



DRINKING WATER QUALITY ANNUAL REPORT

January 1 to December 31, 2005



Bare Point Water Treatment Plant Expansion Project

TRANSPORTATION & WORKS

ENVIRONMENT DIVISION

RESPECTFULLY SUBMITTED BY:

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WATER TREATMENT OPERATIONS
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INTRODUCTION

This report is prepared on an annual basis to satisfy the requirements of the Ontario Ministry of the Environment and the Certificates of Approval for both plants. As well, this report is intended to inform City elected representatives, the general public and to serve as a source of information on water quality and water supply operations within the City of Thunder Bay.

The Corporation of the City of Thunder Bay operated two water treatment plants in 2005. The water distribution network of the City is divided into a number of pressure zones. Most of the time, the northern part of the City receives its water supply from the Bare Point Water Treatment Plant and the southern portion of the City receives its water from the Loch Lomond Treatment Plant.

During peak demand periods, due to its limited capacity, the Loch Lomond Plant cannot meet the total demand from the southern portion of the City. At these times, additional water is pumped into the south system from the Bare Point supply through the James Street Pump Station.

The Bare Point Water Treatment Plant, located near the City limits, off Lakeshore Drive, has an operational capacity of 68 million litres (ML) per day (15 million gallons per day) and utilizes a chemically assisted direct filtration system. The plant draws water from Lake Superior, the world's largest body of fresh water. Treatment processes at the Bare Point Water Treatment Plant include raw water screening, pre-chlorination, chemically assisted coagulation-flocculation using alum and polymer, sand-anthracite filtration and post chlorine disinfection. The northern part of the City's distribution system consists of four pressure zones, four pumping stations, and four reservoirs.

The Loch Lomond Water Treatment Plant is located south of the City on Mount McKay. This plant draws water from Loch Lomond, partially situated within the Fort William First Nation's Reserve. In the summer when the temperature is 10 degrees Celsius (or above), the temporary microfiltration system, built in 1998, has an operational capacity of 38.68 million litres per day (8.5 million gallons per day). The capacity is 27.28 million

litres per day (6 million gallons per day) in winter when the water temperature is 3 degrees Celsius (or above). Treatment processes include ultra-filtration membrane technology, the addition of sodium silicate for corrosion control and chlorine for disinfection. The south part of the City's distribution system consists of two pressure zones, one reservoir and two pumping stations.

PER CAPITA WATER CONSUMPTION

In Canadian cities the per capita water consumption is a measure of the amount of treated water produced daily to serve each consumer in the water system. This takes into account all water used for residential, commercial, and industrial use including water used for street cleaning, fire protection and water lost through leakage or water main breaks.

The normal per person daily water consumption is about 450 litres (100 gallons). Per capita usage greater than 450 litres per day indicates high water practices in industrial or commercial use.

In 2005, based on an approximate service population of 102,500 for both Water Treatment Plants, the per capita water usage equates to 550 litres, (123 gallons) per person per day. The City's goal is to reduce per capita usage for residents and local industry through successful water conservation programs and system improvements.

MAJOR PROJECTS

PLANT EXPANSION

During 2005 the Bare Point expansion project has made excellent progress and the expected completion date and commissioning of the new plant process has been scheduled for May 2006.

Expansion of the existing Bare Point plant will incorporate state of the art membrane filtration to replace the existing direct filtration. Addition of a second raw water traveling screen and upgrades to the existing screen have been completed and are capable of handling average flows of 90.8 ML/day (20MIGD) and peak flows 136.2 ML/day

(30MIGD). In addition, two new raw water pumps along with modifications to the existing pumps have been completed to provide a total of four raw water pumps with the following capacities:

Pump 1	68.2 ML/d (15MIGD)
Pump 2	54.5 ML/d (12MIGD)
Pump 3	68.2 ML/d (15MIGD)
Pump 4	54.5 ML/d (12MIGD)

An addition of 70m x 30m on the western side of the existing plant building will house the membrane filtration system, membrane cleaning system, chemical feed system, clear water reservoir and high lift pumps, standby power generators, HVAC, control room and related facilities.

The membrane filtration system will include five trains of ultra filtration membranes, air blowing system, six permeate pumps, two backwash pumps, two recirculation pumps, and an air extraction system. The membrane cleaning system will include one 73,600 L concrete storage tank, three chemical feed pumps, one diaphragm metering pump for citric acid, one citric acid mixing tank, one process feeder hopper and one dechlorination system consisting of two chemical metering pumps and one 21,200 L sodium bisulphite storage tank.

A new electrical service for the entire plant will introduce a new supply voltage of 4160 volts replacing the existing transformers rated for 2300. Two standby diesel powered generator sets rated at 2000 kilowatts will provide standby power at 4160 volts for emergency use and have two 50,000 liter diesel fuel storage tanks. Complete automation of the plant will be done with Allen Bradley Programmable Logic Controllers (PLC's) reporting to a Wonderware graphics package. Newly installed monitoring equipment will include state of the art instrumentation and controls.

Decommissioning of existing flocculators, gravity sand filters, filter backwash pumps, existing high lift pumps, standby generators, existing chlorinators, and other related equipment will take place after the commissioning is complete.

ROCKCLIFF RESERVOIR CONSTRUCTION

A new 28.5 ML in-ground reservoir was constructed in 2005 and will be commissioned in March 2006. The reservoir is located north of Highway 61 between Mount Forest Boulevard and Riverdale Road. The project includes interconnected dual-celled in-ground reservoirs, each sized approximately 95m x 25m x 6 meters deep. Reservoirs have baffle walls, level sensors and an overflow level alarm, and an emergency 750 mm diameter overflow pipe and reservoir drains for maintenance purpose. The rechlorination facility consists of four chemical metering pumps (three duty, one standby) each rated at 6.6 L/hr. at 700 kpa, flow paced on discharge flow rate and chlorine residuals. There are two sodium hypochlorite tanks (duty and spare), complete with level sensors and stored within a 200 mm high concrete curb. A 750 mm diameter bi-directional magnetic flow meter, measuring range 0 to 600 L/s, monitors reservoir influent and discharge rates and is capable of transmitting data to the Bare Point Plant. Newly installed continuous inline pH, turbidity and chlorine residual analyzers, monitor reservoir influent and discharge and are also capable of transmitting data to the Bare Point Plant. All instrumentation and control data, communication status and fault conditions are transmitted back the Bare Point Plant via GE Programmable Logic Controllers.

SECURITY UPGRADES

The Water Treatment Plants' security systems have been enhanced using new technology for communicating any intrusion or breach of security back to the plants. Security cameras have been added to the Duke Street and McIntyre Reservoirs and the Hazelwood Storage Tank. Cameras will be added to all remaining stations and reservoirs by the end of 2006. Secondary barriers have been installed on all hatches at reservoir and pumping station sites. Site risk assessments have been completed at all sites and improvements to maintain a high standard of security will continue to be implemented.

REPAIR AND REPLACEMENT OF MEMBRANE FILTERS (LOCH LOMOND)

As part of the yearly maintenance schedule at the Loch Lomond Water Treatment Plant, all individual membrane modules are pressure decay tested to establish their integrity. All modules not passing this test are either repaired or replaced depending on the

degree of leakage from in the pressure decay test. In 2005 all 60 cassettes making up the whole filtration process were tested for their operational integrity. Membrane modules failing the integrity tests were either replaced or repaired. In 2005, most of the failed membranes were repaired back to a high performance quality and 54 new modules were put into service to replace modules deemed to be past their integrity lifespan.

WATER CONSERVATION/BYLAW PROGRAM

A water conservation program was implemented as a result of the limited treated water storage capacity of the temporary membrane filtration plant at Loch Lomond. The program is in compliance with the City of Thunder Bay's Municipal code which states: "The use of or curtailment of water used for purposes of lawn and garden sprinkling shall be subject to such regulations as may be enacted from time to time by Council." The program "Odd and Even Watering Restrictions" effectively reduces the opportunity to water lawns and gardens by 50 per cent.

In addition to lawn and garden watering restrictions, City of Thunder Bay, in partnership with EcoSuperior Environmental Programs provides six different water efficiency programs for the community including:

- ❖ Ultra Low Flow Toilet Rebate Program
- ❖ Water Conservation Public Outreach Program
- ❖ Subsidized Rain Barrel Sales Program
- ❖ Downspout Disconnection Program
- ❖ Energy Star Rated Clothes Washing Machine Rebate Program
- ❖ Water Saver Visits where low flow showerhead and faucet aerator kits and water conservation information is provided to homeowners

In order to encourage residents to participate in water conservation rain barrels have been provided to residents at a subsidized price. A water bylaw enforcement officer patrols the City from May to October, monitoring compliance with the Odd and Even Watering Restrictions. This staff member responds to enquiries from the public and responds to reports of by-law violations. The season with the high demand peak periods for treated water is usually May to October. It is estimated that this program has significantly reduced seasonal water use. In 2005 watering restrictions came into effect on April 11 to reduce water consumption during the Bare Point Upgrade project.

In May 2003 the City of Thunder Bay was presented with *The Award of Excellence in*

Water Efficiency presented by the Ontario Water Works Association. This award recognizes community efforts to reduce water consumption with an integrated and comprehensive water efficiency program for residents and businesses.

If demand met or exceeded maximum possible output, it would be necessary to implement a total ban on outside watering. Failure to reduce the total demand to a figure less than the total output capacity of the plants would necessitate a bypassing of the temporary Loch Lomond Water Treatment Plant. The bypass option would allow unfiltered water to enter the distribution system and would immediately result in a declaration of a boil water advisory by the Medical Officer of Health.

COMPLIANCE SUMMARY
COMPLIANCE WITH TERMS AND CONDITIONS OF THE CERTIFICATE OF APPROVAL

Bare Point WTP

Number	From Date	To Date	Comments
7-0748-90-006 C of A	July 19, 1990	February 20, 2002	
9385-575KF8 C of A	February 20, 2002	October 22, 2002	
1151-5F2J5B C of A	October 22, 2002	May 17, 2004	The two C of A's in 2002 were part of a consolidation of WTP done by MOE. MOE added specific disinfection/inactivation performance criteria & plant upgrade requirements based on Bare Point First Engineers Report of May 2001. Also amended date for completion of upgrade requirements from Dec 31, 2002 to June 30, 2003 & added specifications for Hazlewood Storage Tank.
1144-5WPPLZ C of A	May 17, 2004	Ongoing	Incorporates all additions planned for the Bare Point Plant expansion project
3618-6CSKB9 PTTW *	October 6, 2005	Expires October 5, 2015	Permit to take water to allow a maximum withdrawal of 30 million imperial gallons/day (136,200m ³) from Lake Superior.

- The current C. of A. specifies a maximum treated water flow of 787 Litres/second (68,000 m³/day) for the existing system and 1313 Litres/second (113,400 m³/day) for the plant when expansion is complete.

Loch Lomond WTP

Number	From Date	To Date	Comments
7-0706-98-006 C of A	August 24, 1998	February 20, 2002	
7206-575KCX C of A *	February 20, 2002	Ongoing	Consolidated C of A added specific disinfection/inactivation performance criteria and upgrade requirements based on the Loch Lomond First Engineers Report of May 2001. December 19, amendment extended the date for upgrade requirements (Section 5.1) from December 31, 2002 to June 30, 2003. Since then the upgrade project at Bare Point has been in place and replaces upgrade requirements at Loch Lomond.
91-P-6015 PTTW	Renewed: July 25, 2002	Expires: July 24, 2007	Maximum withdrawal capacity of 17 MIG per day (77,282 m ³ /day) from Loch Lomond.

- The current C. of A. specifies a maximum treated water flow from the plant of 38,680 m³ per day in the summer when water temperature is 10° C or higher and 27,270 m³ per day in winter with water temperatures as low as 3° C.

**NON-COMPLIANCE WITH TERMS AND CONDITIONS OF THE CERTIFICATE
OF APPROVAL**

During September and October the Water Quality Unit of MOE did inspections at the Bare Point and Loch Lomond water treatment plants and their distribution systems. The inspection reports noted two non-compliance items and recommended one best management practice. These are summarized below with the action taken by the City's Environment Division.

Bare Point Inspection – Sept. 14/05

Item No.	Non Compliance Item Noted	Action Taken by Environment Division
1.	Ensure that the free chlorine residual is maintained in the distribution system at all times as required by legislation and control document (C. of A.) requirements. (C. of A. specifies maintaining a minimum free chlorine residual of 0.2 mg/L in the distribution system during the Bare Point upgrade project period)	-An automatic flushing unit was installed on one main of the Bare Point system for evaluation during the summer and fall of 2005 -A large 6" main feeding one building was replaced by a shorter 2" service -Continued looping and pipe replacement projects to eliminate dead-end main situations -Routine testing and flushing in low-flow areas continued in 2005

Loch Lomond Inspection – Aug. 26/05

Item No.	Non Compliance Item Noted	Action Taken by Environment Division
1.	Records did not indicate that in all cases the chlorine levels in the distribution system were above 0.05 mg/L free chlorine.	-An automatic flushing unit was installed on one main of the Loch Lomond system for evaluation during the summer and fall of 2005 -Continued looping and pipe replacement projects to eliminate dead-end main situations -Routine testing and flushing in low-flow areas continued in 2005

Recommended Best Management Action (Both Distribution Systems)

Item No.	Best Management Practice Noted	Action Taken by Environment Division
1.	Consider instituting a by-law to prohibit cross-connections and require the installation of backflow prevention at lateral connections to major industries.	-A revised waterworks by-law, including backflow prevention is being drafted and will be presented to Council in 2006

Bare Point – Filter to Waste

After each of the sand-anthracite filter units at Bare Point is backwashed and put back into service, there is an initial small increase in turbidity as the filter settles into its normal filtering state. It is recommended that this initial filter water be routed to waste to avoid having any higher turbidity water enter the distribution system. The Bare Point expansion will convert the entire Bare Point plant to membrane filtration technology, eliminating this waste stream. While the current plant configuration does not allow a filter to waste process, at no time has the current operation produced treated water turbidity levels above the operational guidelines. Average treated water turbidity values at Bare Point were 0.08 NTU and the highest daily average value recorded in 2005 was 0.42 NTU.

BARE POINT – ADVERSESES & EXCEEDANCES IN 2005

In 2005 analysis was done for 27 Volatile Organics, 48 Pesticides/PCB's, 75 General Chemistry and Metals parameters and over 4500 bacterial tests at the plant and in the distribution system. There was one chemical exceedance in 2005, a high lead result in one of the Drinking Water Surveillance Program (DWSP) samples. Retests on the same line were all negative. There were five bacterial adverse test results in 2005. These were isolated cases and were quickly cleared up by flushing and re-sampling. In one case where fecal coliform was detected, a localized boil water advisory was issued. There were fourteen operational exceedances reported in 2005. These were the result of instrumentation problems, power failures, or low chlorine residuals recorded in the distribution system. The Bare Point Adverse Tables on page 65 and 66 indicate the specific incidents and the corrective actions taken.

