oct-15	06:08	24-Oct-15	14:42	---	---	---	---	---
Chloride [mg/L]	23-Oct-15	16:57	27-Oct-15	15:54	< 1	2	1	< 1	120
Sulphate [mg/L]	26-Oct-15	12:24	27-Oct-15	15:54	2	6	18	3	16
Nitrite (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.06	1.36	< 0.06	< 0.06	0.18
Nitrate + Nitrite (as N) [mg/L]	26-Oct-15	08:40	28-Oct-15	17:00	< 0.06	1.36	< 0.06	< 0.06	0.18
Hardness (dissolved) [mg/L as CaCO3]	30-Oct-15	13:57	02-Nov-15	16:13	385	432	296	512	509
Aluminum (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Barium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.00566	0.0140	0.0215	0.0122	0.0105
Cadmium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.000008	0.000009	< 0.000003	0.000007	< 0.000003
Chromium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.00019	0.00023	0.00006	0.00030	0.00121
Copper (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.00136	0.00081	0.00307	0.00081	0.00147
Lead (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.00001	< 0.00001	0.00005	< 0.00001	< 0.00001

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
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Phone: 705-652-2000 FAX: 705-652-6365

Works #: 120001577
Project : PO#017018
LR Report : CA15454-OCT15

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	21: Well 56-OW56 (Well 12)	22: Well 2I-OW2-I (Well 8)	23: Well 2D-OW2-D (Well 9)	24: Well 56-OW56 (Well 11)	25: Well 60-OW60 (Well 14)
Manganese (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.0178	0.00110	0.00014	0.186	0.0303
Magnesium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	25.4	37.3	33.0	25.2	37.1
Calcium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	112	112	63.9	164	143
Iron (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	< 0.007	< 0.007	0.028	< 0.007	< 0.007
Sodium (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.90	2.23	29.3	0.89	94.2
Zinc (dissolved) [mg/L]	30-Oct-15	13:57	02-Nov-15	16:13	0.004	0.005	0.004	0.003	0.003

Note: Provincial unionized ammonia calculated using lab results for pH and temperature.

Carrie Greenlaw
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000543084

Appendix C
Volume of Received Sewage

2015 - Hauled Sewage

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Bruce Peninsula Septic Service	2,600	6,400	14,675	23,050	2,140	10,030	1,360	2,700	4,940	2,340	14,070	9,250	**93,555**
Scott Septic Pumping	500	0	1,400	17,500	64,900	134,000	244,300	142,600	120,600	22,650	6,600	2,900	**757,950**
Mountain Trout Camp	0	0	0	0	0	7,200	6,000	8,400	6,000	4,800	0	0	**32,400**
Total	**3,100**	**6,400**	**16,075**	**40,550**	**67,040**	**151,230**	**251,660**	**153,700**	**131,540**	**29,790**	**20,670**	**12,150**	**883,905**

*amounts in gallons

Appendix D
Calibration Records

Flowmetrix
Technical Services Inc.

Western Office
2088 Jetstream Road
London, Ontario
N5V 3P6

Eastern Office
1602 Old Wooler Road
Wooler, Ontario
K0K 3M0

F+P (ABB) Mag-meter
Verification Report

AS FOUND CERTIFICATION

FORWARD FLOW DIRECTION

PASS

CLIENT DETAIL	
CUSTOMER	OCWA - West Highlands
CONTACT	Leo Paul Frigault
	Cluster Manager
	519-797-3080

VER. BY - FM Paris Machuk

Quality Management Standards Information - Reference equipment and instrumentation used to conduct this verification test is found in our AC-QMS document at the time this test was conducted.

EQUIPMENT DETAIL		
[MUT] MANUFACTURER		Fisher & Porter
MODEL		50XM1000
CONVERTER SERIAL NUMBER		9312030479
FUSE		Pull Plug on Unit
PLANT ID		Tobermory
METER ID		Sewage Lift Station
FIT ID		N/A
CLIENT TAG		OCWA# 249600
OTHER		ORG 1132
GPS COORDINATES	N45 15.319	W81 39.874
VERIFICATION DATE		May 05, 2015
CAL. FREQUENCY		Annual
CAL. DUE DATE		May 2016

PROGRAMMING PARAMETERS		
DIAMETER (DN)	mm	150
F.S. FLOW - MAG	LPS	169.0
F.S. RANGE - O/P	LPS	25.0

FORWARD TOTALIZER INFORMATION		
AS FOUND	895556	M3
AS LEFT	895565	M3
DIFFERENCE	9	M3

TEST CRITERIA	
AS FOUND CERTIFICATION TEST	Yes
FORWARD FLOW DIRECTION	Yes
ALLOWABLE [%] ERROR	5

COMPONENTS TESTED	
CONVERTER DISPLAY	Yes
mA OUTPUT	Yes
TOTALIZER	Yes
ACCURACY BASED ON [% o.r.]	Yes

ERROR DOCUMENTED IN THIS REPORT, BASED ON % o.r

FLOW TUBE SIMULATION

				0.00	0.37	0.74	1.11	1.48	% Dial (m/s)
				0.00	3.70	7.40	11.09	14.79	% F.S. Flow
				0.0	25.0	50.0	75.0	100.0	% F.S. Range
REF. FLOW RATE				0.000	6.250	12.500	18.750	25.000	LPS
MUT [Reading]				0.176	6.399	12.560	18.840	25.970	LPS
MUT [Difference]				0.176	0.149	0.060	0.090	0.970	LPS
MUT [% Error]				n/a	2.38	0.48	0.48	3.88	%
mA OUTPUT				4.000	8.000	12.000	16.000	20.000	mA
MUT [Reading]	min.	4.000	mA	4.098	8.082	12.026	16.022	19.947	mA
MUT [Difference]	max.	20.000	mA	0.098	0.082	0.026	0.022	-0.053	mA
MUT [% Error]				2.45	1.03	0.22	0.14	-0.27	%
TOTALIZER - REF. FLOW RATE								25.000	LPS
TOTALIZER [MUT]								4	M3
TEST TIME								160.03	SECONDS
CALC. TOTALIZER								4.001	M3
ERROR								-0.02	%

COMMENTS
Note: noticable buzzing noise coming from display unit!

QUALITY MANAGEMENT STANDARDS INFO.

[QMS] INFORMATION	IDENT.	ID #
[REFERENCE] FTS	ABBMM	1
PROCESS METER	DMM	3
ANALOG METER	AM	N/A
STOP WATCH	SW	Yes

RESULTS

TEST	AVG % o.r.	PASS FAIL
DISPLAY	1.81	PASS
mA OUTPUT	0.71	PASS
TOTALIZER	-0.02	PASS

This report reflects the last results of the overall accuracy for the above flow converter using the specified manufacturers flow tube simulator to within the specified tolerance as identified within this report.