

1.0 INTRODUCTION

The Municipality of Brighton is pleased to present its first Annual Compliance Report for the period of January to December 2001. This report summarizes compliance with the terms and conditions of the Certificate of Approval. Under the new Drinking Water Protection Regulation, the Ministry of Environment requires that all owners of municipal waterworks system produce a free, quarterly report for the people to whom they supply drinking water. The report must provide basic system and water source information, outline the measures taken to comply with the regulation and summarize water-testing results. Both Annual and Quarterly reports are available at the municipal offices listed below.

2. CONTACT INFORMATION

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3. CLASSIFICATION

The Ontario Environmental Training Consortium classifies the Brighton Water Supply Works as a Class II Water Distribution system.

4. CONTROL DOCUMENT INFORMATION

During the period of this report, the Brighton Waterworks operated under Certificate of Approval number 7-0020-92-006 (1992) (*Appendix I*) issued by the Ministry of Environment; waterworks identification number is 220000807.

A draft consolidated Certificate of Approval was issued by the MOE on July 31, 2001. This Certificate, when issued, will consolidate and replace all previously issued approvals related to water supply and treatment works associated with the Brighton water supply system. The draft Certificate of Approval identifies physical upgrades to the water works, considered necessary under the Ontario Drinking Water Protection Regulation, to be implemented by December 31, 2002. A request from the Municipality to the MOE to extend the timeframe required in implementing the upgrades from December 2002 to June 2003 was approved.

5. BACKGROUND

The Municipality of Brighton attained the ownership and responsibility of the waterworks from the former Brighton Public Utilities as of January 1, 2001. Hydro One purchased the utility and took over the ownership of the hydroelectric power. The Public Works Department of the Municipality moved into the former PUC building at 67 Sharp Road in November 2001.

6. REGULATIONS

Regulation 459/00 under the Water Resources Act, introduced in August 2000, requires all municipal water systems be reviewed and assessed by an independent engineer. An Engineer's Report was submitted to the MOE in November of 2000. The report identified Brighton's reservoir supply as a surface water source. Reg 459/00 stipulates that owners of a water treatment or distribution system that obtains water from a surface water source shall ensure provision of a minimum level of treatment consisting of chemically assisted filtration and disinfection or other treatment capable of producing water of equal or better quality. As a result, the Municipality of Brighton is currently reviewing the options which are available to change and/or upgrade the present system. Provincial funding has been approved to assist the Municipality in upgrading our drinking water system to comply with the new regulations.

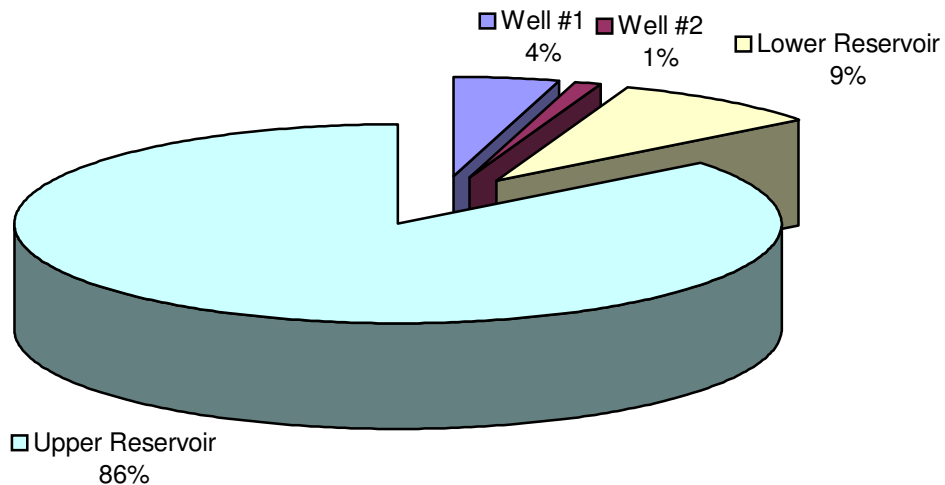
Sampling and analysis were carried out as per Certificate of Approval and the Ontario Drinking Water Standards for the period of this report.

