



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, 2013 to December 31, 2013

<p><u>Complete if your Category is Large Municipal Residential or Small Municipal Residential</u></p> <p>Does your Drinking-Water System serve more than 10,000 people? Yes [X] No []</p> <p>Is your annual report available to the public at no charge on a web site on the Internet? Yes [X] No []</p> <p>Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.</p> <div style="border: 1px solid black; padding: 5px;"> <p>The Corporation of the City of North Bay P.O. Box 360 200 McIntyre Street East North Bay, ON P1B 8H8</p> </div>	<p><u>Complete for all other Categories.</u></p> <p>Number of Designated Facilities served: <div style="border: 1px solid black; width: 100px; height: 20px; margin: 5px 0;"></div> </p> <p>Did you provide a copy of your annual report to all Designated Facilities you serve? Yes [] No []</p> <p>Number of Interested Authorities you report to: <div style="border: 1px solid black; width: 100px; height: 20px; margin: 5px 0;"></div></p> <p>Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? Yes [] No []</p>
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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.

- Public access/notice via the web
- 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 Cryptosporidium removal. The chlorine/UV disinfection Secondary Barrier provides for a 0.5 UV Giardia removal, 0.5-log UV Cryptosporidium 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 feeding 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 a 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**

Were any significant expenses incurred to?

- Install required equipment
- Repair required equipment
- 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:

- **Dryer installed on process air for membrane filtration system**
- **A number of valves and actuators replaced on membrane filtration system.**
- **Chlorine dosing pumps and panels purchased for Airport Standpipe and Birch's Standpipe.**
- **Birch's Standpipe concrete beam and floor deterioration investigation. Repair to occur 2014**
- **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**
- **Replaced 450m of 200mm watermain on Princess between Fisher and Ferguson**
- **Replaced 330m of 300mm watermain on Ferguson between Fifth and Princess**
- **Installed 110m of 400mm watermain across CP Rail lands from the end of Regina to the corner of Stanley & Regina**
- **Installed new watermain on Sage Rd. From Camelot to Ivanhoe**
- **Installed new watermain in North Bay Mall Parking Lot from mall easement main to lakeshore Drive.**
- **Installed new watermain on McLeod St. from Hutcheson to Dudley**
- **Installed 335m of 350mm watermain at Trillium Woods**
- **Installed 260m of 200mm watermain at Perut Place**
- **Installed 150m of 200mm watermain at Surry Drive**

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 Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
25-Feb-13	Chlorine Residual	0.04	mg/L	Reported to MOE and MOH as required. Flushed and re-sampled on 25-02-13. Results met Ontario Drinking Water Quality Standards. AWQI #110100	25-Feb-13



Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
17-Apr-13	Chlorine Residual	0.02	mg/L	Reported to MOE and MOH as required. Flushed and re-sampled on 17-04-13. Results met Ontario Drinking Water Quality Standards. AWQI #110597	17-Apr-13
4-May-13	Chlorine Residual	0.0	mg/L	Drop in residual at CFB Reservoir on chlorine analyzer. Reported to MOE and MOH. Operator confirmed that analyzer was reading values low by 0.08mg/L. Samples taken at CFB and distribution system. Sample results met Ontario Water Quality Standards. AWQI# 110924	4-May-13
21-June-13	Total Coliform	1		Reported to MOE and MOH as required. Flushed watermain and two consecutive sets of bacteriological samples were taken 24 and 48 hours apart and met the Ontario Drinking Water Quality Standards. AWQI #11823	26-June-13
26-Aug-13	Lead	0.024	mg/L	Reported to MOE and MOH as required. Flushed and re-sampled on 26-09-14. Results were 0.001 which met the Ontario Drinking Water Quality Standards. AWQI #114288	26-Sept-13
26-Sept-13	Chlorine Residual	0.04	mg/L	Reported to MOE and MOH as required. Flushed and re-sampled on 26-09-13. Results met Ontario Drinking Water Quality Standards. AWQI #114292	26-Sept-13
09-Oct-13	No Water Pressure	N/A	N/A	No water pressure due to watermain repair. MOE and MOH notified and notice provided to affected consumers. Once repair complete system was flushed, chlorine restored and bacteriological samples taken and met the Ontario Drinking Water Quality Standards. AWQI #114502	12-Oct-13
22-Nov-13	No Water Pressure	N/A	N/A	Pump failed at Canadore Pumping Station. Reported to	24-Nov-13



Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
				MOE and MOH as required. Pump started back up and line was flushed. Two consecutive sets of bacteria samples were taken 24 and 48 hours apart and met Ontario Drinking Water Quality Standards. AWQI #115153	

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	0-12	3->200	52	69->200	N/A	N/A
Treated	52	0-0	0-0	52	0-1	52	0-14
Distribution Fixed Sites	364	0-0	0-0	364	0-1	364	0-18
Distribution Random Sites	530	0-0	0-0	530	0-109	159	0-43

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	184	0.025 – 0.44 NTU	1.0 NTU max
Chlorine	217	0.84 – 1.35 mg/L	0.5 mg/L min
Fluoride (If the DWS provides fluoridation)	50	0.07 – 0.59 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	3710	0.1 – 3.10 mg/L	0.05mg/L min
Chlorine Random Sites	530	0.03-1.8 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 – 0.91 mg/L	5.0 NTU max
Chlorine	8760	0.70 – 2.5 mg/L	0.05 mg/L min
Fluoride (If the DWS provides fluoridation)	8760	0.0 - 0.94 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	11 Apr 13	<1.0	ug/L	no
Arsenic	11 Apr 13	<0.6	ug/L	no
Barium	11 Apr 13	12.1	ug/L	no
Boron	11 Apr 13	<10	ug/L	no
Cadmium	11 Apr 13	<0.2	ug/L	no
Chromium	11 Apr 13	0.84	ug/L	no
Lead	11 Apr 13	<0.50	ug/L	no
Mercury	11 Apr 13	<0.1	ug/L	no
Selenium	11 Apr 13	<0.8	ug/L	no
Sodium	11 Apr 13	16	mg/L	no
Fluoride	11 Apr 13	0.41	mg/L	no
Uranium	11 Apr 13	<0.2	ug/L	no
Nitrite	24 Jan 13	<0.05	mg/L	no
	11 Apr 13	<0.05	mg/L	
	10 July 13	<0.004	mg/L	
	22 Oct 13	<0.004	mg/L	
Nitrate	24 Jan 13	0.14	mg/L	no
	11 Apr 13	0.16	mg/L	
	10 July 13	0.278	mg/L	
	22 Oct 13	0.339	mg/L	

*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 2012 to	Plumbing	44	<0.001 – 0.01	mg/L	0

	Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Unit of Measure	Number of Exceedances
Apr 15 2013	Distribution	8	<0.001 – 0.004	mg/L	0
Round 2 June 15 2013 to Oct 15 2013	Plumbing	44	<0.001 – 0.02	mg/L	2
	Distribution	8	<0.001 – 0.024	mg/L	1

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	11 Apr 13	<0.5	ug/L	no
Aldicarb	11 Apr 13	<2.0	ug/L	no
Aldrin + Dieldrin	11 Apr 13	<0.07	ug/L	no
Atrazine + N-dealkylated metabolites	11 Apr 13	<1.0	ug/L	no
Azinphos-methyl	11 Apr 13	<2.0	ug/L	no
Bendiocarb	11 Apr 13	<2	ug/L	no
Benzene	11 Apr 13	<0.2	ug/L	no
Benzo(a)pyrene	11 Apr 13	<0.01	ug/L	no
Bromoxynil	11 Apr 13	<0.5	ug/L	no
Carbaryl	11 Apr 13	<5	ug/L	no
Carbofuran	11 Apr 13	<5	ug/L	no
Carbon Tetrachloride	11 Apr 13	<0.2	ug/L	no
Chlordane (Total)	11 Apr 13	<0.7	ug/L	no
Chlorpyrifos	11 Apr 13	<1.0	ug/L	no
Cyanazine	11 Apr 13	<1.0	ug/L	no
Diazinon	11 Apr 13	<1.0	ug/L	no
Dicamba	11 Apr 13	<1.0	ug/L	no
1,2-Dichlorobenzene	11 Apr 13	<0.5	ug/L	no
1,4-Dichlorobenzene	11 Apr 13	<0.5	ug/L	no
Dichlorodiphenyltrichloroethane (DDT) + metabolites	11 Apr 13	<3	ug/L	no
1,2-Dichloroethane	11 Apr 13	<0.2	ug/L	no
1,1-Dichloroethylene (vinylidene chloride)	11 Apr 13	<0.2	ug/L	no
Dichloromethane	11 Apr 13	<0.3	ug/L	no
2-4 Dichlorophenol	11 Apr 13	<0.5	ug/L	no
2,4-Dichlorophenoxy acetic acid (2,4-D)	11 Apr 13	<1	ug/L	no
Diclofop-methyl	11 Apr 13	<0.9	ug/L	no
Dimethoate	11 Apr 13	<2.5	ug/L	no
Dinoseb	11 Apr 13	<1	ug/L	no
Diquat	11 Apr 13	<5	ug/L	no

