



NORTH TORONTO WASTEWATER TREATMENT PLANT

2015 Annual Report



March 31, 2016

EXECUTIVE SUMMARY

The North Toronto Treatment Plant is one of four wastewater treatment facilities operated by the City of Toronto. Located in the Don Valley, the plant currently serves a population of about 55,000. Treated effluent is discharged to the Don River. The facility normally operates at a controlled flow rate, with a maximum capacity of 40 ML/day. Because inflow to the plant is controlled, treatment plant bypasses are not required. The plant operates under Certificate of Approval No. 7665-7NWMH2 issued on March 26, 2009.

The average daily influent flow rate was 20.0 ML/d. Average influent concentrations for 2015 were 268.2 mg/L of Suspended Solids (SS), 205.5 mg/L of Biological Oxygen Demand (BOD₅), and 5.5 mg/L of Total Phosphorus (TP).

In 2015, the plant met or exceeded all final effluent parameters regulated under the Certificate of Approval. North Toronto achieved the following effluent quality in 2015:

	Certificate of Approval ¹	2015 Treated Effluent
Suspended Solids (SS)	25 mg/L	3.6 mg/L
Carbonaceous Biological Oxygen Demand (CBOD ₅)	25 mg/L	2.2 mg/L
Total Phosphorus (TP)	1 mg/L	0.7 mg/L
Escheria Coli (E. Coli) ²	200 CFU / 100 mL	9.0 CFU / 100 mL
pH	6.0-9.5	7.4
Total Chlorine Residual	0.02	SBS Presence Detected ³
SS Loading Rate	1,137.5 kg/day	71.2 kg/day
CBOD ₅ Loading Rate	1,137.5 kg/day	42.9 kg/day
TP Loading Rate	45.5 kg/day	13.4 kg/day

¹ Referenced from C of A No. 7665-7NWMH2 issued on March 26, 2009.

² Geometric Mean

³ The presence of Sodium Bisulphite (SBS) indicates a Total Chlorine Residual of zero.

Sludge (raw sludge and waste activated sludge) generated at the North Toronto Treatment Plant is transferred to the North Toronto Trunk Sewer and then conveyed by gravity to the Ashbridges Bay Treatment Plant via the Coxwell Sanitary Trunk Sewer (STS) for further treatment and disposal. An average of 0.3 ML/day of co-settled sludge was transferred in 2015.

The capital projects at the plant in 2015 included: CSO tank upgrades as well as WAS and RAS pump rehab. In addition to routine maintenance, annual calibration of effluent monitoring equipment was completed.

Annual ferrous chloride consumption was 44.17 tonnes as Fe. The total sodium hypochlorite volume used to disinfect the final effluent in 2015 was 131.2 m³. The total sodium bisulphite volume used for dechlorination in 2015 was 49.89 m³. Total annual consumption for potable water and hydro in 2015 was 45,100 m³ and 2.8M kWh, respectively.

The plant operating costs for 2015 totalled \$1.70M. In 2015, the North Toronto Treatment Plant had 10 employees. There were 3 health & safety incidents and 83 lost days due to work-related injuries.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1. INTRODUCTION.....	1
2. OPERATIONS	2
2.1 Influent Quality	2
2.2 Preliminary Treatment	2
2.3 Primary Treatment	2
2.4 Secondary Treatment	3
2.5 Final Effluent Quality and Disinfection	3
2.6 Bypasses, Spills and Abnormal Events	4
2.6.1 Bypasses	4
2.6.2 Spills and Abnormal Events	4
2.7 Solids Handling	4
2.8 CSO Overflow	5
2.9 Complaints	5
3. CAPITAL PROJECTS.....	6
4. MAINTENANCE.....	7
4.1 Effluent Monitoring Equipment Calibration and Maintenance Records	7
4.2 North Toronto Work Area.....	7
5. CHEMICALS AND UTILITIES	8
5.1 Chemicals.....	8
5.1.1 Ferrous Chloride for Nutrient Removal	8
5.1.2 Sodium Hypochlorite for Disinfection	8
5.1.3 Sodium Bisulphite for Dechlorination.....	8
5.2 Utilities.....	8
5.2.1 Water	8
5.2.2 Hydro	8
6. OPERATIONAL COSTS.....	9
7. HUMAN RESOURCES.....	10
7.1 Staffing.....	10
7.2 Occupational Health & Safety	10
7.3 Staff Training & Development.....	10
7.4 Utility Operator Certification.....	11
7.5 MOECC Correspondence	11

APPENDICES

APPENDIX A – Glossary of Abbreviations & Definitions

APPENDIX B – Plant Schematic

APPENDIX C – Plant Performance Charts:

- Influent Flows
- Influent SS & BOD₅ Concentrations
- Influent TKN & TP Concentrations
- Effluent SS & CBOD₅ Concentrations
- Effluent TKN, Ammonia & Total Phosphorus Concentrations

APPENDIX D – Influent and Effluent Metal Concentrations

APPENDIX E – Analytical Testing Summary

APPENDIX F – Influent Flow Meter Calibration Records

LIST OF TABLES

Table 1: Influent Parameters	2
Table 2: Primary Treatment Effluent Parameters.....	3
Table 3: Secondary Treatment Process Parameters.....	3
Table 4: Annual Average Final Effluent Parameter Limits.....	4
Table 5: Monthly Average Final Effluent Parameter Limits.....	4
Table 6: Annual Average Final Effluent Parameter Objectives	4
Table 7: Utility Consumption.....	8
Table 8: Operating Costs.....	9
Table 9: Plant Staffing.....	10
Table 10: Wastewater Treatment Certificates	11
Table 11: Correspondence submitted to the MOECC for NTTP	12

1. INTRODUCTION

The North Toronto Treatment Plant is one of four wastewater treatment facilities operated by the City of Toronto under the responsibility of the Wastewater Treatment section of Toronto Water. The plant is located in the Don Valley on a 27.2 ha site serving a sewershed of approximately 3,060 ha, and a connected population of approximately 55,000.

Commissioned in 1929, North Toronto was one of the first plants in North America to use the biological activated sludge process. The plant operates at a controlled uniform rate and is rated for 40 ML/day. Wastewater in excess of the controlled rate is diverted to the North Toronto Trunk Sewer and then conveyed by gravity to the Ashbridges Bay Treatment Plant via the Coxwell Sanitary Trunk Sewer (STS).

Major treatment processes include screening and grit removal, primary treatment, secondary treatment, phosphorus removal, effluent disinfection and dechlorination. Treated effluent is discharged to the Don River. Co-settled sludges (raw sludge and waste activated sludge) are transferred to the Ashbridges Bay Treatment Plant for disposal via the Coxwell STS. Numerous auxiliary systems are required for proper operation of many plant processes including: potable water, process water, HVAC, electrical power distribution, gas, chemicals, instrument air, etc.

The Ministry of the Environment and Climate Control (MOECC) has classified the North Toronto Plant as a Class III wastewater treatment facility under Regulation 129/04. The facility operates under the Certificate of Approval No. 7665-7NWMH2 issued on March 26, 2009.

This report is a summary of plant operation and performance in 2015. In addition to a discussion of effluent quality and the plant's success in meeting treatment objectives, the report contains summaries of 2015 plant operations, maintenance, chemicals and utilities, operational costs and human resources.

2. OPERATIONS

2.1 Influent Quality

The plant operates at a controlled uniform rate. Wastewater in excess of the controlled rate is diverted to the North Toronto Trunk Sewer and then conveyed by gravity to the Ashbridges Bay Treatment Plant via the Coxwell Sanitary Trunk Sewer.

A summary of annual flow and influent parameter concentrations is shown in Table 1. The plant experienced a 14% decrease in influent flow from 2014 to 2015. A comparison of monthly influent flow rates and characteristics for 2015 is illustrated in Appendix C.

Table 1: Influent Parameters

Parameter	2015	2014	2013	2012
Influent Flow [ML/day]	20.0	23.2	24.4	26.3
Total Annual Flow [ML]	7,281	8,481	8,703	9,586
Influent SS [mg/L]	268.2	229.2	212.4	213.4
Influent BOD ₅ [mg/L]	205.5	169.1	148.6	144.7
Influent TP [mg/L]	5.5	4.4	4.0	4.2

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

Wastewater enters the Head House, which provides a grit and screenings removal operation. There is one automatic climber type bar screen, with bars spaced at 1.27 centimetre openings. The bar screen removes rags and large pieces of debris from the wastewater. Grit channels located downstream of the screen remove sand, gravel and similar heavy inorganic material by gravity separation. The grit and screenings are collected and hauled to a sanitary landfill site.

The quantity of grit and screenings removed by the grit channels and mechanical bar screen averaged approximately 396.4 kg/day in 2015.

