

**2005 ANNUAL COMPLIANCE REPORT**

**OPERATION AND MAINTENANCE**

**Keeper's Cove Water System**

**The Village of Keeper's Cove**

Project No.: 400705  
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## **1.0 INTRODUCTION AND BACKGROUND**

The purpose of the 2005 Annual Compliance Report is to document operation and maintenance data for the Keeper's Cove Water Treatment Plant and water distribution system. This is for review by the Ministry of the Environment in compliance with the Certificate of Approval and Regulation requirements issued by the Ministry of the Environment Approvals Branch in 1979. The Certificate of Approval No. is 7-0689-78-796. A new Certificate of Approval, No. 1472-549LD9, was issued November 9, 2001.

The original works were to supply water to service 331 trailer sites which was the Phase 1 of the then Alpine Shores Trailer Park. The name Alpine Shores Trailer Park subsequently changed to Prime Shores and then to the present name of Keeper's Cove. The design flow for the 331 trailer sites translates into a design flow (demand) of 13.03 L/sec (172 IGPM).

Henderson Paddon & Associates Limited and subsequently Oweson Water Services, a Division of Oweson Ltd. began operations of the Keeper's Cove Water System in mid-February 2000.

The water system was operated by Mr. Harry Wright who holds a Class II licence for Water Distribution, Mr. Mike Doucette, who holds a Class I licence for Water Treatment, Mr. Randy Carriere, who holds a Class I licence for Water Treatment and Mr. Lloyd Adams who holds a Class I Water Treatment Licence. Operation of the plant was supervised in 2005 by Mr. Kyle Snell who holds a Class IV licence for Water Treatment and a Class III licence for Water Distribution.

## **2.0 DESCRIPTION OF FACILITIES**

### **2.1 Water Treatment Plant**

The water treatment plant has a rated design flow of 13.03 L/sec or 172 IGPM. The raw water source for the water treatment plant is Nottawasaga Bay. Elevated turbidity readings are generally encountered in the spring and fall.

The raw water source for these works is Nottawasaga Bay. At the present, there is an existing 220 m long 200 mm dia. high density polyethylene (HDPE) intake line from the Pumping Station to the bell intake. This line was reportedly constructed in 1979.

Raw water is drawn through the intake by two (2) raw water pumps located in the Pumping Station. A 50 mm dia. suction line draws water from the intake via a "saddle" and delivers raw water to the "treatment" works which are located in the basement of the Administration Building.

In 2004 upgraded treatment works were constructed as per Certificate of Approval # 1472-549L09:

### **WATER TREATMENT WORKS**

#### **Coagulant Feed System**

Two (2) chemical feed pumps (one duty, one stand-by), each rated at approximately 7.6 L/hr at 100% capacity, injecting a chemical coagulant to raw water upstream of the in-line static mixer (rated for flows 3.78 L/s - 9.46 L/s) and including one (1) solution tank with capacity of 189L;

#### **Flocculation Tanks**

Five (5) pressure tanks are utilized as flocculation tanks to operate in parallel, each tank with capacity of approximately 833L to provide a total of approximately 8.7 min contact time at the ultimate rate of 8L/s installed upstream of the pressure filters as described below;

#### **Pressure Filters**

Three (3) pressure filters (1067 mm dia) complete with mixed media filter material to operate in parallel, capable of delivering a total of approximately 8L/s of filtered water at a filtration rate of 10.74 m/hr (for three filters in operation), capable of manual backwashing;

### **Sodium Hypochlorite Feed System**

One (1) sodium hypochlorite feed system installed downstream of the pressure filters and upstream of a chlorine contact reservoir, comprising of two (2) metering pumps (one duty, one stand-by) each rated at approximately 7.6 L/hr at 100% capacity and one (1) solution tank with capacity of 189L;

### **Chlorine Contact Reservoir**

One (1) underground precast concrete chlorine contact reservoir with a total capacity of approximately 45,000 L located outside the Administration Building;

### **High Lift Pumps**

Two (2) high lift pumps located in the basement of the Administration Building, each rated at approximately 8.0 L/s at TDH of 42m, pumping potable water from the chlorine contact reservoir to the distribution system via a pressure tank system comprising of twelve pressure tanks, each tank with a capacity of 832 L;

### **Backwash Septic Tank**

One (1) two-compartment underground backwash septic tank with an approximate capacity of 29,500 L installed outside the Administrative Building, to collect backwash wastewater from pressure filters and discharging via a 100mm dia pipe to the road side swale adjacent to Pine Drive and eventually outletting to Nottawasaga Bay of Georgian Bay.

