

REPORT FROM TROPIC REPORT

2015

---

# ST. THOMAS WATER POLLUTION CONTROL PLANT

---

Certificate of Approval 5276-5M9JW7  
Annual Performance Report

For the Period  
January 1st to December 31st, 2015

*Prepared by: John F. Mansell*



THE CORPORATION OF THE CITY OF  
**ST. THOMAS**

---

**Table of Contents**

**1 Monitoring Data Overview: ..... 1**

1.1 Table 1 – Daily Sewage Flow Summary .....2

1.2 Table 2 – Monthly Average Sewage Flow Summary .....3

1.3 Chart 1 – Average Daily Sewage Flow.....3

1.4 Chart 2 – Maximum Daily Sewage Flow .....4

1.5 Chart 3 – Annual % Sewage Flow Capacity Utilized.....4

1.6 Table 3 – Weekly Certified Plant Analytical Data .....5

1.7 Table 4 – Monthly Average Influent/Effluent Concentrations and Loadings .....8

1.8 Chart 4 – Monthly Average Effluent CBOD (mg/L).....9

1.9 Chart 5 – Monthly Average Effluent Total Suspended Solids (mg/L).....9

1.10 Chart 6 – Total Phosphorus (mg/L) Monthly Average Effluent..... 10

1.11 Chart 7 – Ammonia + Ammonium (mg/L) Monthly Average Effluent ..... 10

1.12 Chart 8 – Monthly Geomean Effluent E.Coli. (cfu/100 mL)..... 11

1.13 Chart 9 – Weekly Effluent pH ..... 11

**2 Data Interpretation: ..... 12**

**3 Operational Summaries:..... 13**

3.1 Table 5 – Summary of Effluent Quality Control and Environmental Operating Issues..13

3.2 Table 6 – Summary of Major Maintenance Items ..... 14

3.3 Table 7 – Summary of Future Upgrade Planning ..... 15

3.4 Table 8 - Summary of Monitoring Equipment Calibrations ..... 16

**4 Sludge Management:..... 17**

4.1 Sludge Production:..... 17

4.2 Sludge Disposal: ..... 17

4.3 Table 9 - Summary of Sludge Quantities..... 17

---

## 1 Monitoring Data Overview:

For the purposes of this report the St. Thomas Water Pollution Control Plant shall be referred to as ‘the plant’ and Ontario Ministry of the Environment and Climate Change Certificate of Approval 5276-5M9JW7 shall be referred to as the ‘C of A’. Formal notification of start up of operation of the works for this C of A was given on February 14<sup>th</sup>, 2003.

The average and peak daily sewage flow limits, 27,300 m<sup>3</sup>/day/year and 54,600 m<sup>3</sup>/day respectively, as set out in the C of A, were maintained at all times throughout 2015, with an annual average flow of 14,341 m<sup>3</sup>/day and a peak flow of 39,159 m<sup>3</sup>/day in June 2015.

Throughout 2015 the St. Thomas Water Pollution Control Plant was operated within the limits and objectives for CBOD5, TSS, TP, pH and E.Coli as set out in the C of A.

Despite the use of best effort, averages for Ammonia + Ammonium as Nitrogen, ‘objectives’ were not achieved between in May and between August and October of 2015 as detailed in the data below:

<b>Ammonia Average</b>	<b>Effluent Result and Loading</b>	<b>Effluent Objective and Loading</b>	<b>Effluent Limit and Loading</b>
May 2015	1.08 mg/L / 30.7 kg/day	1 mg/L / 27.3 kg/day	5 mg/L / 136.5 kg/day
August 2015	1.20 mg/L / 13.8 kg/day	1 mg/L / 27.3 kg/day	5 mg/L / 136.5 kg/day
September 2015	1.01 mg/L / 14.1 kg/day	1 mg/L / 27.3 kg/day	5 mg/L / 136.5 kg/day
October 2015	1.05 mg/L / 17.2 kg/day	1 mg/L / 27.3 kg/day	5 mg/L / 136.5 kg/day

Slightly elevated Ammonia + Ammonia as Nitrogen levels in the months of May, August, September and October may be attributed to lost hydraulic retention time due to extensive tank maintenance. A list of Operational and Maintenance Issues are detailed in 3.1 Table 5 – Summary of Effluent Quality Control and Environmental Operating Issues and 3.2 Table 6 – Summary of Major Maintenance Items. The Ammonia and Ammonia as Nitrogen Limits of 5mg/L were maintained at all times throughout 2015.

Sewage flows were maintained within the sewage works and were continuously disinfected with a Trojan UV system. There were no known adverse affects on the receiving stream or reported public complaints throughout 2015.

As indicated by the data presented in this report, the St. Thomas Sewage Treatment Program was both adequate and successful throughout 2015.

The following tables, Table 1 through 4, represent a summary of monitoring data collected at the plant throughout 2015:

1.1 Table 1 – Daily Sewage Flow Summary

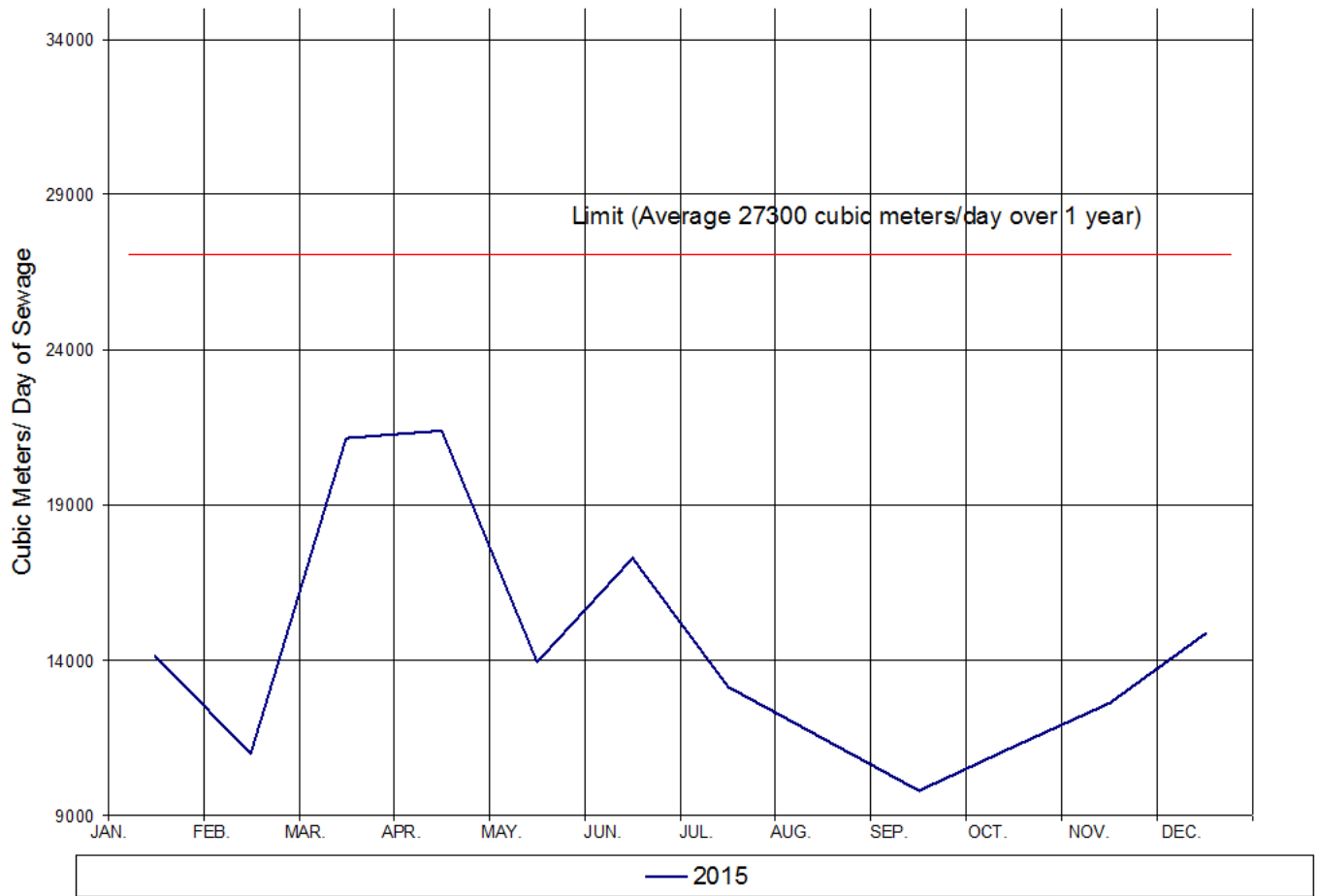
**Corporation of the City of St. Thomas - Water Pollution Control Plant**  
**Table 1 - 2015 Daily WPCP Flow Summary (Limit: Ave. Daily Flow 27300 m<sup>3</sup>/day >1 Year and Max. Flow 54600 m<sup>3</sup>/Day)**

