



ASHBRIDGES BAY WASTEWATER TREATMENT PLANT

2016 Annual Report



March 31, 2017

EXECUTIVE SUMMARY

The Ashbridges Bay Treatment Plant (ABTP) is the largest of four wastewater treatment plants operated by the City of Toronto. Located in Toronto's east end, the plant has a nominal treatment capacity of 818,000 m³/day and serves an equivalent population of 1,524,000. Treated effluent is discharged to Lake Ontario. From January 1 to July 20, 2016, the facility was operated under the Environmental Compliance Approval (ECA) No.2539-9HRRPQ (last amended June 11, 2014). From July 21 to December 31, 2016, the facility was operated under the ECA No.8047-ABZNY9 (last amended July 21, 2016).

The average daily influent flow rate in 2016 was 549.8 ML/day. The 2016 average influent concentrations were 318.6 mg/L of Total Suspended Solids (TSS), 244.6 mg/L of Biological Oxygen Demand (BOD₅), and 7.5 mg/L of Total Phosphorus (TP).

Ashbridges Bay achieved the following secondary effluent quality in 2016:

	ECA ¹	2016 Secondary Effluent
Total Suspended Solids (TSS)	25.0 mg/L	6.4 mg/L
Carbonaceous Biological Oxygen Demand (CBOD ₅)	25.0 mg/L	4.3 mg/L
Total Phosphorus (TP)	1.0 mg/L	0.7 mg/L
Escheria Coli (E. Coli) ²	200 CFU/100 mL	36.8 CFU/100 mL
pH	6.0 – 9.5	6.8
TSS Loading Rate	20,450 kg/day	3,489 kg/day
CBOD ₅ Loading Rate	20,450 kg/day	2,381 kg/day
TP Loading Rate	818 kg/day	365 kg/day

¹Referenced from condition 7 of ECA No. 8047-ABZNY9 issued July 21, 2016.

²Arithmetic mean of Monthly Geometric Means

There were 4 secondary treatment bypass occurrences in 2016 where portions of the flow received preliminary and primary treatment before being disinfected and discharged into Lake Ontario. Total bypassed flows were estimated to be 398 ML.

During 2016, the biosolids generated at Ashbridges Bay were managed through agricultural land application, pelletization, mine reclamation, and soil amendment use. The total amount of biosolids generated at the plant in 2016 was 149,733 wet tonnes at an average of 28.1% total solids (TS). The biosolids generated met all the metal concentration requirements set out in O.Reg 267/03.

The plant continued with numerous capital projects. Notable projects included: design of a new ultraviolet (UV) disinfection facility; design of a new influent pumping station; design of a new waste activated sludge (WAS) thickening facility; design of a new phosphorous removal facility; design of a dewatering polymer system; the construction of P Building headworks upgrades; and the commissioning of Aeration Tank No. 2 upgrades.

Polymer consumption in 2016 was 141.0 tonnes for WAS thickening, and 549.0 tonnes for biosolids dewatering. Ferrous chloride consumption was 2,088 tonnes as Fe. Sodium Hypochlorite consumption and liquid chlorine for effluent disinfection totalled 1.36 ML and 302.6 tonnes, respectively. Total annual consumption for potable water, hydro, and natural gas in 2016 was 597,404 m³, 134.6M kWh, and 5.7M m³, respectively.

The plant operating costs for 2016 totalled \$59.0M. In 2016, the Ashbridges Bay Treatment Plant had 174 employees. As of March 31, 2017, there were 11 health and safety incidents and 27 lost time days due to work related injuries.

TABLE OF CONTENTS

EXECUTIVE SUMMARYi

TABLE OF CONTENTS ii

1. INTRODUCTION.....1

2. OPERATIONS2

2.1 Influent Quality 2

2.2 Preliminary Treatment..... 2

2.3 Primary Treatment..... 3

2.4 Secondary Treatment..... 3

2.5 Effluent Quality and Disinfection..... 4

2.6 Bypasses 5

2.7 Solids Handling 5

2.8 Biosolids Management 7

2.8.1 Land Application..... 7

2.8.2 Alkaline Stabilization..... 7

2.8.3 Pelletization..... 7

2.8.4 Landfill Management of Biosolids..... 7

2.8.5 Mine Reclamation 7

2.9 Complaints 8

2.10 Odour Reduction Plan 8

2.11 Effluent Quality Assurance or Control Measures..... 8

3. CAPITAL PROJECTS AND STUDIES9

4. MAINTENANCE.....10

4.1 Effluent Monitoring Calibration and Maintenance Records..... 10

4.2 Preliminary and Primary Treatment (Work Area 1)..... 10

4.3 Secondary Treatment (Work Area 2) 11

4.4 Dewatering (Work Area 3)..... 12

4.5 Solids Handling (Work Area 4)..... 13

4.6 Digestion and Air Flotation (Work Area 5)..... 15

4.7 Steam System HVAC, and Service Air (Work Area 6)..... 16

4.8 Consumables, Mechanical and Welding, Groundskeeping and Licensed Vehicles (Work Area 7)..... 17

4.9 Disinfection, Plant Water, Elevators (Work Area 8)..... 18

5. CHEMICALS AND UTILITIES19

5.1 Chemicals 19

5.1.1 Polymer for WAS Thickening..... 19

5.1.2 Polymer for Biosolids Dewatering 19

5.1.3 Ferrous Chloride for Nutrient Removal 19

5.1.4 Chlorine for Disinfection..... 19

5.1.5 Sodium Hypochlorite for Disinfection and Odour Control 19

5.2 Utilities 20

5.2.1 Water 20

5.2.2 Hydro 20

5.2.3 Natural Gas..... 20

6.	OPERATIONS AND MAINTENANCE COSTS	21
7.	HUMAN RESOURCES.....	22
7.1	Staffing	22
7.2	Occupational Health and Safety	22
7.3	Staff Training and Development	23
7.4	Utility Operator Certification	26
7.5	MOECC Correspondence	26

APPENDICES

APPENDIX A - Glossary of Abbreviations

APPENDIX B – Plant Schematic

APPENDIX C – Plant Performance Charts:

- Influent Flows 2015 - 2016
- Influent TSS and BOD₅ Concentrations
- Influent TP and TKN Concentrations
- Secondary Effluent TSS and CBOD₅ Concentrations
- Secondary Effluent TP and TKN Concentrations
- Secondary Effluent Ammonia and Nitrate/Nitrite Concentrations
- Secondary Effluent pH
- Secondary Effluent E.Coli Concentration
- Secondary Effluent Temperature
- Final Effluent TSS, BOD₅, and TP Concentrations
- Digester Gas Production

APPENDIX D – Influent and Effluent Metal Concentrations

APPENDIX E – Analytical Testing Summary

APPENDIX F – Influent and Bypass Flow Meter Calibration Records

APPENDIX G – Dewatered Biosolids Metal Concentrations

APPENDIX H – Odour Reduction Plan

LIST OF TABLES

Table 1: Influent Parameters 2
Table 2: Primary Treatment Effluent Parameters..... 3
Table 3: Secondary Treatment Process Parameters..... 4
Table 4: Annual Average Secondary Treatment Effluent Parameter Limits and Performance..... 4
Table 5: Monthly Average Total Phosphorous Effluent Parameter Limits and Performance..... 4
Table 6: Monthly Average E-Coli Effluent Parameter Objectives and Performance..... 4
Table 7: Annual Average Effluent Parameter Objectives and Performance 5
Table 8: Secondary Treatment System Bypass Summary..... 5
Table 9: Solids Handling Process Parameters 6
Table 10: Biosolid Management Methods 8
Table 11: Monthly Utility Consumption for 2014, 2015 and 2016..... 20
Table 12: Operations and Maintenance Cost Breakdown 21
Table 13: Plant Staffing..... 22
Table 14: Wastewater Treatment Certificates 26
Table 15: Correspondence submitted to the MOECC for ABTP 26

1. INTRODUCTION

The Ashbridges Bay Treatment Plant is one of four wastewater treatment plants operated by the City of Toronto under the responsibility of the Wastewater Treatment section of Toronto Water. Built in 1910, Ashbridges Bay is one of Canada's largest and oldest wastewater treatment plants. The facility is located at 9 Leslie Street in Toronto's east end and also includes two raw sewage pump stations located north of Lake Shore Boulevard at 1091 Eastern Avenue. The plant is on a site of approximately 40.5 hectares in the City of Toronto. The Ashbridges Bay plant services the area bounded by Steeles Avenue on the north, the Humber sewershed on the west, the Highland Creek sewershed on the east, and the lakeshore on the south. It is the largest secondary wastewater treatment plant in Canada, with a sewershed of approximately 25,000 ha, and a connected population of 1,524,000 people.

Construction of the plant was carried out in several phases and commenced in 1910 by the former City of Toronto. Construction of the present plant began in 1943 and has continued in various stages since that date. The plant is rated for 818 ML/day, provides complete wastewater treatment, including removal of suspended solids, dissolved organics, and phosphorus. The plant also provides effluent disinfection and disposal of biosolids, including the biosolids that are generated and transferred from the Humber and North Toronto Treatment Plants.

Major treatment processes include screening and grit removal, primary treatment, secondary treatment, phosphorus removal, effluent disinfection, waste activated sludge thickening, anaerobic digestion, biosolids dewatering and biosolids management. Treated effluent is discharged to Lake Ontario. Numerous auxiliary systems are required for proper operation of many plant processes including: potable water, process water, heating, ventilation and air conditioning, electrical power distribution, gas, chemicals, instrument air, etc.

The Ministry of the Environment and Climate Control (MOECC) has classified the Ashbridges Bay Treatment Plant as a Class IV wastewater treatment facility under Regulation 129/04. From January 1 to July 20, 2016, the facility was operated under the ECA No.2539-9HRRPQ (last amended June 11, 2014). From July 21 to December 31, 2016, the facility was operated under the ECA No.8047-ABZNY9 (last amended July 21, 2016).

This report is a summary of plant operations and performance in 2016. In addition to a discussion of effluent quality and the plant's success in meeting treatment objectives, the report contains summaries of 2016 plant operation, maintenance, chemicals and utilities, costs and human resources.

2. OPERATIONS

2.1 Influent Quality

The Ashbridges Bay Treatment Plant treats wastewater coming from the Mid-Toronto, High Level, Low Level, and Lakefront Interceptor Sewers, as well as the Queen Street and Coxwell Avenue Trunk Sewers. The High Level and Low Level Interceptor Sewers, and the Queen Street Trunk sewer flows are pumped to the plant via the Pumping Station known as "M Building". The Lakefront Interceptor Sewer flows are pumped to the plant via the M Building or the Pumping Station known as "T Building". The Mid-Toronto Interceptor flows are pumped to the plant via the T Building. The Coxwell Avenue Trunk Sewer flows come to the plant by gravity. Once wastewater enters the plant, it flows by gravity through the plant's processes.

A summary of annual flow and influent parameter concentrations for the past two years is shown in Table 1. The plant experienced a 6.1% decrease in influent flow from 2015 to 2016. A comparison of monthly influent flow rates and characteristics for 2016 is illustrated in Appendix C.

Influent to the Ashbridges Bay Treatment Plant also includes sludge flows received from the Humber Treatment Plant and the North Toronto Treatment Plant. Ashbridges Bay received an average of 67.4 dry tonnes/day of liquid biosolids, and 598 m³/day of waste activated sludge from the Humber Treatment Plant via the Mid-Toronto Interceptor. The North Toronto Treatment Plant transferred an average of 0.48 ML/day of co-settled sludge (raw sludge and WAS) to Ashbridges Bay Treatment Plant via the Coxwell Sanitary Trunk Sewer.

Table 1: Influent Parameters

Parameter	2016	2015
Influent Flow [ML/day]	549.8	585.2
Total Annual Flow [ML]	201,229	212,831
Influent TSS [mg/L]	318.6	334.6
Influent BOD ₅ [mg/L]	244.6	274.9
Influent TP [mg/L]	7.5	7.5

Influent concentrations for eleven (11) select metals have been included in Appendix D and presented against the sewer Bylaw limits for comparison purposes only.

2.2 Preliminary Treatment

Raw wastewater flows into two preliminary treatment facilities, P and D Buildings where grit and screenings are removed.

The P Building has six aerated clam shell bucket type grit channels, each having a hydraulic capacity of 141,000 m³/day. There are also six automatic bar screens, each having a hydraulic capacity of 272,500 m³/day. The grit and screenings from P Building are hauled to a sanitary landfill site. Throughout 2016, P Building was under renovation as the P Building Preliminary Treatment Upgrades Project was in construction.

The D Building preliminary treatment facility was commissioned in 2013. Wastewater passes through five mechanical screens, with each screen channel rated at a peak flow rate of 545,000 m³/day. The wastewater then flows into four aerated grit channels, each rated at a peak flow rate of 545,000 m³/day. The grit and screenings from D Building are further processed prior to hauling to the landfill.

The quantity of grit and screenings removed by the grit channels and screening systems averaged 5.7 tonnes per day in 2016.

2.3 Primary Treatment

The next step in the treatment process is called Primary Settling or Sedimentation where the flow enters large tanks and its velocity is reduced, allowing heavier solids in the wastewater to settle to the bottom. Sludge collectors in the tanks sweep the settled sludge (called Raw Sludge) into sludge hoppers located at the bottom of the tank at one end, from where it is pumped to the anaerobic digestion tanks. There are twelve Primary Clarifiers, six tanks (No. 1 to 6) with dimensions of 61 m x 19.5 m x 4.5 m and rated at a peak flow capacity of 100,000 m³/day, three tanks (No. 7 to 9) with dimensions of 76.2 m x 32.04m x 4.8 m and rated at a peak flow capacity of 292,333 m³/day, and three tanks (No. 10 to 12) with dimensions of 91.4 m x 35.05 m x 5.09 m and rated at a peak flow capacity of 418,000 m³/day, with a total installed peak flow capacity of 2,730,999 m³/day.

Table 2 contains a summary of key primary treatment effluent parameter concentrations for 2016 and 2015.

The plant has the capacity to co-settle waste activated sludge from the Final Clarifiers in the Primary Clarifiers.

Table 2: Primary Treatment Effluent Parameters

Parameter	2016	Primary Removal Efficiency	2015	Primary Removal Efficiency
Primary TSS [mg/L]	123.9	61%	223.3	33%
Primary CBOD ₅ [mg/L]	84.3	57% ¹	98.9	54.1% ^{1,2}

¹ECA No. 8047-ABZNY9 issued July 21, 2016 condition 9 requires BOD₅ monitoring for influent flows and CBOD₅ monitoring for effluent flows. Therefore removal efficiency calculation assumes *influent CBOD₅ = influent BOD₅ * 0.8*.

²Quantity was incorrectly reported in 2015 and has been corrected as shown.

2.4 Secondary Treatment

In the activated sludge process, effluent from the Primary Clarifiers is mixed with Return Activated Sludge from the Final Clarifiers and aerated. The activated sludge is made up of naturally occurring bacteria and other micro-organisms. The micro-organisms use oxygen and dissolved organics in the wastewater for their metabolic functions and in doing so purify the wastewater. There are eleven rectangular Aeration Tanks that employ a step feed aeration process with four passes per tank. Each tank has an average flow capacity of 91,000 m³/day and each pass has dimensions of 161.5 m x 6.17 m x 4.6 m. Ten out of the eleven tanks are equipped with coarse air bubble diffusers. Aeration Tank No. 2 was refurbished with fine bubble diffusers in 2015. Throughout 2016, Aeration Tank 2 was used as a pilot to plan for the remaining aeration tank upgrades. Testing of different flow splits, anoxic zones and dissolved oxygen levels were conducted.

The mixed liquor from the Aeration Tanks flows to large quiescent Final Clarifiers where Activated Sludge is allowed to settle. A controlled quantity of this sludge is "returned" to the Aeration Tanks to repeat the treatment process, and the excess is removed as WAS and directed to the Primary Clarifiers, or the Flotation process for thickening, and then pumped to the Digestion Tanks. There are eleven Final Clarifiers, each with dimensions of 124.4 m x 24 m x 5.3 m and rated at a peak flow capacity of 182,000 m³/day.

A summary of key aeration parameters for the last three years is shown in Table 3.

Table 3: Secondary Treatment Process Parameters

Parameter	2016	2015	2014
Aeration Loading [kg CBOD ₅ /m ³ ·day]	0.25	0.32	0.32
Mixed Liquor Suspended Solids [mg/L]	2643	2969	2696

2.5 Effluent Quality and Disinfection

Through operating and maintaining preliminary, primary and secondary treatment processes, final effluent is treated to meet Condition (6)(2)(c) of ECA. Chlorine is mainly used to disinfect the final effluent prior to discharging into Lake Ontario; however, on occasion, Sodium hypochlorite is used to disinfect the final effluent. The plant outfall is equipped with diffusers and extends 1000 m into the lake from the shore. In addition to the plant outfall, 2,004 ML of final effluent was discharged through seawall gates.

In 2016, the Ashbridges Bay Treatment Plant encountered no abnormal operating problems, and continued to produce a high quality effluent which surpassed requirements of the effluent objectives as described in condition 6 of the plant's ECA. This was achieved through continuous improvement in operations and maintenance of the treatment process, and infrastructure delivery. The plant also met Federal Government effluent monitoring requirements for un-ionized ammonia and acute toxicity.

A summary of key effluent parameters, limits and objectives is shown in Table 4, Table 5, Table 6, and Table 7. Details of the plant effluent characteristics are presented in graphical form in Appendix C.

Table 4: Annual Average Secondary Treatment Effluent Parameter Limits and Performance

Parameter	ECA Limit ¹	2016	Removal Efficiency	2015	Removal Efficiency
TSS [mg/L]	25	6.4	98%	10.1	97%
CBOD ₅ [mg/L]	25	4.3	98% ²	5.0	98% ²
pH	6.0 - 9.5	6.8	-	7.0	-
TSS Loading Rate [kg/day]	20,450	3,489	-	5,906	-
CBOD ₅ Loading Rate [kg/day]	20,450	2,381	-	2,884	-

¹Referenced from condition 7 of ECA No. 8047-ABZNY9 issued July 21, 2016.

²ECA No. 8047-ABZNY9 issued July 21, 2016 condition 9 requires BOD₅ monitoring for influent flows and CBOD₅ monitoring for effluent flows. Therefore removal efficiency calculation assumes $influent\ CBOD_5 = influent\ BOD_5 * 0.8$.

Table 5: Monthly Average Total Phosphorous Effluent Parameter Limits and Performance

Parameter	ECA ¹	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
TP [mg/L]	1.0	0.8	0.8	0.4	0.7	0.6	0.9	0.8	0.6	0.5	0.6	0.6	0.7
TP Loading Rate [kg/day]	818	413	414	258	411	335	467	438	338	251	301	351	388

¹Referenced from condition 7 of ECA No. 8047-ABZNY9 issued July 21, 2016.

Table 6: Monthly Average E-Coli Effluent Parameter Objectives and Performance

Parameter	ECA ¹	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
E-Coli ² [CFU/100mL]	200	175.1	38.7	5.4	29.2	8.7	9.0	8.0	3.0	12.0	42.0	85.0	25.0

¹Referenced from condition 6 of ECA No. 8047-ABZNY9 issued July 21, 2016.

²Monthly Geometric Mean

Table 7: Annual Average Effluent Parameter Objectives and Performance

Parameter	Secondary Effluent		Final Effluent ²	
	Objective ¹	2016	Objective ¹	2016
TSS [mg/L]	15	6.4	25	6.5
CBOD ₅ [mg/L]	15	4.3	25	4.4
TP	0.9	0.7	1.0	0.7
pH ³	6.5 – 8.5	6.8	-	-

¹ Referenced from condition 6 of ECA No. 8047-ABZNY9 issued July 21, 2016.

² Final Effluent concentrations are calculated as weighted averages of the flows and concentrations of the Secondary Treatment Effluent and the Secondary Treatment System Bypass.

³ Due to infrastructure limitations, pH reported is for Secondary Treatment Effluent. Secondary Treatment System Bypass pH information is available upon request.

Final effluent concentrations for eleven (11) select metals have been included in Appendix D.

2.6 Bypasses

There were 4 secondary treatment bypasses in 2016 where portions of the flow received preliminary and primary treatment before being disinfected and discharged into Lake Ontario. Each instance was reported to the MOECC Spills Action Center and recorded in the plant’s Monthly Report. Secondary bypass occurs due to high wet weather flows that exceed the plant’s secondary treatment capacity. There were 13 secondary treatment bypasses in 2015.

A summary of secondary bypasses occurring in 2016 is presented in Table 8. Secondary bypass resulted in a total annual bypass volume of 398 ML. Total precipitation in the Toronto area¹ was 577 mm in 2016, a 14.6% decrease from 2015.