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Diuron	11 Apr 13	<10	ug/L	no
Glyphosate	11 Apr 13	<0.02	mg/L	no
Heptachlor + Heptachlor Epoxide	11 Apr 13	<0.4	ug/L	no
Lindane (Total)	11 Apr 13	<0.4	ug/L	no
Malathion	11 Apr 13	<5	ug/L	no
Methoxychlor	11 Apr 13	<90	ug/L	no
Metolachlor	11 Apr 13	<0.2	ug/L	no
Metribuzin	11 Apr 13	<0.2	ug/L	no
Monochlorobenzene	11 Apr 13	<0.1	ug/L	no
Paraquat	11 Apr 13	<1	ug/L	no
Parathion	11 Apr 13	<1.0	ug/L	no
Pentachlorophenol	11 Apr 13	<0.5	ug/L	no
Phorate	11 Apr 13	<0.5	ug/L	no
Picloram	11 Apr 13	<5	ug/L	no
Polychlorinated Biphenyls(PCB)	11 Apr 13	<0.2	ug/L	no
Prometryne	11 Apr 13	<0.25	ug/L	no
Simazine	11 Apr 13	<1.0	ug/L	no
THM (NOTE: show latest annual average)	22 Oct 13	93.2	ug/L	no
Temephos	11 Apr 13	<10	ug/L	no
Terbufos	11 Apr 13	<0.5	ug/L	no
Tetrachloroethylene	11 Apr 13	<0.2	ug/L	no
2,3,4,6-Tetrachlorophenol	11 Apr 13	<0.5	ug/L	no
Triallate	11 Apr 13	<0.1	ug/L	no
Trichloroethylene	11 Apr 13	<0.2	ug/L	no
2,4,6-Trichlorophenol	11 Apr 13	<0.5	ug/L	no
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	11 Apr 13	<1	ug/L	no
Trifluralin	11 Apr 13	<2.0	ug/L	no
Vinyl Chloride	11 Apr 13	<0.2	ug/L	no

THM Dist Sample Location 55 Aviation Ave & 201 Pinewood Park	1 st Quarter Result Value	2 nd Quarter Result Value	3 rd Quarter Result Value	4 th Quarter Result Value	Unit of Measure	Excee- dance
Date Sampled	24 Jan 13	9 Apr 13	10 July 13	22 Oct 13	ug/L	No
Bromodichloromethane	5.1 5.2	4.4 4.1	3.9 3.3	3.6 3.5	ug/L	No
Bromoform	<0.3 <0.3	<0.1 <0.1	<0.1 <0.1	<0.1 <0.1	ug/L	No



THM Dist Sample Location 55 Aviation Ave & 201 Pinewood Park	1 st Quarter Result Value	2 nd Quarter Result Value	3 rd Quarter Result Value	4 th Quarter Result Value	Unit of Measure	Excee- dance
Chloroform	82 85	65.5 64.4	93.1 77.8	83.5 72.8	ug/L	No
Dibromochloromethane	<0.2 <0.2	<0.1 <0.1	<0.1 <0.1	<0.2 <0.2	ug/L	No
Total Trihalomethanes	87 90	99 86	97 82.3	87.1 76.3	ug/L	No
Total Tirhalomethanes 4 Quarter Average				93.2	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	93.2	ug/L	50	100	22 Oct 2013
*Benzo(a)pyrene	<0.01 lab detection limit	ug/L	0.005	0.01	11 Apr 13

***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.**