Manitoba
Health
Health Protection Unit

COMMERCIAL PREPACKAGED and NON-PREPACKAGED WATER GUIDELINES (Volume 1)

Under *The Public Health Act* regulations, the operators of **Water Bottling Plants** or **Water Vending Machines** must obtain regulatory approval to process and sell water for domestic purposes.

These types of facilities *must be designed, operated and maintained* in a sanitary manner to ensure that water does not become contaminated and pose a risk to Public Health.

For the purposes of harmonization of standards with other jurisdictions, this guideline is a close adaptation of the *"Code of Hygienic Practice for Commercial Prepackaged and Non-Prepackaged Water",* as published by the Canadian Food Inspection System (CFIS) committee.

This is a guideline only. Additional items may be required by the Public Health Inspector and/or Health Officer pursuant to the *Food and Food Handling Establishments Regulation (The Public Health Act).* For more information and access to downloadable documents, go to: www.manitoba.ca/healthprotection

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VOLUME 2: *"Appendices 1-8 of the Commercial Prepackaged and Non-Prepackaged Water Guidelines"*
*(*available online at: www.manitoba.ca/healthprotection)*

1.0 INTRODUCTION

The prepackaged water industry is large and growing internationally. The types of water products and packaging vary dependent upon consumer tastes. The Canadian water industry has also expanded in size and diversity. There is a need for appropriate guidelines so that water bottlers and processors can ensure the microbiological, chemical and physical safety of their products.

At the time of developing this Guideline there have been no serious illnesses reported in Canada associated with bottled water (*Warburton D., Health Canada*[1]). However, prepackaged water like any food may be exposed to sources of contamination (biological, chemical or physical) that may impair its quality or become a safety risk to consumers.

Canadian and international surveys indicate that sources of contamination may be naturally occurring, or may be introduced during processing or packaging. Contamination may also occur when water is transferred from the original source to tanker trucks that haul water to prepackaging plants or non-prepackaged consumer self-serve devices.

Studies conducted in Canada since the 1980s indicate that prepackaged waters may contain harmless bacteria from naturally occurring sources, as well as those introduced during the processing or packaging process. The presence of these harmless bacteria should not be confused with **microbial pathogens or indicators of faecal contamination, which must not be present in prepackaged or non-prepackaged water sold in Canada**.

The Canadian Food Inspection System (CFIS)[2] was created in 1994 for the development of national food safety Guidelines. This was a collaborative process between federal, provincial and territorial governments. The objectives of CFIS are to facilitate harmonization, streamline the inspection Codes, reduce pressures on industry and provide a system that is flexible, responsive and timely. Working committees have been established to develop model regulations and Codes. A CFIS sub-committee was formed to develop the *Code of Hygienic Practice for Commercial Prepackaged and Non-prepackaged Water* (the 'Code') for use in Canada. Manitoba has carefully adapted the Code and reformatted it into a compliance guide to supplement existing food safety regulations *(hereafter referred to as 'the Guideline'.)*

1.1 Objective

The Guideline establishes a common set of hygienic practices for the safe collection, processing, packaging, transporting and storing of commercial prepackaged water and the collection, transportation, storage, processing and dispensing of non-prepackaged water for human consumption offered for sale.

This is accomplished by:

1.1.1 adopting the principles of the *Codex Alimentarius Commission*, such as those contained in the *Codex* documents in the Reference List[3];

1.1.2 developing a HACCP (Hazard Analysis Critical Control Point) plan or similar type system that is commodity/industry specific and identifies specific hazards and establishes system controls that focus on prevention rather than end product testing; and

1.1.3 providing a Guideline that is responsive to the changing needs of industry and other stakeholders.

1.2 Scope

1.2.1 The Guideline is applied to all facilities that process, package, bottle, distribute or dispense water intended for human consumption but does not include facilities classified as a public or semi-public water supply system licensed under *The Drinking Water Safety Act.*[4]

1.2.2 The Guideline may be applied to prepackaged and non-prepackaged water that is labelled such as spring, mineral, glacial, prepared, flavoured (without added sweetener) and/or carbonated. It also may be applied to prepackaged water that is distributed for point of use drinking water, water coolers and water that is distributed in bulk containers for replenishing water vending facilities designed for point of use dispensing into individual consumer containers.

1.2.3 The hygienic practices for commercial non-prepackaged water are limited to requirements for source water protection, safe collection, water vending machines, and non-prepackaged haulage of water in tanker-trucks.

1.2.4 The Guideline references the *Food and Drugs Act* and *Division 12, Prepackaged Water and Ice* of the *Regulations*.[5] Together, the *Food and Drugs Act* and its *Regulations* govern commercial prepackaged and non-prepackaged waters for quality, safety, labelling and identity standards.

1.2.5 Manitoba prescribes the following standards for water safety and quality, equipment and construction standards, as the approval authority pursuant to the regulations under *The Public Health Act.*[6]

1.2.6 The Guideline references the most recent edition of the *Guidelines for Canadian Drinking Water Quality*[7] for good manufacturing practices for hygienic requirements.

1.3 Manitoba – Regulatory References

Under *The Public Health Act* regulations, the owner of a premises involved in processing, packaging, distributing or selling commercially prepackaged and non-prepackaged water is required to apply for a permit to operate. Copies of the application form and the *Food and Food Handling Establishments Regulation (339/88R)* are available on-line at: www.manitoba.ca/healthprotection

The following excerpts are provided for quick reference purposes only. Readers are urged to consult the complete copy for full details:

Definitions

"Food" means any substance intended for human consumption and includes ice, water or other liquids.

"food handling establishment" includes any place, premises, structure or vehicle in which food is: (a) manufactured, processed, prepared, packaged, stored or handled.

Registration

2 No person shall construct, extensively remodel or operate a food handling establishment or other building intended to be used as a food handling establishment without first registering the food handling establishment by completing and filing a registration form in a form approved by the minister.

Permits

3(1) Subject to subsections (4) and (5), and to section 3.1 of the Regulation, no person shall operate a food handling establishment unless in possession of a valid and subsisting permit in a form approved by the minister, issued by the director or a public health inspector.

1.4 Registration

For the purposes of obtaining a permit to operate a water bottling plant or water vending machine, an owner must register by completing an application form (available online at: manitoba.ca.healthprotection). The completed form and detailed plans must be submitted to the local Public Health Inspector or Health Officer for review.

