

SUMMARY OF DRINKING WATER QUALITY MONITORING AT LAKELSE LAKE IN 2002-03

A safe and dependable supply of drinking water is critical to the health of all British Columbians, and we all want to have confidence in the quality of the water we consume. Drinking water quality is influenced by a number of factors including local geology, climate, and water flow patterns. Human land use activities in watersheds (such as urbanization/development, agriculture and forestry) can cause pollution, and are important influences on water quality.

The Regional District of Kitimat-Stikine (RDKS) is concerned about water quality at Lakelse Lake, and has voluntarily begun creation of a Liquid Waste Management Plan to protect drinking water supplies. The provincial government recently created a Drinking Water Action Plan to prevent contamination of drinking water, identify potential risks and improve water quality. Although the Northern Health Authority (NHA) plays the primary role in implementing the action plan, providing safe drinking water requires an integrated approach. The B.C. Ministry of Water, Land and Air Protection (MoWLAP) manages and regulates activities in watersheds that have a potential to affect water quality, and plays the lead role in protecting and monitoring drinking water quality at its source. The RDKS, NHA, and MoWLAP are all committed to improved protection of drinking water sources, and they have recently formed a partnership to assess source water quality at Lakelse Lake.

LAKELSE LAKE

Lakelse Lake is located on the eastern margin of the Coast Range Mountains, approximately 10 km south from the city of Terrace. The lake has low nutrient concentrations and good water clarity, making it an important recreational and fisheries resource. In addition to a large park, there are approximately 200 developed waterfront lots around Lakelse Lake. Parts of its watershed have been logged in the past. Lakelse Lake and its tributaries are drinking water sources for many lakeshore residences. In addition to possible water quality impacts from land use activities in the watershed, there is a general concern that onsite sewage disposal systems on lakeshore properties may not be functioning properly because they lie below the high water level.

2002-03 WATER QUALITY MONITORING PROGRAM

Lakelse Lake was sampled at three drinking water intakes in August and October 2002, and April and August 2003. A water monitoring program was also implemented on 11 tributary creeks over the summer of 2003. Water samples were analyzed for three indicators of bacteriological water quality (fecal coliforms, *E. coli*, and *Enterococci*), as well as a range of physical and chemical parameters that have health and aesthetic

implications in drinking water. Test results were compared to B.C. MoWLAP approved and working guidelines for drinking water quality.

TEST RESULTS FROM LAKELSE LAKE

Lakelse Lake Drinking Water Intakes:

All three bacteriological indicators were detected at Lakelse Lake drinking water intakes in 2002-03 indicating that the water is not safe for consumption without treatment. MoWLAP has bacteriological indicator water quality guidelines for water that will receive *at least disinfection* (treatment with chlorination or ultraviolet light) prior to consumption. Fecal coliform and *E. coli* concentrations were below these guideline levels, but *Enterococci* concentrations did not meet the guideline. This indicates that disinfection alone may not be sufficient to ensure potability of the water, and further treatment such as filtration may be required. See *Data Summary for Lakelse Lake* (attached) for additional information.

Turbidity at Lakelse Lake intakes was often greater than the recommended level of 1 NTU for water entering distribution systems, so effectiveness of treatment systems may be compromised by suspended materials in the water. At times, turbidity values also exceeded the 5 NTU (maximum) aesthetic guideline. Colour values and iron concentrations did not meet aesthetic drinking water guidelines in April 2003, and phosphorus exceeded its guideline level in one sample. None of these elements pose a health risk at observed concentrations. Other physical and chemical parameters were all below (MoWLAP) guideline levels on all dates at all intake sites.

