

Agence de la santé publique du Canada

Assessment and Inspection Guidelines for Potable Water on Passenger Conveyances

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Travelling Public Program/ Le Programme du public voyageur



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1.0 INTRODUCTION

These Assessment and Inspection Guidelines have been developed to support passenger conveyance operators and Environmental Health Officers identify and address potential public health risks related to potable water. These Guidelines detail the elements that the Public Health Agency of Canada's Travelling Public Program (TPP) considers essential for the provision of safe potable water onboard conveyances. They outline both regulatory requirements and best public health practices. Elements noted as Critical in the Guidelines present a level of risk where there is a reasonable probability that an imminent or serious adverse health consequence may result.

The 2016 Potable Water on Board Trains, Vessels, Aircraft and Buses Regulations, apply to operators of conveyances in Canada that are authorized to transport at least 25 people onboard, including:

- an aircraft,
- a vessel or a bus used for interprovincial or international transportation,
- a train used for interprovincial or international transportation or used on a railway declared to be a work for the general advantage of Canada

The Regulations apply for water that is intended to be used for drinking, handwashing or oral hygiene by passengers, for the preparation of food for passengers, and in the form of ice for contact refrigeration of food for passengers or in their beverages. Note that the Regulations do not apply to passenger conveyances that are used for urban transit or that travel through Canada without making any stops.

Regulatory requirements are referenced in **blue text** throughout the *Guidelines*. The other elements in the guidelines support regulatory compliance as well as public health.

The Regulations can be found in their entirety at: <u>http://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-43/FullText.html</u>

Although not all passenger conveyance operations in Canada are subject to the above regulations, TPP actively works with operators to encourage, promote, monitor and verify compliance with all of the elements in these *Guidelines*, with the goal of protecting public health as mandated under the *Department of Health Act*. Compliance is generally achieved through a co-operative approach between conveyance operators and TPP. Alternate approaches to the practices described in the non-regulatory elements of these guidelines may be acceptable provided they are supported by sound rationale and evidence that demonstrates the approach would meet the public health objective of the element. Alternate approaches should be discussed in advance with a TPP Environmental Health Officer to ensure public health objectives are met.

Assessments and inspections are conducted by TPP on a risk-based approach, and frequencies are based on the relative public health risks. An assessment includes examination of supporting documents such as control measures and procedures, maintenance records and sampling results, and usually covers an operator's entire fleet of conveyances (a management system approach to potable water safety). Inspections and water sampling by Environmental Health Officers may be conducted in support of

assessments, or as independent activities. TPP will always share results of assessments, inspections and sampling with operators and provide recommendations to operators on how they can address the findings and prevent or reduce public health risks.

These *Guidelines* are based on current available scientific information and are subject to review and change as new information becomes available.

Questions or comments about these *Guidelines* can be directed to your Environmental Health Officer, or to the Travelling Public Program at: <u>tpp.ppv@phac-aspc.gc.ca</u>.

The Travelling Public Program is also available to respond to urgent situations related to food, water and sanitation onboard conveyances and can be reached 24 hours a day, 7 days a week at 1-877-742-2538.

2.0 ASSESSMENT AND INSPECTION GUIDELINES

POTABLE WATER MANAGEMENT SYSTEM ASSESSMENT

1.0 POLICY

1.1 POLICY STATEMENT

1.1.1 A written policy statement is available (including goals, objectives and purpose).

2.0 JURISDICTIONAL REQUIREMENTS, GUIDANCE DOCUMENTS AND POLICIES

2.1 REFERENCES

- 2.1.1 Applicable legislation, standards, guidance documents and policies are referenced. These include, but are not limited to:
 - Potable Water on Board Trains, Vessels, Aircraft and Buses Regulations 2016
 - Guidelines for Canadian Drinking Water Quality and supporting Annexes
 - Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction-Version 2
 - Industry best practices and health-based guidance and advisories
 - Manufacturer's instructions, and
 - Occupational health and safety requirements.

3.0 ORGANIZATION

3.1 ROLES AND RESPONSIBILITIES

- 3.1.1 Roles and responsibilities of conveyance operators, as well as internal and external stakeholders are defined (e.g. administrators and operations managers, support staff, contractors, laboratories, governmental departments, health authorities, etc.).
- 3.1.2 A system is in place to ensure contractors are informed of their responsibilities to meet operator's requirements when providing services or performing work.

4.0 OPERATIONAL PLAN

4.1 POTABLE WATER SYSTEM ASSESSMENT

- 4.1.1 An inventory of conveyance potable water systems and potable water servicing equipment is available, along with a detailed description for each type of system or equipment. If a potable water container is used, the specifications of the container are available.
- NOTE: Potable water system means: any equipment used onboard for handling, treating, storing or distributing potable water. <u>Potable water container</u> means: a refillable container that is used for potable water and is readily moveable by one person, but does not include a bottle of prepackaged water <u>Potable water servicing equipment</u> includes potable water trucks and carts, hoses, fittings or other appurtenances used to supply conveyances. Descriptions may be in a written and/or schematic form.

- 4.1.2 Potential hazards that may render water non-potable are identified and listed, and corresponding control measures are defined.
- NOTE: Hazards may include, but are not limited to, contaminating water at loading, ingress of foreign materials during maintenance, biofilm growth in tanks and pipe work, unprotected cross-connections.

Control measures may include:

- preventive maintenance activities (e.g. unprotected cross-connection identification, identification and inspection of system components and treatment devices, equipment maintenance, water handling procedures, disinfecting and flushing procedures);
- operational controls (e.g. testing backflow prevention and anti-tampering devices; using treatment devices, treatment additives and system components that are certified for use with potable water; controlling access);
- monitoring methods (e.g. testing water for bacteriological, chemical, physical or radiological contamination; evaluating test results to ensure levels are within maximum acceptable concentrations as per the Guidelines for Canadian Drinking Water Quality (GCDWQ) Summary Table).

4.2 WATER SUPPLY

Potable Water Supply

This section applies to all water supplies that provide potable water to conveyance potable water systems or potable water containers, both domestically and internationally.

- 4.2.1 Measures must be taken to ensure that water that is to be provided by way of a potable water system or to a potable water container is free from contamination when it is taken from the water supply. **Critical, Regulation 6.**
- NOTE: Measures may include, but are not limited to, sampling water supplies, auditing of water supplies, requesting water sample and audit results from supplier, establishing clear public health expectations from contractors such as water sample and audit results, ensuring that the supplier responds to boil water advisories, etc. This does not apply to vessels loading surface water provided the water is subsequently decontaminated in accordance with the regulations.

Operators should have access to recent bacteriological sampling results from the water supply that show the water is free from E. coli. Water samples may be taken by the operator or obtained from the water supplier. The date of the bacteriological analysis results should be no more than 30 days prior to the date of taking water.

Results of chemical, physical or radiological parameters that may influence onboard treatment, if any, or that have a maximum acceptable concentration as outlined in the Canadian Drinking Water Quality (GCDWQ) Summary Table, should be obtained from the supplier at least every 5 years.

Sampling frequencies for bacteriological, chemical, physical or radiological parameters may be increased or reduced depending on the historical sampling results and risk factors of the supply. For example, if particular substances are consistently absent from a water supply, the frequency of sampling for those substances can be reduced.

- 4.2.2 Records of bacteriological analysis results of the supply water show the water is free from total coliform.
- NOTE: The conveyance operator should have available recent microbiological analysis results for total coliform sampling of the supply water. Water samples may be taken by the operator or obtained from the water supplier. The date of the bacteriological analysis results should be no more than 30 days prior to the date of taking water. Frequencies may be reduced depending on the historical and recent sampling results and risk factors of the supply. (See Annex 1 for information on total coliforms).
- 4.2.3 Records from sources with secondary disinfection show the presence of a disinfectant residual in the potable water supply.
- NOTE: All potable water supplies from municipal sources should be disinfected by the municipality and a disinfectant residual should be maintained throughout the municipality's distribution system. Certain non-municipal sources may have disinfectant residual depending on the quality of the source water and treatment requirements. Disinfectant residual levels should be provided with the bacteriological analysis results of the supply water.
- 4.2.4 Documents and records from non-municipal water sources demonstrate that the supply is potable. These may include, but are not limited to:
 - site assessments (assessments identify the biological, chemical, physical and radiological characteristics of the water source, potential risks and how these risks can best be managed);
 - sanitary surveys;
 - operations and maintenance records;
 - treatment requirements to render the water free from contamination (affected by the quality of the source water; may include disinfection);
 - inspection reports and water sampling results.
- NOTE: This applies to any non-municipal sources used by conveyance operators. This refers to small drinking water systems, including both privately owned systems and systems with minimal or no distribution system that provide water to the public. Conveyance operators using these systems should have access to relevant results and records from the supplier. Testing for E. coli should be conducted once every month of operation. Testing for physical-chemical parameters should be conducted once every 5 years. Frequency of analysis may vary if the system assessment indicates a more or less frequent analysis is necessary.
- 4.2.5 Documents and records from water hauling services indicate:
 - the original source of the water is potable and had a disinfectant residual at the time the water was taken;
 - the presence of a disinfectant residual in the potable water, at time of loading onto the conveyance. Disinfectant residuals should be tested and recorded regularly;
 - regular disinfection and flushing of the tank (i.e. weekly);
 - recent bacteriological sampling results of the water in the tank (i.e. quarterly);
 - measures (SOP's, management plans, training, etc.) are in place to ensure safe handling of the water.
- NOTE: An operational range for free disinfectant residual between a detectable level and 5 mg/L should be maintained in the potable water tank. The optimal range of 0.2 to 0.8 mg/L should be targeted. Testing and recording disinfectant residuals should be done

once daily, during the operating period. Monitoring may be reduced when acceptable supporting practices and bacteriological sampling results exist. Maintaining a disinfectant residual will limit the growth of organisms within a potable water system and may also afford some protection against contamination from outside sources. The disappearance of the residual, depending on the residual concentration and other factors, may also provide an indication of organic matter intrusion in the system. Ensuring the presence of a disinfectant residual in water helps prevent water aging and loading stagnant water onto the conveyance.

- 4.2.6 Documents demonstrate that pre-packaged bottled water was obtained from a commercial source, and is commercially sealed, packaged and labelled. Critical
- NOTE: Pre-packaged bottled water served in Canada, including on conveyances, must meet the requirements of the Food and Drugs Act and the Food and Drug Regulations.

