

**2005
Annual Compliance Report**

**OPERATION AND MAINTENANCE
OF
LITTLE CURRENT WATER SYSTEM
THE TOWN OF NORTHEASTERN MANITOULIN AND THE ISLANDS**

Project No.: 405730
Date: February 2006

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1.0 INTRODUCTION

The Little Current Water Treatment Plant (WTP) is owned by the Town of Northeastern Manitoulin and the Islands and is located at Sims Street, former Township of Howland.

The Little Current WTP receives its water from an intake structure located in the north channel of Lake Huron. This facility meets the definition of a “Large Municipal, Residential Drinking Water System” serving the community of Little Current. The Town of Northeastern Manitoulin and the Islands retained the services of Oweson Water Services (OWS), a Division of Oweson Ltd, to prepare the Annual Compliance Report for the Little Current Water Treatment Plant. The Water Works number is 220002191 and the water treatment plant as of November 26, 2005 is operated by Oweson Water Services licensed operators. From January 1, 2005 to November 25, 2005 the water treatment plant was operated by the Municipality.

The objective of this report is to comply with the mandatory requirements for an Annual Report under Section 11.0 and a Summary Report under Schedule 22 of Ontario Regulation 253/05. The annual report covers the period from January 1, 2005 to December 31, 2005.

This report, which outlines the recommendations that the owner/operating authority should undertake to comply with the regulations and continue to provide a safe drinking water quality to the community, includes the following:

- Brief description of the water treatment system
- Summary of the reports and notices submitted to the Ministry of the Environment (MOE)
- Summary of the treated water quality monitoring
- Summary of chemicals used
- Summary of water usage
- Summary of any corrective actions for adverse results
- Water treatment system repairs and improvements on the water treatment system

2.0 DESCRIPTION OF WATER WORKS

The Little Current Water Treatment Plant Water Works consists of a water intake located approximately 60m in the north channel of Lake Huron, a lowlift pumping station consisting of three (3) submersible pumps (two (2) duty and one standby). Each pump has a rated capacity of 31 L/s at a TDH of 15 m. The lowlift pumping station comes complete with one (1) 200L solution tank for sodium hypochlorite and a metering pump with a capacity of 2.4 L/hr for zebra mussel control.

Treatment consists of membrane filtration. This consists of two (2) concrete tanks, each tank with five (5) ultrafiltration units. Each unit contains four (4) modules and each module has a filtering area of 46.45 m². In the process room there are three (3) centrifugal permeate pumps (two duty and one standby). Each pump has a rated capacity of 23.1 L/s at a TDH of 6 m to pump the permeate to the chlorine contact chamber.

The chlorine contact chamber is constructed upstream of the clearwells and has approximate dimensions of 7.95 m long X 3.55 m wide X 5.75 m deep. The contact chamber maintains a constant volume of approximately 162 m³. In the chemical storage room there is a 200 L solution tank for sodium hypochlorite that comes complete with two (2) positive displacement metering pumps which inject sodium hypochlorite solution at the inlet of the chlorine contact chamber and the highlift pump discharge header. Following the contact chamber there are two (2) clearwells, each having a storage volume of 749.8 m³.

The highlift pumping station consists of four (4) centrifugal highlift pumps (three duty and one standby) providing a firm capacity of 10,000 m³/d with two (2) of the highlift pumps having a capacity of 57.87 L/s and two (2) highlift pumps having a capacity of 28.94 L/s. All four (4) pumps are rated at TDH of 63 m.

There is an overflow structure constructed at the west end of the process tank to discharge dechlorinated reject water from the membranes. The reject water is dechlorinated with sodium bisulphite solution which is injected into the water conduit of the reject water prior to being discharged into the North Channel of Lake Huron.

