DRINKING WATER QUALITY

QUARTERLY REPORT

April 1 – June 30, 2001

TRANSPORTATION & WORKS

ENVIRONMENT DIVISION

RESPECTFULLY SUBMITTED BY:

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Environment Division

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CITY OF Thunder Bay
Superior by Nature

City of Thunder Bay: *Quarterly Water Quality Report*

For the period April 1 – June 30, 2001

What is the Quarterly Water Quality Report?

The City of Thunder Bay is pleased to present its *Water Quality Report*, issued at the end of each quarter, to provide consumers with information about our water supply operations and drinking water quality.

In compliance with provincial regulation 459/00, this quarterly report includes:

- description of Thunder Bay's water supply system;
- treatment processes and quality assurance methods;
- process flow diagrams for each plant;
- compliance provisions;
- glossary of terms; and
- summary of water analysis results for this quarter.

What are the new provisions in Regulation 459/00?

Regulation 459/00, also known as Ontario's new Drinking Water Protection Regulation, came into effect on August 26, 2000 to provide an enforceable standard focusing on the treatment and testing of drinking water supplies in Ontario. The regulation includes provisions for public access to information and notification of adverse test results.

How is the safety of our drinking water assured?

In Thunder Bay, we have a supply of surface water of very good quality… consistently delivered to us from two water treatment plant sources – Bare Point on Lake Superior and Loch Lomond on Mount McKay. Treatment processes and quality assurance methods at both plants make our water safe for residents.

Water quality is monitored at both plants 24 hours a day, seven days a week. Water treatment plants must meet strict provincial standards and regulations. Each plant operates under an Ontario Ministry of Environment Certificate of Approval. We are committed to quality and continuous improvement in accordance with Ontario's new water quality standards.

We take the job of monitoring water quality very seriously. Each year, independent labs test more than 2,400 samples for potential contaminants. Our testing program meets, and in many areas, exceeds, regulatory requirements.

Today, City of Thunder Bay residents enjoy safe drinking water of excellent quality. We are committed to making sure we have a water system that will continue to meet our needs tomorrow and beyond.

Who is responsible for water treatment in Thunder Bay?

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 & Water Section is responsible for the upkeep and maintenance of the water distribution system.

Our highly qualified staff at the Water Treatment Plants consists of:

- Supervisor (1)
- Chief Operators (2)
- Certified Operators (6)
- Certified Maintenance Relief Operators (2)
- Electrician (1)
- Controls Technician (1)
- Water Quality Technician (1)
- Leadhand Electrician (1)

We have a highly qualified staff, certified by the Ontario Environmental Training Consortium. Staff is continually trained in accordance with provincial regulations. In addition, the new drinking water regulations require that all water treatment staff performing water testing complete an additional 36 hours of specialized training over the next three years.

Where does our water come from?

Residents of Thunder Bay have two surface water supply sources. The Bare Point Water Treatment Plant supplies most of Thunder Bay north of the Neebing River with water from Lake Superior. The Loch Lomond Microfiltration Plant supplies most residents south of the river with water from Loch Lomond.

Water from Bare Point and Loch Lomond is distributed to consumers through a network of 672 km of water mains.

The total population of Thunder Bay is 116,152. The City's water treatment system serves 106,983 people; representing 92% of the population.

Bare Point Water Treatment Plant is located at the north limit of the City, having a current operational capacity of 13 million imperial gallons per day (64 million litres per day). The plant draws water from the world's largest body of fresh water - Lake Superior.

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.

Bare Point's distribution system consists of four pressure zones, three pumping stations and three reservoirs. The attached flow diagram illustrates plant operations.

Loch Lomond Water Treatment Plant is located south of the city on Mount McKay. Loch Lomond supplies water to the south portion of Thunder Bay. This plant draws water from Loch Lomond, partially situated within the Fort William First Nation Reserve.

The new Loch Lomond temporary filtration system, built in 1998 has an operational capacity of 6.25 million imperial gallons per day (28 million litres per day). Treatment processes include ultrafiltration membrane technology, the addition of sodium silicate for corrosion control and chlorine for disinfection.

The Loch Lomond distribution system consists of two pressure zones, one reservoir and two pumping stations. The pumping stations are available to pump Bare Point water into the Loch Lomond distribution system during seasonal or high demand periods. A process flow

diagram of Loch Lomond operations is attached.

What is found in our source water?

Water taken directly from a surface water source is not suitable for human consumption as it contains impurities.

Parameters affecting the quality of water can be characterized as:

- microbiological – bacterial, algae and other living organisms;
- chemical – substances dissolved in water from manufactured or natural sources; or
- physical – materials that make the water appear cloudy.

Detailed descriptions of raw water characteristics can be found in the Ontario Drinking Water Standards. These are available on the Ministry of Environment web site at **www.ene.gov.on.ca** under "New Drinking Water Protection Regulation".

Are we in compliance with Regulation 459/00?

Enviro-Test Laboratories, an accredited, laboratory chain, provides for our drinking water testing requirements. The Enviro-Test Thunder Bay Lab is accredited to analyze all microbiological parameters, metals and general water quality parameters, while partner labs in Winnipeg and Edmonton are accredited for testing the volatile organics, pesticides and PCBs. All operational staff at both Thunder Bay Water Treatment Plants have all required Water Treatment Plant Certification.

The City's drinking water testing/analysis program was carefully reviewed following enactment of the new water protection legislation in August 2000. We are required to take 112 samples per month from the distribution system for bacterial testing. We have exceeded this requirement for many years, averaging 180 samples per month, and will continue to do so. Quarterly testing for volatile organics (15 parameters), pesticides and PCBs (48 parameters), as well as testing for heavy metals was implemented to meet legislated requirements. Previously, the majority of these parameters had been tested twice a year through the MOE Drinking Water Surveillance Program (DWSP). Our reports from the MOE's DWSP can be viewed on their website at **http://www.ene.gov.on.ca/envision/dwsp9899/dwsp.htm.**

The City of Thunder Bay's in-house lead monitoring program also exceeded provincial requirements, but is being maintained to monitor homes in older sections of the distribution system that have lead service connections.

In total, the City monitors over 100 parameters in its drinking water on a regular basis.

Definitions of water industry terms:

The following is a list of terms that will help you understand this report.

WTP: *Water Treatment Plant*.
MOE: The *Ontario Ministry of Environment* is the principal body regulating the quality of drinking water in Ontario.