Ice Supply

- 4.2.7 Measures are taken to ensure that ice that is not made on board is free from contamination and *E. coli* when it is taken from the supplier. Critical, Regulation 9 & 10(1).
- NOTE: Measures may include, but are not limited to, ensuring that:
 - if ice is purchased, the ice is commercially sealed, packaged and labelled (name of commercial source);
 - if ice is made by an operator or made at an ancillary service, regular ice sample results are free of *E*. coli.

On Board Potable Water

- 4.2.8 Potable water is provided in sufficient quantity for the number of passengers and its intended use (i.e. drinking, handwashing, oral hygiene, food preparation). Critical, Regulation 4.
- NOTE: Records or standard operating procedures indicate a sufficient water quantity for the number of passengers on board. Operational and maintenance records, bunkering/loading records, inspection reports, etc. may be verified for indications of sufficient water supplies and water pressure. Consider the number of passengers and crew, the accommodations provided and the frequency of loading water. (Also see Inspection guideline article 1.7).
- 4.2.9 Measures are taken to prevent the risk of contamination when a potable water container is loaded on board a conveyance, when it is stored, moved and handled once on board, and to ensure the container is maintained in a sanitary condition. Critical, Regulation 16(2).
- NOTE: Measures include having written procedures and training on how to do this correctly on board. See Annex 2 for details.
- 4.2.10 Measures are taken to prevent the risk of contamination of water dispensed to passengers in drinking cups or from a container of 5 L or more, such as the use of single-service cups or a tap. Critical, Regulation 17(1)(2).

On Board Ice

- 4.2.11 Ice made on board a conveyance must be made from water that meets the requirements of the regulations and is free from contamination and *E. coli*. Critical, Regulation 8, 10(1).
- 4.2.12 Measures are taken to prevent the risk of contaminating ice when it is made on board the conveyance. Procedures address how ice making equipment and storage and serving utensils are maintained in a sanitary condition. **Critical** (See Annex 2)
- 4.2.13 Measures are taken to prevent the risk of contaminating ice when it is loaded, moved, stored and handled on board the conveyance, such as the use of ice scoops or tongs. Critical, Regulation 10(2)(3). (See Annex 2).

4.3 POTABLE WATER SYSTEM

Potable Water System Components

- 4.3.1 Measures are in place to ensure that all components of the potable water system, including tanks, hoses, pipes and faucets, potable water containers, servicing equipment, treatment devices, and treatment additives and coatings (such as potable water tank liners) are made of material compatible with potable water and have been certified by an accredited certification body as meeting appropriate NSF International /American National Standards Institute health-based performance standards. Critical
- NOTE: Health Canada strongly recommends that all drinking water materials be certified by an accredited certification body as meeting the appropriate drinking water materials standards, such as NSF International (NSF)/American National Standards Institute (ANSI) health-based standards NSF 60, 61 as well NSF/ANSI Standard 372 (Drinking Water System Components—Lead Content). Certification organizations provide assurance that a product conforms to applicable standards and must be accredited by the Standards Council of Canada (SCC). An up-to-date list of accredited certification organizations can be obtained from the SCC (www.scc.ca).
- 4.3.2 Maintenance programs for public potable water fixtures (e.g. drinking fountains) are established. These include adequate procedures, regular servicing schedules and routine inspections, and reflect manufacturer's recommendations, plumbing codes or health-based standards and guidance documents. These should include as a minimum, the requirement to clean, disinfect and flush fixtures:
 - before being placed into service;
 - before being returned to operation after repair, replacement or maintenance;
 - if water sample results indicate contamination; or
 - if there is any reason to suspect contamination.

Potable Water Treatment and Storage

- 4.3.3 For vessels loading contaminated water (i.e. surface water), measures are in place to ensure water is loaded while making way and not from waters within a harbor or in a port. Critical, Regulation 7(1)(2).
- NOTE: Harbours or ports are areas where vessels load and unload passengers and/or cargo.
- 4.3.4 For vessels loading contaminated water while the vessel is making way, the water is subsequently decontaminated by: In the case of salt water, reverse osmosis or distillation and, if necessary, any other decontamination process; and, in the case of fresh water, filtration and disinfection. **Critical**, **Regulation 7(1)**

- NOTE: This refers to vessels loading any surface water for the production of potable water. Documentation is provided that describes the water decontamination process prior to use (i.e. potable water treatment systems or devices), its suitability to treat the contaminated water supply, and its operating instructions. Water quality monitoring requirements are documented and monitoring is conducted as necessary. Automated monitoring methods are optimal and recommended.
- 4.3.5 Maintenance programs are established for the potable water treatment systems or devices (e.g. filters, chlorinators, reverse osmosis and distillation systems) and potable water storage tanks. These include adequate procedures, regular servicing schedules and routine inspections.
- 4.3.6 Procedures ensure that potable water is protected against microbial regrowth and biofilm development during storage. Measures may include, but are not limited to, the following:
 - Completely draining the potable water system or potable water container frequently (recommended daily, especially when conveyances are parked overnight in warm weather, and at least every 72 hours);
 - Limiting the amount of water in the potable water system or potable water container to only what is needed between each boarding/bunkering;
 - Conducting routine water quality monitoring to ensure no microbial regrowth;
 - Ensuring the presence of a disinfectant residual throughout the potable water system;
 - Providing secondary treatment to maintain a disinfectant residual throughout the potable water system.
- NOTE: To maintain a disinfectant residual and control microbial growth and biofilm development in the potable water system, the use of automated halogenation devices and automated disinfectant residual analyzers is optimal and recommended. Manually adding an appropriate disinfectant may be done ONLY if control measures are in place to ensure the water does not become contaminated (i.e. strict control of concentrations and contact times), residual levels are monitored routinely and operators are adequately trained.

4.4 POTABLE WATER SERVICING EQUIPMENT

- 4.4.1 Maintenance programs are established for potable water servicing equipment (including filling stations, potable water carts, trucks, hoses, etc.) These include adequate procedures, regular servicing schedules and routine inspection conducted according to manufacturer's instructions, or health-based standards and guidance documents.
- 4.4.2 Procedures show that all potable water servicing equipment (carts, trucks, hoses, fittings) is disinfected and flushed:
 - before being placed into service or returned to seasonal service;
 - before being returned to operation after repair, replacement or maintenance;
 - if water sample results indicate contamination;
 - if there is any reason to suspect contamination;
 - on a weekly basis (frequencies may be reduced depending on historical and recent sampling results).

These activities are conducted as per manufacturer's instructions and health-based standards and guidance documents. *(See Annex 3).*

- 4.4.3 Procedures ensure that a disinfectant residual is present in the potable water inside the potable water cart or truck when it is in service and is tested with appropriate testing equipment. Disinfectant residuals should be tested and recorded regularly at the outlet of the potable water tank.
- NOTE: An operational range for free disinfectant residual between a detectable level and 5 mg/L should be maintained in the potable water inside the tank of the cart or truck. The optimal range of 0.2 to 0.8 mg/L should be targeted. Up-to-date testing equipment is appropriate for this range and for the type of disinfectant tested. Procedures for testing, and calibration where required, are established as per manufacturer's recommendations, health-based standards and guidance documents. Testing and recording disinfectant residuals should be done once daily, during the operating period. Monitoring may be reduced when acceptable supporting practices and bacteriological sampling results exist.
- 4.4.4 Procedures are in place to ensure that filling stations and hoses are flushed before use or before periods of continuous use, and drained after use in order to prevent loading stagnant water into the potable water system or container of a conveyance, or the tank of a potable water truck or cart.
- NOTE: Testing for the presence of a disinfectant residual level at the filling station after flushing is a recommended method to ensure adequate flushing of stagnant water.

4.5 POTABLE WATER TRANSFER

- 4.5.1 Procedures address the safe handling of water at transfer points and during loading.
- NOTE: Procedures should include appropriate personal hygiene for employees handling water and ensuring equipment used to transfer potable water is not subject to contamination. Personnel are not tasked simultaneously with both wastewater handling and potable water transfer. Transferring potable water to potable water containers must be conducted in a sanitary manner. Procedures should include disinfecting fill ports and/or supply hose nozzles before connection to the conveyance's potable water system.

4.6 POTABLE WATER SYSTEM PROTECTION

Potable Water System Protection from Tampering

- 4.6.1 Measures are in place to ensure that the potable water system is protected from tampering. Critical, Regulation 11(1) d.
- NOTE: Measures to protect the system from tampering may include, but are not limited to, implementing procedures for protecting filling lines, filling stations, hoses and appurtenances from public access, providing locks or other security devices on filling line caps, hose lockers, etc.

Preventive (Routine) Potable Water System Disinfection and Flushing

- 4.6.2 The potable water system is disinfected and flushed:
 - routinely as per the frequencies set out in the Regulatory Schedule and aligned with the operator's routine sampling frequency (*Refer to Regulatory Schedule in Annex4*);
 - before it is placed in service or before it is returned to service after the conveyance has been taken out of service for the season; and

 before the system is returned to service after an activity, such as repair or cleaning, that might lead to contamination of the water in the system.
 Critical, Regulation 14(1).

If an isolated part of the system is repaired or cleaned, only that part of the system is required to be disinfected and flushed before it is returned to service. Critical, Regulation 14 (2).

- 4.6.3 Disinfecting and flushing procedures for the potable water system are established as per manufacturer's recommendations and health-based standards and guidance documents.
- NOTE: Operator should be able to provide support / rationale for the established practice. This includes key points such as:
 - disinfectant types, concentrations and contact times;
 - disinfectant residual testing procedures and equipment;
 - disinfecting and flushing of all parts of the potable water system. (See Annex 3).

Potable Water Cross-Connection Control Program

- 4.6.4 For every potable water system, a cross-connection control program has been implemented and documented, which includes, but is not limited to:
 - a survey of the potable water system to rank the cross connections based on the degree of hazard posed by the potential contaminant;
 - a suitable level of protection installed on all cross connections based on the hazard;
 - a list of all testable and non-testable backflow devices in the potable water system (and on potable water carts/trucks and filling stations);
 - an assessment of any new construction plans for cross-connection hazards;
 - a tamper policy;
 - annual testing, inspection and maintenance of backflow prevention devices;
 - setting out qualifications required for personnel (i.e. certified specialist or other qualified professional who has expertise in the area);
 - SOPs and protocols.

