

**2005
Annual Compliance Report**

**OPERATION AND MAINTENANCE
OF
MANITOWANING WATER SYSTEM
TOWNSHIP OF ASSIGINACK**

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1.0 INTRODUCTION

The Manitowaning water system is owned by the Township of Assiginack and is located on Manitoulin Island, in Georgian Bay. The community of Manitowaning is located within the Township of Assiginack.

The Manitowaning water treatment system was constructed in 1973 and receives its raw water from Manitowaning Bay. The facility meets the definition of "Large Municipal, Residential Drinking Water System" serving the community. The Township of Assiginack retained the services of Oweson Water Services (OWS), a division of Oweson Limited, to operate this facility which includes the preparation of the Annual Compliance Report. The Water Works number for Manitowaning is 220001013.

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.

The report outlines and includes the following recommendations of which the Owner/Operating Authority should undertake in order to comply with the regulations and continue to provide a safe drinking water quality to the community.

- 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

2.0 DESCRIPTION OF WATER WORKS

The Manitowaning water system consists of a water intake located approximately 80 m from the shore of Manitowaning Bay. The water intake is equipped with an intake screen which is gravity fed to the wet well. The wet well is equipped with four (4) vertical turbine high lift pumps, of which two (2) are rated at 5.45 L/s, one (1) rated at 13.5 L/s and one (1) rated at 9.6 L/s all operating sequentially. At present one (1) vertical high lift pump rated at 5.45 L/s is not operational. All four (4) pumps are connected to a high lift pump common discharge header introducing treated water to the distribution system through an underground chlorine contact facility. Disinfection contact time is achieved through one 29 m long and 750 mm \varnothing pipe located adjacent to the plant enclosure building. This facility is equipped with one (1) vertical turbine fire pump rated at 38.5 L/s at a TDH of 70 m.

The treatment system includes one (1) 450 L sodium hypochlorite solution storage tank with a 1080 L containment tank, two (2) hypochlorinator devices (one duty and one standby) with automatic switchover each rated at 5.9 L/hr. The only chemical used in this system is 12% sodium hypochlorite (NSF 60 approved) and is injected in the high lift pump common discharge header. Refer to **figure 1** overleaf, for Schematic Process Flow diagram.

One (1) magmeter is provided at this facility to measure the flow at the pump discharge header and one (1) flow meter to measure the flow from the vertical turbine fire pump. A chlorine residual analyzer and turbidimeter measures free chlorine residual and the turbidity in the treated water.

The Ministry of the Environment has issued an Amended Certificate of Approval (C of A) #4404-6E3JJK for this facility on August 10, 2005 and is enclosed in **Appendix A**. The Ministry of the Environment issued a Permit to Take Water # 98P5031 dated January 12, 1999 which specifies that the rate of water withdrawal not to exceed 4,279 L/min and is enclosed in **Appendix B**. On June 24, 2004 an amendment was issued to allow for the inclusion of an expiry date of May 31, 2009.

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 January 1, 2005 to December 31, 2005 Manitowaning Water System

Title Of Report or Notice	Date of Submission	Title Of Report or Notice	Date of Submission
AWQI 51627	January 6,2005	AWQI 59323	September 19, 2005
AWQI 51788	January 11, 2005	AWQI 59347	September 20, 2005
AWQI 52111	January 23, 2005	AWQI 59379	September 21, 2005
AWQI 52989	March 5, 2005	AWQI 59518	September 23, 2005
AWQI 54040	April 25, 2005	AWQI 59639	September 27, 2005
AWQI 54020	April 25, 2005	AWQI 59725	September 29, 2005
AWQI 54013	April 25, 2005	AWQI 59735	September 29, 2005
AWQI 54951	May 28, 2005	AWQI 59851	October 3, 2005
AWQI 55893	June 22, 2005	AWQI 60098	October 12, 2005
AWQI 56049	June 24, 2005	AWQI 60155	October 13, 2005
AWQI 56225	June 29, 2005	AWQI 60885	November 9, 2005
AWQI 56364	July 3, 2005	AWQI 61034	November 16, 2005
AWQI 56372	July 3, 2005	AWQI 61047	November 16, 2005
AWQI 56388	July 5, 2005	AWQI 61526	December 11, 2005
AWQI 56614	July 8, 2005	AWQI 61777	December 26, 2005
AWQI 56662	July 11, 2005	AWQI 61784	December 27, 2005
AWQI 56705	July 12, 2005	Part III Form 2	February 28, 2006
AWQI 57263	July 21, 2005		
AWQI 57658	July 31, 2005		
AWQI 58143	August 15, 2005		
AWQI 58505	August 25, 2005		
AWQI 59262	September 16, 2005		

Starting January 1, 2004, Henderson Paddon & Associates Limited and subsequently Oweson Water Services, a division of Oweson Ltd., began operation of this facility. Refer to **Appendix G** for various correspondence from the MOE.

