

RISK ASSESSMENT OF KEMP LAKE AS A RAW WATER SOURCE (DEC 2003)

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The following is a summary of the Report.

OBJECTIVE

The objective of this study is to assess the capability of Kemp Lake as a source of raw water that will allow the production of a safe, clear, potable and aesthetically pleasing public water supply after treatment, now and in the future.

This report examines the watershed, the water source and available treatment technologies in achieving the above objective. It is not an evaluation of the present treatment, storage, distribution network, operation and maintenance or management of the water system.

The supporting documentation to the Guidelines for Canadian Drinking Water Quality provides the following: "Even the most sophisticated municipal treatment system cannot provide water that is absolutely free of disease-causing micro-organisms all the time. The real goal of treatment is to reduce the presence of disease-causing micro-organisms and associated health risks to an acceptable or safe level."

RECOMMENDATIONS

It is recommended that the Kemp Lake Waterworks District:

1. Undertake a program of best management practices, watershed stewardship, and emergency response planning to reduce the susceptibility of Kemp Lake to contamination.
2. Investigate the provision of water treatment comprised of coagulation, sedimentation, filtration and disinfection (or similar alternatives) OR investigate an alternative source of water, such as connection to the CRD water system.

NOTATION / CONCERN / HAZARD	RATING	NOTES	RECOMMENDATION
Chemical and Physical Data. In terms of chemical and physical parameters, the raw water meets Guidelines for Canadian Drinking Water Quality (Health Canada, 2001) except for the high colour.	Nil	According to the Guidelines for Canadian Drinking Water Quality (Health Canada, 2001), "colour may be due to the presence of coloured organic substances, metals such as iron, manganese and copper or highly coloured industrial wastes. Although the presence of colour in drinking water is not directly linked to health, experience has shown that consumers may turn to alternative, possibly unsafe, sources when their drinking water contains aesthetically displeasing levels of colour".	
Bacteriological Data. The raw water has significant levels of bacteria. The GCDWC applies to drinking water after treatment and hence has no guidance on raw drinking water quality. The BC guidelines published by the BC Ministry of Water, Land and Air Protection provides the criteria for raw water as a function of the level of treatment that is subsequently provided.	Nil	The BC Criteria are comparable to those of the US. The US Environmental Protection Agency "Surface Water Treatment Rule" stipulates that surface waters be disinfected and that surface waters be filtered unless certain stringent water quality source requirements and extensive monitoring requirements are met. The requirements to avoid filtration include ability to limit or control potentially adverse activities through ownership of the watershed or through written agreements (AWWA, 1990)(USEPA, 2002). The Kemp Lake water supply would not meet the requirements to avoid filtration.	Future monitoring should be based on Escherichia Coli and Enterococci rather than Fecal Coliform, Pseudomonas Aeruginosa should also be considered if resources permit. <i>Further recommendation from the Ministry is to monitor and track test results for changes or trends.</i>

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Parasitological Data. The Giardia analysis shows 15/100 mL but none of the organisms was viable (capable of producing disease).	Nil	The CGDWQ has established a guideline for Giardia, but because the current detection methods are not very reliable the guideline does not give a maximum acceptable concentration value for these parasites in drinking water.	An assessment of the disinfection reduction of the Kemp Lake water system could be carried out based on chlorine residuals and storage times in the pipelines and storage tanks. Giardia is removed effectively by more thorough treatment such as coagulation, filtration and disinfection.
Logging.	Low	Significant logging activity could degrade water quality by increasing the nutrients that cause growth of algae and aquatic weeds in the lake and affect the taste and odour of the water, increasing the amount of suspended solids, and increasing the intensity of storm runoff flows.	The District could encourage private landowners to use the environmentally sound practices mandated by the Ministry of Forests for community watersheds.
Wildfire.	Medium	Firefighting chemicals, runoff with increased organic matter and nutrients, increases in erosion due to higher peak flows, increase in water temperature through loss of vegetative cover.	
Dry Land Sort.	High	Drainage from TimberWest dry land sort could affect water quality primarily by addition of tannins and lignins, which cause colouring of the water and formation of trihalomethanes from chlorination, and the addition of fuel and oil residues from vehicles. Fuel storage is in a double-walled tank so fuel spillage should be minimal, except for possible spillage during filling of the tank and fuelling of equipment. Leakage of fuel from the fuel trucks would have a major impact on the lake.	The District should work with businesses in the watershed to develop and abide by guidelines for best management practices for the storage and handling of fuels and hazardous materials. Fuels storage tanks should have secondary containment.