4.7 WATER QUALITY SURVEILLANCE & MONITORING

Routine Water Quality Sampling

- 4.7.1 Potable water samples from a potable water system are taken for the purpose of monitoring the presence of *E. coli* at the sampling sites and at frequencies set out in the Regulatory Schedule. Regulation 12(1) (*Refer to Regulatory Schedule in Annex 4*).
- NOTE: Routine samples can be taken before a scheduled disinfecting and flushing, but should be no earlier than 72 hours afterwards. When there is more than one tap in a location, rotate sampling sites to ensure all taps in that location are tested.
- 4.7.2 Results show that the water is free from *E. coli*, as per the microbiological parameter guidelines for *E. coli* in the *Guidelines for Canadian Drinking Water Quality Summary Table*. Critical, Regulation 5.
- 4.7.3 If ice is made onboard a conveyance for the contact refrigeration of food intended for passengers, or to be added to beverages intended for passengers, **ice** samples are taken routinely for the purpose of monitoring the presence of *E. coli*.

- NOTE: For example, routine ice samples can be taken at the same time as water samples, but cannot replace water sample requirements. When there is more than one ice making machine onboard, rotate sampling sites to ensure all ice making machines are tested.
- 4.7.4 Results of any ice samples taken show that the ice is free from *E. coli*, as per the microbiological parameter guidelines for *E. coli* in the *Guidelines for Canadian Drinking Water Quality Summary Table*. Critical, Regulation 5, 10(1).
- 4.7.5 Potable water samples from a potable water system, from potable water servicing equipment (i.e. filling stations, potable water carts and trucks) and ice samples are taken routinely for the purpose of monitoring the presence of total coliforms and the results meet the microbiological parameter guidelines for total coliforms in the *Guidelines for Canadian Drinking Water Quality Summary Table. (See Annex 5).*
- 4.7.6 Potable water samples from a potable water system are taken when required for the purpose of monitoring physical-chemical parameters (e.g. as a result of the operational requirements of a primary or secondary treatment device on a potable water system). The parameters to be tested are based on manufacturer's recommendations and health-based guidance. Results meet the respective parameter guidelines *in the Guidelines for Canadian Drinking Water Quality Summary Table.*
- 4.7.7 Potable water samples from potable water servicing equipment (i.e. filling stations, potable water carts and trucks) are taken routinely for the purpose of monitoring the presence of *E. coli* and the results meet the microbiological parameter guidelines in the *Guidelines for Canadian Drinking Water Quality Summary Table*. Critical
- NOTE: Sampling should occur at least quarterly, as well as before being placed into service, returned to service after being taken out of service for a season, or following any suspected contamination.
- 4.7.8 Documents demonstrate that microbiological water sample analysis is done in accordance with a method for the analysis of potable water set out in Part 9000 of *Standard Methods for the Examination of Water and Wastewater*. Critical, Regulation 12.(2)

Corrective Measures and Follow up Sampling

- 4.7.9 Measures are in place to ensure potable water that is contaminated (i.e. non-potable) must not be provided to passengers. Critical, Regulation 4
- 4.7.10 If the water in the potable water system does not meet the microbiological parameter guidelines for *E. coli* in the *Guidelines for Canadian Drinking Water Quality Summary Table*, or there are reasonable grounds to believe that the water has become contaminated, the following corrective measures are taken:
 - The use of water is discontinued immediately Regulation 4, 5
 - The system is disinfected, decontaminated, repaired or replaced, as the case may be, and flushed with potable water so as to ensure that the water is free from contamination before it is used;
 - The cause of the contamination is investigated;
 - An assessment of the other conveyances in the operator's fleet is done to determine whether their potable water systems have been contaminated (See Annex 5).

Critical, Regulation 13.

NOTE: An investigation of the cause of contamination of the conveyance's water may include:

- Review history of bacteriological testing results for the conveyance, water trucks/carts, filling stations, potable water cabinets and supply stations. Retest the supply and other transfer points if necessary;
- Review possible cross-connections and verify functionality of all backflow preventers;
- Verify date that filters were changed;
- Verify boarding and sampling procedures (e.g. disinfection procedures, hygiene);
- Verify the sanitary condition of the potable water hose, trucks/carts, potable water cabinets and filling stations;
- Verify water treatment units are functioning as intended;
- If water supply is disinfected, verify disinfectant level at supply stations.

The results of this investigation play a crucial role in preventing contamination of the conveyance's potable water system and in assessing whether or not other conveyances in the fleet could have been affected. Unhygienic boarding procedures at a filling station, adverse water sampling results from a water truck, defective components or equipment, or contaminated water supplies present situations that affect multiple conveyances. When there is a potential link, the other conveyances must be assessed to determine whether their potable water systems have been contaminated. This may include reviewing history of previous testing results, sampling, verifying components or equipment, etc.

- 4.7.11 Sampling is conducted for the purpose of verifying that the water in the potable water system is free from contamination after the following activities:
 - The potable water system is disinfected, decontaminated, repaired or replaced, as the case may be, and flushed as a result of suspected or confirmed contamination;
 - The potable water system is disinfected and flushed before the system is placed into service for the first time or returned to service after a seasonal shut-down.

Samples are taken from the sampling sites set out in the Regulatory Schedule and any additional sampling sites as necessary. Sampling parameters (e.g., *E. coli* and any other microbiological, chemical, physical or radiological parameters) and analysis are selected to verify that the suspected or confirmed contamination has been removed. Results meet the respective parameter guidelines *in the Guidelines for Canadian Drinking Water Quality – Summary Table.* Critical, Regulation 15 (1) (2)

NOTE: When a system has been disinfected and flushed as a result of suspected or confirmed contamination, follow up sampling must include analysis for E coli. Repeat testing should be conducted 24 hours after the first retest at the same outlet. (See Annex 5).

When a system is being put into service for the first time, or returned to service after a seasonal shut-down, sampling for E. coli is required. If the water system has been disinfected, decontaminated, repaired or replaced, as the case may be, and flushed as a result of contamination or suspect contamination with a microbiological, physical or chemical parameter other than E coli, sampling is also conducted for the specific parameter in question. For example, any maintenance work on the potable water system that may introduce a physical or chemical contaminant to the system is followed by sampling to verify the absence of the potential contaminants. (i.e. testing

for VOCs following the application of storage tank coatings).

- 4.7.12 If the water in the potable water system does not meet the microbiological parameter guidelines for total coliforms in the *Guidelines for Canadian Drinking Water Quality Summary Table*, records show that corrective measures are taken and follow-up sampling is conducted. (See Annex5).
- 4.7.13 Corrective measures(s) to all contaminated water or ice sample results, or for suspect contamination, are taken in a timely manner in order to mitigate any risk to the travelling public. The corrective measure(s) reflect recommendations in health-based guidance documents. (See Annex 5).

Potable Water Sampling Plan

- 4.7.14 A potable water sampling plan is in place where a potable water system is used on a conveyance. The plan includes, but is not limited to the following:
 - key roles and responsibilities;
 - microbiological parameters to be analyzed. (E. coli, total coliforms);
 - physical-chemical parameters to be analyzed (if necessary);
 - selection of sampling sites and routine sampling frequencies (see regulations for sampling frequencies based on selected disinfecting and flushing schedules);
 - provisions for follow-up sampling;
 - sampling sites, routine sampling frequencies and provisions for follow-up sampling for potable water carts and trucks and their filling stations;
 - reference to the *Guidelines for Canadian Drinking Water Quality* for interpreting results;
 - standard operating procedures (SOPs), based on standard methods, accredited laboratory requirements and health-based standards for the use of sampling and testing equipment, sampling techniques, transporting, chain of custody and reporting. (See inspection articles 7.1 to 7.5);
 - methodology for testing (for *E. coli,* samples must be tested in accordance with a method for the analysis of potable water set out in Part 9000 of *Standard Methods for the Examination of Water and Wastewater*);
 - laboratory accreditation requirement for the analysis requested;
 - quality control measures for onsite microbiological laboratories (i.e. regular analysis of duplicate samples by an accredited laboratory);
 - disinfectant residual testing procedures, equipment and recording requirements.

5.0 TRAINING PLAN

5.1 TRAINING PLAN

5.1.1 A training plan has been established and documented to develop and to maintain the skills and knowledge required to implement and sustain the potable water management system. Training is monitored and records are available.

Training is required for, but not limited to, the following activities:

- onboard water treatment operations (specific to types of treatment, monitoring, maintenance, etc.);
- sampling and testing equipment, sampling techniques;
- cleaning, disinfecting and flushing, maintenance, servicing and testing procedures as related to the potable water system and equipment;

- the safe handling of water;
- preventing contamination of ice and potable water containers (including taps), as well as utensils such as ice scoops and tongs;
- cross-connection control program (identification, inspection, maintenance, servicing and testing policy and procedure);
- application of tampering control measures;
- Incident and emergency preparedness and response plan.

6.0 INCIDENT AND EMERGENCY PLAN

6.1 INCIDENT AND EMERGENCY PLAN

- 6.1.1 An incident and emergency preparedness and response plan is in place. It should include the following elements:
 - identification of key roles and responsibilities;
 - identification of potential incidents, adverse events and emergency situations related to potable water (e.g. water quality advisories such as boil water notices for water supplies, waterborne illness, contaminated water or ice sampling results, natural disasters and emergency events);
 - written corrective action plans and procedures that clearly address how to deal with contamination or suspected contamination of the water and ice onboard, water quality advisories from suppliers, or other situations related to potable water;
 - emergency contact lists (internal and external).
- 6.1.2 Any contaminated water sampling results obtained during sampling by operators are reported to the Travelling Public Program. Positive *E coli* results are reported immediately by calling the TPP 24/7 on-call. Positive total coliform results as well as corrective actions should be sent electronically.

7.0 COMMUNICATION PLAN

7.1 COMMUNICATION PLAN

- 7.1.1 A communication plan is in place. It should include, but not be limited to the following:
 - draft communiqués/ notifications to facilitate rapid response to incidents, adverse events and emergencies related to potable water, including public signs and posters for water outlets that are impacted by adverse water quality;
 - notification of health authorities and individual stakeholders (contractors, conveyance operators, ground service providers, travelling public, employees, etc.) when conditions exist that may pose an imminent health hazard to the travelling public and employees;
 - a communication system with water suppliers to obtain water quality advisories in a timely manner;
 - regularly updated contact information of stakeholders and service providers.
- 7.1.2 Written policies and procedures are in place and available for review, which track deficiencies identified, complaints received, as well as responses and corrective actions taken.