LOCH LOMOND – ADVERSES AND EXCEEDANCES IN 2005

For the Loch Lomond Plant and Distribution System, a total of 27 Volatile Organic tests, 48 Pesticide/PCB tests, 75 General Chemistry and metals tests and over 4000 bacterial tests were done in 2005. There were three chemical adverses in 2005 related to THM formation at an extremity point in the distribution system. This is discussed separately in the Analytical Results Section. Six bacterial adverses were reported in 2005 and these were quickly cleared up by flushing and re-sampling. There were eleven operational exceedances reported. These were due to instrumentation problems, UPS problems or low chlorine residuals in dead-end lines in the system. At no time was the distribution system considered at risk. The Loch Lomond Adverse Tables on page 63 and 64 indicate the specific incidents and the corrective actions taken.

SUMMARY OF WATER SUPPLIED

BARE POINT

The total treated water produced for 2005 was 13882.4 million litres or 3057.6 million gallons. The maximum day output occurred on June 21st when the plant produced 59.6 million litres or 13.1 million gallons. The capacity of 68ML/day (15Mg/day) as listed in the present Certificate of Approval was not exceeded for any day in the year 2005. Data for treated water flows can be viewed on page20 of this report.

LOCH LOMOND

The Loch Lomond Plant total treated water produced for 2005 was 6764.79 million litres (ML) or 1488.1 million gallons. The maximum day output occurred August 11th when the plant produced 23.5 million litres or 5.2 million gallons. The capacity of 38.68 ML/day (8.5 MIGD), as listed in the present Certificate of Approval, was not exceeded for any day in the year 2005. Data for treated water flows can be viewed on page 38 of this report.

ANALYTICAL RESULTS AND REPORTING

Regulation 170/03 requires that public water quality reports be produced annually by large municipal drinking water systems. This annual report is available to the public in printed form and on the city's website, www.thunderbay.ca/water, in March of each year. Additional information on the Ontario Drinking Water regulations is available at the Ontario MOE website at www.ene.gov.on.ca (follow the Drinking Water links). In 2005, three new parameters were added to the Ontario Drinking Water Standards. These were new standards for antimony, bromate and microcystin-LR. Microcystin-LR is a toxin formed during algae blooms in natural waters. Bromates are formed from naturally occurring bromide minerals during ozone treatment (not used in Thunder Bay) and antimony can be present from natural or industrial sources. Also in 2005 the maximum standard for Uranium was revised downward from 0.05 mg/L to 0.02 mg/L. Both city water supplies were well below these revised limits. Also in 2005 the Canadian Drinking Water Guideline for turbidity was revised, which in turn changed some of the turbidity rules in the Ontario Disinfection Procedure for Drinking Water. Again our water quality was not affected.

BARE POINT

The analytical results for the Bare Point Plant and system are listed on pages 30 to 33. In general, the raw water supply is very stable in chemical composition, relatively soft and low in organics, which results in very low THM values on chlorination. All pesticide, PCB and volatile organics tests in 2005 were negative. Dissolved metals are consistently low. Because alum (aluminum sulphate) is used as a treatment chemical, the aluminum residual is monitored daily by in-house analysis. The average value in 2005 was 0.023 mg/L, well below the operational guideline of 0.1 mg/L. Radionuclide tests, done in March/05 were below detection limits.

LOCH LOMOND

The analytical results for the Loch Lomond Plant and system are listed on pages 37 to 54. The raw water supply from Loch Lomond is generally softer than that of Bare Point with lower hardness, lower alkalinity and lower conductivity. The higher organic content is

reflected in the Dissolved Organic Carbon (DOC) values of 5-6 mg/L versus 2-3 mg/L at Bare Point. This water is prone to higher THM formation and has higher colour readings in the treated water. In 2005 the average treated water colour reading was 9.28 TCU, slightly above the Operational Guideline of 5 TCU. The membrane technology treatment at Loch Lomond does not remove any of the dissolved colour. Because of the softness of this water, it is more aggressive toward metal piping and is treated with low dosages of sodium silicate as an anti-corrosion agent and silicate levels are monitored monthly. As with the Bare Point supply, all pesticide and PCB tests in 2005 were negative. Radionuclide tests in March/05 were below detection limits.

LOCH LOMOND – TRIHALOMETHANE AVERAGE

In February, 2002 a post-chlorination procedure was implemented at the Loch Lomond plant, with the objective of lowering the chlorine consumption on the raw water side of the membrane units. The effect of this post-chlorination procedure continued with 22,852 kg of chlorine used in 2005 compared to 30,144 kg used in 2001. However, there was also an increasing trend in the THM levels at the extremity point during the year, with the THM running four-quarter average reaching 112.9 ug/L by the end of the year. Steps were taken in November and December to further reduce chlorine input at Loch Lomond, but these only had a marginal effect at the extremity point. Water temperature, dissolved organics and rate of usage also influence the amount of THM formation. As part of the plan for commissioning of the Rockcliff Reservoir, Bare Point water will be introduced into a new South pressure zone this spring. This will lower the THM levels in that part of the system to the mid-20 ug/L range.

TREATMENT CHEMICAL USAGE

BARE POINT

The Bare Point WTP uses three chemicals for water treatment: alum (aluminum sulphate), polymer (Magnafloc LT7995) and chlorine gas. Chlorine gas is added in two stages, prior to floc formation/filtration to disinfect the water and prevent fouling of the filtering material and post-filtration to provide a good residual in the distribution system.

The average dosage for 2005 was 1.56 mg/L and the average free residual for water leaving the plant was 1.31 mg/L. A total of 24,031.5 kg of chlorine was used in 2005. The alum and polymer combine with the raw water to form a sticky, insoluble floc which removes colour and fine particulate matter from the raw water. This floc settles at the top portion of the filter beds and is periodically back washed as a waste stream. This waste stream is currently discharged into Lake Superior. With the Bare Point expansion, this waste streams will be eliminated. A total of 64,481 kg of alum (48.5% liquid concentrate) and 2499 kg of liquid polymer concentrate were used in 2005 with average doses of 4.19 mg/L and 0.16 mg/L respectively into the raw water.

LOCH LOMOND

At the Loch Lomond Water Treatment Plant, chlorine gas and sodium silicate are used as the main processing chemicals with small quantities of sodium metabisulphite, sodium hydroxide and citric acid used for cleaning and waste neutralization. Chlorine is used for disinfection, again, in two stages: pre-filtration and post-filtration. The post-filtration stage was added in February 2002 with a corresponding drop in pre-filtration dosage in order to reduce THM formation. A lower chlorine dose in the raw water (pre-filtration) results in a slower rate of THM formation with suspended organics. Once these are removed by the membrane filters, there is less organic content for the post chlorine addition to react with. The total chlorine usage at Loch Lomond in 2005 was 22,852 kg, The average dosage was 3.01 mg/L in 2005. The dosage at Loch Lomond is higher than that at Bare Point because the reaction with some organic matter occurs before a free chlorine residual is formed. The average free chlorine residual at the Loch Lomond reservoir was 2.13 mg/L.

Sodium silicate is added to the treated water for corrosion control. In 2005 a total of 59,065 kg of sodium silicate was added for an average dosage of 9.02 mg/L. Sodium silicate is a food grade material often used as a food additive. In the membrane ultra-filtration process, approximately 7% of the raw water is wasted during the backpulse cleaning cycle of the membrane tank. This water is de-chlorinated with sodium metabisulphite prior to discharge into a ditch area at the base of the mountain.

A citric acid bath is used for a Clean-in-Place (CIP) membrane cleaning process. This citric acid bath is neutralized with sodium hydroxide (caustic soda) prior to discharge into the ditch area.

WATER QUALITY ASSURANCE

In 2005 Thunder Bay residents received a very good quality surface water supply consistently delivered to us from two water treatment plant sources – Bare Point on Lake Superior and Loch Lomond on Mount McKay. Ontario Ministry of Environment Regulation 170/03 sets out mandatory treatment requirements for facilities using surface water as a source. These requirements include chemically assisted filtration and disinfection, or alternate treatment capable of providing water of equal or better quality. No water can be allowed to enter the distribution system unless it has been chlorinated or undergone an equivalent disinfection. Samples are taken and evaluated, at a frequency set by the Ministry, for a number of parameters as outlined in the Regulations. Water quality is monitored at both plants 24 hours a day, seven days a week by both operators and on-line instrumentation. Water treatment plants must meet strict provincial standards and regulations. Each plant operates under an Ontario Ministry of the Environment Certificate of Approval. We are committed to quality and continuous improvement in accordance with Ontario's water quality standards.

We are very serious about monitoring the water quality. Each year, certified labs test more than 2,400 samples for potential contaminants and plant staff routinely test operational parameters such as colour, pH, alkalinity. Our testing program meets, and in many areas, exceeds, regulatory requirements.

RESPONSIBILITY FOR TREATMENT

The City of Thunder Bay's Environment Division oversees the treatment and distribution of water to consumers. The Environment Division is made up of several sections. The Water Treatment Plants are responsible for the treatment, sampling and distribution of water. The Sewer and Water Section are responsible for the operation and

maintenance of the water distribution system.

We have a highly qualified team, certified by the Ontario Environmental Training Consortium. Staff is continually trained in accordance with provincial regulations

The City of Thunder Bay has a preventative maintenance system designed to ensure annual, semi annual and monthly inspections and maintenance functions are performed on all equipment associated with the water treatment facilities. Records are kept on scheduled, non-scheduled and emergency repairs of facility equipment and are readily available for Ministry Inspections.

CUSTOMER SERVICE

Our qualified staff is available 24 hours per day, seven days per week to respond to consumer water quality concerns or issues. If needed, times can be arranged for a water sample to be taken by one of our field staff. Qualified staff collects samples in test specific bottles and delivers them to the lab. Homeowners will be informed promptly of test results and when necessary, further investigation will be undertaken.

The availability of the City of Thunder Bay's Annual report is communicated to the public through the media and is posted on the City web site at www.thunderbay.ca/water. Copies of the Annual Report are also available at City Hall, City Clerk's Office, Bare Point Water Treatment Plant, Front & Egan Service yard and all branches of the Thunder Bay Public Library. This process was undertaken to satisfy the requirements of Regulation 170/03.

Bare Point
Water Treatment Plant

R.R. #13, Bare Point Road

Thunder Bay, ON

P7B 5E4

Raw Water Flow Results*

Month	Total For Month	Avg. Peak Flow Daily Flow	Avg. Minimum Daily Flow	Average Daily Flow
January	1210.30	46.90	33.06	39.04
February	1133.50	48.71	33.14	40.49
March	1224.60	48.81	31.16	39.50
April	1207.60	47.33	32.42	40.26
May	1410.10	54.98	37.03	45.49
June	1391.30	54.25	36.67	46.38
July	1444.80	56.13	36.08	46.61
August	1403.00	56.13	36.29	45.26
September	1249.70	50.53	32.98	41.66
October	1224.70	48.08	31.84	39.51
November	1169.30	49.10	30.75	38.98
December	1205.10	48.81	29.66	38.88
Total	15274.00			502.06
Avg/Mth				41.84

*** Flow Results in 1,000,000's of Litres**

Treated Water Flow Results*

Month	Total For Month	Avg. Peak Rate Daily Flow	Avg. Min. Daily Flow	Average Daily Flow
January	1110.40	41.98	27.82	35.82
February	1036.00	43.73	28.70	37.00
March	1172.00	43.50	29.10	37.81
April	1051.10	42.32	28.28	35.04
May	1160.30	46.26	27.81	37.43
June	1262.20	49.82	30.52	42.08
July	1404.40	52.47	32.63	45.30
August	1368.50	53.97	31.08	44.15
September	1156.30	45.23	28.18	38.55
October	1092.40	42.74	26.48	35.24
November	1015.50	41.20	26.60	33.85
December	1053.30	41.39	25.00	33.98
Total	13882.40			456.25
Avg/Mth				38.02

•Flow Results in 1,000,000's of Litres

Process Chemicals

Month	Pri. Coagulant Used (kg/month)	Pri. Coagulant Dosage (mg/L)	Sec. Coagulant Used (kg/month)	Sec. Coagulant Dosage (mg/L)
January	3880.00	3.21	213.03	0.18
February	3880.00	3.43	161.10	0.14
March	4326.20	3.53	171.45	0.14
April	6184.70	5.12	202.50	0.17
May	7488.40	5.39	241.56	0.17
June	6518.40	4.71	239.58	0.17
July	7255.60	5.03	255.78	0.18
August	7139.20	5.08	253.08	0.18
September	5509.60	4.43	223.38	0.18
October	4539.60	3.82	197.46	0.16
November	3530.80	3.02	178.92	0.15
December	4229.20	3.51	162.00	0.13
Total	64481.70		2499.84	
Average Per Month	5373.47	4.19	208.32	0.16

Disinfection

Month	Chlorine Used (kg)	Chlorine Dosage (mg/L)	Free Residual (mg/L)
January	1733.30	1.43	1.35
February	1543.60	1.36	1.34
March	1789.60	1.46	1.34
April	1740.10	1.44	1.35
May	1971.20	1.41	1.36
June	2403.40	1.73	1.35
July	2779.30	1.92	1.34
August	2573.20	1.83	1.33
September	2106.20	1.69	1.28
October	1972.10	1.61	1.22
November	1737.90	1.49	1.23
December	1681.60	1.40	1.24
Total	24031.50		15.73
Average Per Month	2002.63	1.56	1.31

Operational Report - Raw Water

Month	p.H. (-log10)	Hard. (mg/l)	Alk. (mg/l)	Turb. (N.T.U.)	Color (T.C.)	Alum. (mg/l)	Temp. (deg. C)
January	7.41	46.40	42.20	1.41	14.78		4.67
February	7.38	44.00	41.60	0.68	9.56		4.96
March	7.36	48.80	44.40	0.51	11.83		4.02
April	7.48	52.00	48.00	0.67	14.00		4.47
May	7.38	49.40	49.80	0.90	18.89		6.97
June	7.54	50.20	54.00	1.10	16.50		11.52
July	7.48	54.20	52.00	1.17	13.89		14.75
August	7.51	60.00	40.00	1.26	15.09		14.12
September	7.42	58.20	46.60	1.08	16.74		14.61
October	7.44	46.60	42.20	0.97	7.90		13.08
November	7.37	49.00	44.20	0.99	9.06		9.19
December	7.32	51.20	46.60	1.58	11.33		5.22
Average	7.42	50.83	45.97	1.03	13.30		8.96

