

4-3-2-1-0 Drinking Water Objective

Water suppliers are required to provide potable water to all users on their systems. The 4-3-2-1-0 drinking water objective provides a performance target for water suppliers to ensure the provision of microbiological safe drinking water. Interior Health supports water suppliers to meet this objective. All water suppliers serving populations greater than 500 people should have an implementation plan to meet this as a standard.

This objective will be applied as a performance standard for all new water systems. Many existing water systems already meet most of the standard. Risk to human health is substantially reduced when water suppliers meet this objective.

Water suppliers will be required to provide long term plans to reach the goals of:

- 4 log inactivation of viruses
- 3 log removal or inactivation of Giardia Lamblia and Cryptosporidium
- 2 refers to two treatment processes for all surface drinking water systems
- 1 for less than 1 NTU of turbidity with a target of 0.1 NTU
- 0 total and fecal coliforms and E. Coli

Definitions:

4 log inactivation of viruses:

Viruses are easily inactivated by the use of chlorine. The common practice of maintaining 0.5 mg/L of free chlorine for 20 minutes is adequate in most cases.

3 log removal or inactivation of giardia lamblia and cryptosporidium protozoa

The 3 log removal or inactivation of these protozoa is the minimum level required of water systems that have a source that is considered “low risk” by Interior Health and have not had an outbreak of either disease. **Giardia** may be inactivated by large doses of free chlorine, ultraviolet light, ozone and chlorine dioxide, or removed by filtration. The US EPA has developed design guidelines to determine that the proposed treatment will provide the inactivation desired. For example, chemically assisted rapid sand filtration with sedimentation is given a credit of 3.0 log inactivation. Log inactivation credits of 3.0 for slow sand filtration and 2.5 for direct filtration are given. The remaining credit must be accomplished by another means such as ultraviolet disinfection or free chlorine with a long contact time. The Guidelines for Canadian Drinking Water Quality for **Cryptosporidium** have developed design guidelines to determine that the proposed treatment will provide the inactivation desired. Systems with optimized conventional rapid sand filtration are given a credit of 3.0 logs. Membrane filtration may be required to demonstrate removal efficiency through challenge testing and verified by direct integrity testing. Ultraviolet disinfection is given a credit of 3.0 logs if the dose is a minimum of 40mj/sq. cm.

2 treatment barriers are a minimum for all surface water sources. A multiple barrier approach to water treatment is associated with providing potable water:

The main risk to water quality is from microbiological agents. Some of these microbial risks are more resistant to some forms of treatment than others. It is recognized that effective treatment for all microbial risks by a single treatment barrier is not effective. A minimum dual barrier of treatment is required for all surface water to reduce the risk of microbial or health threats to drinking water. Water filtration and disinfection will become the norm for surface water supplies in order to meet the 4-3-2-1-0 performance objectives. For other sources where the turbidity standard can be met without filtration (for example, a well beside a lake), dual treatment may mean chlorination and UV light disinfection. Ground water sources that are not under the influence of surface water will be given credit for filtration.

<1 NTU of turbidity (less than)

The Guidelines for Canadian Drinking Water Quality currently specify that the filtered treated water turbidity should have a target of less than 0.1 NTU at all times. Specific filtration technologies may have target turbidity ranges from 0.1 to 1.0 NTU. Exemptions for filtration may be considered for those systems that use two disinfectants plus maintain chlorine residual in the distribution system and can demonstrate compliance with the GCDWQ for exemption for filtration..

0 Fecal coliform or E. coli bacteria

The Drinking Water Protection Act requires water suppliers to provide water with 0 E.Coli sample results. Coliform bacteria are easily controlled with chlorine, UV light and can be reduced by filtration.