Drinking-Water System Number:	**220000406**
Drinking-Water System Name:	North Bay Water Drinking Water System
Drinking-Water System Owner:	The Corporation of the City of North Bay
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 1, 2015 to December 31, 2015

Complete if your Category is Large Municipal Residential or Small Municipal Residential	***Complete for all other Categories.***
Does your Drinking-Water System serve more than 10,000 people? Yes [X] No [ ] **Is your annual report available to the public at no charge on a web site on the Internet? Yes [X] No [ ]** **Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.** The Corporation of the City of North Bay P.O. Box 360 200 McIntyre Street East North Bay, ON P1B 8H8	**Number of Designated Facilities served:** **Did you provide a copy of your annual report to all Designated Facilities you serve?** **Yes [ ] No [ ]** **Number of Interested Authorities you report to:** **Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility?** **Yes [ ] No [ ]**

Note: For the following tables below, additional rows or columns may be added or an appendix may be attached to the report

List all Drinking-Water Systems (if any), which receive all of their drinking water from your system:

Drinking Water System Name	Drinking Water System Number
N/A	

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?
Yes [ ] No [ ]

Indicate how you notified system users that your annual report is available, and is free of charge.
[X] Public access/notice via the web
[X] Public access/notice via a newspaper

Describe your Drinking-Water System

The City of North Bay water treatment plant (WTP), water distribution facilities and water distribution piping system are owned and operated by the Corporation of the City of North Bay.

The City of North Bay Water Treatment System is classified as a "Large Municipal Residential" Drinking-Water System, Class 3 Water Treatment Plant and Class 4 Water Distribution System with Drinking-Water System Number: 220000460. The WTP, located at 248 Lakeside Drive in North Bay, treats water from Trout Lake which is part of the Mattawa River watershed. The WTP services a population of approximately 54,000 and the permit to take water permits consumption up to 79,500 cubic meters per day.

The water distribution facilities consist of the following:

Ellendale Reservoir, High lift Pump Station & Re-chlorination Facility;
CFB Reservoir;
Canadore Pumping Station;
Judge Avenue Valve Chamber;
Birches Road Standpipe and Re-chlorination Station; and
Airport Road Standpipe, Booster Pumping Station and Re-chlorination Facility.

The membrane filtration water treatment plant has the design capacity of 79,500 cubic meters per day. The plant is a SCADA controlled membrane filtration system with ultraviolet and chlorine disinfection systems. The plant also includes fluoride addition along with caustic pH adjustment prior to delivery to the distribution system.

The membrane filtration plant meets the Ontario Drinking Water Standards requirements for the removal/disinfection of 3-log Giardia Lambia, 2-log Cryptosporidium and 4-log Viruses. The membrane filtration Primary Barrier provides for a 3-log Giardia removal, 2-log Cryptosporidum removal. The chlorine/UV disinfection Secondary Barrier provides for a 0.5 UV Giardia removal, 0.5-log UV Cryptosporidum removal and a 4 log chlorine virus removal.

In general the North Bay WTP can be described as follows:
Intake
A 1200mm diameter series 45 polyethylene intake pipe, with a capacity of 80,000 cubic meters per day. The pipe, constructed in 1973, extends approximately 300 meters into Delaney Bay of Trout Lake and includes an intake structure consisting of a steel inlet bell mouth with fibre reinforced plastic (FRP) cage and is in approximately 21.5 metres of water at low water level.
Membrane Feed Pump Well/Prescreening
Two (2) parallel sub-surface well chambers with level monitoring containing, two (2) 6mm mesh manual prescreen in series, five (5) vertical turbine pumps (4 duty and one standby) rated at 20 m3/d feeing the primary membrane system.

Membrane Feed Strainers
Five (5) 300 micron automatic membrane feed strainers (four duty and one standby).