Part III, Form 2 entitled, "Annual Report", is submitted to the MOE electronically. Refer to **Appendix F**.

4.0 SUMMARY OF WATER QUALITY MONITORING

4.1 Water Treatment Equipment Operation Monitoring 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 for treated water. **Table 2** below shows the monthly Minimum and Maximum Free Chlorine Residual values. The chlorine residual values were analyzed by using both online and handheld chlorine analyzers. The chlorine residuals ranged from a minimum of 0.90 mg/L to a maximum of 2.20 mg/L.

Table 2
Summary of Water Quality - Free Chlorine POE (Online)
January 1, 2005 to December 31, 2005
Manitowaning Water System

Date	No. of Samples	Chlorine Residual (mg/L)	
		Minimum (mg/L)	Maximum (mg/L)
January	31	1.28	2.13
February	28	1.19	1.93
March	31	1.20	1.85
April	30	0.95	1.92
May	31	1.21	2.03
June	30	1.03	1.75
July	31	0.90	>2.00
August	31	1.03	>2.20
September	30	1.10	2.01
October	31	1.00	2.04
November	30	1.32	2.10
December	31	1.17	1.90
Total	365		
Min. (mg/L)		0.90	
Max. (mg/L)			2.20

4.1.2 Chlorine Residual - Distribution

In the year 2005 (from January 1, 2005 to December 31, 2005), a total of 365 samples were collected in the distribution system. **Table 3** below shows the monthly minimum and maximum residual chlorine values. The chlorine residuals ranged from a minimum of 0.56 mg/L to a maximum of 2.05 mg/L.

Table 3
Summary of Water Quality - Free Chlorine Distribution
January 1, 2005 to December 31, 2005
Manitowaning Water System

Month	No. of Samples	Minimum (mg/L)	Maximum (mg/L)
January	31	0.69	1.60
February	28	0.85	1.61
March	31	1.10	1.53
April	30	0.74	1.42
May	31	0.86	1.80
June	30	0.61	1.42
July	31	0.56	1.83
August	31	0.60	2.05
September	30	0.65	1.62
October	31	0.64	1.64
November	30	0.87	2.01
December	31	0.86	1.56
Total	365		
Min. (mg/L)		0.56	
Max. (mg/L)			2.05

4.1.3 Turbidity

The treated water turbidity was measured by both an on-line turbidity analyzer and a portable turbidity analyzer. One raw water grab sample and one distribution grab sample were collected every day and analyzed for turbidity. **Table 4** below shows the minimum and maximum turbidity values for raw water, treated water and distribution samples.

Table 4
Summary of Water Quality - Turbidity (NTU)
January 1, 2005 to December 31, 2005
Manitowaning Water System

Month	Raw Result			POE Result			Distribution Result		
	#	Min.	Max.	#	Min.	Max.	#	Min.	Max.
January	31	0.26	2.54	31	0.29	5.60	31	0.25	2.00
February	28	0.20	0.32	28	0.20	0.31	28	0.20	0.40
March	31	0.17	0.84	31	0.17	0.93	31	0.17	0.29
April	30	0.19	1.66	30	0.19	1.86	30	0.20	1.44
May	31	0.25	0.44	31	0.23	0.49	31	0.25	0.44
June	30	0.20	0.44	30	0.21	0.40	30	0.21	0.35
July	31	0.24	0.67	31	0.24	0.57	31	0.22	0.42
August	31	0.28	0.83	31	0.29	0.64	31	0.26	0.77
September	30	0.37	0.64	30	0.32	0.69	30	0.26	0.70
October	31	0.34	0.70	31	0.37	0.73	31	0.27	0.56
November	30	0.28	3.28	30	0.31	3.85	30	0.25	0.44
December	31	0.32	1.17	31	0.37	1.15	31	0.32	0.86
Total	365			365			365		
Min. (mg/L)		0.17			0.17			0.17	
Max. (mg/L)			3.28			5.60			2.00

The minimum and maximum turbidity values for treated water at the plant were determined by considering both the online turbidity analyzer and the portable turbidity analyzer values.

The turbidity for the treated water ranged from a minimum of 0.17 NTU to a maximum of 5.60 NTU, and the distribution turbidity ranged from 0.17 NTU to 2.00 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.

Several turbidity exceedances were observed during the year 2005 in the treated water samples. A summary of adverse turbidity conditions and the action taken pertaining to the exceedances are detailed under Section 5.0 of this report.

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 sample be 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 123 distribution samples were collected and analyzed for Total Coliform and E.Coli. A total of 59 distribution samples were collected and analyzed for 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 the year.