1.5 Permits

All facility owners must hold a valid health permit. Permits are not transferable to another person. Unless otherwise indicated, permits expire on March 31st of each year and are renewed automatically by the local Public Health Inspector or Health Officer provided the premises are designed, maintained and operated in compliance with the guideline requirements.

1.6 Definitions

For the purposes of this Guideline the following definitions apply in addition to those listed in *Manitoba Regulation 339/88R*:

approved source is a source of water approved by a Medical Officer of Health pursuant to the *Water Supplies Regulation* (under *The Public Health Act*) or water from a system licensed as a public or semi-public water supply system under *The Drinking Water Safety Act.*[8]

bottled water is prepackaged water.

bulk water is defined as potable water intended for human consumption that is conveyed and dispensed from an approved transport vehicle *(i.e. Water Hauling Truck).*

bulk water hauler is the owner and/or operator of a bulk water transport vehicle.

carbonated water is water which contains dissolved carbon dioxide, added and/or naturally occurring, in a concentration such that the water is perceptibly effervescent when the water is in contact with the atmosphere, both the water and the atmosphere being in a normal or near normal state of atmospheric temperature and pressure.

contaminant is any foreign physical, biological, chemical, or radiological agent, material or other substance which may compromise food safety or quality.

contamination is the exposure of food to conditions which may permit the introduction of foreign material including filth, poisonous or other harmful substances or pests, pathogenic microorganisms, toxins, or parasites.

control is action to ensure and maintain compliance with criteria established in a food safety management system such as a 'hazard analysis critical control point (HACCP) plan.

critical control point (CCP) is a point, step or procedure at which control can be applied and a food safety hazard can be prevented, eliminated, or reduced to acceptable levels.

disinfection is an effective germicidal treatment, by means of chemical or physical methods.

establishment is a suitable building, area or surroundings in which water intended for bottling or distribution is collected, processed and bottled. *(synonyms: premise, facility)*

flavoured water (non-sweetened) is water to which aromatic substance(s), other than sweeteners or alcohol, has been added so that the resultant water still retains normal water transparency and is without colour.

good management practices (GMPs) are industry best practices for the production of safe food.

glacial water is water collected from glacial melt water that maintains the same consistent composition of the major minerals and characteristics as that of the proglacial stream at the point of emergence.

groundwater is water originating from subsurface which may be protected or unprotected.

groundwater under the direct influence of surface water (GUDI) means groundwater that has a hydraulic connection to surface water, or that is deemed or determined to be GUDI under the *The Drinking Water Safety Act* of Manitoba.

lot is the amount of product of a specific container size, product style and Guideline produced by a specific plant during a specified period of time not exceeding one day.

mineral water is water from a potable and safe groundwater source that has not passed through a licensed water supply system and that contains a minimum amount of total dissolved solids as may be prescribed by existing federal and provincial regulations.

non-prepackaged water is water that is intended for human consumption, is offered for sale and is dispensed directly into consumer's containers from a self-serve device or from a tanker-truck *(related terms: vended water, bulk water, water dispenser)*

prepackaged water is water contained in a sealed container that is intended for human consumption. *(related terms: bottled water)*

prepared water is water not designated by its origin or that does not comply with the Codex definition for "*waters defined by origin".*

protected groundwater is groundwater which is not directly influenced by surface water or the surface environment.

spring water is water which comes from a potable and safe groundwater source without passing through a licensed water supply system and that contains a maximum amount of total dissolved solids as may be prescribed by existing federal and provincial regulations.

water bottling plant is an establishment where water is handled, processed, packaged and stored for sale to the public (*see 'prepackaged water', 'bottled water'*)

water vending machine *(synonym: self-serve water dispenser)* is any self-service device connected to an approved water supply which, upon insertion of a coin, coins, paper or electronic currency, token, card or receipt of payment by other means, dispenses a unit serving of treated water and/or other water products into a container without the necessity of refilling the machine between each operation [9] [10].

2.0 BOTTLING PLANTS - CONSTRUCTION DESIGN & FACILITIES

2.1 Site and Location

Rationale: The building and equipment should be designed and constructed so as not to contaminate water. Conditions that might lead to contamination include excessive dust, foul odours, smoke, pest infestations, airborne microbial and chemical contaminants, and other similar conditions.

2.2 Design and Construction Specifications

General guidelines on construction standards and requirements are contained in the CFIS *Food Retail and Food Services Regulation and Guideline*. This section contains only those recommendations, which are specific to the source and processing or packaging facilities. Minimum regulatory standards for the design, construction and operation of bottling plants are prescribed in the *Food & Food Handling Establishments Regulation (Manitoba Regulation 339/88R) and associated guidelines.*

2.2.1 Premises Design and Layout

Rationale: Unnecessary movement of water and personnel within the water packaging premises increases the likelihood of contamination, and should be controlled as much as possible. If unsanitary operations are conducted in close proximity to sanitary operations, the likelihood of contamination is increased. A properly designed and operated water packaging establishment will minimize the opportunity for water to be contaminated. Establishing sanitary water handling areas within the plant will reduce the risk of contamination from environmental sources.

2.3 Lighting

Rationale: Adequate lighting promotes cleanliness by facilitating the identification of unclean areas. Shielding lights to prevent the contamination of water from glass fragments in the event of breakage is an essential public health protection measure. Adequate lighting also facilitates the identification of physical contamination in susceptible areas.

- There should be adequate (> 540 lux) lighting levels in work areas where inspection of bottles and bottle filling and capping takes place and 200 lux in all other areas.

2.4 Ventilation

Rationale: The air supplied to a water processing or packaging facility should be of sufficient quality so as not to contaminate the equipment or the water. Unclean air, excessive dust, odours, or build-up of condensation or grease are all potential sources of water contamination.

- Adequate ventilation should be provided to prevent excessive accumulation of heat, ozone gas, condensation, and dust, and to remove any contaminated air.
- Ventilation openings should be equipped with close fitting screens or filters to prevent the intake of contaminated air.
- Filters should be cleaned or replaced as appropriate or indicated by the manufacturer.

Rationale: Packaging water is one critical control point (CCP) where physical contamination can occur because it is not a closed system as is the case in most of the plant. Contamination can occur from splashing, insects, filth or dust. Preventing dust from entering the area can reduce the opportunity for contamination.

- Packaged water should have an enclosed room/chamber for filling and this area should be under positive air pressure with filtered air.

