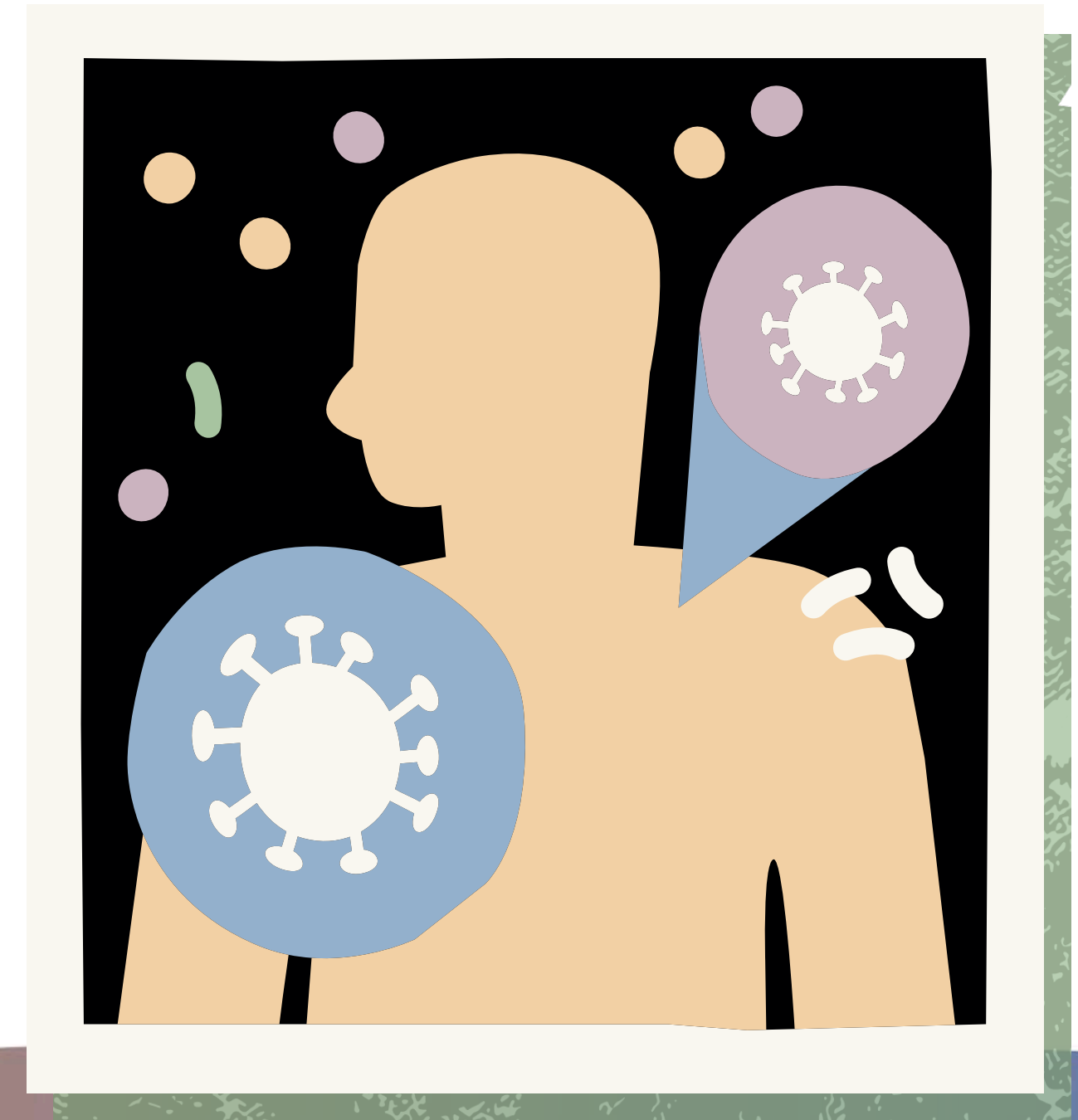


# Water-related Infectious Diseases

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Atlantic Region  
Indigenous Services Canada

Tuesday, November 19<sup>th</sup>, 2024



# LAND ACKNOWLEDGEMENT



## Poem 10

Aye! no monuments,  
No literature,  
No scrolls or canvas-drawn pictures  
Relate the wonders of our yesterday.

How frustrated the searchings  
of the educators.

Let them find  
Land names,  
Titles of seas,  
Rivers;  
Wipe them not from memory.  
These are our monuments.

Breathtaking views-  
Waterfalls on a mountain,  
Fast flowing rivers.  
These are our sketches  
Committed to our memory.  
Scholars, you will find our art  
In names and scenery,  
Betrothed to the Indian  
since time began.







