



## North Bay Water Treatment Plant and Distribution System Report for the Period of January 1 to March 31, 2003 (Eleventh 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 459/00 (as amended) - Drinking Water Protection, as approved under the Ontario Water Resource Act (R.S.O. 2000).*

### **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 1,200 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 UV and 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 the 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, CFB Reservoir and the Birches Road Standpipe. Continuous alarmed chlorine residual monitoring is carried out at these remote locations as well as at the Canadore Pumping Station. Treatment and pumping stations are operated by OCWA, with the distribution system being 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 Drive, North Bay. Pressure in Zone 1A, south of the Judge Avenue Valve Chamber is pressurized from the Birches Road Standpipe (2.0 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 the 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 approximately 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>1,2</sup> of Treated Water entering the North Bay Distribution System and data for Maximum Residency Time Parameters, 2003 (Jan 1 to Mar 31, 2003 highlighted)**

Month/ 2003	Total Flow (m <sup>3</sup> )	Ave/Day Flow (m <sup>3</sup> )	Max/Day Flow (m <sup>3</sup> )	Ave	Max	Ave Free	Ave Total	Ave	Max	pH	Ave	Ave	<u>Distribution System</u>	
				Turbidity (NTU) (Treated)	Turbidity <sup>3</sup> (NTU) (Treated)	Chlorine Residual (mg/L)	Chlorine Residual (mg/L)	Fluoride (mg/L)	Fluoride (mg/L)		Temp °C	UVT	THM <sup>4</sup> (ug/l)	Lead (ug/l)
<b>JAN</b>	<b>895,732</b>	<b>28,895</b>	<b>30,868</b>	<b>0.34</b>	<b>.38</b>	<b>1.31</b>	<b>1.53</b>	<b>.637</b>	<b>0.77</b>	<b>7.36</b>	<b>3.00</b>	<b>84.5</b>		
<b>FEB</b>	<b>873,683</b>	<b>31,203</b>	<b>34,028</b>	<b>0.31</b>	<b>.35</b>	<b>1.29</b>	<b>1.51</b>	<b>.647</b>	<b>0.80</b>	<b>7.32</b>	<b>2.99</b>	<b>85.0</b>	<b>68</b>	<b>&gt;0.02</b>
<b>MAR</b>	<b>1,050,387</b>	<b>33,883</b>	<b>41,494</b>	<b>0.36</b>	<b>.93</b>	<b>1.26</b>	<b>1.46</b>	<b>.625</b>	<b>0.95</b>	<b>7.32</b>	<b>2.91</b>	<b>83.8</b>		
APR														
MAY														
JUN														
JUL														
AUG														
SEP														
OCT														
NOV														
DEC														
Tot. AVG														
MAX: PDWS <sup>5</sup> :				1.00				0.8 <sup>6</sup>					Δ100.0	10.0

- 1) All data is for water entering the distribution system as measured at the North Bay Water Treatment Plant while trihalomethanes and lead are from distant points within the distribution system. Flow, Turbidity, Chlorine Residuals, Fluoride and pH are continuously monitored. Water temperature and Ultraviolet Transmittance (UVT) are averaged from daily grab samples. Trihalomethanes and Lead are measured from grab samples taken quarterly.
- 2) Data for other Inorganics, Nitrate/Nitrites as well as Pesticide and PCB is collected quarterly. Data has not been provided to conserve space. The City has never experienced an exceedance in any of these parameters. Data for these unreported parameters are available from the 3<sup>rd</sup> Floor North Bay City Hall upon request.
- 3) 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)
- 4) 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.
- 5) Provincial Drinking Water Standards: Updated standards came into effect on August 8, 2000
- 6) A new provincial standard of 0.50 to 0.80 mg/ L was introduced in the first quarter of 2001.

## 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, *Escherichia Coli* (*E. Coli*) bacteria and bacterial General Background Populations. Data presented in Table 2 is reported as pass or fail. A water sample fails to meet Provincial Water Quality Standards, 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, 2003\***

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
<b>JAN</b>	<b>68</b>	<b>68</b>	<b>0</b>	<b>68</b>	<b>68</b>	<b>0</b>	<b>68</b>	<b>68</b>	<b>0</b>
<b>FEB</b>	<b>70</b>	<b>70</b>	<b>0</b>	<b>70</b>	<b>70</b>	<b>0</b>	<b>70</b>	<b>70</b>	<b>0</b>
<b>MAR**</b>	<b>83</b>	<b>83</b>	<b>0</b>	<b>83</b>	<b>83</b>	<b>0</b>	<b>83</b>	<b>82</b>	<b>1</b>
APR									
MAY									
JUN									
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									
<b>TOTAL</b>	<b>221</b>	<b>221</b>	<b>0</b>	<b>221</b>	<b>221</b>	<b>0</b>	<b>221</b>	<b>220</b>	<b>1</b>
<b>Ave/mth</b>	<b>73.67</b>	<b>73.67</b>	<b>0</b>	<b>73.67</b>	<b>73.67</b>	<b>0</b>	<b>73.67</b>	<b>73.33</b>	<b>0.33</b>

\*Reg 459/00 requires the City to take a minimum of 62 samples per month in the distribution system. Data includes results from treated water as it enters the distribution system and is in addition to the required 62 (usually 4/month).