2.3 Primary Treatment

After the grit channels, the next step in the wastewater treatment process is Primary Clarification where the velocity of flow entering the clarifier tanks is reduced, allowing the heavier solids in the wastewater to settle to the bottom by gravity. Sludge collectors in the tanks sweep the settled sludge into a sludge hopper located on the bottom of the tank, from where the sludge is pumped to the Ashbridges Bay Treatment Plant via Coxwell STS. There are four square Primary Clarifiers, each with dimensions of 15.2 m x 15.2 m x 3.5 m.

Table 2 contains a summary of key primary treatment effluent parameter concentrations in 2015.

A portion of waste activated sludge from the Final Clarifiers is diverted to the primary clarifiers to co-settle with the raw sludge.

Table 2: Primary Treatment Effluent Parameters

Parameter	2015	Primary Removal Efficiency	2014	Primary Removal Efficiency
SS [mg/L]	116.0	57%	106.4	51%
CBOD ₅ [mg/L]	88.7	57%	73.5	54%

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 eight aeration Tanks, each with dimensions of 99.4 m x 3.96 m x 3.2 m. Aeration Tanks #1 to #4 are part of the original plant construction in 1929. Aeration Tanks #5 to #8 were added in 1932.

The mixed liquor from the Aeration Tanks flows to large quiescent Final Clarifiers where the activated sludge is allowed to settle. A controlled quantity of this sludge is "returned" to the Aeration Tanks to repeat the treatment process, and excess quantities are removed as Waste Activated Sludge to the Primary Clarifiers. There are five Final Clarifiers, two tanks with dimensions of 19.8 m x 19.8 m x 3.2 m, and three tanks with dimensions of 19.8 m x 19.8 m x 4.87 m. Final Clarifiers #1 and #2 are part of the original plant construction in 1929. Final Clarifiers #3 to #5 were added in 1932.

A summary of key aeration basin parameters is shown in Table 3.

Table 3: Secondary Treatment Process Parameters

Parameter	2015	2014	2013
Aeration Loading [kg CBOD ₅ / m ³ ·day]	0.15	0.17	0.19
Mixed Liquor Suspended Solids [mg/L]	2,317	2,434	2,512

2.5 Final Effluent Quality and Disinfection

Treated effluent is disinfected with Sodium Hypochlorite and dechlorinated with Sodium Bisulphite (SBS) before it is discharged into the Don River. As required by Condition (9)(5) of C of A, SBS is being monitored as a surrogate to Total Chlorine Residual (TCR). Presence of SBS residual indicates that chlorine has been removed to a level of 0 mg/L of TCR.

In 2015, the North Toronto Treatment Plant encountered no abnormal operating problems, and continued to produce a high quality effluent which surpassed requirements of the plant's Certificate of Approval. This was achieved through continuous improvement in operations and maintenance of the treatment process, and infrastructure delivery.

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

Table 4: Annual Average Final Effluent Parameter Limits

Parameter	C of A Limit ¹	2015	Removal Efficiency	2014	Removal Efficiency
SS [mg/L]	25	3.6	99%	4.2	98%
CBOD ₅ [mg/L]	25	2.2	99%	2.4	98%
pH	6.0-9.5	7.43	-	7.56	-
CBOD ₅ Loading Rate [kg/day]	1,137.5	42.93	-	55.9	-
SS Loading Rate [kg/day]	1,137.5	71.25	-	99.3	-
TP Loading Rate [kg/day]	45.5	13.36	-	9.9	-

¹Referenced from condition 6 of C of A No. 7665-7NWMH2 issued on March 26, 2009.

Table 5: Monthly Average Final Effluent Parameter Limits

Parameter	C of A Limit ¹	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
TP [mg/L]	1.0	0.8	0.8	0.5	0.5	0.8	0.7	0.7	0.6	0.6	0.5	0.6	0.8
E-Coli ² [CFU/100mL]	200	1.4	7.5	11.9	9.7	1.2	5.4	22.2	4.2	1.6	11.5	2.2	29.0
Total Chlorine Residual ³ (mg/L)	0.02	SBS (P)	SBS (P)	SBS (P)	SBS (P)	SBS (P)	SBS (P)	SBS (P)	SBS (P)	SBS (P)	SBS (P)	SBS (P)	SBS (P)

¹Referenced from condition 6 of C of A No. 7665-7NWMH2 issued on March 26, 2009.

²Monthly Geometric Mean

³The presence (P) of Sodium Bisulphite (SBS) indicates a Total Chlorine Residual of zero.

Table 6: Annual Average Final Effluent Parameter Objectives

Parameter	C of A Objective ¹	2015
SS [mg/L]	15	3.6
CBOD ₅ [mg/L]	15	2.2
TP [mg/L]	0.9	0.7
pH	6.0-8.5	7.43
TCR [mg/L]	0.0	SBS Presence Detected ²
E.Coli ³ [CFU/100 mL]	150	9.0

¹Referenced from condition 7 of C of A No. 7665-7NWMH2 issued on March 26, 2009.

²The presence (P) of Sodium Bisulphite (SBS) indicates a Total Chlorine Residual of zero.

³Average of Monthly Geometric Mean.

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

2.6 Bypasses, Spills and Abnormal Events

2.6.1 Bypasses

Because inflow to the plant is controlled, treatment plant bypasses are not required.

2.6.2 Spills and Abnormal Events

There were no instances of spills and abnormal events in 2015.

2.7 Solids Handling

All sludge (raw sludge and waste activated sludge) generated at the North Toronto Treatment Plant is transferred to the Ashbridges Bay Treatment Plant for further treatment. The sludge generated during 2015 averaged 0.3 ML/day (1.6% TS).

2.8 CSO Overflow

The North Toronto Combined Sewer Detention System operates under Environmental Compliance Approval 2854-9H4JKF, issued May 2, 2014. The CSO Tanks provide holding capacity for combined sewer overflows resulting from wet weather flow conditions. After a wet weather event, the collected CSO is pumped to the Ashbridges Bay plant for treatment. Under excessive flow conditions, the CSO Tanks will overflow into the outfall to the Don River. CSO Tank upgrades commenced in 2014 and the tanks have been out of service since then. The CSO tank construction is expected to be completed by December 2016.

2.9 Complaints

There were no odour or noise complaints received in 2015.

3. CAPITAL PROJECTS

As part of the Toronto Water Capital Program, North Toronto Treatment Plant commenced or continued with the following capital works projects in 2015:

- WAS pump rehabilitation
- RAS pump rehabilitation
- CSO Tank Upgrade

4. MAINTENANCE

The North Toronto Treatment Plant 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 Minor Modifications and were carried out as per Condition 11, as required by conditions 10(6)(c) and (j) of the Certificate of Approval.

4.1 Effluent Monitoring Equipment Calibration and Maintenance Records

Flow to the plant is measured by effluent flow meters. The annual calibration of flow meters and on-line analyzers for regulated parameters was completed in 2015, and found to be within acceptable limits. Calibration records are attached in Appendix F.

4.2 North Toronto Work Area

The North Toronto work area includes all major and auxiliary processes. In addition to routine maintenance, the following maintenance was completed at the North Toronto Treatment Plant in 2014:

- Final Clarifier Tanks # 4
 - Inspected, cleaned and repaired sludge scrapper
 - Performed maintenance on gear box
- Primary Clarifier Tanks # 2
 - Cleaned and inspected lower drive parts
- Aeration tank # 3
 - Inspected, cleaned and replaced air stones as required
 - Acid washed all air stones to improve air displacement
- Installed approx. 200 linear feet of 4" steel water line to the north end of the aeration tanks
- Overhauled 1 Primary Sludge Pump and replaced the Macerator grinder cutting head
- Inspected 2 Chlorine Contact Tanks – washed and checked structure for any damage
- Replaced 2 Aeration Basement Sump pit pumps and Discharge lines.
- Plant Security Upgrade Project: Installed Cameras, new doors, door card readers, and Medco key locking system.
- Repaired water line break on roadway across from Boiler building
- Aeration; Dissolved Oxygen Improvements projects: Installed new DO air sensors to all eight tanks, and running cables to be connected to our SCADA system.
- Aux- generator purchased to assist with our flood control plans
- Purchased and installed 2 new carbon monoxide monitors purchased in the plant's garage
- Renewed a section of roadway and curbs near the Administration building.

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:

- Ferrous Chloride (Nutrient Removal)
- Sodium Hypochlorite (Disinfection, Odour Control)
- Sodium Bisulphite (Dechlorination)

5.1.1 Ferrous Chloride for Nutrient Removal

Ferrous chloride consumption for nutrient removal (i.e. phosphorus) during 2015 was approximately 44,175 kg as Fe. This is a 50% increase from 2014. Ferrous chloride is applied to the distribution conduits to the aeration tanks, at which primary effluent and return activated sludge are mixed. The average ferrous chloride dosage rate was 6.1 mg/L as Fe during the year.

