

# *Drinking Water Compliance Framework: Treatment and Disinfection*

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# Outline for Today's Discussion



The need for compliance standards  
and an oversight framework



The importance of source water  
- treatment standards

The importance of disinfection-  
monitoring requirements

Community-based  
distribution system  
monitoring

Individual wells and septic  
systems

# REGULATIONS: Set Standards for all Communities



**Regulations establish accepted requirements for what constitutes clean and safe water:**

- Acceptable treatment processes
- Appropriate monitoring practices
- Achievable water quality standards
- Reporting processes in case of an incident



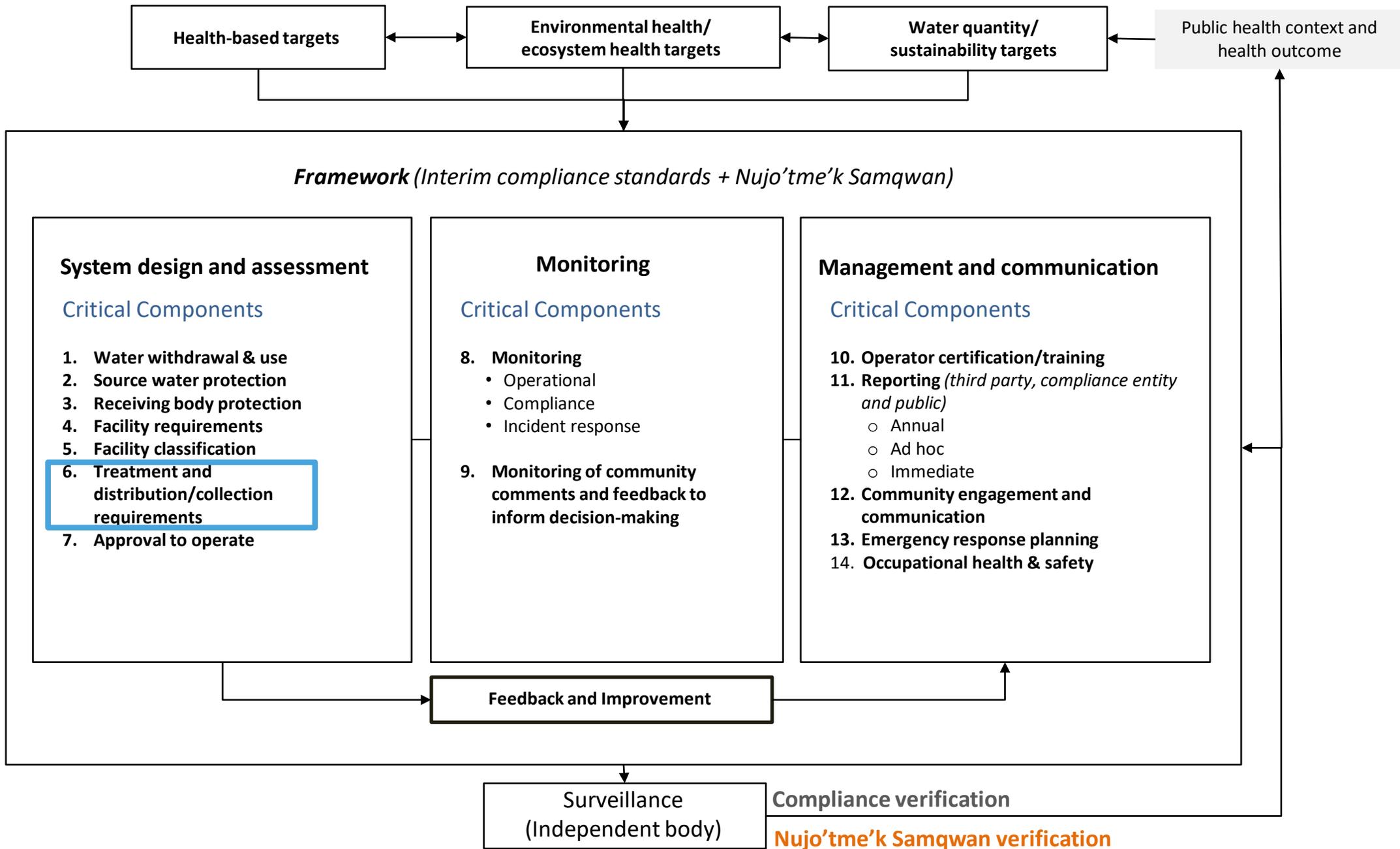
**Water safety plan:**  
a field guide to improving  
drinking-water safety in  
small communities

