

2021 SUMMARY REPORT FOR THE NORTH BAY WATER TREATMENT SYSTEM

This report is a summary of water quality information for the North Bay Water Treatment System, published in accordance with Schedule 22 of Ontario's Drinking-Water Systems Regulation for the reporting period of January 1, 2021 to December 31, 2021. This report is based on all information received within the stated reporting period and items that remained outstanding in the last reporting periods that have been carried forward.

The North Bay Water Treatment System is categorized as a Large Municipal Residential Drinking Water System. The City of North Bay is the Operating Authority for the Water Treatment Plant and water distribution system. The following table lists the requirements that the system failed to meet and the measures taken to correct the failure:

The following is a list of the adverse sampling results from the North Bay WTP and Distribution System (DS) over the year of 2021.

List the requirement(s) the system failed to meet	Specify duration of the failure (i.e. date(s))	Describe the measures taken to correct the failure	Status (complete or outstanding)
Loss of Chlorine Trending	June 22, 2021	Loss of communications due to a UPS failure at Birch's Stand pipe caused a loss of chlorine residual trending at Birch's Stand pipe and Judge Valve chamber from 17:56 to 20:04. Equipment replaced and communications restored. Reported incident to MECP.	Complete
Failure to meet a Secondary disinfection chlorine residual of 0.05 mg/L. Chlorine residual reading was 0.03 mg/L	July 7, 2021	Flushed water main and resampled. Low chlorine not reported until later in day resulting in a non-compliance with reporting immediately. Reported to MOH and SAC as per regulations AWQI # 154557	Complete
Failure to meet a Secondary disinfection chlorine residual of 0.05 mg/L. Chlorine residual reading was 0.04 mg/L	September 15, 2021	Drained and refilled a third of the tower and resampled getting residual of 0.26mg/L. Put auto flusher back on line. Reported to MOH and SAC as per regulations AWQI # 155496	Complete

List the requirement(s) the system failed to meet	Specify duration of the failure (i.e. date(s))	Describe the measures taken to correct the failure	Status (complete or outstanding)
Loss of Chlorine Trending	September 20, 2021	Loss of communications at Birch's Stand pipe caused a loss of chlorine residual trending at Birch's Stand pipe and Judge Valve chamber from 05:49 to 09:35. Manual Samples taken until communications restored. Reported incident to MECP.	Complete
Loss of Chlorine Trending	October 5, 2021	Loss of communications due to a repeater site failure. Airport Stand pipe, CFB & Ellendale reservoir had loss of chlorine residual trending from 04:05 to 05:52. Reported incident to MECP.	Complete
Loss of Chlorine Trending	October 25, 2021	Loss of communications at Cedar Heights Booster Station caused the loss of chlorine residual trending from 16:23 to 20:59. Staff dispatched and manual Samples taken until communications restored. Reported incident to MECP.	Complete
Loss of Chlorine Trending	October 28, 2021	Loss of communications at Cedar Heights Booster Station caused the loss of chlorine residual trending from 12:15 to 14:46. Staff dispatched and manual Samples taken until communications restored. Reported incident to MECP.	Complete
Loss of Chlorine Trending	December 2, 2021	Loss of communications at Airport Stand pipe and Ellendale Reservoir due to UPS failure at repeater site causing the loss of chlorine residual trending from 12:41 to 14:46. Staff. dispatched and manual Samples taken until communications restored. Reported incident to MECP.	Complete
Category 2 main break with potential sewage contamination	December 3, 2021	Category 2 main break had occurred on 100 Patton St.. In the same trench there was a broken sewer line giving the potential for sewage contamination in the water main. Reported incident to MOH and SAC which boil water for homes affected put into place. Isolated main and flushed followed by chlorination of entire affected main. Provided bottle water to affected homes and two bacti samples collected which came back clear. AWQI #157113	Complete

List the requirement(s) the system failed to meet	Specify duration of the failure (i.e. date(s))	Describe the measures taken to correct the failure	Status (complete or outstanding)
High pH in Treated Water Effluent	December 7, 2021	During routine filter rack maintenance there was a high pressure which shut down the CIP. During the operators attempt to correct issue chemical in rack caused a pH spike in contact tanks which shut plant down. Plant put into recirculation mode to bring up chlorine residual to meet CT and dilute with raw water to bring down pH. Reported to MOH and SAC as per regulations AWQI # 157169	Complete

The North Bay WTP has the design capacity of 79,500 cubic meters of water per day. The WTP is a SCADA controlled membrane filtration system with ultraviolet and chlorine disinfection systems. The plant also includes fluoride addition along with caustic for pH adjustment and control max for corrosion control prior to delivery to the distribution. The WTP meets the Ontario Drinking Water Standards requirements for the removal/disinfection of 2-log Cryptosporidium oocysts, 3-log Giardia cysts, and 4-log Viruses.