Hard. - Hardness

Alk. - Alkalinity

Turb. Turbidity

Alum. – Aluminum Residual

Temp. - Temperature

Operational Report - Treated Water

Month	p.H. (-log10)	Hard. (mg/l)	Alk. (mg/l)	Turb. (N.T.U.)	Color (T.C.)	Alum. (mg/l)	Iron (mg/L)	Lead (ug/L)
January	7.06	48.00	44.60	0.07	3.00	0.014		<
February	7.08	47.20	43.40	0.07	3.11	0.017		<
March	7.09	49.20	46.00	0.07	2.67	0.011		<
April	7.11	54.00	49.00	0.09	3.00	0.022		<
May	6.98	52.00	54.40	0.10	3.89	0.022		<
June	7.07	52.20	56.60	0.09	3.25	0.021		<
July	7.13	56.00	54.20	0.08	3.44	0.027		<
August	7.16	58.40	39.60	0.07	4.64	0.028		<
September	6.92	59.60	48.40	0.08	3.56	0.029		<
October	6.99	48.00	43.80	0.08	2.33	0.029		<
November	6.97	51.20	46.20	0.07	1.88	0.028		<
December	6.99	52.80	48.00	0.08	3.00	0.022		<
Average	7.05	52.38	47.85	0.08	3.15	0.023	0.000	0.00

Hard. - Hardness

Alk. - Alkalinity

Turb. Turbidity

Alum. - Aluminum

Temp. - Temperature

**Chemical Analysis 1 - Treated Water
 Drinking Water Surveillance Program
 (tested in May)**

	Chlor. (mg/l)	Sulp. (mg/l)	Sil. (mg/l)	Turb. N.T.U.*	Colour T.C.U.**	Nitrates (mg/l)
May	2.70	6.60	1.20		0.20	0.338
Average	2.70	6.60	1.20		0.20	0.338

Chlor.- Chloride **Sulp.- Sulphate** **Sil. - Silicates** **Turb. - Turbidity**
 (*) - N.T.U. - Nephelometric Turbidity Units (**) - T.C.U. - True Colour Units

**Chemical Analysis 2 - Treated Water
 Drinking Water Surveillance Program
 (tested in May)**

	Cond. (uS/cm)	Hard. (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Alk. (mg/l)	pH (-log10)
	101.00	44.50	13.60	1.40	38.90	7.80
Average	101.00	44.50	13.60	1.40	38.90	7.80

Cond. - Conductivity **Hard. - Hardness** **Alk. - Alkalinity**

**Metal Analysis - Treated Water (Drinking Water Surveillance Program)
 (tested in May)**

	Alum. (ug/l)	Barium (ug/l)	Boron (ug/l)	Chrom. (ug/l)	Copper (ug/l)	Iron (ug/l)	Lead (ug/l)	Mang. (ug/l)	MolyB. (ug/l)	Nickel (ug/l)	Uran. (ug/l)	Zinc (ug/l)
	36.50	9.73	5.00	0.80	0.60	6.00		0.26	0.13	0.10	0.03	0.20
Average	36.50	9.73	5.00	0.80	0.60	6.00	0.000	0.26	0.13	0.10	0.03	0.20
Alum. - Aluminum		Chrom. - Chromium			Mang.- Manganese		MolyB. - Molybdenum		Uran. - Uranium			

Great Lakes Project #10 - Raw Water

Month	Chl. (mg/l)	Sil. (mg/l)	Total Phos. (mg/l)	Reactive Phos. (mg/l)	Total Ammon. (mg/l)	Total Nitrate (mg/l)	Total Nitrite (mg/l)	Chloro- phyll A (mg/l)	Total Nitro (mg/l)
January	1.60	1.12	0.0050	0.0009	0.004	0.365	0.002	0.65	0.090
February	1.73	1.13	0.0080	0.0007	0.006	0.371	0.002	0.50	0.080
March	1.62	1.15	0.0060	0.0011	0.002	0.379	0.001	0.33	0.100
April	2.05	1.23	0.0060	0.0008	0.004	0.366	0.002	0.93	0.140
May	1.63	1.22	0.0060	0.0006	0.003	0.352	0.002	1.30	0.110
June	1.67	1.17	0.0060	0.0005	0.007	0.334	0.001	1.50	0.120
July	1.65	1.11	0.0060	0.0005	0.006	0.326	0.002	1.02	0.110
August	1.50	1.00	0.0070	0.0005	0.004	0.317	0.002	1.18	0.130
September	1.57	0.91	0.0040	0.0011	0.002	0.307	0.002	1.10	0.130
October	1.50	0.90	0.0030	0.0007	0.003	0.310	0.002	1.35	0.110
November	1.45	1.15	0.0040	0.0005	0.006	0.333	0.001	1.00	0.110
Average	1.63	1.10	0.006	0.001	0.004	0.342	0.002	0.99	0.112
	Chl. - Chloride		Sil. - Silicate		Phos. - Phosphorus		Ammon. - Ammonium		Nitro -Nitrogen

**Priority Organics - Treated Water
Drinking Water Surveillance Program
(tested in May)**

	Chloro- form	Chlordi- bromo- methane	Bromodi chloro- methane	Bromo- form	Total trihalo- methane
	14.00		1.40		15.40
Total	14.00		1.40		15.40
Avg/Mth	14.00		1.40		15.40

(All Analysis in ug/L)

Bare Point Water Treatment Plant - Volatile Organics Tests, 2005

Source Water	Parameter	MAC/ IMAC (ug/L)	# of Samples	# of Detectable Results	Date(s) dd/mm/yy	Range (ug/L)	Exceedance	Source of Parameter
Bare Point Treated	Vinyl Chloride	2	1	0	23/03/05	<0.5	NO	
	1,1-Dichloroethylene	14	1	0	"	<0.5	NO	
	Dichloromethane	50	1	0	"	<0.5	NO	
	Carbon Tetrachloride	5	1	0	"	<0.5	NO	
	Benzene	5	1	0	"	<0.5	NO	
	1,2-Dichloroethane	5	1	0	"	<0.5	NO	
	Trichloroethylene	50	1	0	"	<0.5	NO	
	Tetrachloroethylene	30	1	0	"	<0.5	NO	
	Monochlorobenzene	80	1	0	"	<0.5	NO	
	1,4-Dichlorobenzene	5	1	0	"	<0.5	NO	
1,2-Dichlorobenzene	200	1	0	"	<0.5	NO		
Bare Point Distr. System	Chloroform	Note 1	4	4	23/03/05-06/12/05	14.3 – 22.4	NO	Type of trihalomethane (THM)
	Bromodichloromethane	Note 1	4	4	"	2.0 – 3.6	NO	Type of trihalomethane (THM)
	Dibromochloromethane	Note 1	4	0	"	<0.5	NO	Type of trihalomethane (THM)
	Bromoform	Note 1	4	0	"	<0.5	NO	Type of trihalomethane (THM)
	Total THM's – System Extremity (2)	100	4	4	23/03/05-06/12/05	17.5(2)	NO	Disinfection by-products (total)

NOTE 1 Total of all trihalomethanes (chloroform & bromochloromethanes) should not exceed THM standard of 100 ug/L

(2) THMs in the distribution system are based on a running annual average of four quarterly samples at point of max. residence (extremity)

< Means less than the specified method detection limit

Bare Point Water Treatment Plant – Pesticides & PCB Tests

Source Water	Parameter	MAC/ IMAC (ug/L)	# of Samples	# of Detectable Results	Date(s) dd/mm/yy	Range (ug/L)	Exceedance	Source of Parameter
Bare Point Treated Water	Atrazine + N-dealkylated metabolites	5	1	0	23/03/05	<0.2	NO	Insecticide, herbicide and fungicide residues
	Alachlor	5	1	0	"	<0.1	NO	
	Azinphos-methyl	20	1	0	"	<0.1	NO	
	Chlorpyrifos	90	1	0	"	<0.1	NO	
	Cyanazine	10	1	0	"	<0.1	NO	
	Diazinon	20	1	0	"	<0.1	NO	
	Diclofop-methyl	9	1	0	"	<0.2	NO	
	Dimethoate	20	1	0	"	<0.1	NO	
	Dinoseb	10	1	0	"	<0.2	NO	
	Malathion	190	1	0	"	<0.1	NO	
	Metribuzin	80	1	0	"	<0.1	NO	

Bare Point – Pesticides & PCB Tests (cont.)								
Source Water	Parameter	MAC/IMAC (ug/L)	# of Samples	# of Detectable Results	Date(s) dd/mm/yyyy	Range (ug/L)	Exceedance	Source of Parameter
Bare Point Treated Water (cont.)	Parathion	50	1	0	23/03/05	<0.1	NO	Insecticide, herbicide and fungicide residues
	Phorate	2	1	0	“	<0.1	NO	
	Prometryne	1	1	0	“	<0.1	NO	
	Simazine	10	1	0	“	<0.1	NO	
	Terbufos	1	1	0	“	<0.2	NO	
	Triallate	230	1	0	“	<0.1	NO	
	Trifluralin	45	1	0	“	<0.1	NO	
	P,p'-DDD	30**	1	0	“	<0.1	NO	
	P,p'-DDE	30**	1	0	“	<0.1	NO	
	P,p'-DDT	30**	1	0	“	<0.1	NO	
	Aldrin	0.7*	1	0	“	<0.02	NO	
	Dieldrin	0.7*	1	0	“	<0.02	NO	
	Heptachlor	3 ⁺	1	0	“	<0.1	NO	
	Heptachlor Epoxide	3 ⁺	1	0	“	<0.1	NO	
	Lindane (Total)	4	1	0	“	<0.1	NO	
	Methoxychlor	900	1	0	“	<0.1	NO	
	Metolachlor	50	1	0	“	<0.1	NO	
	Chlordane	7	1	0	“	<0.1	NO	
	Bromoxynil	5	1	0	“	<0.2	NO	
	Dicamba	120	1	0	“	<0.2	NO	
	2,4-Dichlorophenol	900	1	0	“	<0.5	NO	
	2,4-D	100	1	0	“	<0.2	NO	
	Pentachlorophenol	60	1	0	“	<0.5	NO	
	Picloram	190	1	0	“	<0.2	NO	
	2,3,4,6-Tetrachlorophenol	100	1	0	“	<0.5	NO	
	2,4,6-Trichlorophenol	5	1	0	“	<0.5	NO	
	2,4,5-T	280	1	0	“	<0.2	NO	
	Glyphosate	280	1	0	“	<10	NO	
	Diquat	70	1	0	“	<7	NO	
	Paraquat	10	1	0	“	<1	NO	
	Aldicarb	9	1	0	“	<9	NO	
	Bendiocarb	40	1	0	“	<0.2	NO	
	Carbaryl	90	1	0	“	<0.2	NO	
Carbofuran	90	1	0	“	<0.2	NO		
Diuron	150	1	0	“	<10	NO		
Temephos	280	1	0	“	<0.1	NO		
PCB's	3	1	0	“	<0.08	NO	Electrical insulating oil	

< - Means less than the specified method detection limit

BARE POINT WATER TREATMENT PLANT - INORGANIC & GENERAL CHEMISTRY PARAMETERS

Source Water	Parameter	MAC/ IMAC	# of Samples	# Detectable Results	Dates dd/mm/yy	Range (mg/L)	Exceedance	Source of Parameter
Bare Point Raw Water	Alkalinity	500**	1	1	23/03/05	44		Natural sources, mostly dissolved carbonate
	Calcium		1	1	“	14.1		Common mineral constituent
	Sodium	200**	1	1	“	1.68		Natural mineral constituent
	Total Phenolics		4	0	“	<0.002		Decomposition of wood
	Chloride	250**	1	1	“	2.0		Natural sources at low levels
	Conductivity (us/cm)		1	1	“	99		Natural dissolved material in water
	Dissolved Organic Carbon	5**	1	1	“	2		Organic matter leached into surface water from vegetation
	Hardness	100**	1	1	“	48		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	4	4	23/03/05- 06/12/05	0.29 – 0.40	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10 ⁺	4	0	“	<0.02	NO	Natural sources in oxygen-poor water
Cyanide	0.2	1	0	23/03/05	<0.002	NO	Industrial processes	

Bare Point – Inorganic & General Chemistry Parameters (cont.)								
Source Water	Parameter	MAC/ IMAC	# of Samples	# Detectable Results	Dates dd/mm/yyy	Range (mg/L)	Exceedance	Source of Parameter
Bare Point Distribution System Water	pH	**	4	4	23/03/05- 06/12/05	7.2 – 7.4		Measure of acidity (7.0 = neutral)
	Chloramines, total	3.0	1	1	08/12/05	0.06	NO	Chlorination byproduct
	Lead	0.01	1	0	23/03/05	<0.001	NO	Leaching from plumbing and service connections
	Alkalinity	500**	1	1	23/03/05	41		Natural dissolved carbonate minerals
	Conductivity (uS/cm)		1	1	“	102		Natural dissolved material in water
	Dissolved Organic Carbon	5**	1	1	“	1		Organic matter leached into surface water from vegetation
	Hardness	100**	1	1	“	48		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	4	4	23/03/05- 06/12/05	0.28 - 0.39	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10 ⁺	4	0	“	<0.02	NO	Natural sources in oxygen-poor water
Chloride	250**	1	1	23/03/05	2.9		Natural sources at low levels	

** -Aesthetic Objectives or no objective given. Exceedance column does not apply to these.

+ -Nitrite plus Nitrate MAC is 10 mg/L < - Means less than the specified method detection limit

Bare Point – Inorganic & General Chemistry Parameters (cont.)								
Source Water	Parameter	MAC/ IMAC	# of Samples	# Detectable Results	Dates dd/mm/yy	Range (mg/L)	Exceedance	Source of Parameter
Bare Point Treated Water	Alkalinity	500**	1	1	“	48		Natural sources, carbonate minerals
	Dissolved Organic Carbon (DOC)	5**	1	1	23/03/05	2		Organic matter leached into surface water from vegetation
	Calcium	**	1	1	“	14.2		Common mineral constituent
	Chloride	250**	1	1	“	2.9		Natural sources at low levels
	Conductivity	**	1	1	“	101		Natural dissolved material in water
	Benzo(a)pyrene	.00001	1	0	23/03/05	<0.00001	NO	Incomplete combustion, diesel exhaust
	Antimony	0.006	1	0	“	<0.001	NO	
	Arsenic	0.025	1	0	“	<0.001	NO	Natural source at low levels
	Barium	1.0	1	0	23/03/05	<0.01	NO	Common constituent of sedimentary rock
	Boron	5.0	1	0	“	<0.05	NO	Borates, borax detergents
	Cadmium	0.005	1	0	“	<0.0001	NO	Electroplating, NiCad batteries
	Chromium	0.05	1	0	“	<0.001	NO	Electroplating, old yellow paints
	Mercury	0.001	1	0	“	<0.0001	NO	Metal refining, coal combustion, natural deposits
	Selenium	0.01	1	0	“	<0.005	NO	Natural deposits
	Uranium	0.10	1	0	“	<0.005	NO	Natural deposits, nuclear processing
	Cyanide	0.2	1	0	“	<0.002	NO	Industrial processes
	Fluoride	1.5	0	0		++		Natural deposits, water fluoridation
	Hardness	100**	1	1	“	48		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	4	4	23/03/05- 06/12/05	0.29 - 0.39	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10 ⁺	4	0	“	<0.02	NO	Natural sources in oxygen-poor water
Silica, reactive	**	4	4	“	1.71 - 2.48		Natural mineral leaching in oxygen-poor conditions, usually low in surface water	
Orthophosphate	**	4	1	“	<.003 - <.003		Bacterial action in ground water	
Gross Alpha (radioactivity)	0.1 Bq/L	1	0	23/03/05	<0.1	NO	Natural Background radiation, discharge of radioactive materials	
Gross Beta (radioactivity)	0.5 Bq/L	1	0	23/03/05	<0.1	NO		
Tritium (radioactivity)	7000 Bq/L	1	0	23/03/05	<1000	NO		