MOH: The *Ontario Ministry of Health* immediately becomes involved when any health related water quality parameters are exceeded.
MAC: The *Maximum Acceptable Concentration*. This is a health-related drinking water standard established for contaminants that have known or suspected adverse health effects when above a certain concentration. The length of time the MAC can be exceeded without injury to health will depend on the nature and concentration of the parameter.
IMAC: The *Interim Maximum Acceptable Concentration*. This is a health-related Ontario Drinking Water Standard established for contaminants when there are insufficient toxicological data to establish a MAC with reasonable certainty, or when it is not practical to establish a MAC at the desired level.
AO: *Aesthetic objective.* This is a parameter limit set for aesthetic appeal of water, such as colour and taste.
OG: *Operational Guidelines*. These are plant guidelines setting parameters that need to be controlled to ensure optimum water treatment.
Parameter: *Parameters* are substances that water is tested for.
mg/L: *Milligrams per liter*. This is the standard measure of concentration of a parameter in water, sometimes also called parts per million (ppm).
ug/L: *Micrograms per litre*, also called parts per billion (ppb). This concentration is 1000 times more sensitive than mg/L (1000 ug = 1mg)
pg/L: *Picograms per litre*. This is equivalent to 10^{-12} grams.
THM: *Trihalomethanes*. Trihalomethanes are the most widely occurring synthetic organics found in chlorinated drinking water. The four most common detected trihalomethanes in drinking water are chloroform, bromodichloromethane, chlorodibromomethane and bromoform. The main source of trihalomethanes in drinking water is the result of the action of chlorine reacting with naturally occurring organic compounds present in the water.
ND: *Non Detectable Limits*. This means that the results are below the laboratory detection limits. This is the bacteriological standard for water free of total coliform, fecal coliform or e-coli.
PLC: *Programmable Logic Controller.* A PLC is used to control plant system operations by computer.

What do test results indicate for this quarter?

The City of Thunder Bay's Environment Division has taken all necessary measures to comply with the Drinking Water Protection Regulations and the Ontario Drinking Water Standards.

The attached tables summarize tests completed, test results, ranges and actions taken to resolve any exceedances from April 1 to June 30, 2001. In this quarter, three total coliform adverse test results were resolved in accordance with the *Corrective Actions Requirements, Regulation 459/00*.

Note that, in this quarter, the reporting units for volatile organics, including THM's and for pesticides have changed from mg/L to ug/L. This will make all the numbers in these tables 1000 times larger than shown in previous quarterly reports. For example, the THM limit is now shown at 100 ug/L instead of 0.10 mg/L. This change is due to a change in the reporting format that MOE requires for certified laboratories.

Minor exceedances of THMs were detected in the Loch Lomond distribution system. This problem is the result of high natural organic compounds in the Loch Lomond water supply. Natural organics in water, when combined with the chlorine (added for disinfection), result in a synthetic compound called THMs or Trihalomethanes. A long-term solution has been identified and corrective measures will be included in the Loch Lomond Plant expansion. In the interim, the City of Thunder Bay Environment Division, in consultation with Thunder Bay District Health Unit and the Ministry of the Environment, are investigating short-term solutions to reduce the formation of THMs.

Where can I get further information?

TRANSPORTATION & WORKS
Phone: 684-2195 (daytime)
684-3117 (after hours)*
* 4:30 pm to 8 am & holidays.

Bare Point Water Treatment Plant
R.R.#13
171 Bare Point Road,
Thunder Bay, ON, P7B 5E4
Phone: 683-8141 (24 hours)
Supervisor: Don W. Kmill, 684-3566
MOE Waterworks No. 220000273
MOE Certificate of Approval
No. 7-0748-90-006

Loch Lomond Water Treatment Plant
R.R.#4
151 Reservoir Road, Thunder Bay, ON,
P7C 4Z2
Phone: 622-0944 or
683-8141 (24 hours)
Supervisor: Don W. Kmill, 684-3566
MOE Waterworks No. 220000282
MOE Certificate of Approval
No. 7-0706-98-006

Additional Contacts:

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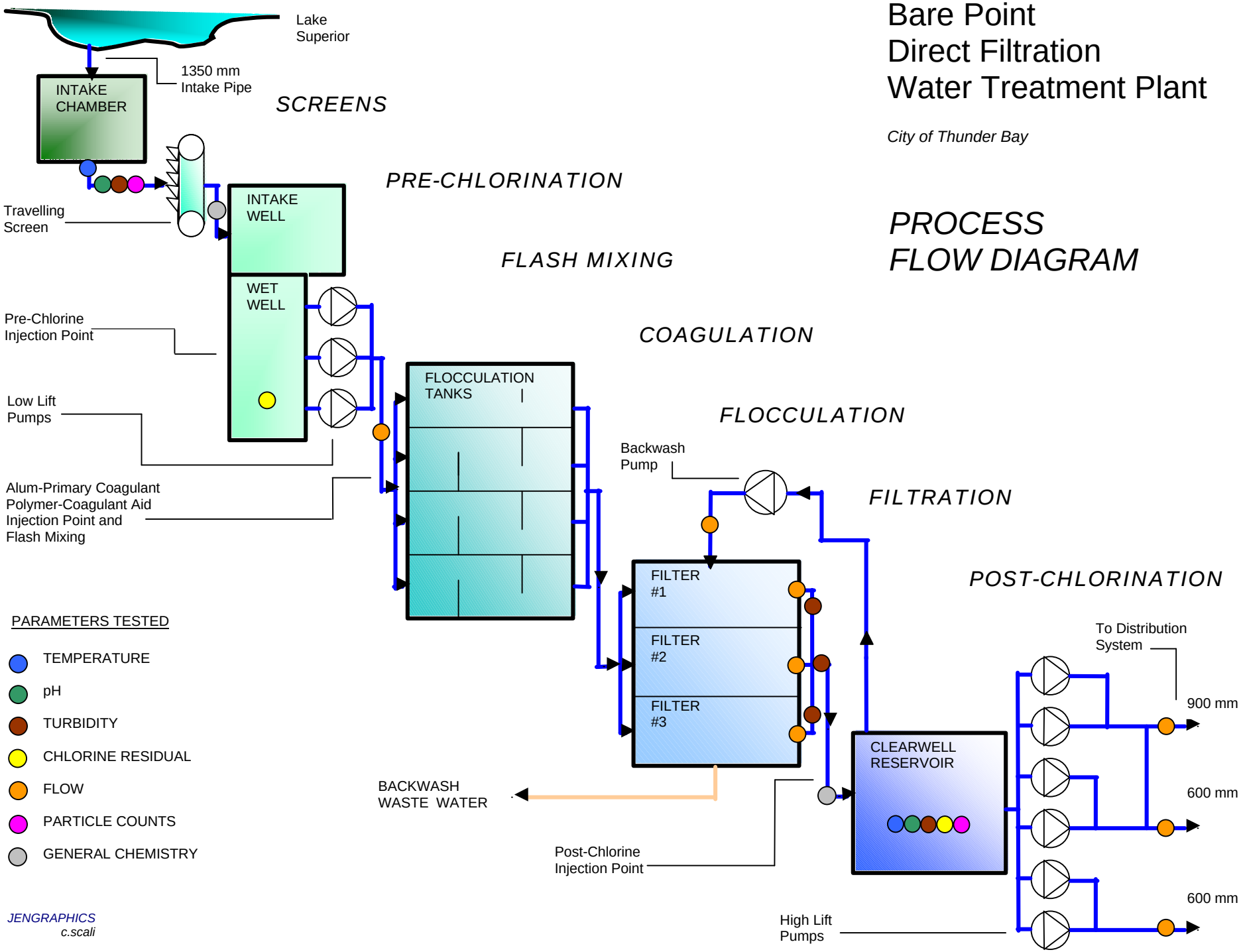
Bare Point
Direct Filtration
Water Treatment Plant