Treatment Plant Process Areas
A building housing the following process components:

- **primary and secondary membrane filtration system;**
- **primary and secondary UV disinfection system;**
- **split chlorine contact tank;**
- **split highlift pump well**
- **three (3) chemical storage and delivery rooms housing membrane cleaning and neutralization chemical systems, pre-chlorination system, primary disinfection chemical system, residual chlorination chemical system, alkalinity adjustment system, and fluoride addition system;**
- **highlift pumping;**
- **Generator room;**
- **Electrical room.**
- **compressor/blower room**

Administration Area
Two floor administrative area including laboratory/control room, server room, multipurpose training room, offices, washrooms, women's and men's locker rooms, janitor room, building mechanical room and storage room.

Membrane Filtration
Eleven (11) pressurized primary membrane racks treating water from the membrane feed strainers, two(2) pressurized secondary membrane racks treating non-chemical backwash water from the primary membrane racks. The primary racks have a maximum production flow rate of 78.7 MLD based on raw water flow rate of 79.5 MLD, Ancillary systems including backwash pumps, instrument air for operating valves and integrity testing membranes, process blowers, and chemical cleaning and neutralization systems.

UV Disinfection Systems
Three (3) 600mm UV reactors (two duty and one standby) treating water from the eleven (11) pressurized primary membrane racks and two (2) secondary membrane racks. Each reactor contains medium pressure high intensity lamps housed in quartz sleeve and equipped with self cleaning mechanism and intensity sensor.

Chemical systems for:
Primary disinfection
Secondary (residual) disinfection
Fluoride Dosing
Alkalinity Adjustment
Membrane cleaning
Membrane cleaning solutions neutralization
Chlorine Contact Tank #1 and #2

Two (2) baffled chlorine contact tanks in series with storage volumes of 688 cubic meters (tank #1) and 502 cubic meters (tank #2).

High Lift Pump Well #1 and #2
High lift pump well #1 has a capacity of approximately 240 cubic meters and is equipped with one (1) variable speed and two (2) constant speed vertical turbine high lift pumps each rated at 20 MLD. High lift pump well #2 has a capacity of approximately 240 cubic meters and is equipped with one (1) variable speed and one (1) constant speed vertical turbine high lift pump each rated at 20 MLD.

Generator Room
One (1) dual fuel generator set (NG/Diesel) with a rating of 2050KW, to provide power during peak hours and emergency situations.

Wastewater Disposal System
Primary Membrane Backwash Tank
Tank with a volume of approximately 310 cubic meters,
Two (2) membrane feed pumps supplying water to the Secondary Membrane System.

Secondary Waste Tank
Tank with a volume of approximately 130 cubic meters,
Two (2) pumps, one duty and one standby, to deliver water to the sanitary sewer.

Neutralization Tank #1 and #2
Two (2) tanks each with a volume of 150 cubic meters, pH and Chlorine Residual analyzers.

Sanitary Sewage Disposal
One sump with two (2) submersible pumps in the Administration Area and two (2) sumps and two (2) submersible pumps in the Process Area discharging to the sanitary sewer along Lakeside Drive

The treated water is pumped to the distribution system.

The water distribution facilities can be described as follows:

Ellendale Reservoir, Highlift Pumping Station and Re-chlorination Facility
The facility is a reinforced concrete at-grade, double cell, un-baffled, treated water reservoir, located at the east end of Ellendale Drive. The reservoir has an approximate capacity of 18,200 cubic meters, with dimensions of 71 meters by 38 meters by 7 meters. The facility is equipped with a sodium hypochlorite re-chlorination system, on-line continuous water quality analyzers for free chlorine and turbidity and a standby generator to operate the facility during power outages.

Birchs Road Standpipe and Re-chlorination Station

The facility consists of one (1) 39 meter high, 19 meter diameter, 11,775 cubic meter capacity, steel, un-baffled, treated water standpipe, located near the southwest corner of Birchs Road and Booth Road. The facility is equipped with sodium hypochlorite re-chlorination system, on-line continuous water quality analyzers for free chlorine and turbidity and fixed 7.5kW, 120/240 Volt single phase, diesel powered generator to power the re-chlorination and SCADA communications during prolonged power outages.