	January	February	March	April	May	June	July	August	September	October	November	December
	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)	Flow (M3)
Min:	11328	10443	10333	15135	11245	12027	10222	9307	7838	8911	10427	10339
Max:	29982	11898	36384	34984	33598	39159	21407	23673	14764	32398	19298	36029
Avg:	14127	11000	21152	21396	13949	17275	13137	11485	9817	11247	12630	14878
Total:	437951	307987	655726	648887	432426	518258	407237	356023	294513	348650	378894	461211
1	12983	11853	11417	22996	14543	20789	17563	10633	9415	10285	19298	12766
2	12481	11259	10762	23408	14914	15072	15910	11086	9511	9707	13129	12583
3	23242	11246	310428	329405	314649	313846	314602	323673	310676	311848	312085	313940
4	29982	11066	410909	425076	414107	413188	414300	413849	410342	411081	411553	411623
5	18312	11241	510654	522770	517451	512838	513897	512545	519731	510043	511311	511898
6	16331	11134	610333	621235	615553	612605	613394	611586	619270	619812	614460	612000
7	14969	711888	711109	720014	714676	713372	714127	711091	719956	719772	712376	711196
8	14458	811717	812621	822682	813899	818104	812982	810870	819864	810116	811937	811024
9	13650	910890	914450	925615	914003	921885	916149	910727	919810	912010	911030	910961
10	13840	1010889	1014781	1034984	1013878	1015066	1013239	1018597	1019695	1010385	1012160	1010815
11	13595	1110968	1119844	1127705	1113942	1113616	1112627	1111548	1119870	1119862	1111537	1110339
12	12870	1210835	1220029	1223584	1213675	1213067	1212437	1210866	1211384	1210065	1212023	1210579
13	12768	1310756	1320727	1321996	1313300	1312619	1312195	1310701	1319969	1319547	1311306	1310940
14	12768	1411195	1432339	1420510	1413173	1424574	1421407	1410701	1419628	1419287	1411433	1414033
15	12530	1510922	1532738	1519228	1512780	1525000	1514101	1521083	1519241	1518911	1511325	1512103
16	12314	1611300	1628842	1618701	1612791	1618478	1612907	1610425	1618106	1619037	1610697	1611498
17	12805	1710895	1736384	1718713	1712455	1715528	1714899	1710359	1718285	1719656	1710427	1711350
18	17514	1810750	1832213	1818203	1813133	1817212	1814398	1810250	1817838	1810009	1810951	1811030
19	13957	1910705	1927269	1918440	1912238	1914741	1913186	1910224	1914764	1919265	1913462	1911320
20	13033	2010615	2026258	2032803	2011888	2014176	2012293	2010442	2010743	2019371	2011178	2011058
21	12821	2111061	2128857	2121583	2113599	2113873	2111895	2119722	2119669	2119274	2114821	2118419
22	12595	2211206	2226057	2220128	2211847	2213464	2211428	2219779	2219778	2219174	2215353	2215062
23	12358	2310606	2322048	2318496	2311876	2315217	2311306	2319781	2319301	2318987	2314091	2315117
24	12720	2410485	2420165	2417479	2411938	2412844	2411159	2419835	2419445	2412365	2412365	2415281
25	12716	2510487	2523214	2517407	2511552	2512439	2511191	2519505	2518730	2511077	2512042	2513054
26	12016	2610443	2628629	2617018	2611953	2612027	2610926	2619391	2618461	2619840	2611684	2614266
27	11764	2710470	2726663	2715938	2712618	2725999	2710746	2719307	2718409	2719671	2713731	2723934
28	11716	2811105	2822190	2815445	2811436	2839159	2810665	2819405	2818825	2832398	2815176	2816923
29	11604	2920585	2915135	2915135	2911245	2928075	2910627	2919308	2912775	2919654	2913546	2936029
30	11328	3011328	3020215	3015190	3013886	3019385	3010459	3019307	3011022	3013472	3012407	3035568
31	11911		3122996	3115190	3133598	3110222	3110222	3119427	3110222	3112769	3112769	3124502

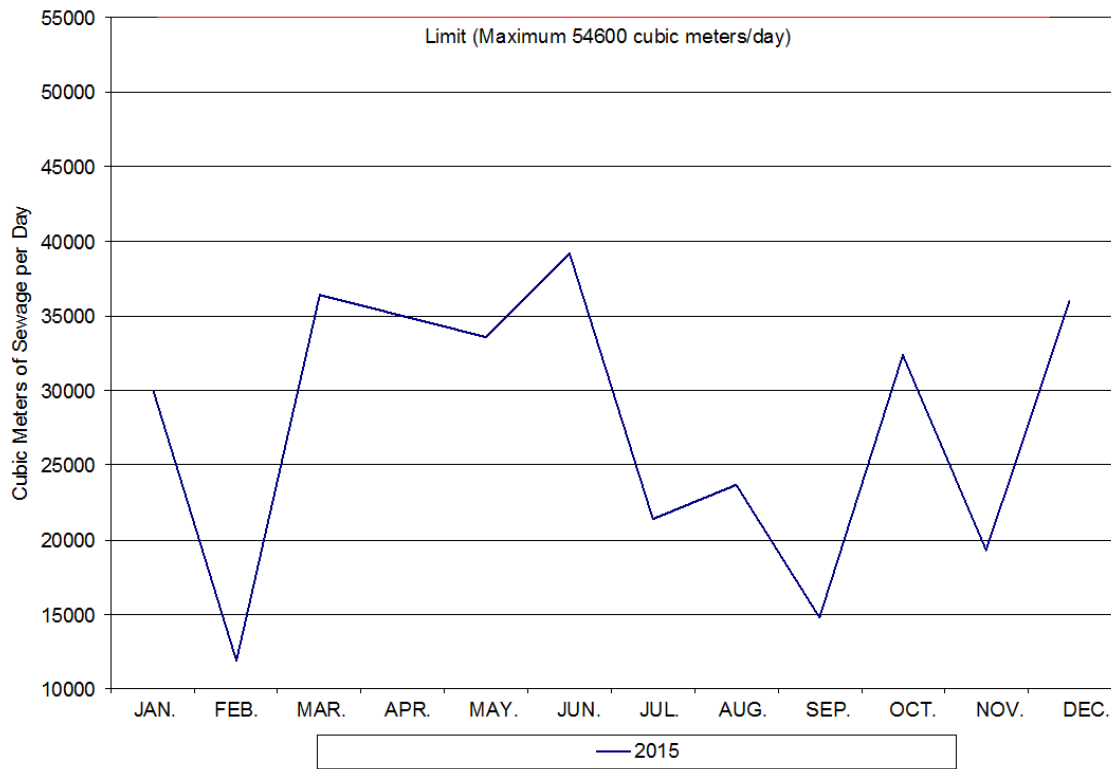
**1.2 Table 2 – Monthly Average Sewage Flow Summary**

Month of: 2015	Total Flow (m3)	Average Flow (m3)	Min. Flow (m3)	Max. Flow (m3)
January 2015	437951	14127	11328	29982
February 2015	307987	11000	10443	11888
March 2015	655726	21152	10333	36384
April 2015	641887	21396	15135	34984
May 2015	432426	13949	11245	33598
June 2015	518258	17275	12027	39159
July 2015	407237	13137	10222	21407
August 2015	356023	11485	9307	23673
September 2015	294513	9817	7838	14764
October 2015	348650	11247	8911	32398
November 2015	378894	12630	10427	19298
December 2015	461211	14878	10339	36029
<b>Totals:</b>	<b>5240763</b>	<b>14341</b>	<b>7838</b>	<b>39159</b>