City of Thunder Bay

PROCESS FLOW DIAGRAM



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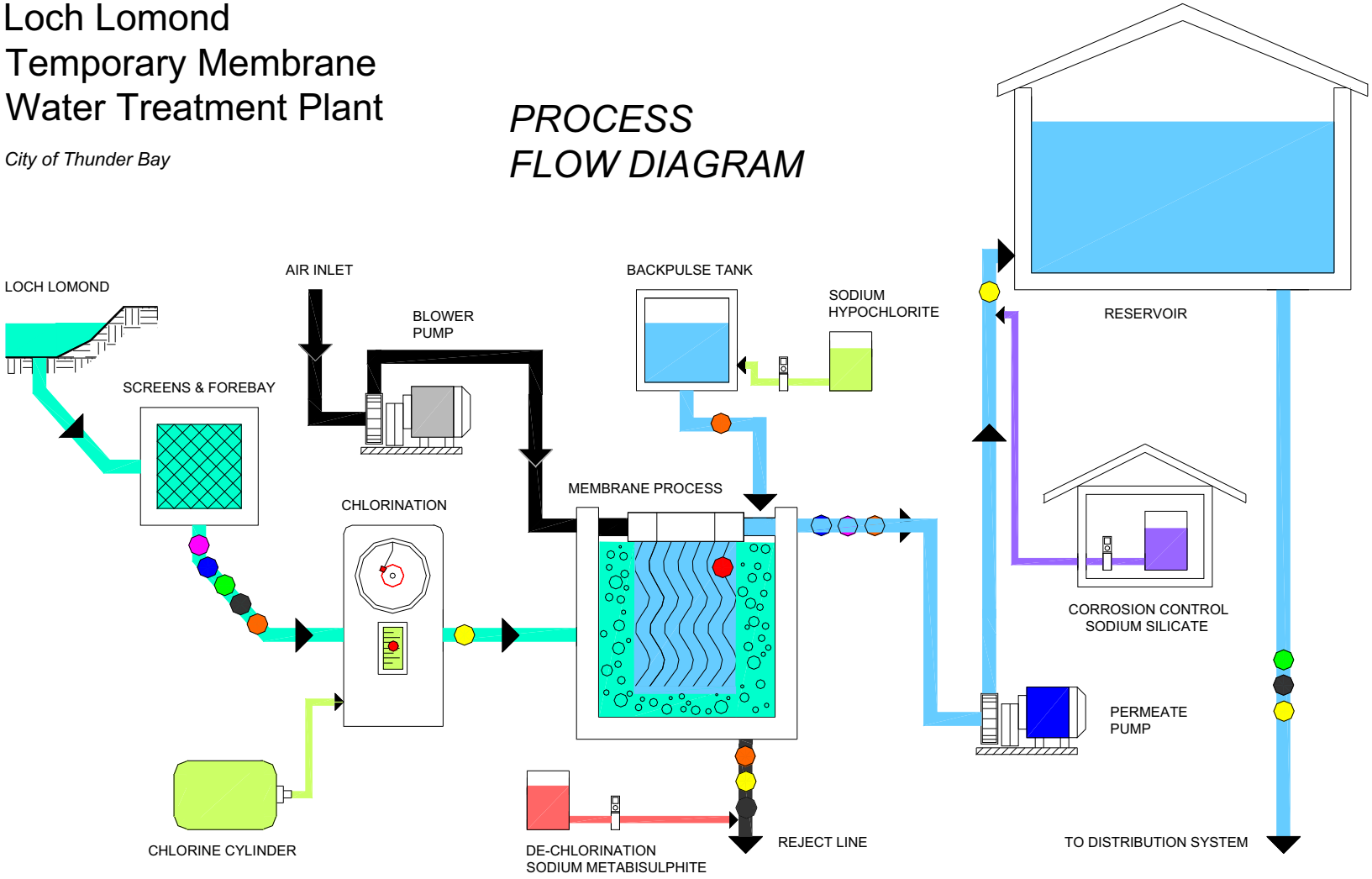
Loch Lomond Temporary Membrane Water Treatment Plant

City of Thunder Bay

PROCESS FLOW DIAGRAM



BARE POINT DISTRIBUTION SYSTEM: ROUTINE BACTERIOLOGICAL SAMPLES

Microbiological Parameters	MAC/ IMAC	# of Samples	# Detect Results	Sampling Date	Range	Exceedance	Typical Source of Parameter
Total Coliform	ND	308	1	01/04/01-30/06/01	Present	Yes (1)	Naturally present in environment
Fecal Coliform	ND	308	0	01/04/01-30/06/01	0	No	Animal / human fecal waste
E. Coli	ND	308	0	01/04/01-30/06/01	0	No	Animal / human fecal waste
Deterioration Indicators	--	308	0	01/04/01-30/06/01	0	No	
Heterotrophic Plate Count	500	75	26	01/04/01-30/06/01	0 - 108	No	General bacterial population