Lakelse Lake Tributaries:

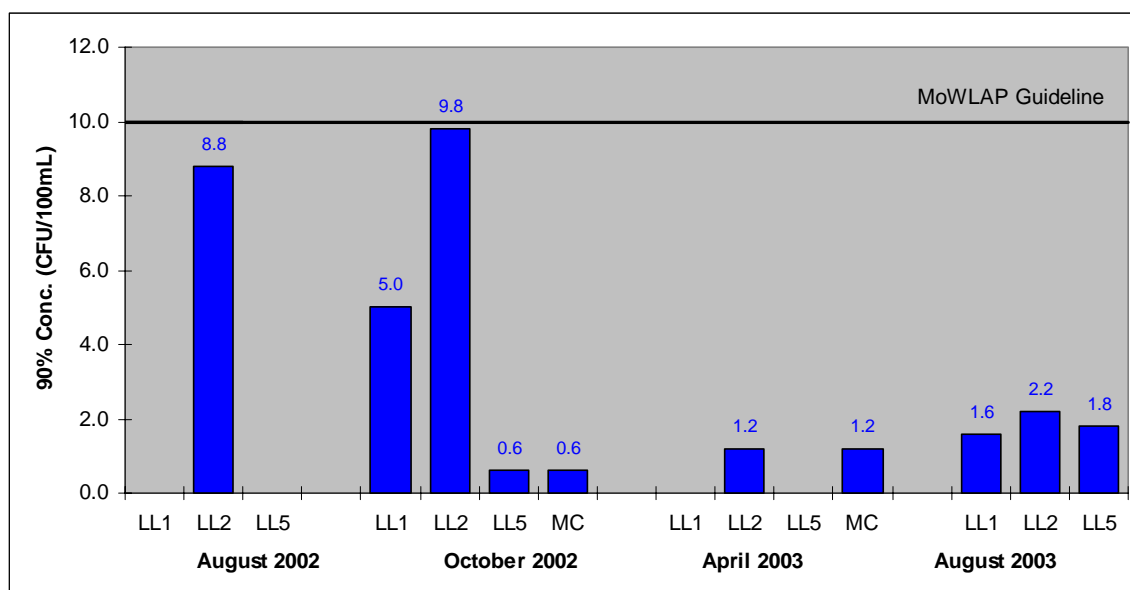
Fecal coliforms, *E. coli*, and *Enterococci* were all detected in every Lakelse Lake tributary that was tested in 2003. Fecal coliform concentrations ranged from <1 to 260 CFU/100mL, *E. coli* concentrations ranged from <1 to 240 CFU/100mL, and *Enterococci* concentrations ranged from <1 to 1130 CFU/100mL. Generally, downstream sampling sites had higher concentrations than upstream sites on the same date, suggesting that contamination is originating in the developed area of the watershed. The results indicate that water from tributaries around Lakelse Lake is not suitable for consumption without treatment, and these creeks do not provide a safe alternative to lake water. All surface water supplies should receive at least disinfection prior to consumption, and in many cases, bacteriological indicator concentrations indicate that higher levels of treatment are required.

In Lakelse Lake tributary creeks, turbidity, iron, manganese, and phosphorus also exceeded MoWLAP guideline levels in some samples.

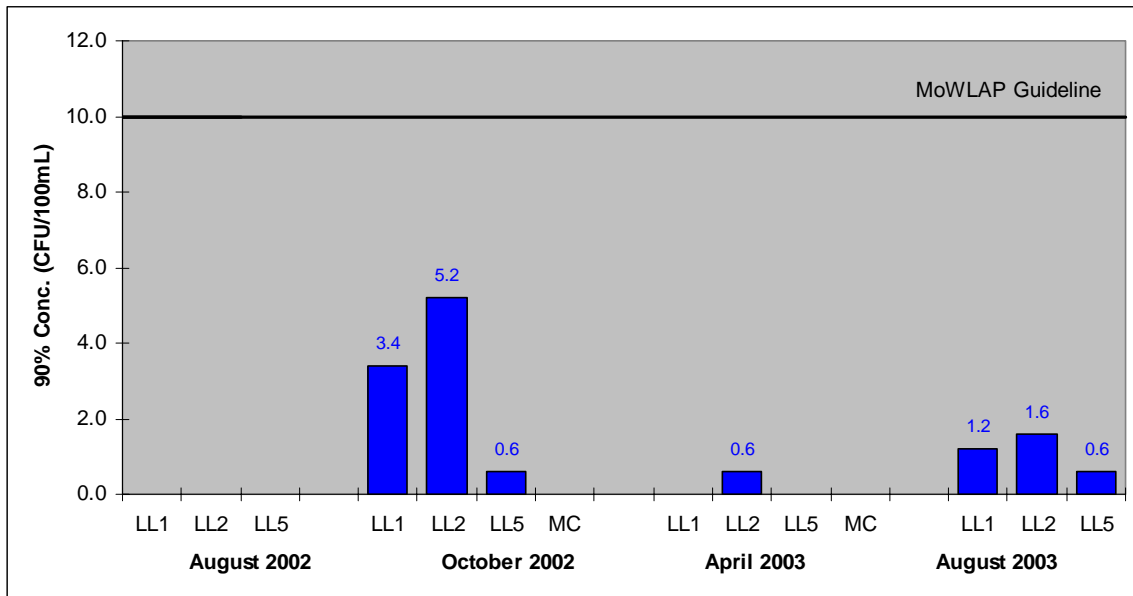
DATA SUMMARY OF LAKELSE LAKE MONITORING (2002-03)