Rationale: Ozone is an atmospheric pollutant and excess levels of ozone in the atmosphere may pose serious health and safety issues for employees. When ozone is used in treatment there should be an effective means of removing or neutralizing the residual ozone released to the indoor air.

- Sufficient ventilation should be provided to prevent unacceptable accumulation of ozone gas.
- Ozone gas should be vented through a suitable destructor unit, as per the manufacturer's specifications for installation and operation.

2.5 Storage Areas

Rationale: Water including prepackaged water can be susceptible to physical contamination or odour and taste transference from external sources.

- Packaging materials and finished products should not be stored in areas where volatile chemicals (with the ability to transfer strong odours or taste to finished water) and high humidity (where mould growth potential is increased) exist.

- Finished products should be stored and handled so as to prevent damage and contamination by:

  a) storing and handling under conditions to prevent deterioration, including stored away from light sources to prevent algae growth;
  b) storing in clean and dry areas to prevent packaging contamination;
  c) storing the packaged product separate from chemicals or products which may transfer odour or taste;
  d) rotating stock to prevent deterioration that could prevent a health hazard or compromise the product quality;
  e) clearly identifying and isolating returned or defective suspect product for appropriate disposition; and
  f) providing customers with educational materials explaining the proper handling and storage of the water and the bottles.

2.6 Water Supply for Cleaning

Rationale: An adequate water supply, in quantities that encourage cleaning and rinsing, is necessary to ensure effective cleaning and safe processing operations. A safe water supply for cleaning and other sanitation is necessary to avoid contamination of the water handling equipment or the water product.

- The water used for sanitation and domestic purposes in the plant must be potable.

2.7 Final Rinse Water

Rinse water must also be potable.

3.0 WATER SOURCE, COLLECTION & MONITORING REQUIREMENTS

3.1 Primary Water Collection

- Water may be from a public or semi-public drinking water system, a groundwater source (e.g., well) or a surface water source (e.g., lake, glacier).

- Water obtained from a water supply other than a public or semi-public system regulated by the *The Drinking Water Safety Act* is subject to review & approval of the Medical Officer of Health pursuant to *Manitoba Regulation 330/88R.*

Rationale: An assessment of the safety of the source, the collection process, and the water quality will determine the treatment necessary to achieve final end product safety. Water collection is a CCP in selecting and sustaining a safe source. A safe

water supply is also critical for equipment cleaning and sanitization and packaging sanitation. The source will also determine the market identity of the water.

3.2 Safety Goals and Principles of Water Collection

Rationale: It is important to determine the overall safety of a water source. Routine testing of the source water for consistency of water characteristics is the prime method of conducting a **risk assessment**. A risk assessment can help determine the water source safety and alert the bottler to possible hazards.

The following steps may increase the safety of the primary water collection:

a) Choose a safe source and location (see sections 3.4 to 3.6).

b) Protect the recharge and contribution area (see sections 3.7 and 3.8).

c) Construct a safe water collection facility and establish safe procedures for operation (see sections 3.9 and 3.10).

d) Monitor the level of safety and determine if alternative monitoring or protection measures are necessary (see sections 3.11 and 3.12).

3.3 Source Safety Levels and Recommended Treatment

There are three levels of safety: **maximum, minimum** and **unacceptable level**.

3.3.1 **Maximum level of safety** applies to water from a source which has the following characteristics verified through long-term *monitoring (see Volume 2, Appendix 4.3):*

a) The water is safe without treatment;
b) The water is not contaminated by foreign substances or microorganisms;
c) The source of the water has shown minimal risk of any existing and future contamination
d) The source of water has natural barriers that ward off any potential risk of contamination (including those microorganisms generated by the external fauna and flora);
e) The source is protected from the occurrence of new or future risks of contamination through watershed protection; and

f) The water is regularly monitored to verify its safety and consistency of the above criteria.

Note: At a source which meets the **maximum level of safety**, the water may be bottled without disinfection provided the bottling is performed hygienically at the source (with *no bulk transport between the source and the bottling facility).* This level of safety corresponds to the safety objectives set by Codex general standard for *"waters defined by origin".*

3.3.2 **Minimum level of safety** applies to water from a source which has the following characteristics verified through long-term monitoring:

a) The water source has had all existing contaminants and microorganisms and present and future risks identified;
b) Safe treatments are used control or eliminate contamination or microbiological hazards in the water;
c) Measures have been implemented to monitor and control any future risk of contamination at the source; and
d) The water is regularly monitored for quality to establish a history of the results to help verify the adequacy of the treatment processes.

Note: At a source which meets the **minimum level of safety**, the water must receive disinfection treatment necessary to ensure its safety prior to bottling or dispensing.

3.3.3 **Unacceptable level of safety** applies to water from a source which is contaminated and adequate treatment is not technically or operationally feasible, or the water is not regularly monitored.

3.4 Establishing Safe Water Collection

Rationale: Groundwater is generally safer than surface water, such as streams, rivers and lakes. Surface water sources are not recommended for commercial prepackaged or non-prepackaged water without an appropriate treatment process. If a municipal drinking water distribution system is used, a review of the adequacy of monitoring is prudent and it should comply with the standards of *The Drinking Water Safety Act.*

Many of today's commercial water comes directly from groundwater sources and the methods of assessment (Hazard Analysis) for the type of environmental source are well known (see Volume 2, Appendices 5.1, 5.2 and 5.3).

Glaciers and icebergs are marketed as *"water defined by origin".* The general principles for the establishment of safe spring and mineral water collection are applicable to *"waters defined by origin".*

Municipal drinking water distribution systems are commonly used as the source for the production of *"prepared waters*", such as de-mineralized, mineralized or other types of processed or treated waters. They are also often used as a utility water source for sanitizing and rinsing premises, equipment and water containers. The risk assessment of the source should include a review of the records of the municipal drinking water system.