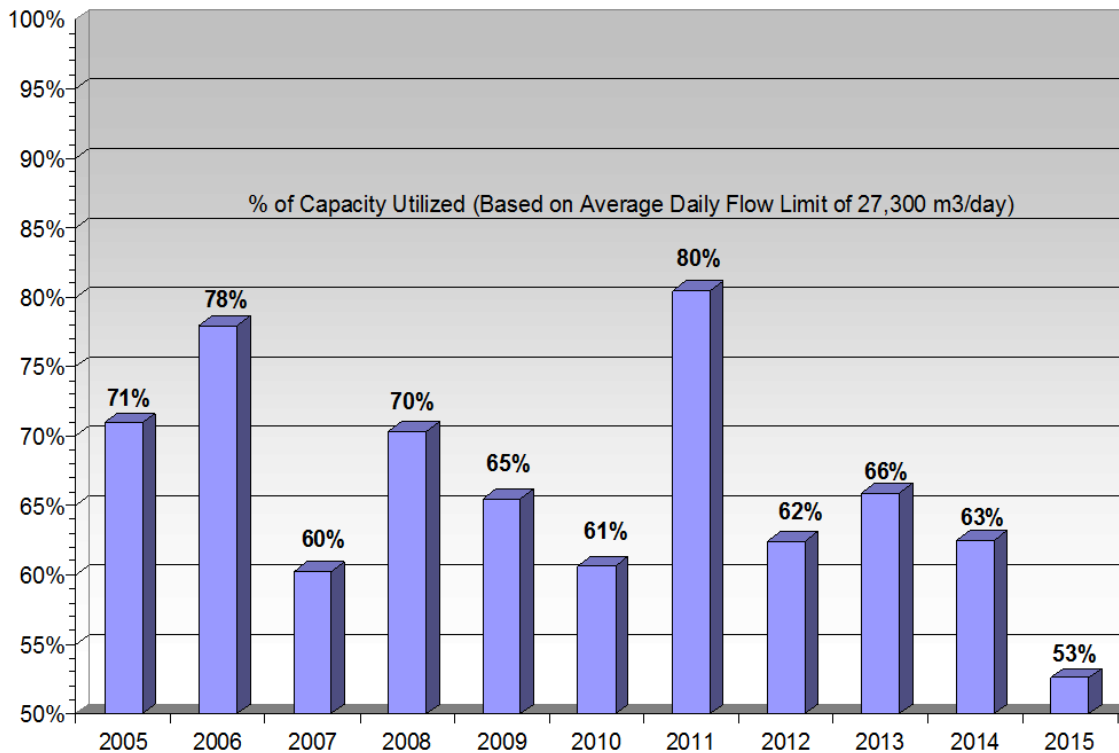
**1.3 Chart 1 – Average Daily Sewage Flow**



**1.4 Chart 2 – Maximum Daily Sewage Flow**



**1.5 Chart 3 – Annual % Sewage Flow Capacity Utilized**



1.6 Table 3 – Weekly Certified Plant Analytical Data

Date	In	pH	Temp C	CBOD (mg/L)		TSS (mg/L)		Amm (mg/L)		TKN (mg/L)		NO2		NO3		NO2NO3		TP (mg/L)		Ecoli Final		UV% Power
				Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	
07-Jan-15	6	7.62	10.7	138	5.0	136	5	24.7	0.2	29.1	1	1.27	17.7	19	3.22	0.5	18	64%				
14-Jan-15	6	7.37	11.6	183	5.0	206	7	47.9	1.9	55.9	3.8	2.85	19.1	22	7.37	0.69	348	64%				
21-Jan-15	6.4	7.22	11.2	145	6.0	4	32.2	0.4	35	1.6	1.78	20.5	22.3	3.14	0.72	72	60%					
28-Jan-15	7.2	7.39	10.7	155	6.0	3	31	0.2	34.4	0.25	1.81	24.6	26.4	3.51	0.72	62	60%					
<b>AVERAGE:</b>				<b>155.3</b>	<b>5.5</b>	<b>171</b>	<b>4.8</b>	<b>33.95</b>	<b>0.68</b>	<b>38.60</b>	<b>1.66</b>	<b>1.93</b>	<b>20.48</b>	<b>22.43</b>	<b>4.31</b>	<b>0.66</b>						
04-Feb-15	6	7.36	11.4	147	4.0	6	41.8	0.05	40.5	1.2	1.12	26.3	27.4	4.35	0.64	22	60%					
11-Feb-15	6.1	7.32	11.6	91	2.0	250	6	32.8	0.2	42.3	0.9	0.61	25.2	25.8	3.29	0.57	26	60%				
18-Feb-15	7.1	7.34	9.6	262	6.0	7	31.8	0.9	44.6	1.3	0.92	25.9	26.8	6.4	0.5	24	60%					
25-Feb-15	7.4	7.11	10.7	195	5.0	370	10	38.1	0.9	47.5	2.9	1	26.3	27.3	7.33	0.66	54	60%				
<b>AVERAGE:</b>				<b>173.8</b>	<b>4.3</b>	<b>310</b>	<b>7.3</b>	<b>36.13</b>	<b>0.51</b>	<b>43.73</b>	<b>1.58</b>	<b>0.91</b>	<b>25.93</b>	<b>26.83</b>	<b>5.34</b>	<b>0.59</b>						
04-Mar-15	7	7.28	10.5	174	5.0	308	6	39.2	1.1	48.6	0.7	0.99	29	30	6.09	0.76	178	60%				
11-Mar-15	7	7.27	11	112	6.0	211	6	24.6	1.8	30.4	2.7	0.99	21.5	22.5	3.01	0.54	16	60%				
18-Mar-15	7.7	7.61	8.9	63	5.0	87	12	8.4	1.1	10	1	0.47	10.6	11.1	1.31	0.37	400	84%				
25-Mar-15	7.6	7.56	9.8	115	5.0	129	6	16.5	1	21.6	1.4	0.63	16	16.6	1.52	0.45	4	60%				
<b>AVERAGE:</b>				<b>116</b>	<b>5.3</b>	<b>184</b>	<b>7.5</b>	<b>22.18</b>	<b>1.25</b>	<b>27.65</b>	<b>1.45</b>	<b>0.77</b>	<b>19.28</b>	<b>20.05</b>	<b>2.98</b>	<b>0.53</b>						
01-Apr-15	7.6	7.55	10.5	113	6.0	130	4	17.2	1.8	22	2.2	1.03	15.1	16.1	1.74	0.56	30	62%				
08-Apr-15	7.9	7.76	10.4	90	2.0	135	4	15.1	2.5	18.3	3.2	0.84	12.4	13.2	1.9	0.42	6	72%				
15-Apr-15	7.6	7.58	10.9	108	6.0	199	8	24.8	1.4	26.3	1.5	0.84	15.8	16.6	3.17	0.47	16	68%				
22-Apr-15	7.6	7.54	11	119	5.0	200	8	17.8	1	20.7	4.4	0.58	15.9	16.5	1.92	0.55	16	72%				
29-Apr-15	7.5	7.52	12.4	134	2.0	162	7	23.8	0.6	30.9	1.7	0.59	21.5	22.1	2.86	0.6	56	68%				
<b>AVERAGE:</b>				<b>112.8</b>	<b>4.2</b>	<b>165</b>	<b>6.2</b>	<b>19.74</b>	<b>1.46</b>	<b>23.64</b>	<b>2.60</b>	<b>0.78</b>	<b>16.14</b>	<b>16.90</b>	<b>2.32</b>	<b>0.52</b>						
06-May-15	7.5	7.56	13.2	128	5.0	180	6	21.4	1.6	24.8	1.6	0.66	20.5	21.2	1.89	0.82	134	64%				
13-May-15	7.8	7.46	13.4	160	2.0	263	6	24.7	0.9	29	6	0.8	20.4	21.2	3.3	0.65	32	64%				
20-May-15	7.6	7.68	14.4	200	7.0	198	8	30.5	2.8	34.8	2.8	0.56	17.6	18.2	2.99	0.67	8	60%				
27-May-15	7.6	7.5	17.1	148	2.0	224	4	29.8	3.5	34.9	3.6	0.69	20.7	21.4	2.84	0.75	16	64%				
<b>AVERAGE:</b>				<b>159</b>	<b>4.0</b>	<b>216</b>	<b>6.0</b>	<b>26.60</b>	<b>2.20</b>	<b>30.88</b>	<b>3.50</b>	<b>0.68</b>	<b>19.80</b>	<b>20.50</b>	<b>2.76</b>	<b>0.72</b>						

The Corporation of the City of St. Thomas - Water Pollution Control Plant  
 Table 3 - Weekly Plant Analytical Data