++ Fluoride testing is done every 5 years in non-fluoridated systems. 2003 result for Bare Point was 0.31 mg/L

** -Aesthetic Objectives or no objective given. Exceedance column does not apply to these.

+ -Nitrite plus Nitrate MAC is 10 mg/L < - Means less than the specified method detection limit

BARE POINT WATER

BARE POINT WATER TREATMENT PLANT

2005 DIRECT OPERATING EXPENDITURES

Hourly Wages & Fringe Benefits	\$ 621,444.73
Building Maintenance	\$ 6,391.62
Electricity	\$ 449,729.75
Chemicals	\$ 133,430.17
Equipment Maintenance and Operations	\$ 58,164.45
General Expenditures	\$ 31,175.86
<hr/>	
Total Operating Expenditure	\$1,300,336.58
<hr/>	
No. of Million Litres Treated in 2005	13,882.40
Cost Per Million Litres Treated	\$ 93.67

BARE POINT TREATMENT PLANT HISTORICAL OPERATING COSTS

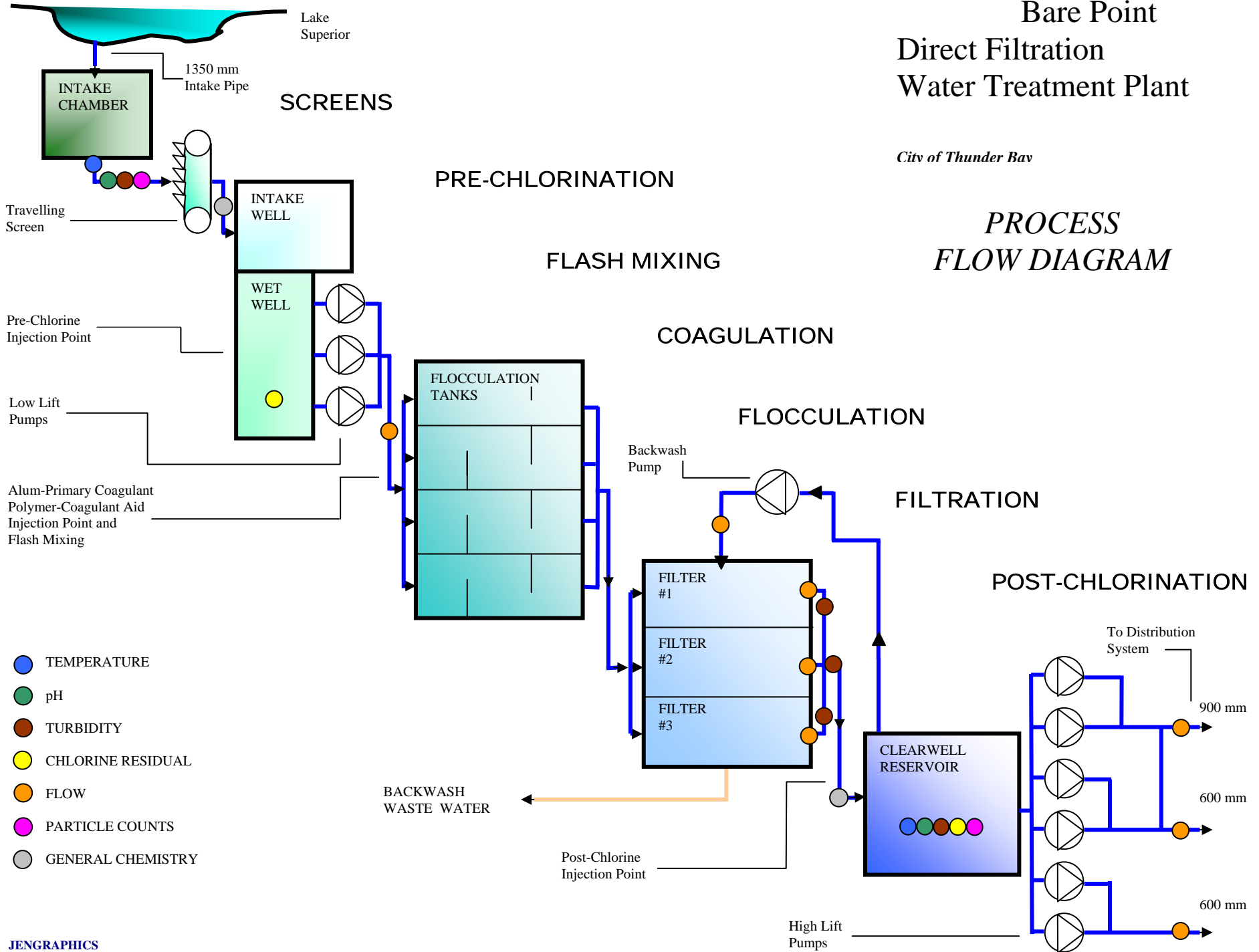
Year	Total Annual Flow(*)	Total Cost	Cost Per Million Litres
1983	11917.89	\$ 544321.07	\$ 45.67
1984	12590.29	\$ 584133.23	\$ 46.40
1985	13217.80	\$ 597494.63	\$ 45.20
1986	13777.55	\$ 650378.04	\$ 47.21
1987	13551.66	\$ 705033.91	\$ 52.03
1988	13221.18	\$ 612531.00	\$ 46.33
1989	12194.12	\$ 703281.00	\$ 57.67
1990	13673.08	\$ 688995.00	\$ 50.39
1991	12760.22	\$ 735409.00	\$ 57.63
1992	12270.34	\$ 724104.00	\$ 59.01
1993	12470.60	\$ 690107.28	\$ 55.34
1994	13169.20	\$ 758123.44	\$ 57.57
1995	12927.96	\$ 778917.96	\$ 60.25
1996	13464.00	\$ 782121.53	\$ 58.09
1997	11744.60	\$ 829325.31	\$ 70.61
1998	12276.90	\$ 740585.45	\$ 60.32
1999	11110.47	\$ 846144.20	\$ 76.16
2000	12229.58	\$ 882070.60	\$ 72.13
2001	13013.14	\$ 927899.39	\$ 71.30
2002	13314.86	\$ 1020587.61	\$ 76.65
2003	14595.70	\$ 997863.90	\$ 68.37
2004	14840.30	\$ 1264966.11	\$ 85.24
2005	13849.50	\$ 1300336.58	\$ 93.67

*Millions of Litres

Bare Point Direct Filtration Water Treatment Plant

City of Thunder Bay

PROCESS FLOW DIAGRAM



Loch Lomond
Water Treatment Plant

Mission Road
Thunder Bay, ON
P7C 4Z2

Raw Water Flow Results*

Month	Total For Month	Avg. Peak Rate Daily Flow	Avg. Minimum Daily Flow	Average Daily Flow
January	580.78	25.74	13.85	18.73
February	539.58	25.73	13.81	19.27
March	626.21	26.92	13.62	20.20
April	589.99	26.03	13.01	19.67
May	580.03	22.84	14.77	18.71
June	653.29	27.17	16.15	21.78
July	729.27	28.59	16.84	23.52
August	738.13	28.47	17.86	23.81
September	664.67	26.47	15.67	22.16
October	617.52	26.00	11.21	19.92
November	516.00	23.46	9.17	17.20
December	516.82	22.36	9.73	16.67
Total	7352.29			241.64
Average Per Month				20.14

* Flow Results in 1,000,000's of Litres

Treated Water Flow Results*

Month	Total For Month	Avg. Peak Rate Daily Flow	Avg. Min. Daily Flow	Average Daily Flow
January	537.44	25.74	13.85	17.34
February	503.10	25.73	13.82	17.97
March	588.77	26.92	13.59	18.99
April	549.55	26.03	13.01	18.32
May	533.08	22.84	14.79	17.20
June	604.41	27.17	16.10	20.15
July	672.76	28.59	16.84	21.70
August	677.31	28.47	18.11	21.85
September	604.66	26.47	15.67	20.16
October	561.11	26.00	11.35	18.10
November	462.18	23.46	9.17	15.41
December	470.42	22.36	9.73	15.17
Total	6764.79			222.36
Avg/Mth.				18.53

* Flow Results in 1,000,000's of Litres

Sodium Silicate Treatment

Month	Sodium Silicate Used (kg/month)	Sodium Silicate Dosage (mg/L)	Treated Water pH (-log10)
January	4783.20	8.91	7.06
February	4276.40	8.47	7.09
March	4421.20	7.52	6.99
April	4617.80	8.42	6.94
May	4538.70	8.51	7.00
June	5321.60	8.82	6.98
July	5696.40	8.47	6.90
August	5873.90	8.69	6.87
September	5561.40	9.55	6.88
October	4105.10	9.62	7.02
November	5054.20	10.95	7.04
December	4815.20	10.28	7.00
Total	59065.10		
Avg/Mth.	4922.09	9.02	6.98

Disinfection

Month	Chlorine Used (kg)	Chlorine Dosage (mg/L)	Free Residual (mg/L)
January	1598.70	2.75	2.17
February	1476.20	2.73	2.10
March	1655.90	2.64	2.12
April	1608.70	2.72	2.05
May	1594.30	2.75	2.15
June	1907.10	2.92	2.08
July	2444.10	3.36	2.26
August	2642.40	3.58	2.21
September	2204.10	3.32	2.17
October	2190.50	3.56	2.12
November	1796.60	3.49	2.05
December	1734.10	3.36	2.07
Total	22852.70		
Avg/Mth.	1904.39	3.10	2.13

Operational Report - Raw Water

Month	p.H. (-log10)	Hard. (mg/l)	Alk. (mg/l)	Turb. (N.T.U.)	Color (T.C.)	Temp. (deg. C)
January	7.06	24.00	20.20	1.32	15.91	3.06
February	7.09	22.00	20.40	0.16	15.91	3.00
March	6.99	23.20	19.80	0.14	17.91	3.39
April	6.94	23.80	20.00	0.23	18.60	4.13
May	7.00	26.20	24.40	0.27	19.18	6.32
June	6.98	24.20	24.00	1.09	23.90	9.78
July	6.90	22.00	18.80	0.50	21.50	12.52
August	6.87	27.20	22.10	0.69	21.70	13.94
September	6.88	24.10	20.20	0.36	20.89	15.98
October	7.02	20.40	18.60	0.36	20.25	12.81
November	7.04	22.20	20.80	0.36	20.00	7.80
December	7.00	24.20	21.80	0.26	16.56	3.80
Average	6.98	23.63	20.93	0.48	19.36	8.04

Hard. - Hardness

Alk. - Alkalinity

Turb. Turbidity

Temp. - Temperature

Operational Report - Treated Water

Month	p.H. (-log10)	Hard. (mg/l)	Alk. (mg/l)	Turb. (N.T.U.)	Color (T.C.)	Temp. (deg. C)	Iron (mg/L)	Lead (ug/L)	Conductivity (Umho/Cm)
January	7.93	25.40	22.00	0.06	7.82	3.06			65.82
February	7.91	23.00	21.80	0.05	7.27	3.00			66.27
March	7.88	24.60	21.70	0.05	8.00	3.39			64.45
April	7.85	24.80	22.00	0.05	9.90	4.13			64.70
May	7.89	28.20	26.20	0.05	8.00	6.32			65.55
June	7.93	26.20	24.80	0.05	9.70	9.78			72.20
July	7.80	23.60	19.40	0.05	7.70	12.52			71.20
August	7.84	29.40	24.80	0.05	8.80	13.94			64.10
September	7.82	24.80	22.00	0.07	10.33	15.98			63.56
October	7.79	22.60	20.00	0.06	13.50	12.81			62.38
November	7.92	23.60	21.00	0.06	12.30	7.80			62.70
December	7.79	24.80	24.30	0.06	8.00	3.80			63.00
Average	7.86	25.08	22.50	0.06	9.28	8.04	0.000	0.000	65.49

Hard. - Hardness

Alk. - Alkalinity

Turb. Turbidity

Temp. - Temperature

Control Point Residual

Month	Sil. N.W. Hotel (mg/l)	Sil. St.P. School (mg/l)	Sil. L.L. Plant (mg/l)
January	9.90	9.40	10.60
February	12.80	9.40	10.10
March	10.70	10.40	12.10
April	7.70	5.70	8.60
May	9.60	9.90	10.70
June	12.90	13.40	14.90
July	10.20	10.90	11.30
August	9.60	9.90	10.10
September	10.20	10.50	11.30
October	11.30	10.60	12.10
November	10.90	11.10	11.80
December	10.40	10.60	11.00
Total	126.20	121.80	134.60
Average Per Month	10.52	10.15	11.22

Sil.- Silicate

CL2 - Chlorine

St.P.- St Patrick School

L.L.- Loch Lomond

**Chemical Analysis 1 - Raw Water
 (Drinking Water Surveillance Program)**

Month	Chlor. (mg/l)	Sulp. (mg/l)	Sil. (mg/l)	Turb. N.T.U.*	Colour T.C.U.**	Nitrates (mg/l)
March	0.50	5.00	1.72	0.09	11.20	0.082
June	0.30	4.70	1.76	0.20	13.10	0.072
Average	0.40	4.85	1.74	0.15	12.15	0.077

Chlor.- Chloride
 (*) - N.T.U. - Nephelometric Turbidity Units

Sulp.- Sulphate

Sil. - Silicates
 (**) - T.C.U. - True Colour Units

Turb. - Turbidity

**Chemical Analysis 2 - Raw Water
 (Drinking Water Surveillance Program)**

Month	Cond. (uS/cm)	Hard. (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Alk. (mg/l)	pH (-log10)
March	59.00	24.50	5.40	1.20	22.60	7.47
June	57.00	23.00	5.40	1.20	23.60	7.68
Average	58.00	23.75	5.40	1.20	23.10	7.57

Cond. - Conductivity

Hard. - Hardness

Alk. - Alkalinity

**Chemical Analysis 1 - Treated Water
 (Drinking Water Surveillance Program)**

Month	Chlor. (mg/l)	Sulp. (mg/l)	Sil. (mg/l)	Turb. N.T.U.*	Colour T.C.U.**	Nitrates (mg/l)
March	3.20	4.90	5.42		1.60	0.078
June	3.30	4.50	6.46	0.01	3.20	0.053
Average	3.25	4.70	5.94	0.01	2.40	0.066

Chlor.- Chloride **Sulp.- Sulphate** **Sil. - Silicates** **Turb. - Turbidity**
 (*) - N.T.U. - Nephelometric Turbidity Units (**) - T.C.U. - True Colour Units

