

MUNICIPALITY OF WEST ELGIN

RODNEY WASTEWATER TREATMENT PLANT

2013 ANNUAL REPORT
January 1 to December 31, 2013

Environmental Compliance Approval # 3-0871-88-949

Prepared by:



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Appendix A: Analytical Data

Section 1: Overview

The wastewater treatment plant was operated under Environmental Compliance Approval 3-0871-88-949 dated April 12, 1994 with amendments September 24, 1998.

Collection System

The collection system maintenance is carried out by the Municipality of West Elgin. It contains gravity sewers that lead to the Main Pumping Station located on Furnival Road. The pumping station is operated by OCWA. It contains a wet well with two submersible pumps that pump to the treatment plant. Backup power is supplied by an onsite generator.

Plant Description

The Rodney Wastewater Treatment Plant is an extended aeration facility which consists of: extended aeration, settling, UV disinfection (seasonal), phosphorus removal, and filtration. The extended aeration process is designed to remove carbonaceous and nitrogenous organic compounds (BOD). Aluminum Sulphate is used for phosphorus removal. After the clarifier the effluent is filtered and seasonally disinfected using ultraviolet light, then discharged to Sixteen Mile Creek. Sludge is directed to the lagoon for storage and settling. Decant liquid off the lagoon is returned to the influent of the plant.

Process Details

- Wastewater is directed into the sewage lift station from the Village of Rodney by gravity. Wastewater is pumped from the sewage lift station located near the junction of Furnival Road and King Street by force main into a reinforced concrete splitter chamber, provided with a mechanical rake bar screen.
- The secondary treatment system consists of two aeration basins, one reinforced concrete clarifier tank and two return activated sludge pumps.
- The phosphorous removal system consists of one 30,000 L fiber reinforced tank with spills containment equipped with 2 diaphragm type metering pumps (1 duty and 1 standby).
- Three mechanical aerators in each aeration tank provide oxygen at a low pressure in the aeration tanks.
- The tertiary treatment system consists of four (4) continuous back wash 2 metre deep bed, granular single media sand filtration units housed in the filter building. Hydrogen peroxide is introduced for filter cleaning when necessary.
- The disinfection system consists of a ultra-violet (UV) unit through which the effluent is discharged seasonally.
- A concrete V-notch weir flow measuring chamber is installed between the clarifier and the filter building.
- Operations are controlled by a programmable logic controller (PLC). A data logging computer system with local monitoring capability is used to monitor, trend, and record select process parameters.
- Laboratory space is also located at the WWTP to allow for basic laboratory analyses to be conducted by the plant operator.
- Process control is monitored by SCADA at the West Lorne Wastewater Treatment Facility.

Section 2: Monitoring Data

Sample Collection and Testing

All samples are collected and tested as per the requirements of the Environmental Compliance Approval.

Raw sewage is sampled bi-weekly and tested for BOD₅, total suspended solids, total phosphorus, and total Kjeldahl nitrogen. The raw samples are collected as 24 hour composite samples.

Final effluent is sampled bi-weekly and tested for BOD₅, total suspended solids, total phosphorus, free ammonia nitrogen, total Kjeldahl nitrogen, nitrite, nitrate, pH and alkalinity. Samples are collected using an automatic composite sampler and collected over a twenty-four hour period. Grab samples for dissolved oxygen and temperature are collected bi-weekly. A grab sample for E. coli is sampled bi-weekly during the disinfection period from April 15 to October 15.

In-house tests are conducted on a weekly basis on the final effluent, raw influent and the mixed liquor suspended solids at the plant to check plant performance and to make any operational changes required.

In 2013, all chemical and microbiological sample analyses were conducted by SGS Lakefield Research. Temperature, pH and dissolved oxygen were conducted by staff at the treatment plant.