BARE POINT DISTRIBUTION SYSTEM - ADVERSE WATER SAMPLES

Submission No.	Date of Sample	Problem	Action Required	Date Action Taken	Results	Follow-up Action
A0 - 05	April 25	Total Coliform Present	Flush & 2 sets of samples from site and 2 other nearby locations taken	April 27 April 28	Results OK Results OK	No Further Action Required

LOCH LOMOND DISTRIBUTION SYSTEM: ROUTINE BACTERIOLOGICAL SAMPLES

Microbiological Parameters	MAC/ IMAC	# of Samples	# Detect Results	Sampling Date	Range	Exceedance (#)	Typical Source of Parameter
Total Coliform	ND	306	2	01/04/01-30/06/01	Present	Yes (2)	Naturally present in environment
Fecal Coliform	ND	306	0	01/04/01-30/06/01	0	No	Animal / human fecal waste
E. Coli	ND	306	0	01/04/01-30/06/01	0	No	Animal / human fecal waste
Deterioration Indicators	--	306	0	01/04/01-30/06/01	0	No	
Heterotrophic Plate Count	500	74	35	01/04/01-30/06/01	0 - 24	No	Indicator of deteriorating water quality if over 500

LOCH LOMOND DISTRIBUTION SYSTEM - ADVERSE WATER SAMPLES

Submission No.	Date of Sample	Problem	Action Required	Date Action Taken	Results	Follow-up Action
A0-03	April 23/01	Total Coliform Present	Flush & 2 sets of samples from site and 2 other nearby locations taken	April 25 April 26	Results OK Results OK	No Further Action Required
A0-04	April 24/01	Total Coliform Present	Flush & 2 sets of samples from site and 2 other nearby locations taken	April 26 April 27	Results OK Results OK	No Further Action Required

BARE POINT SYSTEM: OPERATIONAL PARAMETERS

Parameters related to Microbiological Quality	Units	AO/OG	# of Samples	# Detectable Results	Sampling Date	Range (mg/L unless stated)	Typical Source of Parameter
Turbidity	NTU	1	Continuous	Continuous	01/04/01-30/06/01	0.05 – 0.14	Suspended material in water
Free Chlorine at Plant	mg/L	0.8 – 4.0	Continuous	Continuous	01/04/01-30/06/01	0.87 – 1.14	Disinfectant added
Free Chlorine in System	mg/L	0.2 – 4.0	308	308	01/04/01-30/06/01	0.14 – 1.15	Disinfectant added
pH	No units	6.5-8.5	Continuous	Continuous	01/04/01-30/06/01	6.94 – 7.22	Measure of water acidity (7.00 = neutral)
Copper	mg/L	1.0	3	3	01/04/01-30/06/01	<0.07	
Iron	mg/L	0.30	3	3	01/04/01-30/06/01	<0.001	
Manganese	mg/L	0.05	1	1	27/04/01	<0.001	
Alkalinity	mg/L	30-500	3	3	01/04/01-30/06/01	46.40 – 54.40	
Conductivity	uS/cm		3	3	01/04/01-30/06/01	98.0 – 108.0	
Hardness	mg/L	80-100	3	3	01/04/01-30/06/01	48.40 – 54.80	
Aluminum	mg/L	0.10	3	3	01/04/01-30/06/01	0.030 – 0.037	Erosion of natural deposits, Residues from coagulant use
Colour	TCU	5	167	167	01/04/01-30/06/01	0.50 – 7.0	Tannins and lignins from natural decay

AO – Aesthetic Objective
OG – Operational Guideline

LOCH LOMOND SYSTEM: OPERATIONAL PARAMETERS

Parameters related to Microbiological Quality	Units	AO/OG	# of Samples	# Detectable Results	Sampling Date	Range	Typical Source of Parameter
Turbidity	NTU	1	Continuous	Continuous	01/04/01-30/06/01	0.02 – 0.03	Suspended material in water
Free Chlorine at Plant	mg/L	1.1 – 4.0	Continuous	Continuous	01/04/01-30/06/01	1.34 – 2.43	Disinfectant added
Free Chlorine in System	mg/L	0.2 – 4.0	306	306	01/04/01-30/06/01	0.04 – 1.51	Disinfectant added
pH	No units	6.5-8.5	Continuous	Continuous	01/04/01-30/06/01	7.80 – 8.30	Measure of water acidity (7.00 = neutral)
Copper	mg/L	1.0	3	3	01/04/01-30/06/01	<0.07	
Iron	mg/L	0.30	3	3	01/04/01-30/06/01	<0.001	
Manganese	mg/L	0.05	1	1	27/04/01	<0.001	
Alkalinity	mg/L	30-500	3	3	01/04/01-30/06/01	20.40 – 24.20	
Conductivity	uS/cm		3	3	01/04/01-30/06/01	63.00 – 66.00	
Hardness	mg/L	80-100	3	3	01/04/01-30/06/01	24.10 – 24.80	
Colour	TCU	5	153	153	01/04/01-30/06/01	3.0 – 11.0	Tannins and lignins from natural decay

AO – Aesthetic Objective
OG – Operational Guideline

Bare Point Water Treatment Plant - Volatile Organics Tests

Source Water	Parameter	MAC/ IMAC (ug/L)	# of Samples	# of Detectable Results	Date(s)	Range (ug/L)	Exceedance	Source of Parameter
Bare Point Treated	Vinyl Chloride	2	1	0	05/04/2001	<0.2	NO	
	1,1-Dichloroethylene	14	1	0	05/04/2001	<1	NO	
	Dichloromethane	50	1	0	05/04/2001	<1	NO	
	Chloroform	Note 1	1	1	05/04/2001	16	NO	Type of trihalomethane (THM)
	Carbon Tetrachloride	5	1	0	05/04/2001	<0.5	NO	
	Benzene	5	1	0	05/04/2001	<0.5	NO	
	1,2-Dichloroethane	5	1	0	05/04/2001	<0.5	NO	
	Bromodichloromethane	Note 1	1	1	05/04/2001	2	NO	Type of trihalomethane (THM)
	Toluene	24 **	1	0	05/04/2001	<1		
	Trichloroethylene	50	1	0	05/04/2001	<1	NO	
	Tetrachloroethylene	30	1	0	05/04/2001	<1	NO	
	Dibromochloromethane	Note 1	1	0	05/04/2001	<1	NO	Type of trihalomethane (THM)
	Monochlorobenzene	80	1	0	05/04/2001	<1	NO	
	Ethylbenzene	2.4**	1	0	05/04/2001	<1		
	m,p-Xylene	300*	1	0	05/04/2001	<1		
	o-Xylene	300*	1	0	05/04/2001	<1		
	Bromoform	Note 1	1	0	05/04/2001	<1	NO	Type of trihalomethane (THM)
	1,4-Dichlorobenzene	5	1	0	05/04/2001	<0.5	NO	
	1,2-Dichlorobenzene	200	1	0	05/04/2001	<1	NO	
Bare Point Distr. System	THM's – System Avg.	100	3	3	05/04/2001	21	NO	
	Total THM's – System Extremity (2)	100	4	4	09/22/00-05/04/01	21.1(2)	NO	Disinfection by-products (total)