The Little Current water treatment plant comes complete with two (2) continuous chlorine residual analysers to monitor free chlorine residuals. One is located at the outlet of the chlorine contact chamber and the second analyser is on the highlift pump discharge header prior to entering the distribution system. Additionally there are two (2) online turbidimeters installed to continuously monitor turbidity at the raw water pump discharge header and the highlift pump discharge header. Both turbidimeters are located in the water treatment plant building. Additionally there is one particle counter to measure particles in each of the permeate effluent lines

and one ORP analyser to monitor sulphite dosage for dechlorination.

Presently there are five (5) magnetic flow meters installed. There are two (2) magnetic flow meters installed on the raw water inlet pipe capable of measuring flows up to 210 L/s, there are two (2) magnetic flow meters on the permeate lines and one (1) magnetic flow meter installed on the highlift pump discharge header which has a capacity to measure flows up to 31 L/s.

At times of power outages, the Little Current Water Treatment Plant comes complete with one (1) standby diesel engine driven generator rated at 250 kw. There are two (2) 1,150 L diesel fuel storage tanks with containment. Refer to **Figure 1** for Schematic Process Flow Diagram.

The Ministry of the Environment has issued an Amended Certificate of Approval (C of A) #4654-5XCK6A for this facility dated February 28, 2005 which is enclosed in **Appendix A**. A Permit to Take Water (PTTW) # 97-P-5018 was also issued by the Ministry of the Environment on June 19, 1997 and amended on June 25, 1997. The PTTW specifies that the rated taking should not exceed a maximum of 2,361 L/min. The PTTW is in effect from the date of issue to perpetuity inclusive and is enclosed in **Appendix B**.

3.0 LIST OF REPORTS AND NOTICES SUBMITTED TO DIRECTOR - MINISTRY OF THE ENVIRONMENT

Table 1 shows all reports and notices that were submitted to the Ministry of Environment between January 1, 2005 and December 31, 2005.

TABLE 1
List of Reports and Notices Submitted
to the Ministry of the Environment
Little Current Water Treatment Plant

Title of Report or Notice	Date of Submission
Part II [B] [D]	November 28, 2005
Part III Form 2	February 28, 2006

Part III Form 2 titled "Annual Report" is submitted electronically to the Ministry of the Environment. Refer to **Appendix F**. Refer to **Appendix G** for selected correspondence.

4.0 SUMMARY OF WATER QUALITY MONITORING

4.1 Water Treatment Equipment Operation & Maintenance as per Schedule 7 O. Reg. 253/05

4.1.1 Chlorine Residual - POE

In the year 2005 (from January 1, 2005 to December 31, 2005), a total of 365 samples were collected and analyzed for free chlorine residual at the Point of Entry. **Table 2** below shows the monthly Minimum and Maximum Free Chlorine Residuals. The chlorine residuals ranged from a low value of 0.59 mg/L to a high value of 1.98 mg/L which is within compliance.

Table 2
Summary of Water Quality - Free Chlorine (POE)
Little Current Water Treatment Plant

Date	No. of Samples	Chlorine Residual - Distribution (mg/L)	
		Minimum (mg/L)	Maximum (mg/L)
January	31	0.82	1.62
February	28	0.98	1.34
March	31	0.59	1.69
April	30	0.88	1.78
May	31	0.91	1.58
June	30	0.78	1.40
July	31	0.92	1.39
August	31	0.99	1.52
September	30	1.14	1.63
October	31	1.21	1.76
November	30	0.87	1.63
December	31	0.78	1.98
Total	365		
Min. (mg/L)		0.59	
Max. (mg/L)			1.98

4.1.2 Chlorine Residual - Distribution

In the year 2005 (from January 1, 2005 to December 31, 2005), a total of 331 samples were collected and analysed for free chlorine residual at various locations throughout the distribution system. **Table 3** below shows the monthly minimum and maximum free chlorine residual values. The free chlorine residuals ranged from a low value of 0.10 mg/L to a high value of 1.55 mg/L which is within compliance.