7. PLANT DESCRIPTION & TREATMENT PROCESS

7.1 Raw Water Source

The surface water source consists of spring flows from a shallow aquifer which enter the two reservoirs. The reservoirs serve as collection galleries and settling basins for the springs. The second source of raw water is ground water which is captured from a deep aquifer by two drilled wells located adjacent to the Upper Reservoir site. Two wells draw water from the aquifer under the reservoir area, Well No. 1 is a duty well, Well No. 2 is operated as a stand-by well.

Brighton's Raw Water Source 2001



■ Well #1 ■ Well #2 ■ Lower Reservoir ■ Upper Reservoir

7.2 Treatment Process

Disinfection of water to eliminate disease-causing organisms is the most important step in the drinking water treatment process. Chlorine gas is added to the water as it enters the distribution system; this ensures protection to the customers' location. On-line analyzers for chlorine residuals, turbidity and conductivity ensure continuous monitoring of water quality leaving the plant.

7.3 Stand-by-Equipment

Stand-by chlorinator and generator are in place to provide back-up service in case of power or equipment failure. An alarm system notifies operators of any failure with the chlorination system. A licensed operator is on-call 24 hours/day, seven days/week.

7.4 Distribution System

The Municipality of Brighton's distribution system provides drinking water to approximately 4,700 residents through a network of approximately 50 km. of piping and 2,300 service connections.

Fire hydrants are maintained by the Water Department and includes a flushing program to clear out dead-ends to maintain the water quality in the distribution system.

Chlorine residuals in the distribution system are checked on a weekly basis at five separate sites to maintain appropriate levels of disinfection throughout the system. Total Chlorine levels at the chlorine station ranged from 0.58 mg/L to 1.41 mg/L; a minimum of 0.2 mg/L in the treated water is to be maintained at all times prior to the first point of usage.

8. COMPLIANCE WITH TERMS AND CONDITIONS OF THE CERTIFICATE OF APPROVAL

8.1 Flow Rates/Quantity of Water Supplied

A Permit to Take Water No. 92-P-3067 authorizes the municipality to withdraw water from the wells and reservoirs. The groundwater wells and reservoirs have been approved to supply water at the following maximum flow rates:

| | |
|-----------------|-------------|
| Well No 1 | 1,591 L/min |
| Well No. 2 | 1,591 L/min |
| Upper Reservoir | 2,100 L/min |
| Lower Reservoir | 1,800 L/min |

The water treatment plant is operated to treat water at a rate not exceeding the maximum flow rate of 6,445 m³ /day. See *Appendix II* for compliance of flow rates (C of A Condition 11.(a)). The total maximum flow rate is based on a combined flow rate of 5,615 m³ /day from the Upper Reservoir and the Lower Reservoir. In addition, the total maximum flow rate of 6,445 m³ /day is to be made up employing either Well #1 or Well #2 as an additional production and/or standby groundwater supply. The maximum flow rate in 2001 occurred on Sunday, August 12 with 4,787 m³ of water being utilized; the majority of which was taken from the upper reservoir, supplemented by the lower reservoir and Well #1. There were no exceedances of flow rates during the period of this report.

Brighton Waterworks supplied a total of 1,040,779m³ of treated water in 2001, with an average daily flow of 2,845 m³/day. Table I summarizes the quantity and source of Brighton's water supply during the period of this report.

Table I

| Source | Quantity | Percentage |
|-----------------|--------------------------|------------|
| Upper Reservoir | 889,887 m ³ | 86% |
| Lower Reservoir | 94,369 m ³ | 9% |
| Well #1 | 45,856 m ³ | 4% |
| Well #2 | 10,667 m ³ | 1% |
| Total | 1,040,779 m ³ | 100% |

The Upper Reservoir supplied 86% of the water supply with supplementary supplies utilized mainly from July to September. The majority of supplementary water utilized from Well #1 occurred during July (37%) and August (29%), the majority of supplementary water from the Lower Reservoir occurred in the months of July (25%), August (36%) and September (20%).