Condition (6)(2)(3) of ECA sets an objective for Secondary Treatment System Bypass to be continuously disinfected during a Bypass event with an average chlorine dose of 9 mg/L. Chlorine dose for the September and November bypass events was marginally less than the objective due to infrastructure limitations.

Table 8: Secondary Treatment System Bypass Summary

No.	Date	Duration (hrs)	Volume (m ³)	Average Chlorine Dose (mg/L)
1	January 10	4.10	160,549	9
2	September 8	3.18	105,118	8
3	November 3	2.28	69,121	8
4	December 26 – December 27	3.08	62,510	10

2.7 Solids Handling

The plant has 10 Dissolved Air Flotation (DAF) tanks to thicken WAS from the Final Clarifiers with the use of air and a thickening polymer. Each WAS tank has a surface area of 74.3 m². WAS was also occasionally pumped to the Primary Clarifier for co-settling. At the DAF facility, incoming WAS first enters an inlet splitter box, dividing the inlet flow between the DAF tanks in operations. This splitter box also contains an overflow pipe which allows the excess WAS flow to return to the aeration tanks.

In 2016, an average of 7,360 m³/day of WAS was thickened, whereas 2,130 m³/day of WAS was either co-settled to the Primary Clarifier or returned to the aeration tanks. The average WAS total solids

¹ Adapted from http://climate.weather.gc.ca/historical_data/search_historic_data_e.html, Toronto City Station

concentration was 0.7%. An average of 1,600 m³/day of thickened waste activated sludge (TWAS) was pumped to the anaerobic digesters for treatment. Average TS concentration of TWAS was 3.4% and its total volatile solids (TVS) content was 71.6% of TS.

The plant has 20 Anaerobic Digestion tanks of raw and thickened waste activated sludge. Anaerobic digestion is the biological degradation of organic materials (stabilization) in the absence of oxygen, which produces digester gas, made up predominantly of methane, as a by-product. This gas is used as a supplementary fuel for plant needs, reducing the plant’s operating costs. The digesters are operated in the mesophilic temperature range (34 - 38°C). The target operating temperature for the digesters is 36°C. There are twelve Primary Digesters of 30.5 m diameter, and eight Primary Digesters of 33.5 m diameter.

In 2015, Digester No. 14 was taken out of service for refurbishment (project ongoing). From January 1 to September 6, 2016, 19 Anaerobic Digesters were in operation. On September 7, 2016, Digesters No. 9 to 12 were taken out of service for complete refurbishment (project ongoing). An average of 6,420 m³/day of raw sludge from primary treatment was pumped to the anaerobic digesters. Average TS concentration of raw sludge was 2.6% and TVS content was 73.8% of TS.

The average hydraulic retention time of sludge in the Anaerobic Digesters was 18.1 days. Organic loading of the digesters averaged approximately 1.1 kg TVS per m³ of digester capacity per day.

The anaerobic digestion process reduces sludge volume and stabilizes the solids to form biosolids. A summary of the digestion process for the previous three years can be seen in Table 9. The volume transferred to the digesters averaged 8,020 m³/day in 2016.

Table 9: Solids Handling Process Parameters

Parameter	2016	2015	2014
Primary Sludge Treated [m ³ /day]	6,420	4,440	4,292
Primary Sludge TS [%]	2.6	3.0	3.1
WAS to Primary Treatment and Excess WAS to Aeration [m ³ /day]	2,130	1,240	2,409
WAS to Thickening [m ³ /day]	7,360	8,470	8,163
WAS TS [%]	0.7	0.8	0.8
TWAS Treated [m ³ /day]	1,600	2,090	2,366
TWAS TS [%]	3.4	3.3	3.4
Volume to Digestion [m ³ /day]	8,020	6,530	6,658
Liquid Biosolids TS [%]	1.7	1.8	1.8
Dewatered Sludge Cake [%]	28.1	27.7	26.5

Anaerobically digested biosolids are conditioned with a polymer and dewatered using 12 high speed centrifuges, with a total capacity of about 180 L/s. The resulting biosolids “cake” is pumped either to the plant’s truck-loading facility for haulage and disposal, or to the onsite pelletizer facility. The total centrifuge run-time in 2016 was 52,329 unit-hours.

In 2016, the average solids concentration of dewatered biosolids cake was 28.1%, and centrate quality averaged 319 mg/L of suspended solids. The overall average solids capture rate was 98%.

Concentrations of eleven metals in digested sludge are compared to metal concentrations regulated by *Ontario Regulation 267/03, The Nutrient Management Act*, which governs the maximum metal

concentration in biosolids that are applied to land. The analyses may be found in Appendix G. These results indicate that the biosolids met MOECC regulations for all metals and E. Coli.

The average digester gas volume generated in 2016 was estimated to be 62,330 m³/day. This was a decrease of 3.4% from the 2015 volume.

In 2016, the daily average inflow to the Ashbridges Bay Treatment Plant was 549.8 ML/day. The flow projections for 2016 do not exceed the rated plant capacity of 818 ML/day and are expected to generate a sludge volume that will be +/-5% of the given volume for 2016.

2.8 Biosolids Management

Biosolids generated at the plant are managed in a number of ways, including agricultural land application, alkaline stabilization, landfilling, pelletization, and mine reclamation. Biosolids management from the Ashbridges Bay Treatment Plant in 2016 totalled 149,733 wet tonnes and was managed as follows.

2.8.1 Land Application

A total of 35,414 wet tonnes of biosolids were sent to approved agricultural land application sites in Ontario. During the 2016 land application season, the City contracted an independent field inspector to monitor the practices of the City's land applicators. The independent field inspector observed the application of biosolids on 72 agricultural land sites in Ontario. The inspector was responsible for ensuring the Nutrient Management Act and accompanying Regulations were adhered to, site specific requirements were followed, and monitoring and recording of odour measurements were taken before, during and after application.

2.8.2 Alkaline Stabilization

In 2016, a total of 37,968 wet tonnes of biosolids was further processed off-site by licensed external biosolids service providers and used as a soil amendment.

2.8.3 Pelletization

The operation and maintenance of the facility and marketing of pellets is managed by an outside contractor. In 2016, 72,886 wet tonnes of biosolids were processed by the on-site pelletizer. Pellet quality in 2016 met the standards set out by the Canadian Fertilizers Act.

2.8.4 Landfill Management of Biosolids

A total of 0 wet tonnes was transported to landfill sites.

2.8.5 Mine Reclamation

A total of 3,465 wet tonnes of biosolids was utilized at mine reclamation sites.

Table 10 below summarizes the biosolids management methods utilized and the total amount of biosolids sent to each management option.

Table 10: Biosolid Management Methods

Biosolids Management Method	Wet Tonnes		
	2016	2015	2014
Agricultural Land Application	35,414	33,115	30,663
Alkaline Stabilization (Soil Amendment)	37,968	37,515	48,656
Pelletization	72,886	71,911	61,336
Landfill	0	0	1,096
Mine Reclamation	3,465	2,780	1,438
TOTAL	149,733	145,321	143,190

2.9 Complaints

The Ashbridges Bay Treatment Plant personnel logged 3 complaints related to odour and 1 complaint related to noise in 2016. All reported complaints were investigated by City of Toronto staff and determined not to be plant operation related.

2.10 Odour Reduction Plan

As per Section 22 of the ABTP Amended ECA – AIR Number 3771-92NP7X issued January 15, 2015, a review of the Odour Reduction Plan summarizing the work progress in 2016, including odour and total sulphur reduction activities undertaken with associated reduction levels achieved can be found in Appendix H.

2.11 Effluent Quality Assurance or Control Measures

Analytical tests to monitor required parameters are performed by the Toronto Water Laboratory which is accredited to ISO/IEC 17025 by Canadian Association for Laboratory Accreditation Inc.

3. CAPITAL PROJECTS AND STUDIES

As part of the Toronto Water Capital Program, the Ashbridges Bay Treatment Plant commenced or continued with the following capital works projects and studies in 2016:

- Service air compressor and electrical replacements.
- Aeration air header recoating.
- Aeration Tank No. 2 fine bubble conversion.
- Boiler No. 4 replacement.
- New Coxwell Bypass.
- Facility unloading station.
- D Building Peer Review study.
- Digesters No. 9-12 and related upgrades.
- Digesters No. 13, 14 and 16 clean-out program.
- UV disinfection project.
- Final Tank chain and flight replacement for 3 tanks.
- Heating and Air Systems Study.
- New Integrated Pumping Station.
- M and T Building upgrades.
- Hot water loop upgrades.
- New Outfall.
- P Building preliminary treatment upgrades.
- Pelletizer condition assessment study.
- Phosphorous Removal Upgrades.
- Plant Services upgrades.
- Polymer Upgrades.
- Process Roadmap Study.
- RPU upgrades.
- MCC replacements, pigeon alley, silo building, Z-Building and West Control Building.
- New VFD building.
- North substation transformer and related equipment upgrades.
- New WAS thickening facility.
- Truck Loading Facility upgrades.
- New Waste Gas Burners.
- Z-Building hot water conversion.
- Phosphorous removal SCADA improvements.
- Biosolids pumping improvements.

4. MAINTENANCE

The Ashbridges Bay Treatment Plant maintenance activities in 2016 were distributed between eight Work Areas. Staff from these groups performed a variety of scheduled, preventative, predictive and breakdown maintenance on a diverse spectrum of equipment. The main goal of maintenance activities is to ensure equipment availability to meet plant process operation requirements.

The following is a summary of significant maintenance accomplishments over the past year. These activities are considered to be maintenance activities, as required by conditions 10(6) (c) of the ECA No. 8047-ABZNY9 issued July 21, 2016. Under condition 10(6) (j) of the ECA, relating to Limited Operability Flexibility, no Notices of Modifications to Sewage Works were submitted to the Water Supervisor, the MOECC, as no work performed in 2016 fell under Schedule B of the ECA.

4.1 Effluent Monitoring Calibration and Maintenance Records

Flow is metered in the North and South Final Effluent channels, and the East and West Bypass channels. The annual calibration and maintenance records of flow meters, automatic samplers and on-line analysers for regulated parameters was completed in 2016, and found to be within acceptable limits. Calibration data sheets for flow meters are attached in Appendix F.

4.2 Preliminary and Primary Treatment (Work Area 1)

Work Area 1 includes two raw sewage pumping stations (M and T Buildings), preliminary treatment areas (D and P Buildings), and three primary treatment areas (Tanks No. 1 to 6, Tanks No. 7 to 9, and Tanks No. 10 to 12). The following maintenance was completed in 2016:

a) M Building:

- Overhauled North and South Boskers
- MGV No. 03, 04, 05, 08 and MSG No. 05: actuators, electrical controls and electrical disconnects replaced
- Sump Pumps No. 01 and 02: floats and related discharge piping replaced; associated electrical controls, electrical disconnects and control panel also replaced.
- City Water 6" line added from M Building to T Building. Heat tracer line included with this installation
- Repaired hydraulic unit for RST No. 3
- Repaired leak on discharge line from Low Level Basement pumps to Conduit No. 1
- Replaced scrubber media
- All locks replaced with City owned MEDECO keys
- Refurbished 112.5 HP motor on Pump No.8 in M Building
- New grating for back flow preventer

b) T Building:

- RSP No. 01, 02, 03, 04, 05: discharge gate actuators replaced; associated electrical controls and electrical disconnects also replaced.
- RSP No. 01, 02, 03, 04, 05: lubrication system replaced; oil lines, cooling water lines, oil reservoirs, electrical controls and electrical panels replaced.
- TSG No. 07 gate major overhaul

- TSG No. 04, 05, 06, 07: actuator replacement; associated electrical controls and electrical panels also replaced.
 - Sump pumps repaired
 - All locks replaced with City owned MEDECO keys
 - Refurbished Pump EM drive
 - Building feed cable repaired
- c) Monument Building:
- Replaced scrubber media
- d) P, D, and OPS Buildings:
- Complete overhaul of five perforated screen machines in D Building
 - Rebuilt and installed two sludge pumps in D Building
 - Rewired and reinstalled one electric motor on circulation pump biofilter No. 1
 - Installed portable lights on north side of D Building
 - Installed new lighting system in the welding shop and storage area of D Building
 - Replaced two gearboxes on D building scum collectors
 - Replaced one compactor screw conveyor on level No. 87 in D Building
 - Overhauled bridge No. 9
 - Replaced four damaged chutes in loading truck bay D Building
 - Overhauled the Muffin Monster Grinder in screen room in D Building
 - Installed new process airline in D Building grit pumps room
 - Replaced grit pump discharge 6" plastic lines with stainless steel pipes in D building
 - Overhauled No. 8 NPS tank scum collector
 - Replaced two scum pumps with Vogelsang pumps in OPS house No. 2 and tank No. 12.
 - Overhauled three screen machines in P Building
 - Major overhaul to No. 3 OPS tank
 - Realigned tracks and placed wheel bearings and shaft on bridge No. 11
 - Realigned/repairs structural damage on bridge No. 10 after derailment from tracks
 - Repaired Rugby Park water line
 - Upgraded MSA Suprema Gas Panel

4.3 Secondary Treatment (Work Area 2)

Work Area 2 includes eleven Aeration Tanks and eleven Final Clarifiers. The following maintenance was completed in 2016:

- a) General:
- Start-up and commissioning of Aeration Tank No. 2
 - Scum skimmer and beach plate replaced – Final Clarifier No. 6
 - Mixed Liquor Channel diffuser replacement and upgrade – Final Clarifier No. 6
 - Heat exchanger and piping replacement – Blower BL-4004
 - Fabrication and installation of Effluent Weir Plate – Aeration Tank No. 2
 - Emergency piping repairs to 20" RAS header
 - Installation of flushing line to Secondary Scum Hoppers

- Oil piping modification – Blower BL-4010
- Bearing replacement and alignment – RAS Pump P-3222
- Repair and reinstallation of 1250 HP blower motor – BL-4003
- Control card replacement – BL-4010
- Complete overhaul, impeller and bearing replacement – Scum Pump P-2401
- Motor replacement – Scum Pump P-2301
- Asbestos abatement – Aeration Gallery piping
- Current Transformer (CT) replacement – BL-4005
- VFD power board replacement – FN-1230
- Repair and reinstallation of Final Effluent Flow Meters
- Replacement and repair of drain pipes in the basement below stores

4.4 Dewatering (Work Area 3)

Work Area 3 includes the Centrifuges for dewatering operations. The following maintenance was completed in 2016:

a) General:

- Centrifuge No. 1 major overhaul; gear box and VFD replaced
- Centrifuge No. 8 major overhaul and gear box replaced
- Centrifuge No. 11 major overhaul; gear box and vibration isolators replaced
- Sludge Feed Pump No. 8 VFD replaced
- Polymer Transfer Pump No. 3 VFD replaced
- Polymer Transfer Pump No. 4 VFD replaced
 - Two polymer mixer drives replaced
 - New 6" No. 3 Polymer line installed
- Centrifuge No. 1 to 8 delay start installed
- Rewired centrifuge diverter flushing valve control
- Refurbished 600V Penthouse Breakers
- Installation of density meter for digested sludge
- Repaired 2 HP Elliot Motor Rewind
- Repaired 5 HP Nord Motor
- Repaired 40 HP Siemens Motor Rewind
- Modified Hoisting Systems in Dewatering Building
- Supply and install structural steel for hoisting system for the conveyors above Schwing Pumps
Repaired 300 HP Reliance AC Motor for Centrifuge No. 11
- Repaired 75 HP Westinghouse AC Motor
- Dewatering Building, 2nd floor main conveyor- Bearing and Shaft Assemblies modified
- Repaired ABB Sludge Feed Pump #5 VFD
- Dewatering Building HVAC system repairs
- Supply and install of removable guardrail for the 4th floor openings
- Access platform extended for overhead crane in Dewatering Building
- Installed effluent water Filters, flowmeters, and piping for Dewatering Polymer System
- Upgrades to Dewatering Building control room - Phase 2

b) Centrate

- Replaced 6 valves on Centrate Pumps
- Replaced three 12" valves and three 8" inch valves
- Replaced one Centrate Pump
- Overhauled Centrate Pump No. 3 and 4
- Installed electronic cycling of all Centrate Pumps
- Vacuumed Centrate Tank
- Cleaned all Centrifuge main drive motor with CO₂.

c) Sludge Feed:

- Replaced 4 sludge holding tank valves
- Installed two air valves on sludge line main header
- Installed polymer density control
- Replaced 2 flame arrestors on Sludge Holding Tank
- Replaced 6 streams of activated carbon on Sludge Holding Tank
- Replaced three 6" flushing water valves on sludge feed system
- New Sludge Feed Pump on Centrifuge No. 12
- New Sludge Feed Pump on Centrifuge No. 6
- Overhauled Polymer Pumps No. 1, 2, and 6
- Replaced differential meter for odour control on Equalization Tank
- Polymer Pump No. 3 changed from progressive to lobe type.
- Vacuumed both Equalization and Sludge Feed Tank twice

d) Schwing:

- Replaced Schwing Pump No. 2 power pack
- Overhauled Schwing Silo No. 1 and 3 sliding frame
- Replaced Poppet valve on pump No. 2 and 3
- Replaced Poppet housing on pump No. 1, 2 and 3

4.5 Solids Handling (Work Area 4)

Work Area 4 includes the Biosolids Storage Silos, Sludge Cake Transfer Pumps, Truck Load Facility, Biofilters, Odour Control Building, Instrument Air Compressors (Auxiliary Building), Lab Building Maintenance, Training Center Building Maintenance, Operational responsibilities include Disinfection of Final Effluent. The following maintenance was completed in 2016:

a) Schwing Pumps – KSP-80 - Biosolids Transfer Pumps

- Complete overhaul of Extraction Screw Gearbox
- Complete overhaul of Screw Feeder Gearbox
- Complete overhaul of Hydraulic Differential Cylinders
- Replacement of Differential Hydraulic Cylinders on all 3 pumps – 6 Cylinders in total
- Material Ram replacement on each pump every 1000 running hours
- SCADA Program Upgrades and supporting PCS group – Silo and Truck Load Facility
- Silo Building, Exhaust Fan House – installed grated flooring to provide Fan unit access
- Silo Building, LED emergency lighting installed on rooftop buildings – Elevator mechanical room, Exhaust fan room and Make up air units room

b) Truck Load Facility

- Replaced liners on 4 shaft-less screw conveyors
- Overhauled two sets of 24" Hopper Knife Gate valves
- Replaced two sets of 24" Hopper Knife gate valves
- Repaired Weigh Scale Platform corroded plates
- West Loading Bay door – Control Panel replaced due to corrosion
- Replacement of 3rd floor ceiling mounted light fixtures

c) Chlorine Building

- Overhauled Evaporators #3 and #4 as per TSSA compliance - Static Pressure Test
- Replaced Liquid Chlorine Emergency shut off valves – North and South
- Replaced Liquid Chlorine Flex Lines – North and South
- Replaced anodes – pressure vessel protection in 4 Evaporators
- Replaced 2 sump pumps in Chlorine Building Basement
- Replaced heated water circulating pump on Evaporator #7

d) SCBA Management

- Removed all low pressure units/cylinders from service
- Created inventory list containing locations and entity numbers
- Created inventory list for breathing air cylinders – tracking cylinder testing and replacements
- Training Material developed for WA4 PTs for use of SCBA

e) Lab Building

- Modified Final Effluent Sample Pump piping to accommodate ESA regulation
- Removed partition walls in Lab Building Basement to accommodate Aquatox sampling
- Installed Ventilation unit in Lab Building Basement to improve air exchange rate
- Repaired plumbing in Lab Building Basement to accommodate Aquatox sampling
- Repaired Lighting in Lab Building Basement

f) Others

- Ash Pipe Removed. Create space in tunnel pipe gallery to accommodate upcoming NaOCl pipe installations for bypass dosing.

Notes:

Service Air Compressors – WA-4 maintenance role has been reduced due to ongoing capital construction project by Sutherland and Schultz. WA 4 role as capital support resource has increased.

Biofilter - WA-4 maintenance role is reduced due to ongoing capital construction project by Torbear. WA 4 support as capital resource has increased.