Table 3
Summary of Water Quality - Chlorine Residual (Distribution)
Little Current Water Treatment Plant

Month	No. of Samples	Minimum (mg/L)	Maximum (mg/L)
January	29	0.58	1.05
February	25	0.59	1.12
March	27	0.64	1.39
April	28	0.60	1.18
May	26	0.52	1.19
June	30	0.38	1.16
July	31	0.20	1.04
August	26	0.10	1.16
September	26	0.26	1.27
October	25	0.66	1.55
November	27	0.65	1.26
December	31	0.79	1.51
Total	331		
Min. (mg/L)		0.10	
Max. (mg/L)			1.55

The log sheet has been revised such that each day all the data is recorded in one central place.

4.1.3 Turbidity

At the Little Current Water Treatment Plant, raw water and treated water turbidity are analysed by continuous analysers. In the year 2005, a total of 365 samples were collected and analysed. **Table 4** below shows the minimum and maximum turbidity values for raw water and treated water.

Table 4
Summary of Water Quality - Turbidity (NTU)
Little Current Water System

Month	# of Samples	Raw Result		(Final)Treated Water Turbidity NTU	
		Min.	Max.	Min.	Max
January	31	0.19	0.97	0.03	0.10
February	28	0.18	0.51	0.02	0.10
March	31	0.17	0.77	0.02	0.18
April	30	0.16	0.72	0.05	0.09
May	31	0.26	0.70	0.03	0.10
June	30	0.36	1.50	0.05	0.10
July	31	0.34	1.00	0.04	0.09
August	31	0.34	1.50	0.05	0.12
September	30	0.30	1.10	0.04	0.10
October	31	0.48	2.35	0.06	0.15
November	30	0.40	4.33	0.05	0.10
December	31	0.39	0.66	0.03	0.08
Total	365				
Min. (mg/L)		0.16		0.02	
Max. (mg/L)			4.33		0.18

The turbidity for the treated water ranged from a low value of 0.02 NTU to a high value of 0.18 NTU, and for the raw water the turbidity ranged from 0.16 NTU to 4.33 NTU.

The Ontario Drinking Water Quality Standards (ODWQS) have set a Maximum Acceptable Concentration (MAC) of 1 NTU for treated water leaving the POE and an Aesthetic Objective (AO) of 5.0 NTU for treated water in the distribution system. No exceedance in treated water turbidity were reported in the year 2005 at the Little Current Water Treatment Plant.

4.2 Microbiological Sampling as per Schedule 10 O. Reg. 253/05

4.2.1 Distribution System

Schedule 10 of Ontario Regulation 253/05 requires that at least nine (9) distribution samples are collected monthly and tested for E.Coli, Total Coliform and either Heterotrophic Plate Count (HPC) or Background Count. In the year 2005, a total of 155 distribution samples were collected and analysed. **Table 5** enclosed and **Appendix C** shows the weekly microbiological water quality results for the year 2005. All analysis results were found to be safe.

4.2.2 Raw Water Samples

Schedule 10 of Ontario Regulation 253/05 requires that at least one (1) raw water sample be collected every week and tested for E.Coli and Total Coliforms. In the year 2005, a total of 52 raw water samples were collected and analysed. Refer to **Table 5** and **Appendix C**.

4.2.3 Point of Entry Samples

Schedule 10 of Ontario Regulation 253/05 requires one (1) treated water sample to be collected from the Point of Entry (POE) every week. During 2005, 52 samples were collected and analyzed for E.Coli, Total Coliform and either Background Count or HPC. Refer to **Table 5** and **Appendix C**. All analysis results were found to be safe.

Microbiological sampling results for the distribution, raw and treated water are summarized in **Table 5**. All samples were analysed by SGS Lakefield which is an accredited lab.

