

**REPORT TO MAGIC LAKE ESTATES WATER AND SEWER COMMITTEE
MEETING OF TUESDAY, JUNE 9, 2015**

SUBJECT WATER QUALITY UPDATE – MAGIC LAKE ESTATES

ISSUE

To update the Committee on current water quality within the overall system.

BACKGROUND

Water Quality Sampling Program – May 2015

Buck Lake and Magic Lake provide the source waters for the Magic Lake Estates drinking water system. Buck Lake is the main source with Magic Lake serving as a back-up system. The water is treated through a new dissolved air floatation or DAF treatment system. For May 2015, operators collected samples for weekly chemistry (e.g., chlorine residuals) and monthly biological (e.g., bacteria), physical (e.g., taste and odour, pH) and chemical (e.g., total organic carbon, total metals) parameters.

Water Quality Monitoring

Analyses indicated the absence of bacteria throughout the distribution system, reinforcing the efficacy of the treatment system for this parameter. However, elevated taste and odour results indicated a “moderate to strong earthy odour” in the Buck Lake source water, with less dominant taste and odour associated with Magic Lake source water. Concurrently, samples collected post-treatment had a “strong chlorine” taste and “low to moderate earthy odours”.

Capital Regional District (CRD) staff analyzed Buck Lake source water samples collected on May 7, 20 and 26 for biological parameters. Results indicated the presence of healthy colonies of the algae *Anabaena flos-aquae* and *Oscillatoria spp.* Both are blue-green alga that can produce the compound geosmin (earthy taste and odour) as well as potentially harmful cyanotoxins during a bloom and under certain environmental conditions. At this point in time, there is no indication that this algal event will have further implications for the community’s drinking water system other than aesthetic impacts. The algal concentration in the latest sample (May 26) was noticeably lower than in the earlier May samples, indicating improving conditions in the lake. However, the algae die-off is likely causing a temporary rise in geosmin concentrations in the water which is reflected in the strong earthy odours detected in the May 26 sample from Buck Lake (lab test score 4/4). It may take 1-5 weeks for geosmin to naturally degrade in the lake.

Magic Lake samples in early May show similar algae trends and more recent samples are still being analyzed.

As an operational response to the Buck Lake algal event, CRD staff increased the potassium permanganate dosage at the treatment plant to mitigate the taste and odour in the treated water and are closely monitoring the situation in both lakes for potential implications to the drinking water and the need for further mitigative action. A draft fact sheet with general information on algae in drinking water sources is attached as Appendix A.

Also of note, iron and manganese concentrations in the raw water were elevated as expected but after treatment, were well below the aesthetic objective (Guidelines for Canadian Drinking Water) in the distribution system.

Operations Update

On May 20, 2015, a scheduled maintenance procedure on mechanical equipment at the Magic Lake Estates Treatment Plant stirred up sediments and particles that had accumulated in some pipes and tanks, causing discoloured water to enter the distribution system. CRD staff immediately flushed most of the discoloured water from hydrants and standpipes in the distribution system; however, some customers experienced a “brown” water event at their taps. CRD informed the Committee Chair and posted an advisory to customers on the website from May 21-22. Staff received a few customer complaints as a result of this incident. At no time was the public’s safety compromised by this event.

RECOMMENDATION

That the Magic Lake Estates Water and Sewer Committee receive this report for information.

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Attachment: Appendix A – Draft FAQ - Algae and Water Quality

Algae and Water Quality

Frequently Asked Questions



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Bloom of a blue-green algae visible as a surface "scum".

What are algae?

Algae are a diverse group of organisms containing chlorophyll and other photosynthetic pigments. They range in size, shape and habitat. Some exist as microscopic single cells, others as colonies (aggregates of cells) that take a variety of forms from filaments to spheres. The seaweeds, including the giant kelps, are also part of this group.

Algae live in the air, soil, on snow and beneath polar ice but the majority of algae are found in water bodies all over the earth. Algae are an important component of aquatic food webs because they are the key food source for zooplankton, aquatic insects and fish.

Are algae a type of plant?

Not quite. Algae are similar to plants because they photosynthesize and contain chlorophyll but different from plants due to their lack of specialized structures such as roots, stems and leaves.

How do algae grow?

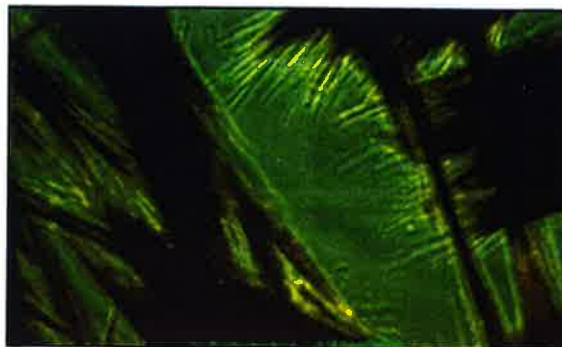
Algal population growth is dependent upon several factors such as available nutrients, sunlight, temperature, water flows and predation.