Judge Avenue Valve Chamber
The facility consists of a valve and is located near the northeast corner of Judge Avenue and Lakeshore Drive. The facility is equipped with a fixed 7.5kW 120.240 Volt single phase, diesel powered generator to power the valve and SCADA communications during prolonged power outages. Valve control that is integrated with Birches Standpipe. The equipment for a re-chlorination station is located at the facility however not currently in use.

CFB North Bay Reservoir and Re-chlorination Facility
The facility consists of one (1) 1820 cubic meter capacity, un-baffled reservoir and a re-chlorination facility located at the north end of Manston Crescent. The facility is equipped with on line continuous water quality analyzer for free chlorine and standby power.

Canadore Pumping Station
The facility is equipped with highlift pumps and pressurized cushion tanks to maintain pressure in the pressurized zone of the distribution system servicing Canadore College and Nipissing University. There is an on-line continuous water quality analyzer to monitor free chlorine residual and a 200kW, 347/600 Volt, 3 phase diesel generator to provide power and SCADA communications during prolonged power outages.

Airport Standpipe, Booster Pumping Station
This 4,000 cubic meter water storage standpipe, booster pumping station and re-chlorination facility was constructed in 2009. With the standpipe, high lift pumps and pressurized cushion tanks this facility maintains pressure in the pressurized zone of the distribution system servicing the Airport and Carmichael Drive areas. The overall system consists of pressure zones 4 and 5 which accommodate a total of nine pumps, including three booster pumps (2 duty and 1 standby) for Zone 4, four booster pumps (3 duty and 1 standby) and two fire pumps for Zone 5. The water standpipe is connected to the zone 4 distribution header to provide zone 4 fire flow and peak hour demand. It is also connect to the zone 5 fire pumps suction header to provide zone 5 fire demand. Zone 5 is equipped with four (4) pneumatic tanks connected to the Zone 5 discharge header to mitigate minor pressure fluctuations within the distribution system, and to provide some volume of available storage during power interruptions before the standby power system engages. This will mitigate the potential for negative pressure in the distribution system.

List all water treatment chemicals used over this reporting period

Sodium Hydroxide
Sodium Hypochlorite
Hydrofluosilicic Acid
Control Max

Were any significant expenses incurred to?

[X] Install required equipment
[X] Repair required equipment
[X] Replace required equipment

Please provide a brief description and a breakdown of monetary expenses incurred

Major repair and replacement to ensure reliable treatment and distribution of water to the water system.

The major capital repairs and replacements include:

- **Cleaning of Ellendale Reservoir**
- **Cleaning of CFB Reservoir**
- **Cleaning of Secondary Membrane Feed Tank**
- **Chlorine Dosing Pumps installed at Airport Standpipe**
- **Valves and actuators replaced on membrane filtration system**
- **Third party flow meter calibration at all water system sites**
- **Annual hoist and crane inspections for all equipment at all water systems facilities**
- **Annual maintenance of generators at all water facilities**
- **Installed 90m of 200mm watermain and 5 valves on merlin Ave from Shallot Cr. To Sable Cr.**
- **Installed 122m of 400mm watermain on memorial Dr. from Regina to WWTP service and 18m of 200mm watermain road crossing at WWTP**
- **Installed 80m of 150mm watermain and two 150mm valves on Eva St. replacing 54m of existing 100mm watermain looping to O'Brien St.**
- **Installed 30.5m of 150mm watermain and one 150mm valve on Cartwright St. looping to Whitney Ave.**
- **Installed 33m of 250mm watermain, 26m of 250mm watermain, 510m of 300mm watermain on Ferguson Street.**
- **Installed 14m of 300mm watermin and 1556m of 400mm watermin on College Dr.**

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident	Parameter	Result	Unit of	Corrective Action	Corrective

