



North Bay Water Treatment Plant and Distribution System Report for the Period of July 1 to September 30, 2002 (Issue Nine)

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 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 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 m³/day with a rated head of 83.8 m. The firm capacity of the Trout Lake pumping system is 79,500 m³/day with pump 3 out of service. In a power failure this pumping rate is reduced to 17,500 m³/day through emergency pump 5. The City's water taking permit allows a maximum withdrawal of 79,500 m³/day from Trout Lake.

Table 1: Summary of Chemical and Physical Characteristics^{1,2} of Treated Water entering the North Bay Distribution System and data for Maximum Residency Time Parameters, 2002 (July 1 to Sept 30, 2002 highlighted)

Month/ 2001	Total Flow (m ³)	Ave/Day Flow (m ³)	Max/Day Flow (m ³)	Ave	Max	Ave Free	Ave Total	Ave	Max	pH	Ave	Ave	<u>Distribution System</u>	
				Turbidity (NTU) (Treated)	Turbidity ³ (NTU) (Treated)	Chlorine Residual (mg/L)	Chlorine Residual (mg/L)	Fluoride (mg/L)	Fluoride (mg/L)		Temp °C	UVT	THM ⁴ (ug/l)	Lead (ug/l)
JAN	827,331	26,688	28,560	0.35	0.74	1.27	1.47	0.51	0.58	7.33	3.14	83.85	-	-
FEB	720,722	25,740	32,810	0.32	0.33	1.28	1.48	0.51	0.58	7.31	3.12	83.78	77.0	< 2.0
MAR	782,149	25,231	29,460	0.42	0.88	1.29	1.47	0.52	0.62	7.34	3.10	83.69	-	-
APR	785,570	26,186	36,800	0.66	1.26	1.40	1.61	0.55	0.82	7.31	3.27	81.73	-	-
MAY	828,053	26,711	35,822	0.62	0.69	1.21	1.40	0.51	0.60	7.33	5.81	83.31	110.0	< 2.0
JUN	949,750	31,658	37,300	0.52	0.60	1.18	1.36	0.52	0.56	7.30	6.78	84.92	-	-
JUL	1,321,370	42,625	53,820	0.54	0.63	1.28	1.49	0.55	0.61	7.22	7.24	85.23	90.0	-
AUG	1,300,261	41,944	53,440	0.46	0.54	1.26	1.44	0.50	0.58	7.18	7.39	85.16	-	<2.0
SEP	1,049,350	34,978	48,960	0.38	0.55	1.25	1.43	0.55	0.66	7.21	7.50	83.90	-	-
OCT														
NOV														
DEC														
Total AVG														
MAX:													89.0	
PDWS ⁵ :				1.00				0.8 ⁶					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 3rd 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 federal standard of 0.60 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, 2002*

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	85	85	0	85	85	0	85	85	0
FEB	68	68	0	68	68	0	68	68	0
MAR	68	68	0	68	68	0	68	68	0
APR	147	147	0	147	147	0	147	147	0
MAY	89	89	0	89	89	0	89	89	0
JUN	71	70	1	71	71	0	71	71	0
JUL	85	85	0	85	85	0	85	85	0
AUG	68	68	0	68	68	0	68	68	0
SEP	72	71	1	72	72	0	72	71	1
OCT									
NOV									
DEC									
TOTAL	753	751	2	753	753	0	753	752	1
Ave/mth	83.67	83.44	0.23	83.67	83.67	0	83.67	83.55	0.12

*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).

Notices Given within the Third Quarter of 2002

Four adverse water quality events were reported in the third quarter of 2002. Two adverse events were reported for distribution system chlorine residuals that were lower than the 0.05 mg/L. Readings below this level are considered inadequate for disinfection. In both instances water main flushing was immediately undertaken and residual were restored to levels above 0.2 mg/L. These sites are in close proximity to each other and the City has identified an area with a tendency to experience low residuals, not related to ends of lines and permanent solutions to this problem are being explored. One notice of adverse water quality was given due to an exceedence of lead at the end of the distribution system. Upon reviewing this sampling event it was determined that the method and location of the sample did not meet sampling protocols and thus duplicate samples were retaken following established protocols which are designed to determine the quality of water from the City's distribution system.

Both resample results were below detection limits.

The original lead exceedence, which suggested adverse water quality, was caused by an internal building problem and is not reflective of water quality in the City's distribution system, therefore this reading has not been recorded in Table 1. The fourth adverse water quality event report in the third quarter was for the same site that exceeded both Total Coliform and General Background Plate Standards of 0 CFU/100 ml and 200 CFU/100 ml respectively. The chlorine residuals at this location were high at the point of taking the bacteriologic samples and the results are likely due to sampler contamination. This site was flushed and resampled to establish that the site was, indeed, in compliance with all standards.

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

The City of North Bay has continued to advance compliance work in the third quarter of 2002 to achieve full compliance with Ontario Regulation 459/00 by established dates. New drinking water legislation, including updated Provincial Water Quality Standards, came into effect on August 26th, 2000. An Amended Certificate of Approval (No. 4118-55JMHT) for the North Bay Water Treatment Plant was issued on December 19, 2001. This Certificate specifies that the City must add UV disinfection, move its point of chlorination into the water intake and make other repairs to the existing plant as specified in the Engineers Report by the end of 2002. The City has been given 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. It included a thorough evaluation of raw source water as well as treated and distributed water in the North Bay system and recommendations on compliance issues were also included. The Certificate of Approval provides the City with clarification as to what it must do to comply with the new Drinking Water Protection Regulations.

All works to be completed by the end of 2002 have now been implemented including the installation of Ultraviolet disinfection, the relocation of the initial point of chlorination at the entrance to the intake pipe, the changing of instrumentation and raw water sampling, the repairs to chemical storage tanks and improvement required to chemical room ventilation. The City is now working on the installation of a backup power supply to ensure that the system can continue to operate in a power outage. The flow meter at the Trout Lake Water Treatment Plant has now been properly calibrated. Improvements are being completed to update the SCADA control systems and to improve electronic communications and alarms.

How the City will achieve compliance with the requirement to add filtration or equivalent at the City's Water Treatment Plant is being determined through a Municipal Class C Environmental Assessment that will select the appropriate technology through a public process. R. V. Anderson has been hired by the City to complete the Environmental Assessment. Two public open houses have been held to confirm that Trout Lake is the long-term source and to select the preferred method of filtration. The final ESR which recommends that the top two preferred treatment options; conventional filtration and membrane filtration, be referred to a Value Engineering evaluation process to better determine which is most appropriate for North Bay. The EA has only dealt with cost in a conceptual nature and CH2 M Hill is completing details on treatment regimes to refine operating costs. The ESR will begin a 30-day public review on Oct 19, 2002 and the VE session is currently tentatively scheduled for early December, subject to North Bay City Council Approval.

The City has reconstructed the Margaret Street drainage course, which was the main source of silt that impacted the City's water supply during heavy runoff events. The work was completed in August 2002. In 2001 siltation from this source is thought to be the main reason that a Boil Water Advisory was issued by the local Health Unit for a two-week period. High turbidity was also experienced in 2002 however the City was able to isolate runoff from this erosion zone by pumping around it and this control mechanism proved to be effective. The erosion control project should eliminate the need to control flows through this site at times of high flow.

Quarterly Reports are available from City Hall or at North Bay's Web Site at www.city.north-bay.on.ca.