

# Ontario Drinking Water System Disinfection Procedures

2024 NEOWWC Conference – May 30, 2024

# Background – Ontario Disinfection Procedures

## **November 2015:** Issuance of Ontario Watermain Disinfection Procedure (WDP)

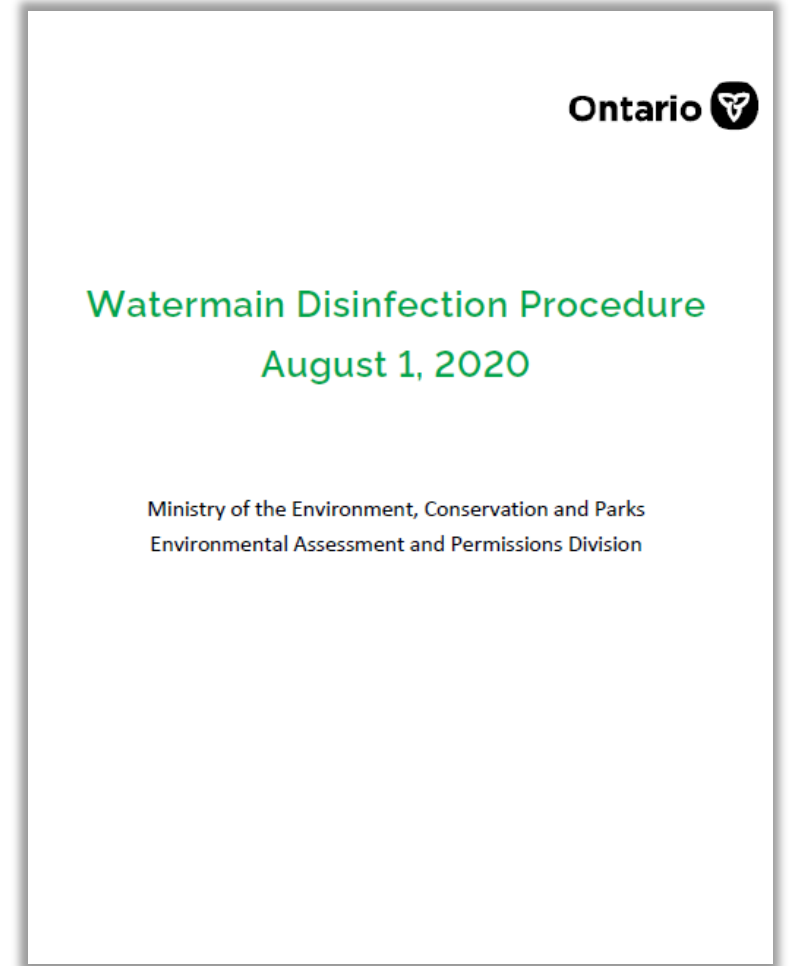
- Addressed issues when using AWWA C651 to disinfecting repaired watermains

## **August 2020:** Updated version of WDP released

- Clarified and added requirements for disinfection of new watermains.

## **Present:**

- Draft completed for AWWA C652 procedure
- Work started on C653 and C654 procedures



# Background – Issues with AWWA C652

Stakeholders reported the following issues related to AWWA Standard C652 to the Ministry:

- Having to switch between standards to address disinfection of components.
- Confusion on requirements for sampling (e.g., highlift pump sampling).
- Confusion on requirements when a facility can be placed back in service.



# C652 Working Group Members

<b>C652 Stakeholder Working Group Members</b>	
ASI Marine	Ontario Clean Water Agency (OCWA)
City of Barrie	City of Ottawa
Enwin Utilities	Ontario Water Works Association (OWWA)
City of Guelph	Oxford County
Halton Region	Niagara Region
Landmark	Region of Peel
City of London	City of Toronto
MECP	City of Thunder Bay
District of Muskoka	Region of Waterloo

Thank you to all the members of our working group!

# Water Storage Facility Disinfection Procedure

## Preface

# Preface

- Similar numbering structure as AWWA C652 for ease of reference
- Preface like the Watermain Disinfection Procedure with references to:
  - Current versions of AWWA standards
  - Requirements for Certified Operators
  - Use of Drinking Water for disinfection activities
    - If Drinking Water is not available, water with the highest level of treatment available at the time.



# Preface – Table A

**\*LRC: Log Removal/Inactivation Credits**

**Table A: Applicable Procedures by Equipment/Facility**

Location	Water Treatment Plant Disinfection Procedure	Water Storage Facility Disinfection Procedure	Watermain Disinfection Procedure
<b>Water Treatment Plant Equipment</b>	Any parts after LRC treatment started but is not completed	Tanks AFTER LRC achieved	---
	Tanks for raw water	Tanks that is part of the LRC calculation	---
	Filters (cartridges, filter tanks)	---	---
	Drinking water pumps, including backwash pumps	Pressure Vessels AFTER all LRC achieved	---
<b>Water Treatment Plant Piping</b>	Process Piping	---	Drinking Water Piping
	Raw Water Piping	---	---
<b>Distribution System Outstation</b>	Drinking Water Pumps	Storage Facilities/Tanks	Drinking Water Piping
	---	Pressure Vessels	Appurtenances

# Water Storage Facility Disinfection Procedure

## Section 4 - Requirements



# AWWA C652 – Section 4 (General)

## Clarifications added in Section 4

- No disinfection required for empty Storage Facilities provided **no** maintenance is performed **and** sanitary practices are used when entering.
- A combination of the three chlorination methods may be used.
- Total chlorine and free chlorine deemed equivalent at concentrations over 10 mg/L.