**Chemical Analysis 2 - Treated Water
 (Drinking Water Surveillance Program)**

Month	Cond. (uS/cm)	Hard. (mg/l)	Calcium (mg/l)	Sodium (mg/l)	Alk. (mg/l)	pH (-log10)
March	69.00	24.00	5.20	3.20	22.50	7.51
June	68.00	21.00	5.00	3.60	22.90	7.75
Average	68.50	22.50	5.10	3.40	22.70	7.63

Cond. - Conductivity **Hard. - Hardness** **Alk. - Alkalinity**

Metal Analysis - Treated Water (Drinking Water Surveillance Program)

Month	Alum. (ug/l)	Barium (ug/l)	Boron (ug/l)	Chrom. (ug/l)	Copper (ug/l)	Iron (ug/l)	Lead (ug/l)	Mang. (ug/l)	MolyB. (ug/l)	Nickel (ug/l)	Uran. (ug/l)	Zinc (ug/l)
March	4.90	4.94	6.00	0.70	2.10	6.00	0.11	0.19	0.11	0.30	0.01	0.70
June	6.50	5.03	6.00	0.60	1.60	6.00	0.08	0.17	0.10	0.40	0.01	0.40
Average	5.70	4.99	6.00	0.65	1.85	6.00	0.10	0.18	0.11	0.35	0.01	0.55
Alum. - Aluminum		Chrom. - Chromium		Mang.- Manganese		MolyB. - Molybdenum		Uran. - Uranium				

**Priority Organics - Treated Water
(Drinking Water Surveillance Program)**

Month	Chloro- form *	Chlordi- bromo- methane *	Bromodi chloro- methane *	Bromo- form *	Total trihalo- methane *
March	52.40		1.40		53.80
June	68.20		1.60		69.80
November	54.30		1.40		55.70
Avg/Mth.	58.30		1.47		59.77

***(All Analysis in ug/L)**

Loch Lomond Water Treatment Plant - Volatile Organics Tests, 2005

Source Water	Parameter	MAC/ IMAC (ug/L)	# of Samples	# of Detectable Results	DATE(S) dd/mm/yyy	Range (ug/L)	Exceedance	Source of Parameter
Loch Lomond Treated	Vinyl Chloride	2	1	0	23/03/05	<0.5	NO	
	1,1-Dichloroethylene	14	1	0	"	<0.5	NO	
	Dichloromethane	50	1	0	"	<0.5	NO	
	Chloroform	Note 1	4	4	"	52.8-66.2	NO	Type of trihalomethane (THM)
	Carbon Tetrachloride	5	1	0	"	<0.5	NO	
	Benzene	5	1	0	"	<0.5	NO	
	1,2-Dichloroethane	5	1	0	"	<0.5	NO	
	Bromodichloromethane	Note 1	4	4	"	2.4 – 3.6	NO	Type of trihalomethane (THM)
	Trichloroethylene	50	1	0	"	<0.5	NO	
	Tetrachloroethylene	30	1	0	"	<0.5	NO	
	Dibromochloromethane	Note 1	4	0	"	<0.5	NO	Type of trihalomethane (THM)
	Monochlorobenzene	80	1	0	"	<0.5	NO	
	Bromoform	Note 1	4	0	"	<1	NO	Type of trihalomethane (THM)
1,4-Dichlorobenzene	5	1	0	"	<0.5	NO		
1,2-Dichlorobenzene	200	1	0	"	<0.5	NO		
Loch Lomond Distr. System	Total THM's – System Extremity (2)	100	4	4	23/03/05 – 06/12/05	112.9	YES	Disinfection by-products (total)

** NOTE 1 Total of all trihalomethanes (chloroform & bromochloromethanes) should not exceed THM standard of 100 ug/L

(3) THMs in the distribution system are based on a running annual average of four quarterly samples at point of max. residence (extremity)

< Means less than the lab method detection limit

Loch Lomond Water Treatment Plant – Pesticides & PCB Tests

Source Water	Parameter	MAC/ IMAC (ug/L)	# of Samples	# of Detectable Results	Date(s) dd/mm/yy	Range (ug/L)	Exceedance	Source of Parameter
Loch Lomond Treated	Atrazine + N-dealkylated metabolites	5	1	0	23/03/05	<0.2	NO	Insecticide, herbicide and fungicide residues
	Alachlor	5	1	0	"	<0.1	NO	
	Azinphos-methyl	20	1	0	"	<0.1	NO	
	Chlorpyrifos	90	1	0	"	<0.1	NO	
	Cyanazine	10	1	0	"	<0.1	NO	
	Diazinon	20	1	0	"	<0.1	NO	
	Diclofop-methyl	9	1	0	"	<0.2	NO	
	Dimethoate	20	1	0	"	<0.1	NO	
	Dinoseb	10	1	0	"	<0.2	NO	
	Malathion	190	1	0	"	<0.1	NO	
	Metribuzin	80	1	0	"	<0.1	NO	

Loch Lomond – Pesticides & PCB Tests (cont.)								
Source Water	Parameter	MAC/IMAC (ug/L)	# of Samples	# of Detectable Results	Date(s) dd/mm/yy	Range (ug/L)	Exceedance	Source of Parameter
Loch Lomond Treated Water (cont.)	Parathion	50	1	0	23/03/05	<0.1	NO	Insecticide, herbicide and fungicide residues
	Phorate	2	1	0	“	<0.1	NO	
	Prometryne	1	1	0	“	<0.1	NO	
	Simazine	10	1	0	“	<0.1	NO	
	Terbufos	1	1	0	“	<0.2	NO	
	Triallate	230	1	0	“	<0.1	NO	
	Trifluralin	45	1	0	“	<0.1	NO	
	P,p'-DDD	30	1	0	“	<0.1	NO	
	P,p'-DDE	30	1	0	“	<0.1	NO	
	P,p'-DDT	30	1	0	“	<0.1	NO	
	Aldrin	0.7	1	0	“	<0.02	NO	
	Dieldrin	0.7	1	0	“	<0.02	NO	
	Heptachlor	3	1	0	“	<0.1	NO	
	Heptachlor Epoxide	3	1	0	“	<0.1	NO	
	Lindane (Total)	4	1	0	“	<0.1	NO	
	Methoxychlor	900	1	0	“	<0.1	NO	
	Metolachlor	50	1	0	“	<0.1	NO	
	Chlordane	7	1	0	“	<0.1	NO	
	Bromoxynil	5	1	0	“	<0.2	NO	
	Dicamba	120	1	0	“	<0.2	NO	
	2,4-Dichlorophenol	900	1	0	“	<0.5	NO	
	2,4-D	100	1	0	“	<0.2	NO	
	Pentachlorophenol	60	1	0	“	<0.5	NO	
	Picloram	190	1	0	“	<0.2	NO	
	2,3,4,6-Tetrachlorophenol	100	1	0	“	<0.5	NO	
	2,4,6-Trichlorophenol	5	1	0	“	<0.5	NO	
	2,4,5-T	280	1	0	“	<0.2	NO	
	Glyphosate	280	1	0	“	<10	NO	
	Diquat	70	1	0	“	<7	NO	
	Paraquat	10	1	0	“	<1	NO	
	Aldicarb	9	1	0	“	<9	NO	
	Bendiocarb	40	1	0	“	<0.2	NO	
	Carbaryl	90	1	0	“	<0.2	NO	
Carbofuran	90	1	0	“	<0.2	NO		
Diuron	150	1	0	“	<10	NO		
Temephos	280	1	0	“	<0.1	NO		
PCB's	3	1	0	“	<0.08	NO	Electrical insulating oil	

< Means less than the specified method detection limit

Loch Lomond Water Treatment Plant - Inorganic & General Chemistry Parameters

Source Water	Parameter	MAC/ IMAC	# of Samples	# Detectable Results	Dates dd/mm/yy	Range (mg/L)	Exceedance	Source of Parameter
Loch Lomond Raw Water	Calcium	**	1	1	23/03/05	6.3		Common mineral constituent
	Sodium	200**	1	1	“	1.28		Natural mineral constituent
	Alkalinity	500**	1	1	“	22		Natural sources, mostly dissolved carbonate
	Chloride	250**	1	1	“	1.1		Natural sources at low levels
	Conductivity (us/cm)	**	1	1	“	58		Natural dissolved material in water
	Dissolved Organic Carbon	5**	1	1	“	5		Organic matter leached into surface water from vegetation
	Hardness	100**	1	1	“	27		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	4	3	23/03/05 – 06/12/05	0.05 - 0.12	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10 ⁺	4	0	“	<0.02	NO	Natural sources in oxygen-poor water
	Cyanide	0.2	1	0	23/03/05	<0.002	NO	Industrial processes
Total Phenolics	**	1	0	“	<0.002		Decomposition of wood	

Loch Lomond – Inorganic & General Chemistry Parameters (cont.)

Source Water	Parameter	MAC/ IMAC	# of Samples	# Detectable Results	Dates dd/mm/yy	Range (mg/L)	Exceedance	Source of Parameter
Loch Lomond Distribution System Water	pH	**	4	4	23/03/05 – 06/12/05	7.4 – 8.0		Measure of acidity (7.0 = neutral)
	Calcium	**	1	1	23/03/05	6.8		Common mineral constituent
	Chloramines, total	3.0	1	1	08/12/05	0.12	NO	Chlorination byproduct
	Sodium	200**	1	1	23/03/05	3.54		Natural deposits
	Alkalinity	500**	1	1	“	23		Natural dissolved carbonate minerals
	Chloride	250**	1	1	“	3.1		Natural sources at low levels
	Conductivity (uS/cm)	**	1	1	“	69		Natural dissolved material in water
	Dissolved Organic Carbon	5**	1	1	“	5		Organic matter leached into surface water from vegetation
	Hardness	100**	1	1	“	27		Natural dissolved minerals (Ca, Mg)
	Lead	0.01	1	0	“	0.003	NO	Leaching from plumbing and service connections
	Nitrate	10	4	2	23/03/05 – 06/12/05	<0.02 – 0.13	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
Nitrite	10 ⁺	4	0	“	<0.02	NO	Natural sources in oxygen-poor water	

** -Aesthetic Objective or no objective. Exceedance column does not apply to these.

+ -Nitrite plus Nitrate MAC is 10 mg/L < - Means less than the specified method detection limit

Loch Lomond – Inorganic & General Chemistry Parameters (cont.)

Source Water	Parameter	MAC/ IMAC	# of Samples	# Detectable Results	Dates dd/mm/yy	Range (mg/L)	Exceedance	Source of Parameter
Loch Lomond Treated Water	Chloride	250**	1	1	23/03/05	3.1		Natural sources at low levels
	Conductivity	**	1	1	“	67		Natural dissolved material in water
	Dissolved Organic Carbon (DOC)	5**	1	1	“	4		Organic matter leached into surface water from vegetation
	Antimony	0.006	1	0	“	<0.001	NO	
	Arsenic	0.025	1	0	“	<0.001	NO	
	Barium	1.0	1	0	“	<0.01	NO	Common constituent of sedimentary rock
	Boron	5.0	1	0	“	<0.05	NO	Borates, borax detergents
	Cadmium	0.005	1	0	“	<0.0001	NO	Electroplating, NiCad batteries
	Chromium	0.05	1	0	“	<0.001	NO	Electroplating, old yellow paints
	Hardness	100**	1	1	“	26		Natural dissolved minerals (Ca, Mg)
	Mercury	0.001	1	0	“	<0.0001	NO	Metal refining, coal combustion, natural deposits
	Selenium	0.01	1	0	“	<0.005	NO	Natural deposits
	Uranium	0.10	1	0	“	<0.005	NO	Natural deposits, nuclear processing
	Benzo(a)pyrene	.00001	1	0	“	<0.00001	NO	Incomplete combustion, diesel exhaust
	Cyanide	0.2	1	0	“	<0.002	NO	Industrial processes
	Nitrate	10	4	3	23/03/05 – 06/12/05	0.06 - 0.12	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10 ⁺	4	0	“	<0.02	NO	Natural sources in oxygen-poor water
	Orthophosphate	**	4	3	“	<.003 - 0.014		Bacterial action in ground water
	Reactive Silica	**	4	4	“	11.9 – 13.8		
	Gross Alpha (radioactivity)	0.1 Bq/L	1	0	23/03/05	<0.1	NO	Natural background radiation, discharge of radioactive materials
Gross Beta (radioactivity)	0.5 Bq/L	1	0	“	<0.1	NO		
Tritium (radioactivity)	7000 Bq/L	1	0	“	<1000	NO		

** -Aesthetic Objective or no objective. Exceedance column does not apply to these.

+ -Nitrite plus Nitrate MAC is 10 mg/L < - Means less than the specified method detection limit

LOCH LOMOND WATER TREATMENT PLANT

2005 DIRECT OPERATING EXPENDITURES

HOURLY WAGES & FRINGE BENEFITS	\$ 371,238.08
Building Maintenance	\$ 6,158.80
Electricity	\$ 169,429.40
Chemicals	\$ 69,335.43
EQUIPMENT MAINTENANCE AND OPERATIONS	\$ 115,246.11
General Expenditures	\$ 26,528.00
<hr/>	
Total Operating Expenditure	\$ 757,935.82
<hr/>	
No. of Million Litres Treated in 2005	6764.79
Cost Per Million Litres Treated	\$ 112.04