**** NOTE 1 – Total of all trihalomethanes (chlroform & 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)

**** - Aesthetic Objective(AO). Exceedance column does not apply to these.**

*** - 300 ug/L is AO for total Xylenes < - 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)	Range (ug/L)	Exceedance	Source of Parameter
Bare Point Treated Water	Alachlor	5	1	0	05/04/2001	<0.5	NO	Insecticide, herbicide and fungicide residues
	Atrazine + N-dealkylated metabolites	5	1	0	05/04/2001	<1	NO	
	Azinphos-methyl	20	1	0	05/04/2001	<2	NO	
	Chlorpyrifos	90	1	0	05/04/2001	<9	NO	
	Cyanazine	10	1	0	05/04/2001	<1	NO	
	Diazinon	20	1	0	05/04/2001	<2	NO	
	Diclofop-methyl	9	1	0	05/04/2001	<0.9	NO	
	Dimethoate	20	1	0	05/04/2001	<3	NO	
	Dinoseb	10	1	0	05/04/2001	<1	NO	
	Malathion	190	1	0	05/04/2001	<19	NO	
	Metribuzin	80	1	0	05/04/2001	<8	NO	

Bare Point – Pesticides & PCB Tests (cont.)								
Source Water	**Parameter**	**MAC/ IMAC (ug/L)**	**# of Samples**	**# of Detectable Results**	**Date(s)**	**Range (ug/L)**	**Exceedance**	**Source of Parameter**
Bare Point Treated Water (cont.)	Parathion	50	1	0	05/04/2001	<5	NO	Insecticide, herbicide and fungicide residues
	Phorate	2	1	0	05/04/2001	<0.5	NO	
	Prometryne	1	1	0	05/04/2001	<0.3	NO	
	Simazine	10	1	0	05/04/2001	<1	NO	
	Terbufos	1	1	0	05/04/2001	<1	NO	
	Triallate	230	1	0	05/04/2001	<23	NO	
	Trifluralin	45	1	0	05/04/2001	<4.5	NO	
	P,p'-DDD	30**	1	0	05/04/2001	<0.5	NO	
	P,p'-DDE	30**	1	0	05/04/2001	<0.5	NO	
	P,p'-DDT	30**	1	0	05/04/2001	<0.5	NO	
	Aldrin	0.7*	1	0	05/04/2001	<0.07	NO	
	Dieldrin	0.7*	1	0	05/04/2001	<0.07	NO	
	Heptachlor	3^{+}	1	0	05/04/2001	<0.1	NO	
	Heptachlor Epoxide	3^{+}	1	0	05/04/2001	<0.1	NO	
	Lindane (Total)	4	1	0	05/04/2001	<0.4	NO	
	Methoxychlor	900	1	0	05/04/2001	<90	NO	
	Metolachlor	50	1	0	05/04/2001	<5	NO	
	Chlordane	7	1	0	05/04/2001	<0.7	NO	
	Bromoxynil	5	1	0	05/04/2001	<0.5	NO	
	Dicamba	120	1	0	05/04/2001	<12	NO	
	2,4-Dichlorophenol	900	1	0	05/04/2001	<90	NO	
	2,4-D	100	1	0	05/04/2001	<10	NO	
	Pentachlorophenol	60	1	0	05/04/2001	<6	NO	
	Picloram	190	1	0	05/04/2001	<19	NO	
	2,3,4,6-Tetrachlorophenol	100	1	0	05/04/2001	<10	NO	
	2,4,6-Trichlorophenol	5	1	0	05/04/2001	<0.5	NO	
	2,4,5-T	280	1	0	05/04/2001	<28	NO	
	Glyphosate	280	1	0	05/04/2001	<28	NO	
	Diquat	70	1	0	05/04/2001	<7	NO	
	Paraquat	10	1	0	05/04/2001	<1	NO	
	Aldicarb	9	1	0	05/04/2001	<0.9	NO	
	Bendiocarb	40	1	0	05/04/2001	<8	NO	
	Carbaryl	90	1	0	05/04/2001	<9	NO	
	Carbofuran	90	1	0	05/04/2001	<10	NO	
	Diuron	150	1	0	05/04/2001	<15	NO	
	Temephos	280	1	0	05/04/2001	<28	NO	
	PCB's	3	1	0	05/04/2001	<0.3	NO	Electrical insulating oil
	Dioxins & Furans	15 pg/L	1	1	04/27/2001	1.4	NO	Insecticide & bleaching by-product, combustion by-product

