

B.C. IRRIGATION MANAGEMENT GUIDE

Chapter 10

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LIMITATION OF LIABILITY AND USER'S RESPONSIBILITY

The primary purpose of this B.C. Irrigation Management Guide is to provide irrigation professionals and consultants with a methodology to assess the irrigation system performance and manage the system effectively.

While every effort has been made to ensure the accuracy and completeness of these materials, additional materials may be required to complete more advanced assessments. Advice of appropriate professionals and experts may assist in completing assessments that are not covered in this Guide.

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10 USE OF RECLAIMED WATER

Reclaimed water is the term used for water that has been treated at a municipal waste treatment facility and is of an acceptable quality to be reused. In some parts of British Columbia, reclaimed water is a viable source of irrigation water for farmers. As the demand on water resources increase and the competition for water becomes more intense, reusing water will become more prevalent. The regulations, code of practice and irrigation considerations regarding the use of reclaimed water for agriculture are discussed in this chapter.

10.1 Municipal Sewage Regulation

The Municipal Sewage Regulation (MSR) of the Waste Management Act (WMA) allows for the use of reclaimed water on agricultural crops. Water purveyors that wish to supply reclaimed water to agricultural areas must ensure that the reclaimed water meets the quality standards outlined in Schedule 2 of the Regulation. The permitted agricultural uses are shown in Table 10.1. There are two standards for water quality, restricted public access and unrestricted public access.

Category 1: Restricted Public Access

Category 1 reclaimed water requirements are at a level more stringent than most discharge effluent standards, though the resulting quality still requires that the public be restricted from contact with it, including access to land irrigated with the reclaimed water.

Category 1 reclaimed water uses are limited to activities where:

- The public will not likely come into contact with the reclaimed water.
- Sufficient time has elapsed since treatment or use prior to public contact.
- In the case of agricultural products, a commercial process has been applied to make the product safe for distribution.

Category 2: Unrestricted Public Access

Category 2 reclaimed water is of sufficient quality that the MSR and the code allow public contact with it, e.g., public access to land irrigated with the reclaimed water. The restricted public access category is of lower quality and has restrictions on public access.

The regulation outlines the treatment requirements for each category of reclaimed water.

 http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/129_99.htm

Table 10.1 Permitted Uses and Standards for Reclaimed Water	
Agricultural Irrigation Use	Effluent Quality
Category 1: Restricted Public Access	
commercially processed food crops (1) fodder and fibre crops pasture (2) silviculture nurseries sod farms spring frost protection (3) chemical spray trickle or drip irrigation of orchards and vineyards	pH = 6 – 9 < 45 mg/L BOD ₅ < 45 mg/L TSS < 200 fecal coliform per 100ml
Category 2: Unrestricted Public Access	
food crops eaten raw orchards and vineyards pasture seed crops frost Protection (3) crop Cooling chemical spraying on crops eaten raw	pH = 6 – 9 < 10 mg/L BOD ₅ < 2 NTU < 2.2 fecal coliform per 100ml
<p>(1) Irrigation of Commercially Process Food Crops Commercially process food crops are those that, prior to sale to the public or others, have undergone chemical or physical processing, such as canning, heat treatment, fermentation and pickling to destroy pathogens.</p> <p>(2) Irrigation of Pasture Milking animals must be prohibited from grazing for 6 days after irrigation ceases. Other cattle must be prohibited from grazing for 3 days after irrigation ceases unless the meat is inspected under the Federal Meat Inspection Program.</p> <p>(3) Frost Protection with Irrigation Reclaimed water that is under the Unrestricted Public Access category can use frost protection in the spring and fall. If the reclaimed water is under the Restricted Public Access category frost protection with irrigation can only be done in the spring. It is assumed that the spring frost protection would occur well before harvest.</p>	

10.2 Code of Practice for the Use of Reclaimed Water

The Code of Practice is a key reference and guidance document for the use of reclaimed water. It is designed to support the regulatory requirements and is a companion document to the MSR. Irrigation systems can use reclaimed water provided that the systems are designed and operated to maximize beneficial use, using only sufficient quantities to replenish the crop's climatic soil moisture deficit.

Considerations for Use of Reclaimed Water

The MSR and the Code specify the use of reclaimed water for agriculture as determined for each of the following two categories.

Crop Irrigation

Reclaimed water can have a beneficial nutrient content. Knowledge of nutrient uptake and removal by the crop is required to adjust fertilization programs to account for the nutrients supplied by the reclaimed water.