LOCH LOMOND WATER TREATMENT PLANT
HISTORICAL OPERATING COSTS

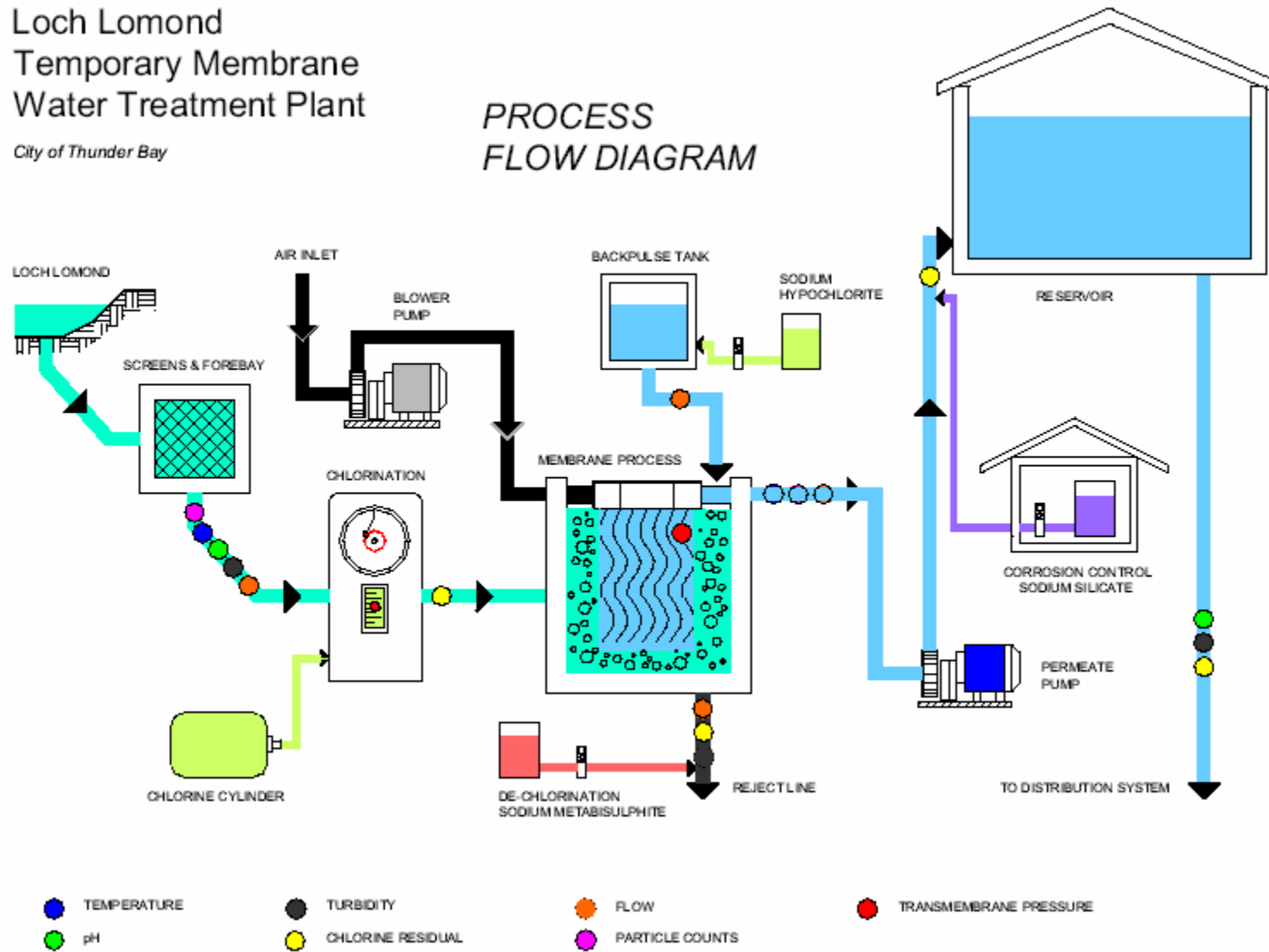
Year	Total Annual Flow(*)	Total Cost	Cost Per Million Litres
1983	13454.40	\$ 228431.94	\$ 16.98
1984	13090.56	\$ 191232.90	\$ 14.61
1985	12825.45	\$ 227958.11	\$ 17.78
1986	12268.26	\$ 290036.07	\$ 23.64
1987	12497.24	\$ 346792.58	\$ 27.75
1988	12431.00	\$ 389382.00	\$ 31.32
1989	10958.00	\$ 332113.00	\$ 30.31
1990	11749.00	\$ 301610.00	\$ 25.67
1991	11631.00	\$ 309233.00	\$ 26.59
1992	11173.70	\$ 342037.00	\$ 30.61
1993	10183.70	\$ 304573.22	\$ 29.91
1994	9670.50	\$ 296776.40	\$ 30.69
1995	9899.50	\$ 329433.49	\$ 33.28
1996	10054.80	\$ 365922.20	\$ 36.39
1997	8970.50	\$ 344535.91	\$ 38.41
1998	9151.50	\$ 507953.91	\$ 55.50
1999	9386.85	\$ 776628.32	\$ 82.71
2000	9832.39	\$ 712039.62	\$ 72.42
2001	10178.71	\$ 787739.76	\$ 77.39
2002	9427.16	\$ 858695.28	\$ 91.09
2003	7385.86	\$ 935855.48	\$ 126.71
2004	5235.97	\$ 676316.76	\$ 129.17
2005	6764.79	\$ 757935.82	\$ 112.04

*Millions of Litres

Loch Lomond Temporary Membrane Water Treatment Plant

City of Thunder Bay

PROCESS FLOW DIAGRAM



Thunder Bay
North Distribution
System

Bacteriological Results

Routine Sampling Program

Month	Number of Samples	Number of HPC	Number of Total Coliform	Number of Fec. Col.	Number of Fec. Strep.
January	93	24	0	0	0
February	87	25	0	0	0
March	95	26	1	1	0
April	97	27	0	0	0
May	101	28	0	0	0
June	109	28	0	0	0
July	94	27	0	0	0
August	115	30	0	0	0
September	88	24	0	0	0
October	100	26	0	0	0
November	103	27	2	0	0
December	70	18	0	0	0

HPC – Heterotrophic Plate Count Total Col. – Total Coliform Bacteria
Fec. – Fecal Coliform Fec. Strep. – Fecal Streptococcus Bacteria

**Metal Analysis - Treated Water (Drinking Water Surveillance Program)
 (Tested in May)**

	Alum. (ug/l)	Barium (ug/l)	Boron (ug/l)	Chrom. (ug/l)	Copper (ug/l)	Iron (ug/l)	Lead (ug/l)	Mang. (ug/l)	MolyB. (ug/l)	Nickel (ug/l)	Uran. (ug/l)	Zinc (ug/l)
	33.20	9.71	5.00	0.70	2.00	6.00	0.03	0.67	0.12	0.10	0.03	0.80
Average	33.20	9.71	5.00	0.70	2.00	6.00	0.03	0.67	0.12	0.10	0.03	0.80
Alum. - Aluminum	Chrom. - Chromium			Mang.- Manganese			MolyB. - Molybdenum			Uran. - Uranium		

**Priority Organics - Treated Water
(Drinking Water Surveillance Program)
(tested in May)**

	Chloro- form	Chlordi- bromo- methane	Bromodi chloro- methane	Bromo- form	Total trihalo- methane
	17.80		2.00		19.80
Total	17.80		2.00		19.80
Avg/Mth.	17.80		2.00		19.80

(All Analysis in ug/L)

Thunder Bay
South Distribution
System

Bacteriological Results
Routine Sampling Program

Month	Number of Samples	Number of HPC	Number of Total Coliform	Number of Fec. Col.	Number of Fec. Strep.
January	83	22	0	0	0
February	77	19	0	0	0
March	83	22	1	1	0
April	84	21	0	0	0
May	91	25	0	0	0
June	89	24	0	0	0
July	83	22	1	1	0
August	94	24	0	0	0
September	85	22	0	0	0
October	85	22	0	0	0
November	85	24	0	0	0
December	49	14	0	0	0

HPC – Heterotrophic Plate Count Total Col. – Total Coliform Bacteria
 Fec. – Fecal Coliform Fec. Strep. – Fecal Streptococcus Bacteria

Metal Analysis - Treated Water (Drinking Water Surveillance Program)

Month	Alum. (ug/l)	Barium (ug/l)	Boron (ug/l)	Chrom. (ug/l)	Copper (ug/l)	Iron (ug/l)	Lead (ug/l)	Mang. (ug/l)	MolyB. (ug/l)	Nickel (ug/l)	Uran. (ug/l)	Zinc (ug/l)
March	5.10	4.72	6.00	0.60	1.90	13.00	0.09	0.63	0.08	0.20	0.01	89.30
June	6.50	5.54	6.00	0.50	13.30	6.00	0.06	0.57	0.10	0.50	0.01	1.50
Average	5.80	5.13	6.00	0.55	7.60	9.50	0.07	0.60	0.09	0.35	0.01	45.40
Alum. - Aluminum		Chrom. - Chromium		Mang.- Manganese		MolyB. - Molybdenum		Uran. - Uranium				

**Priority Organics - Treated Water
 (Drinking Water Surveillance Program)**

Month	Chloro- form	Chlordi- bromo- methane	Bromodi- chloro- methane	Bromo- form	Total trihalo- methane
March	88.90		2.60		91.50
June	77.80		2.00		79.80
November	57.20		1.60		58.80
Total	223.90		6.20		230.10
Avg/Mth.	74.63		2.07		76.70

(All Analysis in ug/L)

South Distribution System

ADVERSE 2005

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
April 1, 2005	Total Coliform Fecal Coliform	Present Present	Flushed and resampled Apr. 1st, 2nd	Resamples OK Apr. 3/05
June 23, 2005	THM's	118 ug/L Avg 102.5	Flush and Resample	Ongoing
June 30, 2005	Total Coliform - Background	>200 col/100mL	New main, not in service, flushed and resampled	Resamples OK
July 21, 2005	Total Coliform Fecal Coliform	Present Present	Flushed and resampled, results OK	July 21, 22/05.
Sept 25, 2005	Total Coliform	Present	New main, not in service. Re-Chlorinated and resampled. Results OK	Sept 27/05
Sept 26, 2005	Total Coliform	Present	New main, not in service. Re-Chlorinated and resampled. Results OK	Oct 3/05
Sept 30, 2005	THM's	123.5 ug/L Avg. 107.7	Raw water chlorine dosage lowered at WTP – reduced THM's to 95.4 ug/L by Nov. 22nd	Nov. 22/05
Oct 18, 2005	Total Coliform	Present	New main, not in service. Re-Chlorinated and resampled. Results OK	Oct. 20/05.
Dec 06, 2005	THM's	116.6 ug/L	Chlorine reduction in backpulse cycle at WTP	Ongoing

South Distribution System
OPERATIONAL ADVERSE 2005

Incident Date	Parameter	Result	Corrective Action Taken	Corrective Action Date
Jan 5, 2005	Low Chlorine residual	0.03 mg/L	Dead-end main flushed for 7 hours to bring residual to .26 ppm	Jan. 6/05
July 5, 2005	High Chlorine residual	3 mg/L	Chlorine analyzer respanned, readings returned to normal	Jul. 5/05
Sept 20, 2005	Low Chlorine residual	0.0 mg/L	Dead-end main flushed to bring residual up to .20 ppm.	Sep. 20/05
Sept 27, 2005	Chlorine Analyzer	No Data	UPS failure caused loss of power to Cl2 analyzer. Free chlorine residual was maintained at all times	Sep. 27/05
Oct 6, 2005	Low Chlorine residual	0.03 mg/L	Line flushed and resampled. Residual up to 0.28 after flushing	Oct. 6/05
Oct 11, 2005	Low Chlorine residual	0.03 mg/L	Dead-end hydrant flushed to bring residual up to .58 ppm	Oct. 12/05
Oct 20, 2005	Low Chlorine residual	0.03 mg/L	Flushed extremity line to bring residual up to .82 ppm	Oct. 20/05
Oct 26, 2005	Chlorine Analyser	No Data	Cl2 analyzer taken out of service for maintenance. Manual readings were taken to ensure chlorine residual	Oct. 26/05
Oct 28, 2005	Chlorine Analyser	No Data	Cl2 analyzer taken out of service for maintenance. . Manual readings were taken to ensure chlorine residual	Oct. 28/05
Nov 3, 2005	Low Chlorine residual	0.05 mg/L	Flushed to bring residual up to .24 ppm	Nov. 3/05
Nov 6, 2005	Low Chlorine residual	0.03 mg/L	Flush to bring residual up to 1.07 ppm	Nov. 6/05
Nov. 16/05	Turbidity	1.8 NTU	Booster Station turbidity reading high – flushed to bring down to 0.15 NTU	Nov. 16/05
Nov. 16/05	Chlorine Residual	0.04 mg/L	Low reading from analyzer but OK on manual reader. Analyser regelled, calibrated and returned to service	Nov. 17/05
Nov. 17/05	Chlorine Residual	0.0 mg/L	Residual was 0.37 to 0.42 when checked manually. Analyser recalibrated and readings OK	Nov. 18/05
Dec. 7/05	Turbidity	1.0 NTU	Reading spike during annual maintenance of turbidity unit. Back to normal after maintenance complete	Dec. 7/05

North Distribution System

ADVERSE 2005

Date	Parameter	Result	Corrective Action	Corrective Action Date
Mar 20, 2005	Total Coliform, Fecal Coliform	Present Present	Local boil water advisory issued. Flushed and resampled. Resample okay and boil water lifted	March 20/05
Sept 13, 2005	Low Chlorine Residual	0.03 mg/L	Flushed and resampled, results okay	Sept. 13/05
Oct 2, 2005	Total Coliform	Present	New main testing before being put into service. Rechlorinated and tested again. Results okay	Oct 19, 20/05
Nov 4, 2005	Total Coliform, Pseudomonas aeruginosa	Present Present	Flushed and resampled Nov. 4, 5th	Passed Nov 8/05
Nov 4, 2005	Total Coliform	Present	Flushed and resampled Nov. 4 th , 5th	Passed Nov 8, 2005
Nov 23, 2005	Total Coliform	Present	Flushed and resampled Nov. 23rd, 24th	Passed Nov 24, 2005

North Distribution System

OPERATIONAL ADVERSE 2005

Incident Date	Parameter	Result	Summary of Action Taken	Corrective Action Date
Feb 16, 2005	Low Chlorine, High Turbidity	0.0 mg/L	Hazelwood Tank Commissioning - Instruments recalibrated	Feb. 16/05
April 13, 2005	High Turbidity (one filter)	1.07 NTU	Adjusted coagulant chemical dosage and turbidity returned to normal	Apr. 14/05
June 24, 2005	High Turbidity	5.0 NTU	Station pumps restarted, brief turbidity spike, returned to normal in 6 minutes	June 24/05
July 25, 2005	Low Chlorine reading	0.03 mg/L	Stagnant water in instrument feed line -flushed until residual was above 0.2 mg/L	Jul. 25/05
Sept 15, 2005	Low Chlorine residual	0.03 mg/L	Hydrant flushed until residual was 0.55 mg/L	Sep. 14/05
Sept 22, 2005	Chlorine Analyzer	No Data	UPS failure caused power loss to analyzer. Manual testing confirmed chlorine residual. Okay when power restored	Sep. 27/05
Sept 30, 2005	High Turbidity	4.0 NTU	Closing of valves at plant caused spike in finished water turbidity. Returned to normal after 15 minutes	Sep. 30/05
Oct 16, 2005	Chlorine Analyser	No Data	GFI on instrument faulted causing loss of power to analyzer. Manually sampled water to check residual - OK	Oct. 17/05
Oct 20, 2005	Chlorine reading	No Data	Maintenance of SCADA resulted in analyzers showing a reading of 0 ppm. Manual sampling of water showed .35 ppm	Oct. 20/05
Oct 27, 2005	Chlorine Analyser	No Data	Scheduled plant shutdown for expansion tie-in, analysers off. At no time did any unchlorinated water enter the system	Oct. 27/05
Oct 27, 2005	Lead	44.9 ug/L	Resampled immediately and sent for testing. Results indicate low Lead levels (<1 ug/L)	Oct. 28, Nov 15/05
Nov 2, 2005	Chlorine Analyser	No Data	Analyzer taken out of service for maintenance resulting in reading of 0 ppm on SCADA. Manual sampling confirmed residual	Nov. 2/05
Nov 2, 2005	Chlorine Analyser	No Data	Analyzer taken out of service for maintenance resulting in reading of 0 ppm on SCADA. Manual sampling confirmed residual	Nov. 2/05
Dec 20, 2005	Chlorine Analyser	No Data	Analyzer taken out of service for maintenance resulting in reading of 0 ppm on SCADA. Manual sampling confirms residual	Dec. 20/05
Dec 29, 2005	Chlorine Analyser	No Data	Analyzer taken out of service for maintenance resulting in reading of 0 ppm on SCADA. Manual sampling confirms residual	Dec. 29/05