Ferrous chloride for nutrient removal was purchased at a cost of \$815 per tonne Fe, plus applicable taxes.

5.1.2 Sodium Hypochlorite for Disinfection

Sodium hypochlorite is used for disinfection of the final effluent. In 2015, approximately 131.2 m³ was consumed for this purpose, representing an 18.2% increase in consumption from 2014.

Sodium Hypochlorite was purchased at an average cost of \$128 per 1,000 L, plus applicable taxes.

5.1.3 Sodium Bisulphite for Dechlorination

Sodium Bisulphite was used as a dechlorination agent. The total sodium bisulphite usage in 2015 was 49.9 m³, representing a 2.6% decrease in consumption from 2014.

Sodium Bisulphite was purchased at an average cost of \$262 per tonne, plus applicable taxes.

5.2 Utilities

A summary of utility consumption for the previous two years at North Toronto Treatment Plant is provided in Table 7, below.

Table 7: Utility Consumption

Utility	2015	2014	2013
Water [m ³ / month]	3,758	3,674	2,454
Hydro [kWh / month]	231,830	207,484	178,822

5.2.1 Water

Total potable water consumption increased 2.3% from 2014 to an annual use of 45,100 m³. Total cost for potable water was \$148,676. The average unit cost of water was \$3.30 per cubic meter.

5.2.2 Hydro

Total energy consumption increased 12% from 2014 to an annual use of 2.8M kWh. Total cost for hydro was \$353,516. The average unit cost power was \$0.13 per kWh.

6. OPERATIONAL COSTS

Plant operational costs are broken down into five (5) categories: Salaries & Benefits, Materials & Supplies, New Equipment, Services & Rents and Other Charges. Materials & Supplies is further segregated into Utilities (power and water), Machine & Equipment Parts, Chemicals and Other Materials & Supplies. The total cost of plant operation in 2015 was \$1.70M. A breakdown of annual operational costs is shown in Table 8. The 2015 operating costs are also illustrated in Figure 1.

Table 8: Operating Costs

Operating Cost	2015	2014
Salaries & Benefits	\$820,569	\$830,442
Materials & Supplies		
Utilities	\$531,641	\$455,063
Machine & Equipment Parts	\$43,809	\$42,981
Chemicals	\$111,660	\$78,601
Other Materials & Supplies	\$76,840	\$45,731
New Equipment	\$27,025	\$15,563
Services & Rents	\$65,103	\$62,779
Other Charges	\$21,891	\$17,057
TOTAL PROGRAM COST:	1,698,538	1,548,217¹

¹Quantity incorrectly reported in 2014 and has been corrected as shown.

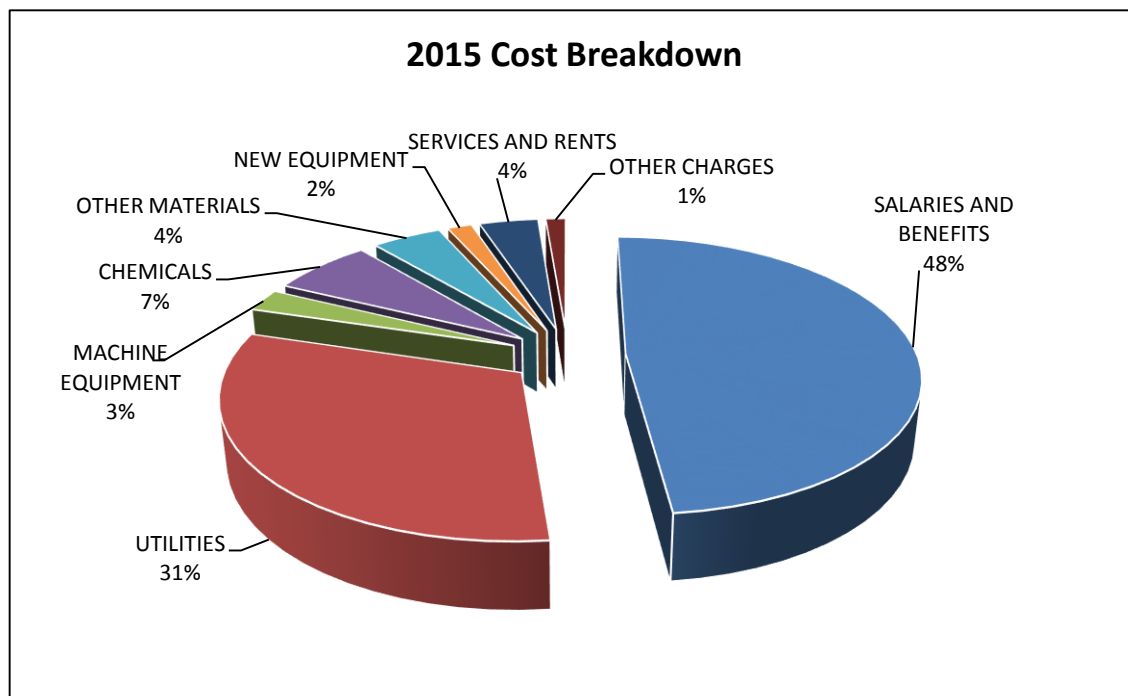


Figure 1: North Toronto Treatment Plant Operating Cost Breakdown for 2015

7. HUMAN RESOURCES

7.1 Staffing

In 2015, the North Toronto Treatment Plant had 10 positions. Plant Staffing is shown in Table 9:

Table 9: Plant Staffing

Position Title	Number
Supervisor, Operational Support	1
EICT	1
Plant Technicians	1
Development Plant Technicians	2
Industrial Millwrights	4
Wastewater Plant Worker	1

7.2 Occupational Health & Safety

Continuous efforts are made in maintaining a safe working environment at the North Toronto Treatment Plant facility. The Joint Health and Safety Committee (JHSC) assists management in resolving issues through monthly meetings and Plant Audits.

Plant Health and Safety statistics for the North Toronto Treatment Plant in 2015 were as follows:

Incident	0
First Aid	0
Medical Aid	1
Lost Time	1
Recurrence	1
Total	3

There were 83 lost time days due to work related injuries in 2015.

7.3 Staff Training & 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. North Toronto Treatment Plant operating staff and skilled trades staff attended the training. Plant Technicians have met their mandatory 40 hours of training for the year.

The training in 2015 included:

- Standard First Aid Level "C" CPR and Automated External Defibrillation (AED)
- Confined Space Entry
- Electrical Safety Authority (Conductors & Safety in a High Voltage Environment)
- Electrical Safety for District Operators
- Hydraulics Unplugged
- Industrial Maintenance Technician (IMT)- 2 day update course
- Industrial Maintenance Technician (IMT) Certification- Mechanical
- Lockout, Tagout & Test
- Lubrication
- Machinery Health

- Managing Water Quality
- Mathematics for Operators Module 1
- Microbiology of Wastewater
- Motor Analysis
- Problem Solving in the Plants (Wastewater)
- Ultra-Low Chlorine Residual Sampling & Testing
- General Sampling & Testing
- SKF Bearing
- Technical writing
- Vibration analysis advanced
- Work Management System (WMS)
- Creative thinking & Workplace innovation
- Energy management training
- Transportation of Dangerous goods/WHMIS Review
- Designated Substances, Asbestos Awareness & Construction Safety for PTs
- Log Book Entry
- Confined Space Entry & Rescue (Awareness Level) Training
- Review & Practical Application of GroupWise & Excel
- Chlorine Safety & B- KIT
- Source Water Protection Planning

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 10 summarizes the status of operator certification at the North Toronto Treatment Plant for 2015.

Table 10: Wastewater Treatment Certificates

Class Level	Licensed
Class IV	2
Class III	1
Class II	1
Class I	5
O.I.T.	0
TOTAL	9

7.5 MOECC Correspondence

Table 11 summarizes the correspondence submitted to the MOECC for NTTP.