4.6 Digestion and Air Flotation (Work Area 5)

Work Area 5 includes twenty Anaerobic Digesters and ten DAF tanks. The following maintenance was completed in 2016:

a) Dissolved Air Flotation:

- Tank No. 3 overhaul completed including chain jig fabrication and installation of new skimmer, drive, and idler shafts.
- Tank No. 6: Major repairs to worn skimmers and chain, new skimmers drive shaft with BRG.
- Tank No. 1 and 7: recycle pump overhaul/rebuild/installation.
- Polymer transfer pump No. 3: Modify pump suction, inter connection to Tank No. 1 and 2.
- Polymer powder feeder No. 2 and 3: fabricate and install new auger and screw shafts.
- Tank No. 8: manufacturing of replacement components for rebuilding tank in 2017.
- TWAS Pump No. 1 and 5: rebuild/installation and modify coupling drive assembly.
- TWAS Pump No. 2 and 6: rebuild/installation and modify coupling drive assembly.
- TWAS Pump No. 2 and 7: gearbox rebuild/installation and redesign mechanical seal assembly.

b) Digestion:

- Digester No. 13 and 15: Recirculating pump rebuild/installation and modify mechanical seal.
- Digester No. 2: Recirculating pump rebuild/installation and modify mechanical seal.
- Digester No. 13: Manometer retrofit and upgrade seals and O rings.
- Digester No. 15: Manometer retrofit and U tube replace purging procedure. Shutdown and complete isolation required.
- Digesters No. 13 to 16: Replaced ten plug valves on RAW-1, 2, and 3 and TWAS pipes with 8" knife gate valves.
- Digester No. 13: Recirculating pump retro fit (gauge and valves).
- Digester No. 4: Mixing pump complete overhaul and modify mechanical seal.
- Digester No. 6 and 8: Mixing pumps overhaul/rebuild /installation.
- Digesters No. 13 to 16: Gas mixing compressors No. 1 and 6 complete mechanical rebuild.
- Repair and installation of plug valves.
- Replace the digester gas thermal mass flow meter for Digesters No. 1 to 4.
- Repair of Gas Compressor No. 2.

c) Electrical and Instrumentation:

- Digester No. 1 to 8: Complete upgrade of heating loop system; modified system from manual control to automatic. Calibration of heating loop modulating valves.
- Digesters No. 1 to 4: Replaced gas flow meter FIT-6902 (sensor and receiver unit).
- Replaced two of the process sump pumps in Digesters No. 13-16 area with brand new Flight sump pumps and floats.
- Upgraded automatic float Controls Digesters No. 9 to 12 and No. 5 to 8.
- Repair lighting in "M" tunnel with new ballasts and lamps.
- Upgraded gas sensors for Digesters #19-22.
- Flotation tank #4 and 6: Installed new AC high torque motor with VFD and associated controls.
- Sub-basement "Z" bldg.: replaced both sump pumps with new Flight pumps.
- Repaired and replaced lighting fixtures Seawall Tunnel (west side).

- Ongoing overhaul of the pneumatic air switches for Digesters #13-16 and #19-22.
- Gas mixing compressors #1 and 6 modified/replaced flow and temperature limit switches and modified control panel.
- Assisted with the transfer of all loads to the new generator back up panels including commissioning and testing of generators.
- Calibrated and tested heating control loops for Digesters #1-8. Documented and verified calibration with outside contractor.
- Digesters #19-22 Substation maintenance.
- Repaired Gas Compressor #3 Motor.

4.7 Steam System HVAC, and Service Air (Work Area 6)

Work Area 6 includes the plant-wide steam system, HVAC, and service air. The following maintenance was completed in 2016:

a) HVAC, Steam and Hot Water System:

- Two HVAC systems renewed in Seawall Tunnel.
- Centrifuge process chiller system maintenance and repaired as required.
- Boiler stack and breeches inspection done and report produced.
- Deaerator tank non-destructive testing inspection and cleaning done as per TSSA requirement.
- Plant wide HVAC system maintenance and repaired as required.
- Continued routine overhaul and maintenance of hot water circulating pumps, ventilation fans and all auxiliary equipment.
- Installed four new 16" valves in Auxiliary Building basement.
- Installed four new 16" valves at roadway before Seawall Tunnel.
- Regular safety inspection and testing done on all boilers, gas streams and all associated equipment.
- Hot Water Boiler No. 1, 2 and 3 isolation valves installed for future isolation.
- Pressure tested and calibrations done on necessary safety relief valves.
- Temporary air compressor and dryer continued operation and required maintenance.
- Installed new isolation valve at instrument air compressor building and in tunnel for easy isolation.
- Installed new Hot Water Boiler No. 4 and all associated equipment.
- Fixed leak on glycol system, steam, and on hot water piping.
- Replaced and upgraded heat exchanger with additional pump at Biosolids Building and commissioning and training completed.
- D Building glycol leaking problem fixed.
- Z Building ventilation duct cleaning completed.
- Installed guard rails at Z Building loading bay.
- Brine tank damage identified and installed supports and isolation for safety.
- Installed agitator for small brine tank for temporary use.
- Steam boilers burner removed and cleaned inside.
- Replaced fire damaged panel and insulation at Blower Building.
- Removed abandoned old ash pipes and installed wall to protect rain water entering road in front of Lab Building.
- Repaired leaking refrigerant at Z Building roof chiller

- Boilers and Stack inspection and maintenance
- Plant-wide heating loop repair
- Emergency replacement of natural gas pipe and plant-wide heating communication

b) Instrumentation:

- All boiler instruments calibrated, air-fuel ratio adjusted, and damaged instruments replaced
- Calibrated water softener system and replaced damaged instruments
- Overhauled and calibrated feed water to steam boilers and all steam regulators
- Boiler flue gas analyser replace and calibrated
- Migration of PLC for plant wide heating system on SCADA
- Replaced and up-graded MSA gas detection system in Gas control building and in the boiler Room.
- Calibrated and replaced three way valves
- Calibrated and repaired all portable gas detectors

4.8 Consumables, Mechanical and Welding, Groundskeeping and Licensed Vehicles (Work Area 7)

Work Area 7 includes consumables, mechanical and welding, grounds keeping, and licensed vehicles. The following maintenance was completed in 2016:

a) General

- All windsocks in the plant inspected and torn ones renewed.
- Inspected and repaired all overhead cranes including Idling devices.
- Inspected, repaired and preventative maintenance done on all fork lift vehicles including Gators and Kubotas.
- Preventive maintenance done on all licensed vehicles in the plant.
- Inspected and repaired Plant Water Pumping Station leaky roof, Pelletizer Building roof, North Substation Building roof, and Administration Building roof.
- Road repairs executed throughout the plant.
- Lawn and snow removal executed when required.
- Rail tracks in the plant inspected and rail track ties renewed as required.
- Waste oil storage area maintained, and the oil shipped off site using a licensed vendor.
- Recycled fluorescent lights and bulbs, and ensured used batteries placed in their proper storage.
- Located, isolated and repaired plant water line

b) Machinist

- Fabricated new bridge wheel shafts Area 1.
- Fabricated return pump wear rings Area 2.
- Gate nuts and stems.
- Parts for collector mechanism sleeves, shear pins, flanges, couplings, etc.

c) Electrical and Instrumentation

- Overhauled south gate electrical control panel
- Sidewalk and walkways were done throughout the plant.

- Inspected, and repaired all back flow preventers in accordance with legislative requirements.
- Repaired ruby field water line.
- Inspected, tested and replaced fire alarm control panel and annunciator in dewatering building.
- Inspected, tested and repaired all elevators to meet TSSA compliance throughout the plant.
- Purchase of one Bobcat Tool cat utility vehicle, one Case tractor and Four Polaris Ranger utility vehicles to assist in daily operation of the plant.
- Supply and install of grills for raccoon control.

4.9 Disinfection, Plant Water, Elevators (Work Area 8)

Work Area 8 includes disinfection, plant water, fuel safety, fire protection and elevators. The following maintenance was completed in 2016:

- Upgraded the lights in the north parking lot from regular High Pressure Sodium Vapour to LED lighting.
- Completed major maintenance and overhaul of Bus A in North Substation
- Completed bi-annual maintenance on Mobile Generators (Mo-Gens)
- Completed bi-annual maintenance on Standby Generators
- Replaced Waste Gas Burner Liner Bracket
- Rapid Relay testing
- Transformer oil sampling and testing
- Bus 1506 Corono investigation and repair of sea wall substation bus
- Removal and disposal of 4160 V cable from seawall substation to M Tunnel riser in Auxiliary Building
- Cable pathway for Bell New IP/VPN Circuit
- North substation B side preventive maintenance

5. CHEMICALS AND UTILITIES

5.1 Chemicals

Several chemicals are used for a variety of treatment processes at the plant. Major process chemicals are discussed below and include:

- Polymer (WAS Thickening)
- Polymer (Biosolids Dewatering)
- Ferrous Chloride (Nutrient Removal)
- Chlorine (Disinfection)
- Sodium Hypochlorite (Disinfection, Odour Control)

5.1.1 *Polymer for WAS Thickening*

Polymer applied at the DAF tanks is used as a coagulant to aid in the thickening of the WAS. Polymer consumption for WAS thickening during 2016 was approximately 141,000 kg. This represents a decrease of 17.2% over the previous year's consumption.

Polymer for WAS thickening was purchased at a cost of \$4,160.00 per tonne, plus applicable taxes.

5.1.2 *Polymer for Biosolids Dewatering*

Polymer is applied to the biosolids feed into the dewatering centrifuges. The polymer consumption for biosolids dewatering during 2016 was approximately 549,000 kg. This represents an increase of 1.7% over the previous year's consumption.

Polymer for biosolids dewatering was purchased at a cost of \$3,090.00 per tonne, plus applicable taxes.

5.1.3 *Ferrous Chloride for Nutrient Removal*

Ferrous chloride is applied to the distribution conduits upstream of the aerated grit channels, or applied to the aeration tanks for nutrient removal (i.e. phosphorus). Ferrous chloride consumption during 2016 was approximately 2,088 tonne as Fe, which is an 8.8% increase from 2015. The average ferrous chloride dosage rate was 10.4 mg/L as Fe during the year.

Ferrous chloride for nutrient removal was purchased at a cost of \$720.00 per tonne Fe, plus applicable taxes.

5.1.4 *Chlorine for Disinfection*

Chlorine is applied to the final effluent just prior to the outfall for disinfection. The consumption during 2016 was approximately 302,550 kg.

Chlorine for disinfection was purchased at a cost of \$160.00 per tonne, plus applicable taxes.

5.1.5 *Sodium Hypochlorite for Disinfection and Odour Control*

Sodium hypochlorite is used for backup disinfection when the chlorine system is not available, in the air scrubbers for odour control, and to disinfect plant water for housekeeping. The consumption during 2016 was approximately 1.36 ML, a decrease of 20.2% of the consumption in 2015.

Sodium hypochlorite for disinfection and odour control was purchased at a cost of \$129.46 per 1,000L, plus applicable taxes.

5.2 Utilities

A summary of utility consumption at Ashbridges Bay Treatment Plant is provided in Table 11, below.

Table 11: Monthly Utility Consumption for 2014, 2015 and 2016

Utility	2016	2015	2014
Water [m ³ / month]	49,784	62,029	62,029
Hydro [kWh / month]	11,219,457	10,915,593	10,915,593
Natural Gas [m ³ / month]	478,039	508,560	508,560

5.2.1 Water

Total potable water consumption decreased by 19.7% from 2015 to an annual use of 597,404 m³, as a result of various water in-plant water conservation measures. Total cost for potable water was \$2.17M. The average unit cost of water was \$3.62 per cubic meter.

5.2.2 Hydro

Total electrical energy consumption increased by 2.8% from 2015 to 134.6M kWh. The total cost for hydro was \$13.74M. The average unit cost of power was \$0.10 per kWh.

5.2.3 Natural Gas

Total natural gas consumption decreased by 6% from 2015 to 5.7M m³. Total cost for natural gas was \$1.35M. The average unit cost of natural gas was \$0.24 per m³.

6. OPERATIONS AND MAINTENANCE COSTS

Plant operations and maintenance costs are broken down into five (5) categories: Salaries and Benefits, Materials and Supplies, New Equipment, Services and Rents and Other Charges. Materials and Supplies is further segregated into Utilities (power, natural gas and water), Machine and Equipment Parts, Chemicals and Other Materials and Supplies. The total cost of plant operation in 2016 was \$59.0M, a 4.8% increase in comparison to the operating costs for 2015. A breakdown of 2016 annual operations and maintenance costs is shown in Table 12 and illustrated in Figure 1.

Table 12: Operations and Maintenance Cost Breakdown

Operating Cost	2016	2015
Salaries and Benefits	\$17,525,550	\$16,422,381
Materials and Supplies		
Utilities	\$17,435,419	\$16,456,776
Machine and Equipment Parts	\$1,793,869	\$1,674,868
Chemicals	\$4,443,817	\$4,561,765
Other Materials and Supplies	\$991,724	\$1,078,346
New Equipment	\$324,810	\$370,535
Services and Rents	\$15,607,995	\$14,976,957
Other Charges	\$925,649	\$808,912
TOTAL PROGRAM COST:	\$59,048,833	\$56,350,540

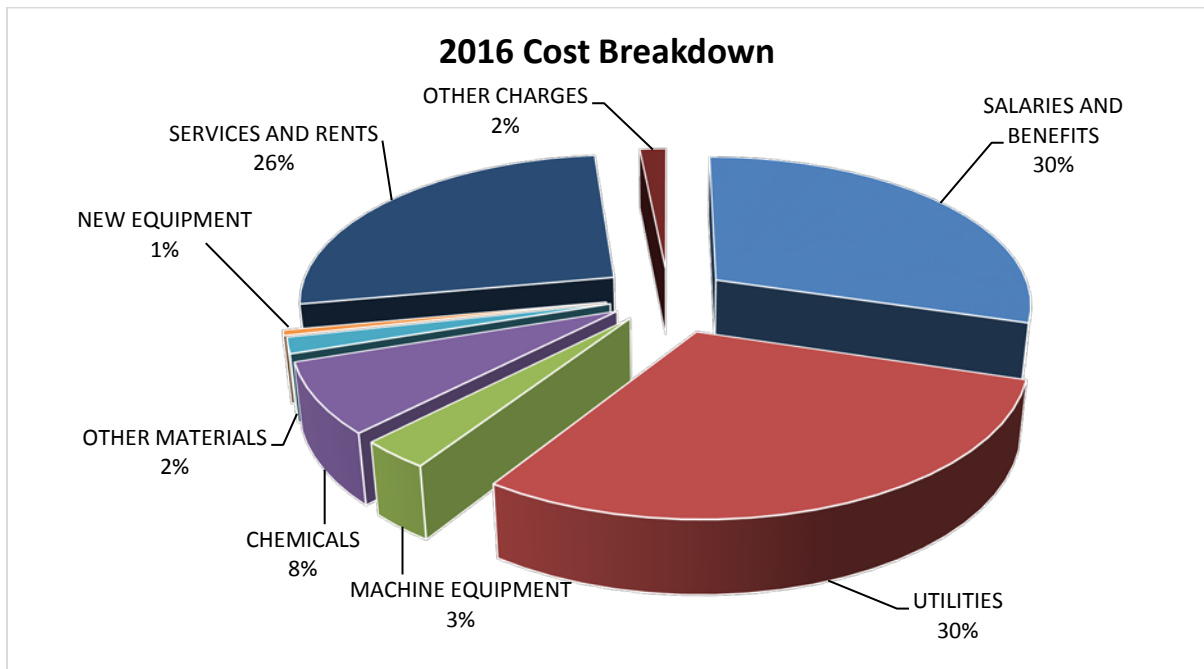


Figure 1: Ashbridges Bay Treatment Plant Operations and Maintenance Cost Breakdown for 2016

7. HUMAN RESOURCES

7.1 Staffing

In 2016, the Ashbridges Bay Treatment Plant had 174 employees. Total Plant Staffing complement is shown in Table 13, below:

Table 13: Plant Staffing

Position Title	Number
Sr. Plant Manager	1
Manager, Engineering Services	2
Superintendent, Plant Process and Operations	2
Senior Engineer	2
Engineer	2
Area Supervisor Process Operations and Maintenance	8
Supervisor, Operational Support	1
Supervisor Operating Engineers A/R-C	1
Stationary Engineer Operator	9
Electronic Instrumentation Specialist	2
Engineering Technologist Technician	2
Plant Technician/Wastewater	44
Plant Maintenance Operator	1
Developmental Plant Technician	4
Industrial Millwrights	51
EICT	25
Support Assistant	3
Systems Integrator 1	1
Materials Management Assistant	2
Wastewater Plant Worker	7
Seasonal Temporary	4

7.2 Occupational Health and Safety

Continuous efforts are made in maintaining a safe working environment at the Ashbridges Bay Treatment Plant facility. The Joint Health and Safety Committee assisted management in resolving issues through bi-monthly meetings and conducting monthly workplace inspections.

Plant Health and Safety statistics for the Ashbridges Bay Treatment Plant in 2016 were as follows:

Incident	3
First Aid	2
Medical Aid	3
Lost Time	3
Near Miss	0
Recurrence	0
Total	11

As of March 31, 2017, there was a total of 27 lost time days due to work related injuries in 2016.

7.3 Staff Training and Development

Toronto Water's Strategic Planning and Workforce Development team has developed a comprehensive Operator Training Program that expands the abilities of the operational staff, resulting in better service to the public.

All Ashbridges Bay Treatment Plant operating staff and skilled trades staff attended the training. Courses were eligible for Continuing Education Units from the Ontario Environmental Training Consortium.

The Ashbridges Bay Treatment Plant sent its operations and maintenance staff on the following training courses:

a) Technical and Health and Safety Training:

- 2015 Ontario Electrical Safety Code (26th Edition) New And Amended Requirements General Level 1
- 2015 Ontario Electrical Safety Code (26th Edition) New And Amended Requirements General Level 2
- Advanced Water Treatment (2016)
- Arc Flash Awareness For Non-Electrical Personnel
- Asbestos Awareness
- Backflow Prevention Awareness (2016-2018)
- Chlorination And Disinfection Refresher (2016-2018)
- Chlorine 'C' Kit Training
- Chlorine Safety / "B" Kit (2016-2018)
- Classroom Review Of Common Wear Items For Plant Machinery (2016-2018)
- Conductors (2016-2018)
- Confined Space Awareness
- Confined Space Entry and Rescue Training Awareness
- Cross Connection Specialist Backflow Tester - Certification
- Designated Substances Awareness
- Disinfection Of Potable Water Piping (2016)
- Electrical Awareness
- Electrical Safety For District Operations and Maintenance Operators (2016-2018)
- Electrical Safety For Maintenance Staff (2016-2018)
- Emergency First Aid Level 'A' CPR (2016-2018)
- Emergency Response Information For Employees With Disabilities - May 2016 (Tailgate)
- Equipment: Inspect It Before You Use It (August Tailgate)
- Fall Protection Awareness
- Fire Hydrant and Valve - Operation, Inspection, Maintenance and Installation
- Fundamentals Of Ladder Safety Awareness
- Gas Chlorination And Disinfection 4 Days (2016-2018)
- Genie Aerial Work Platform AWP 30S - Safe Equipment Operation

- GIS Basics
- GIS In The City
- Health And Safety Competency For Front-Line Supervisors
- Hot Work Permit System Awareness (2016-2018)
- Industrial Maintenance Technician (IMT)M Certification
- In-Service Health and Safety Orientation
- Level "C" CPR Renewal (2016-2018)
- Lifting Safely - Posture Matters-February (2016) Safety Tailgate
- Lock Out, Tag Out and Test Awareness (2016-2018)
- Lockout, Tag Out And Test Awareness
- Log Book Entry Workshop - Facilities
- Mathematics For Operators: Module 1 (2016-2018)
- Mathematics For Operators: Module 2 (2016-2018)
- MMR - Self-Contained Breathing Apparatus
- Power Elevated Work Platform Operator Training – Skyjack and Genie
- Quatrosafety Incident Reporting
- Rigging Safety Awareness (2016-2018)
- Safety In A High Voltage Environment (2016-2018)
- Sampling and Testing In The Distribution System (2016-2018)
- Scaffolding Awareness Course (2016-2018)
- Slip-Free, Trip-Free, Fall-Free (November Tailgate)
- Standard First Aid - Level "C" CPR and AED - 2 Day (2016-2018)
- Supervisor Health And Safety Awareness In 5 Steps
- Technical Report Writing
- Transportation Of Dangerous Goods (2016-2018)
- Trenching And Excavating Awareness
- Wastewater Laboratory Procedures (2016-2018)
- Wastewater Treatment Certification Program Level 1 and 2
- Wastewater Treatment Certification Program Level 3 and 4
- Watermain Tapping And Repair (2016-2018)
- WHMIS
- WMS Avantis Workshop
- Worker Health And Safety Awareness In 4 Steps
- Working At Heights (2016-2018)
- Working With Wastewater
- Writing Clearly On Technical Subjects

b) Other Training:

- Accessibility for Ontarians with Disabilities Act – Ontario Human Rights Commission: Customer Service Standard
- Attendance Management
- Basic Presentation Skills: Planning A Presentation
- Basics Of Staffing
- Clear Writing And Design
- Clear, Concise, Engaging And Energized Presentations
- Communication Essentials: Taking Your Interpersonal Communication Skills To The Next Level
- Conflict Of Interest - Part 1
- Conflict Resolution And Negotiation Skills
- Content Server Knowledge Fundamentals 101
- Corporate Orientation For New TPS Employees
- Customer Service Essentials For Administrative Support And Frontline Staff
- Developing Effective Partnerships With The Private Sector
- Engaged Conversations And Group Decision Making Through Facilitation
- Essential Financial Planning For Retirement
- Etime Scheduling Shift Employees In SAP
- Fraud Prevention And Whistleblower Protection - Part 1
- Fraud Prevention And Whistleblower Protection - Part 2
- Fundamentals Of Purchasing
- Improving Your Grammar
- Incident Management Team Training (Environment, Health and Safety Committee)
- Incident/Accident Reporting
- Influencing Strategies For Impact And Alignment
- Lessons In Leadership
- Local 416 Collective Agreement Information Session
- Long Range Financial Planning
- Managing And Assisting The Troubled Employee
- Managing Conflict: Foundation Skills For Front-Line Staff
- Managing Human Rights Today
- Outlook 2013 - Increase Your Productivity With Outlook
- Outlook 2013: All About Outlook 2013
- Positive Space Toronto - Module 1
- Preparing To Move Into Supervision
- Protecting Privacy On The Job
- Request For Proposal (RFP) Preparation And Evaluation
- Request For Quotation (RFQ) And Tender Preparation And Award
- Respect In Our Workplace
- Responding To Discrimination And Harassment Complaints

- Responding To Workplace Harassment: What You Need To Know
- Skills For Conflict Intervention
- Speaking Clearly And Confidently
- The Toronto Public Service By-Law Elearning
- Toronto Water Orientation
- Understanding Municipal Governance
- Using Strategic Thinking Skills
- Violence In The Workplace
- Workplace Conflict: Recognizing And Responding To Conflict
- Workplace Innovation: Critical Thinking And Creative Problem Solving
- Writing Better Emails

7.4 Utility Operator Certification

Toronto Water has incorporated the requirement of a Class 1 operating licence into the job profiles of the skilled trades in the Water and Wastewater Treatment facilities.