Date			Measure		Action Date
18-Feb-15	Chlorine Residual	0.00	mg/L	Chlorine analyzer at CFB reservoir reading 0.00. Chlorine residual when operator responded to alarm 0.74 mg/L. Analyzer re-calibrated and replaced electrolyte. AWQI #122560	20-Feb-15
20-Feb-15	THM	102.5	Ug/L	Reduction in chlorine residual, THM study throughout distribution system, cleaning reservoirs, flushing. Annual running average 95.8 ug/L with samples taken Nov 10, 2015. AWQI #122589, #123403, #125523	23-Nov-15
28-May-15	Chlorine Residual	0.01	mg/L	CFB chlorine analyzer reading between 0.01-0.05mg/L. Chlorination restored by operator on site however it was noted that these were true readings. Flushing of hydrants upstream and downstream restored the chlorine residual. AWQI#123770	29-May-15
16-July-15	Chlorine Residual	0.03	mg/L	0.03 free chlorine residual at Marathon Beach drinking water fill station. Flushed line 10 minutes and residual brought up to 0.08mg/L. Service line was not flushed long enough before taking sample and MOH noted no re-sample was required. Reported to MOE and MOH as required. Drinking Water Quality Standards. AWQI #125032	16-July-15
06-Oct-15	Chlorine Residual	0.02	mg/L	0.02 free chlorine residual at dead end on Galahad Ct. Hydrant 9-1071 flushed and resampled. Results met Ontario Drinking Water Quality Standards. AWQI #126749	06-Oct-15
19-Oct-15	Chlorine Residual	0.01	mg/L	0.01 free chlorine residual at 860 Lakeshore Drive. Flushed and resampled. Results met the Ontario Drinking Water Quality Standards. AWQI#126950.	19-Oct-15
09-Nov-15	Chlorine Residual	0.00	mg/L	0.00 free chlorine at dead end hydrant in front of 26 Herman Cresc. Watermain flushed and re-sampled 09-Nov-15. Results met Ontario Drinking Water Quality Standards.	12-Nov-15

				AWQI#127309	

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period.

	Number of Samples	**Range of E.Coli (#)-(#)**	**Range of Total Coliform Results (#)-(#)**	**Number of samples Background Colony Counts**	**Range of Back-ground Colony Counts**	**Number of HPC Samples**	**Range of HPC Results (#)-(#)**
Raw	52	0-4	4->200	52	54->200	N/A	N/A
Treated	52	0-0	0-0	52	0-0	52	0-8
Distribution Fixed Sites	364	0-0	0-0	364	0-0	104	0-17
Distribution Random Sites	520	0-0	0-0	520	0-22	153	0-36

Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03 during the period covered by this Annual Report.

POE Grab Samples	**Number of Grab Samples**	**Range of Results (min #)-(max #)**	**ODWQS/Operational Requirement**
Turbidity	**147**	**0.061 – 0.12 NTU**	**1.0 NTU max**
Chlorine	**209**	**0.93 – 1.37 mg/L**	**0.5 mg/L min**
Fluoride (If the DWS provides fluoridation)	**48**	**0.27 – 0.63 mg/L**	**1.5 mg/L max**

Distribution Free Chlorine Grab Samples	**Number of Grab Samples**	**Range of Results (min #)-(max #)**	**ODWQS Requirement**
Chlorine Fixed Sites	**3701**	**0.32 – 4.99 mg/L**	**0.05mg/L min**
Chlorine Random Sites	**510**	**0.07-1.49 mg/L**	**0.05 mg/L min**

POE on-line Continuous Analyzers	**Number of Grab Samples**	**Range of Results (min #)-(max #)**	**ODWQS/Operational Requirement**
Turbidity	**8760**	**0.02 – 0.1 mg/L**	**5.0 NTU max**
Chlorine	**8760**	**0.45 – 2.8 mg/L**	**0.05 mg/L min**
Fluoride (If the DWS provides fluoridation)	**8760**	**0.0 - 0.75 mg/L**	**1.5 mg/L max**