## **2.2 Water Distribution System**

The existing distribution system within the development consists of 100 mm, 75 mm and 50 mm dia. distribution piping being supplied by the "treatment" works located in the Administration Building. This is a self-contained distribution system with only service connections to the individual sites being provided.

The existing watermain distribution system does not have any "blowoffs" at the end of individual pipe runs nor does it have "blowoffs" at strategic locations which would permit the flushing of the watermains.

### 3.0 SUMMARY OF WATER QUALITY MONITORING

#### 3.1 Bacteriological

A summary of the bacteriological sampling and analysis results are provided in **Table 1**. In **Table 1**, information has been provided to indicate the number of safe and unsafe water samples out of the total number of samples taken for raw water, treated water (now referred to as Point of Entry (POE)) and the distribution system. A weekly breakdown of bacteriological sampling and analysis for raw, treated and distribution system is provided in **Appendix B**.

Samples were analyzed for Total Coliforms, E.Coli and Background Count and/or HPC Count..

**Table 1**  
**Summary of Water Quality Monitoring 2005: Bacteriological**

Sample	Total Coliform			E. Coli.			Background Count			HPC		
	Total No. of Samples	No. Unsafe	No. Safe	Total No. of Samples	No. Unsafe	No. Safe	Total No. of Samples	No. Unsafe	No. Safe	Total No. of Samples	No. Unsafe	No. Safe
Raw	12	10	2	12	5	7	6	6	0	6	1	5
Treated	52	0	52	52	0	52	22	0	22	53	1	52
Distribution	55	0	55	55	0	55	22	0	22	57	1	56

#### 3.2 Turbidity and Chlorine Residual

A summary of the POE water turbidity and free chlorine residual monitoring for the Keeper's Cove water system is provided in **Table 2** and **Table 3** respectively. Turbidity and chlorine monitoring was conducted daily in 2005. A monthly breakdown of turbidity monitoring and free chlorine residual in the POE water and the distribution system is provided in **Appendix A**.

The highest raw water turbidity recorded was 26.3 NTU. This occurred on August 22, 2005. No POE samples exceeded 1NTU and no distribution samples exceeded 1NTU. The Ontario Drinking Water Quality Standards (ODWQS) have also set a MAC of 1 NTU for treated water at the pumphouse and an Aesthetic Objective (AO) of 5 NTU for chlorinated water sampled in the distribution system. Of the 45 samples collected

and analyzed from the distribution system, none exceeded the AO. **Table 2** indicates the extent of improvement of the water quality compared to previous years.

The free chlorine residual sampled at the POE from January 1, 2005 to December 31, 2005 daily, ranged from a low of 0.42 mg/L to a high of 2.69 mg/L. Free chlorine measured in the distribution system (i.e on the watermains at points representing the maximum residents times) ranged from a low of 0.43 mg/L to a high of 2.57 mg/L, which is within compliance. See **Table 3** for complete breakdown.

Both free chlorine and turbidity are analyzed by continuous analyzers complete with alarms.

### **3.3 Quarterly and Annual Sampling**

All physical/chemical analysis were performed by Caduceon Environmental Laboratories.

Quarterly analysis for Trihalomethanes (THM's) from the Keeper's Cove distribution system was performed as per the Regulation. The annual average for THMs from the distribution system is to be less than 100 micrograms per litre ( $\mu\text{g/L}$ ). The annual average for Keeper's Cove was found to be well within compliance. All quarterly analysis of Nitrate and Nitrite were all found to be within compliance. Refer to the Analysis Report in **Appendix C**.

O.Reg. 170/03 requires Schedule 23, Inorganic Parameters, to be sampled and analyzed annually for all surface water treatment plants. The Regulation also requires Schedule 24, Organic Parameters, to be sampled annually. Schedule 23 and 24 were sampled in September 2005. All parameters were found to be within compliance. **Refer to Appendix C**.

The annual sample for Lead in the Keeper's Cove distribution system was sampled in June 2005 and found to be within compliance. Refer to **Appendix C**.