TABLE 5
Summary of Water Quality: Microbiological
Little Current Water Treatment System

Water Type	Total Coliform Examination Results			E.Coli Examination Results			HPC or Background Examination Results		
	Total No. of Samples	>0	0	Total No. of Samples	>0	0	Total No. of Samples	≥500	<500
		Adv.	Safe		Adv.	Safe		Adv.	Safe
Distribution Water	155	0	155	155	0	155	77	0	77
Raw Water	52	44	8	52	21	31	7	1	6
Point of Entry Water	52	0	52	52	0	52	7	0	7

E.Coli Escherichia coli (fecal coliform)

HPC Heterotrophic Plate Count

4.3 Chemical Sampling and Testing as per Schedule 13 of O. Reg. 253/05

During 2005, the Town of Northeastern Manitoulin and the Islands, attempted to negotiate a new contract with the Municipal staff. Unfortunately they were not successful and a significant number of the Municipal employees went on strike in the fall of 2005. This included the Operator In Charge for the Municipality. Due to the extremely heavy work load of the remaining staff, all regulated sampling was collected but unfortunately some samples were collected outside of the time frames as stipulated in Schedule 13. Therefore Section 4.3 has been structured to double as the sampling program for 2006 for the Little Current Water Treatment Plant

4.3.1 Inorganics

Schedule 13.2 of Ontario Regulation 253/05 requires that at least one water sample is taken every twelve months, if the system obtains water from a raw water supply that is surface water. Since the Little Current Water Treatment Plant receives its raw water from the north channel of Lake Huron, a treated water sample was collected on November 28, 2005 and submitted to SGS Lakefield for analysis of all the inorganics as listed in Schedule 23. All parameters were found to be within compliance. Inorganics are required to be sampled and analysed again before November 28, 2006. Refer to **Appendix D**.

4.3.2 Lead

Schedule 13-3 of Ontario Regulation 253/05 requires that at least one distribution sample be taken every 12 months from a point in the distribution system and tested for lead. A water sample was collected from the Little Current distribution system on November 28, 2005 and analyzed for lead by SGS Lakefield. The concentration of lead was found to be 0.6 µg/L which is within compliance. This parameter is required to be sampled and analyzed before November 28, 2006. Refer to **Appendix D**.

4.3.3 Organics

Schedule 13-4 of Ontario Regulation 253/05 requires that at least one water sample is taken every 12 months if the raw water source is a surface water. All organic parameters, as per Schedule 24, were sampled and analyzed on November 28, 2005 and were found to be within compliance. Organics are required to be sampled and analysed again before November 28, 2006. Refer to **Appendix D**.

4.3.4 Trihalomethanes (THMs)

Schedule 13-6 of Ontario Regulation 253/05 requires that at least one distribution sample is taken every three months from a point in the drinking water system's distribution system and tested for Trihalomethanes (THMs). In the year 2005, samples were collected during the months of February, May, November and December. The Ontario Drinking Water Quality Standard (ODWQS) have set a Maximum Allowable Concentration (MAC) of 100 µg/L for this parameter and is expressed as a running annual average. In the year 2005, the annual average THM was found to be 39 µg/L. Please refer to **Table 6** below on the Summary of Trihalomethanes and **Appendix D** for analytical results.

Table 6
Summary of Trihalomethanes (THMs) - 2005
Little Current Water Treatment Plant

Sample Date	Result (µg/L)
February 7, 2005	31
May 31, 2005	42
November 28, 2005	51
December 12, 2005	32
Annual Average	39

In 2006, THM's should be collected in March, June, September and December from remote locations within the distribution centre.

4.3.5 Nitrate and Nitrite

Schedule 13-7 of Ontario Regulation 253/05 requires that at least one water sample is taken every three months and tested for nitrate and nitrite. Samples were collected during the months of February, May, November and December. The analytical results were found to be in compliance. Refer to **Appendix D**. In 2006, samples should be collected in March, June, September and December.

4.3.6 Sodium

Schedule 13-8 of Ontario Regulation 253/05 requires that at least one water sample is collected every 60 months and tested for sodium. The Ontario Drinking Water Quality Standards (ODWQS) have set a Maximum Acceptable Concentration (MAC) of 200 mg/L for sodium and requires the Medical Officer of Health be notified if the concentration exceeds 20 mg/L. A sample was collected and analysed for sodium on February 26, 2003 and was found to have a concentration of 5.2 mg/L which is within compliance. A sample is not required to be collected again until February 26, 2008. Refer to **Appendix D**.

