North Bay Water Treatment Plant and Distribution System Report for the Period of July 1 to September 30, 2001 (Fifth 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).

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

Table 1: Summary of Chemical and Physical Characteristics[1, 2] of Raw Water and Treated Water entering or in the North Bay Distribution System, 2001 (with July 1 to September 30, 2001 highlighted)

Month/ 2001	Total Flow (m^3)	Ave/Day Flow (m^3)	Max/Day Flow (m^3)	Ave Turbidity (NTU) (Raw)	Max Turbidity[3] (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[4] (ug/l)	Distribution System 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		
APR	841,876	28,063	31,500	0.92	5.18	1.26	1.46	0.69	0.88	7.3	3.7		
MAY	982,200	31,684	38,980	0.51	0.61	1.20	1.40	0.59	0.64	7.3	4.8	50.0	N/A[5]
JUN	1,126,990	37,566	55,040	0.61	0.74	1.13	1.37	0.60	0.69	7.2	5.7		
JUL	**1,427,685**	**46,054**	**72,490**	**0.53**	**0.63**	**1.13**	**1.35**	**0.52**	**0.71**	**7.2**	**6.7**		
AUG	**1,459,356**	**47,076**	**75,200**	**0.43**	**0.49**	**1.19**	**1.41**	**0.60**	**0.82**	**7.1**	**7.2**	**86.0**	**9.0**
SEP	**882,470**	**29,416**	**33,990**	**0.43**	**0.50**	**1.25**	**1.48**	**0.56**	**0.78**	**7.1**	**7.2**		
OCT													
NOV													
DEC													
Total													
AVG:												45.0	
MAX:													
PDWS[6]:				1.00					0.80			100.0	10.0

1) 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.

2) 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.

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) Not Available, sample vial was broken at lab

6) Provincial Drinking Water Standards: Updated standards came into effect on August 8, 2000

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, 2001

	Total Coliforms			*E. Coli*			General Background		
Month	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
APR	226	226	0	226	226	0	226	226	0
MAY	102	102	0	102	102	0	102	102	0
JUN	64	64	0	64	64	0	64	64	0
JUL	**86**	**86**	**0**	**86**	**86**	**0**	**86**	**86**	**0**
AUG	**68**	**68**	**0**	**68**	**68**	**0**	**68**	**68**	**0**
SEP	**67**	**67**	**0**	**67**	**67**	**0**	**67**	**67**	**0**
OCT									
NOV									
DEC									
TOTAL	807	807	0	807	807	0	807	807	0
Ave/mth*	89.7	89.7	0	89.7	89.7	0	89.7	89.7	0

*Reg 459 requires the City to take a minimum of 62 samples per month in the distribution system. Data includes result from treated water as it enters the distribution system which are not part of the required 62.

Notices Given within the Second Quarter of 2001

No adverse water quality events occurred during the 3rd quarter of 2001. The City of North Bay maintained a higher chlorine dosing rate during the summer period and the net effect, in conjunction with high demand rates, was to see higher chlorine residuals carried to the ends of lines throughout the distribution system. Chlorine by products, as measured by trihalomethanes, are also higher as a direct result of higher chlorination, but within permitted levels.

The City of North Bay was subject to a boil water advisory during the second quarter of 2001 due to high turbidity in the source that occurred during spring freshet. 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 13th, 2001in raw intake water. Boosted chlorine was one of the methods that the City employed to combat high turbidity and the levels were left high following this event to observe impacts to residual carried in the distribution

system.

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

The City of North Bay has continued to be active on several fronts to seek compliance with Ontario Regulation 459/00. Ontario Regulation 459/00, including updated Provincial Water Quality Standards, came into effect on August 26th, 2000. On the 16th of August 2001, the City received a new consolidated Certificate of Approval for the North Bay Water Treatment Plant (MOE Reference No. 3341-4VGLNE). The 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 filed its Engineers Report 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, which reflects the recommendations that were made in the Engineers Report, provides the City with clarification as to what it must do to comply with the new Drinking Water Protection Regulations. The City has been given until October 31, 2005 to add filtration or equivalent to its treatment process through the Certificate of Approval.

Work is underway to install UV disinfection and to make the other modifications to the City's existing water treatment plant and this work is well at hand to meet the meet the 2002 deadline. This work is being coordinated by the Ontario Clean Water Agency with engineering being provided by of CH_2 M Hill Canada Ltd. UV installation and system upgrades are considered temporary while options for filtration are investigated. The UV install will include the addition of a backup generator to ensure that UV disinfection is operable at all times and it will also permit the City to operate its water system indefinitely in a limited fashion during blackout periods.

How the City will achieve compliance with the requirement to add filtration or equivalent at the City's Water Treatment Plant will be determined through a Municipal Class C Environmental Assessment that will select the appropriate technology through a public process. A consultant selection process to complete this work has been concluded and a steering committee of stakeholders has recommended R. V. Anderson be hired to complete the Environmental Assessment. R. V. Anderson has indicated that the process will take about 9 months to complete, once awarded, and that any conceived option at this time can be planned, designed and built by the 2005 deadline.

The new Certificate of Approval also specifies other work that is being pursued by the City including written procedures for the notification of the Medical Officer of Health and MOE, developing contingency plans for emergency situations, beefing up operation manual(s), developing a complaint recording and tracking system and several smaller upgrades as recommended in the Engineers Report. 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 to the Judge Avenue Valve Chamber. A chlorine booster has been added to CFB Reservoir to boost chlorine residuals at the Airport. The City is also planning to install a chlorine injection system in the water intake in early 2002.

The final occurrence of note in the third quarter was the new high peak demand experienced in August, 2001 which reached 75,200 m^3/day. It will be imperative for the City of North Bay to consider meaningful water conservation measures in conjunction with filtration options or an additional water source will be necessary in the near future.

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