# SESSION OBJECTIVES

To highlight the importance of water treatment systems

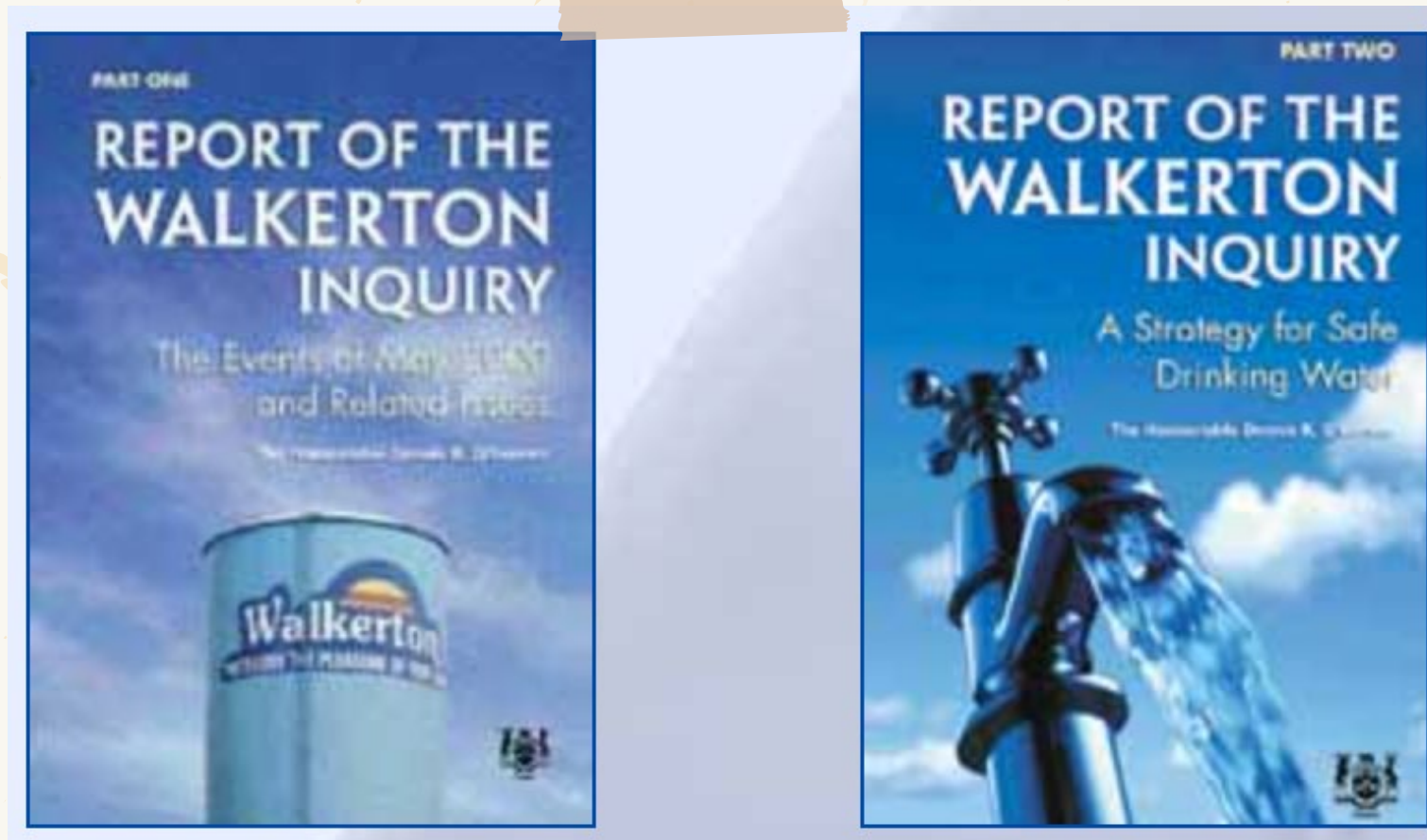
To provide an overview of waterborne diseases relevant to water treatment

To describe possible symptoms from waterborne diseases





# TURNING POINT



- water contamination by E coli
- 7 people died
- 2300 became ill
- Preventable through proper chlorination