4.2.2 Raw Water Samples

Schedule 10 of Ontario Regulation 253/05 requires that at least one (1) raw water sample be collected weekly and tested for E.Coli and Total Coliforms. In the year 2005, a total of 59 raw water samples were collected and tested for Total Coliform and E.Coli. Refer to **Table 10** in **Appendix C**.

4.2.3 Point of Entry Samples

Schedule 10 of Ontario Regulation 253/05 requires that at least one (1) treated water sample be collected weekly from the Point of Entry. A total of 56 samples were collected and analyzed for Total Coliform, E.Coli. and 54 samples collected for HPC. No exceedances were found. Refer to **Table 10** in **Appendix C**.

Microbiological sampling results for the distribution, raw and treated water are summarized in **Table 5**.

4.2.4 Clostridium Samples

As a Best Management Practice, clostridium was sampled monthly. A total of 12 samples were collected and analysed from the raw water and point of entry (POE). No POE exceedances were found. Refer to **Table 11** in **Appendix C**.

TABLE 5
Summary of Water Quality: Microbiological
January 1, 2005 to December 31, 2005
Manitowaning Water System

Water Type	Total No. of Samples	Total Coliform Examination Results		Total No. of Samples	E. Coli Examination Results		Total No. of Samples	HPC Examination Results	
		>0	0		>0	0		>0	0
		Adv.	Safe		Adv.	Safe		Adv.	Safe
Distribution Water	123	0	123	123	0	123	59	0	59
Raw Water	59	51	8	59	9	50	0	0	0
Point of Entry Water	56	0	56	56	0	56	54	0	54

E.Coli Escherichia coli (fecal coliform)

HPC Heterotrophic Plate Count

All samples were analyzed by SGS Lakefield Research which is an accredited lab.

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

4.3.1 Inorganics

Schedule 13.2 of Ontario Regulation 253/05 requires that at least one water sample is taken every 12 months, if the system obtains water from a raw water supply that is surface water. Since Manitowaning Water System receives its raw water from Manitowaning Bay (surface water), a treated water sample was collected on April 18, 2005 and submitted to the laboratory for analysis of Inorganics listed in Schedule 23. All parameters were found to be within compliance. Inorganics are required to be sampled and analyzed before April 18, 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 and tested for lead. A water sample was collected and analyzed on April 18, 2005. The concentration of lead was found to be 0.3 µg/L which is within compliance. This parameter is required to be sampled and analyzed before April 18, 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 and tested for organics if the raw water source is surface water. All organic parameters, as per Schedule 24, were sampled and analyzed on April 18, 2005 and were found to be within compliance. Organics are required to be sampled again before April 18, 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 and tested for Trihalomethanes (THMs). In the year 2005, samples were collected during the months of January, April, July and October. 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 average THM was found to be 25 µg/L. Please refer to the **Table 6** below on the Summary of Trihalomethanes and **Appendix D** for analytical results.

In 2006, THMs should be sampled in January, April, July and October.

Table 6
Summary of Trihalomethanes (THMs)
January 1, 2005 – December 31, 2005
Manitowaning Water System

Sample Location	Sample Date	Result (µg/L)
Highway #6	January 18, 2005	24
Wellington St.	January 18, 2005	19
25 Spragge St	April 18, 2005	24
Highway 6	July 14, 2005	31
DDW Public School	October 14, 2005	26
Annual Average		25

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 January, April, July

and October. The analytical results were found to be in compliance. Refer to **Appendix D**. In 2006, samples should be collected in January, April, July and October.

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. The analytical results were found to be in compliance. The sodium sample was collected on February 9, 2005 and was found to be within compliance. The sample should be collected and analyzed again before February 9, 2010.

4.3.7 Fluoride

Schedule 13-9 of Ontario Regulation 253/05 requires that a water sample be collected at least once in every 60 months and tested for fluorides. The ODWQS have set a MAC of 1.5 mg/L for fluoride. The analytical results were found to be in compliance. The fluoride sample was collected on February 9, 2005 and was found to be within compliance. The sample should be collected and analyzed again before February 9, 2010.

5.0 WATER USAGE

The Certificate of Approval issued by the Ministry of the Environment specifies that the Manitowaning drinking water system shall not be operated at a rate exceeding a maximum daily volume of 750m³/day. **Table 7** below shows the summary of water usage for the year 2005 recorded by the magmeter installed at this facility. This table includes monthly water consumption, monthly average, minimum & maximum day flows. From **Table 7** it can be seen that the maximum daily volume did not exceed the rated capacity as specified in the Certificate of Approval. The maximum daily volume occurred in July 2005 and was observed to be 587 m³.