***NOTE**: For continuous monitors use 8760 as the number of samples.*

Summary of Inorganic parameters tested during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	**14 Jul 15**	<1.0	ug/L	no
Arsenic	**14 Jul 15**	<0.6	ug/L	no
Barium	**14 Jul 15**	11.1	ug/L	no
Boron	**14 Jul 15**	<10	ug/L	no
Cadmium	**14 Jul 15**	<0.2	ug/L	no
Chromium	**14 Jul 15**	<0.6	ug/L	no
Mercury	**14 Jul 15**	<0.1	ug/L	no
Selenium	**14 Jul 15**	<0.8	ug/L	no
Sodium	**11 Mar 14**	11.7	mg/L	no
Fluoride	**14 Jul 15**	0.39	mg/L	no
Uranium	**14 Jul 15**	<0.2	ug/L	no
Nitrite	11 Feb 15 14 Apr 15 16 Jul 15 10 Nov 15	<0.05 <0.02 <0.05 <0.005	mg/L mg/L mg/L mg/L	no
Nitrate	11 Feb 15 14 Apr 15 16 Jul 15 10 Nov 15	0.240 0.281 0.261 0.246	mg/L mg/L mg/L mg/L	no

*only for drinking water systems testing under Schedule 15.2; this includes large municipal non-residential systems, small municipal non-residential systems, non-municipal seasonal residential systems, large non-municipal non-residential systems, and small non-municipal non-residential systems

Summary of lead testing under Schedule 15.1 during this reporting period
(applicable to the following drinking water systems; large municipal residential systems**,** small municipal residential systems, and non-municipal year-round residential systems)

	Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Unit of Measure	Number of Exceedances
Round 1 Dec 15 2013 to Apr 15 2014	**Plumbing**	**47**	**<0.001 – 0.043**	**mg/L**	**1**
	Distribution	**8**	**<0.001 – 0.0019**	**mg/L**	**0**
Round 2 June 15 2013 to Oct 15 2013	**Plumbing**	**45**	**<0.001 – 0.005**	**mg/L**	**0**
	Distribution	**8**	**<0.001 – 0.0043**	**mg/L**	**0**

Summary of Organic parameters sampled during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	14 Jul 15	<0.5	ug/L	no
Aldicarb	14 Jul 15	<2.0	ug/L	no
Aldrin + Dieldrin	14 Jul 15	<0.07	ug/L	no
Atrazine + N-dealkylated metobolites	14 Jul 15	<1.0	ug/L	no
Azinphos-methyl	14 Jul 15	<2.0	ug/L	no
Bendiocarb	14 Jul 15	<2	ug/L	no
Benzene	14 Jul 15	<0.2	ug/L	no
Benzo(a)pyrene	14 Jul 15	<0.01	ug/L	no
Bromoxynil	14 Jul 15	<0.5	ug/L	no
Carbaryl	14 Jul 15	<5	ug/L	no
Carbofuran	14 Jul 15	<5	ug/L	no
Carbon Tetrachloride	14 Jul 15	<0.2	ug/L	no
Chlordane (Total)	14 Jul 15	<0.7	ug/L	no
Chlorpyrifos	14 Jul 15	<1.0	ug/L	no
Cyanazine	14 Jul 15	<1.0	ug/L	no
Diazinon	14 Jul 15	<1.0	ug/L	no
Dicamba	14 Jul 15	<1.0	ug/L	no
1,2-Dichlorobenzene	14 Jul 15	<0.5	ug/L	no
1,4-Dichlorobenzene	14 Jul 15	<0.5	ug/L	no
Dichlorodiphenyltrichloroethane (DDT) + metabolites	14 Jul 15	<3	ug/L	no
1,2-Dichloroethane	14 Jul 15	<0.2	ug/L	no
1,1-Dichloroethylene (vinylidene chloride)	14 Jul 15	<0.2	ug/L	no
Dichloromethane	14 Jul 15	<0.3	ug/L	no
2-4 Dichlorophenol	14 Jul 15	<0.5	ug/L	no
2,4-Dichlorophenoxy acetic acid (2,4-D)	14 Jul 15	<1	ug/L	no
Diclofop-methyl	14 Jul 15	<0.9	ug/L	no
Dimethoate	14 Jul 15	<2.5	ug/L	no
Dinoseb	14 Jul 15	<1	ug/L	no
Diquat	14 Jul 15	<5	ug/L	no
Diuron	14 Jul 15	<10	ug/L	no
Glyphosate	14 Jul 15	<0.02	mg/L	no
Heptachlor + Heptachlor Epoxide	14 Jul 15	<0.3	ug/L	no
Lindane (Total)	14 Jul 15	<0.4	ug/L	no
Malathion	14 Jul 15	<5	ug/L	no
Methoxychlor	14 Jul 15	<90	ug/L	no
Metolachlor	14 Jul 15	<0.2	ug/L	no
Metribuzin	14 Jul 15	<0.2	ug/L	no
Monochlorobenzene	14 Jul 15	<0.1	ug/L	no
Paraquat	14 Jul 15	<1	ug/L	no
Parathion	14 Jul 15	<1.0	ug/L	no
Pentachlorophenol	14 Jul 15	<0.5	ug/L	no