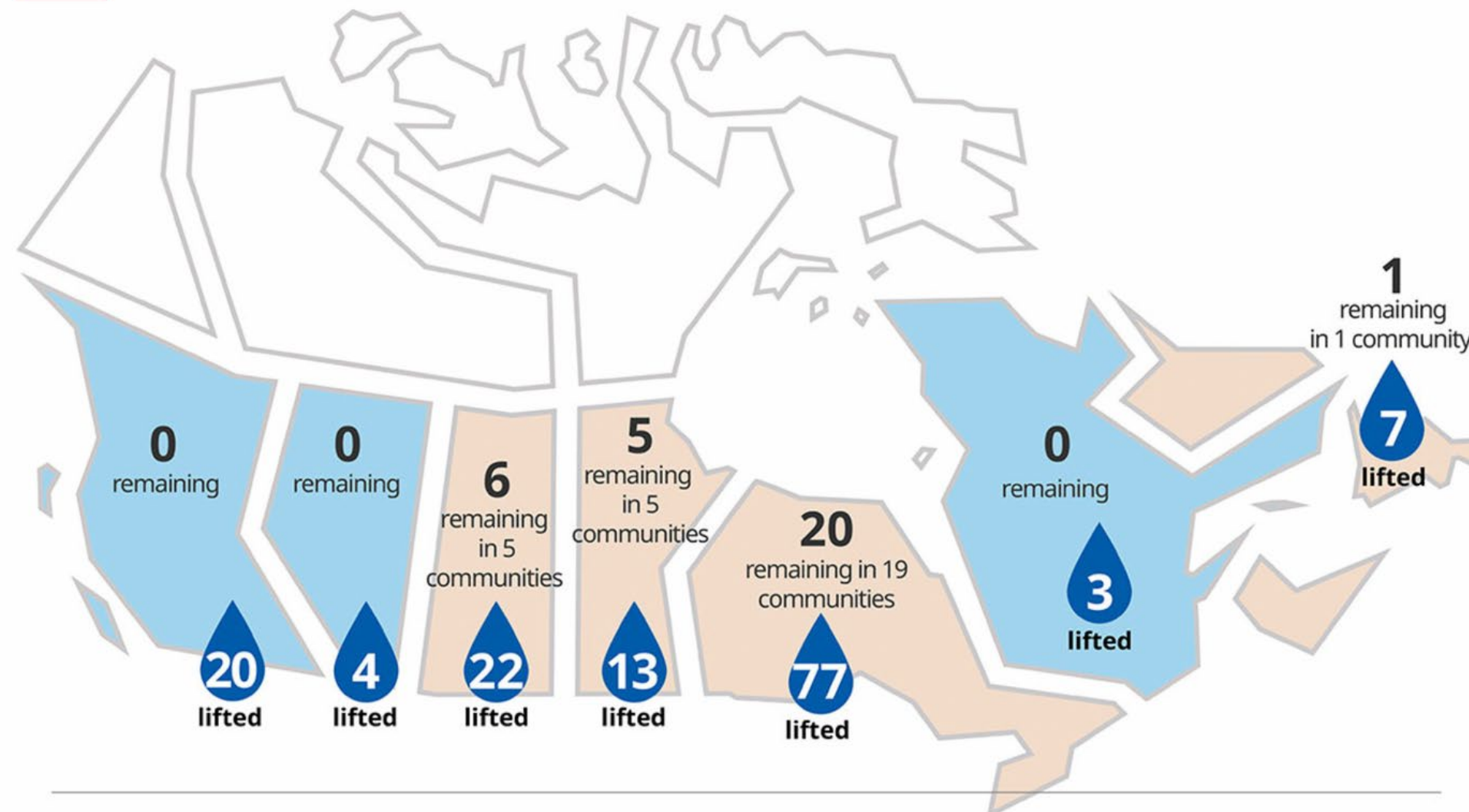




# ONGOING RISKS & SURVEILLANCE

Boil water advisory lifted effective immediately, following power failure at facility

## Remaining long-term drinking water advisories



Halifax waterfront





# WATER RELATED INFECTIOUS DISEASES

## TRANSMISSION



the gastrointestinal tract, by ingestion of contaminated water (drinking or recreational water)



the respiratory tract, by inhalation or aspiration of aerosols



the skin, mucous membranes or eyes, by contact during recreational water use or bathing