8.1 RECORDS

- 8.1.1 Records must be readily accessible for examination by a PHAC EHO. Critical, Regulation 23 (See summary table in Annex 6).
- NOTE: Operators may maintain records in hard-copy or electronic formats. They may be stored on or off-board conveyances but must be accessible for EHO review upon request.
- 8.1.2 All records must be retained for a period of 12 months after the day on which the activity (sample, corrective measures, investigation, inspection, maintenance, etc.) is conducted or completed (as applicable). Where regulatory sampling frequency is every 24 or 36 months, all associated records must be retained for that period of time. Regulations 19(3), 19(4), 20(3), 21(2), 22(2)
- 8.1.3 Routine sampling for *E. coli* is recorded and includes the following:
 - the identity of the conveyance;
 - the sampling sites and location of the taps;
 - the date and time when each sample was taken; and
 - the results of the analysis.

Critical, Regulation 19(1)

- 8.1.4 Routine disinfection and flushing of on board potable water systems is recorded and includes the following:
 - the identity of the conveyance;
 - the date and time when routine disinfection and flushing was conducted.

Critical, Regulations 19(2)

- 8.1.5 All non-routine instances when an on board potable water system is disinfected, decontaminated, flushed, repaired or replaced are recorded. Records include:
 - the conveyance affected;
 - the activity completed (e.g disinfection and flushing, repair, decontamination etc.)
 - the date and time when the activities are completed.
 - the reason for the activity (e.g., water sampling results indicated contamination; suspected contamination; before conveyance is placed into service; conveyance is returned to service at the start of a new season; the conveyance is being returned to service after repair, cleaning or another activity that might have contaminated it).

Critical, Regulation 20(1)

- 8.1.6 All results of water analyses completed to verify that water in the on board potable water system is free from contamination are recorded. Records include:
 - the identity of the conveyance;
 - the sampling sites and location of the taps;
 - the date and time when each sample was taken;
 - the parameter/s being analysed;
 - methodology for testing (for *E. coli,* samples must be tested in accordance with a method for the analysis of potable water set out in Part 9000 of *Standard Methods for the Examination of Water and Wastewater*).
 - results of the analysis.

Records must indicate why sampling was completed (for example, conveyance/potable water system placed into service for the first time or returned to service after a season; following measures such as disinfection, decontamination or repair to remove contamination). Critical, Regulation 20(2)

- 8.1.7 All corrective measure(s) taken in respect of the results of a regulatory inspection or an analysis of a water sample taken during an inspection are recorded. The record identifies the conveyance and provides a description of the measure taken and the date on which it is taken. Critical, Regulation 21 (1)
- 8.1.8 Details of all investigations into the cause of contamination and of assessments of possible contamination on other conveyances in the fleet are recorded. Records include:
 - the steps taken in the course of the investigation;
 - the steps taken in the course of the assessment of other conveyances in the operator's fleet;
 - the results obtained from the investigation and assessment;
 - a description of any corrective measure taken;
 - the date on which the corrective measure is taken; and
 - the date on which the corrective measure is completed.

Critical, Regulation 22(1)

- 8.1.9 Records of disinfectant residual test results from the conveyance potable water system specify the conveyance as well as the date and time when tests are taken, where applicable.
- 8.1.10 All microbiological (including *E. coli* and total coliform), physical, and chemical sampling results for each water sample from potable water servicing equipment are recorded and include the following:
 - the identity of the conveyance or equipment sampled;
 - the sampling sites and an identification of the taps;
 - the date and time when each sample is taken; and
 - the parameter analyzed and the results of the analysis.
- 8.1.11 All investigations into the cause of a contamination and the assessment of possible contamination on potable water servicing equipment in the operator's fleet are recorded and include:
 - the steps taken in the course of the investigation and assessment;
 - the results obtained;
 - a description of any corrective measure taken; and
 - the date on which the corrective measure is taken.
- 8.1.12 All instances when potable water servicing equipment is disinfected, decontaminated, repaired or replaced, and flushed are recorded. Records include:
 - the equipment affected;
 - the activity completed (i.e. disinfection and flushing, repair, decontamination etc.);
 - the date and time when the activities are completed;
 - the reason for the activity (e.g., water sampling results indicated contamination; suspected contamination; before equipment is placed into service, returned to service at the start of a new season, or being returned to service after repair; cleaning or another activity that might have contaminated it).

- 8.1.13 Records of disinfectant residual test results from potable water carts and trucks specify the potable water cart or truck as well as the date and time when tests are taken.
- 8.1.14 Records are established and maintained for the inspection and maintenance of the potable water system and potable water servicing equipment. Records may include:
 - Reports from the water supplier;
 - Boarding/bunkering logs;
 - Operational and maintenance manuals and "as-built" design drawings;
 - Manufacturer's information for each piece of equipment;
 - · Reports of in-house operational procedures tests;
 - Curing and drying records when coatings are applied in potable water tanks;
 - Reports of any incidents, including remedial and emergency measures, boil advisories, etc.;
 - A record of corrective actions taken as part of operational controls, or in the event of water-related complaints;
 - Correspondence;
 - Communications protocols;
 - Complaint logs;
 - Internal or external inspections and audits.

8.2 PLAN REVIEW

8.2.1 The components of the Potable Water Management System are reviewed and updated at least annually or when there is a change in regulations, process, procedure or equipment. Changes are monitored and recorded.

9.0 SYSTEM INSPECTION AND REVIEW

9.1 ROUTINE INSPECTION AND MANAGEMENT SYSTEM REVIEW

9.1.1 Routine site inspections and internal management system review activities are conducted by the operator as necessary and documented.

POTABLE WATER INSPECTION GUIDELINES

1. ONBOARD POTABLE WATER

- 1.1 Water intended to be used on board conveyances must be provided by way of a potable water system, from a potable water container, or from a bottle of prepackaged water for these purposes:
 - For drinking, hand washing or oral hygiene by passengers;
 - For food preparation for passengers; or
 - Ice, used for the contact refrigeration of food intended for passengers;
 - Ice, to be added to beverages intended for passengers.

Critical, Regulation 3 and 4.(2)

NOTE: If potable water is provided on board, it can ONLY be provided by way of a potable water system or a potable water container that meet regulatory requirements or by pre-packaged bottled water that meets the requirements set out in the Food and Drugs Act and Food and Drug Regulations.

Only potable water may be provided for the purposes listed above. Running water at hand washing facilities must be potable water. Posting signs indicating that water is not potable does not exempt operators from this requirement.

The National Plumbing Code of Canada (article 2.7.4.1 (2)) states that non-potable water systems shall only be used to supply water closets and urinals.

- 1.2 Potable Water and ice that is contaminated (i.e. non-potable) must not be provided to passengers. Critical, Regulation 4 (1)
- 1.3 Potable water containers used on board must be readily moveable by one person. Critical, Regulation 16(1)
- NOTE: Containers that are not readily moveable by one person and are not part of the fixed potable water system are not permitted, as they may be difficult to clean and sanitize.
- 1.4 Measures are taken to prevent the risk of contamination when a potable water container is loaded on board a conveyance or is stored, moved or handled once it is on board the conveyance and to ensure the container is maintained in a sanitary condition. Critical, Regulation 16(2) (See Annex 2).
- 1.5 Measures are taken to prevent the risk of contamination of water when it is dispensed to passengers in drinking cups, such as the use of single-use drinking cups. **Critical**, **Regulation 17(1)** (See Annex 2).
- 1.6 Measures are taken to prevent the risk of contamination of water dispensed from a container that has a capacity of not less than 5 L when the water is used in the preparation of food or provided to passengers, such as the use of a tap. Critical, Regulation 17(2)
- NOTE: A tap or another means of preventing the risk of contamination is used. Tubes, chutes and orifices that dispense water must be protected from manual contact and are designed to prevent contact between the lip-contact surface of glasses or cups that are refilled. Serving utensils such as ladles must not be used.

- 1.7 A sufficient quantity of potable water is available for:
 - Drinking, hand washing or oral hygiene for passengers;
 - Food preparation for passengers. **Critical**, Regulation 4(1)
- NOTE: Potable water quantities on board are sufficient to meet foreseeable needs for all purposes and to achieve sufficient water pressure at each tap to minimize the potential for contamination. Water quantity and pressure at taps in various locations on the conveyance are adequate for the designed purpose.

2. ONBOARD ICE

- 2.1 Ice may be made on board the conveyance or loaded on board. Ice must always be:
 - made from a water supply that is free from contamination, with measures taken to ensure it is free from contamination when taken from the supplier;
 - available in sufficient quantity for its intended use (i.e. contact refrigeration of food intended for passengers or for passenger beverages);

• free from *E. coli.* Critical, Regulations 8, 9, 10(1)

- 2.2 Measures are taken to prevent the risk of contamination of ice when it is loaded on board a conveyance, as well as when it is moved and when it is stored once it is on the conveyance. Critical, Regulation 10(2)
- NOTE: Measures include moving and storing ice in clean, sanitized and closable food grade containers (including bags). Precautions are taken to ensure the ice is not exposed to contamination from non-food products. Personnel practice adequate hand hygiene when handling containers. (See Annex 2).
- 2.3 Measures are taken to prevent the risk of contamination of ice when it is handled. Ice is handled with clean utensils such as an ice scoops and tongs to prevent the risk of contamination. Critical, Regulation 10(3)
- NOTE: Only clean utensils are used. Additional measures include not touching ice with hands or handles of utensils. Personnel practice adequate hand hygiene when handling or serving ice. Reusable utensils, ice scoops and tongs are cleaned and sanitized after daily use and when soiled or improperly handled. If a reusable item has fallen on the floor, is dirty or has been mishandled, it cannot be used until it is washed and sanitized. (See Annex 2).

3. POTABLE WATER SYSTEM

- 3.1 The potable water system is used only for potable water and no other substances. Critical
- 3.2 The potable water system is designed, constructed and operated in a manner that prevents the risk of contamination through the implementation, in particular, of measures
 - (a) to protect the system during the loading of water,
 - (b) to prevent backflow,
 - (c) to protect filling connections and cross connections, and
 - (d) to protect the system from tampering. Critical, Regulation 11(1)

NOTE: See Assessment Guidelines - Section 4.6 POTABLE WATER SYSTEM PROTECTION.