As part of the Municipality of Brighton's water conservation policy, the annual Water Conservation By-law No. 029-2001, is enforced annually from June 1st to September 15th. This by-law is maintained to regulate and restrict the unnecessary use of water for outdoor purposes within the serviced area.

8.2 Sampling & Analysis Requirements

Sampling and analyses are performed as required by the Ontario Drinking Water Protection Regulation and by Certificate of Approval provided by the Ministry of Environment.

Bacteriological testing is carried out on raw water, treated water and distribution samples on a regular basis. In addition to the on-line monitoring of chlorine residuals, turbidity and conductivity, certified operators make daily checks on the system and perform daily tests for free and total chlorine residuals, pH, colour, and presence/absence test for bacteria. Weekly bacteriological samples are analyzed at ETRL labs in Kingston, an accredited lab. More specialized testing occurs on a quarterly basis for heavy metals, pesticides, volatiles, organics, and disinfection by-products as per ODWS. Quarterly testing occurred in February, June, September and December. These tests encompass a wide range of parameters as noted in C of A Condition 14.(a) for raw water, treated water and most remote point in the distribution system as well as those parameters stipulated under the Ontario Drinking Water Standards.

Drinking Water Surveillance Program (DWSP) samples were also submitted in February and November 2, 2001; results of which are available at the Municipal Office. Participation of operating authorities in DWSP is voluntary. The DWSP samples are analyzed at the Ministry of Environment Central Lab.

8.3 Monitoring and Reporting

Certificate of Approval 14.(a) states: *Samples of raw water and treated water (at the point of discharge to the distribution system and at the most remote point in the distribution) shall be collected and analyzed for at least the following parameters at the indicated sampling location and sampling frequency. See Appendix II for a monthly summary of daily parameters.*

8.3.1 Raw Water

Daily

- pH - daily testing of pH is performed on raw water entering the distribution system by licensed operators as part of the daily monitoring program. The pH range of raw water entering the distribution system in 2001 was between 7.00 and 8.00, with an average pH of 7.72. The operational guideline recommended in drinking water by the ODWS is between 6.5 and 8.5.

- Turbidity – Turbidity is measured on the raw water entering the distribution system on a continuous basis by the on-line analyzer. The maximum acceptable concentration for turbidity in drinking water is 1.0 NTU for water entering the distribution system. Brighton’s water supply averages 0.242 NTU with an annual range between 0.150-0.366.
- Colour – The aesthetic objective for colour in drinking water is 5 TCU (True Colour Units). The colour is tested daily on-site by a licensed operator. A new colorimeter was purchased in September 2001; previous to this date, samples were analyzed at Quinte West Water Works lab. During the transition period by the Municipality, an operator in charge was utilized from Quinte West Waterworks. Raw water analysis for colour was not conducted during the month of January 2001; this was corrected as soon as noncompliance was discovered. The range for colour entering the distribution system in 2001 is 2.2 to 2.9 TCU.
- Temperature – It is desirable that the temperature of drinking water should not exceed 15° C because the palatability of water is enhanced by its coolness. Low water temperatures offer a number of other benefits. A temperature below 15 ° C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. Brighton’s Spring Supply maintained water temperatures between 4 ° and 11.2 ° C during 2001. These temperatures are taken at the Chlorine Station prior to entering the distribution system.
- Conductivity – Conductivity is measured on a continuous basis by on-line analyzers at the treatment plant. The annual average for conductivity is 330 µΩ. Conductivity is also measured every quarter on raw water sources and in the distribution system. Conductivity limitations or objectives are not listed in the ODWS; however it is required to be monitored daily as per C of A.

Quarterly

- There are a total of 6 sampling stations for quarterly testing including:
 - 4 raw water sites -
 - 1) upper reservoir,
 - 2) lower reservoir,
 - 3) Well #1 and
 - 4) Well#2
 - and 2 treated sites -
 - 5) Chlorine Station where the treated water enters the distribution system, and
 - 6) the most remote point in the distribution system.