4.3.7 Fluoride

Schedule 13-9 of Ontario Regulation 253/05 requires that a water sample be collected at least once every 60 months and tested for fluoride. The ODWQS have set a MAC of 1.5 mg/L for fluoride. A sample was collected on May 31, 2005 and was found to have a concentration of 0.06 mg/L which is in compliance. This sample is not required to be collected again until May 31, 2010. Refer to **Appendix D**.

4.4 CHEMICAL SAMPLING AND TESTING AS PER THE CERTIFICATE OF APPROVAL

4.4.1 Total Suspended Solids

Section 5.5 of the Certificate of Approval requires sampling and analysis of Suspended Solids monthly from the point of discharge from the Little Current Water Treatment Plant to the North Channel of Lake Huron. Section 4.4 of the Certificate of Approval requires the annual average concentration of Suspended Solids in the effluent discharge not exceed 25 mg/L. **Table 7** provides a summary of Treated Backwash Water Quality for 2005. It can be seen from **Table 7** that the annual average TSS concentration was 9 mg/L. Refer to **Appendix E** for analysis results.

All analysis in Section 4.3 and 4.4 were performed by SGS Lakefield research.

Table 7
Summary of Effluent Wastewater Quality - 2005
Little Current Water Treatment Plant

Month	Total Suspended Solids mg/L
January	< 2
February	2
March	5
April	2
May	29
June	4
July	6
August	38
September	16
October	2
November	2
December	2
Annual Average (mg/L)	9

For the purpose of calculating the Annual Average, the result in January of less than 2 was assumed to be 2 mg/L. During 2006 TSS samples are to be collected monthly.

5.0 WATER USAGE

The Certificate of Approval issued by the Ministry of the Environment specifies that the Little Current Water Treatment Plant has a rated capacity of 35.9 L/sec or (3,100 m³/day). The Permit to Take Water (PTTW) allows for the withdrawal of 2361L/min or (3,400 m³/day). **Table 8** below shows the summary of water usage for the year 2005 recorded by the flow meters installed at this facility. This table also includes monthly total, average day and maximum day flows. From the table it can be seen that the maximum daily volume did not exceed the maximum rated capacity in the Certificate of Approval or the maximum allowed permitted by the PTTW. The maximum daily volume occurred in June 2005 and was observed to be 3,887 m³. The average day flow for the year was 2,122 m³.

TABLE 8
Summary of Water Usage
January 1, 2005 to December 31, 2005
Little Current Water Treatment Plant

Month	Raw Water		
	Quantity of Water (m ³)	Average Day (m ³)	Maximum Day (m ³)
January	39,371	1,270	2976
February	42,615	1,522	2061
March	56,919	1,836	2759
April	60,501	2,017	2479
May	67,477	2,177	2738
June	80,656	2,689	3887
July	82,710	2,668	3599
August	73,523	2,372	3345
September	70,965	2,366	2923
October	63,272	2,041	2976
November	69,371	2,312	3107
December	67,967	2,193	3194
Total	775,347		
Average Day		2122	
Maximum Day			3887

The water meters were calibrated by Summa Engineering on July 7, 2005 and were found to be acceptable. However, due to the present pipe configuration, it was difficult to calibrate the flowmeters for train 1 and 2.

In all cases, the error was found to be less than 5% which is acceptable. Refer to **Appendix I** for the Water Meter Calibration Report.

6.0 MONTHLY MONITORING OF CHEMICALS

The chemicals used in the Little Current Water Treatment Plant include sodium hypochlorite (NaOCl) and sodium bisulphate. The sodium hypochlorite is used for disinfection while the sodium bisulphate is used to dechlorinate the wastewater effluent. All sodium hypochlorite is NSF 60 approved. Refer to **Appendix H**.

Table 9 below summarizes the monthly use of sodium hypochlorite and the average dosage. It can be seen from **Table 9** that there was a total of 1,320.51 kg of sodium hypochlorite used with an average dosage of 2.15 mg/L. The volume and dosage are reasonable considering the volume of water that was disinfected.