# Section 4.3.1 – Chlorination Method 1

**Table 1: Chlorine Concentrations and Retention periods for Chlorination Method 1**

Chlorine Addition Method	Minimum Retention Period	Minimum Chlorine Concentration Required After Retention Period
Liquid-chlorine (gas) or Sodium hypochlorite using chemical-feed pump.	1.5 hours	40 mg/L
	3 hours	20 mg/L
	6 hours	10 mg/L
	12 hours	5 mg/L
Hand poured Sodium hypochlorite or Calcium hypochlorite.	24 hours	10 mg/L
	48 hours	5 mg/L

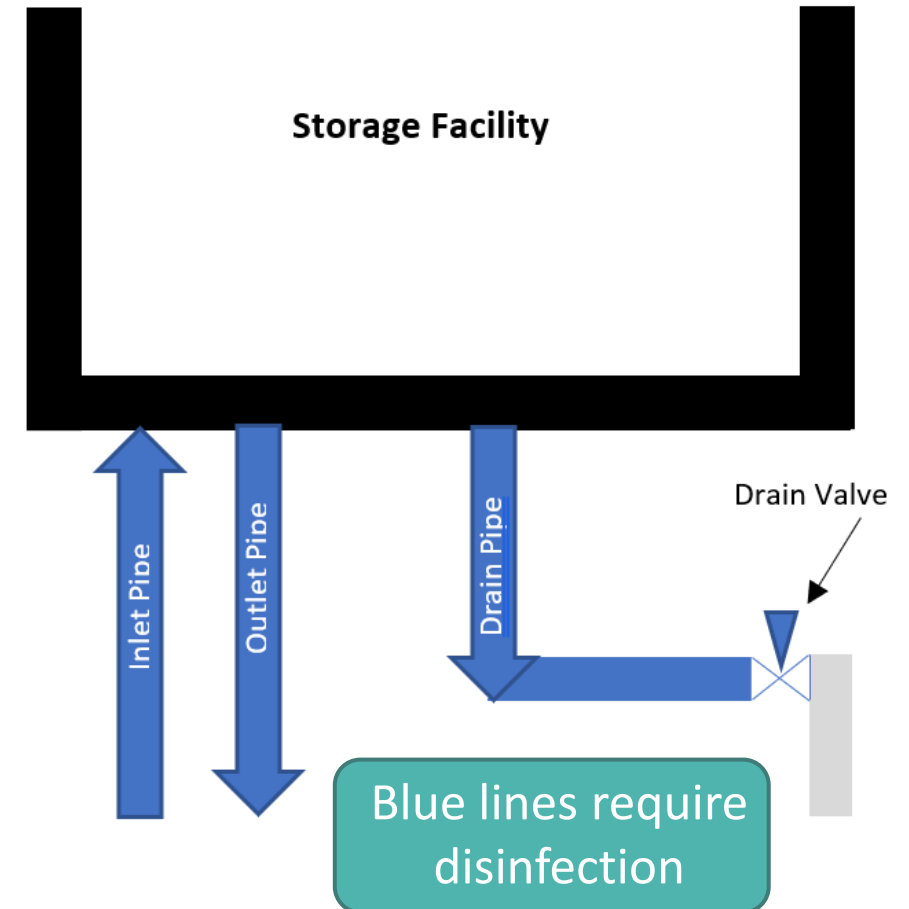
**Additional Options to add Flexibility**

## Section 4.3.2 – Chlorination Method 2

### Chlorination Method 2

Brush or spray a solution of  $\geq 200$  mg/L free chlorine directly to all interior surfaces and leave on for 30 minutes.

The procedure clarifies that surfaces of all pipes that convey drinking water in and out of the Storage Facility (e.g., inlet, outlet, recirculation, and drain) except washdown pipes, require disinfection.



## Section 4.3.2 – Chlorination Method 2

### Section 4.3.2.2 of Chlorination Method 2:

- Best practice: Begin filling Storage Facilities immediately after the retention period.
- Operating Authorities **may allow** filling to begin up to 7 days after the retention period if sanitary and security practices are followed.
- If filling **cannot** be started within 7-days: Satisfactory results from **two consecutive** sets of Microbiological Samples required before Storage Facility can be placed into service.