Table 11: Correspondence submitted to the MOECC for NTTP

Date	Type	Description
From: March 18, 2015 To: March 20, 2015	NT CSO Annual Reporting as specified by the ECA	Communications with Tessa Villeneuve, Senior Environmental Officer (MOECC) which resulted with the submission of a letter in lieu of an annual report for the North Toronto Combined Sewer Overflow Detention System. This letter explained what date the construction on the proposed works began, and outlined that since the CSO is currently under construction, no annual report will be submitted. It also included a statement for each clause in the condition 8(3) indicating why no data is currently available.
April 17, 2015	CSO Events	Clarified with Loralyn Wild, Water Inspector (MOECC) that the incidents reported to MOECC SAC on April 8, 2015, April 10, 2015 and April 13, 2015 were all CSO events.
From: June 9, 2015 To: July 14, 2015	Communications with MOECC regarding North Toronto CSO Tank Construction and Wet Weather Event Planning	Various communications between the City, the Consultant and the MOECC took place to improve Wet Weather Planning during the Construction of the CSO Tank. As a result, the CSO Tank Construction Wet Weather Management Plan was improved and issued to the MOECC and a CSO Construction Interim Measures Approval letter was issued to the City by the MOECC.
Consent Letters		
N/A	N/A	N/A
Notice of Start-up		
N/A	N/A	N/A
MOE Inspection		
From: January 13, 2015 To: March 2, 2015	MOECC Communal Sewage Inspection.	Various communications with Tessa Villeneuve, Senior Environmental Officer (MOECC) regarding the North Toronto Treatment Plant Inspection

Appendix A

Glossary of Abbreviations & Definitions

Glossary of Abbreviations

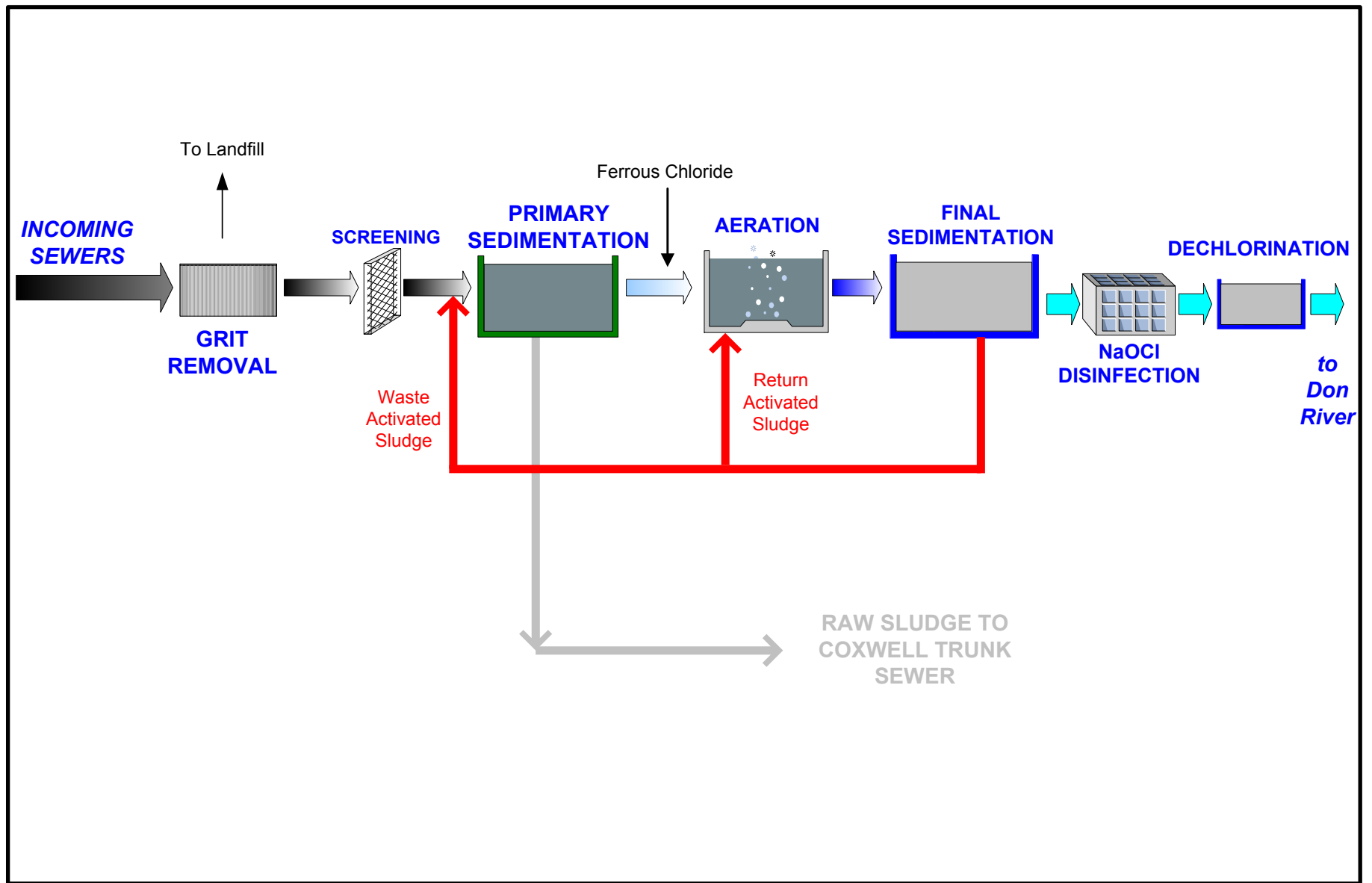
CBOD ₅	Five-Day Carbonaceous Biological Oxygen Demand
CEU	Continuing Education Units
CFU	Colony Forming Units
CSO	Combined Sewer Overflow (Tank)
DAF	Dissolved Air Flotation
E. Coli	Escheria Coli
HP	horsepower
HRT	Hydraulic Retention Time
kg	kilogram
kWh	Kilowatt-hour
MWh	Megawatt-hour
m ³	cubic metre
mA	milliamps
mg/L	milligrams per litre
mL	Millilitre
ML	Megalitre
MTI	Mid-Toronto Interceptor Forcemain
NTTP	North Toronto Treatment Plant
SS	Suspended Solids
TCR	Total Chlorine Residual
TP	Total Phosphorus
TS	Total Solids
TVS	Total Volatile Solids
TWAS	Thickened Waste Activated Sludge
µg/L	micrograms per litre
WAS	Waste Activated Sludge

Definitions

$$\text{Percent Removal (\%)} = 1 - \frac{\text{Concentration (Final)}}{\text{Concentration (Initial)}}$$

$$\text{Aeration Loading (kg CBOD/ m}^3 \text{ Aeration Capacity)} = \frac{\text{Primary CBOD}_5 \times (\text{Secondary Treatment Volume} \times \text{RAS Volume})}{\text{Capacity of Aeration Tanks}}$$

Appendix B
Plant Schematic



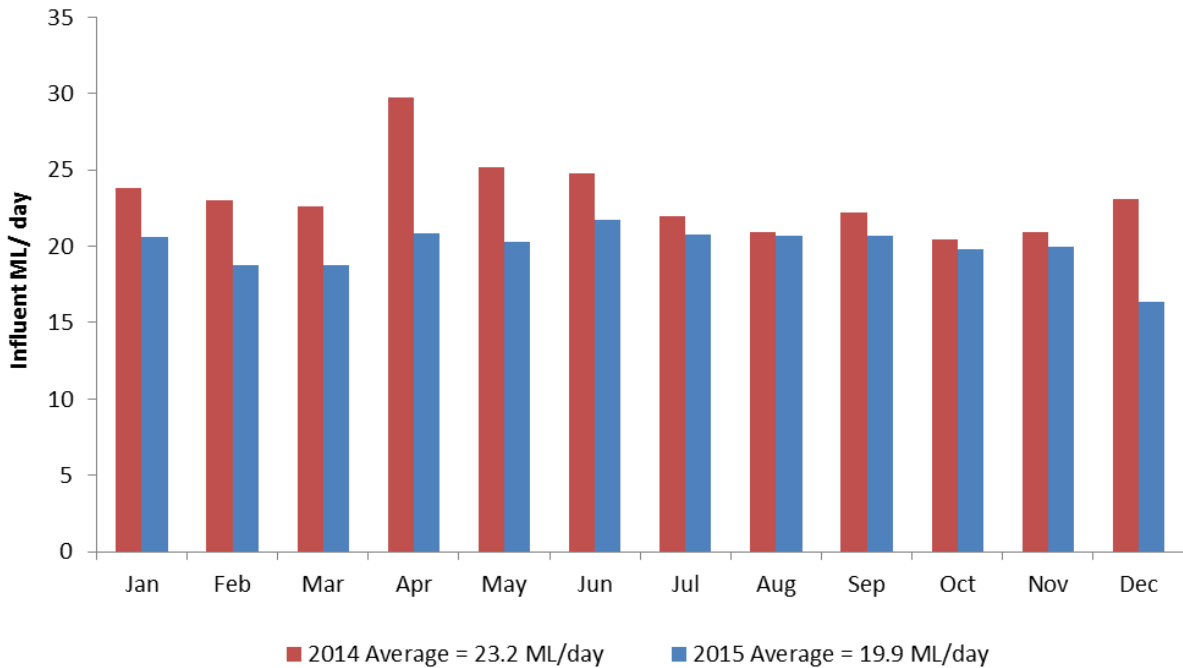
Process Flow Diagram for North Toronto Wastewater Treatment Plant

