



Temagami South Wastewater Treatment Lagoon

Annual Performance Report January 1, 2015 to December 31, 2015

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Annual Sewage Performance Report

Sewage System Name	Temagami South Wastewater Treatment Lagoon
Sewage System Address	Part of Parcels 19125 and 16810 (22 Jack Guppy Way), Municipality of Temagami, ON
Sewage System Owner	Corporation of the Municipality of Temagami
Sewage System Number	110002327
Environmental Compliance Approval No.	3-1567-98-006, issued November 3, 1998 and 3-1567-98-006 Notice No. 1
Reporting Period	January 1, 2015 to December 31, 2015

Facility Description

Capacity of Works	232 m ³ /day
Service Area	Temagami, District of Nipissing
Service Population	350
Effluent Receiver	Snake Island Lake
Major Process	Two Cell Phosphorous Removal Lagoon

The Temagami South Wastewater Treatment Lagoon is a Class I facility with a daily average flow capacity of 232 m³/day. The two-celled lagoon design affords a storage capacity of 45,800 m³. The system provides phosphorus removal with the addition of ferric sulphate.

The system discharges seasonally into Snake Island Lake. The discharge period occurs from May 1 to June 15 and from October 15 to November 30, at a rate that is not to exceed 33.3 L/s or 2877.12 m³/day. In 2015, the spring discharge occurred from May 1st to June 15th. The fall discharge began on November 12 and ended on November 24.

1.0 Monitoring Data

1.1 Monitoring Program as Outlined in the Environmental Compliance Approval

BOD₅ = Five-day biochemical oxygen demand measured in an unfiltered sample
 TSS = Total Suspended Solids
 TP = Total Phosphorus
 TKN = Total Kjeldahl Nitrogen
 (NH₃⁻ + NH₄) N = Nitrogen as Ammonium and Ammonia
 H₂S = Hydrogen Sulphide



1.1.1 Raw Sewage (Influent)

Parameter	Type of Sample	Minimum Frequency
BOD ₅	grab	quarterly
TSS	grab	quarterly
TP	grab	quarterly
TKN	grab	quarterly

1.1.2 Lagoon Cell Contents

Parameter	Type of Sample	Minimum Frequency
TP	grab	prior to discharge
H ₂ S	grab	prior to discharge
<i>E. coli</i>	grab	prior to discharge

1.1.3 Final Effluent

Parameter	Type of Sample	Minimum Frequency
BOD ₅	grab	five per discharge
TSS	grab	five per discharge
TP	grab	five per discharge
(NH ₃ ⁻ + NH ₄) N	grab	five per discharge

Note: Collected at 0%, 25%, 50%, 75% and 100% drawdown in the lagoon, during the discharge period.

1.2 Data

1.2.1 Influent Flow

Month	Average Flow (m ³ /day)	Maximum Flow (m ³ /day)
January	176	283
February	163	170
March	165	181
April	171	201
May	103	115
June	106	111
July	124	138
August	129	158
September	90	145
October	80	85
November	85	92
December	112	134

1.2.2 Summary of Influent Flow

Maximum Flow (m ³ /day)	Average Flow (m ³ /day)	Rated Capacity (m ³ /day)	% Capacity	Exceedance
283	125	232	54	No

1.2.3 Raw Sewage (Influent)

Parameter	Average	Maximum
BOD ₅ (mg/L)	204.5	364
TSS (mg/L)	179.75	295
TP (mg/L)	5.313	9.19
TKN (mg/L)	39.8	71.7

1.2.4 Effluent Flow Summary

Discharge Period	Volume (m ³)	Average Flow (m ³ /day)	Flow Rate (L/sec)	Compliance
Spring	19,080	1908	22.1	2877.1 m ³ /day
Fall	22,900	1908.3	22.1	33.3 L/sec

1.2.5a Effluent – Spring

Parameter (mg/L)	Average	Maximum	Compliance Limit	Compliance Period
BOD ₅	7.66	14.6	25	seasonal average
TSS	15.8	44	25	seasonal average
TP	0.2	0.57	1.0	seasonal average
(NH ₃ ⁻ + NH ₄) N	15.4	21.5	N/A	N/A

1.2.5b Effluent – Fall

Parameter (mg/L)	Average	Maximum	Compliance Limit	Compliance Period
BOD ₅	<1.34	1.7	25	seasonal average
TSS	5.7	9	25	seasonal average
TP	0.04	0.05	1.0	seasonal average
(NH ₃ ⁻ + NH ₄) N	14.9	16.1	N/A	N/A



1.2.6a Effluent – Spring Loadings

Parameter (kg/day)	Average	Compliance Limit	Compliance Period
BOD ₅	0.84	71.9	seasonal average
TSS	1.77	71.9	seasonal average
TP	0.02	2.9	seasonal average

1.2.6b Effluent – Fall Loadings

Parameter (kg/day)	Average	Compliance Limit	Compliance Period
BOD ₅	<1.18	71.9	seasonal average
TSS	5	71.9	seasonal average
TP	0.03	2.9	seasonal average

1.2.7 Lagoon Cell Contents

Parameter	Spring	Fall
TP (mg/L)	0.19	0.04
H ₂ S (mg/L)	<0.02	<0.02
<i>E. coli</i> (cfu/100 mL)	<223	50

Note: cfu = colony forming units

1.3 Sewage Treatment Program Success and Adequacy

The Performance Summary details results and efficiency of the lagoon performance demonstrating pollutant removal rates from raw sewage concentrations through to final effluent for BOD₅, suspended solids and total phosphorus.