Date	pH	In	Temp C	Eff	CBOD (mg/L)	Inf.	Eff.	TSS (mg/L)	Inf.	Eff.	Amm (mg/L)	Inf.	Eff.	TKN (mg/L)	Inf.	Eff.	NO2	NO3	NO2/NO3	TP (mg/L)	Inf.	Eff.	E coli	Final	UV%	Power
03-Jun-15	7.6	7.69	15.7	93	2.0	146	5	27.3	0.8	30.4	2.2	0.38	18.7	19.1	2.58	0.4	26	64%								
10-Jun-15	7.6	7.66	16.9	74	6.0	138	6	16.2	0.8	19.7	1.8	0.33	15.9	16.2	1.8	0.46	14	64%								
17-Jun-15	8	7.7	17.1	87	2.0	142	6	18.2	0.3	28.1	1.4	0.23	16.5	16.7	1.55	0.48	16	76%								
24-Jun-15	7.6	7.48	18.1	205	2.0	333	6	25.3	0.9	29.1	0.9	0.49	19.4	19.9	2.17	0.71	8	68%								
29-Jun-15	7.5	7.65	17.5	62	13.0	51	7	7.2	0.2	11.1	0.25	0.17	8.42	8.59	0.77	0.3	4	100%								
<b>AVERAGE :</b>					<b>104.2</b>	<b>5.0</b>	<b>162</b>	<b>6.0</b>	<b>19.00</b>	<b>0.60</b>	<b>23.68</b>	<b>1.31</b>	<b>0.32</b>	<b>15.78</b>	<b>16.10</b>	<b>1.79</b>	<b>0.47</b>									
08-Jul-15	7.2	7.58	18	91	6.0	214	3	24.7	0.6	29	0.25	0.48	21.3	21.8	2.56	0.63	14	60%								
15-Jul-15	7.2	7.51	18.9	96	5.0	194	7	15.2	1.4	19.1	1.4	0.66	16.6	17.3	1.58	0.81	8	64%								
22-Jul-15	7.5	7.71	19	74	2.0	205	3	25.1	0.5	28.3	3.4	0.39	23.6	24	2.53	0.6	36	64%								
29-Jul-15	7.2	7.5	20.2	123	4.0	292	5	34	0.3	36.1	1.4	0.35	25.3	25.7	3.35	0.7	84	60%								
<b>AVERAGE :</b>					<b>96</b>	<b>4.3</b>	<b>226</b>	<b>4.5</b>	<b>24.75</b>	<b>0.70</b>	<b>28.13</b>	<b>1.61</b>	<b>0.47</b>	<b>21.70</b>	<b>22.20</b>	<b>2.53</b>	<b>0.69</b>									
05-Aug-15	7.6	7.62	21.3	172	13.0	238	6	25.5	0.3	28	2.5	0.26	18.2	18.5	1.37	0.45	10	60%								
12-Aug-15	7.5	7.72	21	134	6.0	211	6	34.9	0.6	37.2	1.9	0.24	23.1	23.3	2.8	0.61	14	60%								
19-Aug-15	7.5	7.66	21.6	149	6.0	198	7	32.1	2.1	33.9	2.4	0.57	21.1	21.6	2.1	0.68	2	60%								
26-Aug-15	7.6	7.53	20.7	100	8.0	130	18	33.1	1.8	42.9	1.5	3.39	18.4	21.8	3.29	0.89	26	64%								
<b>AVERAGE :</b>					<b>138.8</b>	<b>8.3</b>	<b>194</b>	<b>9.3</b>	<b>31.40</b>	<b>1.20</b>	<b>35.50</b>	<b>2.08</b>	<b>1.12</b>	<b>20.20</b>	<b>21.30</b>	<b>2.52</b>	<b>0.66</b>									
02-Sep-15	7.3	7.46	22	174	6.0	289	7	29.3	2.2	39.7	3.4	0.59	25	25.6	4.71	0.44	10	60%								
09-Sep-15	7.3	7.45	22	88	2.0	233	6	27.9	1.6	34.5	4.7	0.33	23.8	24.1	3.29	0.61	24	60%								
16-Sep-15	7.1	7.23	21.2	163	2.0	256	7	38.3	0.4	51.6	0.25	0.2	32	32.2	3.29	0.52	2	60%								
23-Sep-15	7.2	7.48	20.9	119	2.0	227	3	31.1	0.4	33.4	0.7	0.24	26.3	26.5	3.36	0.51	1	60%								
30-Sep-15	7.2	7.47	20.7	95	5.0	69	8	20.2	2.6	24.5	4.3	0.38	22.4	22.8	1.75	0.51	2	60%								
<b>AVERAGE :</b>					<b>127.8</b>	<b>3.4</b>	<b>215</b>	<b>6.2</b>	<b>29.46</b>	<b>1.44</b>	<b>36.74</b>	<b>2.67</b>	<b>0.35</b>	<b>25.90</b>	<b>26.24</b>	<b>3.28</b>	<b>0.52</b>									
07-Oct-15	7	7.53	20.1	196	2.0	294	5	29.7	1.1	35.7	1.8	0.42	26	26.4	3.35	0.47	56	60%								
14-Oct-15	7.6	7.56	19.7	114	2.0	154	6	30.5	2.8	37.1	3.7	0.51	21	21.5	3.33	0.66	68	60%								
21-Oct-15	7.1	7.28	19.4	141	4.0	2620	2	37.3	1.5	40.8	4.6	0.26	31.6	31.9	3.1	0.67	1	60%								
28-Oct-15	7.5	7.15	16.3	177	2.0	212	7	31	0.7	43.2	1.2	0.2	29	29.2	3.4	0.58	1360	176%								
<b>AVERAGE :</b>					<b>157</b>	<b>2.5</b>	<b>820</b>	<b>5.0</b>	<b>32.28</b>	<b>1.53</b>	<b>39.20</b>	<b>2.83</b>	<b>0.35</b>	<b>26.90</b>	<b>27.25</b>	<b>3.30</b>	<b>0.60</b>									



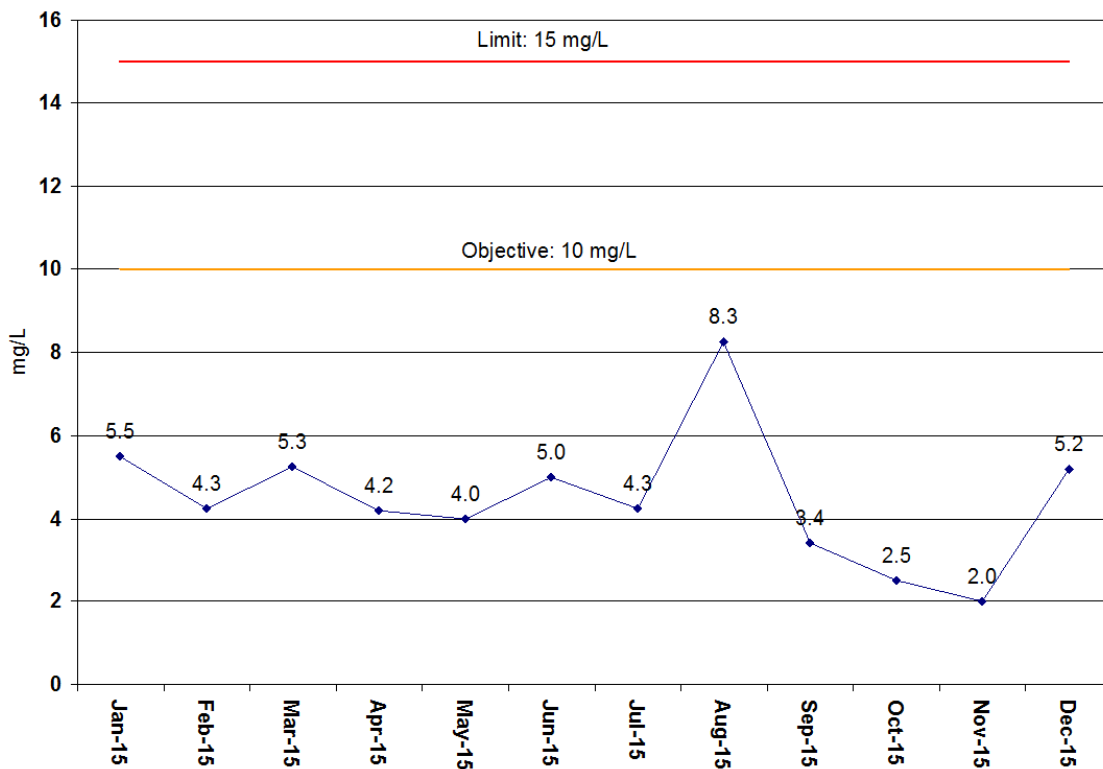
The Corporation of the City of St. Thomas - Water Pollution Control Plant  
 Table 3 - Weekly Plant Analytical Data