Table 14 summarizes the status of operator certification at the Ashbridges Bay Treatment Plant for 2016.

Table 14: Wastewater Treatment Certificates

Class Level	Licensed
Class IV	33
Class III	5
Class II	12
Class I	36
O. I. T.	47
TOTAL	133

7.5 MOECC Correspondence

In addition to reports submitted for 3 odour complaints and 1 noise complaint received at the plant in 2016, and reports submitted for 4 bypasses, the following correspondence was submitted to the MOECC for Ashbridges Bay Treatment Plant.

Table 15: Correspondence submitted to the MOECC for ABTP

Date	Type	Description
May 11, 2016	Communication regarding an odour complaint via MOECC	Communicated with Lorilyn Wild, MOECC Water Inspector, an odour complaint received by Spills Action Centre with investigation revealed that the plant was not the source of this off-site odor.

Date	Type	Description
May 26, 2016	Communication regarding a noise complaint	Communicated with Loralyn Wild, MOECC Water Inspector, a noise complaint with investigation revealed that it was not plant operation related.
June 7, 2016	Communication regarding an odour complaint	Communicated with Loralyn Wild, MOECC Water Inspector, an odor complaint with investigation revealed that it was not plant operation related.
June 24, 2016	Communication regarding an odour complaint via MOECC	Communicated with Loralyn Wild, MOECC Water Inspector, an odour complaint received by Spills Action Centre with investigation revealed that the plant was not the source of this off-site odor.
October 17, 2016	Clarifications regarding a suspected natural gas leak	Clarified with Melissa Hills, MOECC Water Inspector, this natural gas leak was outside Ashbridges Bay Treatment Plant's ECA as the equipment belongs to ENBRIDGE. And it was not considered as a leak under ENBRIDGE ECA.
November 23, 2016	10 Day Report as per Amended ECA	Written report regarding release of primary effluent.
November 30, 2016	10 Day Report as per Amended ECA	Written report regarding release of plant water (treated final effluent).
Consent Letters		
July 21, 2016	Director Consent Letter	Request for Consent – planned release of treated primary effluent to final effluent channel.
July 25, 2016	Director Consent	Consent Granted - planned release of treated primary effluent to final effluent channel.
November 7, 2016	Director Consent Letter	Request for Consent – Shutdown of the Aeration Odour Control System for the winter.
December 13, 2016	Director Consent	Consent Granted – Shutdown of the Aeration Odour Control System for the winter.
Notice of Start-up		
January 8, 2016	Notice of Start-up	MOECC Drinking Water Supervisor, Demetra Loros, was given a notice of start-up regarding Aeration Tank No.2.
MOE Inspection		
No Inspection		

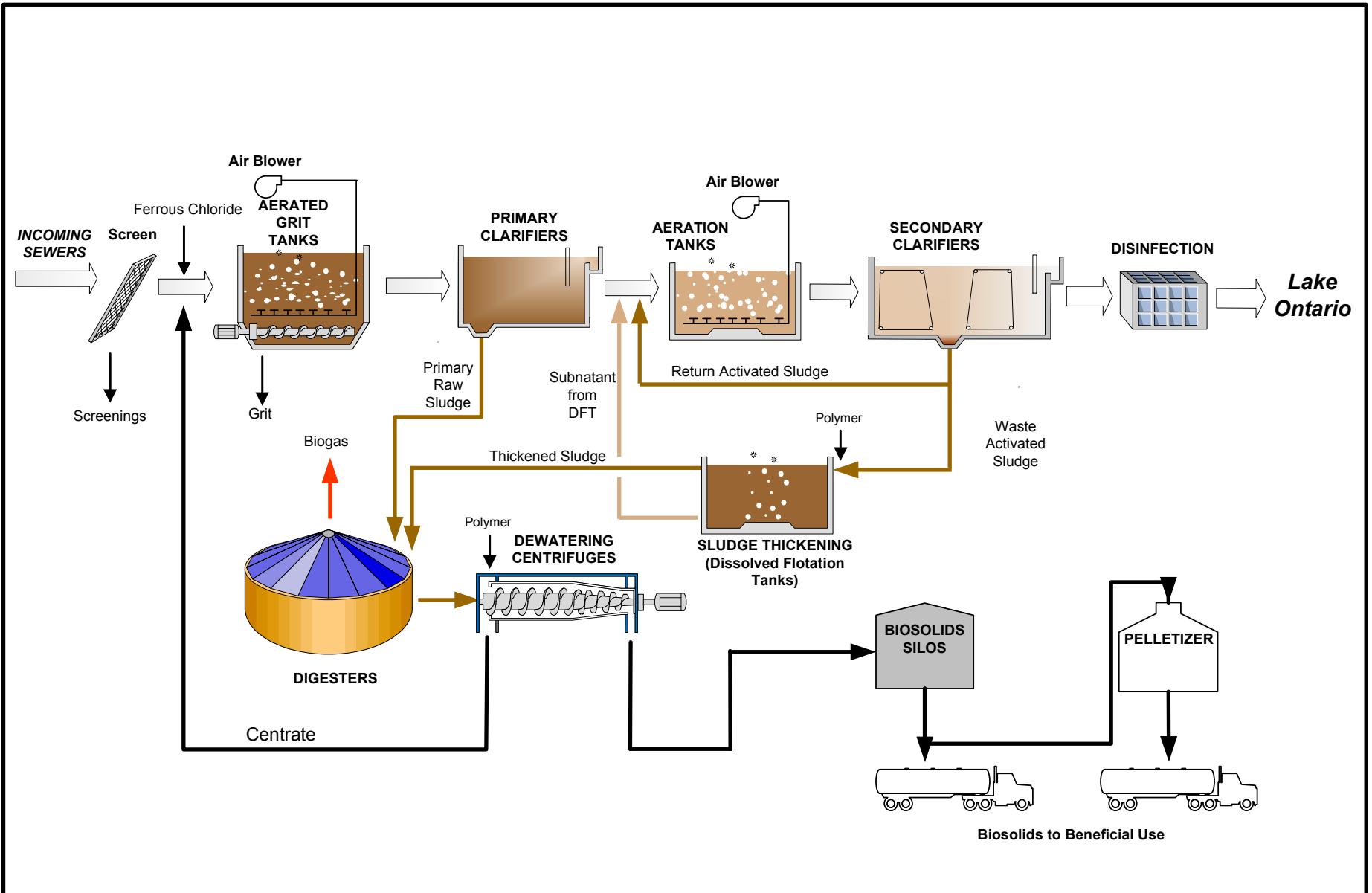
Appendix A

Glossary of Abbreviations

Glossary of Abbreviations

ABTP	Ashbridges Bay Treatment Plant
BOD ₅	Five-Day Biological Oxygen Demand (in some instances this may be referred to as BOD)
CBOD ₅	Five-Day Carbonaceous Biological Oxygen Demand
CEU	Continuing Education Units
CFU	Colony Forming Units
C of A	Certificate of Approval
CPR	Cardiopulmonary Resuscitation
CSO	Combined Sewer Overflow (Tank)
DAF	Air Flotation
D.O.	Dissolved Oxygen
ECA	Environmental Compliance Approval
E. Coli	Escheria Coli
ha	Hectare
HCTP	Highland Creek Treatment Plant
HTP	Humber Treatment Plant
HP	Horsepower
HRT	Hydraulic Retention Time
kg	Kilogram
kg/day	Kilogram per day
kWh	Kilowatt-hour
kWh/month	Kilowatt-hour per month
MWh	Megawatt-hour
m	Metre
m ³	Cubic metre
m ³ /month	Cubic metre per month
M	Million
MCC	Motor Control Centre
mA	milliamps
mg/L	Milligrams per litre
mL	Millilitre
ML	Megalitre
ML/day	Megalitre per day
MOECC	Ministry of Environment and Climate Change
No.	Number
P	Presence
MTI	Mid-Toronto Interceptor Forcemain
NTTP	North Toronto Treatment Plant
SBS	Sodium Bisulphite
SCADA	Supervisory Control and Data Acquisition
STS	Sanitary Trunk Sewer
SS	Suspended Solids
TCR	Total Chlorine Residual
TP	Total Phosphorus
TS	Total Solids
TSS	Total Suspended Solids
TVS	Total Volatile Solids
TWAS	Thickened Waste Activated Sludge
µg/L	micrograms per litre
WAS	Waste Activated Sludge

Appendix B
Plant Schematic



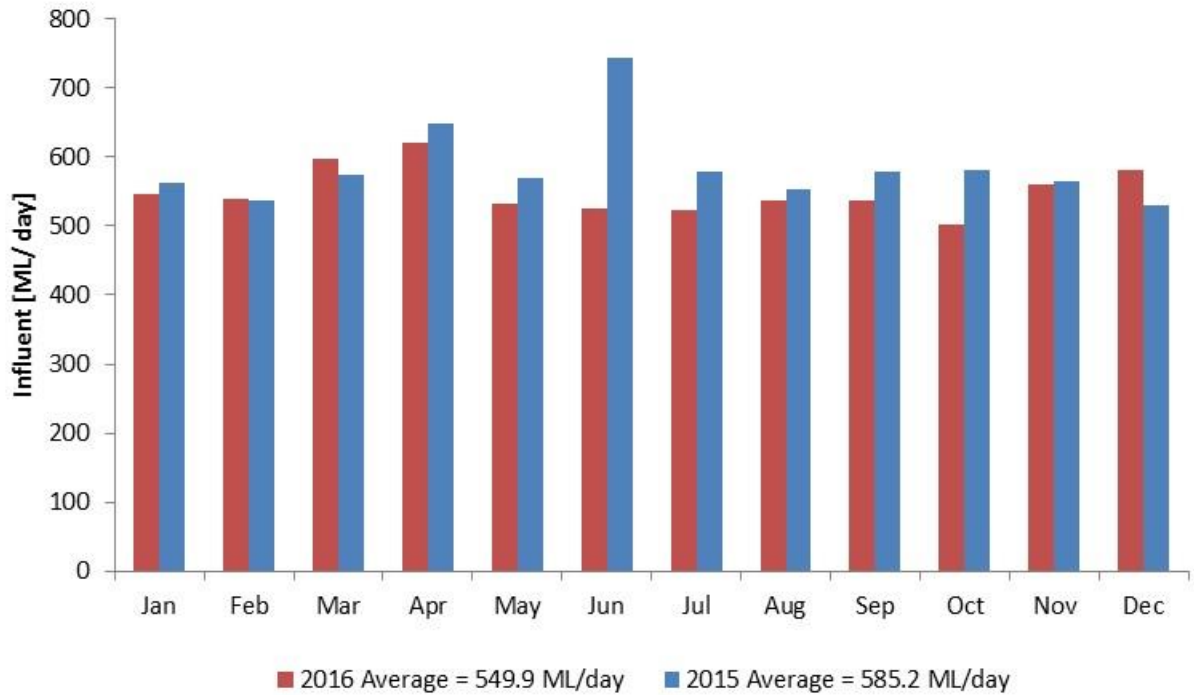
Process Flow Diagram for Ashbridges Bay Wastewater Treatment Plant

Appendix C

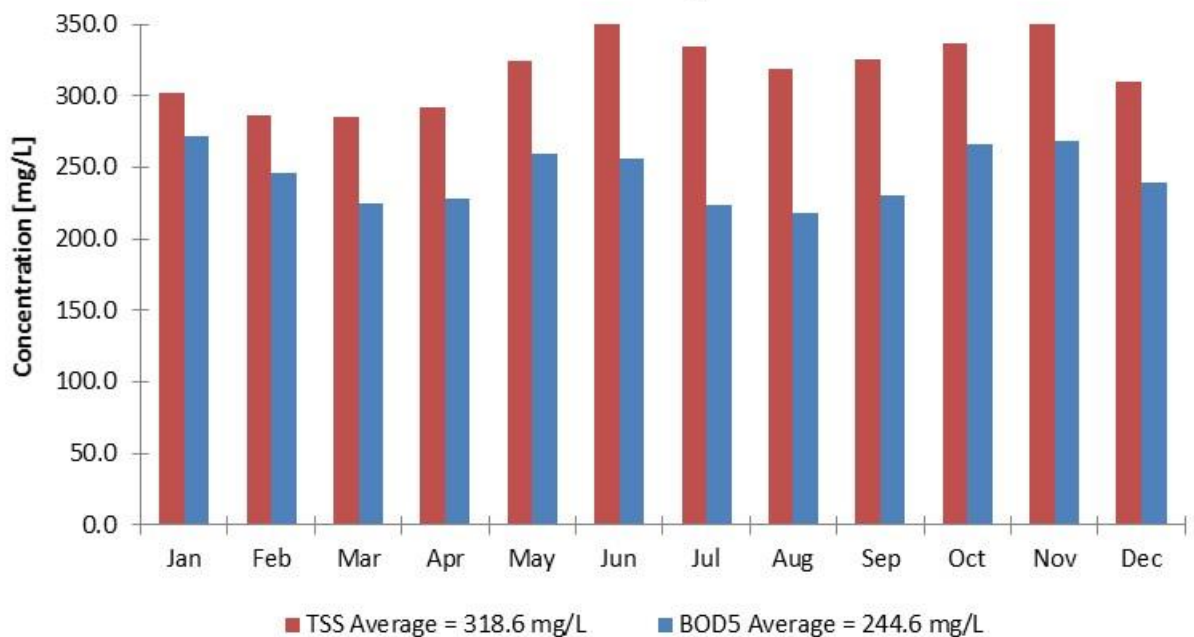
Performance Charts

- **Influent Flows 2015 – 2016**
- **Influent TSS and BOD₅ Concentrations**
- **Influent TP and TKN Concentrations**
- **Secondary Effluent TSS & CBOD₅ Concentrations**
- **Secondary Effluent TP and TKN Concentrations**
- **Secondary Effluent Ammonia and Nitrate/Nitrite Concentrations**
- **Secondary Effluent pH**
- **Secondary Effluent E.Coli Concentration**
- **Secondary Effluent Temperature**
- **Final Effluent TSS, BOD₅, and TP Concentrations**
- **Digester Gas Production**

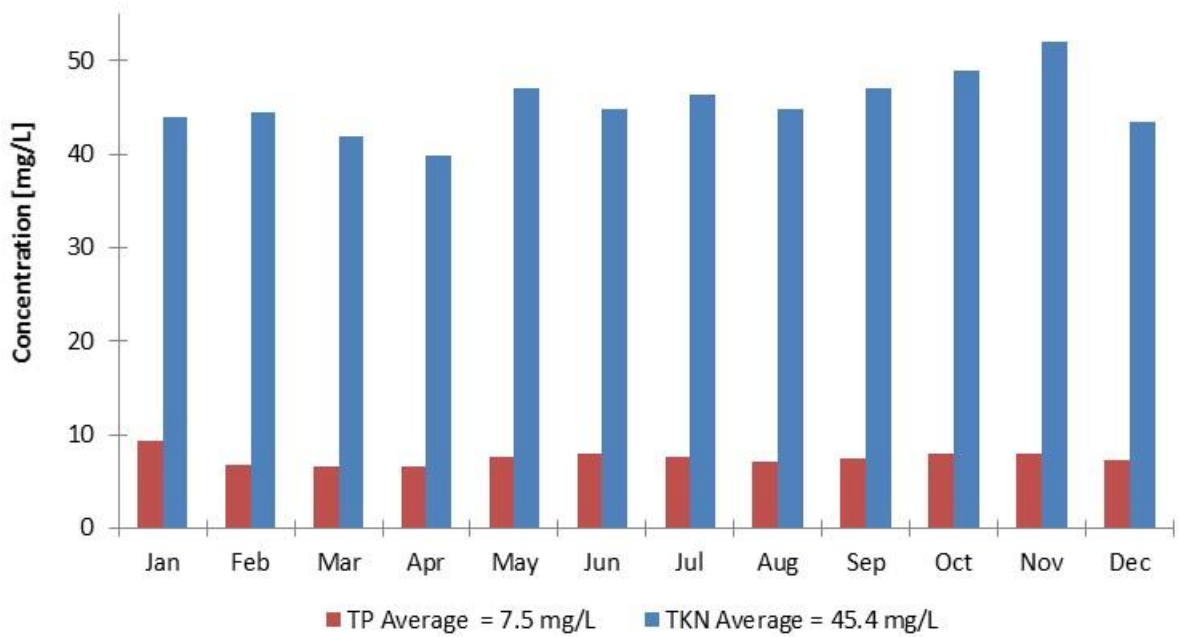
ASHBRIDGES BAY TREATMENT PLANT INFLUENT FLOWS 2015-2016



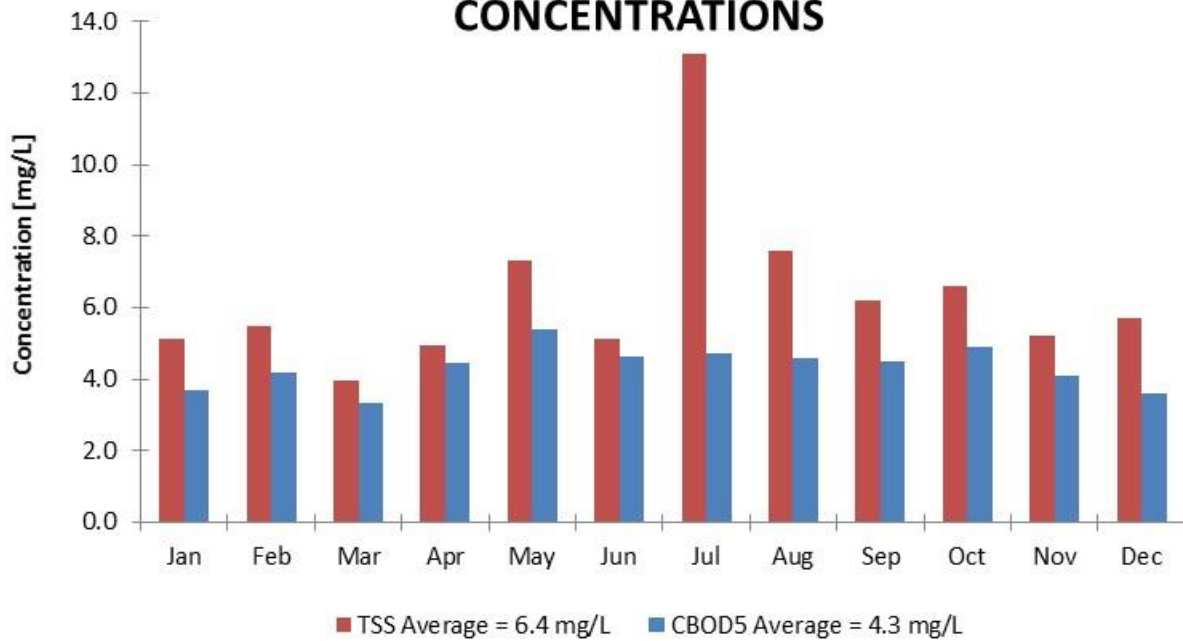
ASHBRIDGES BAY TREATMENT PLANT INFLUENT TSS and BOD₅ CONCENTRATIONS