**Table 9
 Summary of Disinfectant Chemicals Used
 January 1, 2005 to December 31, 2005
 Little Current Water Treatment Plant**

Month	Sodium Hypochlorite	
	Volume Used (kg)	Average Dosage (mg/L)
January	70.83	1.82
February	67.40	1.77
March	82.25	1.69
April	86.19	1.86
May	98.48	1.81
June	119.08	2.01
July	148.08	2.45
August	147.33	2.59
September	148.42	2.70
October	131.48	2.64
November	106.89	2.20
December	114.08	2.25
Total	1320.51	
Average		2.15

7.0 COMPLIANCE OF WATER SYSTEM

During the period covered by this report, no notices were given in accordance with the Schedule 16 and no corrective action was required as per Schedule 17 of Ontario Regulation 253/05.

Section 4.0 of this report has been prepared to double as a sampling program for all sampling as required by Schedule 13.

8.0 CONCLUSIONS

1. Generally the Little Current Water Treatment Plant was in compliance with Regulation 253/05.
2. The average water demand in 2005 was approximately 2,124 m³/day.
3. The maximum day demand was 3,887 m³ and occurred in June of 2005.
4. The average day and the maximum day did not exceed the rated capacity of the Certificate of Approval or the Permit to Take Water.
5. The annual average TSS concentration was 9 mg/L which is less than the annual average requirement as specified in the Certificate of Approval.
6. Calibration and routine preventive maintenance was performed in the system. The water meters were calibrated on July 7, 2005 by Summa Engineering and were found to be acceptable.
7. All bacteriological sampling was completed as per Schedule 10.
8. All physical/chemical sampling was completed as per Schedule 13, however some of the time intervals between samples was exceeded.
9. All inorganics as per Schedule 23 were sampled and analyzed on November 28, 2005.
10. All organics as per Schedule 24 were sampled and analyzed on November 28, 2005.
11. Lead was analyzed from the distribution system on November 28, 2005.
12. Trihalomethanes were analyzed a total of four (4) times over the course of 2005, however, no samples were collected between May and November and a sample was collected in November and December. The annual average concentration of THM's was found to be 39 µg/L which is reasonable.
13. Nitrate and Nitrite were analyzed four (4) times in 2005 in February, May, November and December.

14. Sodium was analyzed on February 26, 2005 and was found to have a concentration of 5.2 mg/L.
15. Fluoride was analyzed on May 31, 2005 and was found to have a concentration of 0.6 mg/L.
16. There was a total of 1,320.51 kg of sodium hypochlorite used with an average dosage of 2.15 mg/L.
17. Free chlorine residuals in the distribution system were taken daily, however, not all analysis results were recorded in the logbook.

9.0 RECOMMENDATIONS AND CONCLUSIONS

1. Generally the Little Current Water Treatment Plant should continue to be operated in compliance with the Regulation 253/05.
2. TSS samples are to be collected monthly.
3. The water meters are to be calibrated by July 7, 2006 by Summa Engineering.
4. Sodium should be sampled and analyzed again before February 26, 2008.
5. Fluoride should be sampled and analyzed again before May 31, 2006.
6. The Municipality should consider installing free chlorine residual analyzers complete with data logging and alarms at remote locations within the Little Current distribution system.

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REFERENCE

1. Ontario Ministry of the Environment, Ontario Regulation 170/03 under the Safe Drinking Water Act, 2002 and as amended to O. Reg. 253/05.
2. Permit To Take Water.
3. Certificate of Approval.
4. Safe Drinking Water Act.

Appendix A
Certificate of Approval

Appendix B
Permit to Take Water

Appendix C

Summary of Water Quality - Bacteriological

Appendix H
NSF 60

Appendix F
Part III Form 2
(submitted electronically)

Appendix G
Selected Correspondence

Appendix I
Water Meter Calibration Report

Appendix D
Chemical Sampling and Testing Results

Appendix E
TSS Results