The three figures below summarize bacteriological indicator results from Lakelse Lake sampling sites (**LL1**, **LL2**, and **LL5**) along with Mountain Creek, a tributary stream (**MC**). *The microbiological indicator guidelines used for surface water sources in this study (and shown in the Figures) assume that the raw water is receiving disinfection prior to consumption.* Blue bars that go above the horizontal line indicate sample sets where bacteria concentrations exceeded the guideline level, and therefore disinfection alone is not sufficient to ensure potability of the water. Sites without blue bars mean that no indicator bacteria were detected in samples from that site.

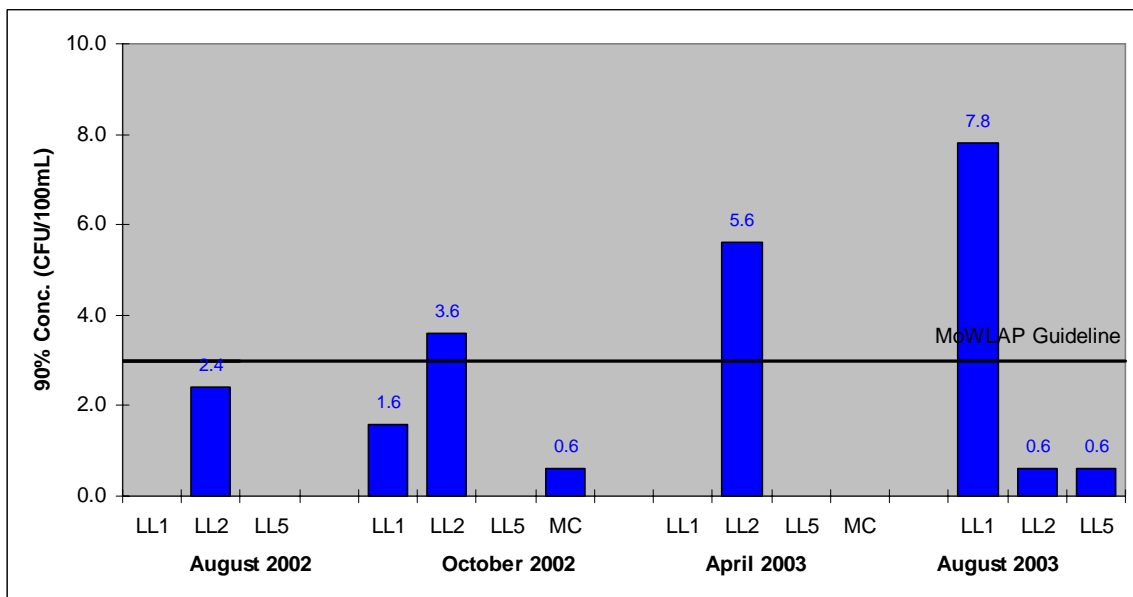
Fecal Coliform 90th Percentile Concentrations at Lakelse Sampling Sites



***E. Coli* 90th Percentile Concentrations at Lakelse Sampling Sites**



***Enterococci* 90th Percentile Concentrations at Lakelse Sampling Sites**



The table below summarizes other water quality results from Lakelse Lake sampling sites (LL1, LL2 and LL5). Results are reported in mg/L unless otherwise noted.