A broad range of parameters are tested according to C of A as well as ODWS. The following are the quarterly parameters required by C of A.

Alkalinity – Alkalinity is a measure of the resistance of the water to the effects of acids added to water; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. The alkalinity was tested quarterly at all sampling stations listed above. A total of 16 raw water samples were taken for alkalinity during the period of this report, and an additional 8 treated water samples. The recommended operational

range for alkalinity in coagulant treated drinking water (ODWS) is 30-500 mg/L. Quarterly results in Brighton's raw water sources range from 140 – 212 mg/L.

Hardness – The operational guideline for hardness in drinking water is between 80 – 100 mg/L measured as calcium carbonate; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. Hardness is caused by dissolved calcium and magnesium, and is expressed as the equivalent quantity of calcium carbonate. Hard water has a tendency to form scale deposits when heated. Hardness levels between 80 – 100 mg/L CaCO₃ are considered to provide an acceptable balance between corrosion and incrustation. Water supplies with a hardness greater than 200 mg/L are considered tolerable. A total of 16 raw water samples and 8 treated samples were analyzed for hardness during the period of this report with ranges between 196 – 300 mg/L. Homeowners who opt to install water softeners may report this range to the service technician installing the system.

Calcium – A total of 16 raw water samples were analyzed for calcium with ranges between 60.5 and 84.0 mg/L. There are no limitations for Calcium under the ODWS.

Sodium - The aesthetic objective for sodium in drinking water is 200 mg/L; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. Persons suffering from hypertension or congestive heart disease may require a sodium-restricted diet. It is therefore recommended that the measurement of sodium levels be included in routine monitoring programs of water supplies. There were 16 raw water samples taken for Sodium, and 8 treated samples. Levels of sodium ranged between 3.2 – 39.6 in the raw water and distribution system during the period of this report. Sodium concentrations exceeding 20 mg/L were resampled as required by ODWS. Upon confirmation, the local Medical Officer of Health is notified so that this information may be communicated to local physicians. Notification to the Ministry of Environment was reported during the first quarter of 2001 when the sodium concentrations were first reported in excess of 20 mg/L; Sodium levels over this limit are reportable to the Ministry of Environment once every five years.

Iron – Iron may be present in surface water as a result of anaerobic decay in sediments and in groundwater as a result of mineral deposits; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. The aesthetic objective for iron, set by appearance effects, in drinking water is 0.30 mg/L. Excessive levels of iron in drinking water supplies may impart a brownish colour to laundered goods, plumbing fixtures and the water itself. Iron was tested during each quarter at all of the above noted sampling stations; all samples were reported well below the aesthetic objective ranging from concentrations of less than 0.001 mg/L up to 0.07 mg/L.

Copper – The aesthetic objective for Copper in drinking water is 1.0 mg/L; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. Copper occurs naturally in the environment but rarely in raw water. Quarterly tests of raw water concentrations were less than 0.01 mg/L. Copper is used extensively in domestic plumbing and may be found in higher concentrations in the distribution system.

Lead - is listed under Table 1 – Metals of the ODWS. The maximum acceptable concentration for Lead in drinking water is 0.01 mg/L. This applies to water at the point of consumption since lead is only present as a result of corrosion of lead solder, lead containing brass fittings or lead pipes which are found close to or in domestic plumbing and the service connection to buildings. Lead ingestion should be avoided particularly by pregnant women and young children, who are most susceptible. Lead concentrations in all quarterly samples were well below the MAC of 0.01 mg/L.

Zinc – The taste related aesthetic objective for zinc in drinking water is 5.0 mg/L; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. All quarterly samples for zinc were well below the aesthetic objective.

Arsenic – The interim maximum acceptable concentration for arsenic in drinking water is 0.025 mg/L; it is listed under Table 1 – Metals of the ODWS. Arsenic is a known carcinogen and must therefore be removed by treatment where present at levels over this concentration. Arsenic is sometimes found at higher levels in ground water in hard rock areas such as the Canadian Shield through the natural dissolution of arsenic containing minerals. Arsenic is present at very low concentrations in most surface waters. All quarterly samples analyzed for Arsenic were well below the IMAC limit of 0.025 mg/L.