The Regulation requires that one (1) sample be collected every sixty (60) months and analyzed for its concentration of sodium and fluoride. The ODWQS have set a MAC for sodium of 200 mg/L and 1.5 mg/L for fluoride. The ODWQS also require that the Medical Officer of Health be notified of any sodium sample analysis result greater than 20 mg/L. The samples for Keeper's Cove were collected in 2001 and were found to be within compliance. Sodium and fluoride should be sampled and analyzed during 2006. Refer to **Appendix C** for the analysis results.

### 3.4 Backwash Waste Treatment Suspended Solids Monitoring

The Certificate of Approval requires that the backwash waste treatment tank effluent be monitored on a monthly basis. This includes collecting a sample and having it analyzed for Total Suspended Solids (TSS). The Annual Average TSS is not to exceed 25 mg/L. **Table 4** summarizes the samples taken in 2005.

**TABLE 4**  
**Summary of Backwash Waste Suspended Solids Monitoring: 2005**

<b>Date</b>	<b>TSS (mg/L)</b>
January	26
February	18
March	11
April	30
May	11
June	8
July	8
August	20
September	20
October	13
November	19
December	6
<b>Average</b>	<b>15.8</b>

During 2005 the Annual Average TSS was 15.8 mg/L which is within compliance. 2005 was the first full year that the coagulant system and pressure filters were functional and therefore there is no historical data to compare the annual average to. However, the annual average does not exceed the CofA and is consistent with other WTPs using the same source and coagulant. In 2005 the accumulated sludge in the backwash tank was removed and the TSS concentrations were improved.

#### **4.0 WATER USAGE**

Water usage is provided in **Table 5**. The water meter is a compound meter and the "low flow" and "high flow" values must be added together to determine total flow, average day, minimum day and maximum day.

The maximum day water consumption took place on July 15, 2005, which was 156 m<sup>3</sup>/day which is significantly below the rated capacity of 1126 m<sup>3</sup>/day.

The Annual Record of Water Taking for 2005 is included in **Appendix G**.

During November 2005, Nottawasaga Bay off of The Village of Keeper's Cove experienced extremely high winds. This created larger than normal wave activity in this portion of Nottawasaga Bay. Combined with below average lake levels, the intake became air locked and was out of service from November 10, 2005 to November 18, 2005. The intake was visually inspected by divers and no visual damage to either the intake or the intake pipe was observed.

It took several days to determine that the intake was air locked. The air lock was removed by using the irrigation pumps for the Golf Course. In order to ensure an adequate supply of potable water, during this period The Village of Keeper's Cove, purchased bulk chlorinated water and deposited it directly into the chlorine contact reservoir. All operations were supervised by a properly licensed operator.

The local MOE and Health unit were kept informed of all developments and users were asked to conserve water. No further problems with the intake were experienced.

## 5.0 COMPLIANCE WITH TERMS AND CONDITIONS OF THE CERTIFICATE OF APPROVAL

This section provides assessment of compliance with the Certificate of Approval (CofA) and O.Reg 170/03.

From January 1, 2005 to December 31, 2005, SGS Lakefield Research in London, Ontario was the analytical laboratory for bacteriological analysis of all samples collected. All chemical analysis were performed by Caduceon Environmental Laboratories.

1. Water samples for bacteriological water quality were collected in accordance with O.Reg 170/03.
2. Water samples collected at both the POE and the distribution system showed turbidity analysis were less than 1 NTU. A complete daily breakdown for POE turbidity and distribution turbidity analysis results can be found in **Table 2**.
3. The sampling for treated water chlorine residual from both the Point of Entry (POE) and the distribution system was always carried out in compliance O.Reg. 170/03. Refer to **Table 3** and **Appendix A**.
4. THMs, NO<sub>2</sub> and NO<sub>3</sub> were taken at the required frequencies and all analysis results were within compliance. Refer to **Appendix C**.
5. Fluoride and Sodium sampling was carried out at the required frequency as per O.Reg. 170/03. Refer to Section 3.3.

### 5.1 Chemical Usage

During the calendar year of 2005, Keeper's Cove Water System used 489.4 litres of Sodium Hypochlorite (NaOCl) with an average dosage of 3.5 mg/L. Refer to **Table 6**. NaOCl is added to disinfect the water provided to the distribution system. The dosage rate is reasonable considering the volume of water that was treated. A coagulant, Poly Aluminum Chloride (PACl), is injected prior to the pressure filters. During 2005, this system used 241 L of PACl at an average dosage of 6.10 mg/L.

## **5.2 Regulation 170/03, Section 11 – Annual Report**

Part III - Form 2 was submitted electronically. Refer to **Appendix H**.