The North Bay WTP achieves the above performance criteria using membrane filtration (0.1 micron pore size), ultraviolet (UV) inactivation and chlorine disinfection.

The filtration process meets the criteria listed in the Procedure for Disinfection of Drinking Water in Ontario for membrane filtration, including;

1. Maintain effective backwash procedures, including filter-to-waste or an equivalent procedure, to ensure that the effluent turbidity requirements are met at all times;
2. Monitor integrity of the membrane by continuous particle counting or equivalent effective means (e.g., intermittent pressure decay measurements) (Note: intermittent pressure decay monitored at the North Bay WTP).
3. Continuously monitor filtrate turbidity; and,
4. Meet the performance criterion for filtered water turbidity of less than or equal to 0.1 NTU in 99% of the measurements each month.

The following is a breakdown of the pathogen removal credits for the North Bay WTP:

- Membrane filtration provides 3.0 log removal of Giardia, 2-log removal of Cryptosporidium
- UV inactivation provides 0.5-log removal of Giardia and 0.5-log removal of Cryptosporidium
- Chlorine disinfection provides 4-log removal of viruses

All of the filter rack effluent lines are equipped with continuously monitored, recorded and alarmed turbidity analyzers which will shut down the respective rack if a reading exceeds 0.1 NTU.

Filtered water is directed through the UV disinfection units prior to entering the contact chambers. The two chlorine contact tanks can be operated separately or in sequence and still provide the required 4 log disinfection. This facility is equipped with continuously monitored, recorded and alarmed CT calculation. The SCADA system also automatically takes data from several sources (flow, temperature, free chlorine residual, pH, water depth in contact tanks, and which contact tank is in service) and calculates the log removal credits achieved for Giardia & Viruses.

The following information presents the Annual Record of Water Taking for the North Bay Water Treatment Plant and the treated water consumption.

Raw Water Taking

In overview some 7,521,563 cubic meters of water were taken from Trout Lake during the year of 2021. The average water taking for 2021 was 20,607 cubic meters per day. The maximum water taking per day was 36,180 cubic meters in June and this was 46% of the maximum 79,500 cubic meters per day allowed under the Permit to Take Water.

Raw Water Taking	Total Taking (m3)	Average Day (m3/d)	Max Day (m3/d)	Max Day % of PTTW allowable (79,500 m3/d)
2021	7,521,563	20,607	36,180	46%
2020	7,152,145	19,541	27,907	35%
2019	7,475,978	20,482	33,351	42%
2018	7,265,251	19,905	27,500	35%
2017	6,881,781	18,851	28,818	36%
2016	7,677,448	20,973	27,638	35%
2015	10,244,897	28,149	39,531	50%
2014	10,451,967	28,645	41,509	52%
2013	10,713,683	29,257	43,560	55%
2012	11,804,231	32,227	51,963	65%
2011	12,752,104	34,925	51,870	65%

The 2021 total raw water taking was up by 5% from 2020.

Treated Water

In overview some 7,411,731 cubic meters of water were delivered to the distribution system during the year 2021. The average treated water delivered to the distribution system was 20,306 cubic metres per day for 2021. The maximum water delivered to the distribution system per day during 2021 was 35,837 cubic meters in June and this was 46% of the 78,700 cubic meters per day rated capacity of the plant.

Treated Water Taking	Total Treated (m3)	Average Day (m3/d)	Max Day (m3/d)	Max Day % of PTTW allowable (78,700 m3/d)
2021	7,411,731	20,306	35,837	46%
2020	7,053,621	19,272	27,527	35%
2019	7,392,707	20,254	33,137	42%
2018	7,146,560	19,573	27,074	34%
2017	6,788,663	18,597	28,655	36%
2016	7,564,121	20,720	27,290	35%
2015	10,228,009	28,019	39,128	50%
2014	10,337,724	28,335	41,399	52%
2013	10,578,115	28,962	43,235	55%
2012	11,659,907	31,910	51,534	65%
2011	12,563,903	34,408	51,450	65%

The 2021 total treated water volume delivered into the distribution system was up by 5% from 2020.

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