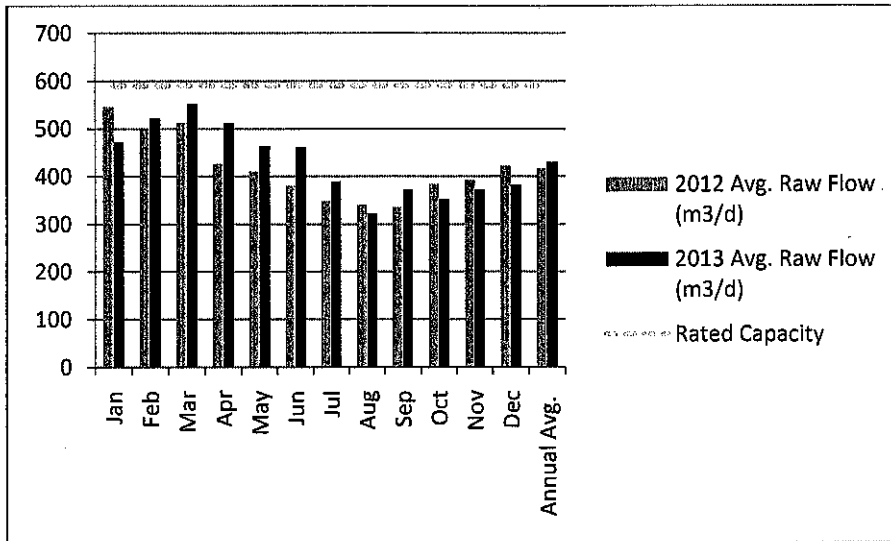
The receiving stream temperature is performed at Sixteen Mile Creek.

Flows

Detailed monthly flow information is summarized in Appendix A. The total flow treated in 2013 was 157,336m³, which corresponds to a 3% increase from 2012 raw flows. The annual average daily flow for the reporting period was 431m³/day, or 73% of the plant's rated design capacity of 590m³/day (see Chart 1).

The design average daily flow for the plant was exceeded 29 times during the year, compared to 12 times in 2012. The hydraulic peak flow of 2,190m³/day for the plant was not exceeded in 2013.

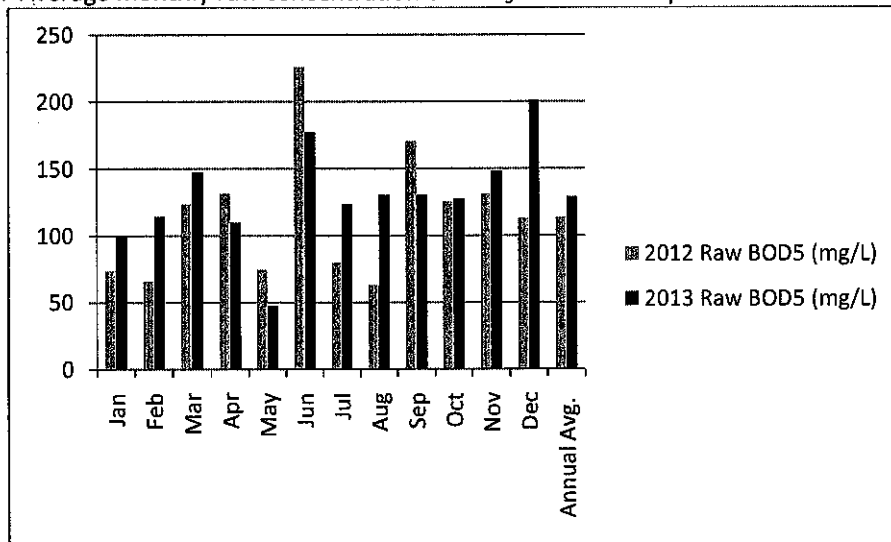
Chart 1. The average daily raw sewage flow to the plant in 2013 compared to 2012.