A Hazard Analysis should be carried out when choosing a source (see section 3.5) and the exact location for a water collection point (see section 3.6). The following criteria will help establish the safety of the source at the collection point:

a) The water at the collection point should be comprehensively tested and assessed to determine its characteristics prior to any treatment. Appendix 4.2 in Volume 2 is an example of a source water analysis and Appendix 4.3 is an example of an analysis for a pre-screening of a proposed source.)

b) The recharge and contribution area that supplies water to the proposed water collection point should be identified (see Volume 2, Appendix 5.1).

c) The potentially vulnerable sub-zones in this area should be located and evaluated for contamination risks, including parasites, bacteria, human enteric viruses and chemical substances (see Volume 2, Appendix 5.1). This appendix is an example of the evaluation of groundwater sources. Other equivalent science-based methods may be available. It is recommended that a qualified hydrogeologist carry out a comprehensive risk assessment.

d) Existing and future activities in each of these sub-zones that present a potential risk should be identified, e.g., avoid areas subject to flooding, intensive livestock production, etc. Future risks of contamination may be predicted through municipal or regional land management plans, zoning, by-law, or provincial agriculture and mining development plans. Potentially vulnerable areas subject to future activities should undergo a risk assessment to determine any necessary preventive measures.

e) Each sub-zone should be assessed to determine its natural ability to stop or reduce identified contaminants from migrating into the source (see Volume 2, Appendix 5.2). This appendix is an example of evaluating groundwater sources. Other equivalent science-based methods may be available. It is recommended that a qualified hydrogeologist carry out a comprehensive risk assessment.

It is recommended that a proponent consult with a qualified environmental specialist or hydrogeologist (depending on the type of source chosen) to analyse the data from the Hazard Analysis and determine the level of safety of the source and the water collection point.

Critical Control Points (CCPs) should be established for the source and the location of the water collection point by:

a) implementing protection measures such as protective perimeters to prevent future contamination in the higher risk-zones (see Volume 2, Appendix 5.3). This appendix is an example of evaluating a groundwater source. Other equivalent science-based methods may be available. It is recommended that a qualified hydrogeologist carry out a comprehensive risk assessment;

b) adhering to safe design and GMP construction for water collection installation (see section 3.9);

c) establishing a safe water collection procedure (see section 3.10); and

d) implementing source surveillance and water monitoring programs for human activities in the water recharge and contribution area (see sections 3.11 and 3.12).

3.5 Determining the Current State of Water Quality

Rationale: The recharge and contribution zone and the contamination risk sub-zone may change in shape and increase in area from their original assessment. Reassessment of the safety of the source and collection point may be necessary to evaluate new risk activities or larger risk areas.

Key microbiological and chemical parameters should be analysed on a number of samples to ensure reliability. Refer to Appendix 4.2 and 4.3 in Volume 2 for further information on source water analysis and pre-screening of potential candidate sources.

Water quality should be tested at the proposed collection site in a worst-case scenario, such as:

a) Water is at its maximum flow rate.
b) Wildlife fauna and flora have attained maximum activity.
c) Human activities, especially agriculture, have attained their maximum level.
d) Natural water bodies have attained their year-round maximum temperature.
e) Rain precipitation is at its peak.

Note: If connected to a municipal drinking water system, the sampling analysis for the past 2 years can be obtained from the system's owner pursuant to *The Drinking Water Safety Act*. An analysis of the water quality should be available in the monitoring records of the system over a period of years. The history of compliance to drinking water standards will help determine variations and reliability of the water quality.

3.6 Determining the Source's Natural Ability to Resist Contamination

Each identified contamination hazard should be evaluated to determine to what extent the contaminants (microbiological and chemical) will penetrate into the source and migrate to the water collection point. Contaminant load, water precipitation rate, water flow rate, contaminant properties, media properties and distance to water collection point should be included in the evaluation. This information is essential to determine what protection measures are necessary to supplement the source's natural ability to minimize the identified contamination hazard or to determine the adequacy of existing protection measures. (Appendix 5.2 in Volume 2 provides a method for vulnerability evaluation of the source media.) This appendix is an example of evaluating groundwater sources. Other equivalent science-based methods may be available. It is recommended that a qualified hydrogeologist carry out a comprehensive risk assessment.

3.7 Re-assessment Needs

Re-assessment with a Hazard Analysis may be necessary when:

a) the maximum production flow rate of a collection point is increased beyond the initial risk assessment;
b) new collection points are added in the vicinity of the original collection point;
c) new water collection points on adjacent property have been established near the original water collection point or existing collection points have increased flow rates; or
d) new or increased risk activities commence on adjacent property.

3.8 Protecting the Source and Water Collection Point

Protection perimeters should be implemented in the recharge and contribution area to determine what protection measures are necessary, their location and what surveillance may be warranted. Three protection perimeters should be established according to the different range of risks.

3.8.1 The "**immediate protection perimeter**" or the "defence perimeter" is intended to ward off intruders, stray animals, restrict human activities and limit man-made objects to only those needed for the source water collection. It is recommended that the "immediate protection perimeter":

a) be fenced and the surrounding area is under control of the operator; and
b) extend a distance beyond the water collection shelter (see Vol. 2, Appendix 5.3).

Note: In some jurisdictions a perimeter distance is mandatory for water collection facilities intended for human consumption.

3.8.2 The "**close protection perimeter**" determines part or parts of the recharge and contribution area that have been identified by means of a risk analysis as being the most vulnerable. In this area, contamination may have short-term negative consequences in the quality and safety of the water. The exact location of the perimeter requires a case-bycase determination (see Volume 2, Appendix 5.3).

Rationale: The intent is to control and/or monitor the imminent risks of contamination. The "close protection perimeter" usually encompasses all parts of the recharge and contribution zone that are vulnerable to contamination from microorganisms (parasites and harmful or nuisance bacteria and viruses) because these may cause illness. The balance of the recharge and contribution zone is less vulnerable because it is too far away or the underlying media is more impervious or the contaminants would not produce significant illnesses. In addition to determining current and future activities and ensuring compliance with existing zoning by-laws and environment protection regulations, other more direct or stringent control measures may be necessary dependant on the risk of these activities and the underlying media's vulnerability. Where zoning by-laws or environment protection measures are inadequate, the water collection operator may control these activities by acquiring land ownership or by contracting agreements with neighbours.
The **"close protection perimeter"** generally does not extend beyond areas that are vulnerable to chemical contamination however it should include areas that may be susceptible to microbiological contamination.

3.8.3 The **"far protection perimeter"** covers the rest of the recharge and contribution areas and extends beyond the "close protection perimeter". The "far protection perimeter" is the area that is least vulnerable to contamination. Protection measures may be limited to human activity surveillance.

3.9 Constructing a Safe Water Collection Facility

Rationale: A shelter or other methods can be used to protect the water collection point from contamination. A shelter both protects and permits access to the wellhead or spring catchment basin.