## REPORT OF THE EXPERT PANEL ON SAFE DRINKING WATER FOR FIRST NATIONS



NOVEMBER 2006

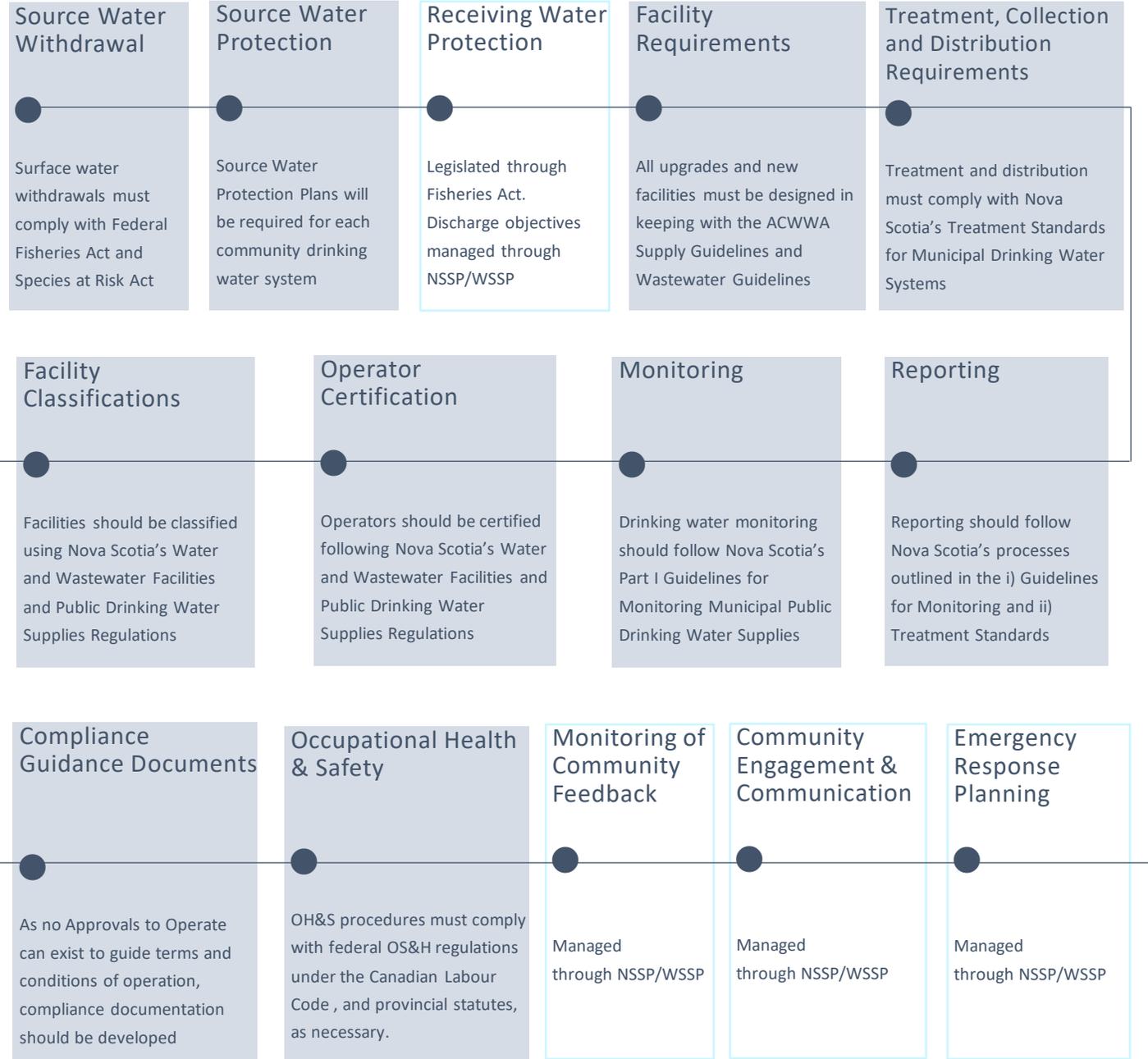






ATLANTIC FIRST NATIONS  
WATER AUTHORITY INC.