Raw Sewage Quality

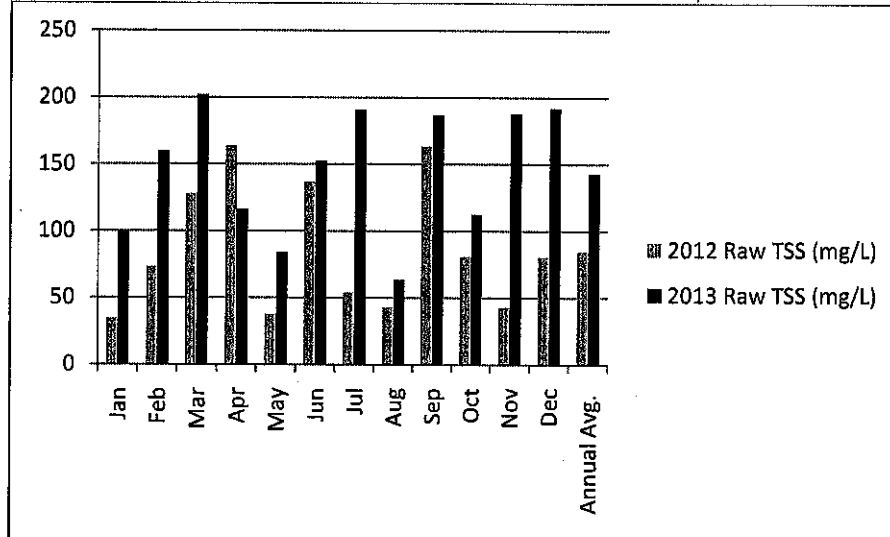
The annual average raw sewage BOD₅ concentration to the plant was 129mg/L with a maximum concentration of 266mg/L. The average BOD₅ loading to the plant was 55.6kg/d for 2013. The annual average concentration of BOD₅ has increased 13.3% from 2012, see Chart 2.

Chart 2. Average monthly raw concentration of BOD₅ for 2013 compared to 2012.



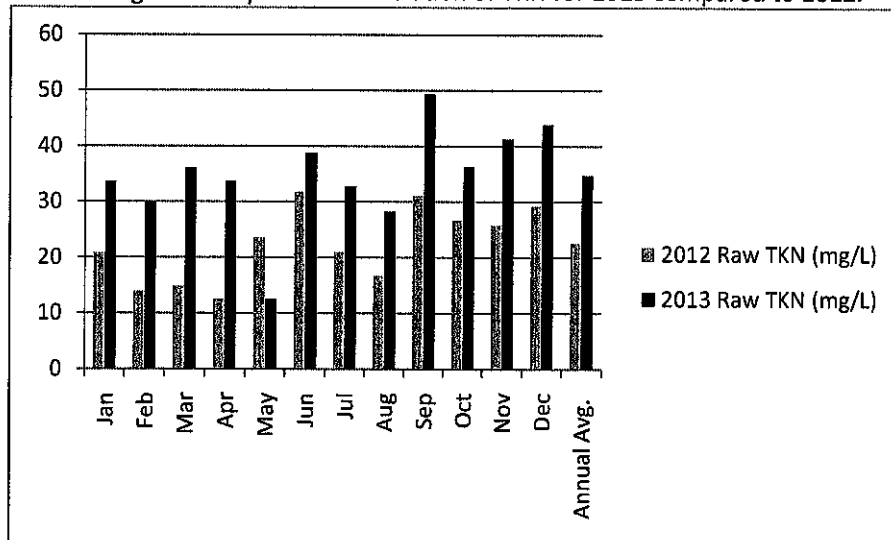
The annual average raw sewage suspended solids (TSS) concentration to the plant was 143mg/L, with a maximum of 338mg/L. This corresponds to an average TSS loading to the plant of 61.7kg/day. The average concentration of TSS has increased 69.6% from 2012, see Chart 3.

Chart 3. The average monthly raw concentration of TSS for 2013 compared to 2012.



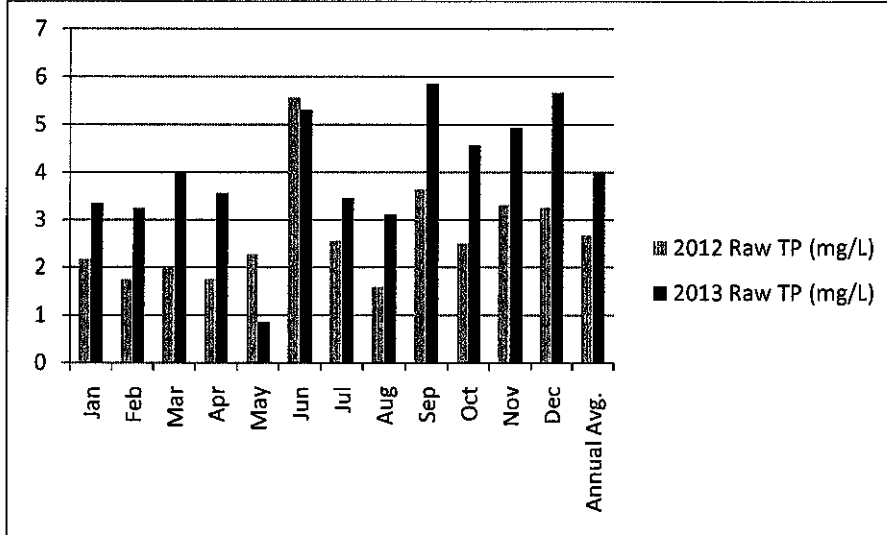
The annual average raw sewage Total Kjeldahl Nitrogen (TKN) concentration to the plant was 34.7mg/L, with a maximum of 77.4mg/L. This corresponds to an average TKN loading to the plant of 15kg/day. The average concentration of TKN has increased 53.8% from 2012, see Chart 4.