Aluminum – Aluminum in untreated water is present in the form of very fine particles of alumino-silicate clay. The operational guideline for aluminum is 0.1 mg/L; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. All quarterly samples were reported below the operation guideline for Aluminum.

Manganese – The colour related aesthetic objective for manganese in drinking water is 0.05 mg/L; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. Like iron, manganese is objectionable in water supplies because it stains laundry and fixtures black. Manganese is present in some ground waters from the presence of manganese mineral deposits and seasonally in surface waters when anaerobic decay processes in sediments is occurring. All quarterly samples analyzed for Manganese were below the aesthetic objective concentration of 0.05 mg/L.

Conductivity – is measured in the quarterly samples as well as daily by on-line analyzers. It is not a listed parameter in the ODWS; however, monitored as required as per C of A.

Chloride – Chloride is a common non-toxic material present in small amounts in drinking water and produces a detectable salty taste at the aesthetic objective level of 250 mg/L; it is listed under Table 4 – Chemical/Physical Objectives –Not Health Related under the ODWS. Chloride is widely distributed in nature in the form sodium chloride, potassium chloride and calcium chloride. Chloride concentrations in the quarterly samples ranged between 3.9-47.3 mg/L, well below the aesthetic objective.

Sulphate – The aesthetic objective for sulfate in drinking water is 500 mg/L; it is listed under Table 4 – Chemical/Physical Objectives – Not Health Related under the ODWS. Quarterly samples ranged from 15.5 – 17.6 mg/L. The presence of sulfate in drinking water above 150 mg/L may result in noticeable taste.

Ammonia + Ammonium (N) – This parameter is not listed under the Ontario Drinking Water Standards; however, it is required to be analyzed on raw water on a quarterly basis as per C of A.

Total Kjeldahl Nitrogen – TKN is a required routine analysis for quarterly raw water testing as per C of A; ranges for raw water were between 0.1 – 0.4 mg/L during the period of this report.

Nitrite – The maximum acceptable concentration of nitrite in drinking water is 1.0 mg/L as Nitrogen. It is listed in Table 1 – Inorganic and Physical Parameters of the ODWS. Nitrite may occur in ground water sources, however, post-chlorination, the nitrite will usually be oxidized to nitrate. Concentrations in the quarterly sampling were reported as less than 0.05 mg/L.

Nitrate – The maximum acceptable concentration of nitrates in drinking water is 10 mg/L as Nitrogen. The concentration range for nitrates in the quarterly samples was 2.36-3.37 mg/L. It is listed in Table 1 – Inorganic and Physical Parameters of the ODWS. Nitrates are present in water as a result of decay of plant or animal material, the use of agricultural fertilizers, or geological formations containing soluble nitrogen compounds.

Dissolved Organic Carbon – This parameter is listed under Table 4 – Chemical/Physical Objectives – Not Health Related of the ODWS. The aesthetic objective is 5.0 mg/L. The range in the quarterly samples for raw water was 1-14 mg/L.

Silica – This parameter is not listed in the ODWS. Testing is required quarterly on raw water samples to comply with the current C of A.

Bacteriological Testing – On-site testing for Total and Faecal Coliform was performed on raw water as per C of A 14. (a). Weekly samples for Total Coliform, E.Coli and Heterotrophic Plate Count were analyzed at ETRL, an accredited lab. A total of 107 raw water samples were tested on-site for Presence/Absence, Total and Faecal Coliform, all indicated a positive Presence prior to chlorine treatment. Bacteriological samples were also analyzed on site for treated water. A total of 85 samples from the chlorine station were tested for Presence/Absence, Total and Faecal Coliform. A positive Presence/Absence test from a treated sample taken on September 30, 2001 at the Chlorine Station, revealed negative results for Total and Faecal Coliform (24 and 48 hours) and was negative when resampled.

