

**2005
Annual Compliance Report**

**OPERATION AND MAINTENANCE
OF
TOBERMORY "LITTLE TUB"
WATER TREATMENT PLANT
WATER SYSTEM
MUNICIPALITY OF
NORTHERN BRUCE PENINSULA**

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1.0 INTRODUCTION

The Tobermory "Little Tub" Water Treatment Plant water system is owned by the Municipality of Northern Bruce Peninsula and is located at the tip of the Bruce Peninsula. The Water Treatment Plant is classified as a small, municipal non-residential water system. This is a seasonal facility that operated from April 15, 2005 to October 28, 2005.

The Water Treatment Plant is approximately 31 years old and receives its raw water from Georgian Bay. The Municipality of Northern Bruce Peninsula retained the services of Oweson Water Services (OWS), a division of Oweson Ltd., to operate this facility, which includes the preparation of the Annual Compliance Report. The Water Works number for the Water Treatment Plant is 260024817.

The objective of this report is to comply with the mandatory requirements for an Annual Report under Section 11.0 and 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 Tub" Water Treatment Plant water works consists of a water intake located approximately 40 m into Georgian Bay, a wet well with a low lift pumping station consisting of two (2) low lift pumps. One (1) pump has a capacity of 163.4 m³/day while the other low lift pump has a capacity of 163 m³/day. Both have a total dynamic head of 30.5 m.

Treatment consists of the addition of polyaluminum chloride (PaCl)(coagulation) for filtration augmentation which comes complete with two (2) metering pumps (one duty, one standby), a chemical holding tank and injection points. After the PaCl is injected, the Water Treatment Plant is equipped with an inline static mixer prior to entering the pressure filters. Filtration consists of two (2) pressure filters with a total surface area of approximately 0.43 m² with a hydraulic flow rate of approximately 124 m³/day at a filtration rate of 12 m per hour. The backwash facilities include a 10,000 L backwash water holding tank with a 100 mm \varnothing discharge line to the existing storm sewer system.

Disinfection is achieved through the injection of sodium hypochlorite. The system comes complete with two (2) metering pumps (one duty, one standby), a chemical holding tank with a secondary containment and two (2) chlorine injection points. Primary disinfection is achieved with an ultraviolet reactor unit. This includes reactors rated at 196 m³/day with 100% redundancy.

The system also comes complete with a 9,100 L storage and chlorine contact tank, a 2,300 L water pressure tank with flow control and two (2) high lift pumps, one having a capacity of 392 m³/day and the other having a capacity of 409 m³/day at a total dynamic head of 64 m. Refer to **Figure 1** for a schematic process flow diagram.

The system is also equipped with a fire pump for emergency use only.

The Ministry of the Environment issued a Certificate of Approval for this facility dated October 1, 2002 which is enclosed in **Appendix A**. A Permit to Take Water (PTTW)(02-P-1143) was also issued by the Ministry of the Environment on July 19, 2002. The PTTW specifies that the rated taking should not exceed a maximum of 130 L/min. The Permit to Take Water expires on July 15, 2012 and is enclosed as **Appendix B**.

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

Table 1 summarizes 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
Tobermory "Little Tub" Water Treatment Plant Water System

Title of Report or Notice	Date of Submission
Part II [C]	April 19, 2005
Part II [B] and [D]	July 19, 2005
AWQI # 58189 (Section 1, 2(a) and 3)	August 17, 2005
AWQI # 58189 (Section 2(b))	August 22, 2005
AWQI # 59652 (Section 1, 2(a) and 3)	September 28, 2005
AWQI # 59652 (Section 2(B))	October 1, 2005
Part II [C]	November 15, 2005
Part II, Form 2	February 28, 2006

Part III, Form 2 entitled Annual Report is submitted electronically to the Ministry of the Environment and a copy is attached in **Appendix H**. Part II [C], dated April 19, 2005 was emailed to the Form Submission Branch of the MOE to notify them that the seasonal plant was back on line for 2005. Additionally, on November 15, 2005, Part II [C] was emailed to the MOE to notify them that this facility was shut down and taken off line October 28, 2005. A copy of both are attached in **Appendix I**.

