



## North Bay Water Treatment Plant and Distribution System Report for the Period of April 1 to June 30, 2001 (Fourth Issue)

Prepared by  
City of North Bay Engineering and Environmental Services Department with data supplied by  
the Ontario Clean Water Agency

*This report is prepared in compliance with Section 12, Ontario Regulation 459 - Drinking Water Protection, as approved under the Ontario Water Resource Act (R.S.O. 2000).*

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### **North Bay's Water System:**

The City of North Bay obtains its municipal water supply from Trout Lake, a high quality surface water source. The North Bay Water Treatment Plant, rated as a level 2 facility, is located at 248 Lakeside Drive, North Bay. Water is drawn from Delaney Bay at a depth of 21.5 m through a 1200 mm polyethylene intake structure approximately 300 meters from shore. The intake is situated 4 meters above the lake bottom. Water treatment at the North Bay Water Treatment Plant consists of coarse screening, disinfection through the continuous feed of sodium hypochlorite (chlorine), fluoridation and pH adjustments using soda ash prior to distribution. The plant is owned by the City of North Bay and is operated by the Ontario Clean Water Agency (OCWA) under a long term contract. OCWA's operating staff certification exceeds the certification required for the North Bay facility.

The North Bay Water Treatment Plant has been automated and can be run remotely through a Supervisory Control and Data Acquisition (SCADA) system operated by the Ontario Clean Water Agency. All key processes are fully alarmed. Raw and treated water turbidity, as well as treated water free chlorine residual, pH, fluoride and flow are continuously monitored and recorded. Post chlorination occurs within the distribution system at the Ellendale Highlift Reservoir, the Judge Avenue Valve Chamber and the Birches Road Standpipe. Continuous alarmed chlorine residual monitoring is carried out at these remote locations as well as at the CFB reservoir and at the Canadore Pumping Station. Treatment and pumping stations are operated by OCWA, and the distribution system is maintained by City forces (North Bay Public Works).

The City of North Bay water distribution system has 5 pressure zones. Zone 1, below the North Bay escarpment, is pressurized from the Ellendale Highlift Reservoir (4.0 Million Imperial Gallon (MIG) capacity) located at the top of Ellendale Road, North Bay. Pressure in Zone 1A, south of the Judge Avenue Valve Chamber is pressurized from the Birches Road Standpipe (1.5 MIG capacity) located on Birches Road. Zone 2 (Canadore College area) and Zone 3 (Airport Hill) are pressurized by pumping stations located on Gormanville Road and at the Ellendale Highlift Reservoir. Zone 4 is pressurized by a small reservoir at CFB North Bay (0.4 MIG capacity) and by residual pressure from Zone 3. The system is fully monitored and controlled by OCWA through a SCADA system. The City of North Bay's distribution system is rated as a level 4 system.

North Bay's water system serves a population of 54,000 and the Treatment Plant has a total capacity of 115,900 m<sup>3</sup>/day with a rated head of 83.8 m. The firm capacity of the Trout Lake pumping system is 79,500 m<sup>3</sup>/day with pump 3 out of service. In a power failure this pumping rate is reduced to 17,500 m<sup>3</sup>/day through emergency pump 5. The City's water taking permit allows a maximum withdrawal of 79,500 m<sup>3</sup>/day from Trout Lake.

**Table 1: Summary of Chemical and Physical Characteristics<sup>a,b</sup> of Raw Water and Treated Water entering or in the North Bay Distribution System, 2001 (with April 1 to June 30, 2001 highlighted)**