## DRINKING WATER REGULATORY GUIDANCE AND COMPLIANCE STANDARDS



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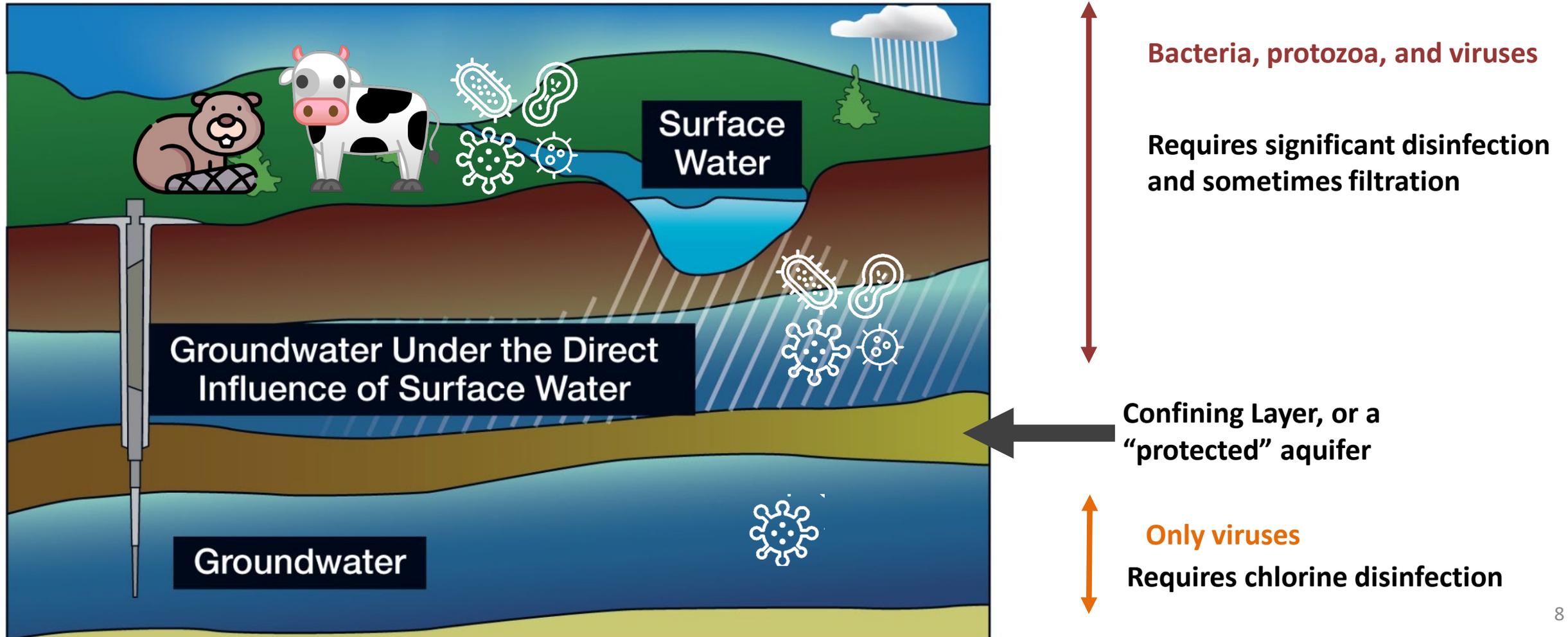
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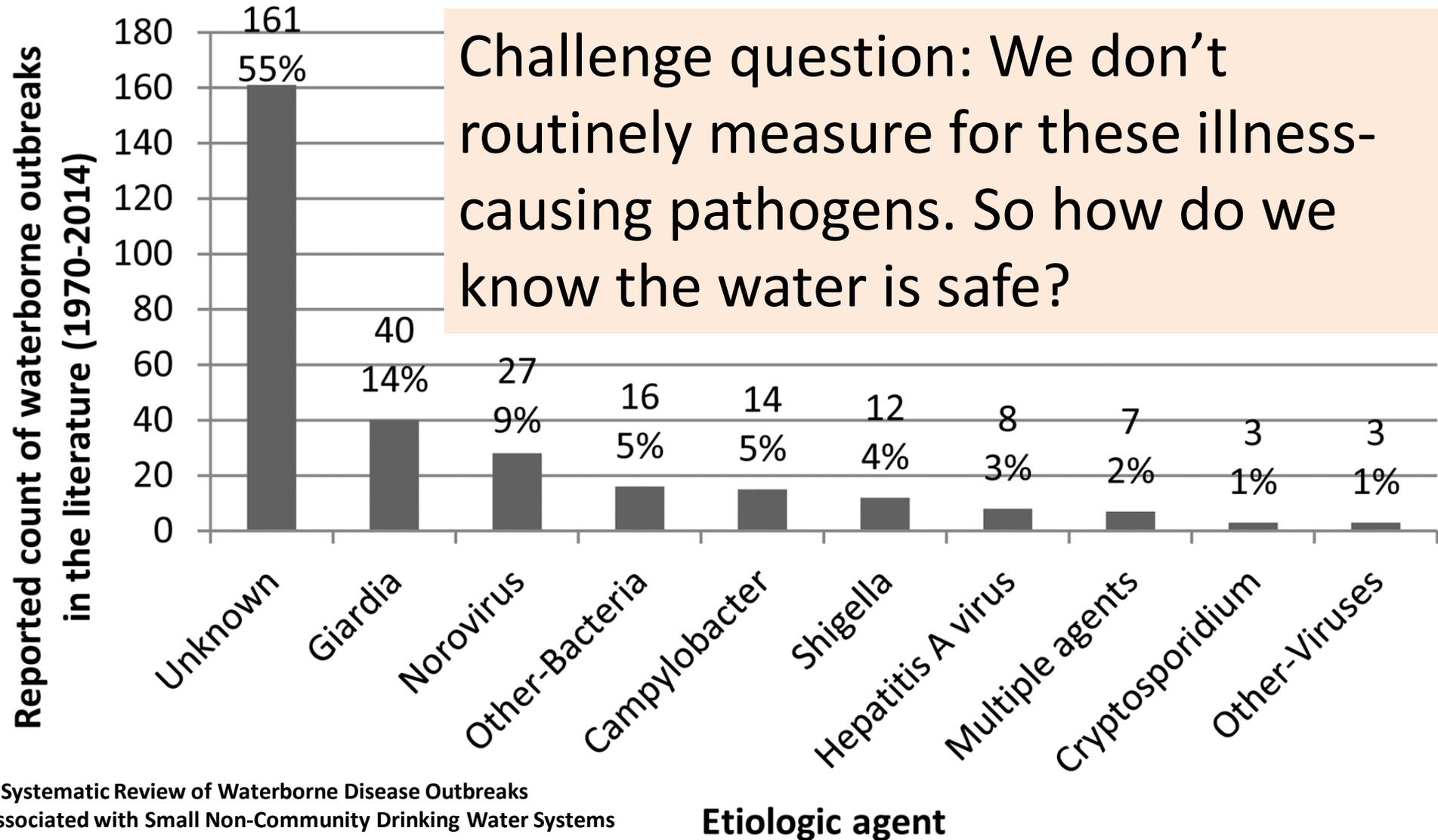
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# Source water quality determines treatment



# Public Health Outbreaks: Drinking Water



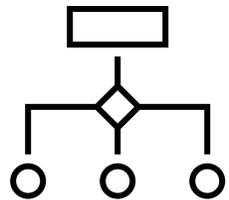
A Systematic Review of Waterborne Disease Outbreaks  
Associated with Small Non-Community Drinking Water Systems  
in Canada and the United States