**Table 7
 Summary of Water Usage
 January 1, 2005 to December 31, 2005
 Manitowaning Water System**

Month	Quantity of Water (m³)	Average Day (m³)	Minimum Day (m³)	Maximum Day (m³)
January	12810	413	360	539
February	11025	394	362	465
March	12186	393	375	445
April	10053	335	293	455
May	11268	364	295	465
June	11270	376	272	535
July	13299	429	340	587
August	11265	363	298	470
September	10857	362	339	460
October	11640	375	331	462
November	10690	356	301	482
December	11890	384	334	433
Total (m³)	138,253			
Average Day (m³)		379		
Minimum Day (m³)			272	
Maximum Day (m³)				587

The water meters were calibrated by R&R Instrumentation on June 24, 2005 and were found to be acceptable. The meters are to be calibrated again by June 24, 2006. Refer to **Appendix H** for the Instrumentation Calibration Report.

6.0 MONTHLY MONITORING OF CHEMICALS

The only chemical used in the Manitowaning water system is sodium hypochlorite (NaOCl) for disinfection which is NSF 60 approved. Refer to **Appendix E**.

Table 8 below shows the monthly summary of sodium hypochlorite chemical used and the average dosage applied. Considering the volume of water disinfected, the average dosage is quite reasonable.

Table 8
Summary of Disinfectant Chemical Used
January 1, 2005 to December 31, 2005
Manitowaning Water System

Month	Volume of NaOCl used (Litres)	Average Dosage Applied (mg/L)	Flow
January	249	2.46	12810
February	223	2.57	11025
March	246	2.57	12186
April	198	2.50	10053
May	235	2.65	11268
June	220	2.47	11270
July	317	3.02	13299
August	251	2.83	11265
September	218	2.55	10857
October	230	2.51	11640
November	217	2.57	10690
December	214	2.29	11890
Total (m³)	2,818		138,253
Average Day (m³)		2.58	

7.0 COMPLIANCE OF WATER SYSTEM

During the year 2005 several exceedances were observed. **Table 9** below shows the Adverse Report Summary for the Manitowaning Water Treatment Plant. The table includes the date and the adverse values observed for turbidity and chlorine, the cause and the corrective action taken. The table also included hours of adverse condition and the Adverse Water Quality Incident number (AWQI). The adverse values were reported to the Ministry of the Environment (MOE), the local Health Unit and the Owner.

During the fall months, the distribution system was systematically flushed and each fire hydrant tested. This should be performed again in 2006.

8.0 WATER TREATMENT SYSTEM IMPROVEMENTS AND REPAIRS

The flow meters at this facility were calibrated on June 24, 2005.

The Diesel Gen Set was test run monthly.

9.0 CONCLUSIONS

1. In the year 2005, no adverse results were reported with respect to Bacteriological water quality in the treated water and distribution samples. All samples were collected as per Schedule I0 of O. Reg. 253/05.
2. Seasonal turbidity exceedances were reported in the year 2005, which were mainly due to high consumption and weather conditions.
3. The 2005 average demand was approximately 379 m³/day compared to 361 m³/day in 2004 .
4. In 2005, the maximum day demand was 587 m³/day which occurred in July. In 2004 the max day was 680 m³/day which occurred in August.
5. A review of water consumption pattern in the year 2005 revealed that the maximum volume of 750 m³/day as specified in the Certificate of Approval was not exceeded.
6. The only treatment chemical used in the system was sodium hypochlorite for disinfection and 2,818 L was used with an average dosage of 2.58 mg/L.
7. Calibration and routine preventative maintenance was performed on the water system.
8. The water meters were calibrated in June 2005 and were found to be acceptable.
9. The water system was systematically flushed during the fall of 2005.
10. All chemical sampling and testing was performed as per Schedule 13 of O. Reg. 253/05.
11. The annual average for THMs in 2005 was 25 µg/L.
12. The PTTW expires on May 31, 2009.
13. As a best management practice the Operating Authority collected Clostridium samples from the raw water and the POE.

14. The Diesel Gen Set was test run monthly.

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 water meters should be calibrated by June 24, 2006.
3. The distribution system should be systematically flushed in the fall of 2006.
4. Bacteriological and chemical sampling should continue as per Schedules 10 and 13 respectively of O. Reg. 253/05.
5. Clostridium samples should be collected monthly from the raw water and the POE.
6. The Diesel Gen Set should be test run monthly.
7. The new WTP will need to be reclassified.
8. The Township should consider installing a free chlorine analyzer complete with a data logger/chart recorder and alarm system at a remote location within the 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. Safe Drinking Water Act.
3. Certificate of Approval.
4. Permit to Take Water.
5. Inspection Report.

Appendix A

Certificate of Approval

Appendix B

Permit to Take Water

Appendix C

Weekly Summary of Water Quality – Bacteriological

Appendix D

Chemical Sampling and Testing Results

Appendix E

NSF 60

Appendix F

Part III Form 2

Appendix G

Selected Ministry of the Environment Correspondence

Appendix H

Water Meter Calibration Report