Appendix C

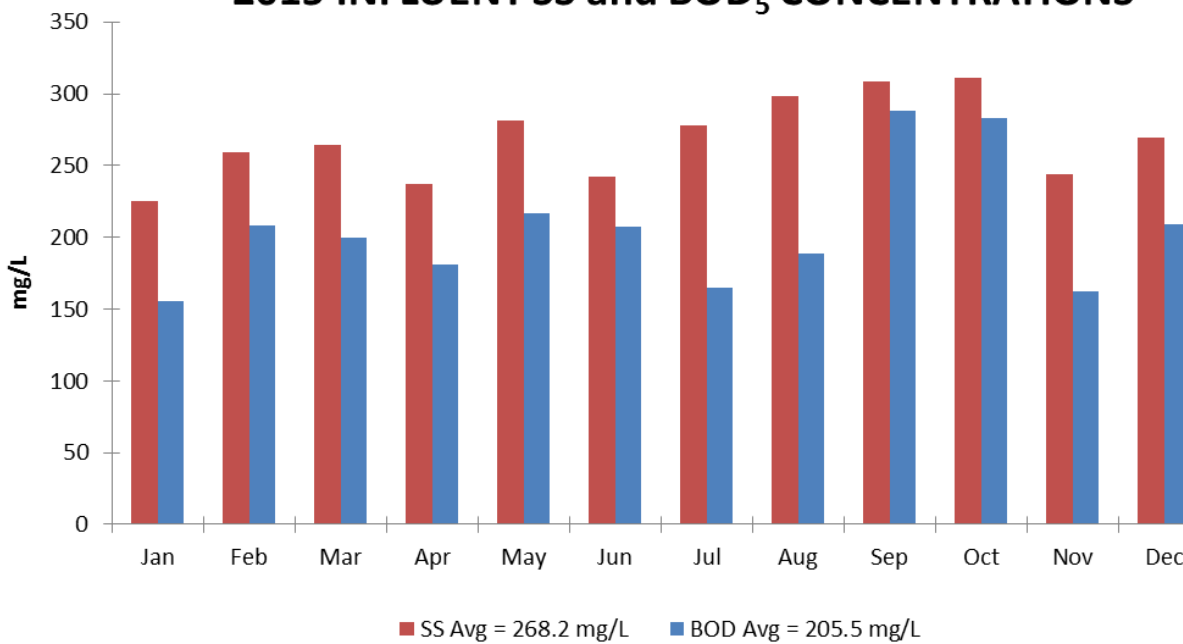
Performance Charts

- **Influent Flows**
- **Influent SS & BOD Concentrations**
- **Influent TKN & Total Phosphorus Concentrations**
- **Effluent SS & CBOD₅ Concentrations**
- **Effluent TKN, Total Phosphorus, & Ammonia Concentrations**

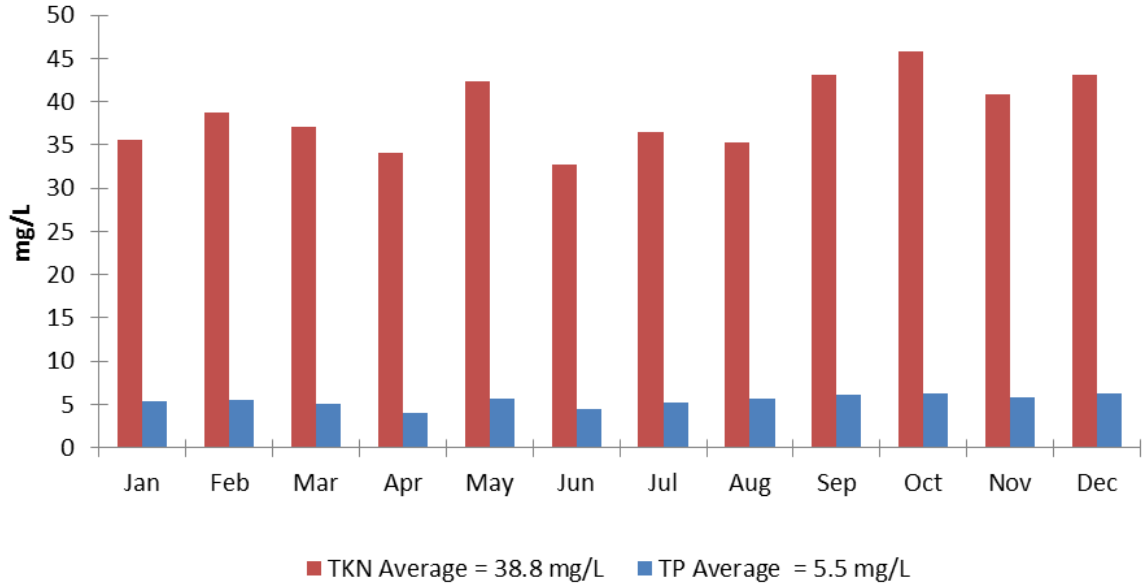
NORTH TORONTO TREATMENT PLANT INFLUENT FLOWS 2014-2015



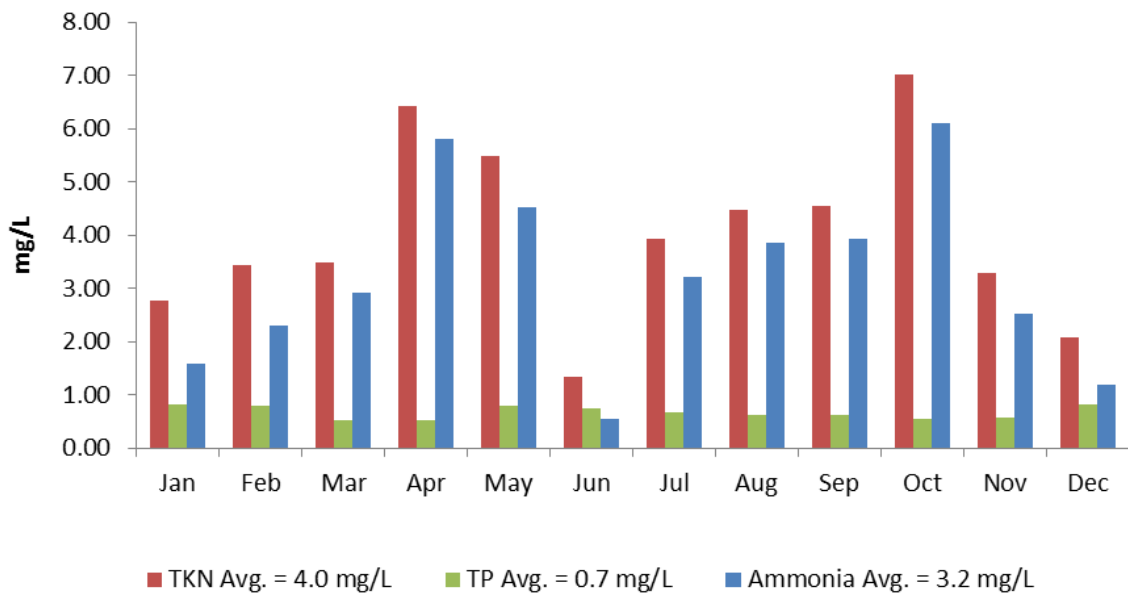
NORTH TORONTO TREATMENT PLANT 2015 INFLUENT SS and BOD₅ CONCENTRATIONS