- 3.3 The potable water system's components are easily identifiable in order to avoid confusion with those of other systems. Each storage tank and filling connection is identified through the use of a readily visible and legible sign. Critical, Regulation 11(2)
- NOTE: Labelling and colour coding are examples of methods to identify potable water system components where necessary. For marine vessels, refer to ISO Standards 14726 identification requirements for potable water systems.
- 3.4 Records show that manufacturer's recommendations are followed for the application, drying and curing of interior coatings of potable water tanks. These records, as well as product specifications, are available for review. **Critical**
- NOTE: Operators must demonstrate that curing and drying times respect product specifications. Ensure that coatings for potable water tanks have been certified by an accredited certification body as meeting the appropriate NSF International /American National Standards Institute NSF/ANSI drinking water materials standards.
- 3.5 Potable water tanks are equipped with a drain that permits complete drainage of the tank.
- 3.6 Potable water tanks are equipped with sampling valves that are labelled and are directed downward.
- 3.7 Potable water tanks are completely enclosed, from the filling inlet to the discharge outlet.
- 3.8 Devices for determining water depth in potable water tanks are constructed and maintained so as to prevent contaminated substances or liquids from entering tanks. Manual sounding is not permitted.
- 3.9 For marine vessels, potable water tanks do not share a common wall with the hull of the vessel or with tanks containing non-potable water or other liquids. **Critical**
- NOTE: For older vessels that do not meet this requirement, risks of potable water contamination should be evaluated and mitigated. For example, operators may use salinity meters to assess leaks in potable water storage tanks for salt water vessels and/or adopt other interim measures until the system is reconfigured or the vessel is replaced.
- 3.10 Potable water filling line openings are horizontal or directed downward and are a suitable distance above the ground or deck.
- NOTE: For marine vessels, this distance should be at least 460 mm (18 inches) above the deck.
- 3.11 Potable water filling lines have a cap fastened by a non-corroding cable or chain to an adjacent bulkhead or surface in such a manner that the cap cannot touch the ground/deck when hanging free.

- 3.12 Potable water tank overflows are properly located and protected to prevent the entrance of contaminating substances and vectors. **Critical**
- 3.13 All vents connected to the potable water system are properly located and protected to prevent the entrance of contaminated substances and vectors. The openings of all vents face downwards, are covered with wire mesh and are a suitable distance above the top of the tank or deck. **Critical**
- 3.14 For marine vessels, all potable water vents or openings passing through the hull discharge at least 3 m above the maximum load water line.
- 3.15 For marine vessels, potable water filling lines and potable water piping are striped or painted blue or in accordance with the colour designation in ISO 14726. Pipelines shall be marked as follows:
 - once in each room, at least;
 - at each penetration point in bulkheads, walls and decks;
 - close to each valve;
 - at intervals not exceeding 5 meters (15 feet) in all spaces.
- 3.16 Piping systems carrying sewage or other non-potable liquids do not pass through potable water tanks. Critical
- 3.17 Non-potable water piping shall not be located where food is prepared, above foodhandling equipment, above a non-pressurized potable water tank or above a cover of a pressurized potable water tank. **Critical**
- NOTE: For older vessels that do not respect this requirement, risks of potable water contamination should be evaluated and mitigated.
- 3.18 Potable water equipment and potable water system components are inspected, maintained, serviced and tested as per procedures and frequencies based on manufacturer's recommendations, plumbing codes or health-based standards and guidance documents. Critical
- 3.19 Potable water fixtures for public access are functional and maintained in a sanitary manner. These fixtures include drinking water fountains, faucets, taps or any part of the fixture that may come in contact with and affect the water quality. Critical

On-Board Potable Water Treatment

- 3.20 In the case of a vessel, if surface water is loaded on the vessel for use as potable water, the water is subsequently decontaminated by:
 - in the case of salt water, reverse osmosis or distillation and, if necessary, any other decontamination process; and
 - in the case of fresh water, filtration and disinfection.

The vessel must be making way, and water cannot be loaded from the waters within a harbor or in a port. Critical, Regulation 7(1)a, 7(1)b, 7(2)

NOTE: Harbors or ports refer to areas where vessels load and unload passengers and/or cargo.

- 3.21 Potable water treatment devices that are part of the potable water system are inspected, maintained, serviced and tested as per procedures and frequencies based on either manufacturer's instructions or health-based standards and guidance documents. Critical
- NOTE: When a potable water treatment device is installed to maintain a disinfectant residual in the potable water tank and distribution system, the use of automated halogenation devices and automated disinfectant residual analyzers is optimal and recommended.
- 3.22 Water treatment devices (such as filters and reverse osmosis systems and their components), system components (such as potable water tanks, pipes and faucets), and treatment additives are made of material compatible with potable water and have been certified by an accredited certification body as meeting appropriate NSF International /American National Standards Institute health-based performance standards. **Critical**

4. POTABLE WATER SERVICING EQUIPMENT

Filling Stations

- 4.1 The location of filling stations is satisfactory including being maintained in a sanitary condition, accessible to users, isolated from sources of contamination and public access, appropriate lighting etc.
- 4.2 Potable water filling stations must not be used by lavatory service equipment and potable water carts and trucks must not be filled at lavatory service areas. Critical
- 4.3 Filling stations are constructed of corrosion-resistant materials.
- 4.4 Filling stations are identified as 'potable water'.
- 4.5 Filling stations are maintained in a sanitary condition and are equipped with adequate backflow prevention which is inspected and serviced regularly as per manufacturer's recommendations or guidance documents. Critical
- 4.6 Filling stations are equipped with quick-type couplings (or threaded for permanent hose connection).
- 4.7 Outlets of filling stations are directed downward or horizontal.
- 4.8 The area surrounding filling stations is adequately drained.
- 4.9 Potable water hoses are flushed before being attached to a filling line of a conveyance potable water system, or before each period of continuous use, and drained after use or after each period of continuous use. **Critical**
- 4.10 The potable water supply hose nozzle is disinfected at least before periods of continuous use and as necessary to ensure it is free of contamination.

Potable Water Carts and Trucks

4.11 Potable water carts and trucks are kept in clean storage areas that are separate from fuel handling, toilet waste and sewage tank flushing carts or other activities that may increase risk of contamination. **Critical**

- 4.12 The potable water components of water carts and trucks are routinely cleaned, disinfected and flushed with potable water on a regular basis. **Critical**
- NOTE: Routine disinfection frequencies may vary depending on the historical and recent water sample results and sampling frequency, and may be evaluated on a case by case situation. It is recommended that water tanks be disinfected weekly.
- 4.13 The potable water components (i.e. tanks, hoses and appurtenances) of water carts and trucks are cleaned, disinfected and flushed with potable water:
 - before being placed into service;
 - before being returned to operation after repair, replacement or maintenance; and
 - if water analysis results indicate contamination or there are grounds to suspect contamination.

Tasks are completed as per procedures and frequencies, and are based on manufacturer's recommendations or health-based standards and guidance documents. **Critical**

- 4.14 The potable water components of water carts and trucks are inspected, maintained and serviced as per procedures and frequencies based on manufacturer's recommendations or health-based standards and guidance documents. **Critical**
- 4.15 A disinfectant residual is maintained in water carts and trucks and is tested with appropriate testing equipment. Disinfectant residuals should be tested and recorded regularly at the outlet of the potable water tank.
- NOTE: An operational range for free disinfectant residual between a detectable level and 5 mg/L should be maintained in the potable water inside the tank of the cart or truck. The optimal range of 0.2 to 0.8 mg/L should be targeted. Up-to-date testing equipment is appropriate for this range and for the type of disinfectant tested. Procedures for testing, and calibration where required, are established as per manufacturer's recommendations, health-based standards and guidance documents. Testing and recording disinfectant residuals should be done once daily, during the operating period. Monitoring may be reduced when acceptable supporting practices and bacteriological sampling results exist.
- 4.16 Potable water tanks on water carts/trucks are made of smooth, heavy-gauge, corrosion-resistant material that are compatible with potable water.
- 4.17 Potable water tanks on water carts and trucks are labeled with 'potable water' and are completely enclosed, from the filling inlet to the discharge outlet.
- 4.18 Potable water tanks on water carts and trucks are equipped with a drain that permits complete drainage of the tank.
- 4.19 The water within the tanks of water carts and trucks is delivered or drained within 24 hours of filling.
- 4.20 Vents on potable water tanks of water carts and trucks are properly located and protected to prevent the entrance of contaminating substances and vectors.
- 4.21 Inlets and outlets on potable water tanks of water carts and trucks are directed downward.

- 4.22 Inlets and outlets on potable water tanks of water carts and trucks are provided with caps or closures with keeper chains, and are kept closed except when filling or cleaning tank.
- 4.23 Devices for determining water depth in potable water tanks of water carts and trucks are constructed and maintained so as to prevent contaminated substances or liquids from entering tanks.

NOTE: Manual sounding is not permitted.

Potable Water Hoses and Appurtenances

- 4.24 Potable water hoses are not used for any other purpose Critical
- 4.25 Potable water hoses and appurtenances are disinfected before being placed into service, before returning to service after repair, replacement or maintenance, or if there are grounds to suspect contamination. **Critical**
- 4.26 Potable water hoses and appurtenances are routinely cleaned, disinfected and flushed with potable water.
- 4.27 Potable water hoses are handled in a sanitary manner to prevent contamination. Critical
- 4.28 Potable water hoses are identified as "potable water" and are equipped with unique fittings.
- 4.29 Potable hoses and appurtenances are constructed of durable, easily cleanable materials and are maintained in good repair.
- 4.30 Potable water hoses are constructed of food grade material approved for potable water use. Critical
- 4.31 Potable water hoses and appurtenances are stored in a way that prevents contamination. Critical
- 4.32 Potable water hoses are drained and stowed with the ends capped, on reels or racks, in secure and locked potable water hose storage lockers with restricted public access.
- 4.33 Potable water hose storage lockers are constructed of smooth, non-toxic, corrosion resistant, easily cleanable material and maintained in good repair. They are mounted at least 45 cm (18") above floor level and are self-draining.
- 4.34 Potable water hose storage lockers are identified as for 'potable water use only' and are not used for any other purpose than storing potable water hoses, fittings, and other associated equipment.