1.3.1a Performance Summary – Spring

Parameter	Influent	Effluent	% Removal
BOD ₅ (mg/L)	204.5	7.66	96.3
TSS (mg/L)	179.75	15.8	91.2
TP (mg/L)	5.313	0.2	96.2

1.3.1b Performance Summary – Fall

Parameter	Influent	Effluent	% Removal
BOD ₅ (mg/L)	204.5	<1.34	<99.3
TSS (mg/L)	179.75	5.7	97
TP (mg/L)	5.313	0.04	99.3

2.0 Interpretation of Monitoring and Analytical Data

The Temagami South Sewage Treatment Lagoon operated well within its required capacity. The raw sewage (influent) flow is a measurement based on the total volume of sewer water taken each day. Table 1.2.1 *Influent Flow Data* summarizes the flow data for 2015. The average flows and the maximum daily flows are presented for each month. Compliance is achieved when the annual influent flow does not exceed 232 m³/day and when the seasonal average effluent does not exceed 2877.1 m³/day. In 2015, the average annual flow was 125 m³/day which represents 54% of the rated capacity and the maximum seasonal average effluent flow was 1908.3 m³/day, which represents 66 % of the compliance limit.

The effluent quality is based on the seasonal average of the biochemical oxygen demand, total suspended solids, and total phosphorus levels. The annual averages for all parameters are listed in table 1.2.5 *Effluent*.

Biological Oxygen Demand (BOD₅) is the amount of oxygen used by micro-organisms as they decompose organic matter in the effluent sample for five days. High BOD₅ in effluent means a large quantity of oxygen was needed to break down the organic matter and identifies a large amount of organic matter in the effluent indicating inadequate treatment. In 2015, the average BOD₅ for both seasons complied with the limit of 25 mg/L.

Suspended Solids (TSS) in effluent are composed of settleable solids and non-settleable solids depending on the size, shape and weight of the solid particles. Settable solids are large sized particles that tend to settle more rapidly in a given period of time. In 2015, the average TSS for both seasons complied with the limit of 25 mg/L.

Total Phosphorus (TP) refers to the amount of phosphorus in a sample. Excess TP stimulates algae and weed growth that may cause fluctuations in dissolved oxygen in the receiving waters. In 2015, the average TP for both seasons complied with the limit of 1 mg/L.

Refer to Appendix A for the Monthly Process Data Report, which summarizes the monitoring and sampling analysis conducted at the facility.

3.0 Effluent Quality Assurance and Control Measures Undertaken

The mechanical elements in the facility are in good repair, and each member of the operational staff possesses a high level of process knowledge and regulatory competence.

Samples are collected as required and analyzed by Accuracy Environmental Laboratories located in Kirkland Lake, Ontario. Licensed Operators conduct in-house tests for monitoring purposes using procedures as per Standard Methods of Water and Wastewater.

Any bypass or upset events that occur are tested, monitored and reported to the Spills Action Center (SAC).

4.0 Bypasses, Sewer Main Breaks, Emergency, and Upset Events

There were no bypass, sewer main breaks, emergency or upset events for 2015.

5.0 Calibration and Maintenance of all Monitoring Equipment

Plant maintenance, including non-scheduled maintenance, is monitored using the Hansen Preventative Maintenance software program. All routine and preventative maintenance measures were completed as scheduled in 2015.

All equipment is calibrated based on the manufactures recommendations. Refer to Table 5.1 for a summary of calibrations performed.

5.1 Calibration Summary

Date	Instrument	% Accuracy
May 11	Influent Flow Meter	99.33 to 99.6

6.0 Maintenance Procedures Performed on the Works

Routine maintenance is done as per OCWA's Hansen Preventative Maintenance software program.

7.0 Efforts Made to Meet Effluent Objectives

The Temagami South Wastewater Treatment Lagoon was operated efficiently, producing quality treated wastewater that meets the Objectives specified in Condition 7 of the ECA. The mechanical elements in the facility are in good repair and the operational staff posses a high level of process knowledge and regulatory competence.

Spring Concentration Objectives

Parameter	Average	Maximum	Objective
BOD ₅ (mg/L)	7.66	14.6	15
TSS (mg/L)	15.8	44	20
TP (mg/L)	0.2	0.57	1

Spring Loading Objectives

Parameter	Average	Objective
BOD ₅ (mg/L)	0.84	43.1
TSS (mg/L)	1.77	57.5
TP (mg/L)	0.02	2.9

Fall Concentration Objectives

Parameter	Average	Maximum	Objective
BOD ₅ (mg/L)	<1.34	1.7	15
TSS (mg/L)	5.7	9	20
TP (mg/L)	0.04	0.05	1

Fall Loading Objectives

Parameter	Average	Objective
BOD ₅ (mg/L)	<1.18	43.1
TSS (mg/L)	5	57.5
TP (mg/L)	0.03	2.9

Appendix A: Monthly Process Data Report

Raw Data (mg/L)	Count	Jan	Apr	Jul	Oct	Average
BOD5	4	117	83	254	364	204.5
Suspended Solids	4	144	80	295	200	179.75
TKN	4	19.8	19.9	47.8	71.7	39.8
Total Phosphorus	4	3.01	1.98	7.07	9.19	5.313

Spring Effluent (mg/L)	Count	May	Jun	Average
BOD5	9	11.95	4.22	7.66
Suspended Solids	9	28.8	5.5	15.8
Total Phosphorus	9	0.33	0.09	0.2
NH3 + NH4 as N	9	19.1	12.5	15.4

Fall Effluent (mg/L)	Count	Nov	Average
BOD5	5	<1.34	<1.34
Suspended Solids	5	5.7	5.7
Total Phosphorus	5	0.04	0.04
NH3 + NH4 as N	5	14.9	14.9