Water Quality

Monitoring Program Results:

Distribution Systems

NEW MAINS - 2005

Location	Construction Completion Date	Pressure Test Date	Disinfection Date	Flushing Date	Sampling Date
955 Oliver Road	1-Nov-05	N/A	11-Jan-05	12-Jan-05	12-Jan-05
Pinewood Court	20-Nov-04	25-Nov-04	2-May-05	3-May-05	4-May-05
Tarbutt St.	19-May-05	N/A	19-May-05	20-May-05	20-May-05
Vickers Park	On-going	N/A	31-May-05	1-Jun-05	Mune 2, 05
529 Selkirk St.	N/A	N/A	2-Jun-05	5-Jun-05	5-Jun-05
1808 Hamilton Ave.	N/A	N/A	2-Jun-05	5-Jun-05	5-Jun-05
634 Hyde Park	N/A	N/A	2-Jun-05	5-Jun-05	5-Jun-05
312 Harvard St.	N/A	N/A	2-Jun-05	5-Jun-05	5-Jun-05
Vickers Park	N/A	N/A	6-Jun-05	7-Jun-05	8-Jun-05
349 Main St.	01-Jun-05	N/A	7-Jun-05	8-Jun-05	8-Jun-05
Foxborough Green Condo	01-Sep-03	23-Nov-03	6-Jun-05	7-Jun-05	9-Jun-05
1000 Fort William Road	06-Jun-05	N/A	14-Jun-05	15-Jun-05	6-Jun-05
Vickers Park	N/A	N/A	22-Jun-05	23-Jun-05	24-Jun-05
379 Main St.	20-Jun-05	22-Jun-05	22-Jun-05	23-Jun-05	23-Jun-05
King George Subdivision	N/A	1-Jun-05	27-Jun-05	28-Jun-05	29-Jun-05
Syndicate Ave.	N/A	27-Jun-05	27-Jun-05	28-Jun-05	28-Jun-05
Tarbutt St.	N/A	29-Jun-05	28-Jun-05	29-Jun-05	30-Jun-05
Vickers Park	N/A	N/A	29-Jun-05	30-Jun-05	30-Jun-05
Sills St.	N/A	N/A	30-Jun-05	4-Jul-05	4-Jul-05
Vickers Park	12-Jul-05	N/A	12-Jul-05	12-Jul-05	12-Jul-05
Camelot St.	12-Jul-05	N/A	12-Jul-05	26-Jul-05	26-Jul-05
Vickers Park	15-Jul-05	N/A	15-Jul-05	16-Jul-05	17-Jul-05
Anten St.	N/A	N/A	18-Jul-05	23-Jul-05	23-Jul-05
Hwy 61	N/A	N/A	22-Jul-05	23-Jul-05	24-Jul-05
204 Anten St.	05-Jul-05	5-Jul-05	26-Jul-05	26-Jul-05	26-Jul-05
Camelot St.	25-Jul-05	N/A	26-Jul-05	27-Jul-05	27-Jul-05
Syndicate Ave.	27-Jul-05	N/A	27-Jul-05	28-Jul-05	28-Jul-05
Syndicate Ave.	05-Aug-05	N/A	10-Aug-05	11-Aug-05	11-Aug-05
Syndicate Ave.	08-Aug-05	N/A	9-Aug-05	10-Aug-05	10-Aug-05
Anten St.	08-Aug-05	8-Aug-05	10-Aug-05	10-Aug-05	10-Aug-05

NEW MAINS - 2005

Location	Construction Completion Date	Pressure Test Date	Disinfection Date	Flushing Date	Sampling Date
Anten St.	5-Aug-05	5-Aug-05	10-Aug-05	12-Aug-05	15-Aug-05
Camelot St.	N/A	N/A	12-Aug-05	16-Aug-05	16-Aug-05
Cumberland St.	05-Aug-05	5-Aug-05	15-Aug-05	16-Aug-05	17-Aug-05
Churchill Drive	15-Aug-05	N/A	15-Aug-05	17-Aug-05	18-Aug-05
Anten St.	05-Aug-05	5-Aug-05	25-Aug-05	27-Aug-05	29-Aug-05
Syndicate Ave.	26-Aug-05	6-Sep-05	9-Sep-05	10-Sep-05	11-Sep-05
Laurentian Drive	25-Aug-05	25-Aug-05	27-Aug-05	2-Sep-05	2-Sep-05
Anten St.	05-Aug-05	5-Aug-05	2-Sep-05	2-Sep-05	2-Sep-05
Syndicate Ave.	30-Aug-05	6-Sep-05	7-Sep-05	8-Sep-05	9-Sep-05
Hwy 61	02-Sep-05	2-Sep-05	6-Sep-05	7-Sep-05	7-Sep-05
Syndicate Ave.	07-Sep-05	N/A	31-Aug-05	7-Sep-05	7-Sep-05
River Terrace Subdivision	N/A	N/A	13-Sep-05	14-Sep-05	19-Sep-05
Syndicate Ave.	08-Sep-05	N/A	8-Sep-05	9-Sep-05	10-Sep-05
Syndicate Ave.	13-Sep-05	N/A	14-Sep-05	16-Sep-05	16-Sep-05
Anten St.	09-Sep-05	15-Sep-05	15-Sep-05	16-Sep-05	17-Sep-05
Kingsway Ave.	05-Sep-05	5-Sep-05	15-Sep-05	18-Sep-05	19-Sep-05
King George Subdivision	01-Sep-05	6-Sep-05	21-Sep-05	21-Sep-05	22-Sep-05
Syndicate Ave.	26-Sep-05	26-Sep-05	14-Oct-05	15-Oct-05	16-Oct-05
Dawson St.	27-Sep-05	27-Sep-05	28-Sep-05	28-Sep-05	30-Sep-05
Churchill Drive	24-Sep-05	27-Sep-05	28-Sep-05	29-Sep-05	30-Sep-05
730 Memorial Ave.	04-Oct-05	N/A	11-Oct-05	12-Oct-05	14-Oct-05
Kingsway Ave.	01-Oct-05	5-Oct-05	14-Oct-05	15-Oct-05	16-Oct-05
Bare Point WTP	N/A	2-Nov-05	7-Nov-05	8-Nov-05	9-Nov-05
Dawson St.	04-Nov-05	7-Nov-05	9-Nov-05	10-Nov-05	11-Nov-05
1185 Rolland St.	24-Oct-05	28-Nov-05	28-Nov-05	1-Dec-05	1-Dec-05

Drinking-Water Systems
Regulation O. Reg. 170/03

Part III Form 2
Section 11. ANNUAL REPORT.

Drinking-Water System Number:	220000273
Drinking-Water System Name:	Bare Point Water Treatment Plant
Drinking-Water System Owner:	City of Thunder Bay
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 1 – December 31, 2005

<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;"> <ul style="list-style-type: none"> -Bare Point Water Treatment Plant -All branches of the Thunder Bay Public Library -Env. Division Office - Victoriaville - City Hall - Front Street Service Yard </div>	<p><u>Complete for all other Categories.</u></p> <p>Number of Designated Facilities served:</p> <div style="border: 1px solid black; width: 100px; height: 20px; margin: 5px 0;"></div> <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

Drinking-Water Systems
Regulation O. Reg. 170/03

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 Government Office (City Hall)
- Public access/notice via a newspaper
- Public access/notice via Public Request
- Public access/notice via a Public Library
- Public access/notice via other method - City News Insert "Your City"

Describe your Drinking-Water System

The Bare Point WTP treats an average of 40 ML of Lake Superior water daily using chemically assisted coagulation and filtration through sand-anthracite filters. The water is disinfected using chlorine gas and distributed to approximately 2/3 of the population of the City of Thunder Bay. The Loch Lomond WTP currently serves the remaining population. In May/04 work began on an expansion project at Bare Point to increase its capacity to 113 ML per day using microfiltration/disinfection for treatment and have this plant serve the entire city's population.

List all water treatment chemicals used over this reporting period

Alum (General Chemical)
Polymer (Magnafloc LT7995)
Chlorine Gas

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

See the attached copy of full Annual Report – Major Projects
Bare Point Expansion project cost is approx. \$43. Million

Drinking-Water Systems

Regulation O. Reg. 170/03

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 & Units	Corrective Action	Corrective Action Date
Mar 20, 2005	Total Coliform, Fecal Coliform	Present Present	Local boil water advisory issued. Flushed and resampled. Resample okay and boil water lifted	March 20/05
Sept 13, 2005	Low Chlorine Residual	0.03 mg/L	Flushed and resampled, results okay	Sept. 13/05
Oct 2, 2005	Total Coliform	Present	New main testing before being put into service. Rechlorinated and retested. Results okay	Oct 19, 20/05
Nov 4, 2005	Total Coliform, Pseudomonas aeruginosa	Present Present	Flushed and resampled Nov. 4, 5th	Passed Nov 8/05
Nov 4, 2005	Total Coliform	Present	Flushed and resampled Nov. 4 th , 5th	Passed Nov 8, 2005
Nov 23, 2005	Total Coliform	Present	Flushed and resampled Nov. 23rd, 24th	Passed Nov 24, 2005
Feb 16, 2005	Low Chlorine, High Turbidity	0.0 mg/L	Hazelwood Tank Commissioning – Instruments recalibrated- Storage tank not in service	Feb. 16/05
April 13, 2005	High Turbidity (one filter)	1.07 NTU	Adjusted coagulant chemical dosage and turbidity returned to normal	Apr. 14/05
June 24, 2005	High Turbidity	5.0 NTU	Station pumps restarted, brief turbidity spike, returned to normal in 6 minutes	June 24/05
July 25, 2005	Low Chlorine reading	0.03 mg/L	Stagnant water in instrument feed line - flushed until residual was above 0.2 mg/L	Jul. 25/05
Sept 15, 2005	Low Chlorine residual	0.03 mg/L	Hydrant flushed until residual was 0.55 mg/L	Sep. 14/05
Sept 22, 2005	Chlorine Analyzer	No Data	UPS failure caused power loss to analyzer. Manual testing confirmed chlorine residual. Analyser okay when power restored	Sep. 27/05
Sept 30, 2005	High Turbidity	4.0 NTU	Closing of valves at plant caused spike in turbidity. Returned to normal after 15 minutes	Sep. 30/05
Oct 16, 2005	Chlorine Analyser	No Data	GFI on instrument faulted causing loss of power to analyzer. Manually sampled water to check residual - OK	Oct. 17/05
Oct 20, 2005	Chlorine reading	No Data	Maintenance of SCADA resulted in analyzers showing a reading of 0 ppm. Manual sampling of water showed .35 ppm	Oct. 20/05
Oct 27, 2005	Chlorine Analyser	No Data	Scheduled plant shutdown for expansion tie-in, analysers off. At no time did any unchlorinated water enter the system	Oct. 27/05
Oct 27, 2005	Lead	44.9 ug/L	Resampled immediately and sent for testing. Results indicate low Lead levels (<1 ug/L)	Oct. 28, Nov 15/05
Nov 2, 2005	Chlorine Analyser	No Data	Analyzer taken out of service for maintenance	Nov. 2/05

Drinking-Water Systems Regulation O. Reg. 170/03

			resulting in reading of 0 ppm on SCADA. Manual sampling confirmed residual	
Nov 2, 2005	Chlorine Analyser	No Data	Analyzer taken out of service for maintenance resulting in reading of 0 ppm on SCADA. Manual sampling confirmed residual	Nov. 2/05
Dec 20, 2005	Chlorine Analyser	No Data	Analyzer taken out of service for maintenance resulting in reading of 0 ppm on SCADA. Manual sampling confirms residual	Dec. 20/05
Dec 29, 2005	Chlorine Analyser	No Data	Analyzer taken out of service for maintenance resulting in reading of 0 ppm on SCADA. Manual sampling confirms residual	Dec. 29/05

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 Or Fecal Results (min #)-(max #)	Range of Total Coliform Results (min #)-(max #)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Raw	51	0 – 17	0 – 64	NA	NA
Treated	51	0 – 0	0 - 0	51	0 – 3
Distribution	1152	1 positive, rest negative	3 positive, rest negative	310	0 -450

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

	Number of Grab Samples	Range of Results (min #)-(max #)
Turbidity	8760	0.05 – 0.42 NTU
Chlorine	8760	1.07 – 1.52
Chlorine Residual Distrib. System	1152	0.10 – 1.42
Fluoride (If the DWS provides fluoridation)	N/A	N/A

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

NOTE: Record the unit of measure if it is *not* milligrams per litre.

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure
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Drinking-Water Systems Regulation O. Reg. 170/03

CofA #1151-5F2J5B	Chloramines	08/12/05	0.06	mg/L as Cl
CofA #1151-5F2J5B	Cyanide	23/03/05	<0.002	mg/L
CofA #1151-5F2J5B	Orthophosphate	23/03/05 – 06/12/05	<0.003	mg/L
CofA #1151-5F2J5B	Reactive Silica	23/03/05 – 06/12/05	1.71 – 2.48	mg/L

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	23/03/05	<0.001	mg/L	No
Arsenic	23/03/05	<0.001	mg/L	No
Barium	23/03/05	<0.01	mg/L	No
Boron	23/03/05	<0.05	mg/L	No
Cadmium	23/03/05	<0.0001	mg/L	No
Chromium	23/03/05	<0.001	mg/L	No
Lead	23/03/05	<0.001	mg/L	No
Mercury	23/03/05	<0.0001	mg/L	No
Selenium	23/03/05	<0.005	mg/L	No
Sodium	23/03/05	1.69	mg/L	N/A
Uranium	23/03/05	<0.005	mg/L	No
Fluoride	(Done in	2003)		N/A
Nitrate	23/03/05 – 06/12/05	0.29 – 0.39	mg/L	No (done quarterly)
Nitrite	23/03/05 – 06/12/05	<0.02	mg/L	No (done quarterly)

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	23/03/05	<0.1	ug/L	No
Aldicarb	23/03/05	<9	ug/L	No
Aldrin + Dieldrin	23/03/05	<0.04	ug/L	No
Atrazine + N-dealkylated metabolites	23/03/05	<0.02	ug/L	No
Azinphos-methyl	23/03/05	<0.1	ug/L	No
Bendiocarb	23/03/05	<0.2	ug/L	No
Benzene	23/03/05	<0.5	ug/L	No
Benzo(a)pyrene	23/03/05	<0.01	ug/L	No
Bromoxynil	23/03/05	<0.2	ug/L	No