**** Aesthetic Objective(AO). Exceedance column does not apply to these. * - 300 ug/L is AO for <u>total</u> Xylenes < - 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	Range (mg/L)	Exceedance	Source of Parameter
Bare Point Raw Water	Aluminum	0.1**	1	1	05/04/2001	0.03		Natural sources at low levels
	Arsenic	0.025	1	0	05/04/2001	<0.0004	NO	Natural source at low levels
	Calcium		1	1	05/04/2001	15.1		Common mineral constituent
	Copper	1.0**	1	1	05/04/2001	0.0008		Corrosion of plumbing system, erosion of natural deposits
	Iron	0.3**	1	0	05/04/2001	<0.005		Erosion of natural deposits, corrosion of cast iron mains
	Manganese	0.05**	1	0	05/04/2001	<0.001		Erosion of natural mineral deposits
	Lead	0.01	1	0	05/04/2001	<0.0001	NO	Leaching from plumbing and service connections
	Sodium	200**	1	1	05/29/2001	1.67		Natural mineral constituent
	Zinc	5**	1	0	05/04/2001	0.002		Natural sources, corrosion of plumbing
	Alkalinity	500**	1	1	05/04/2001	43		Natural sources, mostly dissolved carbonate
	Ammonia		1	0	05/04/2001	<0.05		Natural sources at low levels
	Chloride	250**	1	1	05/04/2001	1.9		Natural sources at low levels
	Conductivity (us/cm)		1	1	05/04/2001	98.9		Natural dissolved material in water
	Total Dissolved Carbon	5**	1	1	05/04/2001	13		Organic matter leached into surface water from vegetation
	Hardness	100**	1	1	05/04/2001	51		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	1	1	05/04/2001	0.35	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10^{+}	1	0	05/04/2001	<0.03	NO	
	Sulphate	500**	1	1	05/04/2001	3.9		Natural mineral sources
	Total Kjeldahl Nitrogen (TKN)		1	1	05/04/2001	0.19		Organic matter leached into surface water from vegetation
	Total Phenolics		1	0	05/04/2001	0.006		Decomposition of wood
Bare Point Treated Water	Aluminum	0.1**	1	1	05/04/2001	0.03		Natural sources at low levels
	Arsenic	0.025	1	0	05/04/2001	<0.0004	NO	Natural source at low levels
	Calcium		1	1	05/04/2001	14.5		Common mineral constituent
	Copper	1.0**	1	0	05/04/2001	<0.0006		Corrosion of plumbing system, erosion of natural deposits
	Iron	0.3**	1	0	05/04/2001	<0.005		Erosion of natural deposits, corrosion of cast iron mains
	Manganese	0.05**	1	0	05/04/2001	<0.001		Erosion of natural mineral deposits
	Lead	0.01	1	0	05/04/2001	<0.0001	NO	Leaching from plumbing and service connections
	Sodium	200**	1	1	05/04/2001	1.72		Natural mineral constituent
	Zinc	5**	1	1	05/04/2001	0.003		Natural sources, corrosion of plumbing
	Alkalinity	500**	1	1	05/04/2001	39.0		Natural sources, mostly dissolved carbonate
	Ammonia		1	0	05/04/2001	<0.05		Natural sources at low levels

Bare Point - Inorganic & General Chemistry Parameters (cont.)								
Source Water	**Parameter**	**MAC/ IMAC**	**# of Samples**	**# Detectable Results**	**Dates**	**Range (mg/L)**	**Exceedance**	**Source of Parameter**
Bare Point Treated Water (cont.)	Chloride	250**	1	1	05/04/2001	3.0		Natural sources at low levels
	Conductivity		1	1	05/04/2001	102		Natural dissolved material in water
	Dissolved Organic Carbon (DOC)	5**	1	1	05/04/2001	2		Organic matter leached into surface water from vegetation
	Fluoride	1.5	1	1	04/27/2001	.05		Natural mineral deposits
	Hardness	100**	1	1	05/04/2001	49		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	1	1	05/04/2001	0.35	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10+	1	0	05/04/2001	<0.03	NO	
	Sulphide	0.05**	1	0	05/04/2001	<.003		Natural mineral leaching in oxygen-poor conditions, usually low in surface water
	Methane (L/m3)	3**	1	0	04/27/2001	<.005		Bacterial action in ground water
	Sulphate	500**	1	1	05/04/2001	6.1		Natural mineral sources
	Total Kjeldahl Nitrogen (TKN)		1	1	05/04/2001	0.10		Organic matter leached into surface water from vegetation
	Total Dissolved Solids (TDS)	500**	1	1	05/04/2001	90		Indicator of dissolved mineral content in water
Bare Point Distribution System Water	Aluminum	0.1**	1	1	05/04/2001	0.03		Natural sources at low levels
	Arsenic	0.025	1	0	05/04/2001	<0.0004	NO	Natural source at low levels
	Calcium		1	1	05/04/2001	14.9		Common mineral constituent
	Copper	1.0**	1	1	05/04/2001	0.0061		Corrosion of plumbing system, erosion of natural deposits
	Iron	0.3**	1	0	05/04/2001	<0.005		Erosion of natural deposits, corrosion of cast iron mains
	Manganese	0.05**	1	0	05/04/2001	<0.001		Erosion of natural mineral deposits
	Lead	0.01	1	1	05/04/2001	0.0008	NO	Leaching from plumbing and service connections
	Zinc	5**	1	1	05/04/2001	0.006		Natural sources, corrosion of plumbing
	Alkalinity	500**	1	1	05/04/2001	38		Natural dissolved carbonate minerals
	Ammonia		1	0	05/04/2001	<0.05		Natural sources at low levels
	Chloride	250**	1	1	05/04/2001	2.9		Natural sources at low levels
	Conductivity (uS/cm)		1	1	05/04/2001	101		Natural dissolved material in water
	Total Dissolved Carbon	5**	1	1	05/04/2001	12		Organic matter leached into surface water from vegetation
	Hardness	100**	1	1	05/04/2001	50		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	1	1	05/04/2001	0.36	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10+	1	0	05/04/2001	<0.03	NO	
	Sulphate	500**	1	1	05/04/2001	6.1		Natural mineral sources
	Total Kjeldahl Nitrogen (TKN)		1	1	05/04/2001	0.12		Organic matter leached into surface water from vegetation

****** **-Aesthetic Objectives (AO). 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 - Volatile Organics Tests

Source Water	Parameter	MAC/IMAC (ug/L)	# of Samples	# of Detectable Results	Date(s)	Range (ug/L)	Exceedance	Source of Parameter
Loch Lomond Treated	Vinyl Chloride	2	1	0	05/04/2001	<0.2	NO	
	1,1-Dichloroethylene	14	1	0	05/04/2001	<1	NO	
	Dichloromethane	50	1	0	05/04/2001	<1	NO	
	Chloroform	Note 1	1	1	05/04/2001	53	NO	Type of trihalomethane (THM)
	Carbon Tetrachloride	5	1	0	05/04/2001	<0.5	NO	
	Benzene	5	1	0	05/04/2001	<0.5	NO	
	1,2-Dichloroethane	5	1	0	05/04/2001	<0.5	NO	
	Bromodichloromethane	Note 1	1	1	05/04/2001	2	NO	Type of trihalomethane (THM)
	Toluene	24 **	1	0	05/04/2001	<1		
	Trichloroethylene	50	1	0	05/04/2001	<1	NO	
	Tetrachloroethylene	30	1	0	05/04/2001	<1	NO	
	Dibromochloromethane	Note 1	1	0	05/04/2001	<1	NO	
	Monochlorobenzene	80	1	0	05/04/2001	<1	NO	
	Ethylbenzene	2.4**	1	0	05/04/2001	<1		
	m,p-Xylene	300*	1	0	05/04/2001	<1		
	o-Xylene	300*	1	0	05/04/2001	<1		
	Bromoform	Note 1	1	0	05/04/2001	<1	NO	
	1,4-Dichlorobenzene	5	1	0	05/04/2001	<0.5	NO	
	1,2-Dichlorobenzene	200	1	0	05/04/2001	<1	NO	
Loch Lomond Distribution System	THM's – System Avg.	100	3	3	05/04/2001	79.0	NO	
	Total THM's – System Extremity (2)	100	4	4	09/22/00-05/04/01	108.8 (2)	YES	Disinfection by-products