4.0 SUMMARY OF WATER QUALITY MONITORING

4.1 Water Treatment Equipment Operation Monitoring as per Schedule 9, O. Reg. 253/05

4.1.1 Chlorine Residual - POE

In the year 2005 (from April 3, 2005 to October 28, 2005), a total of 215 samples were collected and analyzed for free chlorine residual at the Point of Entry treatment. **Table 2** below shows the monthly minimum, maximum and average, free chlorine residual values. The chlorine residuals ranged from a low of 0.21 mg/L to a high of 5.00 mg/L.

**Table 2
 Summary of Water Quality - Free Chlorine (POE)
 January 1, 2005 to December 31, 2005
 Tobermory "Little Tub" Water Treatment Plant Water System**

Date *	No. of Samples	Chlorine Residual (mg/L)		Average Chlorine Residual (mg/L)
		Minimum (mg/L)	Maximum (mg/L)	
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	31	0.21	5.00	1.98
May	32	0.45	3.96	1.83
June	30	0.86	2.06	1.57
July	32	0.49	2.12	1.52
August	31	0.70	2.98	1.39
September	31	0.45	2.42	1.56
October	28	1.07	2.45	1.98
November	-	-	-	-
December	-	-	-	-
Total	215			
Min. (mg/L)		0.21		
Max. (mg/L)			5.00	
Avg. (mg/L)				1.69

* This is a seasonal facility that is operated from April to October annually.

4.1.2 Chlorine Residual - Distribution

In the year 2005, a total of 204 samples were collected in the distribution system. **Table 3** below shows the monthly minimum, maximum and average free chlorine residual values. The chlorine residuals ranged from a low of 0.26 mg/L to a high of 2.14 mg/L.

Table 3
Summary of Water Quality - Free Chlorine (Distribution)
January 1, 2005 to December 31, 2005
Tobermory "Little Tub" Water Treatment Plant Water System

Month *	No. of Samples	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	23	0.42	1.96	0.94
May	31	0.26	1.99	1.27
June	30	0.86	1.67	1.31
July	31	0.92	1.82	1.20
August	31	0.68	2.14	1.20
September	30	0.76	1.74	1.20
October	28	1.0	1.81	1.44
November	-	-	-	-
December	-	-	-	-
Total	204			
Min. (mg/L)		0.26		
Max. (mg/L)			2.14	
Avg. (mg/L)				1.22

* This is a seasonal facility that is operated from April to October annually.

4.1.3 Turbidity

At the Tobermory "Little Tub" Water Treatment Plant, the treated turbidity is analyzed two ways. First by an online turbidity analyzer complete with alarms and then by a portable turbidity analyzer. From April 2005 until

October 2005, one (1) raw water grab sample was collected every day and analyzed for turbidity. **Table 4** below summarizes the minimum and maximum turbidity values for raw water and treated water.

Table 4
Summary of Water Quality - Turbidity (NTU)
January 1, 2005 to December 31, 2005
Tobermory "Little Tub" Water Treatment Plant Water System

Month	Raw Result			POE Result (Online)		
	# of Samples	Min.	Max.	# of Samples	Min.	Max.
January	-	-	-	-	-	-
February	-	-	-	-	-	-
March	-	-	-	-	-	-
April	30	0.25	1.22	28	0.24	4.77
May	31	0.15	0.27	31	0.11	0.27
June	30	0.15	0.26	30	0.06	0.20
July	31	0.14	0.22	31	0.06	0.11
August	31	0.08	0.22	31	0.05	0.45
September	30	0.11	0.24	30	0.08	0.45
October	28	0.05	0.19	28	0.06	0.39
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	211			209		
Min. (mg/L)		0.05			0.05	
Max. (mg/L)			1.22			4.77

* This is a seasonal facility that is operated from April to October annually.

The turbidity for the treated water ranged from a low of 0.05 NTU to a high of 4.77 NTU. In April 2005, while the plant was in the "start up" phase and before the plant was on-line, six (6) turbidity analysis were >1 NTU. Once the plant was on-line, no turbidity exceedences were encountered.

The Ontario Drinking Water Quality Standards (ODWQS) have set a Maximum Acceptable Concentration (MAC) of 1 NTU for treated water leaving the POE.