Chart 4. The average monthly raw concentration of TKN for 2013 compared to 2012.



The annual average raw sewage Total Phosphorus (TP) concentration to the plant was 3.99mg/L, with a maximum of 9.29mg/L. This corresponds to an average TP loading to the plant of 1.72kg/day. The average concentration of TP has increased 49.5% from 2012, see Chart 5.

Chart 5. The average monthly raw concentration of TP for 2013 compared to 2012.



Effluent Limits

Detailed analytical data is attached to this report as Appendix A. The following table provides a summary of the monthly average concentration and loading ranges compared to the limits set in the Environmental Compliance Approval.

Summary and Comparison of Compliance Data

Table 1. Monthly average concentration and loading ranges for 2013.

Parameter	Monthly Average Effluent Limit (mg/L)	Monthly Average Effluent Result Ranges (mg/L)	Monthly Average Loading Limit (kg/d)	Monthly Average Loading Result Ranges (kg/d)
BOD ₅	10(a)	<2 – <2.7	6.9	0.6 – 3.0
	15(b)	<2 – <5.5		
Suspended Solids	10(a)	<2 – 7.5	6.9	0.6 – 2.8
	15(b)	<2 – <2.5		
Total Phosphorus	0.5(a)	0.06 - 0.16	0.4	0.02 - 0.08
	1.0(b)	<0.04 – 0.15		
Total (Ammonia + Ammonium) Nitrogen	3.0(a)	<0.1 - <0.20	2.2	0.04 – 0.33
	5.0(b)	<0.1 – 0.60		
E. coli	200	<2 - <10.4		

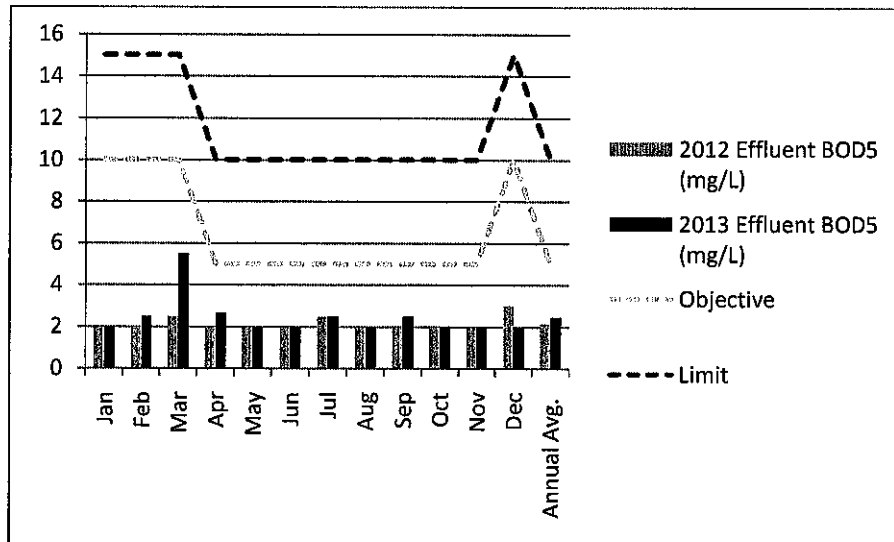
NOTE: (a) limit applies during the non-freezing period
 (b) limit applies during the freezing period

Discussion on Monitoring Data as Compared to the Effluent Limits

The monthly averages were all met as prescribed in the Environmental Compliance Approval. The plant is providing effective treatment with meeting all compliance monthly average concentration and loading limits.