Date	pH In	pH Cert.	Temp C Eff	CBOD (mg/L) Inf.	CBOD (mg/L) Eff.	TSS (mg/L) Inf.	TSS (mg/L) Eff.	Amm (mg/L) Inf.	Amm (mg/L) Eff.	TKN (mg/L) Inf.	TKN (mg/L) Eff.	NO2 Eff.	NO3 Eff.	NO2NO3 Eff.	TP (mg/L) Inf.	TP (mg/L) Eff.	Ecoli Final Eff.	UV% Power
04-Nov-15	7.1	7.83	18.7	196	2.0	274	4	27.1	0.1	32.8	2.3	0.08	22.4	22.5	3.06	0.48	34	60%
12-Nov-15	7.1	7.45	17.6	158	2.0	283	3	23.5	0.2	32.2	0.25	0.06	25.5	25.6	3.58	0.8	164	60%
18-Nov-15	6.8	7.52	17.4	312	2.0	353	7	26.3	0.2	36.2	0.25	0.23	29.8	30	4.94	0.89	44	60%
25-Nov-15	7.1	7.71	16.4	150	2.0	214	6	24.1	0.2	26.8	0.6	0.09	21.7	21.8	2.82	0.47	26	60%
<b>AVERAGE :</b>				<b>204</b>	<b>2.0</b>	<b>281</b>	<b>5.0</b>	<b>25.25</b>	<b>0.18</b>	<b>32.00</b>	<b>0.85</b>	<b>0.12</b>	<b>24.85</b>	<b>24.98</b>	<b>3.60</b>	<b>0.66</b>		
02-Dec-15	7.4	7.74	15.6	151	6.0	244	4	29.9	5.5	34.6	5.7	0.24	19.7	19.9	4.29	0.6	30	60%
09-Dec-15	6.9	7.42	15.8	108	2.0	170	5	27.9	0.9	34.1	2	0.31	25.7	26	4.67	0.67	14	60%
16-Dec-15	7.7	7.48	15.8	221	2.0	240	5	41.3	0.4	47.8	3.9	0.24	23.8	24	4.8	0.62	8	60%
23-Dec-15	7.54	7.54	15.6	129	11.0	202	4	31.1	0.4	35.5	2.1	0.19	19.9	20.1	3.11	0.52	8	64%
30-Dec-15	7.7	7.41	13.3	16	5.0	38	10	7.8	0.4	10.4	1.4	0.32	12.1	12.4	0.75	0.44	200	144%
<b>AVERAGE :</b>				<b>125</b>	<b>5.2</b>	<b>179</b>	<b>5.6</b>	<b>27.60</b>	<b>1.52</b>	<b>32.48</b>	<b>3.02</b>	<b>0.26</b>	<b>20.24</b>	<b>20.48</b>	<b>3.52</b>	<b>0.57</b>		

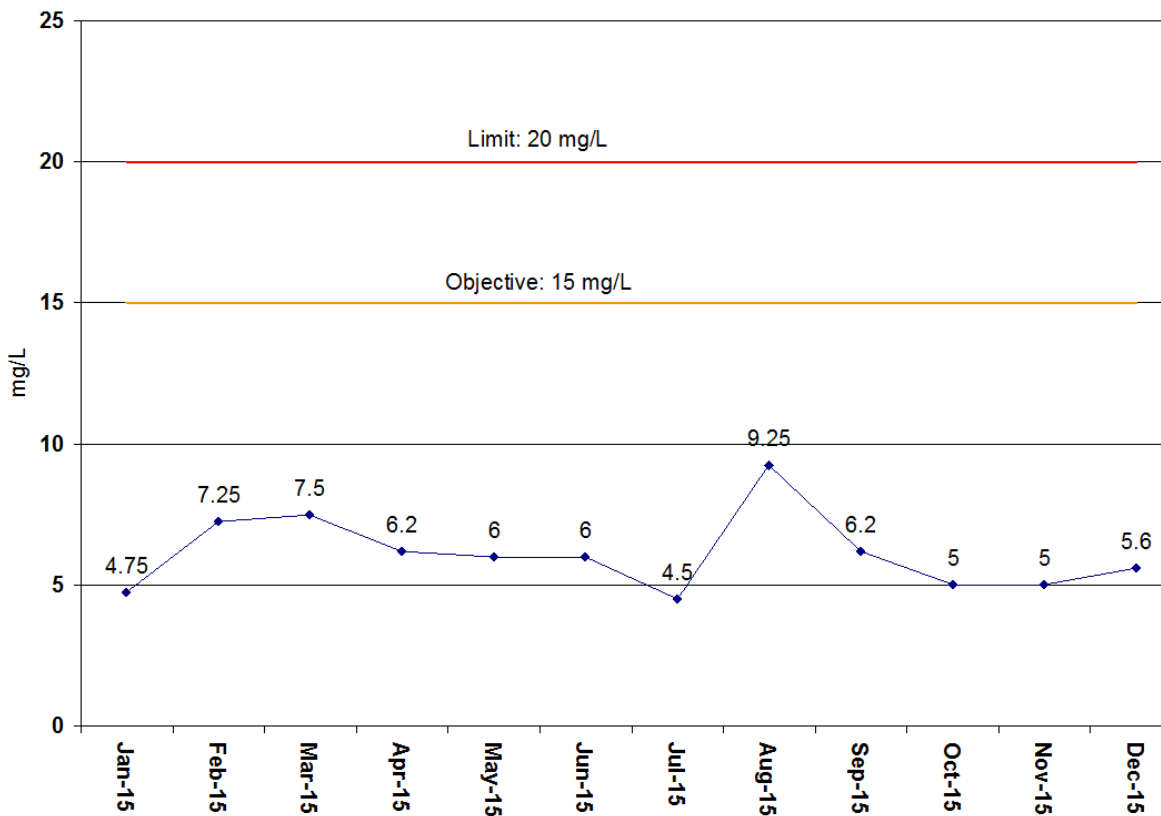
1.7 Table 4 – Monthly Average Influent/Effluent Concentrations and Loadings

Date	# of Days	Total Flow (m3)	# of Samples	CBOD		TSS		Eff. Amm		TKN		TP		E.coli		pH
				Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	Inf.	Eff.	
1	January 2015	31	437951	4	4	(mg/L): 155	5.5	(mg/L): 171	4.8	0.68	38.60	1.66	4.3	0.66	73	6
						(kg/day): 2193	78	2416	67	9.5			61	9.3		7.2
2	February 2015	28	307987	4	4	(mg/L): 174	4.3	(mg/L): 310	7.3	0.51	43.73	1.58	5.3	0.59	29	6
						(kg/day): 1911	47	3410	80	5.6			59	6.5		7.4
3	March 2015	31	655726	4	4	(mg/L): 116	5.3	(mg/L): 184	7.5	1.25	27.65	1.45	3.0	0.53	46	7
						(kg/day): 2454	111	3887	159	26.4			63	11.2		7.7
4	April 2015	30	641887	5	5	(mg/L): 113	4.2	(mg/L): 165	6.2	1.46	23.64	2.60	2.3	0.52	19	7.5
						(kg/day): 2413	90	3535	133	31.2			50	11.1		7.9
5	May 2015	31	432426	4	4	(mg/L): 159	4.0	(mg/L): 216	6.0	2.20	30.88	3.50	2.8	0.72	27	7.5
						(kg/day): 2218	56	3017	84	30.7			38	10.1		7.8
6	June 2015	30	518258	5	5	(mg/L): 104	5.0	(mg/L): 162	6.0	0.60	23.68	1.31	1.8	0.47	11	7.5
						(kg/day): 1800	86	2799	104	10.4			31	8.1		8
7	July 2015	31	407237	4	4	(mg/L): 96	4.3	(mg/L): 226	4.5	0.70	28.13	1.61	2.5	0.69	24	7.2
						(kg/day): 1261	56	2972	59	9.2			33	9.0		7.5
8	August 2015	31	356023	4	4	(mg/L): 139	8.3	(mg/L): 194	9.3	1.20	35.50	2.08	2.5	0.66	9	7.5
						(kg/day): 1593	95	2231	106	13.8			29	7.6		7.6
9	September 2015	30	294513	5	5	(mg/L): 128	3.4	(mg/L): 215	6.2	1.44	36.74	2.67	3.3	0.52	4	7.1
						(kg/day): 1255	33	2109	61	14.1			32	5.1		7.3
10	October 2015	31	348650	4	4	(mg/L): 157	2.5	(mg/L): 820	5.0	1.53	39.20	2.83	3.3	0.60	48	7
						(kg/day): 1766	28	9222	56	17.2			37	6.7		7.6
11	November 2015	30	378894	4	4	(mg/L): 204	2.0	(mg/L): 281	5.0	0.18	32.00	0.85	3.6	0.66	50	6.8
						(kg/day): 2576	25	3549	63	2.2			45	8.3		7.1
12	December 2015	31	461211	5	5	(mg/L): 125	5.2	(mg/L): 179	5.6	1.52	32.48	3.02	3.5	0.57	22	6.9
						(kg/day): 1860	77	2660	83	22.6			52	8.5		7.7
<b>Totals</b>				<b>365</b>	<b>5240763</b>	<b>52</b>	<b>52</b>	<b>260</b>	<b>6.1</b>	<b>1.10</b>	<b>32.68</b>	<b>2.10</b>	<b>3.2</b>	<b>0.60</b>	<b>44</b>	<b>8</b>
				<b>Avg.(kg/day):</b>		<b>139</b>	<b>4.5</b>	<b>3484</b>	<b>88</b>	<b>16</b>			<b>44</b>	<b>8</b>		
								<i>May to November Objective</i>						<i>January-15-16</i>		
								<i>December to April Objective</i>								