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)
**** - Aesthetic Objective(AO). Exceedance column does not apply to these**
*** - 300 ug/L is AO for total Xylenes**
< -Means less than the specified 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)	Range (ug/L)	Exceedance	Source of Parameter
Loch Lomond Treated Water	Alachlor	5	1	0	05/04/2001	<0.5	NO	Insecticide, herbicide and fungicide residues
	Atrazine + N-dealkylated metabolites	5	1	0	05/04/2001	<1	NO	
	Azinphos-methyl	20	1	0	05/04/2001	<2	NO	
	Chlorpyrifos	90	1	0	05/04/2001	<9	NO	
	Cyanazine	10	1	0	05/04/2001	<1	NO	
	Diazinon	20	1	0	05/04/2001	<2	NO	
	Diclofop-methyl	9	1	0	05/04/2001	<0.9	NO	
	Dimethoate	20	1	0	05/04/2001	<3	NO	
	Dinoseb	10	1	0	05/04/2001	<1	NO	
	Malathion	190	1	0	05/04/2001	<19	NO	
	Metribuzin	80	1	0	05/04/2001	<8	NO	

Loch Lomond – Pesticides & PCB Tests (cont.)								
Source Water	**Parameter**	**MAC/ IMAC (ug/L)**	**# of Samples**	**# of Detectable Results**	**Date(s)**	**Range (ug/L)**	**Exceedance**	**Source of Parameter**
Loch Lomond Treated Water (cont.)	Parathion	50	1	0	05/04/2001	<5	NO	Insecticide, herbicide and fungicide residues
	Phorate	2	1	0	05/04/2001	<0.5	NO	
	Prometryne	1	1	0	05/04/2001	<0.3	NO	
	Simazine	10	1	0	05/04/2001	<1	NO	
	Terbufos	1	1	0	05/04/2001	<1	NO	
	Triallate	230	1	0	05/04/2001	<23	NO	
	Trifluralin	45	1	0	05/04/2001	<4.5	NO	
	P,p'-DDD	30**	1	0	05/04/2001	<0.5	NO	
	P,p'-DDE	30**	1	0	05/04/2001	<0.5	NO	
	P,p'-DDT	30**	1	0	05/04/2001	<0.5	NO	
	Aldrin	0.7*	1	0	05/04/2001	<0.07	NO	
	Dieldrin	0.7*	1	0	05/04/2001	<0.07	NO	
	Heptachlor	3^{+}	1	0	05/04/2001	<0.1	NO	
	Heptachlor Epoxide	3^{+}	1	0	05/04/2001	<0.1	NO	
	Lindane (Total)	4	1	0	05/04/2001	<0.4	NO	
	Methoxychlor	900	1	0	05/04/2001	<90	NO	
	Metolachlor	50	1	0	05/04/2001	<5	NO	
	Chlordane	7	1	0	05/04/2001	<0.7	NO	
	Bromoxynil	5	1	0	05/04/2001	<0.5	NO	
	Dicamba	120	1	0	05/04/2001	<12	NO	
	2,4-Dichlorophenol	900	1	0	05/04/2001	<90	NO	
	2,4-D	100	1	0	05/04/2001	<10	NO	
	Pentachlorophenol	60	1	0	05/04/2001	<6	NO	
	Picloram	190	1	0	05/04/2001	<19	NO	
	2,3,4,6-Tetrachlorophenol	100	1	0	05/04/2001	<10	NO	
	2,4,6-Trichlorophenol	5	1	0	05/04/2001	<0.5	NO	
	2,4,5-T	280	1	0	05/04/2001	<28	NO	
	Glyphosate	280	1	0	05/04/2001	<28	NO	
	Diquat	70	1	0	05/04/2001	<7	NO	
	Paraquat	10	1	0	05/04/2001	<1	NO	
	Aldicarb	9	1	0	05/04/2001	<0.9	NO	
	Bendiocarb	40	1	0	05/04/2001	<8	NO	
	Carbaryl	90	1	0	05/04/2001	<9	NO	
	Carbofuran	90	1	0	05/04/2001	<10	NO	
	Diuron	150	1	0	05/04/2001	<15	NO	
	Temephos	280	1	0	05/04/2001	<28	NO	
	PCB's	3	1	0	05/04/2001	<0.3	NO	Electrical insulating oil
	Dioxins & Furans	15 pg/L	1	1	04/27/2001	0.61 pg/L	NO	Insecticide & bleaching by-product, combustion by-product