	#	Minimum	Maximum	Mean	Drinking Water Guideline	
	Values					
PHYSICAL						
pH (pH units)	12	7.3	7.6	7.5	≤ 8.5	ao (>6.5)
Specific Conductance (uS/cm)	12	47	68	57	≤ 700	mac
Residue Filterable - TDS	3	40	52	45	≤ 500	ao
Hardness Total - T	12	19.1	27.5	23.5	≤ 500	mac
Alkalinity (mg/L CaCO ₃)	3	24.3	24.9	24.6		
ANIONS						
Chloride Dissolved	3	1.6	2.0	1.8	≤ 250	ao
Fluoride Dissolved	3	0.03	0.03	0.03	≤ 1.5	mac
CARBON						
Organic Carbon - Total	3	1.4	1.7	1.6	≤ 2	mac (THM)
NITROGEN						
Total Kjeldahl N	8	0.05	0.12	0.08		
Total N	9	0.05	0.18	0.11		
Total Organic N	8	0.1	0.1	0.1		
Ammonia N	12	0.005	0.008	0.005		
Nitrate Nitrogen Dissolved	11	0.02	0.07	0.03	≤ 10	mac
Nitrate+Nitrite	11	0.002	0.069	0.023		
Nitrite Nitrogen	12	0.002	0.003	0.002	≤ 1	mac
PHOSPHORUS						
Ortho-Phosphorus	1	0.001	0.001	0.001		
Phosphorus Total Dissolved	9	0.002	0.007	0.004		
Phosphorus Total	12	0.002	0.016	0.007	≤ 0.01	mac (lakes)
SULFATE						
Sulfate	3	1.9	2.3	2.2	≤ 500	ao
METALS TOTAL						
Aluminum	12	0.0187	0.1650	0.0675	≤ 0.2	mac
Antimony	12	0.00001	0.00003	0.00001	≤ 0.006	imac
Arsenic	12	0.0001	0.0003	0.0002	≤ 0.025	imac
Barium	12	0.00985	0.01480	0.01155	≤ 1	mac
Beryllium	12	0.00002	0.00002	0.00002		
Bismuth	12	0.00002	0.00008	0.00003		
Cadmium	12	0.00001	0.00001	0.00001	≤ 0.005	mac
Calcium	12	6.61	9.44	8.12		
Chromium	12	0.0002	0.0002	0.0002	≤ 0.05	mac
Cobalt	12	0.000005	0.000058	0.000016		
Copper	12	0.00016	0.06550	0.01816	≤ 1	ao
Iron	12	0.117	1.130	0.334	≤ 0.3	ao
Lead	12	0.00001	0.00395	0.00058	≤ 0.01	mac
Lithium	12	0.00005	0.00054	0.00027		
Magnesium	12	0.60	0.99	0.78	≤ 100	ao
Manganese	12	0.006180	0.035700	0.016749	≤ 0.05	ao
Molybdenum	12	0.00051	0.00085	0.00068	≤ 0.25	mac
Nickel	12	0.00005	0.00018	0.00007		
Selenium	12	0.0002	0.0002	0.0002	≤ 0.01	mac
Silver	12	0.00002	0.00002	0.00002		
Strontium	12	0.031700	0.052200	0.042808		
Thallium	12	0.000002	0.000002	0.000002		
Tin	12	0.00001	0.00006	0.00001		
Uranium	12	0.000071	0.000164	0.000106	≤ 0.02	imac
Vanadium	12	0.00015	0.00100	0.00049	≤ 0.1	mac
Zinc	12	0.0002	0.0145	0.0059	≤ 5	ao

Note: ao = aesthetic objective; mac = max acceptable concentration; imac = interim max acceptable concentration