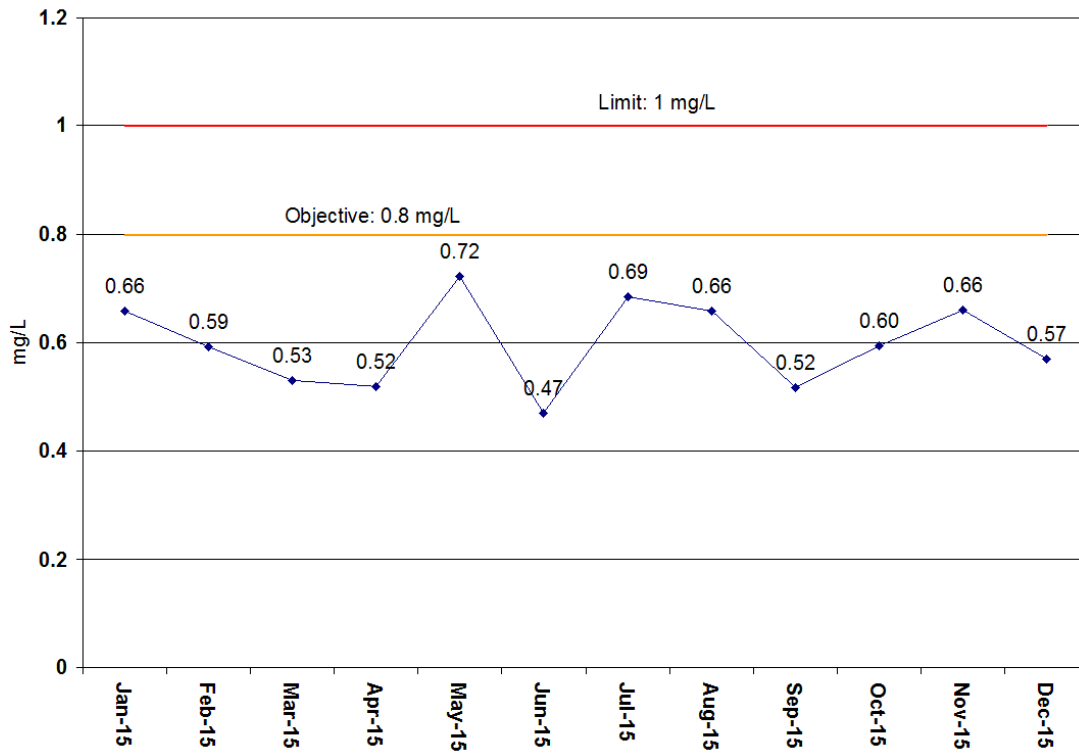
**1.8 Chart 4 – Monthly Average Effluent CBOD (mg/L)**



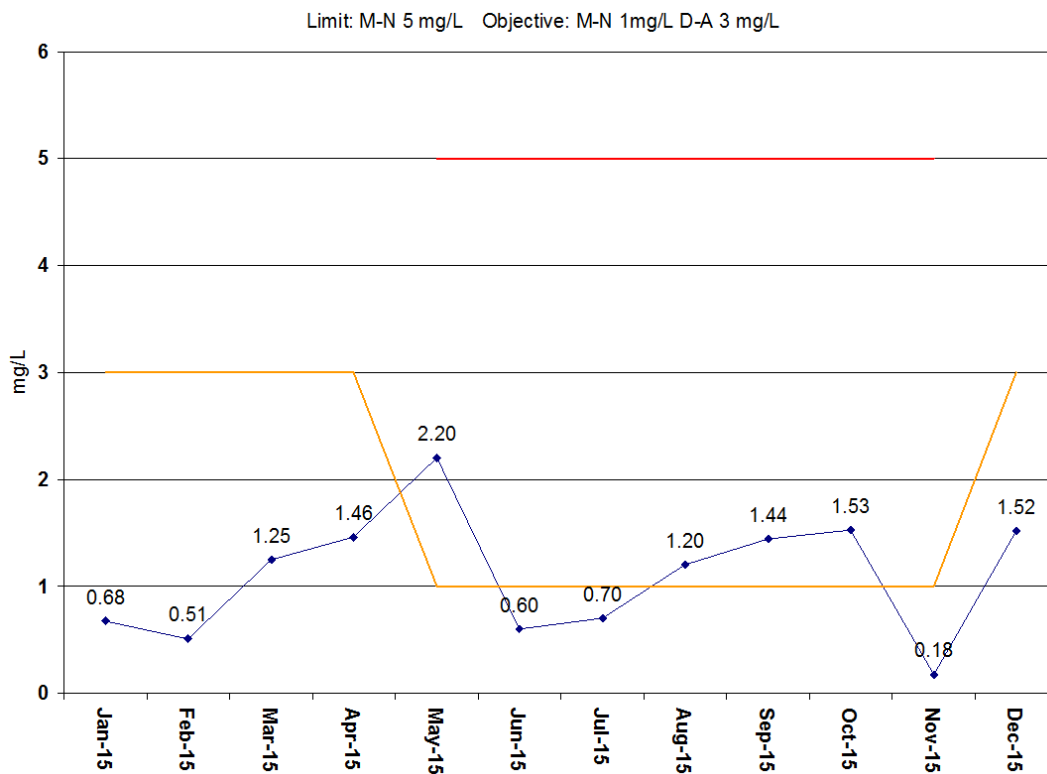
**1.9 Chart 5 – Monthly Average Effluent Total Suspended Solids (mg/L)**