5. POTABLE WATER TRANSFER

5.1 Personnel demonstrate knowledge of, and apply, appropriate procedures for the safe handling of water and of potable water servicing equipment. Employees ensure that equipment used to transfer potable water is not subject to contamination. **Critical**

- 5.2 Personnel handling water demonstrate the basic principles of personal hygiene (hand washing, clean outer garments). Critical
- 5.3 Personnel are not tasked simultaneously with both wastewater handling and potable water transfer. Critical

6. POTABLE WATER SYSTEM PROTECTION

6.1 Disinfecting and flushing of the potable water system are conducted as per manufacturer's recommendations and health-based standards and guidance documents. Critical

This includes, but is not limited to, the correct use of the following:

- disinfectant types, concentrations and contact times;
- disinfectant residual testing procedures and equipment;
- ensuring disinfecting and flushing of all parts of the potable water system. (See Annex 3).
- 6.2 The potable water system is maintained free of unprotected cross connections with non-potable piping systems or other sources of contamination. Cross connections to the potable water system are protected to prevent backflow (back-siphonage or backflow). Critical, Regulation 11(1) b), c)
- 6.3 Personnel are trained in cross-connection control identification, inspection, maintenance, servicing and testing procedures.
- 6.4 Backflow prevention devices are maintained in good repair, inspected and serviced in accordance with applicable CSA standards, the manufacturer's instructions and as necessary to prevent the device's failure. **Critical**
- 6.5 Backflow prevention devices are located in such a manner that permits inspection, maintenance, servicing and testing.
- 6.6 Testable backflow prevention devices are inspected and tested with a differential pressure test kit at least annually with test results showing pressure readings recorded for each device.
- 6.7 Personnel demonstrate knowledge of, and apply, measures to prevent the risk of contamination of potable water. Critical

7. WATER QUALITY SURVEILLANCE AND MONITORING

Potable Water & Ice Sampling

7.1 Personnel responsible for water and ice sampling are trained and demonstrate knowledge of sampling procedure requirements.

- 7.2 Water samples are collected according to standard methods and in a manner that prevents contamination of the sample. Procedures include, but are not limited to:
 - using sterile, non-expired containers pre-treated with chlorine neutralizer;
 - washing and drying hands and donning gloves before sampling;
 - collecting from a cold water tap if possible. (If the only sampling point in the lavatory or galley is a hot water tap or the coffee maker, collect sample and document sampling location);
 - removing aerators and filters (where applicable);
 - disinfecting the opening and flushing the tap before sampling;
 - not touching the mouth of the container or the inside of the lid;
 - not sampling from leaking taps where water flows over the outside of the tap.
- 7.3 Ice samples are collected according to standard methods and in a manner that prevents contamination of the sample. Procedures include, but are not limited to:
 - using sterile, non-expired containers;
 - washing and drying hands and donning gloves before sampling;
 - collecting representative ice samples using a sterile collection device;
 - ensuring the sample bag is properly secured to prevent sample leakage.
- 7.4 Water and ice sample containers are appropriately labelled. Sampling information is appropriately documented and accompanies the sample. This includes, but is not limited to:
 - sampling identification, date, time, location, analysis requested;
 - any pertinent information (e.g. objectionable aesthetic parameters in the water or ice such as odour, colour, taste).
- 7.5 Water and ice samples are stored and transported to the laboratory in appropriate transport containers with appropriate time and temperature controls.
- NOTE: As per methods set out in Part 9060B of Standard Methods for the Examination of Water and Wastewater, preferably hold samples at less than 10°C during transit to laboratory on day of sampling. Hold at 4°C if arrival to laboratory is too late for processing on same day. Do not exceed 30 hour holding time from collection to analysis for coliform bacteria.

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4.0 DOCUMENT HISTORY & VERSION CONTROL TABLE

This table records details of minor and major amendments to the Guidelines over time. It shows when it was last amended, what was changed from the previous version and the date that this occurred.

Date		Action		
April 2016	Creation of original document			
September 2016	Modification of	of the following sections/articles:		
	Introduction	Clarified application		
	4.2.5	Modified disinfection residual testing and recording recommendations. Added information in NOTE		
	4.3.1	Modified NOTE re: certification of components and certification bodies		
	4.4.3	Modified disinfection residual testing and recording recommendations. Added information in NOTE		
4.7.5		Added potable water servicing equipment		
	4.7.7	Removed total coliforms		
	3.4	Modified NOTE re: certification bodies		
	3.22	Deleted NOTE		
	4.15	Modified disinfection residual testing and recording recommendations. Removed Critical requirement		
	4.27	Modified application		
	References	Updated reference to 2016 Food Retail and Food Services Code		
	Annex 5	Modified total coliform information as per Annex 1		

ANNEX 1 - Guidance on Total Coliforms for Conveyances

PURPOSE

The intent of this document is to provide guidance on the public health significance of total coliforms and their importance as a potable water quality monitoring tool.

PUBLIC HEALTH SIGNIFICANCE OF TOTAL COLIFORMS

Total coliforms are a diverse group of bacteria, including *Escherichia coli (E. coli)*, that are naturally found on plants and in soils, water, and in the intestines of humans and warm-blooded animals. Because total coliforms are present in both faecal and non-faecal environments, they are not good indicators of faecal contamination. Consequently, in the absence of *E. coli*, total coliforms do not provide information on health risk. However, coliform bacteria are operational indicators, used to indicate potential pathways for contamination. The presence of total coliform in storage and distribution systems can indicate water quality degradation, possibly via bacterial regrowth or post-treatment contamination.

TOTAL COLIFORM AS A MONITORING TOOL

The Guidelines for Canadian Drinking Water Quality¹ state that total coliforms should be monitored in a distribution system because they can show changes in water quality. Detection of total coliforms (i.e. any value over 0 CFU/100ml) from consecutive samples from the same site should be investigated.

Microbiological contamination and water quality degradation can occur during the transfer of water from a potable supply to the conveyance's potable water system, or from inadequate treatment of raw water onboard. Water quality problems can occur during the water boarding process if there are issues with the watering point connections, water transfer equipment, or the sanitary practices employed. Contamination can also occur if the conveyance's onboard water system is not properly operated and maintained or designed ² (e.g. unprotected cross-connections, inadequate treatment of raw water on vessels). The importance of total coliforms is that their presence in any amount indicates that potential pathways of contamination may exist. Monitoring total coliforms can help operators find and correct issues in the transfer process or in the conveyance's potable water system before they lead to serious operational or health issues. Applying a multiple-barrier approach, which includes regular total coliform monitoring, is an effective way to not only reduce the risk of illness from pathogenic microorganisms but also to ensure adequate maintenance of drinking water systems. This is a risk management approach involving the protection of source water, the use of appropriate and consistently effective treatment, a well-maintained distribution system, routine verification of drinking water quality and training.

Because total coliforms are widespread in the environment, they can be used as one of the many operational tools in a multi-barrier approach to determine the efficacy of a drinking water treatment system. The presence of total coliforms in storage and distribution systems may result from inadequately treated source water, allowing total coliforms to pass through the treatment system into the distribution system; subsequent regrowth; or intrusion of the organisms into the water post-treatment.

Detection of any level of total coliforms should trigger retesting of the affected water system as a minimum response. Subsequently, an investigation of the causes or potential causes of positive total coliform results may prompt corrective actions.

¹Health Canada (2012). Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Total Coliforms. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

² US EPA – Guidance Manual for the Drinking Water Rule – interim Final (2010)

No bacteriological analysis can replace a complete knowledge of the quality of the water at the source of supply, during treatment, and throughout all distribution steps. As well, routine sampling of total coliforms is not a substitute for the regular cleaning and maintenance of the system. However, the sampling of total coliforms should be part of an integrated management system. Their detection may indicate a potential threat to the system and should trigger an investigation and corrective actions in order to maintain overall bacteriological quality of the water. Refer to Annex 5 of the Assessment and Inspection Guidelines for Potable Water on Passenger Conveyances for further guidance on responding to positive total coliform testing results.

Ice:

Ice must be stored and transported in clean, sanitized and closable food grade containers or bags. Procedures need to be in place to ensure the ice is not exposed to contamination from non-food products during transportation and storage.

Ice must be served in a way that prevents contamination, such as with a utensil like a tong or an ice scoop (reusable or disposable) without the ice touching the hands or the handle of the utensil. Personnel should wash hands before doing any handling or service. Ice that is used for cooling exterior surfaces of food containers must not be used as food.

Ice making equipment on board must be designed, maintained, cleaned and sanitized to prevent the contamination of the ice. Cleaning and sanitizing of ice making equipment must be done routinely and following contamination or suspected contamination of ice, according to manufacturer's recommendations and health-based guidance documents for food contact surface equipment.

Any part of reusable items such as ice containers, buckets, ice scoops and tongs that come in direct contact with ice must be cleaned and sanitized regularly. This applies to multi-use potable water containers, drinking cups and serving utensils as well.

Containers and Utensils:

Any part of a container that comes in contact with potable water, including the tap on potable water containers, is made of food grade material and is compatible with potable water. It must be able to withstand cleaning and sanitizing methods/products. Surfaces that come in contact with potable water are free from breaks, cracks, or similar imperfections. Containers and utensils are handled in a sanitary manner (i.e. frequent hand hygiene, not touching interior surfaces, spouts or rims) and stored in a clean location, away from any sources of contamination. Lids and caps are kept on containers and closed.

Potable water containers, ice containers and utensils must be cleaned and sanitized using appropriate ware washing procedures, at a frequency that prevents the contamination of the water.

Cleaning and sanitizing are two distinct processes, and can be accomplished in a dishwasher or manually in sinks. These processes include:

- daily washing with a detergent solution followed by rinsing with water to remove loosened soil and residues of detergent;
- sanitizing, by the use of hot water or chemical sanitizers. Sanitizing solutions for food contact solutions are generally chlorine, quaternary ammonium compounds or iodine. Sanitizers must be used according to instructions on the product label. Concentrations of the sanitizing solution must be verified regularly.

More details are available in sections 4.2.6 to 4.2.8 of the most recent version of the Food Retail and Food Services Code.

ANNEX 3 – Guidance on Disinfecting and Flushing Procedures

ISSUE:

All potable water systems (PWS) on conveyances should be cleaned, disinfected and flushed regularly and as needed, to address potential public health risks. Procedures are required for disinfecting and flushing potable water systems to ensure any microbiological hazards are mitigated.