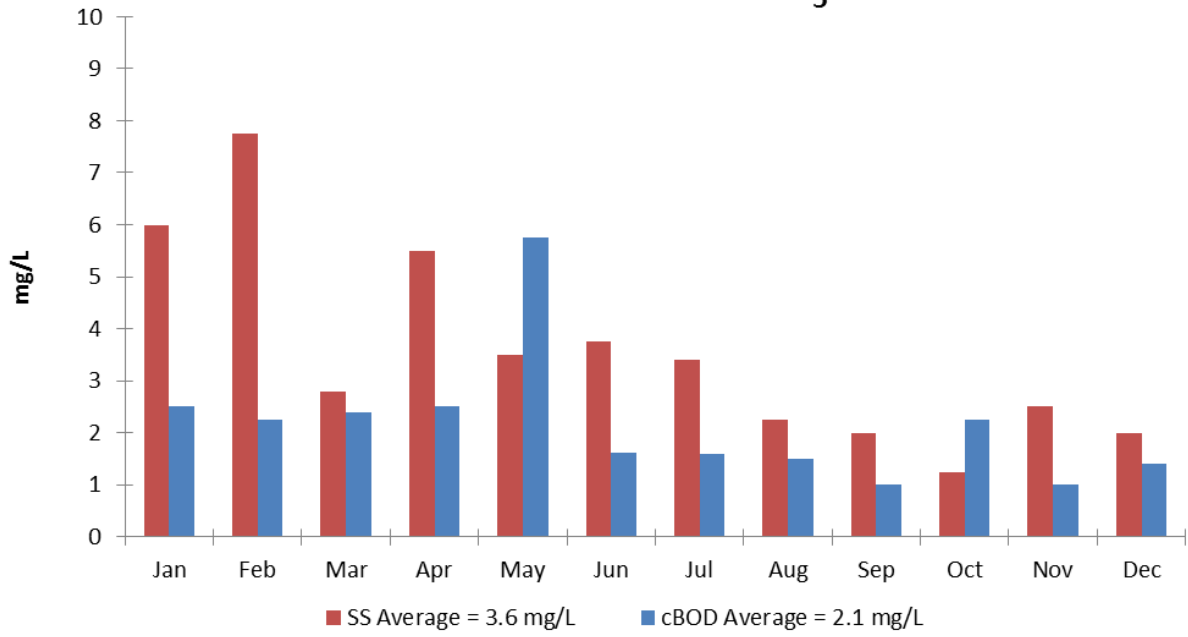
NORTH TORONTO TREATMENT PLANT 2015 INFLUENT TKN and TOTAL PHOSPHORUS CONCENTRATIONS



NORTH TORONTO TREATMENT PLANT 2015 EFFLUENT TKN, TOTAL PHOSPHORUS and AMMONIA CONCENTRATIONS



NORTH TORONTO TREATMENT PLANT 2015 EFFLUENT SS and CBOD₅ CONCENTRATIONS



Appendix D

Influent & Effluent Metal Concentrations

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: January 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.006	mg/L	0.0200	
	Cadmium	0.00113	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0163	mg/L	0.0400	
	Iron	0.319	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0451	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	<u>0.0408</u>	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.006	mg/L	1.0000	
	Cadmium	<0.001	mg/L	0.7000	
	Chromium	<0.004	mg/L	4.0000	
	Copper	0.118	mg/L	2.0000	
	Iron	0.876	mg/L		
	Lead	<0.005	mg/L	1.0000	
	Manganese	0.0444	mg/L	5.0000	
	Mercury	0.00007300	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.113	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: 19-Feb-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: February 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT- Monthly Metals @ Dec	Arsenic	<0.006	mg/L	0.0200	
	Cadmium	<0.001	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0337	mg/L	0.0400	
	Iron	0.441	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0626</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0388	mg/L	0.0400	
INFLUENT- Monthly Metals @ Dec					
	Arsenic	<0.006	mg/L	1.0000	
	Cadmium	<0.001	mg/L	0.7000	
	Chromium	<0.004	mg/L	4.0000	
	Copper	0.128	mg/L	2.0000	
	Iron	1.11	mg/L		
	Lead	<0.005	mg/L	1.0000	
	Manganese	0.0563	mg/L	5.0000	
	Mercury	0.00007300	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.147	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: 24-Mar-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: March 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.006	mg/L	0.0200	
	Cadmium	<0.001	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0174	mg/L	0.0400	
	Iron	0.236	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0756</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	<u>0.0424</u>	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.006	mg/L	1.0000	
	Cadmium	<0.001	mg/L	0.7000	
	Chromium	0.00415	mg/L	4.0000	
	Copper	0.0990	mg/L	2.0000	
	Iron	1.06	mg/L		
	Lead	0.00673	mg/L	1.0000	
	Manganese	0.0685	mg/L	5.0000	
	Mercury	0.0001070	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.115	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-Apr-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: April 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.006	mg/L	0.0200	
	Cadmium	<0.001	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0140	mg/L	0.0400	
	Iron	0.115	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0601</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0379	mg/L	0.0400	
INFLUEN - Monthly Metals @ Dec.					
	Arsenic	<0.006	mg/L	1.0000	
	Cadmium	<0.001	mg/L	0.7000	
	Chromium	<0.004	mg/L	4.0000	
	Copper	0.0892	mg/L	2.0000	
	Iron	0.810	mg/L		
	Lead	0.00594	mg/L	1.0000	
	Manganese	0.0496	mg/L	5.0000	
	Mercury	0.00008700	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.0968	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: 28-May-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: May 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT - Monthly Metals at Dec.	Arsenic	<0.006	mg/L	0.0200	
	Cadmium	<0.001	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0145	mg/L	0.0400	
	Iron	0.0984	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0443	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	<u>0.0415</u>	mg/L	0.0400	
INFLUENT- Monthly Metals @ Dec					
	Arsenic	<0.006	mg/L	1.0000	
	Cadmium	<0.001	mg/L	0.7000	
	Chromium	<0.004	mg/L	4.0000	
	Copper	0.125	mg/L	2.0000	
	Iron	1.16	mg/L		
	Lead	0.00513	mg/L	1.0000	
	Manganese	0.0517	mg/L	5.0000	
	Mercury	0.00009500	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.139	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: 22-Jun-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: June 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.006	mg/L	0.0200	
	Cadmium	<0.001	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0148	mg/L	0.0400	
	Iron	0.205	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0265	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	<u>0.0402</u>	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.006	mg/L	1.0000	
	Cadmium	<0.001	mg/L	0.7000	
	Chromium	<0.004	mg/L	4.0000	
	Copper	0.101	mg/L	2.0000	
	Iron	1.11	mg/L		
	Lead	0.00592	mg/L	1.0000	
	Manganese	0.0508	mg/L	5.0000	
	Mercury	<0.00006	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.117	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: 23-Jul-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: July 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT - Monthly Metals @ Dec.	Arsenic	<0.006	mg/L	0.0200	
	Cadmium	<0.001	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0107	mg/L	0.0400	
	Iron	0.189	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0444	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0311	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.006	mg/L	1.0000	
	Cadmium	<0.001	mg/L	0.7000	
	Chromium	<0.004	mg/L	4.0000	
	Copper	0.103	mg/L	2.0000	
	Iron	1.17	mg/L		
	Lead	0.00682	mg/L	1.0000	
	Manganese	0.0541	mg/L	5.0000	
	Mercury	<0.00006	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.126	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: 21-Aug-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: August 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT- Monthly Metals @ Dec.	Arsenic	<0.006	mg/L	0.0200	
	Cadmium	<0.001	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0137	mg/L	0.0400	
	Iron	0.219	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0362	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0322	mg/L	0.0400	
INFLUENT- Monthly Metals @ Dec.					
	Arsenic	<0.006	mg/L	1.0000	
	Cadmium	<0.001	mg/L	0.7000	
	Chromium	<0.004	mg/L	4.0000	
	Copper	0.129	mg/L	2.0000	
	Iron	1.03	mg/L		
	Lead	0.00665	mg/L	1.0000	
	Manganese	0.0510	mg/L	5.0000	
	Mercury	0.00007100	mg/L	0.0100	
	Nickel	0.00501	mg/L	2.0000	
	Zinc	0.137	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-Sep-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: September 2015 (

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>
North Toronto 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	0.0102	mg/L	0.0400	
	Iron	0.159	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0445	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0322	mg/L	0.0400	
INFLUENT - Monthly Metals @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.00407	mg/L	4.0000	
	Copper	0.126	mg/L	2.0000	
	Iron	1.17	mg/L		
	Lead	0.00589	mg/L	1.0000	
	Manganese	0.0520	mg/L	5.0000	
	Mercury	0.00009100	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.131	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: 27-Oct-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: October 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT - Biometals @ Dec.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0104	mg/L	0.0400	
	Iron	0.113	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0339	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0340	mg/L	0.0400	
INFLUENT - Biometals @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.00524	mg/L	4.0000	
	Copper	0.117	mg/L	2.0000	
	Iron	1.18	mg/L		
	Lead	0.00656	mg/L	1.0000	
	Manganese	0.0623	mg/L	5.0000	
	Mercury	0.0001580	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.116	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-Nov-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: November 2015

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>
North Toronto Treatment Plant					
FINAL EFFLUENT - Monthly @ Dec.	Arsenic	<0.01	mg/L	0.0200	
	Cadmium	<0.004	mg/L	0.0080	
	Chromium	<0.004	mg/L	0.0800	
	Copper	0.0105	mg/L	0.0400	
	Iron	0.138	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	0.0304	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	0.0321	mg/L	0.0400	
INFLUENT - Monthly @ Dec.					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.00431	mg/L	4.0000	
	Copper	0.112	mg/L	2.0000	
	Iron	0.951	mg/L		
	Lead	<0.005	mg/L	1.0000	
	Manganese	0.0493	mg/L	5.0000	
	Mercury	<0.00006	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.111	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-Dec-2015 /