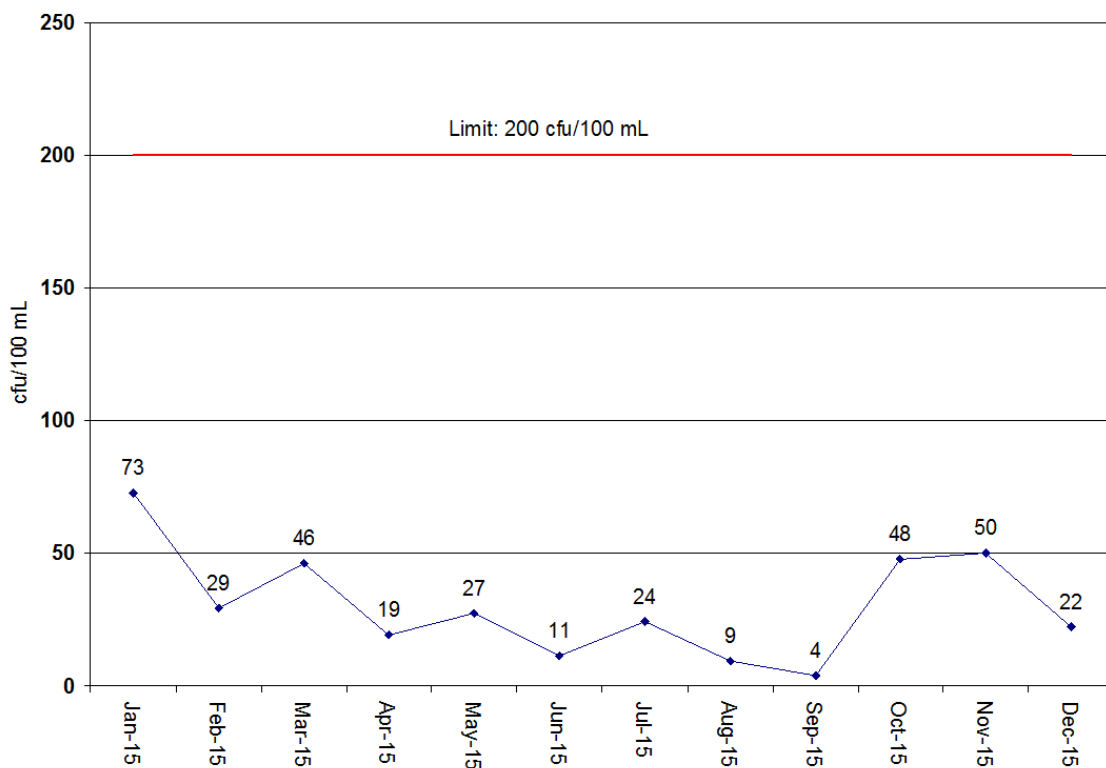
**1.10 Chart 6 – Total Phosphorus (mg/L) Monthly Average Effluent**



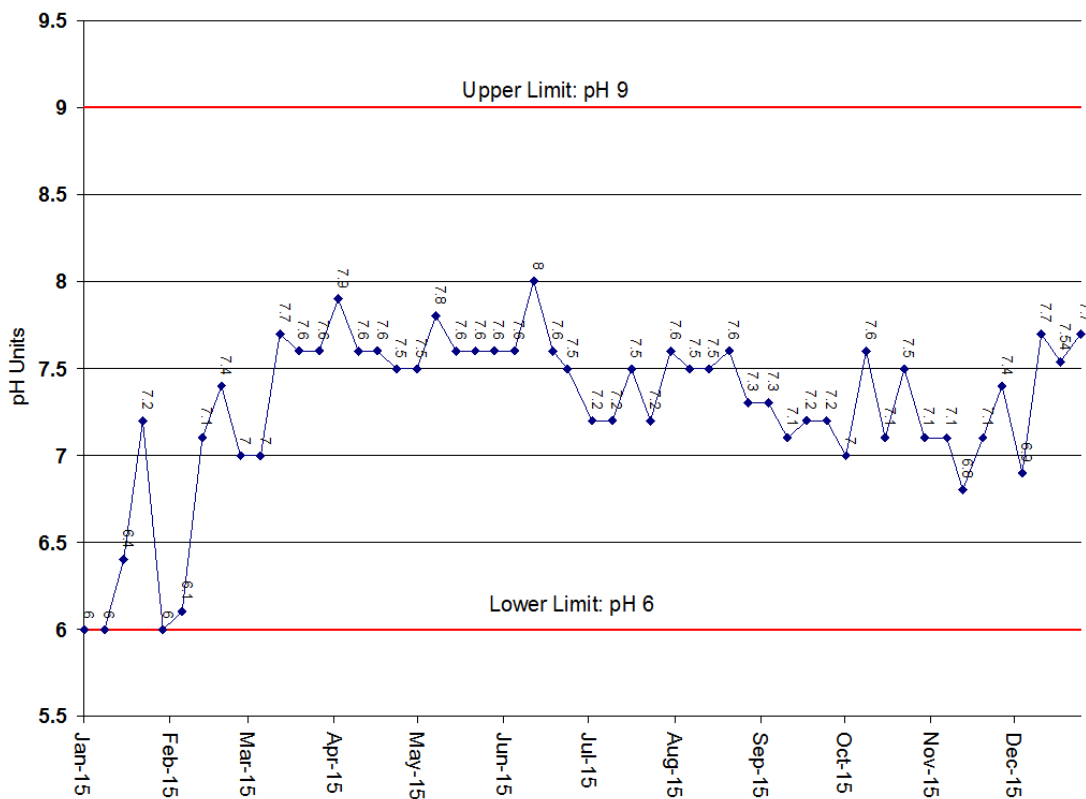
**1.11 Chart 7 – Ammonia + Ammonium (mg/L) Monthly Average Effluent**



1.12 Chart 8 – Monthly Geomean Effluent E.Coli. (cfu/100 mL)



1.13 Chart 9 – Weekly Effluent pH



## 2 Data Interpretation:

The following represents a comprehensive interpretation of all monitoring and certified analytical data obtained during the 2015 reporting period, comparing plant effluent quality and quantity to the criteria stipulated in the C of A in Conditions 1.1 through 1.8.

### Peak Flow:

The highest peak flow measured through the plant at any one time was 39,159 m<sup>3</sup>/day in June 2015. This represents 72% of the C of A limit peak flow rate of 54,600 m<sup>3</sup>/day.

### Average Daily Flow:

The average daily flow for the year measured through the plant in 2015 was 14,341 m<sup>3</sup>/day. This represents 52% of the C of A limit average daily flow of 27,300 m<sup>3</sup>/day for any period greater than one (1) calendar year.

A three year average daily flow for, 2013–18,001 m<sup>3</sup>/day, 2014–17,068 m<sup>3</sup>/day and 2015–14,341 m<sup>3</sup>/day is 16,470 m<sup>3</sup>/day or 60% of plant capacity.

### Overflow and Bypass:

There were no diversions of sewage from any portion of the sewage treatment plant under C of A 5276-5M9JW7 during 2015. Diversions of sewage of this nature are prohibited.

### Carbonaceous Biochemical Oxygen Demand (5 day):

The highest monthly average CBOD5 in effluent was 8.3 mg/L in August of 2015 with an annual average of 4.5 mg/L. Effluent CBOD5 loadings were highest in March of 2015 at 111 kg/d averaging 65 kg/d over 2015. As per the C of A, the monthly average limit of 15 mg/L with yearly average loading limits of 409.5 kg/d were not exceeded at any time in 2015.

### Total Suspended Solids:

The highest monthly average Total Suspended Solids in effluent was 9.3 mg/L in August of 2015 with an annual average of 6.1 mg/L. Effluent TSS Loadings were highest in March of 2015 at 159 kg/d, averaging 88 kg/d over 2015. As per the C of A, the monthly average limit of 20 mg/L with annual average loading limits of 546 kg/d were not exceeded at any time in 2015.

### Total Phosphorus:

The highest monthly average Total Phosphorus in effluent was 0.72 mg/L in May of 2015 with an annual average of 0.60 mg/L. Effluent Total Phosphorus Loadings were highest in March of 2015 at 11.2 kg/d averaging 8 kg/d over 2015. As per the C of A, the monthly average limit of 1 mg/L with yearly average loading limits of 27.3 kg/d were not exceeded at any time in 2015.

### (Ammonia + Ammonium) Nitrogen:

The highest monthly average (Ammonia + Ammonium) Nitrogen in effluent was 2.20 mg/L in May of 2015 with an annual average of 1.1 mg/L. Effluent (Ammonia + Ammonium) Nitrogen Loadings were highest in April at 31.2 kg/d averaging 16 kg/d over 2015. As per the C of A, the monthly average limit of 5 mg/L with annual average loading limits of 136.5 kg/d between May and November were not exceeded at any time in 2015.

**Effluent pH:**

The effluent pH ranged from 6.0 to 7.9 throughout 2015. As per the C of A, the range limit of 6.0 to 9.5 was maintained throughout 2015.

**Disinfection:**

The highest monthly geomean E.coli was 73 cfu/100 ml in January of 2015. As per the C of A, the monthly geomean limit of 200 cfu/100 ml was not exceeded at any time in 2015.