Category 1 Reclaimed Water

Considerations for the use of Category 1 reclaimed water are:

- Irrigation through sprinkler systems may only be applied to forage, fibre, nursery and turf, or food crops that are commercially processed.
- Trickle/drip irrigation systems may be used on orchard and vineyard crops provided that the reclaimed water does not contact the fruit.
- Spring frost protection is allowed but crop cooling and autumn frost protection are not.
- Category 1 reclaimed water must not be applied to crops that will be eaten raw, except for orchard and vineyard crops as qualified above.



Category 2 Reclaimed Water

Category 2 reclaimed water may be applied:

- by sprinkler irrigation systems to forage, fibre and nursery crops
- by sprinkler systems to food crops that are commercially processed
- to crops that will be eaten raw, provided that the water does not contact the fruit or vegetable directly



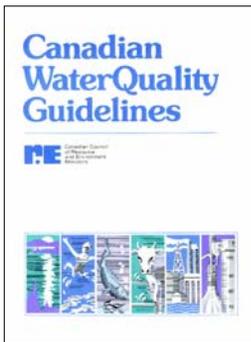
Guide to Irrigation System Design with Reclaimed Water

Drip and trickle systems must be used for sweet corn, berry and fruit crops. Vegetable crops must be irrigated with a subsurface drip irrigation system. Root crops may not be irrigated with reclaimed water if they are

likely to be eaten raw. Processed vegetables should be thoroughly washed and cooked.

Extra precautions should be taken with sweet corn and some cole crops. Water that accumulates inside the husks may not have an opportunity to drain away, and may be shielded from the disinfecting effects of sunlight. There is greater potential for bacteria growth under these conditions.

General Irrigation



Follow the practices listed below for general irrigation:

- Irrigation shall be applied to provide crop water needs over an irrigation interval, providing an allowance for some leaching, but minimizing leaching to groundwater.
- Reclaimed water contains higher levels of metals than most fresh water supplies. Water samples should be taken to ensure that metals and specific ions do not exceed Canadian Water Quality Guidelines.

 **Canadian Water Quality Guidelines**

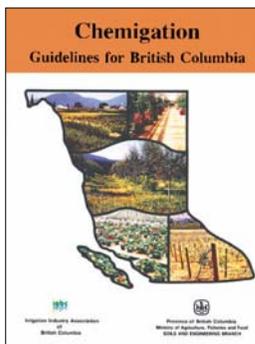
- Reclaimed water may not be used for irrigation within 30 m of any well or in-ground reservoir used for domestic supply.
- There must be no surface runoff of reclaimed water from irrigated lands.
- Reclaimed water irrigation systems must be managed to minimize aerosol drift from irrigated land.
- Adequate disinfection (minimum chlorine residual of 0.5 mg/L) must be maintained in reclaimed water discharged from the disinfection system to the irrigation system.

Cross-Connection Control

An approved backflow preventor must be used where a cross-connection might cause contamination of a potable water system. In most cases, the reclaimed water system may not be connected to any potable water system.

 **Chemigation Guidelines for British Columbia**

 **Irrigation System Cross Connection Control**



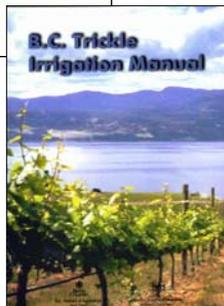
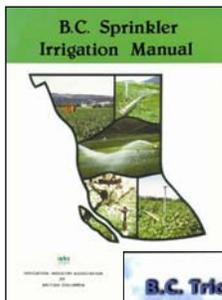
Soil Considerations

Irrigated land must be monitored to prevent soil saturation, surface erosion, and instability in the irrigated areas and downgradient of the irrigated lands.

While all water sources contain some salts, reclaimed water contains higher levels of salts than the fresh water supply. There is also a higher proportion of sodium in relation to other dissolved cations. The primary concerns for sodicity and salinity control in reclaimed water are:

- selecting crops properly
- ensuring adequate salt and specific ion tolerance of the crops to be irrigated
- ensuring satisfactory levels of salinity, sodicity and specific ion concentrations in soil seed-bed during germination
- ensuring sufficient irrigation to allow for some leaching
- ensuring sufficient drainage to dispose of leaching water

Specific Design Suggestions



In accordance with Part 5 of the MSR, reclaimed water irrigation systems must be designed by a Professional Engineer (P.Eng.) with experience in irrigation system design, or by a Certified Irrigation Designer (CID) registered with the Irrigation Industry Association of British Columbia (IIABC).

 www.irrigationbc.com

Design and construct irrigation works in accordance with best current practices. For agricultural irrigation systems, the design must be in accordance with the *B.C. Sprinkler Irrigation Manual* or the *B.C. Trickle Irrigation Manual*.

 **Guide To Irrigation System Design with Reclaimed Water**

 **B.C. Sprinkler Irrigation Manual**

 **B.C. Trickle Irrigation Manual**