4.2 Microbiological Sampling as per Schedule 12, O. Reg. 253/05

4.2.1 Distribution System

Since chlorination is provided, Schedule 12 of Ontario Regulation 253/05 requires that at least one (1) distribution sample be collected once every two (2) weeks and analysed for E.Coli, total coliform and heterotrophic plate count (HPC). In the year 2005, a total of 40 distribution samples were collected and analyzed for total coliform, E.Coli and HPC. No exceedances on these parameters were observed in the results. **Table 10** enclosed in **Appendix C** shows the weekly microbiological water quality results for 2005 and **Table 5** below which summarizes the results.

4.2.2 Raw Water Samples

Schedule 12 of Ontario Regulation 253/05 further requires that at least one (1) raw water sample be collected every month and tested for E.Coli and total coliforms. In 2005, a total of eight (8) raw water samples were collected and analysed. Refer to **Table 10** in **Appendix C** for weekly results and **Table 5** below which summarizes the results.

4.2.3 Point of Entry Samples

Even though Ontario Regulation 253/05 does not specify or require microbiological analysis of treated water collected from the Point of Entry, a total of 34 samples were collected and analysed for total coliform, E.Coli and HPC. The Operating Authority (OA) believes the Municipalities best interest is served by collecting these samples. Of the 34 samples that were collected, a sample on August 15, 2005 and a sample on September 26, 2005 were found to be adverse. On August 15, 2005 the treated water sample had a total coliform count of 1 CFU/100mL. Resampling conducted on August 17th and 18th consisted of one (1) treated water sample from the point of entry (POE) and two (2) distribution samples. All six (6) samples were found to be safe. On September 26, 2005, the treated water sample collected from the POE had a total coliform count of 45 CFU/100mL and E. Coli count of 7 CFU/100mL. Resampling was completed on September 28th and 29th, 2005. This included in both cases, a treated water sample from the pumphouse and three (3) distribution samples. All eight (8) samples were found to be safe. The Grey Bruce Health Unit issued a Boil Water Advisory on September 28, 2005 and lifted it on October 3, 2005. Refer to **Appendix I** for a copy of these notices.

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

TABLE 5
Summary of Water Quality: Microbiological
January 1, 2005 to December 31, 2005
Tobermory "Little Tub" Water Treatment Plant Water System

Water Type	Total No. of Samples	Total Coliform Examination Results		E.Coli Examination Results		HPC Examination Results		
		>0	0	>0	0	Total No. of Samples	≥500	<500
		Adv.	Safe	Adv.	Safe		Adv.	Safe
Distribution Water	40	0	40	0	40	37	0	37
Raw Water	8	7	1	3	5	0	-	-
Point of Entry Water	34	2	32	1	33	34	0	34

E.Coli Escherichia coli (fecal coliform)

HPC Heterotrophic Plate Count

4.3 Chemical Sampling and Testing as per Schedule 14 of O. Reg. 253/05

4.3.1 Inorganics & Organics

Schedule 14-2 of Ontario Regulation 253/05 requires that at least one (1) treated water sample be collected every 60 months and tested for every parameter as set out in Schedules 23 and 24. These samples were collected on September 21, 2005 and all parameters were found to be within compliance. Inorganics and organics do not need to be sampled and analyzed again until September 21, 2010. Refer to **Appendix D**.

4.3.2 Lead

Schedule 14-3 of Ontario Regulation 253/05 requires that at least (1) one distribution sample be taken every 60 months from a point in the distribution system and tested for lead. A sample was collected from the Tobermory "Little Tub" WTP Distribution System on June 22, 2004 and was found to have a concentration of <0.0002 mg/L, which is within compliance. This parameter is not required to be sampled and analyzed again until June 22, 2009. Refer to **Appendix D**.

4.3.3 Trihalomethanes (THMs)

Since chlorination is provided, Schedule 14-4 of Ontario Regulation 253/05 requires that at least one (1) distribution sample is taken every three (3) 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 April, June and September. The Ontario Drinking Water Quality Standard (ODWQS) have set a Maximum Allowable Concentration (MAC) of 100 µg/L for this parameter and it is expressed as a running annual average. In 2005, the average THM was found to be 56.8 µg/L, which is within compliance. Please refer to the **Table 6** below for a Summary of Trihalomethanes and **Appendix D** for analytical results.