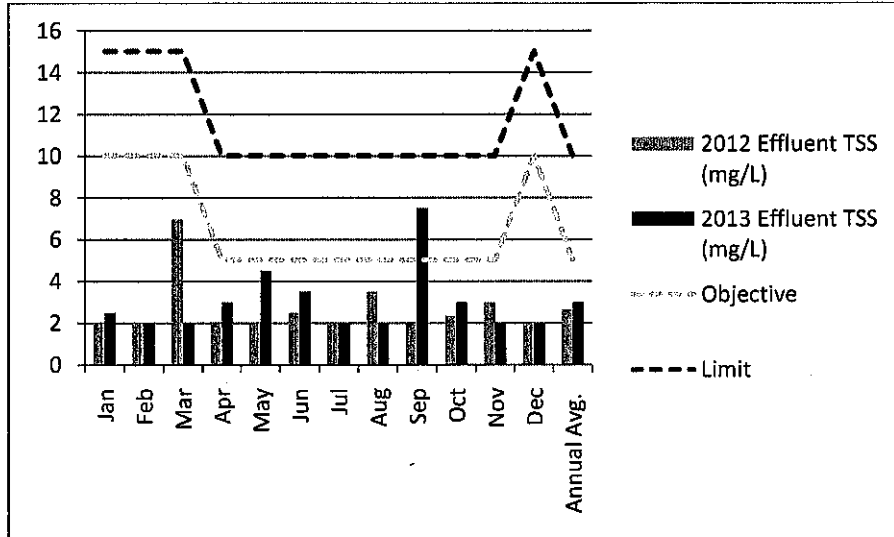
The annual average effluent BOD₅ for 2013 was 2.5mg/L, which is a 14.3% increase from 2012 (see Chart 6). The annual loading of BOD₅ at the plant in 2013 was 1.1kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 6. The effluent monthly average concentration of BOD₅ in 2013 compared to 2012 concentrations.



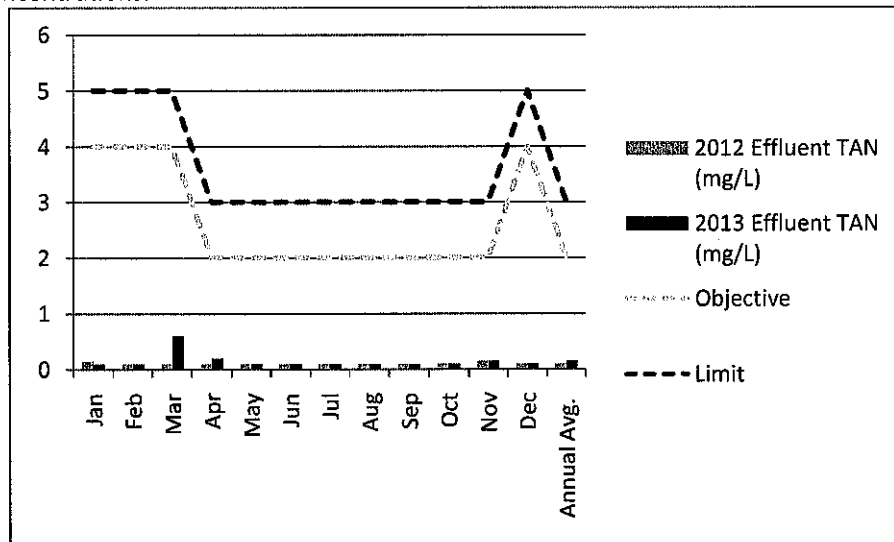
The annual average effluent Total Suspended Solids (TSS) for 2013 was 3mg/L, which is an increase from 2012 by 13% (see Chart 7). The annual loading of TSS at the plant in 2013 was 1.3kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 7. The effluent monthly average concentration of TSS in 2013 compared to 2012 concentrations.