3.9.1 Water Collection Point Shelter

The shelter should be properly constructed. The inside materials should be water-resistant and the floor should be sloped to a screened drain exiting as far away as possible from the shelter (outside the "defence perimeter" is recommended). Adequate lighting should be provided. To protect the shelter against vandalism, windows should be avoided, a steel door installed and a monitored alarm system should be in place.

3.9.2 Groundwater Collection Design and Safety

Wells can be a safe method to collect or extract water directly from the aquifer provided that the wells are properly designed and maintained. Collection directly from a naturally flowing spring should be performed under conditions that prevent surface water intrusion.

a) Well casing:
   - Commercial wells should be cased and grouted as deep as possible in order to prevent direct surface water intrusion.
   - Steel is the preferred casing material as biofilms are less likely to develop on steel than on plastic casings. Stainless steel offers the best protection against corrosion and growth of iron bacteria. Plastic casings, if used, should be approved for potable water.
   - The wellhead casing should have a sanitary seal and be designed to prevent seepage or contamination. *(i.e. use of 'pitless adaptors')*
   - The casing should be designed so that all parts can be properly sanitized.

b) A sampling port should be placed in the main water line close to the wellhead (see Volume 2, Appendix 3.7)

3.10 Safe Operation & Maintenance of a Water Collection Facility

Rationale: Properly designed water collection installations will facilitate safe operation and maintenance. After final construction, start up disinfection should be scrupulously carried out by:

a) spraying disinfectant on the upper inside casing walls above the static water table level;
b) introducing sufficient chlorine solution (or other approved disinfectant) to obtain an effective germicidal concentration (e.g., 500 mg/L water) throughout the entire system; and
c) providing sufficient contact time without pumping activity to achieve disinfection before flushing and rinsing (24 hours is generally recommended).
d) chlorinated water must be disposed of safely in a municipal sewer or other approved wastewater collection facility.

Maintenance disinfection should be repeated using the same process, as often as necessary, based upon the water quality monitoring results (minimum annually). Storage tanks and long aqueducts should be disinfected more frequently.

3.11 Water Quality Monitoring

Rationale: Monitoring source water quality is critical and is the most reliable means to confirm the overall safety of the water and the collection point. After determining knowledge of the base line water quality, monitoring is the only way to detect hazards that may have been overlooked or under estimated by the initial risk assessment study (or by future risk reassessments). Monitoring is critical for a hazard analysis and is an essential CCP.

a) New water collection points should have increased sampling frequency for the first two to three years to determine the consistency of the water quality, particularly bacteriological quality.
b) Following a contamination incident, the frequency of sampling should be increased for sufficient time to ensure water safety and quality.
c) Routine monitoring frequencies should be dependent on the level of vulnerability of the source and its surroundings. Additional parameters may be necessary to detect specific local contaminant risks, e.g., pesticides in an agricultural area.
d) The results should be continuously and closely monitored so as to adjust the frequency and the selection of parameters in accordance with the testing results. Specific monitoring or the availability of monitoring results will be prescribed in the under the ‘conditions’ section of the facility’s operating permit/licence.

3.11.1 Sample Monitoring, Documentation & Records

Operators of water bottling plants must demonstrate at reasonable intervals that their source water and processing operation is being maintained in sanitary condition and not at risk from contamination. As a condition of their permit, operators shall ensure that water samples are collected and submitted to an accredited laboratory for analysis at the following frequencies [1, 4, 11, 7] :

Source Type	**Minimum # of Samples/Year** **Notes: 3*	**Required Tests** **Notes: 1,2,3, 4*	**Guideline Limits** **Notes: 1,2,3*
Private Source *(a well, spring, etc)*	**4 - 12**	1. E. Coli 2. Heterotrophic Plate Count (HPC)	E. coli = zero (<1) HPC = 100
Licensed Source[5] *(i.e. municipal)*	**4**	1. E. Coli 2. Heterotrophic Plate Count (HPC)	E. coli = zero (<1) HPC = 100

**Notes:*

1. *Food and Drug Regulations, Division 12 (Prepackaged Water & Ice), CRC, C.870*
2. *Guidelines for Canadian Drinking Water Quality*
3. *Frequency depends on the risk of contamination associated with the source. Frequency is subject to determination by inspector's review of hydrogeological conditions.*
4. *Samples to be taken immediately prior to bottling or within 24 hours of bottling.*
5. *Public or Semi-Public Water System licenced under The Drinking Water Safety Act.*

All laboratory results must be kept on file by the operator for a minimum of 2 years and made available for review upon request of a Public Health Inspector or Health Officer. All positive E. Coli *results (where bacteria results exceed Health Canada Guidelines for Drinking Water Quality)* must be **reported immediately** to the inspector or officer. On-site records may consist of electronic copies or submission of electronic tabulations of test results. However, original copies of all analytical reports must be provided when requested by an inspector or officer if a more formal audit is indicated.

3.12 Permanent Surveillance in the Recharge and Contribution Area

Regular surveillance of the recharge and contribution areas in the watershed including changes in human and wildlife activities is essential in deciding if a re-assessment of the risk is needed and/or if the quality monitoring program should be modified. Surveillance re-assessments and continual revision of the monitoring program are part of the HACCP safety approach.

4.0 PROCESSING CONTROLS

Rationale: After the water is taken from the source, it may be handled, treated or processed depending on source water quality and safety, end product quality objectives and general case by case operating constraints. Many processes serve no direct hygienic purpose (e.g., carbonation, flavouring, demineralization, etc.) where as others are performed primarily to ensure end product safety such as disinfection and bottled water container sanitation. Most processes, including those intended to assure safety, may be potentially hazardous if not properly designed, executed and controlled.

a) Water should have treatment processes as required to ensure consistent product safety and end product characteristics.

b) The water and its characteristics will determine the type and design of treatment needed.

c) Treatment systems and equipment should be operated and maintained in accordance with the manufacturer's specifications.

d) Components of water treatment systems and product water contact surfaces should be of a food grade quality and appropriate for water use.

e) Maintenance and sanitation programs should be documented and maintained.

4.1 Filtration

All water filtration systems should be designed, operated and maintained to ensure the safety of the product water. The filters should be operated and maintained in accordance with the equipment manufacturer's specifications so as to prevent them from becoming a source of contamination.