Phorate	**14 Jul 15**	**<0.5**	**ug/L**	**no**
Picloram	**14 Jul 15**	**<5**	**ug/L**	**no**
Polychlorinated Biphenyls(PCB)	**14 Jul 15**	**<0.2**	**ug/L**	**no**
Prometryne	**14 Jul 15**	**<0.25**	**ug/L**	**no**
Simazine	**14 Jul 15**	**<1.0**	**ug/L**	**no**
THM (NOTE: show latest annual average)	10 Nov 15	**96.0**	**ug/L**	**no**
Temephos	**14 Jul 15**	**<10**	**ug/L**	**no**
Terbufos	**14 Jul 15**	**<0.5**	**ug/L**	**no**
Tetrachloroethylene	**14 Jul 15**	**<0.2**	**ug/L**	**no**
2,3,4,6-Tetrachlorophenol	**14 Jul 15**	**<0.5**	**ug/L**	**no**
Triallate	**14 Jul 15**	**<0.1**	**ug/L**	**no**
Trichloroethylene	**14 Jul 15**	**<0.2**	**ug/L**	**no**
2,4,6-Trichlorophenol	**14 Jul 15**	**<0.5**	**ug/L**	**no**
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	**14 Jul 15**	**<1**	**ug/L**	**no**
Trifluralin	**14 Jul 15**	**<2.0**	**ug/L**	**no**
Vinyl Chloride	**14 Jul 15**	**<0.2**	**ug/L**	**no**

THM Dist Sample Location 55 Aviation Ave & 201 Pinewood Park	**1st Quarter Result Value**	**2nd Quarter Result Value**	**3rd Quarter Result Value**	**4th Quarter Result Value**	**Unit of Measure**	**Excee-dance**
Date Sampled	**11 Feb 15**	**14 Apr 15**	**16 Jul 15**	**10 Nov 15**	**ug/L**	**No**
Bromodichloromethane	**3.4** **3.9**	**4.7** **<0.3**	**4.0** **3.8**	**6.8** **7.0**	**ug/L**	**No**
Bromoform	**<0.4** **<0.4**	**<0.4** **<0.4**	**<0.4** **<0.4**	**<0.5** **<0.5**	**ug/L**	**No**
Chloroform	**101** **87.1**	**92.7** **91.1**	**97.9** **95.8**	**68.9** **70.3**	**ug/L**	**No**
Dibromochloromethane	**<0.3** **<0.3**	**<0.3** **<0.3**	**<0.3** **<0.1**	**<0.2** **<0.2**	**ug/L**	**No**
Total Trihalomethanes	**105** **90.5**	**103** **103**	**98.5** **97.9**	**77.3** **75.7**	**ug/L**	**No**
Total Trihalomethanes 4 Quarter Average				**95.95**	**ug/L**	**No**

List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	½ MAC VALUE	MAC VALUE	Date of Sample
THM	**95.95**	**ug/L**	**50**	**100**	**10 Nov 2015**
***Benzo(a)pyrene**	**<0.01 lab detection limit**	**ug/L**	**0.005**	**0.01**	**14 Jul 2015**

***In all the cases marked with * the analysis result value was less than the lab detection limit. However the lab detection limit is above the ½ MAC value.**