Etiologic agent

# DRINKING WATER: Regulations Modeled after Nova Scotia approach, Regional Guidance, and National Best Practice

- The System Steward(s) shall conduct the operation of the system in accordance with the following provisions:
  - The Interim Regulatory Framework as amended from time to time;
  - The **Atlantic Canada Water Supply Guidelines** (2022), as amended from time to time;
  - **Health Canada's Guidelines for Canadian Drinking Water Quality**, as amended from time to time; and
  - Any standard adopted by NSECC involving public drinking water regulations, as amended from time to time, which includes but is not limited to the following:
    - **Nova Scotia Treatment Standards for Municipal Drinking Water Systems** (2022), as amended from time to time;
    - **The Guidelines for Monitoring Public Drinking Water Supplies**, as amended from time to time;
    - **Facility Classification Standards** (2009), as amended from time to time.
    - **Policy on Acceptable Certification of Laboratories**

# Treatment Requirements: Source Water

Source Water	Surface water or GUDI (high-risk)	Low or medium-risk GUDI	Non-GUDI
Treatment Standard	4-log reduction viruses 3-log reduction protozoa	4-log reduction viruses 3-log reduction protozoa	4-log reduction viruses
Treatment Processes	Combination of: Engineered filtration + Primary Disinfection	It depends... 	Primary Disinfection only

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# Secondary Disinfection - Storage



Reservoirs provide contact time for chlorine to disinfect and inactivate bacteria and viruses.

Reservoirs should maintain a chlorine residual to break down organic matter and safeguard the water against the reintroduction of bacteria and viruses.

Routine maintenance and cleaning of reservoirs ensures water can be stored safely before entering the distribution system.

**Chlorine levels of water leaving the reservoir should be monitored by SCADA or grab samples. Chlorine booster stations may be necessary to maintain a chlorine residual.**

# Secondary Disinfection – Distribution System

Chlorine residual in the distribution system continues to disinfect after the water leaves the plant.

Bacteria and other pathogens can enter into the **distribution system**

- Depressurization (main breaks)
- Contamination during maintenance or repairs
- Faults in the storage facility
- Cross connections and backflow
- Growth of biofilms in the distribution system

**Secondary disinfection residual helps protect against the health threats from these pathogen pathways.**

Water sampled at the tap, after a 5-minute flush period, must have a chlorine residual greater than 0.20 mg/L and less than 4.0 mg/L

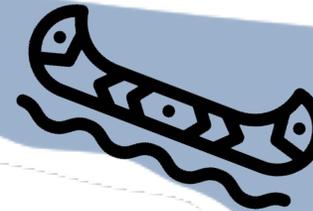
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# Annual Sampling Plan: *The Guidelines for Monitoring Public Drinking Water Supplies*

Lennox Island		
SCHEDULE A		
<b>Turbidity</b>		
Turbidity	<u>Individual wellheads or the combined flow</u> Samples to be collected at each wellhead or combined flow from four production wells.	Daily grab samples or continuous monitoring at 5-minute intervals. Continuous monitoring not currently available so grab samples pending system upgrades.
	<u>Distribution system sample points</u> Sample turbidity during weekly microbiological sample collection.	Weekly system turbidity levels shall be checked when the weekly micro-biological samples are collected.
<b>Primary Disinfection</b>		
<b>Sodium Hypochlorite (chlorine) Disinfection</b>		
Free Chlorine Residual	<u>CT control point (water entering distribution system)</u> Sample Free Chlorine Residual leaving the contact chamber and when it leaves the clearwell prior to entering the distribution system. Calculate and document CT calculations supporting compliance	Continuous monitoring at 5-minute intervals-must meet the CT design criteria.
Temperature	<u>CT control point</u> Sample temperature prior to entering the disinfection contact chamber	Continuous monitoring at 5-minute intervals-must meet the CT design criteria.
pH	<u>CT control point</u> Sample pH at the same time and location of residual collection.	Continuous monitoring at 5-minute intervals-must meet the CT design criteria.