BACKGROUND:

Operators of PWS should disinfect and flush the potable water system:

- on a regular basis (based on regulatory requirements, manufacturer's instructions);
- when sampling shows presence of *E. coli* or there are reasonable grounds to believe that the water has become contaminated (e.g. multiple positive or elevated total coliform results);
- before the PWS is placed in service or before it is returned to service after being out of service for a season;
- before the PWS is returned to service after an activity that might lead to contamination of the water in the system.

Operators of potable water trucks/carts are also advised to disinfect and flush their systems based on the parameters above.

KEY POINTS IN A PWS DISINFECTING AND FLUSHING PROCEDURE:

- Written procedures from the conveyance manufacturer for disinfecting and flushing the PWS should be followed whenever they are available.
- Filters must be removed before disinfecting and flushing.
- The disinfectant must be of a type, and in a concentration, that ensures the disinfection of all interior surfaces of the potable water system components, *not of the water it contains.*
- A minimum concentration and contact time is respected. Minimum concentration and contact times are in accordance with manufacturer's instructions or as per health-based guidance documents.
- Disinfectant solutions must be used in accordance with the manufacturer's instructions.
- The disinfectant solution must be run through the tank(s), distribution system and taps/nozzles, to ensure contact with all parts of the potable water system.
- Disinfectant residual tests must be conducted at the furthest point to ensure the required disinfectant concentration is reached. Up-to-date testing equipment is appropriate for the range and for the type of disinfectant tested. Procedures for testing, and calibration where required, are established as per manufacturer's recommendations or health-based standards and guidance documents.
- Following flushing after required contact time, disinfectant residual tests must be conducted at the furthest point of the distribution system. When a chlorine product is used, the free chlorine residual at the furthest point of the distribution system must not exceed 5 mg/L.
- Record of PWS identifier and date of disinfecting and flushing.
- It is the operator's responsibility to ensure the compatibility of the product with water system components and the efficacy of the disinfectant for this purpose. Operators should be able to provide the technical support/rationale for the practice adopted.
- The operator needs to keep a record of the disinfecting and flushing activity for a period of 12 months. The record should include the date and time of the activity and procedures followed.

The regulations include a provision for disinfecting and flushing only the affected part of a PWS following an activity such as repair or cleaning and before that part is returned to service. This would apply to repairs done on a specific part of a PWS that can be isolated and that there is no risk of contaminating the whole system. Examples may include: cleaning of an isolated water tank, repairs on, or additions to an isolated section of the water distribution system.

ANNEX 4 – Regulatory Schedule for Routine Activities: *E. coli* sampling and Potable Water System Disinfection and Flushing

Conveyance	Sampling Sites	Sampling Frequency
Aircraft	The following sites, as applicable: (<i>a</i>) a tap in the galley or bar and a tap in one lavatory facility; (<i>b</i>) if there is no tap in one of the locations referred to in paragraph (<i>a</i>), a tap in another location referred to in that paragraph and another tap in a different location on board; or (<i>c</i>) if there is only one tap on board, that tap.	 Any of the following frequencies during a 12 month period: (a) from each site, once in each 3-month period during which the aircraft is in operation, with a minimum of 45 days between the taking of samples from the same site; (b) from each site, once in each 6-month period during which the aircraft is in operation, with a minimum of 90 days between the taking of samples from the same site, and with a disinfection and flushing of the potable water system conducted at least once in each 4-month period; or (c) from each sampling site, once in each 12-month period during which the aircraft is in operation, with a minimum of 180 days between the taking of samples from the same site, and with a disinfection and flushing of the potable water system conducted at least once in each 4-month period; or
Train	The following sites in each rail car used in the transport of passengers, as applicable: (<i>a</i>) a tap in the galley or bar and a tap in one lavatory facility; (if there is no tap in one of the locations referred to in paragraph (<i>a</i>), a tap in another location referred to in that paragraph and another tap in a different location on board; or (<i>c</i>) if there is only one tap on board, that tap.	 Any of the following frequencies: (a) from each site, once in each 12-month period, with a minimum of 180 days between the taking of samples from the same site; (b) from each site, once in each 24-month period, with a minimum of 360 days between the taking of samples from the same site, and with a disinfection and flushing of the potable water system conducted at least once in each 4-month period; or c) from each site, once in each 36-month period, with a minimum of 540 days between the taking of samples from the same site, and with a disinfection and flushing of the potable water system conducted at least once in each 3-month period, with a minimum of 540 days between the taking of samples from the same site, and with a disinfection and flushing of the potable water system conducted at least once in each 3-month period
Vessel with sleeping	The following four sites:	From each site, once in each month during

accommodations	(a) a tap at the forward end;	which the vessel is in operation
for passengers or	(b) a tap at the aft and:	
any other vessel	(D) a tap at the art end,	
that loads water	(c) a tap at the farthest point from	
while making way	the potable water storage tanks	
	(typically by the bridge, on the	
	upper deck);and	
	(d) a tap at the closest point to the	
	potable water storage tanks	
	(typically on the lower deck)	
Veccel without	The following sites, as appliable:	Any of the following frequencies during a 12
sleeping	The following sites, as applicable.	month period:
accommodations	(a) a tap in the galley or bar and a	
for passengers	tap in one lavatory facility;	(a) from each site, once in each 3-month
and that does not		period during which the vessel is in
load water while	(b) If there is no tap in one of the	operation, with a minimum of 45 days
making way	(a) a tap in another location	between the taking of samples from the same
	referred to in that paragraph and	Site;
	another tap at a different location	(b) from each site, once in each 6-month
	on board; or	period during which the vessel is in
		operation, with a minimum of 90 days
	(c) if there is only one tap on board,	between the taking of samples from the same
	that tap	site, and with a disinfection and flushing of
		the potable water system conducted at least
		once in each 4-month period; or
		(c) from each site, once in 12-month period
		during which the vessel is in operation, with a
		minimum of 180 days between the taking of
		samples from the same site, and with a
		disinfection and flushing of the potable water
		system conducted at least once in each 3-

ANNEX 5 - Guidance for Responding to Routine Bacteriological Water Quality Testing Results

PURPOSE

The intent of these guidelines is to identify risk management actions that should be followed by the conveyance industry when positive drinking water³ tests are received for *E.coli* or total coliform. These guidelines have been reviewed by Health Canada's Water, Air and Climate Change Bureau for consistency with the application and intent of the *Guidelines for Canadian Drinking Water Quality* (2012)^{4,5.}

Guidelines for Canadian Drinking Water Quality (2012)

E.coli: The maximum acceptable concentration (MAC) of *Escherichia coli* (*E. coli*) in drinking water is none detectable per 100 mL

Total Coliform: The MAC of total coliforms in water leaving a treatment plant and in non-disinfected groundwater leaving the well is none detectable per 100 mL.

Total coliforms should be monitored in the distribution system because they are used to indicate changes in water quality. Detection of total coliforms from consecutive samples from the same site or from more than 10% of the samples collected in a given sampling period should be investigated.

INTRODUCTION

Guidelines for Canadian Drinking Water Quality

The Guidelines for Canadian Drinking Water Quality set out the basic parameters that every water system should strive to achieve in order to provide the cleanest, safest and most reliable drinking water possible. They are used by every jurisdiction in Canada as the basis for establishing their own requirements for drinking water quality, thereby ensuring national consistency. The most important drinking water quality guidelines deal with microbiological quality, to ensure there is minimal risk of exposure to disease-causing organisms in drinking water. These include bacteriological parameters (e.g., *Escherichia coli* [*E.coli*], total coliforms), enteric viruses and protozoa.

Multi-Barrier Approach

Applying a multiple-barrier approach is an effective way to reduce the risk of illness from pathogenic microorganisms. This is a risk management approach that includes the protection of source water, the use of appropriate and consistently effective treatment, a well-maintained distribution system, routine verification of drinking water quality and public education.

The following describes the key elements of the water supply in relation to conveyances. Each element contains potential risks of contamination and should be addressed as part of a multi-barrier approach to safe drinking water⁶:

³ Drinking water: Water that is safe and satisfactory for drinking and food preparation (Synonym: potable water) - Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction – Version 1, 2005.

⁴Health Canada (2012a). Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – *Escherichia coli* (. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

⁵Health Canada (2012b). Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Total Coliforms. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

⁶ WHO *Guide to Hygiene and Sanitation in Aviation,* Third Edition

- the **source** of water coming into the terminal (airport, port, train station)
- the **onsite** water system, which includes the on-site distribution system (may include treatment facilities if the terminal produces or treats its own potable water)
- the **transfer point**, including the water transfer and delivery system. This is typically a temporary interconnection between the hard-plumbed distribution system of the terminal (e.g. at a filling station) and the conveyance water system, by means of potable water trucks and carts, refillable containers or hoses.
- the conveyance **water system**, which includes the water service panel, the filler neck of the water storage tank and all finished water storage tanks, including refillable containers/urns, treatment equipment and plumbing fixtures within the conveyance that supply water to passengers or crew.

Microbiological contamination is a concern on conveyances that board water because it can occur after the potable water leaves the public water system from which the water is obtained. The contamination can occur during the water boarding process if there are problems with the watering point connections, water transfer equipment, or sanitary practices. Contamination can also occur if the conveyance water system is not properly operated and maintained.⁷

Microbiological Testing: An Indicator of the Safety of the Drinking Water System

Microbiological quality is determined by testing drinking water for *E.coli* and total coliforms. Testing drinking water for *E.coli* and total coliforms verifies the quality and safety of the drinking water system onboard a conveyance.

E.coli is a bacterium that is always present in the intestines of humans and other animals and whose presence in drinking water would indicate faecal contamination of the water. Total coliforms are a group of bacteria that are naturally found on plants and in soils, water, and in the intestines of humans and warm-blooded animals. Because total coliforms are widespread in the environment, they can be used as one of the many operational tools to determine the efficacy of a drinking water treatment system.

The presence of total coliforms in a distribution system, as opposed to the natural environment, results from inadequately treated source water, allowing total coliforms to pass through the treatment system into the distribution system; subsequent regrowth; or intrusion of the organisms into the water post-treatment.