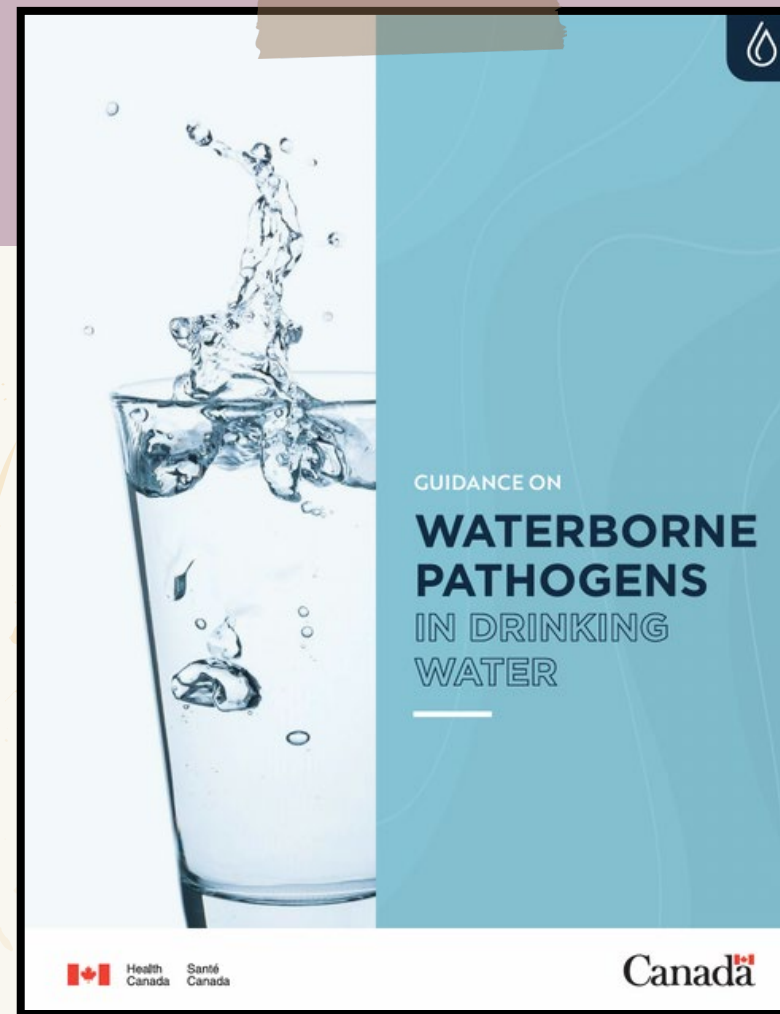
# WATER RELATED INFECTIOUS DISEASES

## CLASSIFICATION

Category	Description	Examples
Water-borne	Ingestion of pathogens in contaminated water	Typhoid, legionellosis, poliomyelitis
Water-washed a) Skin and eyes b) Diarrhoeal diseases	Poor hygiene / lack of access to safe water	Scabies, trachoma, bacillary dysentery
Water-based a) Skin penetration b) Ingested	Infection by agents that spend part of their life-cycle in water	Schistosomiasis
Water-related vectors a) Biting near water b) Breeding in water	Spread by vectors that breed or bite near water	Malaria, West Nile Fever



# WATER RELATED INFECTIOUS DISEASES



## Waterborne pathogens of gastrointestinal origin

*Campylobacter* spp.

Enteric pathogenic

*Escherichia coli* (*E. coli*) and *Shigella* spp.

*Helicobacter pylori*

*Salmonella* spp.

*Yersinia* spp.

## Waterborne naturally-occurring pathogens

### Bacteria:

*Aeromonas* spp.

*Legionella* spp.

*Mycobacterium* spp.

*Pseudomonas* spp.

### Protozoa:

*Acanthamoeba* spp.