8.3.2 Treated Water

Weekly

Weekly testing of the treated water at the point of discharge to the distribution system (Chlorine Station) for Total Coliform, Faecal Coliform, and Standard Plate Count was performed weekly at an accredited lab as per C of A 14.(a). Presence/Absence, Total and Faecal Coliform testing also were performed on site on the treated water entering the distribution system. Free and Total Chlorine Residuals are also performed daily on-site as per C of A 14.(a).

Quarterly

Total Trihalomethane – The maximum acceptable concentration for Trihalomethane (THM) in drinking water is 100 µg/L (0.10 mg/L) based on four quarter moving annual average test results. THM was tested each quarter at the Chlorine Station as well as at a remote point in the distribution system. All sample results were well below the MAC. Annual average THM concentration was 14.8 µg/L at the Chlorine Station and 20.85 µg/L at the remote point site in the distribution system, both well below the MAC of 100 µg/L. Trihalomethanes are the most widely occurring synthetic organics found in chlorinated drinking water. The principal source of Trihalomethanes in drinking water is the action of chlorine with naturally occurring organics.

8.3.3 Distribution System

Weekly analysis for Total Coliform, Faecal Coliform, Free Chlorine Residual and Total Chlorine Residual are required as per C of A 14.(a). Total and Faecal Coliform in the distribution system were analyzed at 5 separate sampling sites/week and analyzed at an accredited lab. All treated samples submitted to the lab were reported as Absent from coliform contamination. The minimum concentration of Total Chlorine in the distribution system during this report was 0.21mg/L. Total Chlorine levels at the chlorine station ranged from 0.58 mg/L to 1.41 mg/L. Table II demonstrates compliance to C of A Condition 12.(a) which states that the minimum Total Chlorine residual of 0.2 mg/L in the treated water is to be maintained at all times prior to the first point of usage.

Under the current Certificate of Approval, raw water samples were required to be tested once a year for parameters listed under Table 1 and Table 3 under the Ontario Drinking Water Objectives (1983). The Ontario Drinking Water Standards (formerly the Ontario Drinking Water Objectives) have been updated and strengthened to reflect the most current expertise and procedures in drinking water protection. The Brighton Water Supply system has been determined as a Surface Water Source, sampling and analysis requirements for Surface Water Source of O. Reg. 459/00 requires quarterly samples of raw water to be sampled and analyzed. The results of these parameters can be found at the Municipal Public Works Office at 67 Sharp Road and are found in Quarterly Reports available to the public.

8.4 Operations and Maintenance

Operators make daily inspections at the Water Treatment Plant including visual inspection of the grounds, equipment and on-site water quality testing and monitoring. The Contingency Plan and Operating and Maintenance Manuals are in place at the reservoirs as well as the Public Works office.

All instruments were calibrated as per the manufacturer's instructions in June 2001, including four flow meters, the turbidity and chlorine analyzers, pen recorder and chlorine controller.

There were a total of 59 water leaks in the distribution system during the period of this report, which included 4 water main breaks and 55 service leaks. The majority of these repairs were conducted by municipal staff.

The Municipality of Brighton encourages and supports safety and continuing education at the workplace. Staff are involved with on-site and off-site training programs in regards to health and safety and water distribution and treatment courses.

9. NON-COMPLIANCE WITH TERMS AND CONDITIONS OF THE CERTIFICATE OF APPROVAL

- During the month of January 2001, daily analysis of colour was not performed. The Municipality of Brighton took ownership of the water supply plant as of January 1, 2001, when non-compliance was realized, arrangements were made with Quinte West to utilize their operator to test for this parameter. Testing for colour resumed on February 1, 2001.

10. CONCLUSION

The Brighton Water Supply Plant is fortunate in having an excellent source of natural spring water as it's main source of water supply. The Brighton Water Department is proud of its water quality and is committed to providing the safest and most reliable water supply.

Prepared by Susan Hall, OIT – Water Department

DATE: _____

SIGNATURE: _____

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