Detection of any level of *E.coli* requires immediate corrective actions and a follow-up investigation of the drinking water systems. Detection of any level of total coliforms should trigger retesting of the affected water system as a minimum response. Subsequently, an investigation of the causes or potential causes of positive total coliform results may prompt corrective actions.

Appendices A & B – Identifies actions to be taken by operators on receipt of positive results for *E.coli* or total coliforms.

No bacteriological analysis can replace a complete knowledge of the quality of the water at the source of supply, during treatment, and throughout a distribution system. Routine water testing is only one component for a multi-barrier approach to drinking water safety and should occur in the context of the implementation of a management plan for potable water⁸ that includes directions for safe handling, transportation and transfer of water to the conveyances, as well as procedures for cleaning/maintenance of the conveyance water tanks. The regular cleaning and maintenance of the system does more to protect public health than the occasional sampling, which is a verification procedure.

⁷ US EPA – Guidance Manual for the Drinking Water Rule – interim Final (2010)

⁸ Health Canada - A Guide to Developing Management Plans for Conveyances: Potable Water, Food and Sanitation (2011)

Assessment and Inspection Guidelines for Potable Water on Passenger Conveyances – September 2016

Appendix A: E. coli Testing Result Flowchart



Note 1: If presence of total coliform is detected (but no *E. coli* is present), refer to Appendix B Note 2: Wait for laboratory results indicating no contamination before re-activating affected potable water system.

Continue routine monitoring (Note 2)

Appendix B: Total Coliform Testing Result Flowchart

Presence of Total Coliforms (when E. coli is absent) Retest affected water system (minimum response): Wash/sanitize hands and disinfect faucet outlet before sampling. Retest positive outlet and adjacent outlets on the same system (e.g. the farthest point in the distribution system, upstream and downstream from affected outlet). High-risk outlets such as fountains, galley faucets, should be considered as priority areas for retesting. Conduct a Risk Analysis considering the following factors: The impact of a delay in retesting The number of positive results detected The location where the positive results were obtained If quantitative data are available, the concentration of total coliform in a sample The presence and type of water treatment units & related operational data The source of the water Historical water testing results Consult the Risk Analysis Table below for more information Recommended Response Measures may consist of, but are not limited to, one or more of the following: Investigate source of contamination: Review history of bacteriological testing results for the conveyance, water trucks/carts, filling stations, potable water cabinets and supply stations. Retest the supply and other transfer points if necessary. Review possible cross-connections and verify functionality of all backflow preventers. Verify date that filters were changed Verify boarding and sampling procedures (e.g. disinfection procedures, hygiene) Verify the sanitary condition of the potable water hose, trucks/carts, potable water cabinets and filling stations Verify water treatment units are functioning as intended If water supply is disinfected, verify the level of disinfectant at supply stations. Implement necessary corrective actions such as: Flush reservoir and distribution system with fresh, potable water Disinfect and flush reservoir and distribution system Replace or repair of defective plumbing or faucets Replace or repair treatment units. Disinfect conveyance filling port Disinfect hoses and hose ends Change filters No further action Presence of Total NO continue routine YES* Coliform? (Note 3) monitoring

Note 3: A 2nd resample may be required depending on the risk analysis in each scenario.

* If all corrective actions have been exhausted and Total Coliform re-sampling results remain above 0, a case-by-case review by The Public Health Agency of Canada may be requested.

*RISK ANALYSIS TABLE

The presence of Total Coliforms without the presence of *E. coli* in a drinking water sample indicates the water on the conveyance may be degrading, possibly due to bacterial growth or post-treatment contamination. As a result, a risk analysis should be performed following all positive tests, to assess the safety of the water supply. Some factors to consider when determining the appropriate response to the presence of total coliforms are:

- THE IMPACT OF A DELAY IN RETESTING: The minimum response to a positive coliform result is to retest in a timely manner to confirm the presence or absence of both *E. coli* and total coliforms. However, if it is not possible to retest the affected location within 24 hours of receiving the initial test results, other corrective measures as listed under "recommended response measures" should be implemented. This will ensure that passengers and crew are not exposed to water that is potentially contaminated.
- THE NUMBER OF POSITIVE RESULTS DETECTED: Multiple positive results from the same sampling session are less likely to be the result of sampling or analytical error and more likely to indicate a problem with the water system when compared with a single positive result. When there are multiple positive total coliform results from the same system, consideration should be given to restricting access to the water system immediately, and recommending remedial measures such as flushing or disinfecting and flushing the system.
- THE LOCATION WHERE THE POSITIVE RESULTS WERE OBTAINED: The number of samples as well as the frequency and the location of testing will vary according to the type and size of the conveyance water system. The location of the positive test result(s), for example: the tank vs. the furthest point on the distribution system, lavatory vs. food service area or drinking fountain, may indicate the extent of contamination and the choice of corrective actions.
- THE CONCENTRATION OF TOTAL COLIFORM IN A SAMPLE: In some cases only Presence/Absence results are available. However, if quantitative data are available, a riskbased assessment of the concentration of total coliform detected in a sample and extent (location and number of positive results) of the contamination, taking into account the water quality history of the conveyance, is important in order to establish the degree of response to the presence of total coliforms.
- THE PRESENCE AND TYPE OF WATER TREATMENT UNITS: The presence and type of water treatment units will influence the choice of corrective actions. As well, if there is a treatment system in place, verification of its integrity and optimal operation should be part of the response plan.
 - Where a chlorine disinfection residual is maintained, the residual should optimally be at least 0.2 mg/L free chlorine. Immediate remedial action should be taken when a disinfection residual is absent.
 - Where a UV disinfection system is in place, verify the efficacy of the UV lamp in use, including the absence of scaling or fouling of the lamp surface. The prefiltration unit should also be reviewed to verify that it has been maintained, to ensure the water quality necessary for adequate function of the UV lamp.
- **THE SOURCE OF THE WATER:** As part of a multi-barrier approach, it is important to consider the history and variability of the quality of the drinking water supply for the conveyance (for example, a treated municipal source or an untreated source such as a well.
- **HISTORICAL WATER TESTING RESULTS:** The history of water sampling results, particularly any prior adverse results on the conveyance, should be considered in developing a response.

If there is evidence of a potential link between a water system and a disease outbreak, provide direction to the owners/operators/users and advise to discontinue the provision of drinking water from the system.

Regulatory Record Requirements – Potable Water intended for Passengers and provided via an Onboard Potable Water System

Potable Water on Board Trains, Vessels, Aircraft and Buses Regulations (2016)

ACTIVITY	RECORD	REGULATORY REQUIREMENT	GUIDELINE
Routine microbiological (<i>E. coli</i>) water sampling	 Identification of conveyance Sampling site Location of the taps Date and time the sample is taken Results of the analysis 	19(1)	8.1.3
Routine disinfection and flushing	Identification of conveyanceDate and time	19(2)	8.1.4
 Disinfection, decontamination flushing, repair or replacement of potable water system: following suspected or confirmed contamination before being placed into service for the first time or after seasonal shut-down Before return to service after cleaning / repair or other activities that might have contaminated the system) 	 Identification of conveyance Date and time the system is disinfected, decontaminated, repaired or replaced, and flushed with potable water Description of the activity 	20(1)	8.1.5
 Sampling a system: following suspected or confirmed contamination before being placed into service for the first time or after seasonal shut-down 	 Identification of conveyance Sampling site and location of the tap Date and time when sample is taken Type of analysis conducted Type of parameter that is the object of the analysis Results of the analysis 	20(2)	8.1.6
Corrective measures following an EHO inspection, assessment or sampling	 Identification of conveyance A description of the measure taken Date on which the measure is taken 	21(1)	8.1.7

Investigation and Assessment into contamination	 Identification of conveyance Steps taken in the course of the investigation of source of contamination Steps taken in the course of assessment of possible impacts on fleet Results obtained from the investigation and assessment Description of any corrective measure taken Date on which the corrective measure is completed 	22(1)	8.1.8
Accessibility	Records must be readily accessible for examination by an EHO	23	8.1.1
Retention	Records must be retained for 12 months. Exception: Rail operators taking routine samples every 24 or 36 months must retain records for routine sampling and disinfection for 24 or 36 months.	19(3), 19 (4), 20(3), 21 (2), 22(2)	8.1.2

ANNEX 7 – Glossary

Contamination: Means the presence of chemical, physical, radiological or microbiological parameters in water, or the addition of such parameters to water – other than for disinfection of the water, a potable water system or a potable water container – in a quantity or concentration that renders or may render the water non-potable.

Critical Element (cited as a Critical Violation by EHOs): Elements noted as **Critical** present a level of risk by an entity, a condition or a circumstance where there is a reasonable probability that an imminent or serious adverse health consequence may result in the exposed population.

Operator: A person or corporation who carries on a business of transporting passengers.

Passenger: a person who travels on board a conveyance under a contract, but does not include the master, pilot or driver of the conveyance, or a member of the crew working on board.

Potable water system: any equipment used on board a conveyance for handling, treating, storing or distributing water (for the purposes of drinking, hand washing or oral hygiene by passengers, for food preparation for passengers or in the form of ice, for the contact refrigeration of food intended for passengers, or to be added to beverages intended for passengers) other than a potable water container or a bottle of prepackaged water.

Potable water container: a refillable container that is readily moveable by one person, used for the purposes of drinking, hand washing or oral hygiene by passengers, or for food preparation for passengers, but does not include a bottle of prepackaged water. Examples could include water jugs, or containers used to serve tea or coffee.

Preparation of food for passengers: includes the cleaning of surfaces used in food preparation, the washing of utensils, and handwashing by people who prepare or handle food, ice or potable water on behalf of the operator.

Secondary disinfection: is the subsequent application of a disinfectant, either immediately following primary treatment or in the distribution system, with the objective of ensuring that a disinfectant residual is present throughout the distribution system.

Sufficient quantity of potable water: Potable water quantities on board are sufficient to meet foreseeable needs for all purposes (e.g. drinking, food preparation, sanitation and hygiene activities) and to achieve sufficient water pressure at each tap to minimize the potential for contamination. In providing adequate storage for potable water, consideration should be given to the size of the conveyance's complement of crew and passengers, the accommodations provided, the time and distance between potable water sources and the availability of water suitable for treatment on board (WHO, 2011, p.25-26).

Utensils: include kitchenware, tableware or other items used in the handling, preparation, storage, transportation or consumption of food, ice or potable water

Vessel: any boat, ship or other method of transportation by water.