Disinfection Requirements

PURPOSE
This guideline has been established to ensure that public and semi-public drinking water suppliers throughout the Province of Manitoba meet their regulatory requirements with regard to disinfection.

Disinfection of drinking water is the single process that has the greatest impact on drinking water safety.

Legislation
The Drinking Water Safety Act (DWSA) Section 20 states that every public water supplier and semi-public who is required to disinfect must do so in accordance with the regulations.

Section 20 (2,3) requires water suppliers that are required to disinfect, measure and record disinfectant residuals prior to the water entering the distribution system after 20 minutes of contact time and periodically in the distribution system.

Operating Licence
All water system licenses provide primary and secondary disinfection standards and monitoring requirements specific to each water system.

Water Treatment Standards
Primary Disinfection
Primary disinfection refers to the first dose of a disinfectant the water receives immediately after treatment to ensure removal or inactivation of human pathogens such as bacteria, viruses and protozoa in water.

The following forms of primary disinfection are considered acceptable pursuant to Section 17(1) the Drinking Water Safety Regulation (MR 40/2007):

- Chlorine disinfection after 20 minutes of contact time under peak water demand conditions
- An alternative method (ex: ultraviolet (UV) light disinfection), or combination of methods of disinfection approved by the Office of Drinking Water

Section 21(1) of the Drinking Water Safety Regulation states that the minimum allowable disinfectant residual at the point where the water enters the water distribution system after primary disinfection is

- 0.5 mg/L of free chlorine for water systems using chlorine; or
- 1.0 mg/L of monochloramine for water systems approved to use chloramines

Secondary Disinfection
Secondary disinfection is required to maintain and protect the water quality within the distribution system, for the purposes of:

- protecting water from microbiological re-contamination
- reducing bacterial re-growth
- controlling biofilm formation; and
- serving as an indicator of distribution system integrity

Section 22 of the Drinking Water Safety Regulation states that the minimum allowable disinfectant residual at any point within a water distribution system is

- 0.1 mg/L of free chlorine for water systems using chlorine as the disinfectant; or
- 0.3 mg/L of monochloramine for water systems approved to use chloramines as the disinfectant

The Drinking Water Safety Regulation Schedule A states the minimum frequency of testing for disinfectant residuals. The frequency is based on the type of system (ODW-OG-09 Types of Water Systems), source water and population.

Monitoring and reporting requirements
All public water systems must test daily as water enters the distribution system (e.g., water leaving the treated water reservoir).
For water systems that report disinfection residuals through continuous monitoring; confirmatory handheld measurements must be taken at the water treatment facility where the water enters the distribution system (e.g. water leaving the treated water reservoir) or at other locations directed by the regional drinking water officer.

Water suppliers are required to record disinfectant residuals on an approved form and, at the end of each month, submit the completed form to the regional drinking water officer.

Distribution system disinfectant residual testing is required periodically at the same time and location as bacteriological samples are collected from the distribution system.

Water suppliers are to record distribution residuals on the bacterial sample submission form.

Monitoring and reporting on approved alternative disinfectants are specified in the operating licenses of the specific water systems.

**Approved alternate disinfectants**
Pursuant to Section 17(1) of the Drinking Water Safety Regulation (MR 40/2007) the following alternative primary disinfectants have been approved:

- **Ultraviolet light**
  Ultraviolet light (UV) is an effective, chemical free disinfectant process that provides inactivation of bacteria, protozoa such as Cryptosporidium and Giardia and some viruses. To ensure full virus inactivation, higher doses of UV radiation are required.

- **Chlorine Dioxide**
  Chlorine dioxide is a powerful disinfectant effective for inactivation of viruses, bacteria and protozoa such as Cryptosporidium and Giardia.

  Chlorine dioxide is a chemical disinfectant that is generated at the water treatment plant. Dosages must be limited to control the formation of chlorite and chlorate.

- **Ozone**
  Ozone is a powerful disinfectant that has been approved for public water systems only. Ozone can inactivate viruses, bacteria and protozoa such as Cryptosporidium and Giardia with less contact time and at lower concentrations than chlorine.

  Ozone is generated at the water treatment plant because it is unstable and reverts back to oxygen in a short period of time after generation.

- **Other Disinfectants**
  There are other methods of disinfection such as hydrogen peroxide, potassium permanganate, and bromine that have limited information supporting their effectiveness as drinking water disinfectants. As such, their use in Manitoba water systems as primary disinfectants has not yet been approved.

**Office of Drinking Water**
Regional Drinking Water Officers are available for operational and monitoring advice and to provide technical assistance.

After hours, please call the Environmental Emergency Response line at 204-944-4888 and ask for the on-call drinking water officer.

For more information related to Manitoba’s drinking water and how it is regulated visit: www.manitoba.ca/drinkingwater.