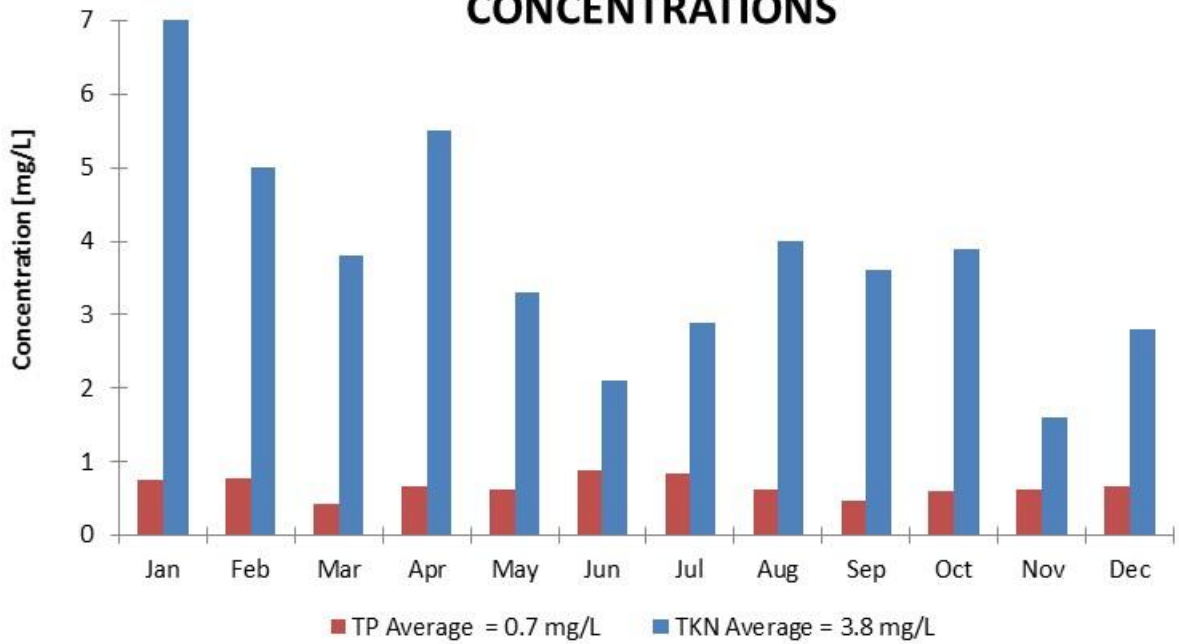
ASHBRIDGES BAY TREATMENT PLANT INFLUENT TP AND TKN CONCENTRATIONS



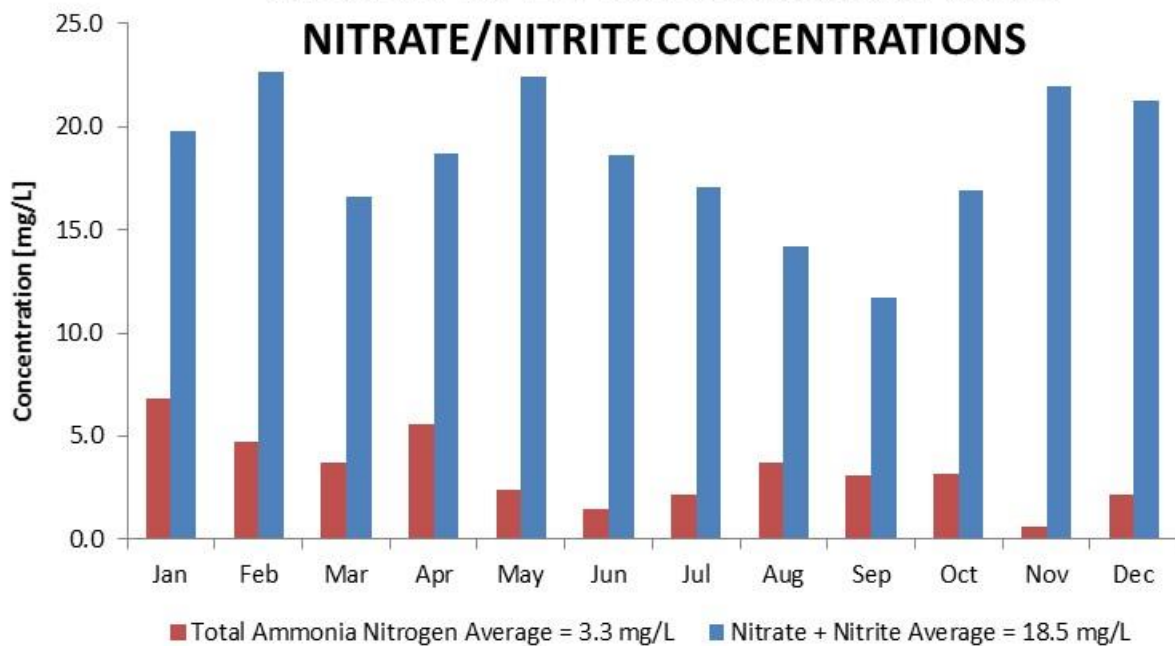
ASHBRIDGES BAY TREATMENT PLANT SECONDARY EFFLUENT TSS and CBOD₅ CONCENTRATIONS



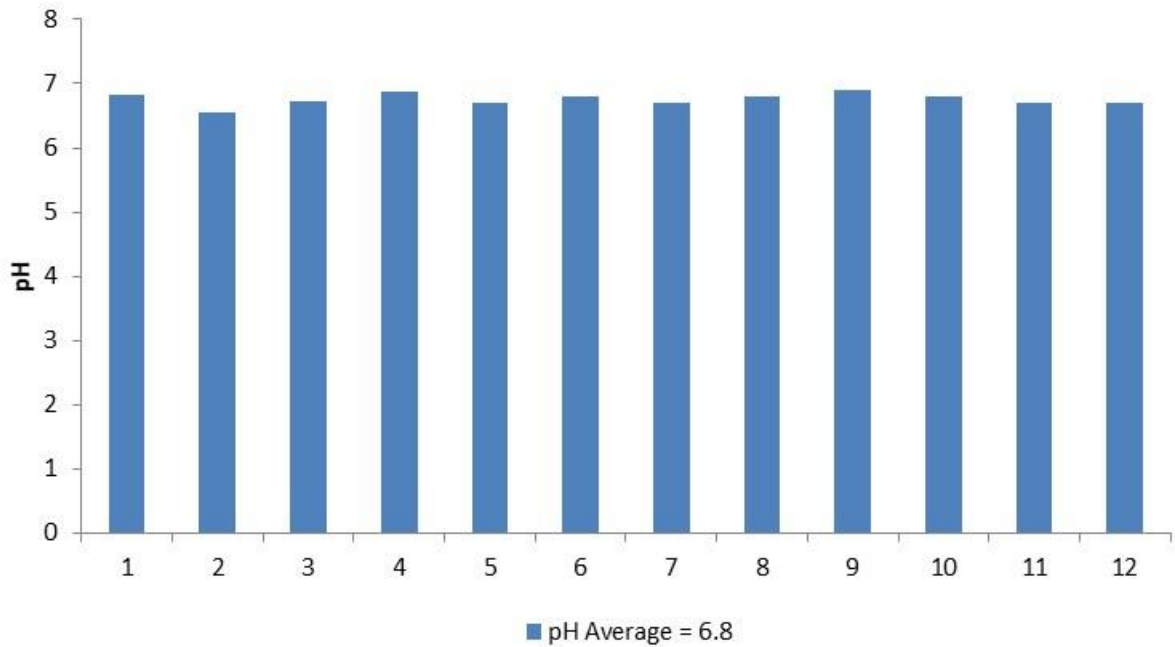
ASHBRIDGES BAY TREATMENT PLANT SECONDARY EFFLUENT TP AND TKN CONCENTRATIONS



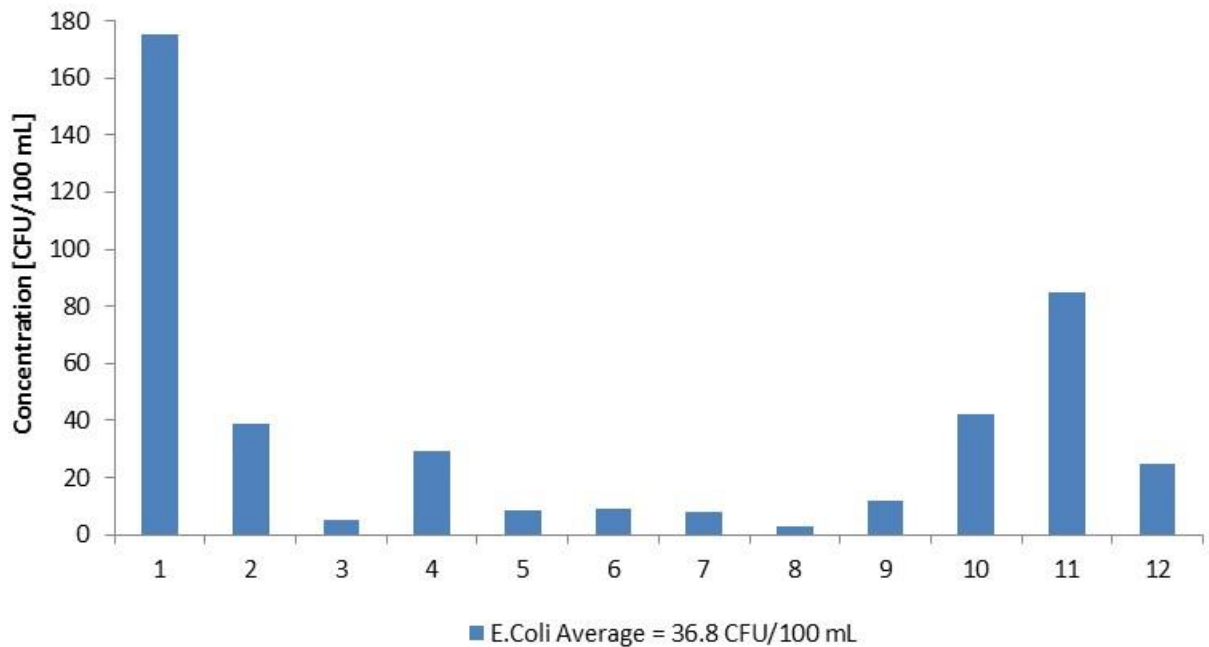
ASHBRIDGES BAY TREATMENT PLANT SECONDARY EFFLUENT AMMONIA AND NITRATE/NITRITE CONCENTRATIONS



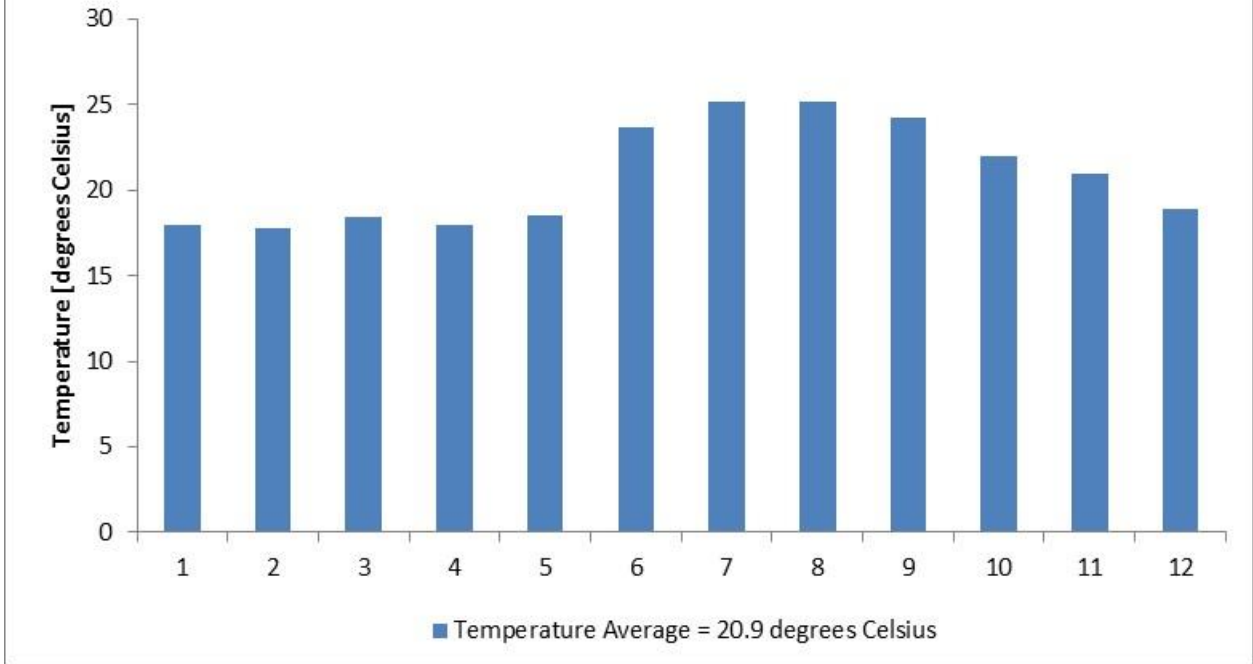
ASHBRIDGES BAY TREATMENT PLANT SECONDARY EFFLUENT PH



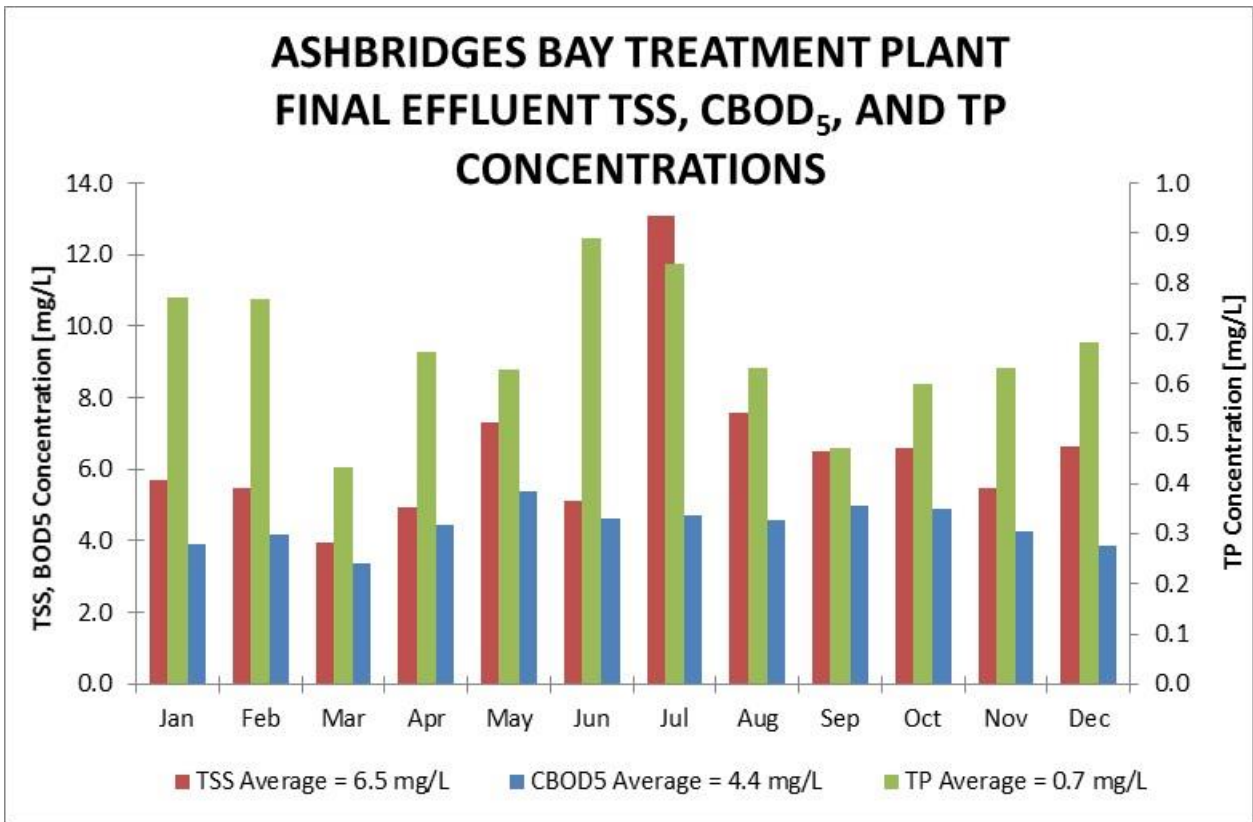
ASHBRIDGES BAY TREATMENT PLANT SECONDARY EFFLUENT E. COLI CONCENTRATION



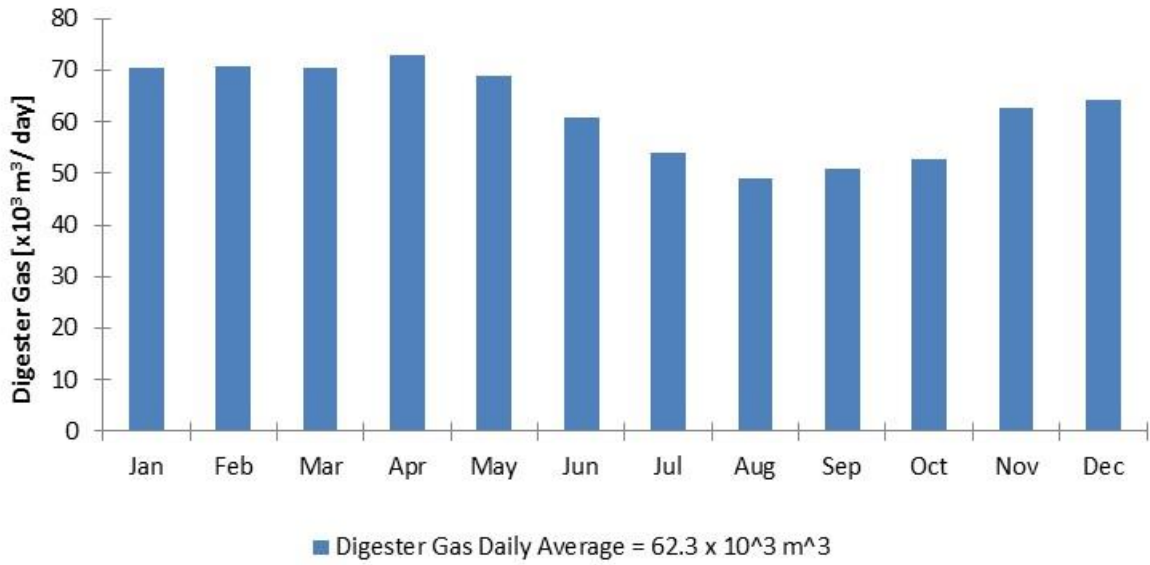
ASHBRIDGES BAY TREATMENT PLANT SECONDARY EFFLUENT TEMPERATURE



ASHBRIDGES BAY TREATMENT PLANT FINAL EFFLUENT TSS, CBOD₅, AND TP CONCENTRATIONS



ASHBRIDGES BAY TREATMENT PLANT DIGESTER GAS PRODUCTION



Appendix D

Influent and Effluent Metal Concentrations

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: January 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0117	mg/L	0.0400	
	Iron	0.380	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0395	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00583	mg/L	0.0800	
	Zinc	0.0332	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0127	mg/L	4.0000	
	Copper	0.148	mg/L	2.0000	
	Iron	4.11	mg/L		
	Lead	0.0163	mg/L	1.0000	
	Manganese	0.0769	mg/L	5.0000	
	Mercury	<0.00006	mg/L	0.0100	
	Nickel	0.0148	mg/L	2.0000	
	Zinc	0.593	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 25-Feb-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: February 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0145	mg/L	0.0400	
	Iron	0.497	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0852</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00617	mg/L	0.0800	
	Zinc	0.0400	mg/L	0.0400	
INFLUENT					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0104	mg/L	4.0000	
	Copper	0.144	mg/L	2.0000	
	Iron	3.87	mg/L		
	Lead	0.00677	mg/L	1.0000	
	Manganese	0.0661	mg/L	5.0000	
	Mercury	0.00006700	mg/L	0.0100	
	Nickel	0.00750	mg/L	2.0000	
	Zinc	0.174	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 18-Mar-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: March 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
Monthly Metals at Dee - FINAL EFFLUENT Lab Based	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0143	mg/L	0.0400	
	Iron	0.382	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0634</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00532	mg/L	0.0800	
	Zinc	0.0352	mg/L	0.0400	
Monthly Metals at Dee. - INFLUENT	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0120	mg/L	4.0000	
	Copper	0.136	mg/L	2.0000	
	Iron	4.96	mg/L		
	Lead	<0.005	mg/L	1.0000	
	Manganese	0.0685	mg/L	5.0000	
	Mercury	0.00003300	mg/L	0.0100	
	Nickel	0.00686	mg/L	2.0000	
	Zinc	0.194	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 03-May-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: April 2016