Are all algae green?

No, they're not! Most algae are grouped broadly according to their colour and there are many, including red, brown, golden brown, yellow-green, green and blue-green.

What is an algal bloom?

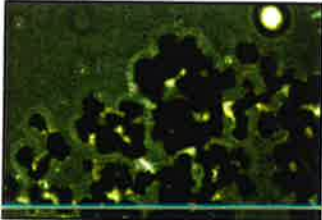
An algal bloom is a rapid increase in the population of one or more species of algae in a water body. Algal blooms are natural occurrences in water bodies and occur only under specific conditions. Though commonly associated with an upwelling of nutrients from bottom waters during the spring and fall season, algal blooms can and do occur at all times of the year.



Filaments of Aphanizomenon spp. clump together to form "flakes".

What are green algae?

More formally called the Chlorophytes, green algae range in form and size from microscopic single cells to macroscopic colonies and filaments. They have chloroplasts that are grass-green in colour. The presence of certain species is indicative of a range of water quality from low to high nutrient enrichment.



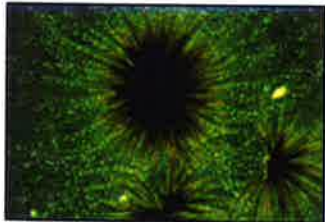
Colony of *Botryococcus braunii*. This organism is buoyant due to a high concentration of oil both in and between cells



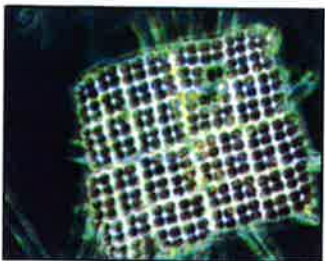
Colony of *Volvox* spp. Individual cells are visible, as are the darker green "daughter" colonies.

What are the blue-green algae?

Blue-green algae are somewhat primitive organisms that are believed to have been among the first forms of life on earth. Named due to their blue-green colour, these microscopic algae are also called Cyanobacteria. When they bloom, they can form blue-green surface "scum" which may disappear and reappear multiple times per day. Several species have the potential to produce toxins under certain conditions. While toxin producing blue-green algae exist in low concentrations in source drinking water lakes, normal lake conditions are not conducive to supporting blooms of these species.



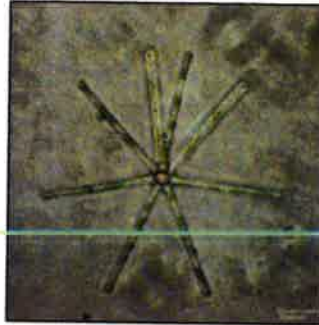
Individual filaments in buoyant colonies of *Gloeotrichia echinulata* radiate outward from the centre.



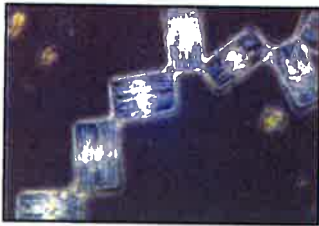
Oval or spherical cells in colonies of *Merismopedia* spp. are held together by a clear mucilage. Cells come together in quadrants to form flat colonies with a grid-like pattern.

What are diatoms?

Diatoms, the most numerous of all algal groups, are microscopic algae that have a cell wall made of silica (glass). The presence of certain diatoms indicates high water quality. Others, if they bloom, may produce tastes and odours, or clog water filters.



Star-shaped colony of *Asterionella formosa*. In high concentrations, this organism has potential to cause earthy or musty tastes and odours in water. Though unpleasant, the compounds responsible for these tastes and odours are harmless to humans and pets.



Zig-zag colony of *Tabellaria flocculosa*. In high concentrations, this organism can clog filters.

Do algae blooms affect drinking water?

Algal blooms occasionally occur in the source drinking water bodies supplying Greater Victoria residents. Although some algal blooms may produce taste and odour issues and several blue-green algal species have the potential to produce toxins, most algal blooms are benign.

What is the CRD's role in monitoring water quality?

CRD staff regularly collect samples from all source water bodies. Samples are analyzed for chemical and biological parameters, including the identification of algae present and determination of their concentration in the water.

Is Greater Victoria's water safe to drink?

Absolutely! Greater Victoria residents enjoy safe, healthy, drinking water. Greater Victoria's drinking water meets all provincial and federal health-based regulations.

Need more information? CRD Water Quality Program
250.474.9603 or www.crd.bc.ca/service/drinking-water



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