4.1.1 Carbon and Activated Charcoal Filters (adsorption, absorption)

Purpose: to reduce or remove odour and/or taste producing substances or other undesirable substances that have bonding properties to a specific filtration media, e.g., activated carbon.

Operating Considerations : filter size, bed life, regeneration & renewal program, as needed.

Health and Safety Requirements: regular back-flushing and sanitization programs (see Volume 2, Appendix 7).

4.1.2 Particulate Filtration

Purpose: To reduce or remove particulate, water insoluble matter or other turbidity causing substances (e.g., suspended solids, colloids, oxidized iron and manganese compounds etc.) by granular media or membrane filtration or more rarely, by decanting or other clarification methods.

Operating Considerations: Capacity Granular media: granular size and bed depth, compactness, and horizontal uniformity.

Membrane/cartridge filtration: particulate and pore size, and pressure differential.

Health/Safety Requirements: regular back-flushing and sanitization programs are necessary. Filter replacement may be required more frequently than indicated depending on the quantity and size of the particulate matter in the raw feed water (see Volume 2, Appendix 7).

4.1.3 Reverse Osmosis

Purpose: To remove and reduce total dissolved solids content.

Operating Considerations: to protect the membrane, pre-treatment of the water such as softening, particulate filtration, chlorine removal, oxidant removal. Regular membrane demineralization and flow-rate differential monitoring as needed.

Health/Safety Requirements: regular back-washing and sanitization programs (see Volume 2, Appendix 7).

4.2 Other Treatments

4.2.1 Deionization

Purpose: To reduce/remove total dissolved solids.

Operating Considerations : filter bed capacity, back-flushing and regenerating renewal.

Health/Safety Requirements: regular back-flushing and sanitization programs (see Volume 2, Appendix 7).

4.2.2 Distillation

Purpose: To remove total dissolved solids. Operating Considerations : pre-treatment of the water by water softening, sediment removal and removal of chlorine and organic substances.

4.2.3 Other Treatment Processes

The following are examples of specific water treatment processes: iron and manganese removal, water softening, degassing, mineralization/flavouring and carbonation. Other methods may be used depending on the situations.

4.3 Disinfection Treatments

Rationale: Disinfection treatments are generally necessary to ensure end-product safety.

The decision to implement a disinfection treatment and the type of treatment needed is dependent on the level of safety of the water supply and the safety of handling and processing (see Volume 2, Appendix 7). Disinfection may be unnecessary if the water is:

a) directly tapped from a groundwater source which meets the criteria for the **maximum level of safety** (see section 3.3); or

b) municipal water that is disinfected and treated and consistently meets the requirements of the most recent edition of the *Guidelines for Canadian Drinking Water Quality.*

However, disinfection of the water referred to in a) and b) is necessary if the water is sold through a water vending machine, or is subjected to further processing which could jeopardize the microbiological safety.

4.3.1 Validated Disinfection Process

If the water disinfection procedure is required the disinfection process should:

a) be in accordance with the most recent edition of the *Guidelines for Canadian Drinking Water Quality* and applicable provincial/territorial legislation;
b) be designed to continually and effectively disinfect the product;
c) be documented in writing;
d) include at least one complete effective disinfection process in place as the effects of different processes are not necessarily cumulative;
e) be conducted with complete monitoring and documentation;
f) be designed so that the risk of recontamination after disinfection is minimized and be **as close to the filling stage as feasible.**

4.3.2 Disinfection Methods

The following sections outline several popular disinfection methods currently in use although other effective methods may be used.

a) Ozonation

Purpose: To disinfect (bacteria, viruses and parasites).

Operating Considerations: continuous and effective dissolution, cleanliness and humidity of intake air, water temperature, ozone demand and monitoring and ozone venting.

Health/Safety Requirements: adequate CT value *(see Volume 2, Appendix 6),* prevention of the formation of disinfection by-products such as bromate *(see Appendix 8 of Volume 2).* Refer to NSF/ANSI Standards 61 and 50 for applicable technical requirements..

b) Ultra-Violet Irradiation

Purpose: to disinfect (bacteria and viruses).

Operating Considerations: water turbidity and color, light source and intensity, consistency of flow rate and pressure lamp breakage controls.

Health/Safety Requirements: water turbidity, color, maximum flow capacity and light irradiation.

Refer to *NSF/ANSI 55 Ultra-Violet Microbiological Water Treatment Systems*[12] for additional information.

c) Microfiltration

Purpose: to remove parasites.

Operating Considerations : water pre-filtration, porosity, capacity and pressure differential.

Health/Safety Requirements: Parasite removal effectiveness (refer to *NSF/ANSI 53 Drinking Water Treatment Units – Health Effects*[13]), regular back-flushing and sanitization programs are necessary. Filter replacement may be required more frequently than indicated depending on the quantity and size of the particulate matter in the raw feed water.

5.0 CONTROL OF OPERATION

5.1 Incoming Materials Control

5.1.1 Water Intended for Bottling (See Chapter 3.0 - Water Collection)

5.1.2 Packaging Materials

Rationale: Packaging can provide a potential source of contamination and needs consideration in the control process. Bottled water is a food and as such its packaging must comply with the appropriate rules and regulations for food contact surfaces.

The bottler should:

a) maintain control over incoming packaging materials so as to minimize any biological, physical or chemical hazards which may affect the finished product,
b) take steps to ensure that incoming bottles are free of contaminants,
c) use new container caps and/or closures, and
d) ensure that retail packaging is designed to be tamper evident.

5.1.3 Empty Container Handling

a) Empty containers should be handled to minimize damage.
b) Damaged, defective or contaminated containers should not be used because they may prevent proper closure of the product container and permit contamination.

5.1.4 Cleaning of Multi-Use and Returnable Bottles

Rationale: Returnable bottles pose a challenge for product safety and require additional controls than single use packaging materials.