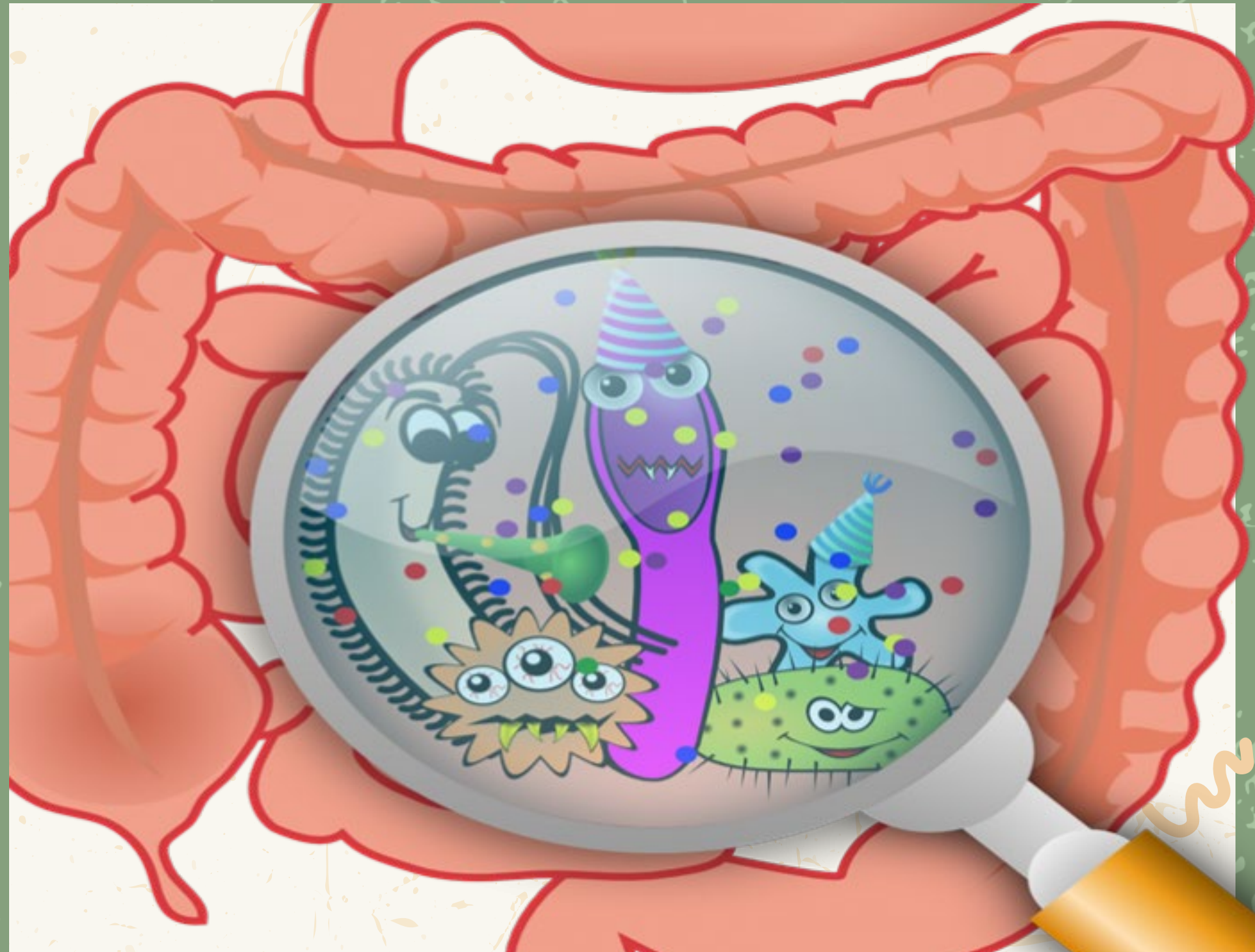
*Naegleria fowleri*



# SYMPTOMS

## WATERBORNE DISEASES

- No symptoms
- Symptoms 2 to 10 days after drinking infected water
- Diarrhea, stomach cramps, nausea, vomiting, a fever, foul - smelling gas or feces
- Fever
- Swollen glands



# HIGHEST RISK

- People with weakened immune systems, such as those who have HIV/AIDS, an organ or bone marrow transplant, or who have had cancer treatment
- Infants and young children
- Pregnant women
- Older adults
- People with a chronic disease





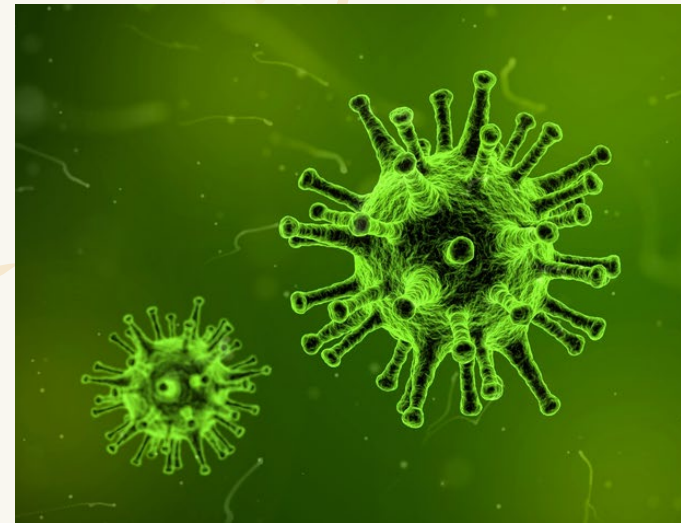
# PATHOGENS

These are common microorganisms that  
**cause water - borne diseases .**

A disease caused by a pathogen is called a **communicable disease** ,  
meaning it can spread from one organism to another organism.



**E coli**



**Salmonella**



**Campylobacter  
spp**



**Giardia**

# E COLI

## MAIN FEATURES

### Reservoir

Escherichia coli (E. coli) bacteria normally live in the intestines of healthy people and animals.

### Symptoms

Most types of E. coli are harmless or cause relatively brief diarrhea.

### Severity

But a few strains, such as E. coli O157:H7, can cause severe stomach cramps, bloody diarrhea and vomiting.



In drinking water monitoring programs, E. coli testing is used to provide information on the quality of the source water, the adequacy of treatment and the safety of the drinking water distributed to the consumer.