Drinking-Water Systems Regulation O. Reg. 170/03

Carbaryl	23/03/05	<0.2	ug/L	No
Carbofuran	23/03/05	<0.2	ug/L	No
Carbon Tetrachloride	23/03/05	<0.5	ug/L	No
Chlordane (Total)	23/03/05	<0.3	ug/L	No
Chlorpyrifos	23/03/05	<0.1	ug/L	No
Cyanazine	23/03/05	<0.1	ug/L	No
Diazinon	23/03/05	<0.1	ug/L	No
Dicamba	23/03/05	<0.2	ug/L	No
1,2-Dichlorobenzene	23/03/05	<0.5	ug/L	No
1,4-Dichlorobenzene	23/03/05	<0.5	ug/L	No
Dichlorodiphenyltrichloroethane (DDT) + metabolites	23/03/05	<0.4	ug/L	No
1,2-Dichloroethane	23/03/05	<0.5	ug/L	No
1,1-Dichloroethylene (vinylidene chloride)	23/03/05	<0.5	ug/L	No
Dichloromethane	23/03/05	<0.5	ug/L	No
2-4 Dichlorophenol	23/03/05	<0.5	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	23/03/05	<0.2	ug/L	No
Diclofop-methyl	23/03/05	<0.2	ug/L	No
Dimethoate	23/03/05	<0.1	ug/L	No
Dinoseb	23/03/05	<0.2	ug/L	No
Diquat	23/03/05	<7	ug/L	No
Diuron	23/03/05	<10	ug/L	No
Glyphosate	23/03/05	<10	ug/L	No
Heptachlor + Heptachlor Epoxide	23/03/05	<0.2	ug/L	No
Lindane (Total)	23/03/05	<0.1	ug/L	No
Malathion	23/03/05	<0.1	ug/L	No
Methoxychlor	23/03/05	<0.1	ug/L	No
Metolachlor	23/03/05	<0.1	ug/L	No
Metribuzin	23/03/05	<0.1	ug/L	No
Monochlorobenzene	23/03/05	<0.5	ug/L	No
Paraquat	23/03/05	<1	ug/L	No
Parathion	23/03/05	<0.1	ug/L	No
Pentachlorophenol	23/03/05	<0.5	ug/L	No
Phorate	23/03/05	<0.1	ug/L	No
Picloram	23/03/05	<0.2	ug/L	No
Polychlorinated Biphenyls(PCB)	23/03/05	<0.08	ug/L	No
Prometryne	23/03/05	<0.1	ug/L	No
Simazine	23/03/05	<0.1	ug/L	No

Drinking-Water Systems Regulation O. Reg. 170/03

THM (NOTE: show latest annual average)	23/03/05 – 06/12/05	17.5	ug/L	No
Temephos	23/03/05	<0.1	ug/L	No
Terbufos	23/03/05	<0.2	ug/L	No
Tetrachloroethylene	23/03/05	<0.5	ug/L	No
2,3,4,6-Tetrachlorophenol	23/03/05	<0.5	ug/L	No
Triallate	23/03/05	<0.1	ug/L	No
Trichloroethylene	23/03/05	<0.5	ug/L	No
2,4,6-Trichlorophenol	23/03/05	<0.5	ug/L	No
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	23/03/05	<0.2	ug/L	No
Trifluralin	23/03/05	<0.1	ug/L	No
Vinyl Chloride	23/03/05	<0.5	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	Date of Sample

(Only if DWS category is large municipal residential, small municipal residential, large municipal non residential, non municipal year round residential, large non municipal non residential)

Drinking-Water Systems Regulation O. Reg. 170/03

Part III Form 2
Section 11. ANNUAL REPORT.

Drinking-Water System Number:	220000282
Drinking-Water System Name:	Loch Lomond Water Treatment Plant
Drinking-Water System Owner:	City of Thunder Bay
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 1 – December 31, 2005

<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;"> <ul style="list-style-type: none"> -Bare Point Water Treatment Plant -All branches of the Thunder Bay Public Library -Environment Division Central Office -City Hall -Front Street Service Yard </div>	<p><u>Complete for all other Categories.</u></p> <p>Number of Designated Facilities served:</p> <div style="border: 1px solid black; width: 100px; height: 20px; margin: 5px 0;"></div> <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:</p> <div style="border: 1px solid black; width: 100px; height: 20px; margin: 5px 0;"></div> <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

Drinking-Water Systems

Regulation O. Reg. 170/03

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 Government Office (City Hall)**
- Public access/notice via a newspaper**
- Public access/notice via Public Request**
- Public access/notice via a Public Library**
- Public access/notice via other method City Newspaper Insert – “Your City”**

Describe your Drinking-Water System

The Loch Lomond WTP treated an average of 18.5 ML per day of water from Loch Lomond using microfiltration and chlorination. Sodium silicate is added for corrosion control and the water is distributed to approximately 1/3 the population of Thunder Bay on the South side of the Neebing River. As part of the Bare Point expansion currently in progress, the reservoir at Loch Lomond will be replaced by a larger one on Hwy 61 and the Loch Lomond plant operations will be replaced by membrane filtration at Bare Point WTP.

List all water treatment chemicals used over this reporting period

Chlorine Gas (Microfiltration treatment)
Sodium Silicate
Citric Acid, Sodium hydroxide

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

See the full Annual Report – Major Projects (copy attached as pdf file)
Membrane replacement costs for 2005 were \$115,000.

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 & Units	Corrective Action	Corrective Action Date
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Drinking-Water Systems

Regulation O. Reg. 170/03

April 1, 2005	Total Coliform Fecal Coliform	Present Present	Flushed and resampled Apr. 1st, 2 nd Resamples OK	Apr. 3/05
June 23, 2005	THM's	118 ug/L Avg 102.5	Flush and Resample	Ongoing investigation
June 30, 2005	Total Coliform - Background	>200 col/100mL	New main, not in service, flushed and resampled	Resamples OK
July 21, 2005	Total Coliform Fecal Coliform	Present Present	Flushed and resampled, results OK	July 21, 22/05.
Sept 25, 2005	Total Coliform	Present	New main, not in service. Re-Chlorinated and resampled. Results OK	Sept 27/05
Sept 26, 2005	Total Coliform	Present	New main, not in service. Re-Chlorinated and resampled. Results OK	Oct 3/05
Sept 30, 2005	THM's	123.5 ug/L Avg. 107.7	Raw water chlorine dosage lowered at WTP – reduced THM's to 95.4 ug/L by Nov. 22nd	Nov. 22/05
Oct 18, 2005	Total Coliform	Present	New main, not in service. Re-Chlorinated and resampled. Results OK	Oct. 20/05.
Dec 06, 2005	THM's	116.6 ug/L Avg 112.9	Backpulse water chlorine reduction at WTP	Nov. 15/05
Jan 5, 2005	Low Chlorine residual	0.03 mg/L	Dead-end main flushed for 7 hours to bring residual to .26 ppm	Jan. 6/05
July 5, 2005	High Chlorine residual	3 mg/L	Chlorine analyzer respanded, readings returned to normal	Jul. 5/05
Sept 20, 2005	Low Chlorine residual	0.0 mg/L	Dead-end main flushed to bring residual up to .20 ppm.	Sept. 20/05
Sept 27, 2005	Chlorine Analyzer	No Data	UPS failure caused loss of power to Cl2 analyzer. Free chlorine residual was maintained at all times	Sept. 27/05
Oct 6, 2005	Low Chlorine residual	0.03 mg/L	Line flushed and resampled. Residual up to 0.28 after flushing	Oct. 6/05
Oct 11, 2005	Low Chlorine residual	0.03 mg/L	Dead-end hydrant flushed to bring residual up to .58 ppm	Oct. 12/05
Oct 20, 2005	Low Chlorine residual	0.03 mg/L	Flushed extremity line to bring residual up to .82 ppm	Oct. 20/05
Oct 26, 2005	Chlorine Analyser	No Data	Cl2 analyzer taken out of service for maintenance. Manual readings taken to ensure chlorine residual	Oct. 26/05
Oct 28, 2005	Chlorine Analyser	No Data	Cl2 analyzer taken out of service for maintenance. . Manual readings taken to ensure chlorine residual	Oct. 28/05
Nov 3, 2005	Low Chlorine residual	0.05 mg/L	Flushed to bring residual up to .24 ppm	Nov. 3/05
Nov 6, 2005	Low Chlorine residual	0.03 mg/L	Flush to bring residual up to 1.07 ppm	Nov. 6/05
Nov. 16/05	Turbidity	1.8 NTU	Booster Station turbidity reading high – flushed to bring down to 0.15 NTU	Nov. 16/05
Nov. 16/05	Chlorine Residual	0.04 mg/L	Analyzer reading low, but OK on manual test. Analyser regelled, calibrated and returned to service	Nov. 17/05
Nov. 17/05	Chlorine Residual	0.0 mg/L	Residual was 0.37 to 0.42 when checked manually. Analyser recalibrated and readings OK	Nov. 18/05
Dec. 7/05	Turbidity	1.0 NTU	Spike during annual maintenance of turbidity unit. Back to normal after maintenance complete	Dec. 7/05

Drinking-Water Systems Regulation O. Reg. 170/03

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 Or Fecal Results (min #)-(max #)	Range of Total Coliform Results (min #)-(max #)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Raw	53	0 - 2	0 - 21	NA	NA
Treated	53	0 - 0	0 - 0	53	0 - 3
Distribution	988	2 positive, rest negative	2 positive, rest negative	261	0 - 126

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

	Number of Grab Samples	Range of Results (min #)-(max #)
Turbidity	8760	0.02 – 0.09 NTU
Chlorine	8760	1.70 – 2.57
Chlorine Residual Distrib. System	988	0.03 – 2.40
Fluoride (If the DWS provides fluoridation)	NA	NA

<p>NOTE: For continuous monitors use 8760 as the number of samples</p>

<p><i>NOTE: Record the unit of measure if it is not milligrams per litre.</i></p>

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure
CofA #7206-575KCX	Chloramines	08/12/05	0.12	mg/L as Cl
CofA #7206-575KCX	Radionuclides – Gross Alpha	23/03/05	<0.1	Bq/L
CofA #7206-575KCX	Radionuclides – Gross Beta	23/03/05	<0.1	Bq/L
CofA #7206-575KCX	Radionuclides – Tritium	23/03/05	<1000	Bq/L
CofA #7206-575KCX	Orthophosphate	23/03/05 - 06/12/05	<0.003 – 0.014	mg/L
CofA #7206-575KCX	Reactive Silica	23/03/05 - 06/12/05	11.9 -13.8	mg/L

Drinking-Water Systems Regulation O. Reg. 170/03

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	23/03/05	<0.001	mg/L	No
Arsenic	23/03/05	<0.001	mg/L	No
Barium	23/03/05	<0.01	mg/L	No
Boron	23/03/05	<0.05	mg/L	No
Cadmium	23/03/05	<0.0001	mg/L	No
Chromium	23/03/05	<0.001	mg/L	No
Lead(Distribution System)	23/03/05	0.003	mg/L	No
Mercury	23/03/05	<0.0001	mg/L	No
Selenium	23/03/05	<0.005	mg/L	No
Sodium	23/03/05	3.51	mg/L	N/A
Uranium	23/03/05	<0.005	mg/L	No
Fluoride	(Done in	2003)		N/A
Nitrate	23/03/05 - 06/12/05	<.06 – 0.12	mg/L	No (done quarterly)
Nitrite	“	<0.02	mg/L	No (done quarterly)

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	23/03/05	<0.1	ug/L	No
Aldicarb	23/03/05	<9	ug/L	No
Aldrin + Dieldrin	23/03/05	<0.04	ug/L	No
Atrazine + N-dealkylated metabolites	23/03/05	<0.2	ug/L	No
Azinphos-methyl	23/03/05	<0.1	ug/L	No
Bendiocarb	23/03/05	<0.2	ug/L	No
Benzene	23/03/05	<0.5	ug/L	No
Benzo(a)pyrene	23/03/05	<0.01	ug/L	No
Bromoxynil	23/03/05	<0.2	ug/L	No
Carbaryl	23/03/05	<0.2	ug/L	No
Carbofuran	23/03/05	<0.2	ug/L	No
Carbon Tetrachloride	23/03/05	<0.5	ug/L	No
Chlordane (Total)	23/03/05	<0.3	ug/L	No
Chlorpyrifos	23/03/05	<0.1	ug/L	No

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Cyanazine	23/03/05	<0.1	ug/L	No
Diazinon	23/03/05	<0.1	ug/L	No
Dicamba	23/03/05	<0.2	ug/L	No
1,2-Dichlorobenzene	23/03/05	<0.5	ug/L	No
1,4-Dichlorobenzene	23/03/05	<0.5	ug/L	No
Dichlorodiphenyltrichloroethane (DDT) + metabolites	23/03/05	<0.4	ug/L	No
1,2-Dichloroethane	23/03/05	<0.5	ug/L	No
1,1-Dichloroethylene (vinylidene chloride)	23/03/05	<0.5	ug/L	No
Dichloromethane	23/03/05	<0.5	ug/L	No
2-4 Dichlorophenol	23/03/05	<0.5	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	23/03/05	<0.2	ug/L	No
Diclofop-methyl	23/03/05	<0.2	ug/L	No
Dimethoate	23/03/05	<0.1	ug/L	No
Dinoseb	23/03/05	<0.2	ug/L	No
Diquat	23/03/05	<7	ug/L	No
Diuron	23/03/05	<10	ug/L	No
Glyphosate	23/03/05	<10	ug/L	No
Heptachlor + Heptachlor Epoxide	23/03/05	<0.2	ug/L	No
Lindane (Total)	23/03/05	<0.1	ug/L	No
Malathion	23/03/05	<0.1	ug/L	No
Methoxychlor	23/03/05	<0.1	ug/L	No
Metolachlor	23/03/05	<0.1	ug/L	No
Metribuzin	23/03/05	<0.1	ug/L	No
Monochlorobenzene	23/03/05	<0.5	ug/L	No
Paraquat	23/03/05	<1	ug/L	No
Parathion	23/03/05	<0.1	ug/L	No
Pentachlorophenol	23/03/05	<0.5	ug/L	No
Phorate	23/03/05	<0.1	ug/L	No
Picloram	23/03/05	<0.2	ug/L	No
Polychlorinated Biphenyls(PCB)	23/03/05	<0.08	ug/L	No
Prometryne	23/03/05	<0.1	ug/L	No
Simazine	23/03/05	<0.1	ug/L	No
THM (NOTE: show latest annual average)	23/03/05 - 06/12/05	112.9	ug/L	Yes
Temephos	23/03/05	<0.1	ug/L	No
Terbufos	23/03/05	<0.2	ug/L	No
Tetrachloroethylene	23/03/05	<0.5	ug/L	No
2,3,4,6-Tetrachlorophenol	23/03/05	<0.5	ug/L	No

Drinking-Water Systems Regulation O. Reg. 170/03

Triallate	23/03/05	<0.1	ug/L	No
Trichloroethylene	23/03/05	<0.5	ug/L	No
2,4,6-Trichlorophenol	23/03/05	<0.5	ug/L	No
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	23/03/05	<0.2	ug/L	No
Trifluralin	23/03/05	<0.1	ug/L	No
Vinyl Chloride	23/03/05	<0.5	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	Date of Sample
Total THM (running avg.)	112.9	ug/L	23/03/05 – 06/12/05

(Only if DWS category is large municipal residential, small municipal residential, large municipal non residential, non municipal year round residential, large non municipal non residential)