Tel: 416-392-2894
 Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0130	mg/L	0.0400	
	Iron	0.354	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0539</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0312	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0114	mg/L	4.0000	
	Copper	0.134	mg/L	2.0000	
	Iron	5.75	mg/L		
	Lead	0.00634	mg/L	1.0000	
	Manganese	0.0710	mg/L	5.0000	
	Mercury	0.0001300	mg/L	0.0100	
	Nickel	0.00797	mg/L	2.0000	
	Zinc	0.165	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 16-May-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: May 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0108	mg/L	0.0400	
	Iron	0.614	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0622</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00555	mg/L	0.0800	
	Zinc	0.0319	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0129	mg/L	4.0000	
	Copper	0.154	mg/L	2.0000	
	Iron	5.52	mg/L		
	Lead	0.00686	mg/L	1.0000	
	Manganese	0.0762	mg/L	5.0000	
	Mercury	0.00006400	mg/L	0.0100	
	Nickel	0.00899	mg/L	2.0000	
	Zinc	0.194	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 29-Jun-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: June 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT- Monthly Metals at Dee	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0339	mg/L	0.0400	
	Iron	0.481	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0498	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00573	mg/L	0.0800	
	Zinc	<u>0.0484</u>	mg/L	0.0400	
INFLUENT- Monthly Metals at Dee					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0200	mg/L	4.0000	
	Copper	0.152	mg/L	2.0000	
	Iron	5.17	mg/L		
	Lead	0.00771	mg/L	1.0000	
	Manganese	0.0786	mg/L	5.0000	
	Mercury	0.0001130	mg/L	0.0100	
	Nickel	0.00851	mg/L	2.0000	
	Zinc	0.193	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 29-Jul-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: July 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT - Monthly @ Dec.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	0.00451	mg/L	0.0800	
	Copper	<u>0.0420</u>	mg/L	0.0400	
	Iron	2.29	mg/L		
	Lead	0.00962	mg/L	0.1200	
	Manganese	<u>0.0930</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00964	mg/L	0.0800	
	Zinc	<u>0.355</u>	mg/L	0.0400	
INFLUENT - Monthly @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0170	mg/L	4.0000	
	Copper	0.171	mg/L	2.0000	
	Iron	4.95	mg/L		
	Lead	0.00975	mg/L	1.0000	
	Manganese	0.0847	mg/L	5.0000	
	Mercury	0.0001410	mg/L	0.0100	
	Nickel	0.00887	mg/L	2.0000	
	Zinc	0.232	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 30-Aug-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: August 2016

Tel: 416-392-2894
 Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT - Monthly Meats @ Dec.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0107	mg/L	0.0400	
	Iron	0.745	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0769</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0400	mg/L	0.0400	
INFLUENT - Monthly Meats @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0160	mg/L	4.0000	
	Copper	0.162	mg/L	2.0000	
	Iron	4.56	mg/L		
	Lead	0.00953	mg/L	1.0000	
	Manganese	0.0750	mg/L	5.0000	
	Mercury	0.0002250	mg/L	0.0100	
	Nickel	0.00777	mg/L	2.0000	
	Zinc	0.219	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 03-Oct-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: September 2016 (

Tel: 416-392-2894 #
 Fax: 416-397-0342 #

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES /</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT - Monthly Metals at Dee.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.00795	mg/L	0.0400	
	Iron	0.520	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0599</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00509	mg/L	0.0800	
	Zinc	0.0343	mg/L	0.0400	
INFLUENT - Monthly Metals at Dee.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0144	mg/L	4.0000	
	Copper	0.144	mg/L	2.0000	
	Iron	4.65	mg/L		
	Lead	0.00717	mg/L	1.0000	
	Manganese	0.0752	mg/L	5.0000	
	Mercury	0.0001710	mg/L	0.0100	
	Nickel	0.00835	mg/L	2.0000	
	Zinc	0.205	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 31-Oct-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: October 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
Effluent Monthly Metals	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.00879	mg/L	0.0400	
	Iron	1.01	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0682</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00589	mg/L	0.0800	
	Zinc	0.0290	mg/L	0.0400	
INFLUENT Monthly Metals					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0165	mg/L	4.0000	
	Copper	0.153	mg/L	2.0000	
	Iron	4.90	mg/L		
	Lead	0.00660	mg/L	1.0000	
	Manganese	0.0697	mg/L	5.0000	
	Mercury	0.0002890	mg/L	0.0100	
	Nickel	0.00838	mg/L	2.0000	
	Zinc	0.210	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 01-Dec-2016 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: November 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.00885	mg/L	0.0400	
	Iron	0.433	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0510</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.00638	mg/L	0.0800	
	Zinc	0.0390	mg/L	0.0400	
INFLUENT					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0184	mg/L	4.0000	
	Copper	0.175	mg/L	2.0000	
	Iron	6.36	mg/L		
	Lead	0.00986	mg/L	1.0000	
	Manganese	0.0797	mg/L	5.0000	
	Mercury	0.0001300	mg/L	0.0100	
	Nickel	0.00772	mg/L	2.0000	
	Zinc	0.261	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites./

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 04-Jan-2017 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: December 2016

Tel: 416-392-2894
Fax: 416-397-0342

<u>DESCRIPTION</u>	<u>NAME</u>	<u>RESULT</u>	<u>UNITS</u>	<u>LIMITS</u>	<u>NOTES</u>
Ashbridges Bay Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0118	mg/L	0.0400	
	Iron	0.469	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0781</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	0.0101	mg/L	0.0800	
	Zinc	0.0375	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.0133	mg/L	4.0000	
	Copper	0.113	mg/L	2.0000	
	Iron	3.41	mg/L		
	Lead	0.00753	mg/L	1.0000	
	Manganese	0.0531	mg/L	5.0000	
	Mercury	0.00006700	mg/L	0.0100	
	Nickel	0.0147	mg/L	2.0000	
	Zinc	0.153	mg/L	2.0000	

Notes: All Results in mg/L. These samples are monthly composites. /

Underlined Results have exceeded respective Sanitary or Storm Sewer Bylaw limits of the Sewer Use Bylaw Chapter 681 of the Toronto Municipal Code. limits. /

Date Report Printed: 16-Jan-2017 /

Appendix E

Analytical Testing Summary

Ashbridges Bay Treatment Plant

	ALK pH DS COND	Alkalinity	BOD	CBOD	Chlorine	COD	Dioxins and Furans	ECOLI	Ferric Chloride	Fluoride	Free NH3	IONS	Mercury	METALS	NH3 (as N)	Ortho-phosphate	P	pH	pH_15	Residual Chlorine	Salmonella	SPGR	Temp	TKN (as N)	Toxicity	TS	TSS	Un-ionized NH3 (as N)	VA	Verbal Notifications	Total
PRIMARY DIGESTED SLUDGE VA TANK 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	0	63
PRIMARY DIGESTED SLUDGE VA TANK 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	0	63
PRIMARY DIGESTED SLUDGE VA TANK 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	0	63	
PRIMARY DIGESTED SLUDGE VA TANK 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	60	
PRIMARY DIGESTED SLUDGE VA TANK 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	0	63	
PRIMARY DIGESTED SLUDGE VA TANK 21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	0	63	
PRIMARY DIGESTED SLUDGE VA TANK 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	0	63	
PRIMARY DIGESTED SLUDGE VA TANK 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	66	
PRIMARY DIGESTED SLUDGE VA TANK 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	66	
PRIMARY DIGESTED SLUDGE VA TANK 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	66	
PRIMARY DIGESTED SLUDGE VA TANK 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	66	
PRIMARY DIGESTED SLUDGE VA TANK 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	66	
PRIMARY DIGESTED SLUDGE VA TANK 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	66	
PRIMARY EFFLUENT D BUILDING	0	0	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	161	0	0	213	
PRIMARY EFFLUENT N & S	0	0	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	161	0	0	213	
RAS - METER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	
RAW SLUDGE D BUILDING 10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	0	0	0	300	
RAW SLUDGE NEW P.S. 7-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	0	0	0	300	
RAW SLUDGE OLD P.S. 1-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	0	0	0	300	
TOTAL	843	3	779	606	55	63	2	448	169	1	1	2,974	72	857	478	7	1,154	99	46	1	12	6	13	321	63	2,645	2,856	35	1,119	5	15,733

Ions include: Cl, SO4, NO3, NO2, Br, Ca, Mg, Na, K

Metals by ICP include: Cd, Cr, Cu, Ni, Pb, Zn, Al, Mn, Fe, B

Volatile Total Solids (VS) are done on 80% of Total Solids

Volatile Suspend Solids (VSS) are done on 2% of the Total Suspended Solids samples

TORONTO WATER LABORATORY

Sampling Point: TAB01 INFLUENT &

Group: METALS	Minimum	Maximum	Average	Units	Reporting Limit
Arsenic	0.010000	0.01000	0.01000	mg/L	<0.01
Cadmium	0.004000	0.00400	0.00400	mg/L	<0.004
Chromium	0.010400	0.02000	0.01405	mg/L	<0.004
Copper	0.134000	0.17100	0.15013	mg/L	<0.004
Iron	3.870000	5.75000	4.86125	mg/L	<0.02
Lead	0.005000	0.01630	0.00854	mg/L	<0.005
Manganese	0.066100	0.08470	0.07463	mg/L	<0.004
Nickel	0.006900	0.01480	0.00893	mg/L	<0.005
Zinc	0.165000	0.59300	0.24550	mg/L	<0.02
Group: Mercury	Minimum	Maximum	Average	Units	Reporting Limit
Mercury	0.000000	0.00020	0.00010	mg/L	<0.00003

Sampling Point: TAB04 PRIMARY EFFLUENT D BUILDING

Group: CBOD	Minimum	Maximum	Average	Units	Reporting Limit
Carbonaceous Biochemical Oxygen Demand	44.00	218.00	80.00	mg/L	<2
Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	44.00	384.00	132.41	mg/L	<2
Volatile Suspended Solids				%	

Sampling Point: TAB06 PRIMARY EFFLUENT N & S

Group: CBOD	Minimum	Maximum	Average	Units	Reporting Limit
Carbonaceous Biochemical Oxygen Demand	10.00	144.00	58.49	mg/L	<2
Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	32.00	300.00	103.17	mg/L	<2
Volatile Suspended Solids				%	

Sampling Point: TAB07 FINAL EFFLUENT

Group: ALK pH DS COND	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	57.70	131.00	84.05	mg/L	<1.6
Conductivity	793.00	1,230.00	926.30	µS/cm	<1.5
pH	7.50	8.00	7.73	SU	<0.10
Group: BOD	Minimum	Maximum	Average	Units	Reporting Limit
Biochemical Oxygen Demand (BOD)	4.00	4.00	4.00	mg/L	<2
Group: CBOD	Minimum	Maximum	Average	Units	Reporting Limit
Carbonaceous Biochemical Oxygen Demand	2.00	19.00	4.52	mg/L	<2
Group: COD	Minimum	Maximum	Average	Units	Reporting Limit
Chemical Oxygen Demand	22.00	28.00	25.00	mg/L	<10
Group: Chlorine	Minimum	Maximum	Average	Units	Reporting Limit
Total Residual Chlorine	0.40	1.10	0.69	mg/L	<0.01

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	1.00	700.00	72.00	CFU/100 mL	
Group: IONS	Minimum	Maximum	Average	Units	Reporting Limit
Bromide	0.200000	2.75000	2.49865	mg/L	<0.1
Calcium	50.400000	102.00000	76.27838	mg/L	<0.2
Chloride	99.100000	442.00000	158.67838	mg/L	<0.2
Hardness (Calculation)	179.000000	332.00000	250.86486	mg/L	<1
Magnesium	12.100000	18.70000	14.67838	mg/L	<0.1
Nitrate(as N)	0.275000	24.60000	15.96108	mg/L	<0.01
Nitrite(as N)	0.055000	6.19000	2.18970	mg/L	<0.002
Potassium	7.190000	14.10000	11.54216	mg/L	<0.05
Sodium	65.400000	279.00000	103.58378	mg/L	<0.4
Sulfate	37.800000	55.60000	44.80541	mg/L	<0.2
Group: METALS	Minimum	Maximum	Average	Units	Reporting Limit
Arsenic	0.010000	0.01000	0.01000	mg/L	<0.01
Cadmium	0.004000	0.00400	0.00400	mg/L	<0.004
Chromium	0.004000	0.00450	0.00406	mg/L	<0.004
Copper	0.010700	0.04200	0.01886	mg/L	<0.004
Iron	0.354000	2.29000	0.71788	mg/L	<0.02
Lead	0.005000	0.00960	0.00558	mg/L	<0.005
Manganese	0.039500	0.09300	0.06549	mg/L	<0.004
Nickel	0.005000	0.00960	0.00603	mg/L	<0.005
Zinc	0.031200	0.35500	0.07686	mg/L	<0.02
Group: Mercury	Minimum	Maximum	Average	Units	Reporting Limit
Mercury	0.000100	0.00010	0.00010	mg/L	<0.00003
Group: NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)	0.40	12.00	4.40	mg/L	<0.05
Group: P	Minimum	Maximum	Average	Units	Reporting Limit
Phosphorus (HACH)	0.22	4.30	0.68	mg/L	<0.08
Group: TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	1.38	8.23	4.21	mg/L	<0.2
Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	2.00	132.00	6.61	mg/L	<2
Volatile Suspended Solids				%	
Group: Toxicity	Minimum	Maximum	Average	Units	Reporting Limit
96h_Mortality	0.00	100.00	15.33		
96h_LC50	100.00	100.00	100.00	%	
Un-ionized Ammonia	0.00	0.05	0.02	mg/L	
Group: Un-ionized NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)Un-ionized (Calculation)	0.00	0.15	0.04	mg/L	<0.001
Group: pH_15	Minimum	Maximum	Average	Units	Reporting Limit
pH_15C	7.10	7.70	7.40	SU	

Sampling Point: TAB10 RAW SLUDGE OLD P.S. 1-6

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.17	7.00	1.88	%	
Volatile Total Solids	42.90	88.24	70.57	%	

Sampling Point: TAB11 RAW SLUDGE NEW P.S. 7-9

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.30	8.40	3.16	%	
Volatile Total Solids	43.20	85.51	75.26	%	

Sampling Point: TAB12 RAW SLUDGE D BUILDING 10-12

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.30	5.90	3.01	%	
Volatile Total Solids	59.30	91.70	74.87	%	

Sampling Point: TAB13 PRIMARY DIGESTED SLUDGE VA TANK 5

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,750.00	3,300.00	2,459.38	mg/L	<10
Volatile Acids	50.00	200.00	140.63	mg/L	
pH	7.50	8.00	7.76	SU	

Sampling Point: TAB14 PRIMARY DIGESTED SLUDGE VA TANK 6

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,800.00	3,050.00	2,456.25	mg/L	<10
Volatile Acids	60.00	200.00	130.00	mg/L	
pH	7.40	8.00	7.73	SU	

Sampling Point: TAB15 PRIMARY DIGESTED SLUDGE VA TANK 7

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,900.00	2,900.00	2,431.25	mg/L	<10
Volatile Acids	70.00	180.00	140.63	mg/L	
pH	7.40	8.00	7.74	SU	

Sampling Point: TAB16 PRIMARY DIGESTED SLUDGE VA TANK 8

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	2,000.00	3,000.00	2,443.75	mg/L	<10
Volatile Acids	60.00	230.00	147.50	mg/L	
pH	7.40	8.10	7.74	SU	

Sampling Point: TAB18 PRIMARY DIGESTED SLUDGE VA TANK 10

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	2,150.00	4,050.00	3,003.13	mg/L	<10
Volatile Acids	110.00	280.00	228.75	mg/L	
pH	7.60	8.10	7.81	SU	

Sampling Point: TAB19 PRIMARY DIGESTED SLUDGE VA TANK 11

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	2,900.00	3,350.00	3,168.75	mg/L	<10
Volatile Acids	120.00	550.00	302.50	mg/L	
pH	7.60	8.00	7.81	SU	

Sampling Point: TAB20 PRIMARY DIGESTED SLUDGE VA TANK 12

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	2,150.00	3,250.00	2,793.75	mg/L	<10

Volatile Acids	140.00	270.00	210.00	mg/L
pH	7.50	8.10	7.79	SU

Sampling Point: TAB21 PRIMARY DIGESTED SLUDGE VA TANK 13

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,600.00	2,600.00	2,128.13	mg/L	<10
Volatile Acids	80.00	170.00	128.13	mg/L	
pH	7.40	8.00	7.71	SU	

Sampling Point: TAB22 PRIMARY DIGESTED SLUDGE VA TANK 14

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	4.70	4.70	4.70	%	

Sampling Point: TAB23 PRIMARY DIGESTED SLUDGE VA TANK 15

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,850.00	2,950.00	2,362.50	mg/L	<10
Volatile Acids	40.00	160.00	107.50	mg/L	
pH	7.40	8.00	7.76	SU	

Sampling Point: TAB24 PRIMARY DIGESTED SLUDGE VA TANK 16

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,550.00	2,700.00	2,262.50	mg/L	<10
Volatile Acids	80.00	170.00	125.63	mg/L	
pH	7.30	8.00	7.79	SU	

Sampling Point: TAB25 PRIMARY DIGESTED SLUDGE VA TANK 19

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,850.00	2,900.00	2,396.88	mg/L	<10
Volatile Acids	70.00	210.00	122.50	mg/L	
pH	7.30	8.00	7.75	SU	

Sampling Point: TAB26 PRIMARY DIGESTED SLUDGE VA TANK 20

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,100.00	2,700.00	2,246.88	mg/L	<10
Volatile Acids	40.00	170.00	119.38	mg/L	
pH	7.30	8.10	7.76	SU	

Sampling Point: TAB27 PRIMARY DIGESTED SLUDGE VA TANK 21

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	950.00	3,200.00	2,243.75	mg/L	<10
Volatile Acids	60.00	170.00	130.63	mg/L	
pH	7.30	8.00	7.76	SU	

Sampling Point: TAB28 PRIMARY DIGESTED SLUDGE VA TANK 22

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,000.00	2,850.00	2,140.63	mg/L	<10
Volatile Acids	70.00	180.00	135.00	mg/L	
pH	7.30	8.00	7.72	SU	

Sampling Point: TAB29**PRIMARY DIGESTED SLUDGE TRANSFER TANK 5**

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	25,000.00	1,130,000.00	363,375.00	CFU/g(dry wt)	
GM of last 8 EColi	139,384.00	233,500.00	168,978.25	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.47	2.40	1.77	%	
Volatile Total Solids	58.10	70.60	63.36	%	

Sampling Point: TAB30**PRIMARY DIGESTED SLUDGE TRANSFER TANK 6**

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	129,000.00	1,500,000.00	548,875.00	CFU/g(dry wt)	
GM of last 8 EColi	253,123.00	426,114.00	328,535.88	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.48	2.30	1.75	%	
Volatile Total Solids	51.40	68.40	62.38	%	

Sampling Point: TAB31**PRIMARY DIGESTED SLUDGE TRANSFER TANK 7**

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	106,000.00	2,380,000.00	530,875.00	CFU/g(dry wt)	
GM of last 8 EColi	253,909.00	349,576.00	308,087.38	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.46	2.10	1.75	%	
Volatile Total Solids	55.60	67.90	62.50	%	

Sampling Point: TAB32**PRIMARY DIGESTED SLUDGE TRANSFER TANK 8**

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	95,200.00	550,000.00	215,150.00	CFU/g(dry wt)	
GM of last 8 EColi	160,661.00	231,443.00	189,613.13	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.67	4.40	2.27	%	
Volatile Total Solids	44.80	63.00	54.99	%	

Sampling Point: TAB33**PRIMARY DIGESTED SLUDGE TRANSFER TANK 9**

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.00	1.00	1.00	%	

Sampling Point: TAB34**PRIMARY DIGESTED SLUDGE TRANSFER TANK 10**

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	20,000.00	2,100,000.00	807,800.00	CFU/g(dry wt)	
GM of last 8 EColi	143,516.00	199,884.00	167,590.00	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.20	8.10	1.31	%	
Volatile Total Solids	33.30	66.60	57.09	%	