# SALMONELLA

## MAIN FEATURES

### Reservoir

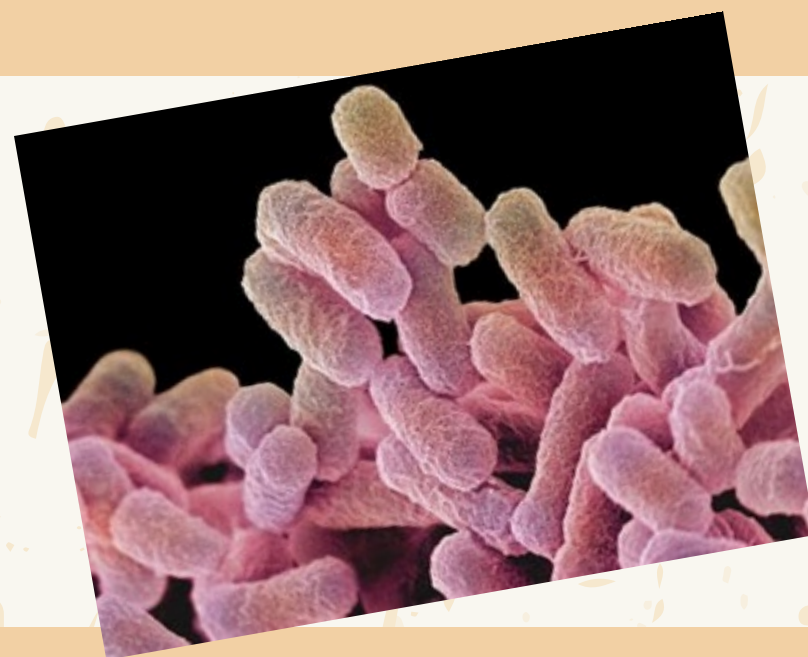
Salmonella bacteria typically live in animal and human intestines and are shed through stool (feces).

### Symptoms

Most people develop diarrhea, fever and stomach (abdominal) cramps within 8 to 72 hours after exposure.

### Severity

Diarrhea can cause severe dehydration. Life-threatening complications can develop.



Non - typhoidal Salmonella are very rarely linked to drinking water outbreaks

# CAMPYLOBACTER SPP

## MAIN FEATURES

### Reservoir

Found in cattle, poultry, pets, wild birds

### Symptoms

Symptoms start in 2 - 4 days, last 3-7 days. Include abdominal pain, vomiting, diarrhea, chills.

### Severity

Important cause of gastroenteritis worldwide



Waterborne outbreaks can occur from fecal contamination of water storage reservoirs with bird feces and consumption of inadequately treated surface water.



# GIARDIA SPP

## MAIN FEATURES

### Location

Salmonella bacteria typically live in animal and human intestines and are shed through stool (feces).

### Symptoms

Diarrhea, abdominal cramps, malabsorption. Usually self-limiting; can be prolonged.

### Transmission

Well established source of water-borne outbreaks globally. Transmission person-to-person, food, water.



Resistant to disinfection. E coli or total coliforms are not a reliable indicator of their presence/absence.



# PUBLIC HEALTH SURVEILLANCE AND RESPONSE

## It's the Law: Reporting Notifiable Diseases, Conditions, and Events

TABLE 1. Public Health Act Notifiable Conditions and Communicable Diseases Regulations

<ul style="list-style-type: none"> <li>Acute flaccid paralysis</li> <li>Adverse events following immunization (AEFI)</li> <li>Amoebiasis</li> <li>Anaplasmosis</li> <li>Anthrax</li> </ul>	<ul style="list-style-type: none"> <li>Listeriosis (invasive)</li> <li>Lyme disease</li> <li>Lymphogranuloma venereum</li> <li>Malaria</li> <li>Measles</li> <li>Methicillin-resistant Staphylococcus aureus (including colonizations)</li> <li>Mumps</li> <li>Opportunistic infections (benign or malignant)</li> <li>Novel organisms deemed as having pandemic potential by the WHO</li> <li>Occurrences of the following if the disease appears epidemic or the case shows unusual features:</li> </ul>
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TABLE 2. To be reported verbally as soon as observed.

<ul style="list-style-type: none"> <li>Acute Flaccid Paralysis</li> <li>Anthrax</li> <li>Botulism</li> <li>Congenital Rubella Syndrome</li> <li>Diphtheria</li> <li>Haemolytic-uremic syndrome</li> <li>Hepatitis A</li> <li>Invasive Group A Streptococcal Disease</li> <li>Invasive Haemophilus influenzae Serotype B</li> <li>Invasive Meningococcal Disease</li> <li>Measles</li> </ul>	<ul style="list-style-type: none"> <li>Novel organisms deemed as having pandemic potential by the WHO</li> <li>Paralytic Shellfish Poisoning</li> <li>Plague</li> <li>Poliomyelitis</li> <li>Rabies</li> <li>Rubella</li> <li>Severe Acute Respiratory Illness (SARI)</li> <li>Severe Acute Respiratory Syndrome (SARS)</li> <li>Smallpox</li> <li>Viral Hemorrhagic Fevers</li> </ul>
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## It's The Law Reporting Notifiable Diseases and Conditions

The Health Protection Act ([novascotia.ca/dhw/cdpc/acts-and-legislation.asp](http://novascotia.ca/dhw/cdpc/acts-and-legislation.asp)) requires the diseases and conditions listed below be reported to Public Health Service. For more information on case definitions for notifiable diseases in Nova Scotia the Surveillance Guidelines: [novascotia.ca/dhw/populationhealth/diseases-and](http://novascotia.ca/dhw/populationhealth/diseases-and)

### Report as soon as SUSPECTED by telephone

All unusual disease clusters, disease outbreaks, and unusual disease occurrences should be