< - Means less than the specified method detection limit

Loch Lomond Water Treatment Plant - Inorganic & General Chemistry Parameters

Source Water	Parameter	MAC/ IMAC	# of Samples	# of Detectable Results	Dates	Range (mg/L)	Exceedance	Source of Parameter
Loch Lomond Raw	Aluminum	0.1**	1	1	05/04/2001	0.01		Natural sources at low levels
	Arsenic	0.025	1	0	05/04/2001	<0.0004	NO	Natural source at low levels
	Calcium		1	1	05/04/2001	5.77		Common mineral constituent
	Copper	1.0**	1	1	05/04/2001	0.0020		Corrosion of plumbing system, erosion of natural deposits
	Iron	0.3**	1	1	05/04/2001	0.034		Erosion of natural deposits, corrosion of cast iron mains
	Manganese	0.05**	1	1	05/04/2001	0.001		Erosion of natural mineral deposits
	Lead	0.01	1	0	05/04/2001	<0.0001	NO	Leaching from plumbing and service connections
	Sodium	200**	1	1	05/29/2001	1.23		Natural mineral constituent
	Zinc	5**	1	1	05/04/2001	0.004		Natural sources, corrosion of plumbing
	Alkalinity	500**	1	1	05/04/2001	19		Natural sources, dissolved carbonate
	Ammonia		1	0	05/04/2001	<0.05		Natural sources at low levels
	Chloride	250**	1	1	05/04/2001	0.50		Natural sources at low levels
	Conductivity (uS/cm)		1	1	05/04/2001	51.6		Natural dissolved material in water
	Dissolved Organic Carbon (DOC)	5**	1	1	05/04/2001	5		Organic matter leached into surface water from vegetation
	Hardness	100**	1	1	05/04/2001	24		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	1	1	05/04/2001	0.12	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10^{+}	1	0	05/04/2001	<0.03	NO	
	Sulphate	500**	1	1	05/04/2001	4.9		Natural mineral sources
	Total Kjeldahl Nitrogen (TKN)		1	1	05/04/2001	0.25		Organic matter leached into surface water from vegetation
	Total Phenolics		1	1	05/04/2001	0.006		Decomposition of wood
Loch Lomond Treated	Aluminum	0.1**	1	1	05/04/2001	0.01		Natural sources at low levels
	Arsenic	0.025	1	0	05/04/2001	<0.0004	NO	Natural source at low levels
	Calcium		1	1	05/04/2001	5.65		Common mineral constituent
	Copper	1.0**	1	1	05/04/2001	0.0014		Corrosion of plumbing system, erosion of natural deposits
	Iron	0.3**	1	1	05/04/2001	0.029		Erosion of natural deposits, corrosion of cast iron mains
	Manganese	0.05**	1	1	05/04/2001	0.002		Erosion of natural mineral deposits
	Lead	0.01	1	0	05/04/2001	<0.0001	NO	Leaching from plumbing and service connections
	Sodium	200**	1	1	05/04/2001	3.23		Natural mineral constituent plus sodium silicate anticorrosion additive at Loch
	Zinc	5**	1	1	05/04/2001	0.009		Natural sources, corrosion of plumbing
	Alkalinity	500**	1	1	05/04/2001	20		Natural sources, mostly dissolved carbonate
	Ammonia		1	0		<0.05		Natural sources at low levels

Loch Lomond - Inorganic & General Parameters (cont.)								
Source Water	**Parameter**	**MAC/ IMAC**	**# of Samples**	**# of Detectable Results**	**Dates**	**Range (mg/L)**	**Exceedance**	**Source of Parameter**
Loch Lomond Treated Water (cont.)	Chloride	250**	1	1	05/04/01	2.5		Natural sources at low levels
	Conductivity (uS/cm)		1	1	05/04/01	60.1		Natural dissolved material in water
	Dissolved Organic Carbon (DOC)	5**	1	1	05/04/01	4		Organic matter leached into surface water from vegetation
	Fluoride	1.5	1	1	04/27/01	0.06		Natural mineral deposits
	Hardness	100**	1	1	05/04/01	24		Natural dissolved minerals (Ca,Mg)
	Nitrate	10	1	1	05/04/01	0.10	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10+	1	0	05/04/01	<0.03	NO	
	Methane (L/m3)	3**	1	0	04/27/01	<.005		Bacterial action in ground water
	Sulphide	0.05**	1	1	05/04/01	0.004		Natural leaching in oxygen-poor conditions, low levels in surface water
	Sulphate	500**	1	1	05/04/01	4.8		Natural mineral sources
	Total Kjeldahl Nitrogen (TKN)		1	1	05/04/01	0.22		Organic matter leached into surface water from vegetation
	Total Dissolved Solids	500**	1	1	05/04/01	80		Indicator of dissolved minerals in water
Loch Lomond Distribution System	Aluminum	0.1**	1	1	05/04/01	0.01		Natural sources at low levels
	Arsenic	0.025	1	0	05/04/01	<0.0004	NO	Natural source at low levels
	Calcium		1	1	05/04/01	5.97		Common mineral constituent
	Copper	1.0**	1	1	05/04/01	0.0152		Corrosion of plumbing system, erosion of natural deposits
	Iron	0.3**	1	1	05/04/01	0.071		Erosion of natural deposits, corrosion of cast iron mains
	Manganese	0.05**	1	1	05/04/01	0.001		Erosion of natural mineral deposits
	Lead	0.01	1	1	05/04/01	0.0002	NO	Leaching from plumbing and service connections
	Zinc	5**	1	1	05/04/01	0.005		Natural sources, corrosion of plumbing
	Alkalinity	500**	1	1	05/04/01	21		Natural sources - dissolved carbonates
	Ammonia		1	0	05/04/01	<0.05		Natural sources at low levels
	Chloride	250**	1	1	05/04/01	2.7		Natural sources at low levels
	Conductivity (uS/cm)		1	1	05/04/01	64.1		Natural dissolved material in water
	Dissolved Organic Carbon (DOC)	5**	1	1	05/04/01	5		Organic matter leached into surface water from vegetation
	Hardness	100**	1	1	05/04/01	25		Natural dissolved minerals (Ca, Mg)
	Nitrate	10	1	1	05/04/01	0.09	NO	Natural sources at low levels, Fertilizer, septic runoff at high levels
	Nitrite	10+	1	0	05/04/01	<0.03	NO	
	Sulphate	500**	1	1	05/04/01	5.1		Natural mineral sources
	Total Kjeldahl Nitrogen (TKN)		1	1	05/04/01	0.20		Organic matter leached into surface water from vegetation

****** **-Aesthetic Objectives (AO). 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 Treatment Plant - Radionuclide Tests

Source Water	Parameter	MAC/ IMAC	# of Samples	# of Detectable Results	Date(s)	Range (mg/L)	Exceedance	Source of Parameter
Bare Point Treated	Gross Alpha	0.1 Bq/L	1	0	04/27/01	<0.024	NO	A discharge of Radioactive Materials
	Gross Beta	0.5 Bq/L	1	0	04/27/01	<0.039	NO	
	Tritiurm	7000 Bq/L	1	0	04/27/01	<9.6	NO	

Loch Lomond Water Treatment Plant - Radionuclide Tests

Source Water	Parameter	MAC/ IMAC	# of Samples	# of Detectable Results	Date(s)	Range (Bq/L)	Exceedance	Source of Parameter
Loch Lomond Treated	Gross Alpha	0.1 Bq/L	1	0	04/27/01	<0.017	NO	A discharge of Radioactive Materials
	Gross Beta	0.5 Bq/L	1	0	04/27/01	<0.038	NO	
	Tritium	7000 Bq/L	1	0	04/27/01	<9.2	NO	