Table 6
Summary of Trihalomethanes (THMs)
January 1, 2005 – December 31, 2005
Tobermory "Little Tub" Water Treatment Plant Water System

Sample Location	Sample Date	Result (µg/L)
Distribution	April 12, 2005	76.3
Administration Building	June 15, 2005	33.8
Harbour Building	September 21, 2005	58.3
Administration Building	September 21, 2005	58.7
Annual Average		56.8

In 2006, THMs should be sampled and analyzed in April, June and September.

4.3.4 Nitrate and Nitrite

Schedule 14-5 of Ontario Regulation 253/05 requires that at least one (1) water sample is taken every three (3) months and tested for nitrate and nitrite. Samples were collected during the months of April, June and September. The analytical results were found to be in compliance. Refer to **Appendix D** for analysis results.

In 2006, nitrate and nitrite should be collected in April, June and September.

4.3.5 Sodium

Schedule 14-6 of Ontario Regulation 253/05 requires that at least one (1) water sample is collected and analyzed every 60 months for sodium. The 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. This sample was collected on June 15, 2005 and was found to be within compliance. This parameter is not required to be sampled and analyzed again until June 15, 2010.

4.3.6 Fluoride

Schedule 14-7 of Ontario Regulation 253/05 requires that a water sample be collected and analysed at least once every 60 months for fluoride. The ODWQS have set a MAC of 1.5 mg/L for fluoride. This sample was collected on June 15, 2005 and was found to be within compliance. This parameter is not required to be sampled and analyzed again until June 15, 2010.

All analysis for Schedule 14 sampling were performed by Caduceon Environmental Laboratories which is an accredited laboratory.

4.4 SAMPLING AS PER THE CERTIFICATE OF APPROVAL

4.4.1 Total Suspended Solids

As per the Certificate of Approval (C of A), the filter backwash was sampled and analysed for Total Suspended Solids (TSS)(composite) monthly, for each month the plant was operational. **Table 7** summarizes the filter backwash TSS. Refer to **Appendix E** for analysis results.

Table 7
Summary of Suspended Solids
January 1, 2005 to December 31, 2005
Tobermory "Little Tub" Water Treatment Plant Water System

Date *	Suspended Solids (Composite) (mg/L)
January	-
February	-
March	-
April 12, 2005	<3
May 27, 2005	5
June 20, 2005	<3
July 13, 2005	<3
August 14, 2005	<3
September 18, 2005	<3
October 18, 2005	<3
November	-
December	-
Annual Average **	3.00

* This is a seasonal facility that is operated from April to October annually.

** For the purpose of calculating the Annual Average, all TSS results that were found to have a concentration of <3 mg/L were assumed to be 3 mg/L.

All analyses were performed by Caduceon Environmental Laboratories, which is an accredited laboratory.

5.0 WATER USAGE

The PTTW issued by the Ministry of the Environment specifies that the drinking water system shall not be operated to exceed a maximum daily volume of 187 m³/day. **Table 8** below shows the monthly summary of water usage for 2005 observed from the flow meter readings installed at this facility. This table also includes monthly average day, minimum and maximum day flows. From this table, it can be seen that the maximum day volume did not exceed the rated capacity. The maximum day volume occurred in June 3, 2005 and was observed to be 137 m³.

Table 8
Summary of Water Usage
January 1, 2005 to December 31, 2005
Tobermory "Little Tub" Water System

Month *	Quantity of Water (m³)	Average Day (m³)	Maximum Day (m³)
January	-	-	-
February	-	-	-
March	-	-	-
April	47.80	1.59	6.10
May	1,197.00	38.61	99.00
June	1,392.00	46.40	137.00
July	1,976.00	63.74	101.45
August	1,698.00	54.77	79.70
September	1,484.00	49.50	89.00
October	1,178.00	38.00	53.00
November	-	-	-
December	-	-	-
Total (m³)	8,972.80		
Average Day (m³)		41.8	
Maximum Day (m³)			137.0

* This is a seasonal facility that is operated from April to October annually.