- |   |  |   |
|---|--|---|
| <ul style="list-style-type: none"> <li>Acute Flaccid Paralysis (AFP)</li> <li>Anthrax</li> <li>Botulism</li> <li>Cholera</li> <li>Diphtheria</li> <li>Ebola Virus Disease</li> <li>Group A Streptococcal Disease Invasive</li> <li>Haemophilus Influenzae Type B Invasive Disease (HIB)</li> <li>Hepatitis A</li> </ul> | <ul style="list-style-type: none"> <li>Influenza: Highly Pathogenic Avian Influenza (HPAI)</li> <li>Measles</li> <li>Meningococcal Disease Invasive</li> <li>Mumps</li> <li>Plague</li> <li>Poliomyelitis</li> <li>Rabies</li> <li>Rubella</li> <li>Severe Acute Respiratory Infection (SARI)</li> </ul> | <ul style="list-style-type: none"> <li>Severe Acute Syndrome (S)</li> <li>Shellfish Poisoning (Paralytic and)</li> <li>Smallpox</li> <li>Tuberculosis</li> <li>Typhoid</li> <li>Verotoxigenic</li> <li>Viral Hemorrhagic (Crimean-Cor Marburg, Rift)</li> </ul> |
|---|--|---|

### Report by next business day

- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>Acquired Immunodeficiency Syndrome (AIDS)</li> <li>Adverse Event Following Immunization (AEFI)</li> <li>Anaplasmosis</li> <li>Babesiosis</li> <li>Brucellosis</li> <li>Campylobacteriosis</li> <li>Chlamydia</li> <li>Clostridium difficile</li> <li>Creutzfeldt-Jakob Disease - Classic (CJD)</li> <li>Creutzfeldt-Jakob Disease - New Variant (vCJD)</li> <li>Cryptosporidiosis</li> <li>Cyclosporiasis</li> <li>Giardiasis</li> </ul> | <ul style="list-style-type: none"> <li>Gonorrhoea</li> <li>Group B Streptococcal Disease of Newborn</li> <li>Hantavirus Pulmonary Syndrome</li> <li>Hepatitis B</li> <li>Hepatitis C</li> <li>Human Immunodeficiency Virus (HIV)</li> <li>Influenza</li> <li>Legionellosis</li> <li>Leprosy (Hansen's Disease)</li> <li>Listeriosis Invasive</li> <li>Lyme Disease</li> <li>Malaria</li> <li>Methicillin Resistant Staphylococcus Aureus (MRSA)</li> <li>Meningitis (Bacterial)</li> </ul> | <ul style="list-style-type: none"> <li>Mumps</li> <li>Pertussis</li> <li>Pneumococcal</li> <li>Powassan Virus</li> <li>Salmonellosis (includes Paratyphoid)</li> <li>SARS-CoV-2 (COVID-19)</li> <li>Shigellosis</li> <li>Syphilis</li> <li>Tetanus</li> <li>Tularemia</li> <li>Vancomycin Resistant Enterococcus (VRE)</li> <li>West Nile Virus</li> <li>Yellow Fever</li> </ul> |
|---|--|--|

## Notifiable Disease and Reportable Events Public Health New Brunswick

2024



Timeline	Notifiable diseases and events	To be reported by		
		Laboratory	Clinicians (clinical illness)	
<b>Verbally within one hour</b> Public Health Region 1 During business hours: 506-856-3220 After business hours: 506-856-2004	Anthrax	✓	✓	
	Botulism	✓	✓	
	Cholera	✓	✓	
	Clusters of illness thought to be food, water-borne, or enteric	✓	✓	
	Clusters of severe or atypical illness thought to be respiratory borne	✓	✓	
	Diphtheria	✓	✓	
	Hemorrhagic fever (viral)	✓	✓	
	Influenza caused by a new subtype	✓	✓	
	Measles	✓	✓	
	Meningococcal disease (invasive)	✓	✓	
	Multisystem inflammatory syndrome in children (MIS-C)	✓	✓	
	Plague	✓	✓	
	Poliomyelitis	✓	✓	
	Severe acute respiratory syndrome (SARS)	✓	✓	
<b>Verbally within 24 hours</b> Public Health Region 1 During business hours: 506-856-3220 After business hours: 506-856-2004	Smallpox	✓	✓	
	Unusual cluster of suspect notifiable cases or cluster of unknown aetiology	✓	✓	
	Yellow fever	✓	✓	
	<b>In writing within seven days</b> Public Health Region 1 Public Health Services 81 Albert Street, Suite 300 Moncton, NB E1C 1B3 Fax: 506-856-3544	Acute flaccid paralysis (AFP)	✓	✓
		Brucellosis	✓	✓
		Campylobacteriosis	✓	✓
		Cryptosporidiosis	✓	✓
		Cyclosporiasis	✓	✓
		Escherichia coli infection (Verotoxigenic)	✓	✓
		Exposure to a suspected rabid animal	✓	✓
Giardiasis		✓	✓	
Guillain-Barré syndrome		✓	✓	
Hantavirus pulmonary syndrome		✓	✓	
Haemophilus influenzae infection - all serotypes (invasive)		✓	✓	
Hepatitis A		✓	✓	
Hepatitis B		✓	✓	
Hepatitis E		✓	✓	
Legionellosis		✓	✓	
Listeriosis (invasive)		✓	✓	
Mumps	✓	✓		
Paralytic shellfish poisoning	✓	✓		
Pertussis	✓	✓		
Q fever	✓	✓		