**Additional  
Flexibility**




## Section 4.3.3 – Chlorination Method 3

**Table 3: Chlorine Concentrations and Retention Periods for Chlorination Method 3**

Initial Chlorine Concentration	Minimum Retention Period at 5% Volume	Minimum Retention Period at full volume
≥ 25 mg/L	12 hours	24 hours
≥ 50 mg/L	6 hours	24 hours

**Additional  
Option to add  
Flexibility**



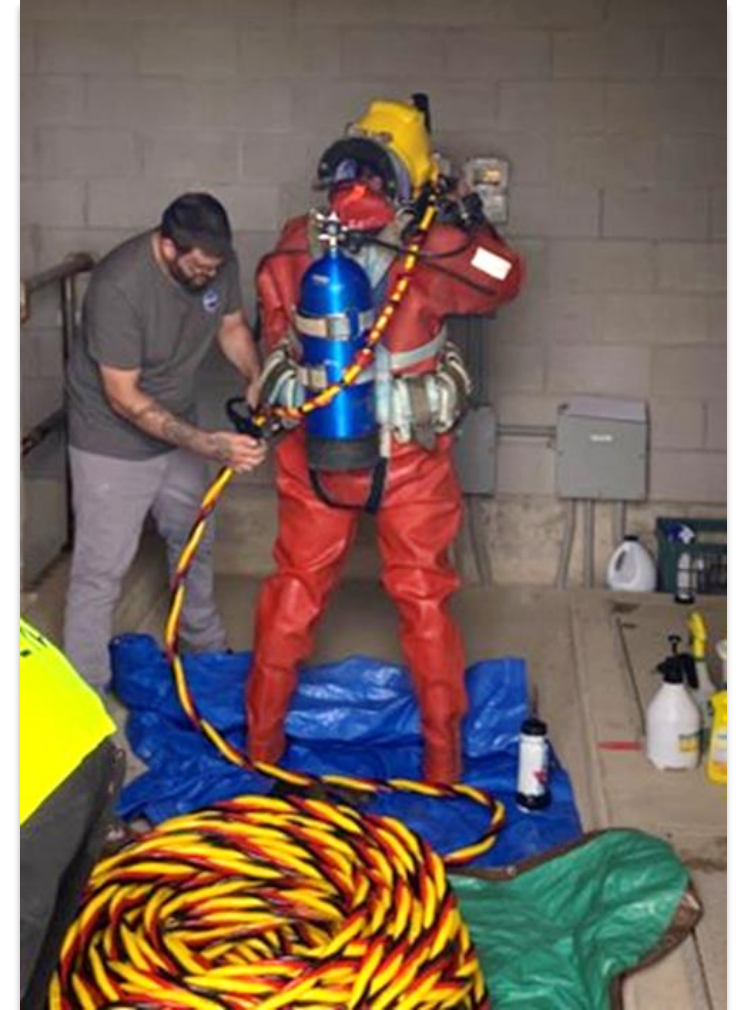
## Section 4.4 – Underwater Inspection/Cleaning

Table 4 adds flexibility for disinfection of equipment prior to entering facility:

Table 4: Chlorine Concentrations and Retention Periods for Equipment Disinfection	
Minimum Chlorine Concentration	Minimum Retention Period
200 ppm	30 minutes
300 ppm	15 minutes
1% (10,000 ppm)	Immediate

### Section 4.4.7:

- Microbiological Samples are **required** after inspection/cleaning activities using divers but **are not** for ROV inspections unless sediment disturbance is expected, observed, or suspected.



## Water Storage Facility Disinfection Procedure

# Section 5 – Sampling and Documentation

# Section 5.1 – Sampling and Testing

## Section 5.1.1

- Operating Authorities are required to obtain representative samples for the Storage Facility.  
Examples:
  - Samples from at least two locations,
  - Two samples from the same location, taken at least 30 minutes apart, with water flowing between samples.





## Section 5.1 – Sampling and Testing

### For Chlorination Methods:

- Use colourometric or amperometric meter
- Test strips are not acceptable to show compliance.

**AWWA C652's intent** is that Operating Authorities wait for satisfactory Microbiological Sample results prior to placing Storage Facilities in service.

Flexibility included when water supply is a concern.



# Sections 5.1 and 5.2

## Section 5.1 – Return to Service

Where Storage Facility is not promptly returned to service after being filled, measure the chlorine residual concentration at required locations.

If chlorine not acceptable, implement re-commissioning plan.

## Section 5.2 – Provides a list of records to demonstrate compliance (e.g.):

- Chemical used
- Chlorination Method used
- Microbiological Sample location and results



# **Water Treatment Plant Disinfection Procedure**

# Water Treatment Plant Disinfection Procedure

- A draft Water Treatment Plant Disinfection Procedure, based on AWWA C653, is being prepared.
- Stakeholders reported the following issues related to AWWA Standard C653 to the Ministry:
  - Confusion on method of disinfection to be used for piping within the water treatment plant
  - No procedure for disinfection of certain types of filters (cartridge, greensand)
  - No procedure for disinfection of pumps in the WTP



# Water Treatment Plant Disinfection Procedure

- Will clarify the cleaning and/or disinfection procedures for different types piping based on three categories:
  - Raw Water Piping
  - Process Piping
  - Drinking Water Piping
- Will clarify requirements for cartridge filters, greensand filters and GAC filters.
- Will simplify disinfection and sampling requirements for high lift pumps and process pumps.
- Will provide flexibility from sampling requirements when Certified Operators are present to witness disinfection of pumps.



# Questions



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