Source water monitoring



**Distribution system monitoring**



Treatment plant monitoring

# Annual Sampling Plan: *The Guidelines for Monitoring Public Drinking Water Supplies*

Secondary Disinfection		
Free Chlorine		
Free Chlorine Residual	<u>Water Tower/Reservoir</u> Sample free chlorine residual of the water exiting the reservoir before entering the distribution system	Continuous monitoring at 5-minute intervals
	<u>Distribution System</u> Chlorine residual is an indicator of potential microbiological activity in the water. Chlorine residuals shall be collected throughout the distribution system (see Comments below)	Weekly grab samples throughout the distribution system when collecting weekly microbiological samples
Microbiological		
Total Coliforms and <i>E. coli</i> (present/absent)	<u>Distribution system</u> Sample for Total Coliforms and <i>E. Coli</i> throughout the distribution system (see Appedix A for sample locations).	Weekly grab samples. Turbidity and chlorine residual to be recorded at the time of sample collection.
Viruses	<u>Raw water</u>	As requested by Oversight Entity
	<u>Treated Water</u>	As requested by Oversight Entity



**Distribution system monitoring**



**Distribution system monitoring**

# Community Based Monitoring Program

- Weekly sampling in the distribution system

CBWM	AFNWA
Chlorine residual	Turbidity
Microbiological sample (TC & E.Coli)	Chlorine residual
	Microbiological sample (TC & E.Coli)

In communities where there is both a CBWM and an AFNWA operator, **both** will continue to take samples.

However, CBWM and ANFWA sampling locations may be in different buildings.

# Monitoring tells us if treatment is working!



- WTP monitoring confirms **primary disinfection** requirements are met and pathogens are inactivated
- Distribution system monitoring confirms **secondary disinfection** requirements are met to protect against the re-introduction of pathogens as the water travels from the plant to our homes, schools, and work places.

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# Decentralised Drinking Water (and septic systems)

- ISC has engaged our research team to gather information about individual wells (and septic systems) to help revise their Decentralised Protocols
- We will be talking with dozens of First Nations communities across the country about how they install, operate, maintain, and monitor individual wells



# Can you help me?

- How many of you sample at individual wells in your communities?
- When do you sample there?
- Does anyone help with maintenance or repairs?
  - What happens if a pump fails?
  - What other types of things can go wrong?

**Wela'lin!**

**Woliwon!**



# Compliance and Nujo'tme'k Samuqwan Components



**(Interim) Compliance Components:**

Source water protection plans  
WSER  
Deposits out of normal course (DONCE)

ACWWA guidelines for system designs  
Nova Scotia Treatment Standards (GUDI protocol; 3, 3, 4 log reduction for Crypto., Giardia, and viruses)

Interim Regulator will oversee drinking water compliance  
ECCC will continue to regulate wastewater systems

All compliance monitoring will be conducted by the AFNWA  
\*\* Discussions are still ongoing regarding the role of CBWMs \*\*

Disinfection residuals, microbial, disinfection byproduct, turbidity monitoring etc. will follow Nova Scotia Standards

Metals testing and microbial monitoring will follow Nova Scotia's standards (which follow the Guidelines for Canadian Drinking Water Quality (GCDWQ))

**Nujo'tme'k Samuqwan Components:**

Withdrawal monitoring plans  
Contingency plans  
Environmental Risk Assessments (ERAs) and Effluent Discharge Objectives (EDO)

Sanitation Safety Plan for wastewater systems  
Water Safety Plan for drinking water systems

An external firm will be contracted by AFNWA to perform OWSP auditing to ensure risk management practices are being followed

Optimization monitoring can be done as needed to guide the OWSP

Corrosion control program [minimize lead leaching]  
Cross-connection control program to prevent backflow  
Inflow & Infiltration reduction program  
Water loss control program [leakage reduction]