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Otter Point Collision.	High	Could affect water quality if improper disposal of fuel, oil, antifreeze, paints or solvents was carried out on the property. Drainage from this site is ditched across the TimberWest Dry Land Sort into the seepage area that flows to a tributary of the lake.	The District should work with businesses in the watershed to develop and abide by guidelines for best management practices for the storage and handling of fuels and hazardous materials.
Agriculture.	High	Livestock farming operations probably have a significant impact on water quality in terms of bacteria and parasites (eg. E Coli, Giardia, Cryptosporidium). Livestock appears to have direct access to the lake, at least seasonally. In addition, manure on the land could easily contaminate the lake through direct draining off the fields to the lake.	Livestock owners in BC have the responsibility to ensure that the quality of water in watercourses is not impaired. A stewardship initiative involving the Ministry of Water, Land and Air Protection and the landowners should be undertaken to reduce the risk to the water quality of the lake.
Wildlife.	Medium	Potential source of pathogenic enteric bacteria and protozoa.	
Residential Sewage.	High	Sewage disposal is a potential risk for lake water quality. Of the eight residences on Manatu Road, four properties require additional assessment and two were deemed to be non-conforming to the extent that they might pose a health hazard. None of the properties were actually causing a health hazard at the time of inspection (2000).	A survey of the disposal fields in the remaining areas of the watershed should be undertaken to evaluate performance and insure that impacts on water quality are minimized. The District should contact the CRD to arrange for a septic system workshop in the area. A stewardship program should be developed to promote awareness of the sensitivity of the watershed and the best practices for its protection.
Residential Household.	Medium	Fuel oils, leaks from old buried tanks, over-filling and spills. Household hazardous waste such as cleaners, oils and pesticides.	A stewardship program should be developed to promote awareness of the sensitivity of the watershed and the best practices for its protection.

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Transportation Corridors.	High	Leaks from vehicles and spills of hazardous materials. Application of road salt. Roads are a significant risk to the lake as a water supply.	A watershed spill contingency plan should be prepared and distributed to emergency agencies, businesses, fuel companies and other commercial agencies making deliveries in the watershed. Signs on roads at the boundaries of the watershed should warn of the sensitivity of the watershed and provide emergency contacts if a contamination event should occur.
Water-Based Recreation.	Medium	With the restriction on motorized boats on the lake, the risk to the water supply is minimal.	The swimming areas should be posted with signs indicating that the lake is a water supply and providing desirable swimming and bathing practices.
Crown Land and Reserves.	Low	Depending on the purpose of the crown land reserves, there might be some protection of water quality.	Government agencies holding the reserve should be informed of the need to protect water quality.

CONCLUSIONS

Given the sensitivity of the lake as a surface water to activities in the watershed, the possible sources of contamination, the poor permeability of the soils, the short travel times of drainage to the lake, and the small size of the lake, Kemp Lake is highly susceptible to contamination affecting the potability of the water.

The susceptibility can be reduced by best management practices, watershed stewardship, and emergency response planning but there is risk inherent in the use of a surface water as a source. Increasing urbanization of the watershed will further degrade water quality.

Treatment comprised of coagulation, sedimentation, filtration and disinfection (or similar alternatives), together with the abovementioned protection measures, would be needed to maintain the capability of Kemp Lake as a source of raw water that will allow the production of a safe, clear, potable and aesthetically pleasing public water supply after treatment, now and in the future. The capital cost of a treatment facility is estimated at \$280,000 (to build only).

NOTES FROM KEMP LAKE WATERWORKS DISTRICT

The BC Government is soon to pass legislative changes to the Drinking Water Protection Act in the Spring 2003 legislative session. Many ministries and government agencies are involved in different aspects of drinking water protection, but there is no proper coordination and integration of these functions. One of the first objectives of the new legislation will be to ensure clear lines of responsibility within government for the various aspects of drinking water protection. The Ministry of Health Services will now be the lead Ministry and responsible for implementing the action plan for Safe Drinking Water in BC.

Of particular and direct benefit to the KLWD is the implementation of the position of Drinking Water Officer. The new Drinking Water Protection Act will define the authority of an important new group of Drinking Water Protection Officers. They will have the authority to investigate complaints, require testing and assessment, perform inspections, coordinate source protection, issue orders and take many other steps to ensure water safety. In regards to flexibility for small systems, on a case-by-case basis Drinking Water Officers may also permit different monitoring and assessment requirements for small water systems than would be required for large systems. For example, there could be more flexibility in the time allowed for small water systems to comply to standards, as long as interim measures are adequate to protect against immediate health risks.