TORONTO WATER LABORATORY
Treatment Plant Monthly Metal Analysis for: December 2015

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>
North Toronto 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	0.0147	mg/L	0.0400	
	Iron	0.217	mg/L		
	Lead	<0.005	mg/L	0.1200	
	Manganese	<u>0.0585</u>	mg/L	0.0500	
	Mercury	<0.00006	mg/L	0.0004	
	Nickel	<0.005	mg/L	0.0800	
	Zinc	<u>0.0405</u>	mg/L	0.0400	
INFLUENT					
	Arsenic	<0.01	mg/L	1.0000	
	Cadmium	<0.004	mg/L	0.7000	
	Chromium	0.00517	mg/L	4.0000	
	Copper	0.134	mg/L	2.0000	
	Iron	1.08	mg/L		
	Lead	0.0100	mg/L	1.0000	
	Manganese	0.0514	mg/L	5.0000	
	Mercury	<0.00006	mg/L	0.0100	
	Nickel	<0.005	mg/L	2.0000	
	Zinc	0.129	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-Jan-2016 /

Appendix E

Analytical Testing Summary

Toronto Water Laboratory LIMS Sample and Result Counts
 Client
 North Toronto Treatment Plant

From: 01/01/2015 To: 12/31/2015 Printed on: 2/1/2016
 Number of Samples
 1346

	ALK pH DS COND	BOD	CBOD	Chlorine	ECOLI	Ferric Chloride	IONS	Mercury	METALS	NH3(as N)	P	pH_15	Sulphite	TKN(as N)	Toxicity	TS	TSS	Un-ionized NH3(as N)	VA	Total
COMBINED SEWER OVERFLOW	0	0	16	0	16	0	0	0	16	16	0	0	16	0	0	16	0	0	0	96
FINAL EFFLUENT	1	0	52	51	52	0	520	12	108	52	152	52	52	15	0	52	51	2	1,276	
INFLUENT	0	50	0	0	0	0	0	12	108	52	152	0	52	0	0	52	0	0	478	
MIXED LIQUOR COMPOSITE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	302	0	0	302	
NTTP FE SAMPLE	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	48
PRIMARY EFFLUENT	0	0	52	0	0	0	0	0	0	0	0	0	0	0	0	52	0	0	104	
RAW SLUDGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	290	0	0	0	290	
RETURN SLUDGE 1&2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	153	0	0	153	
RETURN SLUDGE 3-4&5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	153	0	0	153	
Total	1	50	120	51	68	48	520	24	216	120	320	52	52	120	15	290	780	51	2	2,900

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

Volatlie 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

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

Sampling Point: TNT01 INFLUENT

Group:	Minimum	Maximum	Average	Units	Reporting Limit
BOD Biochemical Oxygen Demand (BOD)	82.00	426.00	207.12	mg/L	<2
METALS	Minimum	Maximum	Average	Units	Reporting Limit
Arsenic	0.006000	0.01000	0.00733	mg/L	<0.01
Cadmium	0.001000	0.00400	0.00200	mg/L	<0.004
Chromium	0.004000	0.00520	0.00425	mg/L	<0.004
Copper	0.089200	0.13400	0.11510	mg/L	<0.004
Iron	0.810000	1.18000	1.05892	mg/L	<0.02
Lead	0.005000	0.01000	0.00622	mg/L	<0.005
Manganese	0.044400	0.06850	0.05345	mg/L	<0.004
Nickel	0.005000	0.00500	0.00500	mg/L	<0.005
Zinc	0.096800	0.14700	0.12315	mg/L	<0.02
Mercury	Minimum	Maximum	Average	Units	Reporting Limit
Mercury	0.000100	0.00020	0.00011	mg/L	<0.00003
NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)	14.00	35.00	26.56	mg/L	<0.05
P	Minimum	Maximum	Average	Units	Reporting Limit
Phosphorus (HACH)	2.80	9.70	5.47	mg/L	<0.08
TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	24.00	47.20	38.84	mg/L	<0.2
TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	128.00	520.00	269.08	mg/L	<2

Sampling Point: TNT02 PRIMARY EFFLUENT

Group:	Minimum	Maximum	Average	Units	Reporting Limit
CBOD Carbonaceous Biochemical Oxygen Demand	12.00	181.00	89.29	mg/L	<2
TSS Total Suspended Solids	52.00	384.00	116.00	mg/L	<2

Sampling Point: TNT03 FINAL EFFLUENT

Group:	Minimum	Maximum	Average	Units	Reporting Limit
ALK pH DS COND Alkalinity	86.50	86.50	86.50	mg/L	<1.6
CBOD Carbonaceous Biochemical Oxygen Demand	2.00	18.00	2.77	mg/L	<2
Chlorine Total Residual Chlorine	0.40	1.20	0.79	mg/L	<0.01
ECOLI EColi	0.00	900.00	32.87	CFU/100 mL	
IONS Bromide	0.200000	2.75000	1.91250	mg/L	<0.1

Calcium	56.200000	98.70000	74.88077	mg/L	<0.2
Chloride	90.000000	389.00000	160.24808	mg/L	<0.2
Hardness (Calculation)	192.000000	322.00000	247.75000	mg/L	<1
Magnesium	11.000000	19.00000	14.76154	mg/L	<0.1
Nitrate(as N)	5.150000	19.00000	10.80885	mg/L	<0.01
Nitrite(as N)	0.049000	3.50000	0.88267	mg/L	<0.002
Potassium	6.420000	14.10000	9.45442	mg/L	<0.05
Sodium	60.000000	250.00000	97.43462	mg/L	<0.4
Sulfate	34.200000	51.40000	42.50577	mg/L	<0.2

Group: METALS	Minimum	Maximum	Average	Units	Reporting Limit
Arsenic	0.006000	0.01000	0.00733	mg/L	<0.01
Cadmium	0.001000	0.00400	0.00201	mg/L	<0.004
Chromium	0.004000	0.00400	0.00400	mg/L	<0.004
Copper	0.010200	0.03370	0.01508	mg/L	<0.004
Iron	0.098400	0.44100	0.20412	mg/L	<0.02
Lead	0.005000	0.00500	0.00500	mg/L	<0.005
Manganese	0.026500	0.07560	0.04684	mg/L	<0.004
Nickel	0.005000	0.00500	0.00500	mg/L	<0.005
Zinc	0.031100	0.04240	0.03698	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	6.60	6.60	6.60	mg/L	
Ammonia(as N)	0.10	9.80	3.18	mg/L	<0.05

Group: P	Minimum	Maximum	Average	Units	Reporting Limit
Phosphorus (HACH)	0.24	1.40	0.67	mg/L	<0.08

Group: Sulphite	Minimum	Maximum	Average	Units	Reporting Limit
Sulphite_P_A				mg/L	

Group: TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	0.88	10.20	3.98	mg/L	<0.2

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	2.00	12.00	3.69	mg/L	<2
Volatile Suspended Solids				%	

Group: Toxicity	Minimum	Maximum	Average	Units	Reporting Limit
96h_Mortality	0.00	0.00	0.00		
96h_LC50	100.00	100.00	100.00	%	
Un-ionized Ammonia	0.00	0.02	0.01	mg/L	

Group: Un-ionized NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)Un-ionized (Calculation)	0.00	0.30	0.04	mg/L	<0.001

Group: pH_15	Minimum	Maximum	Average	Units	Reporting Limit
pH_15C	7.10	8.10	7.50	SU	

Sampling Point: TNT05 RAW SLUDGE

Group: TS	Minimum	Maximum	Average	Units	Reporting Limit
Total Solids	0.15	3.20	1.56	%	
Volatile Total Solids	0.00	87.50	76.04	%	

Sampling Point: TNT19 MIXED LIQUOR COMPOSITE

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
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Total Suspended Solids	1,120.00	4,020.00	2,320.07	mg/L	<2
Volatile Suspended Solids	69.80	87.60	75.92	%	

Sampling Point: TNT20 RETURN SLUDGE 1&2

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	2,300.00	8,240.00	5,139.08	mg/L	<2

Sampling Point: TNT21 RETURN SLUDGE 3-4&5

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	2,320.00	13,010.00	5,227.58	mg/L	<2

Sampling Point: TNT22 COMBINED SEWER OVERFLOW

Group: CBOD	Minimum	Maximum	Average	Units	Reporting Limit
Carbonaceous Biochemical Oxygen Demand	32.00	180.00	93.94	mg/L	<2

Group: ECOLI	Minimum	Maximum	Average	Units	Reporting Limit
EColi	70,000.00	2,800,000.00	1,268,750.00	CFU/100 mL	

Group: NH3(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Ammonia(as N)	2.40	21.00	9.08	mg/L	<0.05