\*\* A total of 9 treated water samples are included in each of the 83 sampling events for the month of March/03

## Notices Given within the First Quarter of 2003

A total of 16 adverse water quality notices were reported to the province and the North Bay and District Health Unit during the first quarter of 2003. Eight events are attributed to brief turbidity spikes at the North Bay Water Treatment Plant caused by either pump starts, maintenance work on turbidity analyzers or possibly from organics that may have broken away from the intake pipe after the intake chlorination system became operational in late December 2002. Four events relate to low free chlorine residuals below 0.05 mg/L of which 3 are distribution system related and 1 was experienced at the Trout Lake Pumping Station. Two fluoride spikes in excess of the Maximum Allowable Concentration (MAC) of 1.5 mg/L were reported and one GBP exceedence of 200 CFU/100 ml in the distribution system was also reported. One adverse water quality event was reported in error. The City changed its reporting policy at the beginning of 2003 to now include brief turbidity bumps from pump startups or from monitoring equipment maintenance after the Clean Drinking Water Act was passed in December 2002 and from concerns raised in provincial inspections of other facilities. It had been past practice to ignore brief turbidity bumps as indicators of adverse water quality because pump start-ups can create bubbles in the water or

false equipment readings

are recorded when bringing monitoring equipment back into service after maintenance. The new provincial regulatory regime leave no room for operator discretion and the City will continue to report any and all indicators of adverse water quality until reporting rules are clarified.

All low chlorine residuals in the distribution system have been promptly addressed through line flushing to restore residual to above 0.20 mg/L. Follow-up sampling for the one GBP exceedences indicated that the event was either an isolated event or was due to sample contamination. Three events at the Trout Lake Pumping station related to fluoride spikes and a low chlorine residual in treated water were caused by equipment malfunction, which were quickly addressed. The low chlorine residual issue was followed up with distribution system free chlorine and bacteriological sampling in the vicinity of the water treatment plant and all data shows that no adverse conditions were detected in the distribution system.

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

The City of North Bay continues to advance work to achieve compliance with Ontario Regulation 459/00 and Amended Certificate of Approval No. 4118-55JMHT issued for the North Bay Water Treatment Plant on December 19, 2001. This Certificate specifies that the City must add UV disinfection, move its point of chlorination to the intake and make other repairs to the existing plant as specified in the Engineers Report by the end of 2002. The City has until October 31, 2005 to add filtration or equivalent to its treatment process. Certificate of Approval conditions reflect recommendations made in the Engineers Report prepared for the North Bay Water Works that was filed with the Ministry of the Environment on March 31, 2001. The Engineers Report included a thorough evaluation of raw and treated water and made recommendations on compliance issues. The North Bay Water Treatment Plant and distribution system was subject to an annual inspection by the province during this reporting period (between March 11<sup>th</sup> to 13<sup>th</sup>, 2003) and subsequent work orders and recommendations have been issued to the City of North Bay.

The inspection of major works to be completed by the end of 2002 found that some minor works had not been completed as specified. Backup chlorinators at the Judge Avenue Valve Chamber and the Birchs Road Stand Pipe were not installed to the inspector's satisfaction and some of the upgrades have been completed without amending the Certificate of Approval. A blanket provincial six-month extension to the end of 2002 date was issued by the province in July of 2002 however the new date had not been incorporated into the City's Certificate of Approval. A Certificate of Approval amendment to cover the changed date, the works already completed and works to be completed is currently being requested. The City is also working on the installation of backup power at the North Bay Water Treatment Plant to ensure that the system can continue to operate in a power outage (the current backup pump does not have UV disinfection).

The City of North Bay has moved a step closer to adding filtration to its system by October 31, 2005. The City completed a Class C Environmental Assessment in mid October 2002 and has subsequently completed a Value Engineering process to identify that the recommended type of filtration for North Bay is micro filtration. The City is currently in the process of hiring a consultant to prepare a Detailed Design for the facility. The plant will be built at the existing plant site at 248 Lakeside Drive, North Bay.

The City tested the erosion control work completed for a Margaret Street drainage course, in the first quarter of 2003 and raw water turbidity associated with the spring freshet did not exceed 1.0 NTU. The City is studying options for improving chlorination in the western part of Zone 1 of the water distribution system and it is also studying ways to limit trihalomethanes until a new filtration plant is constructed, which should solve current issues. The City has received approval to model the distribution system for the purposes of carrying out directional flushing. The City is also planning to improve line cleaning, swabbing, directional flushing, end of line flushing and

general preventative maintenance. The City further is planning to continue to complete water line looping projects in 2003 to eliminate dead ends.

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).