If multi-use containers are refilled bottlers should:

a) inspect, wash and sanitize the container prior to filling so as to remove any extraneous materials, chemical or microbiological contaminants;
b) develop a program for the maintenance and operation of the bottle washing and sanitation unit *(manufacturers' instructions may provide a source of the necessary information);*
c) inspect returnable bottles to detect damage and contamination including suspicious odours, oily appearances, mold, algae and foreign objects in order to cull these bottles for separate handling or rejection;

d) invert the bottles and wash both the internal and external surfaces using an effective cleaning agent within the concentration, contact time and temperature range recommended by the manufacturer's specifications;
e) ensure that the operation includes monitoring, documenting, routine maintenance and regular cleaning of equipment;
f) after washing the bottles, they should be rinsed free of the washing agent and sanitized using an effective sanitizer within the recommended concentration, contact time and temperature range according to the manufacturer's specifications; and
g) ensure that chemical agents, if used, are compatible with packaging materials such that chemicals do not leach into or otherwise contaminate the water.
h) the design of the bottle cleaning area will be required to meet minimum design standards for proper warewashing, as outlined in *Manitoba Regulation 339/88R* or as otherwise approved by the public health inspector or health officer.

5.1.5 Cleaning of Single-Use Bottles

The bottler should:

a) ensure that all single-use bottles are free of extraneous materials and contaminants prior to filling; or

b) clean all containers, if they are not ensured free from contamination, by inverting and rinsing them with an effective sanitizing solution; and

c) ensure that chemical agents, if used, are compatible with packaging materials such that chemicals do not leach into or otherwise contaminate the water.

5.1.6 Protection of Cleaned Containers

Rationale: Cleaned containers may become contaminated if not protected during storage.

The bottler should have suitable controls established to prevent contamination of cleaned containers including:

a) Containers should not be left unprotected on the line between the washer and the filler during employee breaks, during clean-up or extended downtime.

b) Suitable environmental controls should be in place to prevent potential contamination.

c) The processing operations for container cleaning, filling and closing should be located within the closest possible physical proximity so as to minimize product exposure to the environment.

d) Cleaned containers should be stored in a clean and dry environment.

6.0 BULK WATER HAULING GUIDELINES

The safe and sanitary transportation of non-prepackaged (bulk) water is addressed in a separate companion guideline entitled: *"Bulk Water Hauling Guidelines - #13-01".* The latest version of the document is available for download at: **manitoba.ca/healthprotection**

7.0 WATER VENDING MACHINES (Self-Serve Dispensers)

Rationale: There are numerous self-serve vending machines that sell and distribute water in retail food stores. This Guideline considers vended water a food, similar to bottled water. Vended water requires increased handling and therefore has a higher risk. Consumers fill their bottles in the store and the water is "processed" in an "uncontrolled" environment that may increase the complexity and potential health risk.

- Water obtained from a vending machine is intended for personal use only and should not be re-sold or re-distributed by the consumer.

7.1 Construction and Design

7.1.1 Construction of Dispensing Equipment

All water contact surfaces/materials should be approved food grade material and be rated for contact with potable water.

7.1.2 Design of Dispensing Tube, Chute or Orifice

Rationale: Product can become contaminated from the vending machine so equipment needs to be designed so that the consumer filling the container does not contaminate the equipment or product.

The dispensing tube, chute or orifice of the water vending machine should be designed so:

a) splashes and drips (including drips from condensation) are directed away from the container receiving the water and from the dispensing spout or delivery tube (by means of barriers, baffles or drip aprons);

b) water dispensing spouts (tubes, chutes and orifices) are protected from contamination from dust, dirt or manual contact and contact with the consumer's container (e.g., by being recessed or behind a drop-down door); and

c) the drain is equipped with a device to preclude the entrance of insects and rodents.

Additional references for water dispensing equipment:

NSF International and/or NAMA can be contacted for further information contained in *NSF/ANSI 25 Vending Machines for Food and Beverages:*

NSF International - P.O. Box 130140, Ann Arbor, Michigan, 48113-0140 Phone: 734-769-8010; Toll free: 888-NSF-9000; Fax: 734-669-0196 Email: info@nsf.orgWebsite: www.nsf.org

NAMA – National Automatic Merchandising Association 20 N. Wacker Drive, Suite 3500 Chicago, Illinois 60606-3102 Phone: 312-346-0307; Fax: 312-704-4140 Email: tech@vending.org Website: www.vending.org

7.2 Control of Operation

7.2.1 Water Source

a) Water intended for dispensing and self-serve bottling should be safe with or without treatment and of suitable quality for consumption.

b) Source water should be from a potable water supply (municipal supply) that meets the requirements of the most recent edition of the *Guidelines for Canadian Drinking Water Quality.*

c) Vending machines (and their associated water treatment systems) should be equipped with backflow prevention devices to protect the water supply from potential contamination.

7.2.2 Treatment of Water

The provisions for the treatment of water apply to water vending machines:

a) Disinfection should take place immediately before the dispensing spout.

b) Disinfection should be the last process before dispensing.

c) The disinfection operation should be equipped with a monitoring device (fail-safe) which automatically shuts the unit down if the disinfection process fails.

7.2.3 Standards for Water Treatment Devices

a) Water treatment devices and components used in conjunction with

water vending machines should meet the requirements of NSF/ANSI water treatment device standards.

b) Piping, gaskets and other materials used in water vending machines should be resistant to the deleterious effects of disinfection processes (e.g., ozone, UV, cleaning agents and sanitizers).

c) Treatment systems that use or generate ozone for treatment should be equipped with a mechanism to prevent or minimize the release of ozone from the machine to the atmosphere. Note: Ozone is an indoor air contaminant with levels regulated by worker health regulations in most jurisdictions.

d) Vending machines that treat water to remove microbiological or other contaminants (such as the use of Reverse Osmosis) should be equipped with a fail-safe device to prevent dispensing of untreated water when the treatment unit is inoperable or requires maintenance.

Rationale: Fail-safe devices are necessary to ensure that the dispensed water meets the most recent edition of the *Guidelines for Canadian Drinking Water Quality*. Failure of treatment systems will not be readily or immediately obvious, thereby allowing potentially contaminated water to be dispensed to the public.

7.2.4 Delivery of Water to Vending Machine

The distance between the point of disinfection and the dispensing spout should be kept to a minimum (e.g., with UV less than 60 cm). Ideally, the water treatment system should be an integral part of the dispensing unit. Remote treatment systems that require long runs of piping to the dispensing machine should be equipped with a means to prevent bacterial growth in the piping.

Rationale: Studies have shown that even with the best treatment and disinfection, water held for long periods of time in water lines can be subject to bacterial re-growth and slime build-up in the lines.

7.2.5 Storage of Water

The storage tank in the dispensing equipment should be provided with an inverted air return spigot/ven to minimize the potential for contaminants from entering the storage tank.

Rationale: Intake air vents with openings facing upward are exposed to potential airborne contamination.