Group: P	Minimum	Maximum	Average	Units	Reporting Limit
Phosphorus (HACH)	0.52	6.60	2.46	mg/L	<0.08

Group: TKN(as N)	Minimum	Maximum	Average	Units	Reporting Limit
Total Kjeldahl Nitrogen	6.93	33.10	16.04	mg/L	<0.2

Group: TSS	Minimum	Maximum	Average	Units	Reporting Limit
Total Suspended Solids	84.00	668.00	219.75	mg/L	<2

Sampling Point: TNT28 NTTP FE SAMPLE

Group: Ferric Chloride	Minimum	Maximum	Average	Units	Reporting Limit
Absolute Difference	0.00	0.04	0.01		
Bill of Lading #	1,734,148.00	82,338,439.00	74,900,942.00		
Specific Gravity	1.16	1.33	1.27		
Supplier Specific Gravity	1.16	1.32	1.26		

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

Flow Meter Calibration/Maintenance Record



6415 Northam Drive
Mississauga, ON L4V 1J2
TEL: (905) 678-2882
FAX: (905) 293-9774

VERIFICATION / CALIBRATION REPORT

Report No.: 010139-0001

Date: December 16, 2015

SITE: North Toronto TP
PROCESS AREA: Final Effluent Flow
INSTR. TAG: TNT-DCL-FIT-0002
MANUFACTURER: Siemens OCM III
MODEL: 7ML-1002-0AA05
SERIAL No.: PBD/A6070683
INSTR. RANGE: 0 to 109,999.8 cubic meters / day

SERVICE DATE: December 16, 2015

TECHNICIAN: John Yaworski

JOB REFERENCE: 010139

Input (Test)		Output (Signal)		(Process)		
Type:	Head (Meters)	Type or EGU:	mA	cubic meter /day		
Min:	0.0000	Min:	4.00	0.00		
Max:	0.59744	Max:	20.00	109999.8		
open channel type	rectangular weir without end contractors					
exponent	1.5					
constant	9928 (m3/hr)					
			Before Calibration		After Calibration	
Input (meters)	Calc flow (cu m /day)	Calc. O/P (mA)	Displayed Flow	Error (%Rng)	Displayed Flow	Error (%Rng)
0.177	17743.24	6.58	17690	-0.05%		
0.185	18959.66	6.76	19255	0.27%		
0.220	24587.08	7.58	24883	0.27%		
0.287	36634.97	9.33	36913	0.25%		
0.421	65087.28	13.47	65387	0.27%		
0.448	71447.99	14.39	71756	0.28%		
0.509	86526.61	16.59	86830	0.28%		
0.590	107981.92	19.71	107661	-0.29%		
	0.00					

Calibration Equipment			
Type:			
Manufacturer:			
Model:			
Serial No.:			
Last Cal. Date:			

Comments: Unable to stop plant flow to perform zero calibration.
Calculated flow for the rectangular weir without end contractors on the Siemens OCM III was found within range.
Unit did not require any calibration.

UNIT PARAMETERS:

- | | |
|--|--|
| P1 Dimensional Units ---- Meters | P27 MA Damping ---- 10 Sec |
| P3 Primary Element ---- Exponential Device | P29 Fail Safe Timer ---- 60 Seconds |
| P4 Method of Calculation ---- Ratiometric | P30 Fail Safe Analog Mode ---- Hold Last Value |
| P5 Flow Units ---- Cubic Meters / Day | P33 Flow Rate Display ---- 2 Decimal Places |
| P6 Flow at Max Head ---- 109999.8 Cubic Meters / Day | P39 Data Logging Rate ---- 15 Minutes |
| P7 Height at Max Head ---- 0.59744 Meters | P47 Blanking Distance ---- 0.610169 Meters |
| P15 Relay 1 Assignment ---- De-energize on Echo Loss | U0 Exponent ---- 1.5 |
| P18 Relay 2 Assignment ---- Not In Service | |
| P21 Relay 3 Assignment ---- Not In Service | |

VERIFICATION / CALIBRATION SUCCESSFULL

Certificate Of Calibration

Customer:

 City of Toronto - North Treatment Plant
 21 Redway Road, Toronto, ON M4H 1P6
 Phone: (416) 936-5049
 Fax:

Instrument Identification:

 Description: pH/mV/Temperature Meter
 Manufacturer: YSI
 Model No: PH100CCA-01
 Serial No: IC01674
 Range: -2 to 16 pH / -10 to 120 °C
 Tolerance: ± (0.1% + 2 digit) / (0.3 °C + 1 digit)
 Tag No: N/Av
 Location: N/Av

Cal. Date: November 24, 2015

Due Date: May 24, 2016

Standards Used:

Asset No	Manufacturer	Calibration Date	Due Date
BU1400R	AlphaChem	N/Ap	May, 2016
BU1700Y	AlphaChem	N/Ap	May, 2016
BU1100B	AlphaChem	N/Ap	April, 2016
LTB001	Cole Parmer	December 11, 2015	December 11, 2016

Test Report:

AS FOUND		
Reference	Instrument	Error
pH	pH	% FS
4.00	3.99	-0.06
7.00	7.00	0.00
10.00	10.01	0.06
°C	°C	°C
0.0	0.0	0.0
40.0	39.9	-0.1
80.0	79.8	-0.2

AS LEFT		
Reference	Instrument	Error
pH	pH	% FS
4.00	3.99	-0.06
7.00	7.00	0.00
10.00	10.01	0.06
°C	°C	°C
0.0	0.0	0.0
40.0	39.9	-0.1
80.0	79.8	-0.2

Passed:

Failed:

Calibration Sticker applied?

Restricted Use:

Yes No

✓	
✓	

As found in tolerance:

As left in tolerance:

Repair performed:

Adjustment performed:

Yes No

✓	
✓	
	✓
	✓

Comments: pH probe calibrated in loop with meter.

Performed By:


 L. Pan Technician

Date:

November 24, 2015

Reviewed By:


 C. Ramnarine - Service Manager

Date:

November 24, 2015

TNT Request for Services

Date JULY 30, 2015

Issued by: Sam Mallia
Tele: 392-9194

Please clean, inspect and calibrate:

FINAL EFFLUENT METER
Located in De-chlorination Mixing Channel

Note:

Attention to this matter is required:

Immediately	<input type="checkbox"/>
As soon as possible	<input type="checkbox"/>
When scheduling permits	<input type="checkbox"/>
Other:	<input type="checkbox"/>

Description of Work Performed:

Calibration Values		
	FlowRate Cu.M / Day	Span : cm
0	0	0
25 %	45,605.09	20.68
50 %	91,112.15	41.7
75 %	136,700.12	62.81
100 %	182,150.6	82.72

Comments: _____

Work Performed by: : (Position) : EICT

<u>AMANDO GAN</u>		<u>30 JULY 2015</u>
Please print name	Signature	Date

TNT Request for Services

Date SEPT 14, 2015

Issued by: Sam Mallia

Please clean, inspect and calibrate:

- Return 1-2-3 Meter
 Return 6-7-8 Meter
 Located in the aeration basement

- Waste Flow Meter
 In the aeration gallery

Note:

Attention to this matter is required:


Immediately	
As soon as possible	
When scheduling permits	
Other:	

Description of Work Performed:

Return Flow 1-2-3		Return Flow 6-7-8		Waste Flow 4-5	
0 - 10 mA = 0-315 L/sec		4 - 20 mA = 0- 260 L/sec		0 - 10mA = 0- 52 L/sec	
mA	L/sec	mA	L/sec	mA	L/sec
4	0	4	0	⊕	0
8	78.74	8	64.5	5	26.52
12	157.55	12	129.6	7.5	39.78
20	315.13	20	260.4	10	53.04

Comments: _____

Work Performed by: (Position) : ELCT

AMANDO GAN		SEPT 14, 2015
Please print name	Signature	Date

TNT Request for Services

Date July 23/15

Issued by: Sam Mallia
Tele: 392-9194

Please clean, inspect and calibrate:

Raw Sewage Meter
Located in the Rack House

Note:

Attention to this matter is required:

Immediately	
As soon as possible	
When scheduling permits	
Other:	

Description of Work Performed:

Totalizer at 20 mA :		c/min		Chart Recorder	
TX in WC	Before mA	After mA	% Error	In (mA)	Display
0	3.95	4.00	0	4	0
16.2	7.96	8.00	0	8	23
64.65	11.96	12.00	0	12	55
145.46	15.97	16.00	0	16	83.1
258.6	19.98	20.00	0	20	110.8

Comments:

Work Performed by: (Position) : E. I. C. T.

<u>Stan PRIVARA</u>	<u>[Signature]</u>	<u>July 23/2015</u>
Please print name	Signature	Date