Sampling Point: TAB35**PRIMARY DIGESTED SLUDGE TRANSFER TANK 11**

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
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EColi	7,060.00	1,120,000.00	214,926.67	CFU/g(dry wt)	
GM of last 8 EColi	51,450.00	144,183.00	84,234.17	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.30	2.20	0.98	%	
Volatile Total Solids	33.30	71.40	60.12	%	

Sampling Point: TAB36 PRIMARY DIGESTED SLUDGE TRANSFER TANK 12

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	100,000.00	1,700,000.00	579,714.29	CFU/g(dry wt)	
GM of last 8 EColi	149,172.00	393,746.00	256,155.57	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.30	2.30	0.81	%	
Volatile Total Solids	50.00	71.40	59.29	%	

Sampling Point: TAB37 PRIMARY DIGESTED SLUDGE TRANSFER TANK 13

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	127,000.00	1,450,000.00	567,250.00	CFU/g(dry wt)	
GM of last 8 EColi	244,260.00	417,475.00	313,240.13	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.10	2.40	1.62	%	
Volatile Total Solids	59.10	68.20	63.29	%	
Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	2,050.00	2,050.00	2,050.00	mg/L	<10
Volatile Acids	150.00	150.00	150.00	mg/L	
pH	7.60	7.60	7.60	SU	

Sampling Point: TAB38 PRIMARY DIGESTED SLUDGE TRANSFER TANK 14

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.40	1.40	1.40	%	
Volatile Total Solids	66.70	66.70	66.70	%	

Sampling Point: TAB39 PRIMARY DIGESTED SLUDGE TRANSFER TANK 15

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	147,000.00	2,540,000.00	646,375.00	CFU/g(dry wt)	
GM of last 8 EColi	341,264.00	449,745.00	380,457.38	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.20	1.90	1.43	%	
Volatile Total Solids	57.10	70.80	64.51	%	

Sampling Point: TAB40 PRIMARY DIGESTED SLUDGE TRANSFER TANK 16

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	66,700.00	1,070,000.00	388,337.50	CFU/g(dry wt)	
GM of last 8 EColi	259,828.00	405,412.00	302,940.13	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.33	1.90	1.56	%	
Volatile Total Solids	55.00	66.70	62.77	%	

Sampling Point: TAB41 PRIMARY DIGESTED SLUDGE TRANSFER TANK 19

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	264,000.00	700,000.00	489,000.00	CFU/g(dry wt)	
GM of last 8 EColi	391,049.00	487,773.00	440,454.38	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.90	1.90	1.46	%	
Volatile Total Solids	56.30	68.20	63.32	%	

Sampling Point: TAB42 PRIMARY DIGESTED SLUDGE TRANSFER TANK 20

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	193,000.00	1,400,000.00	530,625.00	CFU/g(dry wt)	
GM of last 8 EColi	314,718.00	464,484.00	401,935.25	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.10	2.00	1.57	%	
Volatile Total Solids	59.10	71.40	63.78	%	

Sampling Point: TAB43 PRIMARY DIGESTED SLUDGE TRANSFER TANK 21

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	118,000.00	2,000,000.00	517,375.00	CFU/g(dry wt)	
GM of last 8 EColi	215,137.00	349,809.00	275,722.25	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.80	2.20	1.53	%	
Volatile Total Solids	59.10	66.70	62.86	%	

Sampling Point: TAB44 PRIMARY DIGESTED SLUDGE TRANSFER TANK 22

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	138,000.00	1,290,000.00	570,125.00	CFU/g(dry wt)	
GM of last 8 EColi	352,522.00	522,668.00	402,658.75	CFU/g(dry wt)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.70	2.60	1.40	%	
Volatile Total Solids	52.40	68.80	62.88	%	

Sampling Point: TAB45 CENTRIFUGE FEED (COMPOSITE)

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.40	1.90	1.65	%	
Volatile Total Solids	62.07	65.52	63.80	%	

Sampling Point: TAB47 CAKE (BIOSOLIDS)

Group: Dioxins and Furans	Minimum	Maximum	Average	Units	Reporting Limit
Dioxins and Furans (TEQ)	2.93	2.93	2.93	Ng TEQ/Kg	
Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	24,242.00	4,009,164.00	1,030,065.22	CFU/g(dry wt)	
Group: IONS	Minimum	Maximum	Average	Units	Reporting Limit
AVG of Last 8 NO2 Results	0.140000	6.67000	2.94235	mg/Kg (DW)	
AVG of Last 8 NO3 Results	0.300000	0.93000	0.53294	mg/Kg (DW)	
Nitrate(as N)	0.300000	1.13000	0.71471	mg/Kg (DW)	
Nitrite(as N)	0.350000	18.00000	2.18765	mg/Kg (DW)	
Group: METALS	Minimum	Maximum	Average	Units	Reporting Limit
AVG of Last 8 As Results	2.000000	3.45000	2.67778	mg/Kg (DW)	<2.0

AVG of Last 8 Cd Results	1.000000	1.05000	1.00667	mg/Kg (DW)	<1
AVG of Last 8 Co Results	4.750000	5.14000	4.94778	mg/Kg (DW)	<1
AVG of Last 8 Cr Results	110.880000	124.88000	116.43389	mg/Kg (DW)	<11
AVG of Last 8 Cu Results	680.000000	753.38000	715.47500	mg/Kg (DW)	<72
AVG of Last 8 Mo Results	8.430000	10.19000	9.30167	mg/Kg (DW)	<1
AVG of Last 8 Ni Results	26.340000	34.85000	29.90833	mg/Kg (DW)	<8
AVG of Last 8 P Results	25,337.500000	27,787.50000	26,516.66667	mg/Kg (DW)	<2000
AVG of Last 8 Pb Results	37.430000	39.25000	38.16111	mg/Kg (DW)	<5
AVG of Last 8 Se Results	2.550000	3.90000	3.22444	mg/Kg (DW)	<0.5
AVG of Last 8 Zn Results	740.380000	792.75000	768.23167	mg/Kg (DW)	<63
Arsenic	1.180000	4.30000	2.75333	mg/Kg (DW)	
Boron	11.300000	22.70000	17.68889	mg/Kg (DW)	
Cadmium	0.676000	1.18000	0.92244	mg/Kg (DW)	
Chromium	105.000000	141.00000	118.33333	mg/Kg (DW)	
Cobalt	4.580000	5.96000	5.04778	mg/Kg (DW)	
Copper	658.000000	799.00000	710.94444	mg/Kg (DW)	
Lead	32.100000	46.00000	38.74444	mg/Kg (DW)	
Manganese	247.000000	343.00000	290.72222	mg/Kg (DW)	
Molybdenum	7.210000	10.40000	9.27222	mg/Kg (DW)	
Nickel	25.400000	41.60000	28.77222	mg/Kg (DW)	
Potassium	692.000000	1,160.00000	924.61111	mg/Kg (DW)	
Selenium	1.080000	5.31000	3.14889	mg/Kg (DW)	
Total Phosphorus	24,100.000000	29,400.00000	26,711.11111	mg/Kg (DW)	
Zinc	712.000000	827.00000	771.50000	mg/Kg (DW)	
Group: Mercury	Minimum	Maximum	Average	Units	Reporting Limit
AVG of Last 8 Hg Results	0.620000	0.67000	0.64667	mg/Kg (DW)	<0.25
Mercury	0.460000	0.87000	0.63722	mg/Kg (DW)	
Group: NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
AVG of Last 8 NH3 Results	5,800.00	6,881.00	6,517.76	mg/Kg (DW)	
Ammonia(as N)	5,100.00	8,950.00	6,615.88	mg/Kg (DW)	
Group: Salmonella	Minimum	Maximum	Average	Units	Reporting Limit
Salmonella (MPN/g)	0.11	1,580.00	471.70	MPN/g(dry wt)	
Group: TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	39,600.00	67,400.00	52,070.59	mg/Kg (DW)	
Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	26.20	95.30	44.31	%	
Volatile Total Solids	58.40	67.10	63.60	%	

Sampling Point: TAB48 CENTRATE

Group: BOD	Minimum	Maximum	Average	Units	Reporting Limit
Biochemical Oxygen Demand (BOD)	76.00	76.00	76.00	mg/L	<2
Group: NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)	360.00	490.00	437.14	mg/L	<0.05
Group: TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	429.00	519.00	469.50	mg/L	<0.2
Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	60.00	1,470.00	318.72	mg/L	<2
Volatile Suspended Solids				%	

Sampling Point: TAB50 CENTRIFUGE FEED PM (GRAB)

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.70	1.70	1.70	%	

Sampling Point: TAB51 FLOTATION (WAS)

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	2,240.00	10,470.00	7,388.28	mg/L	<2
Volatile Suspended Solids	73.20	74.60	73.90	%	

Sampling Point: TAB52 FLOTATION (TWAS)

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	2.00	4.50	3.48	%	
Volatile Total Solids	65.52	78.38	71.73	%	

Sampling Point: TAB53 FLOTATION SUBNATANT

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	2.00	196.00	32.29	mg/L	<2
Volatile Suspended Solids				%	

Sampling Point: TAB54 MIXED LIQUOR

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	1,500.00	6,750.00	2,587.58	mg/L	<2
Volatile Suspended Solids	69.80	85.40	75.59	%	

Sampling Point: TAB55 POLYMER - FLOTATION TANK 1

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.26	0.56	0.41	%	

Sampling Point: TAB56 POLYMER - FLOTATION TANK 2

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.27	0.55	0.42	%	

Sampling Point: TAB57 POLYMER - DEWATERING TANK 1

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.30	0.53	0.38	%	

Sampling Point: TAB63 POLYMER - FLOTATION TANK 3

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.26	0.45	0.34	%	

Sampling Point: TAB66 BYPASS FINAL EFFLUENT

Group: CBOD	Minimum	Maximum	Average	Units	Reporting Limit
Carbonaceous Biochemical Oxygen Demand	47.00	67.00	57.00	mg/L	<2

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	810,000.00	810,000.00	810,000.00	CFU/100 mL	

Group: IONS	Minimum	Maximum	Average	Units	Reporting Limit

Bromide	0.550000	2.75000	1.65000	mg/L	<0.1
Calcium	45.800000	62.00000	53.90000	mg/L	<0.2
Chloride	60.300000	74.30000	67.30000	mg/L	<0.2
Hardness (Calculation)	144.000000	188.00000	166.00000	mg/L	<1
Magnesium	7.190000	8.17000	7.68000	mg/L	<0.1
Nitrate(as N)	0.190000	0.27500	0.23250	mg/L	<0.01
Nitrite(as N)	0.093000	0.54700	0.32000	mg/L	<0.002
Potassium	6.330000	6.62000	6.47500	mg/L	<0.05
Sodium	33.300000	50.10000	41.70000	mg/L	<0.4
Sulfate	20.300000	21.60000	20.95000	mg/L	<0.2
Group: NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)	17.00	29.00	23.00	mg/L	<0.05
Group: P	Minimum	Maximum	Average	Units	Reporting Limit
Phosphorus (HACH)	2.70	3.00	2.85	mg/L	<0.08
Group: TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	22.50	27.90	25.20	mg/L	<0.2
Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	108.00	132.00	120.00	mg/L	<2

Sampling Point: TAB72 ABTP FE SAMPLE

Group: Ferric Chloride	Minimum	Maximum	Average	Units	Reporting Limit
Absolute Difference	0.00	0.05	0.01		
Bill of Lading #	82,326,117.00	82,445,265.00	82,397,008.19		
Specific Gravity	1.03	1.31	1.23		
Supplier Specific Gravity	1.16	1.31	1.25		
Group: METALS	Minimum	Maximum	Average	Units	Reporting Limit
Iron	132.000000	97,000.00000	25,473.80000	mg/L	<0.02
Manganese	2.000000	67.80000	34.62500	mg/L	<0.004

Sampling Point: TAB79 PRIMARY DIGESTED SLUDGE VA TANK 1

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,900.00	3,000.00	2,453.13	mg/L	<10
Volatile Acids	50.00	180.00	127.50	mg/L	
pH	7.40	8.00	7.68	SU	

Sampling Point: TAB80 PRIMARY DIGESTED SLUDGE VA TANK 2

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,850.00	3,000.00	2,418.75	mg/L	<10
Volatile Acids	70.00	170.00	128.75	mg/L	
pH	7.40	8.00	7.73	SU	

Sampling Point: TAB81 PRIMARY DIGESTED SLUDGE VA TANK 3

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	1,750.00	2,950.00	2,381.25	mg/L	<10
Volatile Acids	60.00	210.00	142.50	mg/L	
pH	7.30	8.00	7.69	SU	

Sampling Point: TAB82 PRIMARY DIGESTED SLUDGE VA TANK 4

Group: VA	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	2,000.00	3,350.00	2,581.25	mg/L	<10
Volatile Acids	30.00	180.00	128.13	mg/L	
pH	7.50	8.00	7.72	SU	

Sampling Point: TAB83 PRIMARY DIGESTED SLUDGE TRANSFER TANK 1

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	86,400.00	1,070,000.00	414,650.00	CFU/g(dry wt)	
GM of last 8 EColi	243,389.00	298,237.00	267,493.63	CFU/g(dry wt)	

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.42	2.50	1.77	%	
Volatile Total Solids	54.10	69.60	62.82	%	

Sampling Point: TAB84 PRIMARY DIGESTED SLUDGE TRANSFER TANK 2

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	37,000.00	371,000.00	178,587.50	CFU/g(dry wt)	
GM of last 8 EColi	132,537.00	188,440.00	170,707.50	CFU/g(dry wt)	

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.36	3.30	2.33	%	
Volatile Total Solids	52.20	65.50	61.69	%	

Sampling Point: TAB85 PRIMARY DIGESTED SLUDGE TRANSFER TANK 3

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	111,000.00	1,940,000.00	592,125.00	CFU/g(dry wt)	
GM of last 8 EColi	211,546.00	362,036.00	279,855.13	CFU/g(dry wt)	

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.47	1.90	1.72	%	
Volatile Total Solids	56.70	68.00	62.36	%	

Sampling Point: TAB86 PRIMARY DIGESTED SLUDGE TRANSFER TANK 4

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	29,300.00	493,000.00	174,516.67	CFU/g(dry wt)	
GM of last 8 EColi	91,572.00	160,461.00	119,769.33	CFU/g(dry wt)	

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	1.50	30.00	7.27	%	
Volatile Total Solids	13.80	59.10	41.39	%	

Sampling Point: TAB89 INFLUENT P BUILDING

Group: ALK pH DS COND	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	215.00	269.00	234.93	mg/L	<1.6
Conductivity	1,090.00	1,910.00	1,320.71	µS/cm	<1.5
pH	7.40	7.80	7.60	SU	<0.10

Group: BOD	Minimum	Maximum	Average	Units	Reporting Limit
Biochemical Oxygen Demand (BOD)	2.00	933.00	221.36	mg/L	<2

Group: CBOD	Minimum	Maximum	Average	Units	Reporting Limit
Carbonaceous Biochemical Oxygen Demand	104.00	249.00	161.50	mg/L	<2

Group: COD	Minimum	Maximum	Average	Units	Reporting Limit
Chemical Oxygen Demand	305.00	415.00	346.67	mg/L	<10

Group: NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)	17.00	41.00	27.59	mg/L	<0.05
Group: P	Minimum	Maximum	Average	Units	Reporting Limit
Phosphorus (HACH)	3.40	12.00	6.33	mg/L	<0.08
Group: TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	29.70	56.10	40.41	mg/L	<0.2
Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	92.00	750.00	262.74	mg/L	<2
Volatile Suspended Solids				%	

Sampling Point: TAB90 INFLUENT D BUILDING

Group: ALK pH DS COND	Minimum	Maximum	Average	Units	Reporting Limit
Alkalinity	226.00	263.00	246.43	mg/L	<1.6
Conductivity	1,170.00	2,330.00	1,390.00	μS/cm	<1.5
pH	7.50	7.70	7.57	SU	<0.10
Group: BOD	Minimum	Maximum	Average	Units	Reporting Limit
Biochemical Oxygen Demand (BOD)	54.00	677.00	264.51	mg/L	<2
Group: CBOD	Minimum	Maximum	Average	Units	Reporting Limit
Carbonaceous Biochemical Oxygen Demand	2.00	341.00	199.79	mg/L	<2
Group: COD	Minimum	Maximum	Average	Units	Reporting Limit
Chemical Oxygen Demand	415.00	465.00	436.67	mg/L	<10
Group: NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)	20.00	41.00	31.68	mg/L	<0.05
Group: P	Minimum	Maximum	Average	Units	Reporting Limit
Phosphorus (HACH)	3.50	150.00	8.61	mg/L	<0.08
Group: TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	37.20	63.20	48.70	mg/L	<0.2
Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	80.00	1,664.00	365.37	mg/L	<2
Volatile Suspended Solids				%	

Sampling Point: TAB93 FINAL EFFLUENT North

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	2.00	2.00	2.00	mg/L	<2

Sampling Point: TAB94 FINAL EFFLUENT South

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	2.00	2.00	2.00	mg/L	<2

Sampling Point: TAB96 FINAL EFFLUENT Lab Basement

Group: Chlorine	Minimum	Maximum	Average	Units	Reporting Limit
Total Residual Chlorine	0.60	1.00	0.71	mg/L	<0.01
Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	1.00	18.00	6.50	CFU/100 mL	

Note: Averages are based on raw data !

Note: Minimum values are normally reported as < the reporting limit for that parameter. !

Note: Average is calculated for ECOLI, if Geometric Mean is required ask the lab for a separate data file.

Appendix F

Influent and Bypass Flow Meter Calibration Records

Certificate Of Calibration

Customer:

City of Toronto - Ashbridges Bay Treatment Plant
9 Leslie Street, Toronto, ON M4M 3M9
Phone: (416) 738-1689
Fax:

Instrument Identification:

Description: pH Analyzer
Manufacturer: GLI
Model No: 63
Serial No: N/Av
Range: 0 to 14 pH
Tolerance: ± 2% FS
Tag No: TAB-DIS-AIT-3006
Location: North

Cal. Date: June 13, 2016
Due Date: December 13, 2016

Standards Used:

Asset No	Manufacturer	Calibration Date	Due Date
BU1400R	AlphaChem	N/Ap	July 2017
BU1700Y	AlphaChem	N/Ap	December 2017
BU1100B	AlphaChem	N/Ap	August 2017

Test Report:

AS FOUND		
Reference	Instrument	Error
pH	pH	% FS
4.00	4.48	3.43
7.00	7.38	2.71
10.00	10.48	3.43

AS LEFT		
Reference	Instrument	Error
pH	pH	% FS
4.00	4.01	0.07
7.00	7.02	0.14
10.00	10.13	0.93

Passed:

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Failed:

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Calibration Sticker applied?

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Restricted Use:

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

As found in tolerance:

Yes	No
<input type="checkbox"/>	<input checked="" type="checkbox"/>

As left in tolerance:

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>


Repair performed:


Yes	No
<input type="checkbox"/>	<input checked="" type="checkbox"/>

Adjustment performed:

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: Installed new pH sensor and calibrated loop.

Performed By: 
A. Shah - Technician
Date: June 14, 2016

Reviewed By: 
C. Ramnarine - Service Manager
Date: June 14, 2016



Certificate Of Calibration

Customer:

City of Toronto - Ashbridges Bay Treatment Plant
9 Leslie Street, Toronto, ON M4M 3M9
Phone: (416) 738-1689
Fax:

Instrument Identification:

Description: pH Analyzer
Manufacturer: GLI
Model No: 63
Serial No: N/Av
Range: 0 to 14 pH
Tolerance: ± 2% FS
Tag No: TAB-DIS-AIT-3003
Location: South

Cal. Date: June 13, 2016
Due Date: December 13, 2016

Standards Used:

Asset No	Manufacturer	Calibration Date	Due Date
BU1400R	AlphaChem	N/Ap	July 2017
BU1700Y	AlphaChem	N/Ap	December 2017
BU1100B	AlphaChem	N/Ap	August 2017

Test Report:


AS FOUND		
Reference	Instrument	Error
pH	pH	% FS
4.00	4.13	0.93
7.00	7.31	2.21
10.00	10.31	2.21


AS LEFT		
Reference	Instrument	Error
pH	pH	% FS
4.00	4.01	0.07
7.00	7.02	0.14
10.00	10.11	0.79

	Yes	No
Passed:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Failed:	<input type="checkbox"/>	<input type="checkbox"/>
Calibration Sticker applied?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Restricted Use:	<input type="checkbox"/>	<input type="checkbox"/>

	Yes	No
As found in tolerance:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
As left in tolerance:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Repair performed:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Adjustment performed:	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: pH sensor serviced and calibrated loop.