Air vents and overflow spigots should all face downwards *(i.e. gooseneck vents)* to minimize the potential for contaminants gaining entry into the water storage tank. Vents and spigots should be screened or protected from the entrance of insects.

Figure A: example of a gooseneck vent

7.2.6 Dispensing of Water

Decals or labels should be posted that advise consumers to use new, clean refillable bottles or to properly clean and sanitize refillable containers prior to filling them. Easy-to-read pamphlets further explaining the proper cleaning and sanitizing procedures should also be available.

7.2.7 Water Quality Monitoring, Documentation and Records

Operators of water vending machines must demonstrate at reasonable intervals that their source water and processing operation is being maintained in sanitary condition and not at risk from contamination. As a condition of their permit, operators shall ensure that water samples are collected and submitted to an accredited laboratory for analysis at the following frequencies [1, 4, 14, 7] :

Source Type	**Minimum # of Samples/Year** **Notes: 3*	**Required Tests** **Notes: 1,2,3, 4*	**Guideline Limits** **Notes: 1,2,3*
Private Source *(a well, spring, etc)*	**4 - 12**	a) E. Coli b) Heterotrophic Plate Count (HPC)	E. coli = zero (<1) HPC = 100
Licensed Source[5] *(i.e. municipal)*	**4**	a) E. Coli b) Heterotrophic Plate Count (HPC)	E. coli = zero (<1) HPC = 100

**Notes:*

1. *Food and Drug Regulations, Division 12 (Prepackaged Water & Ice), CRC, C.870*
2. *Guidelines for Canadian Drinking Water Quality*
3. *Frequency depends on the risk of contamination associated with the source. Frequency is subject to determination by inspector's review of hydrogeological conditions.*
4. *Samples to be taken immediately prior to bottling or within 24 hours of bottling.*
5. *Public or Semi-Public Water System licensed under The Drinking Water Safety Act.*

All laboratory results must be kept on file by the operator for a minimum of 2 years and made available for review upon request of a Public Health Inspector or Health Officer. All positive E. Coli *results (where bacteria results exceed Health Canada Guidelines for Drinking Water Quality [15])* must be **reported immediately** to the inspector or officer. On-site records may consist of electronic copies or submission of electronic tabulations of test results. However, original copies of all analytical reports must be provided when requested by an inspector or officer if a more formal audit is indicated.

7.2.8 Maintenance and Sanitation

a) Cleaning procedures for the water-dispensing machine should meet the standards set out in the CFIS *Food Retail and Food Services Regulation and Guideline*. Manufacturer's instructions must also be carefully followed.
b) Filters should be maintained, back flushed and replaced according to the manufacturer's specifications.
c) Maintenance records shall be maintained on site that contain a log of all maintenance and/or repair work conducted on the unit. Records shall be maintained for a period of at least 2 years.

**Note: If the water treatment system is remote from the dispensing unit, the piping used to deliver the treated water to the unit should be cleaned and sanitized at least weekly to prevent re-growth and slime build-up in the line, unless other methods are used to minimize bacterial growth in the lines.*

7.2.9 Training

Maintenance and operational personnel responsible for the water vending machine should receive training on the requirements of this Guideline, the manufacturer's specifications and the application of good hygienic practices.

7.2.10 Protection of the Water Supply

The potable water supply should be protected from any possible back-siphonage or contamination originating from the water vending machine by means of an approved and operational back-siphonage control device *(as required under the Manitoba Building/Plumbing Codes)*. The back-siphonage protection device should be checked on a regular basis to ensure it is in proper worker order and testing results recorded in a maintenance log book.

8.0 Boil Water Advisories

Public and Semi-Public Water Supply Systems are occasionally affected by degraded water quality or the risk of potential contamination. Boil Water Advisories (BWA) are issued by the Medical Officer of Health to notify all users that the water is no longer considered '*potable*' and safe for drinking water purposes.

In the event of a BWA, water bottling plants and water vending machine operators will be contacted by the Public Health Inspector or Health Officer and provided with specific instructions on special operating measures required to safeguard the public. A failure to abide may result in the temporary suspension of an operating permit during the course of the BWA.

NOTE: The ability to continue operating during a BWA will also depend on the completion of a risk assessment by the local Public Health Inspector that confirms the following:

- ✓ The operator is in compliance with the monitoring requirements of this Guideline for the period leading up to and during the course of the BWA.
- ✓ The technical specifications and capacity of the treatment system is adequate to handle the bacteriological, physical and/or chemical parameters associated with the BWA.***
- ✓ Proper maintenance records that confirm that the treatment system has been kept in satisfactory condition prior to and during the BWA with sufficient records to show that ongoing maintenance has been / is being conducted.
- ✓ Adherence to any extra monitoring, sampling or maintenance requirements prescribed by the inspector.

> ****NOTE:** *In order to facilitate and speed up this aspect of a risk assessment, it is essential that equipment suppliers and operators submit technical specifications to the Department ahead of time. This will ensure that it is on file and available for quick review and assessment purposes. This information is typically required and collected at the time of initial registration. However, some installations pre-date the coming into effect of this guideline. For these reasons, it is advisable that stakeholders collect and submit this information retroactively if it has not already been provided and linked electronically.*

For further information, please contact your local Public Health Inspector or visit the Health Protection Unit website at: manitoba.ca/healthprotection

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3 **Codex Alimentarius Commission** (www.codexalimentarius.net):
CAC/RCP 1-1969, Rev. 3-1997, Amd. (1999) Recommended International Code of Practice General Principles of Food Hygiene; CAC/RCP 33-1985 Recommended International Code of Hygienic Practice for the Collecting, Processing and Marketing of Natural Mineral Waters; CAC/RCP 48-2001 Code of Hygienic Practice for Bottled/Packaged Drinking Waters (Other than Natural Mineral Waters) and CODEX STAN 227-2001General Standard for Bottled/Packaged Drinking Waters (Other than Natural Mineral Waters)

4 **Province of Manitoba**
The Drinking Water Safety Act, C.C.S.M. c. D101
http://web2.gov.mb.ca/laws/1

5 **Government of Canada**
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Standard for the Sanitary Design and Construction of Food and Beverage Vending Machines

[10] **Association of Food and Drug Officials (www.afdo.org):**
Model Water Vending Machine Regulation, 1986, Revised 2002

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www.cbwa.ca

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