Month/ 2000	Total Flow (m <sup>3</sup> )	Ave/Day Flow (m <sup>3</sup> )	Max/Day Flow (m <sup>3</sup> )	Ave Turbidity (NTU) (Raw)	Max Turbidity <sup>c</sup> (NTU) (Raw)	Ave Free Chlorine Residual (mg/L)	Ave Total Chlorine Residual (mg/L)	Ave Fluoride (mg/L)	Max Fluoride (mg/L)	pH	Ave Temp °C	Distribution System	
												THM <sup>d</sup> (ug/l)	Lead (ug/l)
JAN	880,590	28,406	31,855	0.38	0.42	1.00	1.21	0.79	0.90	7.3	3.7		
FEB	761,081	27,181	29,280	0.33	0.42	0.98	1.21	0.75	0.84	7.0	3.6	40.0	2.0
MAR	848,109	27,358	28,980	0.38	0.60	1.01	1.18	0.77	0.84	7.2	3.3		
<b>APR</b>	<b>841,876</b>	<b>28,063</b>	<b>31,500</b>	<b>0.92</b>	<b>5.18</b>	<b>1.26</b>	<b>1.46</b>	<b>0.69</b>	<b>0.88</b>	<b>7.3</b>	<b>3.7</b>		
<b>MAY</b>	<b>982,200</b>	<b>31,684</b>	<b>38,980</b>	<b>0.51</b>	<b>0.61</b>	<b>1.20</b>	<b>1.40</b>	<b>0.59</b>	<b>0.64</b>	<b>7.3</b>	<b>4.8</b>	<b>50.0</b>	<b>N/A<sup>f</sup></b>
<b>JUN</b>	<b>1,126,990</b>	<b>37,566</b>	<b>55,040</b>	<b>0.61</b>	<b>0.74</b>	<b>1.13</b>	<b>1.37</b>	<b>0.60</b>	<b>0.69</b>	<b>7.2</b>	<b>5.7</b>		
JUL													
AUG													
SEP													
OCT													
NOV													
DEC													
Total AVG:												45.0	
MAX:													
PDWS <sup>e</sup> :					1.00				0.80			100.0	10.0

- a) Chlorine residuals, Fluoride, pH and Average Temperature are reported for water entering the distribution system while trihalomethanes and lead are from distant points within the distribution system.
- b) Data for other Inorganics, Nitrate/Nitrites as well as Pesticide and PCB have not been provided. The City has never experienced an exceedance in any of these parameters. Data for other parameters are available from the Engineering and Environmental Services Department upon request.
- c) Turbidity: A measure of water clarity. "The maximum acceptable concentration is 1.0 Nephelometric Turbidity Unit (NTU) for water entering the distribution system." "An appearance related aesthetic objective of 5.0 NTU has been set for water taken at consumers' taps." (Quoted directly from the PWQS definition of Turbidity)
- d) Trihalomethanes: Chlorine can react with natural organics in water to create byproducts generally known as trihalomethanes. The maximum acceptable concentration is 100.0 ug/L based on four quarterly moving annual average test results.
- e) Provincial Drinking Water Standards: Updated standards came into effect on August 8, 2000
- f) Not Available, sample vial was broken at lab

## Microbiological Characteristics of North Bay's Treated Water:

Monitoring for bacterial life in the water distribution system has been an ongoing program of the City of North Bay for decades. Microbiological monitoring consists of testing for Total Coliform bacteria (TC), *Escherichia Coli* (*E. Coli*) bacteria (EC) and bacterial General Background Populations (GBP). Data presented in Table 2 is reported as pass or fail. A water sample fails to meet Provincial Water Quality Standard, and constitutes an adverse reportable event, if greater than zero Colony Forming Units (CFU)/100 ml of either Total Coliform or *E. Coli* bacteria are encountered or if General Background Populations exceed 200 CFU/100 ml in treated water. The City is required to sample weekly and must take a minimum of 62 samples per month within the distribution system. Chlorine residuals are measured in advance of microbiological sampling to ensure that chlorination levels meet provincial standards. If a microbiological sample detects adverse water quality conditions, additional confirmatory testing, including sites around the test failure site, are immediately undertaken. If unacceptable growth in the City's system is confirmed, chlorination rates are boosted and water mains in the affected area are flushed until chlorine residuals are restored and microbiological growth is controlled.

**Table 2: Microbiological Test Results for City of North Bay Water Distribution System, 2001**

Month	<u>Total Coliforms</u>			<u>E. Coli</u>			<u>General Background</u>		
	No. Taken	Pass	Fail	No. Taken	Pass	Fail	No. Taken	Pass	Fail
JAN	75	75	0	75	75	0	75	75	0
FEB	59	59	0	59	59	0	59	59	0
MAR	60	60	0	60	60	0	60	60	0
<b>APR</b>	<b>226</b>	<b>226</b>	<b>0</b>	<b>226</b>	<b>226</b>	<b>0</b>	<b>226</b>	<b>226</b>	<b>0</b>
<b>MAY</b>	<b>102</b>	<b>102</b>	<b>0</b>	<b>102</b>	<b>102</b>	<b>0</b>	<b>102</b>	<b>102</b>	<b>0</b>
<b>JUN</b>	<b>64</b>	<b>64</b>	<b>0</b>	<b>64</b>	<b>64</b>	<b>0</b>	<b>64</b>	<b>64</b>	<b>0</b>
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									
<b>TOTAL</b>	<b>586</b>	<b>586</b>	<b>0</b>	<b>586</b>	<b>586</b>	<b>0</b>	<b>586</b>	<b>586</b>	<b>0</b>
Ave/mth*	97.7	97.7	0	97.7	97.7	0	97.7	97.7	0