Performed By: 
A. Shah - Technician
Date: June 14, 2016

Reviewed By: 
C. Ramnarine - Service Manager
Date: June 14, 2016



Certificate Of Calibration

Customer:

City of Toronto - Ashbridges Bay Treatment Plant
9 Leslie Street, Toronto, ON M4M 3M9
Phone: (416) 738-1689
Fax:

Cal. Date: December 21, 2016
Due Date: June 21, 2017

Instrument Identification:

Description: pH Analyzer
Manufacturer: GLI
Model No: 63
Serial No: N/Av
Range: 0 to 14 pH
Tolerance: ± 2% FS
Tag No: TAB-DIS-AIT-3003
Location: South

Standards Used:

Asset No	Manufacturer	Calibration Date	Due Date
BU1400R	AlphaChem	N/Ap	July 2017
BU1700Y	AlphaChem	N/Ap	December 2017
BU1100B	AlphaChem	N/Ap	August 2017

Test Report:


AS FOUND		
Reference	Instrument	Error
pH	pH	% FS
4.00	4.13	0.93
7.00	7.19	1.36
10.00	10.39	2.79


AS LEFT		
Reference	Instrument	Error
pH	pH	% FS
4.00	4.00	0.00
7.00	7.02	0.14
10.00	10.14	1.00

	Yes	No
Passed:	✓	
Failed:		
Calibration Sticker applied?	✓	
Restricted Use:		

	Yes	No
As found in tolerance:		✓
As left in tolerance:	✓	
Repair performed:		✓
Adjustment performed:	✓	

Comments: Replaced defective pH probe and calibrated in loop.

Performed By: 
A. Shah - Technician
Date: December 23, 2016

Reviewed By: 
C. Ramnarine - Service Manager
Date: December 23, 2016

Certificate Of Calibration

Customer:

City of Toronto - Ashbridges Bay Treatment Plant
9 Leslie Street, Toronto, ON M4M 3M9
Phone: (416) 738-1689
Fax:

Instrument Identification:

Description: pH Analyzer
Manufacturer: GLI
Model No: 63
Serial No: N/Av
Range: 0 to 14 pH
Tolerance: ± 2% FS
Tag No: TAB-DIS-AIT-3006
Location: North

Cal. Date: December 21, 2016
Due Date: June 21, 2017

Standards Used:

Asset No	Manufacturer	Calibration Date	Due Date
BU1400R	AlphaChem	N/Av	July 2017
BU1700Y	AlphaChem	N/Av	December 2017
BU1100B	AlphaChem	N/Av	August 2017

Test Report:


AS FOUND		
Reference	Instrument	Error
pH	pH	% FS
4.00	4.22	1.57
7.00	7.21	1.50
10.00	10.45	3.21

AS LEFT		
Reference	Instrument	Error
pH	pH	% FS
4.00	4.01	0.07
7.00	7.03	0.21
10.00	10.14	1.00

	Yes	No
Passed:	✓	
Failed:		
Calibration Sticker applied?	✓	
Restricted Use:		

	Yes	No
As found in tolerance:		✓
As left in tolerance:	✓	
Repair performed:		✓
Adjustment performed:	✓	

Comments: pH sensor serviced and calibrated in loop.

Performed By: 
A. Shah - Technician
Date: December 23, 2016

Reviewed By: 
C. Ramnarine - Service Manager
Date: December 23, 2016



Certificate of Instrument Performance
Certificat de Conformité

Company Name / Nom de la Compagnie : CITY OF TORONTO

Account Number / No. de compte : 40170851

Certification Number / Numéro du Certificat : 5492300

Part Number / No. de pièce : 5440000	CL17 FINAL ASSEMBLY W/KITS
Serial Number / No. de série : 131100488310	
External Reference / Référence externe : South	

Hach Sales & Service Canada Ltd. certifies that your instrument has been serviced, calibrated, verified with standards and now meets new product specifications.

Hach Sales & Service Canada Ltd. atteste que votre instrument a été entretenu, calibré et vérifié selon les normes en vigueur. Ses spécifications actuelles sont équivalentes à celles d'un produit neuf.

Certified by / Certifié par :
Bilton, Stephen

Certification Date / Date de certification :
31-OCT-16



Certificate of Instrument Performance
Certificat de Conformité

Company Name / Nom de la Compagnie : CITY OF TORONTO

Account Number / No. de compte : 40170851

Certification Number / Numéro du Certificat : 5492300

Part Number / No. de pièce : 5440000	CL17 FINAL ASSEMBLY W/KITS
Serial Number / No. de série : 131200489314	
External Reference / Référence externe : North	

Hach Sales & Service Canada Ltd. certifies that your instrument has been serviced, calibrated, verified with standards and now meets new product specifications.

Hach Sales & Service Canada Ltd. atteste que votre instrument a été entretenu, calibré et vérifié selon les normes en vigueur. Ses spécifications actuelles sont équivalentes à celles d'un produit neuf.

Certified by / Certifié par :
Bilton, Stephen

Certification Date / Date de certification :
31-OCT-16



Hach ServicePlus™
FIELD SERVICE REPORT

Page: 1 / 2
Date: 2-Nov-16

Account Number / No. de compte : 40170851
Customer / Client : CITY OF TORONTO
Ship-to Address / Adresse de livraison: 9 LESLIE ST
 TORONTO-M4M 3M9,Canada
Bill-to address / Adresse de facturation: METRO HALL 14TH FLR
 55 JOHN ST

Contact Name / Nom du Contact : BILL CHUA
Fax / Télécopieur :
Email / Courriel : BCHUA@TORONTO.CA
Phone / Téléphone : 416-392-5844
Technician / Technicien: 18524

Service Request / Requête de service : 5492300
Date of Service / Date de service rendu : 31-OCT-16
Purchase Order / Bon de commande : 3547718

Product / Produit	Product Description	Serial Number / No. de série	References / Références
5440000	CL17 FINAL ASSEMBLY W/KITS	131100488310	South
NOTES: Cleaned and inspected Colorimeter. Replaced Reagent and Sample block as necessary. Replaced tubing and stir bar. As found Cl. reading=0.47 mg/l. As found gain=1.000. As left Cl. reading =0.41 mg/l. As left Gain=1.000. Checked output signal level. Verified using external Standard. Verification results were within 5%. Chlorine Standard used =3.50 mg/L. CL17 readings-3.46,3.45,3.45 mg/L. Verification Method used: Hach Method 8021 (USEPA DPD Method). Test Instrument used : DR 890, SN 070290C62407, Expiry-Jan. 2017. Hach DPD total Chlorine Reagent used: Lot A 2052, Exp. Feb. 17.			

Product / Produit	Product Description	Serial Number / No. de série	References / Références
5440000	CL17 FINAL ASSEMBLY W/KITS	131200489314	North
NOTES: Cleaned and inspected Colorimeter. Replaced Reagent and Sample block as necessary. Replaced tubing and stir bar. As found Cl. reading=0.45 mg/l. As found gain=1.000. As left Cl. reading =0.42 mg/l. As left Gain=1.000. Checked output signal level. Verified using external Standard. Verification results were within 5%. Chlorine Standard used =3.50 mg/L. CL17 readings-3.58,3.58,3.51 mg/L. Verification Method used: Hach Method 8021 (USEPA DPD Method). Test Instrument used : DR 890, SN 070290C62407, Expiry-Jan. 2017. Hach DPD total Chlorine Reagent used: Lot A 2052, Exp. Feb. 17.			

Service Price detail for work listed above / Détails de prix de service pour le travail effectué ci-dessus :

Item Number / No. d'article	Description	Service Activity / Activité de service	Qty / Qté	Unit Price / Prix unitaire	Dis. / Esc.%	Extended Price / Montant total	Net Price / Prix net
CMC_CL17_FRA	Canada CL17 Flat Rate (P)	CA DOM FIELD CHARGES	2	425.00		850	850.00
5444301	KIT, CL17 PRE-ASSY MAINT, POST 3/00	CA DOM FIELD NO CHARGES	2	292.00		584	0.00
4274100	si BLOCK, REAGENT	CA DOM FIELD NO CHARGES	2	67.00		134	0.00
CAN_FIELD_LABOR	CANADA Field Labor	CA DOM FIELD NO CHARGES	2.5	210.00		525	0.00

TOTAL : \$850.00

This is not an invoice. / Ceci n'est pas une facture.



Hach ServicePlus™
FIELD SERVICE REPORT

Page: 2 / 2
Date: 2-Nov-16

ANY DOLLAR AMOUNTS PRESENTED ON THIS ARE AN ESTIMATION AND DOES NOT INCLUDE ANY APPLICABLE TAXES
TOUT MONTANT PRESENTE ICI EST UNE ESTIMATION ET N'INCLUT PAS DE TAXES

Customer Name / Nom du Client : CITY OF TORONTO	Signature : _____	Date: _____
---	-------------------	-------------

Service Tech Name/ Nom du technicien: Bilton, Stephen	Signature: _____	Date: _____
---	------------------	-------------

Effluent Monitoring Equipment Calibration and Maintenance Records

Entity Number	Entity Name	Activity	Date/Time Activity Performed	Activity Performed By
TAB-STR-FIT-8003	Transmitter,Flow Indication, South Effluent Conduit	Offset correction for the water level for Hydrovision Flow Transmitter- Two monthly, Ref: TAB-STR-0005 for TAB-STR-FIT-8003	01/07/2016 13:51	EICT
TAB-STR-FIT-8004	Transmitter,Flow Indication, North Effluent Conduit	Offset correction for the water level for Hydrovision Flow Transmitter- Two monthly, Ref: TAB-STR-0005 for TAB-STR-FIT-8004	01/07/2016 13:51	EICT
TAB-STR-FIT-8003	Transmitter,Flow Indication, South Effluent Conduit	Cleaning of Final Effluent Conduit Hydrovision Flow IndicationTransmitter Sensor- 2 monthly, Ref: TAB-STR-0004 for TAB-STR-FIT-8003	01/21/2016 13:42	EICT
TAB-STR-FIT-8004	Transmitter,Flow Indication, North Effluent Conduit	Cleaning of Final Effluent Conduit Hydrovision Flow IndicationTransmitter Sensor- 2 monthly, Ref: TAB-STR-0004 for TAB-STR-FIT-8004	01/21/2016 13:42	EICT
TAB-STR-FIT-8003	Transmitter,Flow Indication, South Effluent Conduit	Cleaning of Final Effluent Conduit Hydrovision Flow IndicationTransmitter Sensor- 2 monthly, Ref: TAB-STR-0004 for TAB-STR-FIT-8003	03/01/2016 12:45	EICT
TAB-STR-FIT-8004	Transmitter,Flow Indication, North Effluent Conduit	Cleaning of Final Effluent Conduit Hydrovision Flow IndicationTransmitter Sensor- 2 monthly, Ref: TAB-STR-0004 for TAB-STR-FIT-8004	03/01/2016 12:45	EICT
TAB-STR-FIT-8003	Transmitter,Flow Indication, South Effluent Conduit	Offset correction for the water level for Hydrovision Flow Transmitter- Two monthly, Ref: TAB-STR-0005 for TAB-STR-FIT-8003	03/01/2016 12:47	EICT
TAB-STR-FIT-8004	Transmitter,Flow Indication, North Effluent Conduit	Offset correction for the water level for Hydrovision Flow Transmitter- Two monthly, Ref: TAB-STR-0005 for TAB-STR-FIT-8004	03/01/2016 12:47	EICT

Appendix G

Dewatered Biosolids Metal Concentrations

Ashbridges Bay Treatment Plant - Summary of Dewatered Biosolids Analyses for 2016

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Max Allowable	Annual Average
TKN	63,200.00	63,350.00	47,950.00	56,000.00	47,350.00	48,500.00	42,250.00	50,650.00	47,700.00	51,950.00	60,400.00	69,900.00		54,100
Ammonia (N) ²	6,305.00	6,935.00	7,120.00	6,610.00	6,500.00	6,305.00	7,705.00	6,205.00	5,670.00	6,710.00	6,580.00	7,220.00		6,655
Nitrate as N ³	0.30	0.55	0.49	0.50	0.94	0.89	0.96	0.92	0.84	1.15	1.23	0.66		0.78
Nitrite as N ³	4.44	9.78	0.75	1.21	0.72	0.26	0.48	0.18	0.18	0.18	0.95	0.90		1.67
As	1.50	1.98	1.32	2.64	2.70	2.39	3.52	3.61	3.91	2.86	3.26	3.57	170	2.77
B ⁴	20.00	19.05	13.60	14.00	13.15	15.10	22.15	19.55	22.60	23.70	18.75	19.75		18.45
Cd	1.17	1.12	0.94	1.00	0.82	0.83	0.86	0.72	0.85	0.74	0.87	0.81	34	0.89
Cr	121.50	109.50	115.50	108.50	110.00	116.50	123.50	134.50	125.50	121.50	127.50	131.50	2,800	120.46
Co	4.75	4.93	5.09	5.34	4.68	5.03	4.73	5.13	5.77	4.61	6.33	7.44	340	5.32
Cu	769.00	797.00	724.50	677.00	688.50	667.00	687.50	672.00	716.00	700.00	720.00	719.00	1,700	711.46
Pb	36.20	37.10	39.95	42.35	33.60	35.85	39.65	43.20	40.80	35.70	37.40	38.05	1,100	38.32
Mn ⁴	254.00	283.00	270.50	308.00	303.50	338.50	296.50	289.50	273.00	251.00	291.50	320.50		289.96
Hg	0.56	0.61	0.67	0.66	0.68	0.58	0.79	0.67	0.54	0.55	0.63	0.53	11	0.62
Mo	9.78	9.78	8.20	7.40	8.67	9.46	10.14	9.91	10.12	10.10	11.20	11.30	94	9.67
Ni	38.00	31.55	27.15	26.10	25.95	26.40	26.90	27.85	29.05	26.05	27.95	44.20	420	29.76
P ⁴	24,300.00	26,250.00	26,400.00	26,850.00	28,450.00	28,950.00	25,700.00	26,200.00	27,300.00	28,600.00	28,700.00	29,400.00		27,258
K ⁴	1,050.00	1,145.00	897.00	980.50	841.00	772.50	858.00	843.00	884.50	1,031.50	908.00	976.00		932
Se	3.90	3.47	3.84	1.76	1.71	2.91	4.37	2.98	3.42	4.91	3.61	4.86	34	3.48
Zn	818.50	802.50	765.00	723.00	747.50	728.50	762.50	780.50	898.50	774.00	807.00	861.00	4,200	789.04
TSS%	27.60	26.60	29.70	28.80	27.55	27.80	28.40	29.40	28.65	28.15	27.35	26.75		28.06
VS% ⁴	65.45	65.60	63.84	60.60	63.95	62.60	65.20	62.95	63.05	64.55	64.05	64.47		63.86
E.Coli ⁵	277,286.57	126,888.01	600,507.84	1,369,229.59	1,305,942.70	720,732.58	885,530.83	780,274.60	1,446,411.72	822,418.12	592,125.22	416,634.22	2,000,000	778,665
Salmonella ⁶	0.11	1.09	82.70	6.92	1,580.00		0.00	507.00	1.22	15.30	1.05	23.80		201.74

¹ As per MOE regulations for biosolids utilization on agricultural lands

² Ammonia (N) includes ammonia + ammonium

³ Analysis by City of Hamilton Lab

⁴ Required for Quebec analysis only

⁵ Results and limit for E.Coli are CFU/g, dry wt, average is geometric mean- analysis by Durham Region Lab

⁶ Analysis by University of Guelph

Note: All values are expressed in mg metal/kg dry weight unless otherwise noted and as the average of the previous 4 results (excluding B, Mn, P, K, TS, VS% and Salmonella which are monthly averages)

Where values are less than the method detection limit, half of the limit is used to calculate the annual average

Appendix H
Odour Reduction Plan

Odour Reduction Plan (Dec 31 2016 Status)

1. Program Summary

The details of the Odour Reduction Plan status including odour reduction activities, scheduled completion, and estimated emissions reductions of odour are summarized in the following Sections. The plan provides details for Phases I and II, as approved under the Environmental Compliance Approval (Air) ECA number 3771-92NP7X dated January 23, 2013. The facility currently operates under an updated ECA (Air) number 2815-9PWTWV, dated January 15, 2015.

The goal of the Odour Reduction Program is to reduce the plant-wide odour and Total Reduced Sulphur (TRS) impact beyond the plant property. The program achieves this with a combination of air capture and ventilation, improved dispersion, process changes, and treatment. Of these, only process changes and treatment have the potential to reduce odour emissions. For all new odour sources, odour and TRS emissions were estimated on a conservative basis and are not necessarily reduced at each implementation step. However, the overall odour and TRS impact is always reduced, thus meeting the objectives of the odour reduction program.

Following each project, phase emission sampling will be performed and impact assessment will be calculated as required by the ECA (Air).

2. Phase I Scope by Building

The building-by-building details of the odour reduction activities for Phase I are presented in this section for the Ministry's information. The current status of the activities and estimated completion dates have been updated to reflect the current project status.

2.1 T Building

The scope for the T Building includes:

- * New air collection and ventilation system
- * Re-use of existing activated carbon scrubber
- * 3 new roof stacks, all 4m above roof (wet well, dry Well, and scrubber)
- * Monument Building – new activated carbon scrubber

	Odour (impact)	TRS (emission)
Previous	0.34 OU	3.43E-03 g/s
Current	0.34 OU	3.43E-03 g/s
Project Status	In Operation	
Estimated Completion Date	Completed	

2.2 M Building

The scope for the M Building includes:

- * New ventilation system
- * Installation of new activated carbon scrubber
- * One new exhaust stack

	Odour (impact)	TRS (emission)
Previous	0.32 OU	5.49E-03 g/s
Current	0.32 OU	5.49E-03 g/s
Project Status	In Operation	
Estimated Completion Date	Completed	

2.3 Aeration Tanks

The scope for the Aeration Tanks includes:

- * Process aeration air capture and exhausted to incinerator stack

	Odour (impact)	TRS (emission)
Previous	306 OU	2.23E-01 g/s
Current	1.8 OU	2.23E-01 g/s
Project Status	In Operation	
Estimated Completion Date	Completed	

2.4 D Building

The scope for the D Building includes:

- * New enclosed loading bay
- * New ventilation systems

- * Odour segregation and treatment including collection of air from channels, weirs, grit tanks and screens for biological odour treatment
- * New biofilter with 35 m stack
- * New 40 m stack for dispersion of air from primary clarifiers building

	Odour (impact)	TRS (emission)
Previous	12.5 OU	2.55E-02 g/s
Current	3.5 OU	2.55E-04 g/s
Project Status	In Operation	
Estimated Completion Date	Completed	

3. Phase II Scope by Building

3.1 Truck Loading Facility Biofilter

The scope for the Truck Loading Biofilter includes:

- * Replacement of dewatering equalization tanks scrubber
- * Replacement of the existing biofilters
- * Future conveyance of odourous air from WAS thickening to biofilter
- * A new dedicated 20m stack for dispersion of treated air

	Odour (impact)	TRS (emission)
Current	9.6 OU	2.67E-02 g/s
Future	0.62 OU	2.67E-02 g/s
Project Status	Under Construction	
Estimated Completion Date	December 2018	

3.2 P Building

The proposed upgrade of P Building is part of the City's overall strategy to rehabilitate and modernize aging infrastructure, enhance treatment processes, as well as to reduce odours emitted from the facility. In general, this upgrade comprises of the following:

- * Selective odour collection of the preliminary clarifiers 7 to 9
- * Replacement of the odour control system for primary clarifiers 1 to 6
- * Odour segregation / treatment and a new odour collection system for the head works
- * A new biofilter and stack

	Odour (impact)	TRS (emission)
Current	243 OU	1.32E-01 g/s
Future	106 OU ^{1*}	1.22E-02 g/s
Project Status	Under Construction	
Estimated Completion Date	December 2018	

* The odour impact assessment of the P building has increased from 17.3 OU to 106 OU due to the primary clarifier 7 to 9 design scope change. After the completion of this project and the other Phase I and Phase II Odour projects, the City will reassess the odours at the facility to determine next steps.

4. Operational Initiatives

Plant staff implemented a number of operational changes to reduce odour. Below is a list of what's been done so far and what is on-going:

Odour initiative	Timing	Benefit
Replaced Activated Carbon Scrubber media for Equalization tanks	On-going, once a year	Ensures existing odour control equipment operate at maximum efficiency.
Biosolids inventory management	On-going	Keeping in-plant biosolids inventory as low as possible reduces likelihood of septic conditions in certain open tanks.
Good housekeeping	On-going	Includes ensuring tanks taken out of service for maintenance are quickly washed down.
Odour Facility Re-Assessment	2019	The Facility's odour performance will be reassessed after all Phase I and Phase II Odour Projects are complete

¹ Final number will be recalculated upon completion of construction.