### **Section 11 (6) (a) of O.Reg 170/03**

Refer to **Section 2** of this report, titled "Description of Water System".

### **Section 11 (6) (b) of O.Reg 170/03**

Refer to **Section 5.0** of this report, titled "Compliance with Terms and Conditions of the Certificate of Approval.

### **Section 11 (6) (c) of O.Reg 170/03**

Refer to **Tables 1-6** of this report.

### **Section 11 (6) (d) of O.Reg 170/03**

Refer to **Section 5.1** through **Section 5.3** of this report.

### **Section 11 (6) (e) of O.Reg 170/03**

There were no major expenses incurred during the period covered by this report.

### **Section 11 (6) (f) of O.Reg 170/03**

This report was prepared as per Schedule 11 of Regulation 170/03 and a copy of the report can be viewed at either the offices of OWS, at 945 Third Avenue East, Suite 212, Owen Sound, Ontario N4K 2K8, or at The Village of Keeper's Cove.

**Section 11 (9) (1) of O.Reg 170/03**

Once this report has be presented to the Owner (The Village of Keepers Cove), the Owner will take all reasonable steps to make all users of the system aware that the report is complete and where it may be viewed.

**Section 11 (11) of O.Reg 170/03**

1. There are no known private or designated facilities served by the facility.
2. There are no known children's camps served by this facility.
3. There are no known senior's residences served by this facility.

## **6.0 CONSTRUCTION IMPROVEMENTS**

The intake was flushed in November 2005.

The sludge from the backwash holding tank was removed.

The chlorine and turbidity alarm system was upgraded and is tested on a monthly basis.

## **7.0 RESPONSE TO INSPECTION REPORTS**

The MOE did not perform an inspection during the calendar year of 2005. The plant was last inspected on February 2, 2000. Refer to **Appendix F**.

## 8.0 CONCLUSIONS

1. Based on the information provided in this report, it can be concluded that the operation of the water works in 2005 was generally in compliance with the Certificate of Approval and regulation requirement. The upgrades completed in 2004 have significantly improved the performance of this facility over previous years.
2. Sampling results from required quarterly and annual sampling of treated and distribution water indicate compliance with the ODWQS.
3. In 2005, maximum day demand was 155.8 m<sup>3</sup>/day which is significantly below the design capacity of 1126 m<sup>3</sup>/day for the treatment plant as stipulated on the Permit to Take Water.
4. The Ministry of the Environment conducted an inspection of the facility on February 2, 2000. A copy of the Inspection Report is included in **Appendix F**. There was no inspection in 2005.
5. The Annual Average TSS was 15.8 mg/L which is in compliance.
6. Sludge was removed from the backwash holding tank in 2005. This improved subsequent results.
7. During 2005 this facility used 241 L of Poly Aluminum Chloride with an average dosage of 6.09 mg/L and 489 L of NaOCl with an average dosage of 3.50 mg/L.
8. Due to high wave activity and below average Lake levels the intake became air locked in November 2005.
9. The PTTW expires May 31, 2010.

## **9.0 RECOMMENDATIONS**

1. Continue to operate the plant in accordance with the appropriate Regulations, Certificate of Approval and Permit to Take Water for this facility.
2. Apply for an Application for Approval Amendment to delete the online fluoride analyzer from the Certificate of Approval, which was likely included accidentally by the Ministry of the Environment as a typographical error.
3. Ensure the online monitoring equipment and associated alarms operate properly and is properly calibrated as required by the Certificate of Approval.
4. Sodium and fluoride should be sampled in 2006.
5. An Annual Assessment on the volume of sludge should occur during 2006.

Respectfully submitted,

OWESON WATER SERVICES  
(a Division of Oweson Ltd.)

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**Appendix A**  
**Monthly Breakdown of Treated Water Flow**

**Appendix B**  
**Summary of Water Quality – Bacteriological**

**Appendix C**

**Chemical (Quarterly and Annual) Analysis of Water Samples**

**Appendix D**

**Certificate of Approval  
Assignment of Water Distribution System Class 3**

**Appendix E**  
**Permit to Take Water**

**Appendix F**

**MOE Inspection Report, February 2, 2000**  
**MOE Provincial Officer Report and Order, September 11, 2000**

**Appendix G**  
**Annual Record of Raw Water Taking**

**Appendix H**  
**Part III – Form 2**

**Appendix I**

Monthly Log Sheets