\*Reg 459 requires the City to take a minimum of 62 samples per month in the distribution system

## Notices Given within the Second Quarter of 2001

The City of North Bay experienced a boil water advisory during the second quarter of 2001 due to high turbidity in the source experienced during the spring freshet period. The high silt load in the source caused the City to draw in water with turbidity levels exceeding the provincial standard of 1.0 NTU. A maximum peak of 5.18 NTU was experienced on April 13<sup>th</sup>, 2001 in raw intake water. Five separate notices of Adverse Water Quality were submitted to the Medical Officer of Health and the Ministry of the Environment for each of the 5 days that turbidity exceeded 1.0 NTU. Response to the high turbidity included the boil water advisory, increased sampling, boosted chlorination rates and intensive public notification through a comprehensive response team including the Health Unit, the operator and the owner. No adverse water quality events were experienced in the City's water distribution system due to the high source turbidity. The City also provided notice to the MOH and MOE and responded to 4 other low chlorine residual events during the quarter due to low chlorine levels detected through the end of

lines surveillance program.

## **Steps Taken within the Quarter to comply with Provincial Water Quality Standards**

The City of North Bay has been active on several fronts to seek ways to achieve compliance with Ontario Regulation 459/00. Ontario Regulation 459/00, including updated Provincial Water Quality Standards, came into effect on August 26<sup>th</sup>, 2000 and the City has until the end of 2002, or as otherwise directed by the province through a Certificate of Approval, to achieve compliance.

On March 31, 2001 the City of North Bay filed its Engineers Report with the Ministry of the Environment in compliance with Ont Reg 459/00. This report has a companion report entitled "Evaluation of UV Disinfection for the North Bay Water Treatment Plant". Both reports have been completed by CH<sub>2</sub>M Hill Canada Ltd. The Engineers Report provides a thorough evaluation of raw source water as well as treated and distributed water in the North Bay system and makes recommendations on compliance issues including ways to improve North Bay's water supply system.

The Engineers Report recommends that, in order to comply with Ont Reg 459/00, the City should add membrane filtration to its Treatment Facility on Lakeside Drive. The only other form of filtration that was determined to meet new regulation treatment objectives was conventional filtration. Membrane filtration, the act of extracting ultra pure water through microscopic holes in a membrane, which leaves the dirt and particles behind, was found to be less expensive, will produce a better quality product and can be made to fit on the existing Lakeside Drive site. The UV report indicates that UV should also be able to achieve compliance with the new regulations if the province is willing to consider US Environmental Protection Agency (USEPA) filtration avoidance guidelines. The substitution of UV treatment in place of membrane filtration would be linked to other considerations such as strong watershed protection programs. The implementation of filtration at the City's Water Treatment Plant will be determined through a Class C Municipal Environmental Assessment which will select the appropriate technology through a public process.

In addition to compliance with the filtration standard the Engineers Report has made many other recommendations to achieve compliance with Ont Reg 459/00 including improvements to the City's chemical storage and dispensing equipment, improved monitoring of raw and treated water quality, improving chlorine contact by moving the point of application to the inlet of the intake, improving data collection and retrieval mechanisms and improving the Operations manual at the treatment plant. A study of the distribution system was also recommended as well as a continuation of distribution system testing and flushing which has already been initiated by the City.

The City has committed to adding UV disinfection to its current plant as soon as possible to ensure that it has protection against chlorine resistant parasites. The City is in the process of designing and implementing this plant addition with the installation to be completed in 2001. This will be done in conjunction with the install of a backup generator and modification to Pump # 3 that were previously under consideration. The install will also include a continuous UV Transmittance analyzer which is a requirement of the Certificate of Approval to operate UV disinfection. Modifications are being implemented to the chemical storage and dispensing equipment. Monitoring equipment to continuously monitor treated water turbidity has been added to the City's water treatment plant as well as continuous turbidity monitoring equipment being added to the Ellendale Highlift Reservoir and the Judge Avenue Valve Chamber. A chlorine booster is being added to CFB Reservoir due to low chlorine residual at the Airport. The City is also planning to install a chlorine injection system in the water intake in 2001.

Quarterly Reports are available from City Hall or at North Bay's Web Site at [www.city.north-bay.on.ca](http://www.city.north-bay.on.ca).