REQUIRED BY LAW

### Notifiable Disease List

The PUBLIC HEALTH PROTECTION AND PROMOTION ACT requires the following communicable diseases to be reported, as directed below, to the Regional Medical Officer of Health (MOH) or regional Communicable Disease Control Nurse.

Timely reporting is essential to control the spread of communicable disease.

**Report by telephone as soon as an occurrence is SUSPECTED**  
MOH on Call: 1-866-270-7437

All disease outbreaks, unusual disease clusters and unusual disease occurrences or features should be reported immediately

<input type="checkbox"/> Anthrax <input type="checkbox"/> Botulism <input type="checkbox"/> Creutzfeldt-Jakob Disease (CJD) <input type="checkbox"/> Diphtheria <input type="checkbox"/> Group A Streptococcal Disease, Invasive (IGAS) <input type="checkbox"/> Haemophilus Influenza type B Disease, Invasive (HIB) <input type="checkbox"/> Measles <input type="checkbox"/> Meningococcal Disease, Invasive <input type="checkbox"/> Plague	<input type="checkbox"/> Rabies (includes animal bites from species known to carry Rabies, e.g. bats, cats, dogs, farm and wild animals) <input type="checkbox"/> Severe Acute Respiratory Illness (SARI) <input type="checkbox"/> Smallpox <input type="checkbox"/> Tetanus <input type="checkbox"/> Tularemia <input type="checkbox"/> Viral Hemorrhagic Fevers (e.g. Ebola, Lassa, Marburg, Yellow Fever) <input type="checkbox"/> <b>All disease outbreaks, unusual disease clusters and unusual disease occurrences or features should be reported immediately</b>
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Where a report is made by telephone, a written report is required within 24 hours of that initial report

**Report in writing within 24 hours of laboratory or clinical diagnosis**

<input type="checkbox"/> Acute Flaccid Paralysis <input type="checkbox"/> Antimicrobial Resistant Organisms <input type="checkbox"/> Arbovirus (e.g. La Crosse, West Nile, Zika virus) <input type="checkbox"/> Brucellosis <input type="checkbox"/> Clostridium Difficile <input type="checkbox"/> COVID-19 <input type="checkbox"/> Chlamydia <input type="checkbox"/> Food and Waterborne Illness (e.g. Amoebiasis, Campylobacter, Cryptosporidium, E. coli, Giardia, Listeria, Salmonella) <input type="checkbox"/> Gonorrhoea	<input type="checkbox"/> Group B Streptococcal Disease of the Newborn <input type="checkbox"/> Haemophilus Influenza Non-B Disease, Invasive <input type="checkbox"/> Hantavirus Pulmonary Syndrome <input type="checkbox"/> Hepatitis A, B, C, and Unspecified Hepatitis <input type="checkbox"/> Human Immunodeficiency Virus (HIV) <input type="checkbox"/> Influenza (laboratory-confirmed only) <input type="checkbox"/> Legionellosis <input type="checkbox"/> Leprosy <input type="checkbox"/> Louse or Tickborne Diseases (e.g. Babesiosis, Lyme, Powassan)	<input type="checkbox"/> Malaria <input type="checkbox"/> Multisystem Inflammatory Syndrome in Children (MIS-C) <input type="checkbox"/> Mumps <input type="checkbox"/> Pertussis <input type="checkbox"/> Poliomyelitis <input type="checkbox"/> Q fever <input type="checkbox"/> Rubella (including Congenital Rubella Syndrome) <input type="checkbox"/> Syphilis (including Congenital Syphilis) <input type="checkbox"/> Tuberculosis
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- Receives reports
- Investigates
- Take public health action
- Works with communities

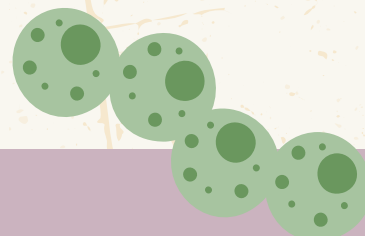


# CONCLUSION



Water treatment (your work!) is an essential part of preventing water-borne illness

Water-borne illnesses are common and preventable



Public health is a key part of surveillance, response and investigation to prevent disease transmission

# Thank-you!



Indigenous Services  
Canada

Services aux  
Autochtones Canada

Canada