Corrosion testing  
Other health-related monitoring

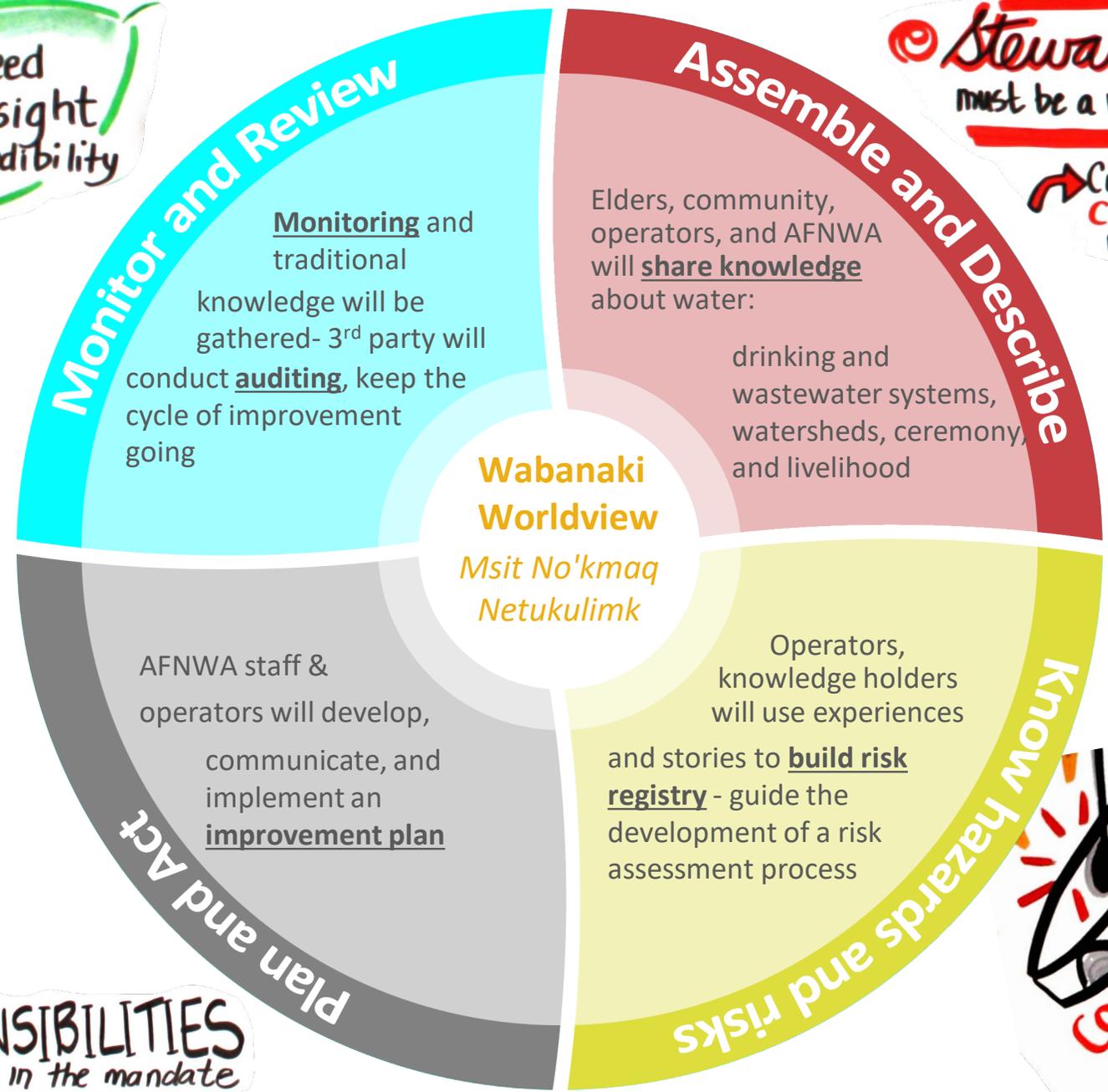
# Nujo'tme'k Samqwan – Indigenous risk management: Keep improving

Need Oversight for credibility

Ensure ALL Communities are brought to a **\*standard**



RESPONSIBILITIES must be in the mandate



**Stewardship** must be a role-collectively

Cultivate a **COLLECTIVE** mindset