The treated water meter was calibrated on November 2, 2005 by R&R Instrumentation and was found to be acceptable. Refer to **Appendix F** for the calibration report. This meter should be calibrated again before November 2, 2006.

6.0 MONTHLY MONITORING OF CHEMICALS

The only chemicals used in the Tobermory "Little Tub" Water Treatment Plant Water System are sodium hypochlorite (NaOCl) for disinfection and PACl for coagulation and both are NSF 60 approved. **Refer to Appendix G.**

Table 9 below shows the monthly summary of disinfectant chemical used and the average monthly dosage applied.

Table 9
Summary of Disinfectant Chemical Used
January 1, 2005 to December 31, 2005
Tobermory "Little Tub" Water System

Month *	Dosage	Volume	
	Sodium Hypochlorite (mg/L)	Sodium Hypochlorite Used (L)	Water m ³
January	-	-	-
February	-	-	-
March	-	-	-
April	5.31	2	47.80
May	2.86	27	1,197.00
June	2.83	31	1,392.00
July	1.54	24	1,976.00
August	2.09	28	1,698.00
September	2.31	27	1,484.00
October	2.05	19	1,178.00
November	-	-	-
December	-	-	-
Total		158	8,972.80
Average	2.23		

Note: Plant start-up on April 15.
 Minimal PaCl was used during 2005.

* This is a seasonal facility that is operated from April to October annually.

7.0 COMPLIANCE OF WATER SYSTEM

During the period covered by this report, two (2) notices were given in accordance with Schedule 18 of Ontario Regulation 253/05. Both notices were due to adverse bacteriological results.

Turbidity levels were found to be within compliance.

Free chlorine readings were found to be within compliance.

All sampling completed as per Schedule 14 and the Certificate of Approval was found to be within compliance.

8.0 WATER TREATMENT SYSTEM IMPROVEMENTS AND REPAIRS

1. During July, the dialer was replaced with a RACO dialer and surge protection.

2. The backwash pump was replaced.

9.0 CONCLUSIONS

1. In 2005 there were no adverse results for either turbidity or free chlorine residual.
2. It can be concluded that the operation of the water works was generally in compliance with the Certificate of Approval, the Regulations and the Permit to Take Water.
3. The filter backwash is monitored for Total Suspended Solids monthly as required by the Certificate of Approval and the annual average was within compliance.
4. The 2005 average demand was approximately 41.8 m³/day.
5. In 2005, the maximum demand was 137 m³/day which occurred on June 3, 2005.
6. A review of water consumption patterns in the year 2005 revealed that the maximum daily consumption did not exceed the rated maximum volume of 187 m³/day.
7. The only treatment chemical used in the system was sodium hypochlorite. A total of 158 L was used with an average dosage of 2.23 mg/L. This is a reasonable dosage. There is a provision for polyaluminum chloride, however, a minimal amount was required.
8. Routine preventive maintenance was performed on the water system.
9. All chemical sampling and testing were performed as per Schedule 14 of O. Reg. 253/05.
10. The treated water meter was calibrated and found to be acceptable.

10.0 RECOMMENDATIONS

1. The Owner shall ensure that all users of the system are aware that an Annual Report was prepared and is available for public review free of charge.
2. The facility should continue to be operated as per the CofA, PTTW and the Regulation.
3. TSS samples should be collected monthly from the backwash in 2006.
4. Samples for Nitrite, Nitrates and THM's should be collected in April, June and September in 2006.
5. Both water meters should be calibrated in 2006.
6. All bacteriological sampling should be completed as per Schedule 12 of O. Reg. 253/05.

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REFERENCES

1. Ontario Ministry of the Environment, Ontario Regulation 170/03 under the Safe Drinking Water Act, 2002 and as amended to O. Reg. 408/04.
2. Certificate of Approval
3. Permit to Take Water

Appendix A
Certificate of Approval

Appendix B
Permit to Take Water

Appendix C

Weekly Summary of Water Quality – Bacteriological

Appendix D

Physical/Chemical Sampling and Testing Results

Appendix E
TSS Results

Appendix F
Instrumentation Calibration Report

Appendix G

NSF 60

Appendix H

Part III Form 2

Appendix I

Selected Correspondence