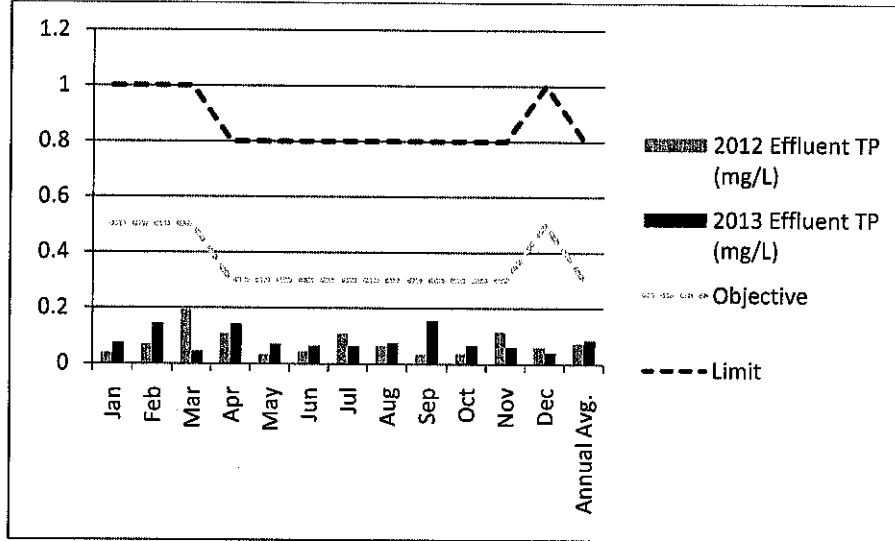
The annual average effluent Total Ammonia + Ammonium Nitrogen (TAN) for 2013 was 0.2mg/L, which is a 13% increase from 2012 (see Chart 8). The annual loading of TAN at the plant in 2013 was 0.07kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 8. The effluent monthly average concentration of TAN in 2013 compared to 2012 concentrations.



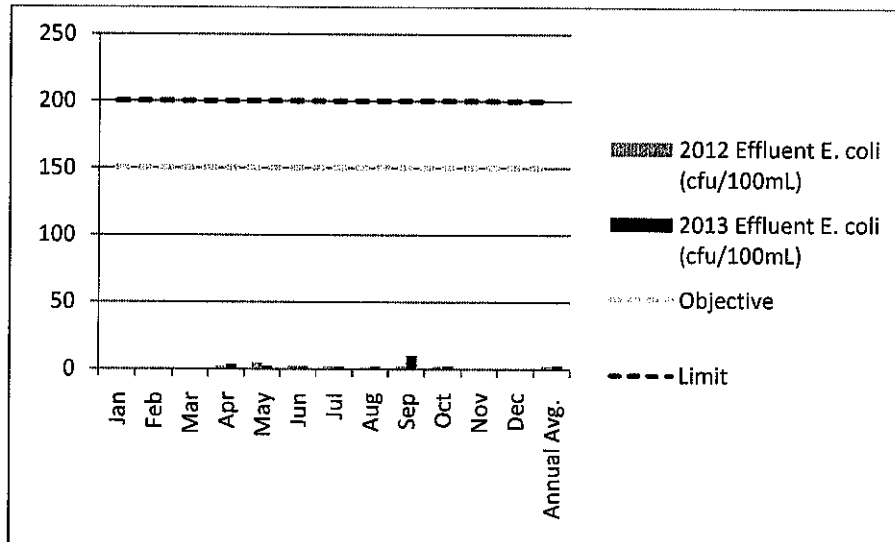
The annual average effluent Total Phosphorus (TP) for 2013 was 0.09mg/L, which is a 16.8% increase from 2012 (see Chart 9). The annual loading of TP at the plant in 2013 was 0.04kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 9. The effluent monthly average concentration of TP in 2013 compared to 2012 concentrations.



The annual geometric mean effluent E.coli for 2013 was 2.7cfu/100mL, which is a 20% increase from 2012 (see Chart 10). Refer to Table 1 for a list of monthly geometric mean effluent limits.

Chart 10. The effluent monthly geometric mean concentration of E. coli in 2013 compared to 2012 concentrations.



Section 3: Operating Problems and Corrective Actions

Cold temperatures can affect the treatment of the sewage. The mechanical surface aerators in the aeration tanks lowers the temperature of the contents further. Adjustments to the mixed liquor

suspended solids the plant was able to remain in compliance during these cold periods. The cold temperatures formed ice on the clarifier which caused the clarifier sweeper arm to break. During the repairs the aeration flow was diverted to the lagoons instead of the clarifier.