**3 Operational Summaries:**

The following tables, Table 5 through 8, represent a summary of effluent quality assurance/control measures, major maintenance conducted at the plant, measures taken to mitigate environmental and operational problems, future plant alterations and upgrades and monitoring equipment calibration/maintenance procedures:

**3.1 Table 5 – Summary of Effluent Quality Control and Environmental Operating Issues**

Date	Type	Description	Details or Response
01-May-15	Compliance	May 2015 Ammonia exceeded objective. The Limits were met.	Plant 2 was shutdown for inspection and maintenance resulting in reduced HRT.
30-Aug-15	Compliance	August 2015 Ammonia exceeded objective. The Limits were met.	Plant 4 Aeration under maintenance. Diffusers were acid washed and damaged ones replaced. Reduced HRT.
01-Sep-15	Compliance	September 2015 Ammonia exceeded objective. The Limits were met.	Plant 4 Aeration under maintenance. Diffusers were acid washed and damaged ones replaced. Reduced HRT.
01-Oct-15	Compliance	October 2015 Ammonia exceeded objective. The Limits were met.	Plant 2 Primary tank was taken out for a rebuild resulting in reduced HRT.

**3.2 Table 6 – Summary of Major Maintenance Items**

Date	Description
15-Jan-15	Hook up Laser sensor & change PLC program to shut sludge pumps & valves off if there is a high level in Digester #2
24-Apr-15	Install new Simplex Komline-Sanderson Sludge Pump in Basement of main Building \$34,416.00 for pump. Ampro, Drive \$2659.00. Yarmouth to install base & pump.
24-Apr-15	Added Logic to Main PLC and Switch to Plant SCADA HMI, (RAW SD Pumps Screen), to allow operators to Reverse to sequence of the Raw Sludge Valves for Plants 2 and 3, (Forward = Cv2, CV3, CV4, CV5 Reverse = CV5, CV4, CV3, CV2).
26-May-15	UV Bank 1B- Replaced 80 Bubs & Seals. 20 Sleeves Reset Bulb Hrs to 0. Bank Hrs 42599.(1073 cycles) Bulbs from First Light Technologies INC.
27-May-15	To add ABB Laser Level sensor to Digester #3
24-Jun-15	Repairing Digester #3 Roof.
24-Jun-15	Decommissioned plant #1. All tanks removed and ground restored with sand.
24-Jun-15	New Material Handler, Cat 257D Rubber Track
26-Jun-15	New Sew Eurodrive Gear Box Plant #2 Primary South
24-Jul-15	Install 7 sections of Aluminum Grating on walkway, South end of Primary #4
25-Aug-15	Aeration Plant 4 East Tank Acid clean Diffusers
28-Sep-15	Rebuild plant #2 south Primary- New chains, flights, bearings, sprockets, wear shoes, & slider pads, drive chain . Yarmouth did install.
13-Nov-15	Install sections of Aluminum Grating on walkway, South end of Primary #4. Yarmouth did Install
17-Nov-15	Replace Hyd Wiper hoses On Bank 1 B. \$716.80
19-Nov-15	Install new 10hp drive on WAS/WAS Pump. ACF600. \$3996.81
19-Nov-15	Replace ABB Drive for WAS/RAS #5 Pump (Old one died) \$3996.81. Labour to install \$452.00
17-Dec-15	Rebuild plant #2 North Primary- New chains, flights, bearings, sprockets, wear shoes, & slider pads, drive chain . Yarmouth did install.



**3.3 Table 7 – Summary of Future Upgrade Planning**

Date	Description
31-Mar-16	Automatic air activated Return and Wasting Valves in Gallery 2 to be replaced.
31-Mar-16	Replace raw sludge pump # 4 with new Komline Sanderson Pump.
30-Apr-16	Both boiler recirculating pumps to be replaced including soft starts.
31-May-16	Replace Centrate Pump and rebuild old pump for spare.
30-Jun-16	Install new flushing water pipe from main bulding to Blower building.
31-Jul-16	Boiler to be replated and tubed
31-Aug-16	Rebuild Plant 3 final tanks A & B
30-Nov-16	New Plant Emergency Generator to Be installed.

3.4 Table 8 - Summary of Monitoring Equipment Calibrations



**R & R INSTRUMENTATION SERVICES INC.**

Business (519)642 7197  
 Fax (519) 642-1311  
 Email: rthachuk@rinstrumentation.com

MAINTENANCE SERVICE REPORT

CUSTOMER City of St. Thomas DATE OF SERVICE Sept. 15,17,22,23/15  
 LOCATION St. Thomas PCP JOB # B13 8758

WORK DESCRIPTION Annual calibrations

<u>Sept 15/15</u> calibrated:	<u>Sept 22/15</u> calibrated:
<u>FIT - 211, FQ - 211, FIR - 211</u>	<u>FIT - P2 - Q4 FQ - P2 - Q4, FIR - P2 - Q4</u>
<u>FQ - 212, FQ - 212, FIR - 212</u>	<u>FIT - P3 - Q5 FQ - P3 - Q5, FIR - P3 - Q5</u>
<u>FQ 212A &amp; FQ 211A</u>	<u>FIT 3&amp;4 Return FQ 3&amp;4 Return (P4 Q9)</u>
<u>FIT Bypass FQ - Bypass, FIR - Bypass</u>	<u>FIT 3&amp;4 Waste FQ 3&amp;4 Waste (P4Q8)</u>
	<u>FIT - P4 - Q6 FQ - P4 - Q6, FIR - P4 - Q6</u>
<u>Sept 17/15</u> calibrated:	<u>FIT, FIR Q7</u>
<u>FIT, FQ, FIR Concentrate</u>	
<u>FIT FQ, FIR 170, Pump 3 Sludge</u>	
<u>FIT, FQ, FIR 169 Pump 4 Sludge</u>	
<u>FIT Q16 Raw Primary Sludge 2, FIR Q16 Raw Primary Sludge 2 <b>poor location</b></u>	

Sept 23/15 calibrated:

<u>FIT 2 QA2 FIR - 2 AQ2</u>
<u>FIT - 3 AQ3 FIR - 3 AQ3</u>
<u>FIT - 4 AQ4 FIR - 4 AQ4</u>
<u>FIT - 5 AQ5 FIR - 5 AQ5</u>

TRAVEL KM 86+83+84 MEALS \_\_\_\_\_ MOTEL \_\_\_\_\_  
 HOURS: S.T. 8+8+8+6.5  
 O.T. \_\_\_\_\_

REPLACEMENT PARTS USED/REPAIRS \_\_\_\_\_

AUTHORIZED BY (CUSTOMER REPRESENTATIVE)	PERFORMED BY _____
Name (IPrint) _____	NAME <u>R.Thachuk CET, CCST Level III</u>
SIGNATURE _____	SIGNATURE <u>R. Thachuk</u>

## 4 Sludge Management:

### 4.1 Sludge Production:

This activated sludge plant, transfers sludge to two anaerobic digesters and one holding tank. Each digester/tank is 40' diameter; 25' deep (including the 5' cone bottom) with a capacity of 712 cubic meters (156,580 imp gallons). Digested sludge is centrifuged to approximately 20% solids using a polymer. It is anticipated that quantity of sludge produced during 2015 will be equal to or less than the 2511 tonnes produced in 2015. Note: Digester 3 was inoperable throughout 2015. Repairs are underway.

### 4.2 Sludge Disposal:

Currently, anaerobically digested plant sludge is dewatered by centrifuge and transferred into a City owned and operated dump truck under Waste Management System C of A A050150. Once the dump truck is filled (approximately 12 tonnes), it drives to the Green Lane Landfill where the sludge is dumped. All sludge produced over 2015 will continue to be disposed of at this landfill. Green Lane Landfill is owned by the City of Toronto.

A new sludge treatment process is being reviewed to better align with the objectives of the province in the reduction of organics to landfill. This process would produce a certified fertilizer material which would be land applied in order to contribute to a sustainable nutrient cycle.

For dry sludge disposal contingency purposes, the plant could utilize its sludge drying bed, which has an approximate storage capacity of one year of dry sludge production. Alternatively, in the past, the City of St. Thomas has land applied dewatered sludge solids to local farmland. All liquid sludge is tested and maintained at land application quality for contingency purposes. The following table represents a summary of the monthly production of digested dewatered sludge processed in 2015:

### 4.3 Table 9 - Summary of Sludge Quantities

Month	Total Tonnes
January 2015	178
February 2015	177
March 2015	223
April 2015	199
May 2015	207
June 2015	203
July 2015	252
August 2015	214
September 2015	213
October 2015	223
November 2015	198
December 2015	225
<b>Total:</b>	<b>2511</b>