Section 4: Maintenance

Regular scheduled monthly preventative maintenance is assigned and monitored using the Workplace Management System (WMS) program. The following is a summary of maintenance performed other than WMS work orders:

- replaced spring on clarifier sweeper arm
- repair clarifier sweeper arm
- replaced RAS pump
- replaced clarifier motor
- replaced aeration motors for aerators 2, 3, 5, 6

Section 5: Effluent Quality Assurance

Effluent quality assurance is evaluated by monitoring parameters and changes throughout the plant processes. The operators monitor the aeration tank by performing weekly tests on the mixed liquor. These tests include dissolved oxygen, pH, temperature, settling tests, Mixed Liquor Suspended Solids (MLSS), and Mixed Liquor Volatile Suspended Solids (MLVSS). As well, monitoring of the alum dosages, wasting volumes and Return Activated Sludge Suspended Solids is completed. Data collected from these tests provide information to the operator to make the appropriate adjustments in the treatment process and take corrective actions before the plant reaches its effluent limits.

Section 6: Calibration and Maintenance

Regular scheduled monthly preventative maintenance is assigned and monitored using the Workplace Management System program.

Annual maintenance on the generator was completed in February by Albert's Generator Services. Flowmetrix Technical Services Inc. performed the annual calibration on the flow meter in May. In house meters for pH and dissolved oxygen are calibrated by OCWA operators as per manufacturer's instructions.

Section 7: Effluent Quality

Effluent Objectives

The following table shows the monthly average effluent concentrations ranges and loadings to the effluent objectives outlined in the Environmental Compliance Approval.

Parameter	Average Monthly Effluent Objective (mg/L)	Average Monthly Effluent Result Ranges (mg/L)	Average Monthly Loading Objectives (kg/day)	Average Monthly Loading Result Ranges (kg/day)
BOD ₅	5(a)	<2 – <2.7	3.9	0.6 – 3.0
	10(b)	<2 – <5.5		
Suspended Solids	5(a)	<2 – 7.5	3.9	0.6 – 2.8
	10(b)	<2 – <2.5		
Total Phosphorus	0.3(a)	0.06 - 0.16	0.28	0.02 -0.08
	0.8(b)	<0.04 – 0.15		
Total (Ammonia + Ammonium) Nitrogen	2.0(a)	<0.1 - <0.20	1.57	0.04 – 0.33
	4.0(b)	<0.1 – 0.60		
E. coli	150	<2 - <10.4		
Dissolved Oxygen	5	7.56 - 12.63		

Discussion of Effluent Objectives

The Rodney WWTP meet allbut one monthly concentration effluent objectives set out in the Environmental Compliance Approval. In September, the monthly average concentration of total suspended solids was 7.5mg/L (Refer to Table above and Chart 7). A possible cause of the exceedance was due to algae build up. All monthly average loading objectives were met

The annual average flow for 2013 was 431m³/d, which is below the design flow of 590m³/d. However, there were 29 instances where the design flow was exceeded, this is up from 12 in 2012. However, there was more rain events that caused the higher flows in 2013 than in 2012.

Section 8: Biosolids

The lagoon is used for sludge digestion and storage as per the Environmental Compliance Approval. The waste activated sludge process transfers to the lagoon. The sludge is allowed to settle at the bottom of the lagoon and the liquid is pumped back to the head of the plant for treatment. There is some sludge build up at the discharge pipe from the plant to the lagoon. This has been put on the capital list for its removal in 2014.

Section 9: Community Complaints

No community complaints with regards to plant operations were received in 2013.

Section 10: Bypasses, Spills, and Abnormal Discharges

There were no by-pass events for the Rodney WWTP during 2013.

The Rodney Wastewater Treatment Plant can direct raw sewage from the pump station to the lagoon when there is a power failure of long duration. The pump station has back up power, however, the treatment plant does not have any back up power.

Section 11: Summary

Overall the Rodney Wastewater Treatment Plant provided effective treatment in 2013.

APPENDIX A

Analytical Data

